

# Taxes and Labor Supply

Elliott Ash

Fiscal Policy and Inequality

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# Estimation of labor supply elasticity

- ▶ Basic cross-section estimation: Ordinary Least Squares (OLS) regression

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  - ▶  $\mathbf{X}_i$ , vector of demographic controls (gender, age, marital status)
- ▶ Since all variables in the regression are in logs:
    - ▶  $\beta$  provides an estimate of \_\_\_\_\_ ?

# Summary of Empirical labor Supply Literature

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# Summary of Empirical labor Supply Literature

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- ▶ Small elasticities ( $\simeq 0.1$ ) for males with ages 20-55
- ▶ Larger responses for married women, retirees, low-income workers
- ▶ Responses driven by extensive margin
  - ▶ Intensive margin (hours) elasticity is close to zero
  - ▶ Extensive margin (participation) elasticity around 0.2 – 0.5

# Issues with cross-sectional estimation

1. Econometric issues:
  - 1.1 Wages ( $w$ ) correlated with taste for work
  - 1.2 Measurement error in hours worked ( $h$ )
  - 1.3 Selection into labor force
2. Extensive vs. Intensive margin responses
3. Non-hours responses

## Issue #1a: Wage correlated with taste for work

$$\log h_i = \alpha + \beta \log w_i + \gamma \log R_i + \mathbf{X}_i \delta + \zeta_i$$

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- ▶ Controlling for individual characteristics  $X_i$  helps, but never sure that we have controlled for everything

⇒ **Omitted variable bias**

## Issue #1b: Measurement error in hours ( $h$ )

- ▶ Usually  $w$  is computed as earnings ( $z$ ) divided by hours ( $h$ )
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- ▶ Usually  $w$  is computed as earnings ( $z$ ) divided by hours ( $h$ )
  - ▶ But hours are measured with error:  $\log h = \log h^* + \mu$ , where  $\mu \neq 0$
- ▶ Measurement error adds noise and biases results toward zero  $\Rightarrow$   
**downward bias**

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  - ▶ For example, due to fixed cost of working
- ▶ We don't observe wages of non-participants
- ▶ Then, OLS is biased because it ignores people with potentially low wages
  - ▶ Existing solutions, like Heckman's (1979) selection model, depend on strong functional-form assumptions

## Issue #2: Extensive vs. Intensive margin responses

- ▶ Related to the selection issue just discussed
- ▶ Do people join the labor force if taxes are lower?
  - ▶ Could happen if there is a fixed cost of working
  - ▶ People may also switch from part-time to full-time
- ▶ Estimation requires tax variation, because wages unobserved for non-participants

## Issue #3: Non-hours responses

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- ▶ Traditional research focuses on hours and labor force participation
- ▶ But income taxes distort other choices:
  - ▶ Occupational choices (including education)
  - ▶ Avoidance/evasion decisions
- ▶ These non-hours responses can be quantitatively large

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  - ▶ Make different career decisions (eg, education, migration) → Real labor supply response (long-term)
- ▶ **Elasticity of taxable income** captures all behavioral responses to taxation
  - ▶ Labor supply elasticity only captures the hours response

# Elasticity of Taxable Income (ETI): Advantages

- Elasticity of Taxable Income definition:

$$\begin{aligned}\varepsilon &= \frac{\partial z / z}{\partial (1 - \tau) / (1 - \tau)} = \frac{\% \text{ change in } z}{\% \text{ change in } (1 - \tau)} \\ &= \frac{\partial z}{\partial (1 - \tau)} \cdot \frac{(1 - \tau)}{z}\end{aligned}$$

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- ▶ Key parameter in public economics for **two main reasons**:
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  2. Data availability: taxable income is precisely measured in tax return data

# Elasticity of Taxable Income (ETI): Estimation

- ▶ Start with a simple model of income choice as function of tax (Saez, Slemrod, Giertz, 2012):

$$z_{it} = z_{it}^0 \cdot (1 - \tau_{it})^\varepsilon$$

- ▶  $z_{it}^0$  = Potential earnings (income reported when  $\tau_{it} = 0$ )

## Elasticity of Taxable Income (ETI): Estimation

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$$\log z_{it} = \varepsilon \cdot \log(1 - \tau_{it}) + \log(z_{it}^0)$$

- ▶ OLS estimation is biased because  $\text{corr}(\tau_{it}, z_{it}^0) > 0$  due to progressivity of tax system
  - ▶ People with positive income shock ( $z_{it}^0 \uparrow$ ) face higher tax rate ( $\tau_{it} \uparrow$ )



# Outline

Feldstein (1995)

Kleven and Schultz (2014)

