

# Lecture 6: Labour income taxation (2)

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Master APE and PPD

Paris – October 2024

# Outline of the lecture 5

## I. Incidence

- 1 Theory
- 2 Empirical estimates

## II. Labour supply responses

- 1 Structural labour supply estimates
- 2 Quasi-experimental labour supply estimates
- 3 Macro vs micro estimates

## III. Policy : Transfer to the poor

- 1 Traditional welfare
- 2 Optimal transfer system
- 3 Workfare or EITC-like policies

# Outline of the lecture 6

## IV. Elasticity of taxable income

- 1 Conceptual framework
- 2 Early ETI studies
- 3 Recent ETI studies
- 4 Issue of international mobility

## V. Optimal labour taxation

- 1 Conceptual framework
- 2 Mirrlees model
- 3 Generalized optimal labour taxation models

## VI. Policy : Taxing top incomes

- 1 What top marginal tax rate?
- 2 Policy debate : supply side vs optimization vs rent seeking

# IV. Elasticity of taxable income

- ① Conceptual framework
- ② Early studies
- ③ Recent studies
- ④ Bunching
- ⑤ International mobility

# Elasticity of taxable income

- **Limits of traditional labour supply**
  - Quantitative measures of labour supply (hours and employment) are not the only behavioural responses to taxation
  - Deadweight loss of taxation should depend on all behavioural responses

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- **Other behavioural margins**

- ① Effort on the job
- ② Career choice
- ③ Form and timing of compensation
- ④ Tax avoidance (legal shifting of income)
- ⑤ Tax evasion (illegal under-reporting of income)

# Elasticity of taxable income

- **Elasticity of taxable income (ETI)**

- ETI,  $e$ , is the % change in reported income  $z$  when the net-of-tax rate  $1 - \tau$  increases by 1%

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

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- **What captures the ETI?**

- Reported income  $z$  captures potentially all margins of behavioural responses to marginal tax rate  $\tau$
- ETI depends on features of the tax system (avoidance opportunities)
- Not a structural parameter



# ETI as sufficient statistics

- **Marginal deadweight loss of taxation  $dDWL$** 
  - Deadweight loss is the difference between utility loss from taxation  $W$  and the revenue from taxation  $R$

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  - Taxation leads to mechanical effects  $dM$  and behavioural revenue effects  $dB$

$$dR = dM + dB$$

- We have  $dW = dM$  (envelope theorem, for small tax change)

$$dDWL = dM - (dM + dB) = -dB$$

- $dB$  depends directly from ETI

# ETI not as sufficient statistics

- **Saez, Slemrod and Giertz (JEL, 2012)**
  - Assumption in the basic ETI framework :
    - (i) reduced  $z$  has no other effect on tax revenue
  - Reasonable assumption for real responses  
e.g., labour supply responses
  - Problem if reduced  $z$  comes from tax shifting or leads to fiscal externalities

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- **Fiscal externalities**
  - Shifting between personal/corporate income
  - Shifting over time of income
  - Externalities (e.g., charitable giving)
- **Other parameters needed**
  - i) Distinction between real responses vs. shifting
  - ii) How much is shifted income taxed?

# Elasticity of taxable income

- **Early studies : high ETI**

- Reagan, 1981 tax cuts (Lindsey, JPubE, 1987)
  - Reagan, 1986 tax cuts (Feldstein, JPE, 1995)
- ⇒ Very high estimates of ETI (well above 1)

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- **More recent studies : smaller ETI**

- More reforms in the U.S. (Goolsbee, 1999 ; Auten and Carroll, ReStat, 1999 ; Giertz, NTJ, 2007)
  - More countries : the U.K. (Brewer, Saez, and Shephard 2010), Canada (Saez and Veall 2005), Norway (Aarbu and Thoresen 2001), Sweden (Blomquist and Selin 2010), etc.
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- **Surveys on ETI**

- Saez, Slemrod and Giertz (JEL 2012)
- Slemrod (NTJ, 1998)

