The Elasticity of Taxable Income with Respect to Marginal Tax Rates: A Critical Review

Saez, Slemrod and Giertz (2009)

Fiscal and Transfer Policies
Ricardo Estrada, PPD M2

Overview

- Conceptual Framework
- Estimation and Identification Issues
- Review of Empirical Analysis
- Conclusions

People respond to taxes

- Key idea in the economic analysis of taxation
  - $dR = dM + dB < dM$
- Until recently, focus on the labor supply elasticity, but...
- All responses to taxation are symptomatic of deadweight loss and potential sources of inefficiency
- The Elasticity of Taxable Income (ETI) intends to capture all these responses and be a more comprehensive measure of the marginal efficiency cost of taxation

Conceptual Framework

From labor supply to ETI

- Individuals maximize $u(c,z)$
  subject to $c = (1- \tau)z + E$, where $z(1- \tau, E)$

  c - disposable income
  z - taxable income
  τ - marginal tax rate
  E - virtual income (created by the tax/transfer budget constrain)

- We are interested on:

$$e = \frac{(1- \tau)}{z} * \frac{\partial z}{\partial (1- \tau)}$$

- Particularly on *e* on the top of the income distribution

Conceptual Framework

We can use *e* to estimate

- The effect of a small reform ($d\tau$) on tax revenue (dR)

$$dR = dM \left[1 - \frac{\tau}{1-\tau} \cdot e \cdot a \right] \approx dM + dB$$

- The marginal excess burden / extra taxes collected

$$-\frac{dB}{dR} = \frac{e \cdot a \cdot \tau}{1 - \tau - e \cdot a \cdot \tau}.$$

- The revenue-maximizing tax rate

$$\tau^* = \frac{1}{1 + a \cdot e}.$$

Conceptual Framework

but... *e* will not be sufficient with fiscal externalities

- Image that a fraction (*s*) of the reported incomes that disappear following the tax rate increase are shifted toward other bases (*z')* and are taxed at rate *t (< τ)*
- Then, *(τ - t • s)dz, so:*
- The effect of d *τ* on *dR* $$dR = dM + dB = dM \left[1 - \frac{\tau - s \cdot t}{1 - \tau} \cdot e \cdot a\right].$$
- The marginal excess burden $$-\frac{dB}{dR} = \frac{e \cdot a \cdot (\tau - s \cdot t)}{1 - \tau - e \cdot a \cdot (\tau - s \cdot t)}.$$
- The revenue maximizing tax rate $$\tau_s^* = \frac{1 + s \cdot t \cdot a \cdot e}{1 + a \cdot e} > \tau^*.$$

More on externalities

- Fiscal Externalities:
  - Individuals might switch between corporate and individual income tax
  - Response can be different for short and long-term
  - Current and deferred income must be taken into account
  - Tax evasion might lead to increases in taxes collected on evading taxpayers following audit
- Classical externalities may arise, e.g. because increase donations to NGO's
- Other issue: changes in the tax base definition