Discussion

## Feldstein (JPE, 1995): Methodology

- ▶ Constructs three income groups:
  - ▶  $M$  = medium ( $N = 3,538$ )
  - ▶  $H$  = High ( $N = 197$ )
  - ▶  $HH$  = Very high ( $N = 57$ )

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  - ▶  $HH$  = Very high ( $N = 57$ )
- ▶ Compares how incomes ( $z^j$ ) and marginal tax rates ( $\tau^j$ ) evolve from 1985 to 1988 for individuals in each group  $j$ , where  $j = \{M, H, HH\}$

## Feldstein (JPE, 1995): Methodology

- ▶ Feldstein forms a diff-in-diff estimator of the ETL:

$$\begin{aligned}\hat{\varepsilon} &= \frac{\Delta \log (z^H) - \Delta \log (z^M)}{\Delta \log (1 - \tau^H) - \Delta \log (1 - \tau^M)} \\ &= \frac{\% \text{ change in taxable income in H vs M}}{\% \text{ change in net-of-tax rate in H vs M}}\end{aligned}$$

## ETI estimation: Diff-in-diff Assumption

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- ▶ **Identification assumption:** absent tax change, log income changes pre- and post-reform would have been the same in treatment and control groups
  - ▶ **Requires parallel trends assumption.**
  - ▶ Assumption fails if, for example, there is growing inequality for reasons unrelated to tax changes

## Feldstein (JPE, 1995): Results

**Table 1: Summary of Data**

Group	$\tau$ in 1985	$z$ in 1985 (\$000)	Obs.	% changes, 1985-88	
				$(1 - \tau)$	$z^*$
<i>M</i>	22% - 38%	\$30 - \$67	3,538	12.1%	6.2%
<i>H</i>	42% - 45%	\$94 - \$127	197	25.6%	21.0%
<i>HH</i>	49% - 50%	\$177 - \$479	57	42.2%	71.6%

Adapted from Feldstein (JPE, 1985). Includes only married taxpayers.

\*  $z$  = Adjusted Taxable Income

## Feldstein (JPE, 1995): Results

**Table 2: Elasticity of Taxable Income**

Group	$(1 - \tau)$	$z^*$
	Percentage changes, 1985-1988	
<i>M</i>	12.1%	6.2%
<i>H</i>	25.6%	21.0%
<i>HH</i>	42.2%	71.6%
	Elasticity Estimates ( $\hat{\epsilon}$ )	
<i>H</i> vs <i>M</i>		<b>1.10</b>
<i>HH</i> vs <i>H</i>		<b>3.05</b>
<i>HH</i> vs <i>M</i>		<b>2.14</b>

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## Feldstein (JPE, 1995): Implications of Results

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  - ▶ lowering tax rate *increases* tax revenue!
- ▶ Efficiency implications (**Feldstein, REStats 1999**):
  - ▶ If  $\varepsilon = 1.04$ , income tax causes an efficiency loss of 32%
  - ▶ That is, compared to lump-sum taxes that collect the same revenue, economy produces 32% less income due to tax distortions

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6. **Response could be avoidance or evasion, rather than productive earnings.**

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- ▶ Data: administrative tax returns in Denmark 1980-2005
  - ▶ Includes socioeconomic variables

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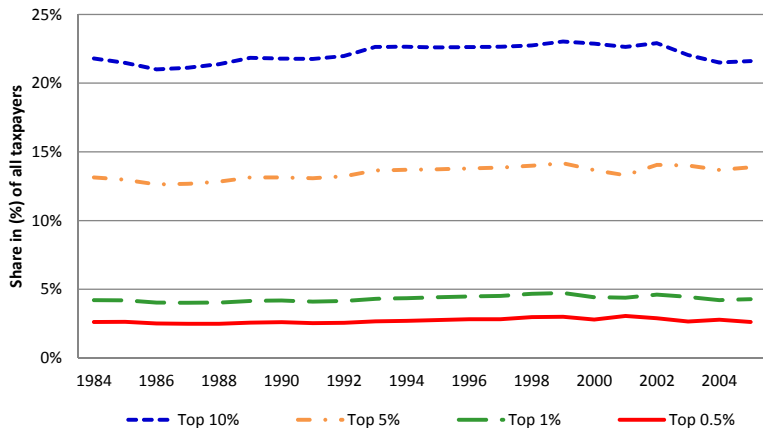
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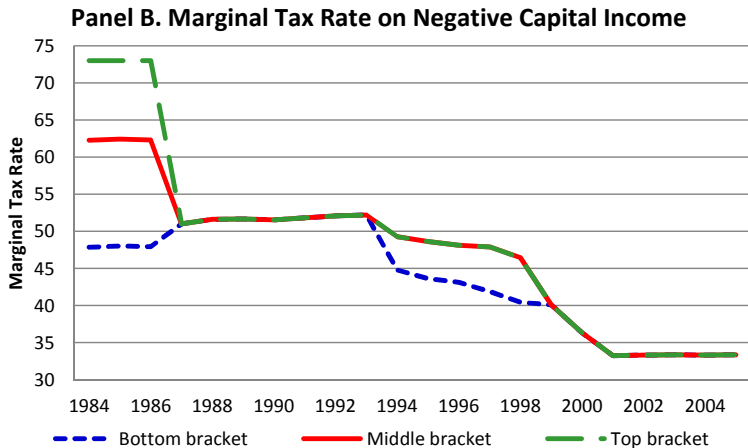
- ▶ Data: administrative tax returns in Denmark 1980-2005
  - ▶ Includes socioeconomic variables
- ▶ Empirical Strategy: diff-in-diff
- ▶ Advantages:
  1. No discernible trends in overall inequality
  2. Multiple tax reforms (some  $\tau \uparrow$ , some  $\tau \downarrow$ )
  3. Parallel trends assumption holds