# Feldstein (JPE, 1995)

- **1986 Tax Reform Act (TRA) in the U.S.**
  - Biggest tax reform in the U.S. since WWII
  - Top MTR down from 50% to 28%
  - Substantial base-broadening : exemptions and preferential tax treatment repealed

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- **DiD approach**
  - Use panel of tax return data between 1985 and 1988
  - Construct three income groups
    - ① Treatment : highest income, with  $\tau_{1985} = 49 - 50\%$
    - ② Control 1 : high income, with  $\tau_{1985} = 42 - 45\%$
    - ③ Control 2 : high income, with  $\tau_{1985} = 22 - 38\%$
  - DiD approach : exploit differences in MTR

$$e^{DiD} = \frac{\Delta \log(z^T) - \Delta \log(z^C)}{\Delta \log(1 - \tau^T) - \Delta \log(1 - \tau^C)}$$

Table 1 – Response of taxable income to changes in MTR

1985 data		$\Delta$ between 1985 and 1988		
MTR	Income (K\$)	$1 - \tau$	Adjusted taxable income	Nb obs.
22	30.7	9.0	13.6	800
25	36.1	13.3	3.5	909
28	42.7	16.3	6.0	713
33	51.5	8.7	2.5	771
38	67.5	16.1	9.6	345
42	94.3	24.1	22.0	152
45	126.9	30.9	18.5	45
49	177.7	41.2	42.7	35
50	479.0	44.0	92.4	22
22-38		12.2	6.2	3,538
42-45		25.6	21.0	197
49-50		42.2	71.6	57

SOURCE : Feldstein (1995), Tab. 1, p. 561.

Table 2 – Response of taxable income to changes in MTR

Taxpayer Groups by 1985 MTR	$1 - \tau$	Adj. Taxable Income	Ad. Taxable Income + Loss
Percentage Changes, 1985–88			
Medium (22-38)	12.2	6.2	6.4
High (42-45)	25.6	21.0	20.3
Highest (49-50)	42.2	71.6	44.8
Differences of Differences			
High vs Med.	13.4	14.8	13.9
Highest vs High	16.6	50.6	24.5
Highest vs Med.	30.0	65.4	38.4
Implied Elasticity Estimates			
High vs Med.		1.10	1.04
Highest vs High		3.05	1.48
Highest vs Med.		2.14	1.25

SOURCE : Feldstein (1995), Tab. 2, p. 565.

NOTE : the last column add to taxable income the gross partnership losses.

# Feldstein (JPE, 1995) : Results

- **Very high ETI estimated**
  - Estimates between 1.04 and 3.05
  - Much larger than the usual labour supply elasticities (0.2-0.5)

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- **Policy implications**

- The U.S. was on the wrong side of the Laffer curve
- Tax cuts with TRA 86 led to no revenue losses
- Clinton's 1993 tax increases should lead to no tax revenues
- The top marginal tax rate should not be much higher than 30%

# Feldstein (JPE, 1995) : Issues

## ① Mean reversion

- After a negative (positive) income shock, income increases (decreases)  
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- control and treatment groups come from different part of the income distribution
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## ③ Very small sample : 57 tax filers in the treated group

- Auten and Carroll (RESTAT, 1999) : with larger admin data, they find  $e=1.10$  (compared to Feldstein's 3.05)
- With additional controls, they get  $e=0.57$

# Feldstein (JPE, 1995) : Issues

## ④ Heterogenous elasticity

- DiD requires homogeneous elasticity
- If elasticities are increasing in income  
⇒ ETI biased upward

e.g. suppose  $e^T = e$  and  $e^C = 0$

$$\text{and } \Delta \log(1 - \tau^C) = 0.5 \Delta \log(1 - \tau^T)$$

$$\text{Then : } \Delta \log(z^T) - \Delta \log(z^C) = e \Delta \log(1 - \tau^T)$$

$$\text{We obtain : } e^{DiD} = 2e$$

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## ⑤ TRA86 changed the tax rate and tax base

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## ⑥ Short-term vs long-term