Estimation and Identification Issues

(very) Basic model

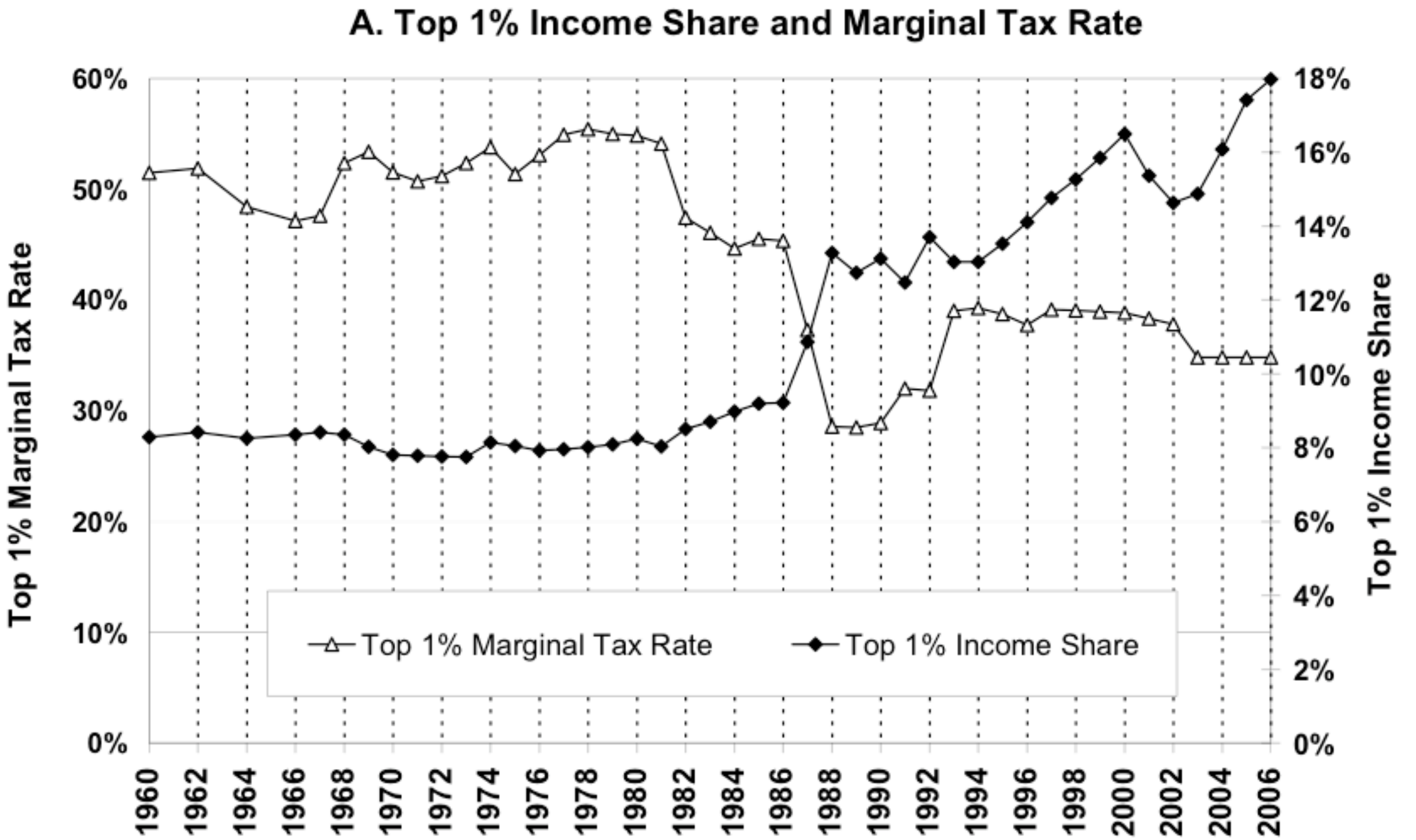
- $\log z_{it} = e \cdot \log (1 - \tau_{it}) + \log z_{it}^{0}$
- Assumptions:
  1. No income effects (exclusion of virtual income, E)
  2. The response to tax rates is immediate and permanent
  3. *e* is constant over time and uniform across individuals at all income levels
  4. Individuals have perfect knowledge of tax structure and choose z_{it} after they know the exact realization of potential income
- Even if the assumptions holds, we need an instrument to get an unbiased estimation of *e*

