

Taxes and Labor Supply

Elliott Ash

Fiscal Policy and Inequality

Monday 29th October, 2018

Estimation of labor supply elasticity

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

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

- ▶ h_i , hours worked
 - ▶ w_i , after-tax wage
 - ▶ R_i , non-labor income (eg, earnings of the spouse)
 - ▶ \mathbf{X}_i , vector of demographic controls (gender, age, marital status)
- ▶ Since all variables in the regression are in logs:
 - ▶ β provides an estimate of _____ ?

Summary of Empirical labor Supply Literature

- ▶ Very extensive literature trying to estimate these parameters
- ▶ 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

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

- ▶ ζ_i includes unobserved characteristics, including whether you like working.
- ▶ If high-skill workers enjoy working more hours, then:

$$\text{corr}(w_i, \zeta_i) > 0,$$

leading to **upward bias** in β (the elasticity estimate)

- ▶ 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)
 - ▶ 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

Issue #1c: Selection into labor force

- ▶ Some individuals are not in the labor force
 - ▶ 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

- ▶ 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

From Labor Supply to Taxable Income

- ▶ How do people respond when the marginal income tax rate goes up?
 - ▶ Reduce working hours → Real labor supply response (short-term)
 - ▶ Look harder for tax deductions → Tax avoidance response
 - ▶ Misreport (part of) their income → Tax evasion response
 - ▶ 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:

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

- ▶ Key parameter in public economics for **two main reasons**:
 1. What matters for policy is the total behavioral response
 - ▶ Not only the hours response
 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

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

- ▶ Taking logs:

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

- ▶ 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 ($\tau_{it} \uparrow$)

Feldstein (JPE, 1995): Methodology

- ▶ Constructs three income groups:
 - ▶ M = medium ($N = 3,538$)
 - ▶ H = High ($N = 197$)
 - ▶ HH = Very high ($N = 57$)
- ▶ Compares how incomes (z^j) and marginal tax rates (τ^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

- ▶ **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	τ 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>		1.10
<i>HH</i> vs <i>H</i>		3.05
<i>HH</i> vs <i>M</i>		2.14

Adapted from Feldstein (JPE, 1985)

* z = Adjusted Taxable Income (ATI)

Feldstein (JPE, 1995): Implications of Results

- ▶ Feldstein obtains very high elasticities ($\varepsilon > 1$) for top earners
- ▶ If results are true:
 - ▶ US was on the wrong side of the Laffer curve for the rich
 - ▶ 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

Feldstein (JPE, 1995): Issues

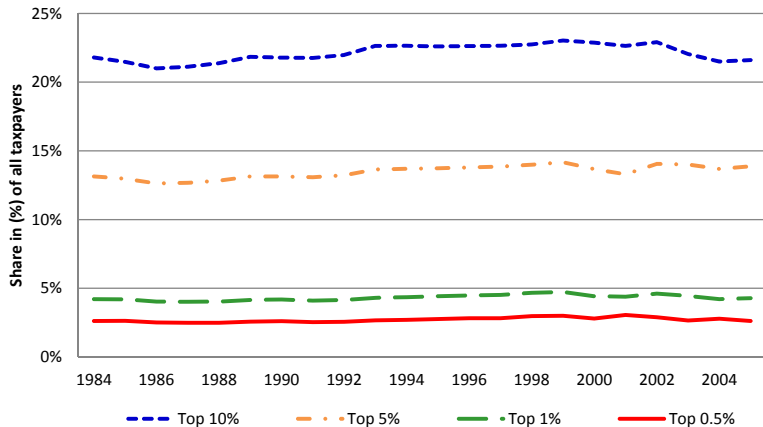
1. Changes in inequality unrelated to tax reform could increase elasticity estimates
2. Small sample size (only 57 people in top group)
3. Mean reversion: rich people in t revert to the mean in $t + 1$.
 - ▶ Biases ε downward when $\tau \downarrow$ for the rich
4. Only measures short-term response, not long-term
5. Diff-in-diff biased when ε differs across groups
6. **Response could be avoidance or evasion, rather than productive earnings.**

Kleven and Schultz (AEJ-EP 2014)

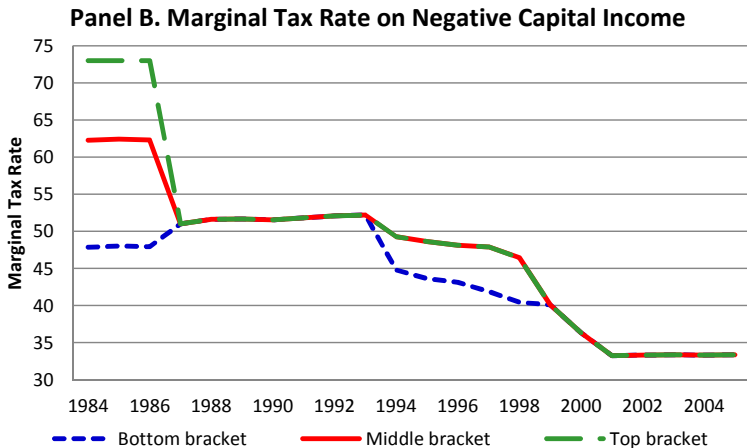
- ▶ Data: administrative tax returns in Denmark 1980-2005
 - ▶ Includes socioeconomic variables
- ▶ Empirical Strategy: diff-in-diff
- ▶ Advantages:
 1. No discernible trends in overall inequality
 2. Multiple tax reforms (some $\tau \uparrow$, some $\tau \downarrow$)
 3. Parallel trends assumption holds

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

Figure 1. The Evolution of Top Income Shares in Denmark

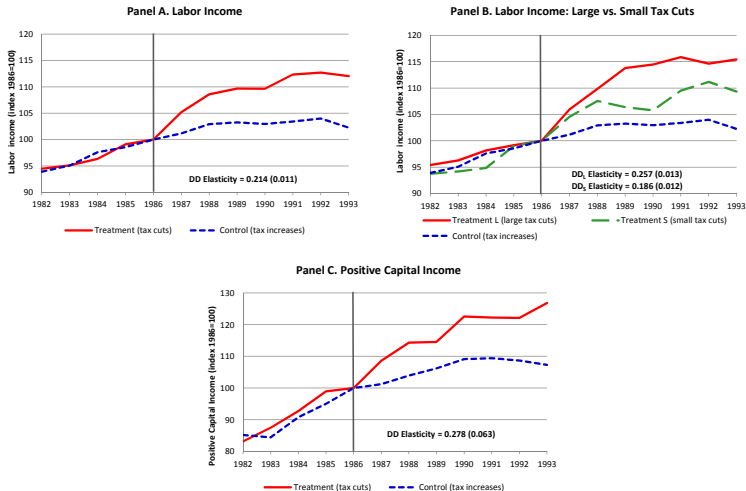


Kleven and Schultz (AEJ-EP 2014): Graphical Analysis



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)
All workers							
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
Wage earners							
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
Self-employed							
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

Slemrod (NTJ 1998): “ETI is not an immutable parameter”

- ▶ ETI varies with government policy and across different contexts
- ▶ ETI is larger when the number of deductions and exemptions in the tax system is larger
 - ▶ 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
 - ▶ 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