- Some responses could be short term shifting effects

# Gruber and Saez (JPubE, 2002)

- **Data**

- Panel data from 1979-1990
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- **Methodology**

- IV regression analysis

$$\Delta \ln(z_{it}) = e \Delta \ln(1 - \tau_{it}) + X_{it} + \nu_{it}$$

- Endogeneity issue :  $\tau_{it}$  linked to  $z_{it}$
- Use predicted change in  $\Delta \ln(1 - \tau_{it})$  assuming income stays constant
- Isolate changes in tax law as the only source of variation

# Gruber and Saez (JPubE, 2002)

Table 3 – Basic elasticity results

Income controls	None		Log income		Log income 10-piece spline	
	Broad income	Taxable income	Broad income	Taxable income	Broad income	Taxable income
Elasticity	-0.300 (0.120)	-0.462 (0.194)	0.170 (0.106)	0.611 (0.144)	0.120 (0.106)	0.400 (0.144)

SOURCE : Gruber and Saez (2002), Tab. 4, p. 16.



# Gruber and Saez (JPubE, 2002)

Table 4 – Elasticity results by income groups

Income range	Broad income	Taxable income
<b>\$10K to \$50K</b>	-0.044 (0.085)	0.180 (0.164)
N. Obs.	49 364	39 902
<b>\$50K to \$100K</b>	-0.065 (0.154)	0.106 (0.219)
N. Obs.	16 688	16 293
<b>\$100K and above</b>	<b>0.171</b> (0.240)	<b>0.567</b> (0.298)
N. Obs.	3 076	3 004

SOURCE : Gruber and Saez (2002), Tab. 9, p. 24.

# Gruber and Saez (JPubE, 2002)

Table 5 – Elasticity results by itemizing status

Itemizing status	Broad income	Taxable income
<b>Itemizers</b>	0.266 (0.068)	0.647 (0.099)
N. Obs.	28 117	25 746
<b>Non-Itemizers</b>	-0.210 (0.079)	-0.179 (0.122)
N. Obs.	41 012	33 569

SOURCE : Gruber and Saez (2002), Tab. 9, p. 24.

# Gruber and Saez (JPubE, 2002)

- **Results**

- ETI estimates of 0.4, and elasticity of broad income of 0.12
- Higher ETI for top incomes (0.5-0.6)
- Smaller ETI for non-top incomes (0.1-0.2)
- Higher ETI comes from itemizers

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- **Issues : results are fragile**

- ① Imprecision of the estimates
- ② Sensitive to exclusion of low income
- ③ Sensitive to controls for mean reversion (Kopczuk, 2005)
- ④ Bundles together small tax change and big tax changes

# Kleven and Schultz (AEJ-EP, 2014)

- **Danish data**
  - Full-population admin data over 21 years
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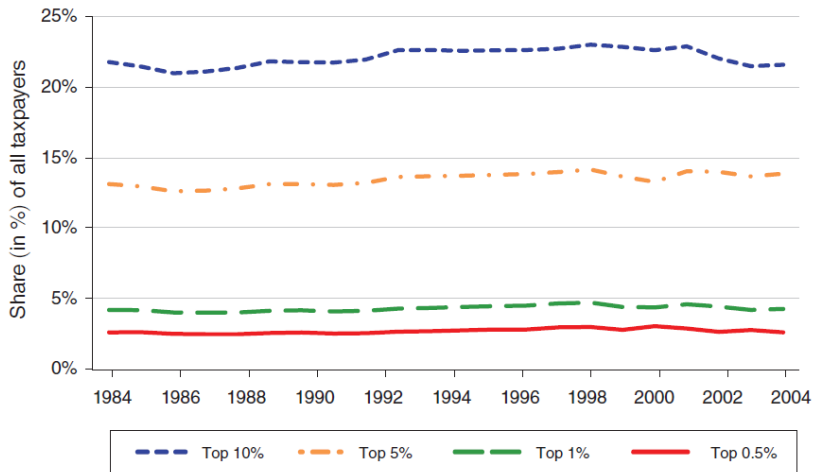
- **Danish tax reforms**