Pre-Post Reform Comparison

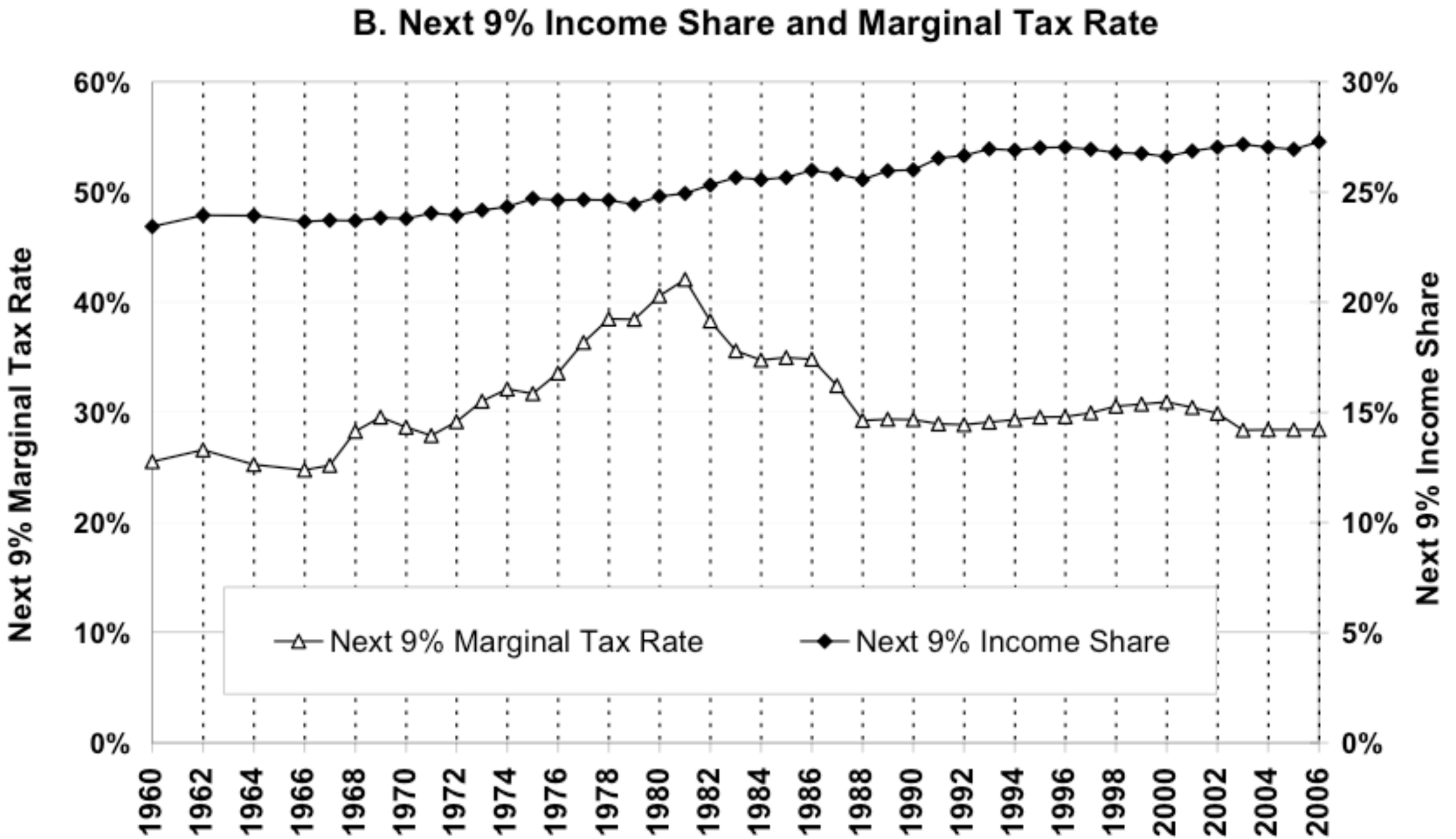
- Using repeated cross sections regress (2SLS):
  - $\log z_{it} = e \cdot \log (1 - \tau_{it}) + \varepsilon_{it}$
  - Tax increases as t=1. Use $1(t \geq 1)$ as instrument for $\log (1 - \tau_{it})$
- But this requires that potential log incomes are not correlated with time (not likely)
- If more that two years of data are available, one could add a linear trend $\beta \cdot t$ to control for secular growth
- But estimates of *e* will be biased if economic growth from year t = 0 to year t = 1 is different for reasons unrelated to the level of tax rates

Estimation and Identification Issues

Share analysis: normalize group's income by the average income in the population



Estimation and Identification Issues



Diff.-in-Diff. with repeated cross sections

$$\log z_{it} = e \cdot \log(1 - \tau_{it}) + \alpha \cdot 1(t = t_1) + \beta \cdot 1(i \in T) + \varepsilon_{it},$$

- Denote by T the group affected by the tax change and by C the group not affected by the reform
- Include year t_0 and year t_1 sample
- Use as instrument $1(t = t_1) \cdot 1(i \in T)$
- Run S2LS regression weighted by income z_{it}

Estimation and Identification Issues

Table 2.
Elasticity estimates using the 1993 top rate increase among top 1% incomes

Control group	next 9%	next 49%
	(1)	(2)
A. Repeated Cross Sections Analysis		
A1. Comparing two years only		
1992 and 1993	0.998	0.958
	(0.109)	(0.107)
1991 and 1994	-0.481	-0.576
	(0.115)	(0.111)
A2. Using all years 1991 to 1997		
1991 to 1997 (no time trends controls)	-0.404	-0.570
	(0.089)	(0.087)
1991 to 1997 (with time trends controls)	1.329	1.342
	(0.107)	(0.104)
B. Panel Analysis		
B1. Comparing two years only		
1992 to 1993 changes (no controls)	1.395	1.878
	(0.107)	(0.184)
1991 to 1994 changes (no controls)	2.420	3.352
	(0.221)	(0.446)
1992 to 1993 changes (log base year income control)	-0.721	0.814
	(0.213)	(0.149)
1992 to 1993 changes (+splines income controls)	-1.669	-1.866
	(1.052)	(0.711)
B2. Using all 1991-1992,…,1996-1997 changes		
No income controls	1.395	1.878
	(0.296)	(0.338)
Base year log income control	0.537	0.955
	(0.264)	(0.247)
Base year log income + splines controls	0.564	0.723
	(0.259)	(0.260)
Base year log income + splines controls	0.143	0.237
(using predicted MTR change instrument)	(0.200)	(0.077)