# Kleven and Schultz (AEJ-EP 2014): Tax Reforms

**Figure 1. The Evolution of Top Income Shares in Denmark**

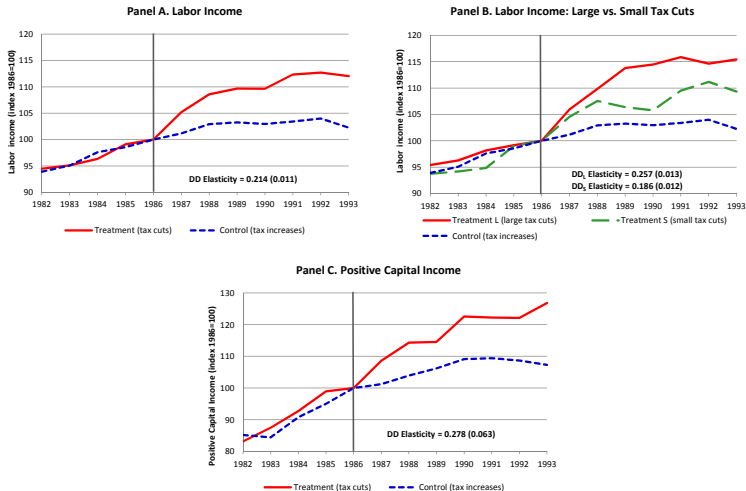


# Kleven and Schultz (AEJ-EP 2014): Graphical Analysis



# Kleven and Schultz (AEJ-EP 2014): Results

Figure 4. Graphical Evidence on Taxable Income Responses to the Danish 1987-Reform





# Kleven and Schultz (AEJ-EP 2014): Results

**Table 4. The Elasticity of Labor Income: Heterogeneity**

	Full sample	Top 20 percent	Top 10 percent	College degree or more	Women	With kids below 18 years old	With kids below 6 years old
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
<b>All workers</b>							
Elasticity wrt. $1-\tau$	0.049*** (0.002)	0.076*** (0.008)	0.085*** (0.012)	0.062*** (0.009)	0.054*** (0.004)	0.054*** (0.005)	0.083*** (0.010)
Number of observations	31,215,140	6,243,028	3,121,514	5,056,852	15,295,419	14,325,926	4,751,852
<b>Wage earners</b>							
Elasticity wrt. $1-\tau$	0.046*** (0.002)	0.073*** (0.009)	0.081*** (0.012)	0.061*** (0.010)	0.052*** (0.005)	0.052*** (0.006)	0.080*** (0.010)
Number of observations	29,568,870	5,913,774	2,956,887	4,844,483	14,785,075	13,631,249	4,593,606
<b>Self-employed</b>							
Elasticity wrt. $1-\tau$	0.090*** (0.014)	0.135*** (0.037)	0.147*** (0.044)	0.113*** (0.039)	0.116*** (0.026)	0.119*** (0.022)	0.171*** (0.046)
Number of observations	1,646,270	329,254	164,627	212,369	510,344	694,677	158,246



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  - ▶ Intuition: there are more margins of response available to taxpayers
  - ▶ In other words, ETI is smaller when the tax base is wider
- ▶ “ETI is a policy choice”

# Slemrod (NTJ 1998)

Examples of alternative margins of response to a change in tax rates:

- ▶ Income shifting across years
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Examples of alternative margins of response to a change in tax rates:

- ▶ Income shifting across years
  - ▶ Alternative measure: elasticity of the *present value* of the tax base
- ▶ Income shifting across tax bases
  - ▶ E.g., between personal income tax and corporation tax (depending on which has a lower marginal rate)
  - ▶ One interesting example is, again, the TRA'86 as we will see in the lecture on inequality