- Stable income distribution throughout the period
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- Separate variations for labour and capital income

- **Method**

- Compelling graphical DiD evidence
- Define treatment/control pre-reform and follow the same group before and after the reforms
- Panel IV regression following Gruber and Saez (2002)

Figure 1 – Top income shares in Denmark

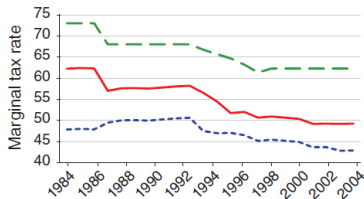


SOURCE : Kleven and Schultz (AEJ-EP 2014), Fig. 1, p. 273.

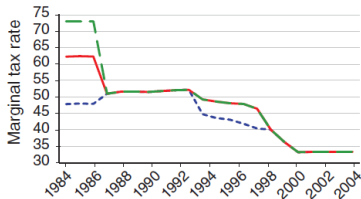


## Figure 2 – Two Decades of Danish tax reforms

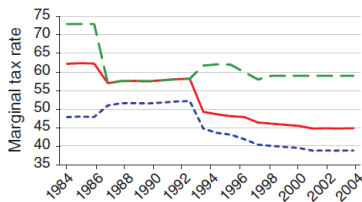
Panel A. Marginal tax rate on labor income



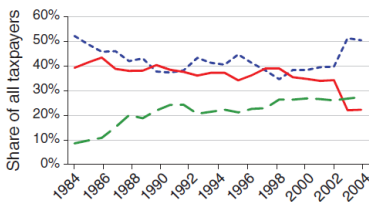
Panel B. Marginal tax rate on negative capital income



Panel C. Marginal tax rate in positive capital income



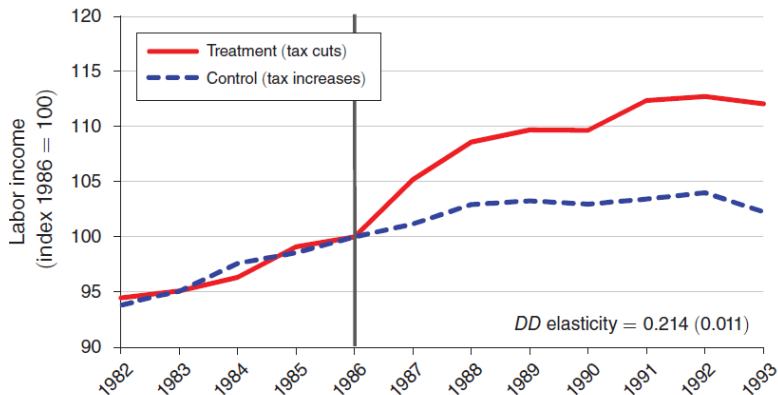
Panel D. Share of taxpayers in the three tax brackets



--- Bottom bracket    — Middle bracket    — Top bracket

# Kleven and Schultz (AEJ-EP, 2014)

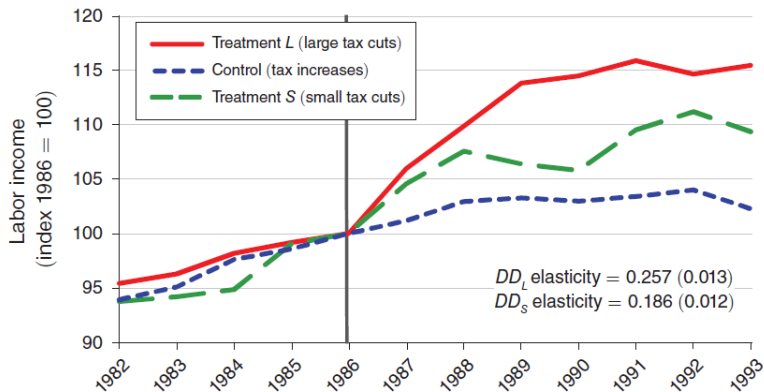
Figure 3 – Danish 1987 reform : labour income