Estimation and Identification Issues

DD with panel data

- Following Feldstein (1995) most empirical studies have used panel data

$$\log \frac{z_{it_1}}{z_{it_0}} = e \cdot \log \left(\frac{1 - \tau_{it_1}}{1 - \tau_{it_0}} \right) + \varepsilon_{it},$$

- But panel data suffers for mean reversion, so one can run

$$\log \frac{z_{it+1}}{z_{it}} = e \cdot \log \left(\frac{1 - \tau_{it+1}}{1 - \tau_{it}} \right) + f(z_{it}) + \alpha_t + \varepsilon_{it},$$

where $f(z_{it})$ denotes controls in base-year

Panel vs. repeated cross-section

- Panel data analysis cons:
  - The identification mix assumptions regarding mean reversion and assumptions regarding changes in income inequalities
  - Estimates are more sensitive to the choice of the control group
  - Regressions are very sensitive to the choice of the instrument
- More useful when:
  - Individual income in a base year is a good predictor of income after the reform
  - The composition of the group might change over time
  - There are other research questions (e.g. income mobility)

U.S. Legislated Tax Changes

Repeated Cross-Section Analysis	
Lindsey (1987)	Estimates ETI 1.6-1.8 and find larger ETI for higher-income groups. DD with income shares. Large estimates driven by rise in income inequality.
Goolsbee (1999)	Finds ETI -0.83-0.59 for five episodes in 1920-1966.
Aggregated Time-Series Analysis	
Feenberg and Poterba (1993)	Use aggregated tax return data to portrait the high-income group share of total income.
Slemrod (1996)	Finds that for 1973-1985 decreases in top tax rate on on individuals did not explain variation in high-income share. Simultaneity of $d\tau$ and Δ in the tax base bias estimation of the elasticity.
Saez (2004)	Concludes it is very difficult to disentangle long-term effect of tax cuts from Δ non-tax earnings inequality.

U.S. Legislated Tax Changes using Panel Data

- Feldstein (1995) finds in seminal study ETI ≈ 1-3 after TRA 86.
- Auten and Carroll (1995) replicate Feldstein's with larger sample and find lower ETI (0.6-2). Navratil (1995) allows for different elasticities across income groups.
- Carroll (1998) and Auten and Carroll (1999) attempt to address mean regression and divergence in income and find low ETI, but as Moffin and Wilheim (2000) use only two time periods.
- Gruber and Saez (2002) find a smaller elasticity for broad income than for taxable income; in the same line Kopeczuk (2005) analyzes how ETI is a function of the tax base (the availability of deductions)
- Giertz (2007, 2008) year choice affect estimates by altering income trend
- Helm (2009) reports substantial ETI estimates in the tails of the distribution and estimates close to zero in between
- Goolsbee (2000) finds ETI larger to 1 for high-income executives to OBRA93, but mostly for temporary shifting into a lower tax period

Unlegislated variation in U.S.

- Saez (2003) uses the discontinuities created by "bracket-creep" in 1979-1981 to estimate an statistically insignificant ETI of 0.3, decomposed in 0.42 for itemizers and ≈0 for non-itemizers
- Looney and Signhal (2006) estimate a ETI of 0.75-0.71 for middle-income families after a change in the dependent tax deduction
- Saez (2009) estimated a ETI of 0.25 using data around the kink points of the tax schedule, but this elasticity is driven entirely by the self-employed

Legislated Tax Changes in Other Countries

Country	Authors	Results
United Kingdom	Dilnot and Kell (1988)	No Δ in income share of top 1% during 1978-1985 despite the top MTR on earnings fell from 83% to 60%.
	Brewer et al (2008)	Income share of top 1% double from 6% in 1978 to 12.6% in 2003, while the net-of-tax-rate al doubled from 21% to 47%.
Canada	Silmaa and Veall (2001)	ETI of 0.14 for those ages 25 to 61 and 0.27 over age 64. Larger ETI for upper income groups.
	Saez and Veall (2005)	ETI 0.83 - 0.48 for top 1%
France	Piketty (1999)	Small changes in French top tax rates generated small, and temporal, short-term responses for top incomes

Conclusions

- Early literature (80's) produced large estimates of ETI
- Subsequent literature (90's) produce lower estimates
- More reliable estimates are in the 0.12 - 0.4 range
- ETI is higher for high-income individuals
- Estimations for short-term elasticities are more robust than estimations for long-term elasticities
- ETI is a very informative statistic, but no sufficient in most cases to perform welfare analysis
- Panel data analysis does not seem likely to resolve the identification issues raised by trends in income inequality and mean reversion