SOURCE : Kleven and Schultz (AEJ-EP 2014), Fig. 4.A

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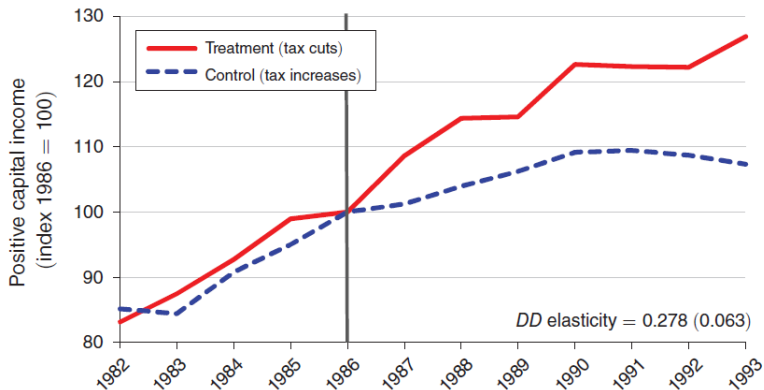
Figure 4 – Danish 1987 reform : labour income, large vs small cuts



SOURCE : Kleven and Schultz (AEJ-EP 2014), Fig. 4.B.

# Kleven and Schultz (AEJ-EP, 2014)

Figure 5 – Danish 1987 reform : positive capital income



SOURCE : Kleven and Schultz (AEJ-EP 2014), Fig. 4.C.

# Kleven and Schultz (AEJ-EP, 2014)

Table 6 – Elasticity of labour income : heterogeneity

	Full sample	Top 20%	Top 10%	College or more	Women	With kids below age 6
<i>A. All workers</i>						
Elasticity	0.049 (0.002)	0.076 (0.008)	0.085 (0.012)	0.062 (0.009)	0.054 (0.005)	0.083 (0.010)
Obs. (in million)	31.2	6.2	3.1	5.1	15.3	4.7
<i>B. Wage earners</i>						
Elasticity	0.046 (0.002)	0.073 (0.009)	0.081 (0.012)	0.061 (0.010)	0.052 (0.005)	0.080 (0.010)
Obs. (in million)	25.6	5.9	2.9	4.8	14.8	4.6
<i>C. Self-employed</i>						
Elasticity	0.090 (0.014)	0.135 (0.037)	0.147 (0.044)	0.113 (0.039)	0.116 (0.026)	0.171 (0.046)
Obs. (in million)	1.6	0.3	0.2	0.2	0.5	0.2

SOURCE : Kleven and Schultz (AEJ-EP 2014), Tab. 4, p. 290.

# Kleven and Schultz (AEJ-EP, 2014)

- **Results**

- Small labour income elasticities (0.05-0.2)
- Larger capital income elasticities (0.1-0.3)
- Larger elasticities when estimated from larger reforms (frictions, cf. Chetty 2012)
- Larger labour income elasticities for self-employed, women with kids
- Limited income shifting between labour and capital income

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- **Implications**

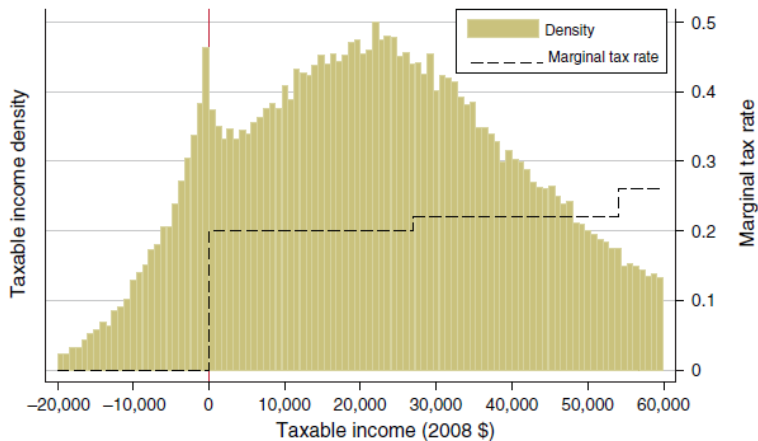
- Broad base and strong enforcement leads to modest behavioural responses even under high marginal tax rates

# ETI and bunching techniques

- **Saez (AEJ-EP, 2010)**
  - ETI could be captured by amount of bunching
  - Tax brackets provide kinks (change in MTR) that should lead to bunching
- **Some evidence of bunching in the U.S.**
  - Evidence of bunching at first tax bracket in 1960s  
⇒ implied elasticity of 0.2
  - No evidence of bunching at higher tax brackets
- **Mechanisms for bunching**
  - Itemization for income tax



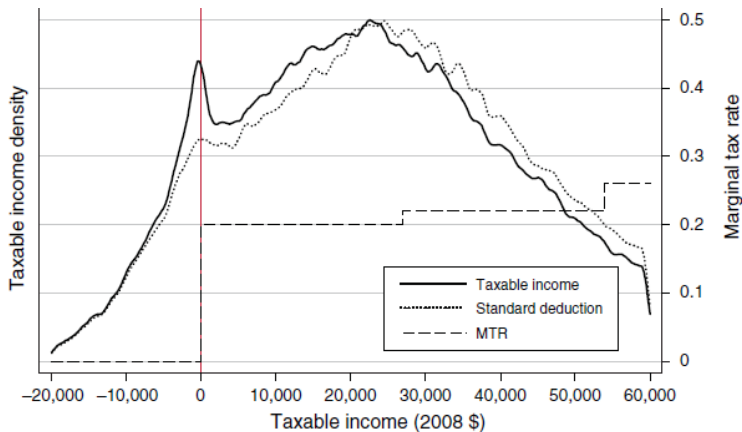
Figure 6 – Bunching around first bracket U.S. income tax (1960-69)



NOTE : Married tax filers.

SOURCE : Saez (2010), Fig. 6.A.

Figure 7 – Itemizing effects on bunching (first bracket, 1960-69)



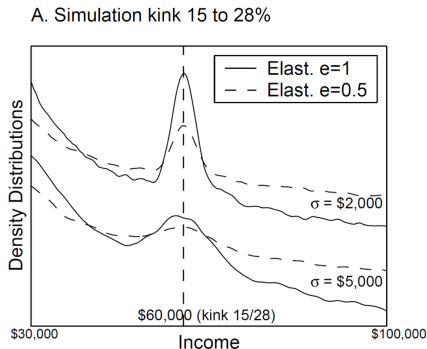
NOTE : Married tax filers.

SOURCE : Saez (2010), Fig. 7.A.

# Why not more bunching at kinks?

## 1 True elasticity is small

Figure 8 – Simulation of bunching according to elasticity



SOURCE : Saez (1999), Fig. 5.1 and 5.2.

# Why not more bunching at kinks?

## ② Salience and information

- Chetty, Looney, and Kroft (AER, 2009) : salience
- Chetty, Friedman, and Saez (AER, 2013) : information on EITC

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## ③ Tax confusion

- Liebman and Zeckhauser (2004) : “Schmeduling”
- Feldman, Katuščák and Kawano (AER, 2016) : evidence from the child tax credit in the U.S. (lump-sum credit removed when child turns 17 leads to negative wage response)

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## ④ Frictions

- Adjustment costs and institutional constraints
- Chetty, Friedman, Olsen, and Pistaferri (QJE, 2011)
- Kleven and Waseem (QJE, 2013) : exploiting notches

# Chetty, Friedman, Olsen, and Pistaferri (QJE 2011)

- **Adjustment costs**
  - Search cost, cost of acquiring information about taxes
  - Institutional constraints (e.g., 35 hours week)
  - These frictions reduce elasticities

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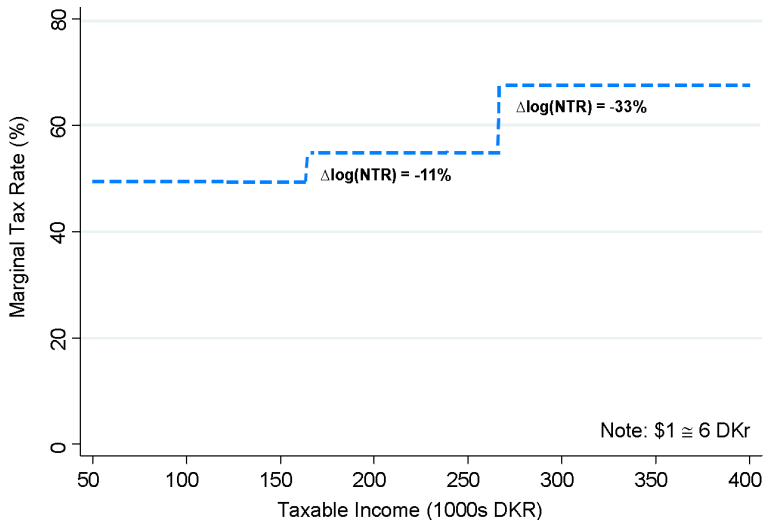
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- **Data and methodology**

- Data on full Danish population
- Sample restriction : wage-earners 15-70
- 2.4 million people per year
- Exploit kinks in Danish tax system

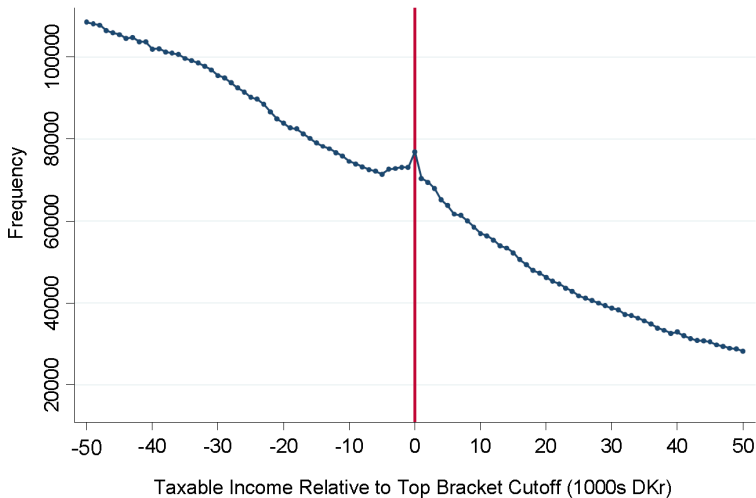


Figure 9 – Marginal Tax Rates in Denmark in 2000



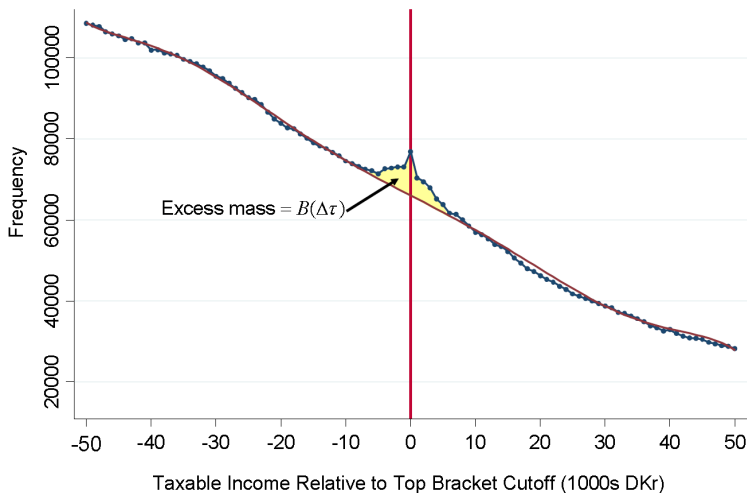
SOURCE : Chetty, Friedman, Olsen, and Pistaferri (2011), Fig. II.a, p. 772.

Figure 10 – Income Distribution for Wage Earners Around Top Tax Cutoff



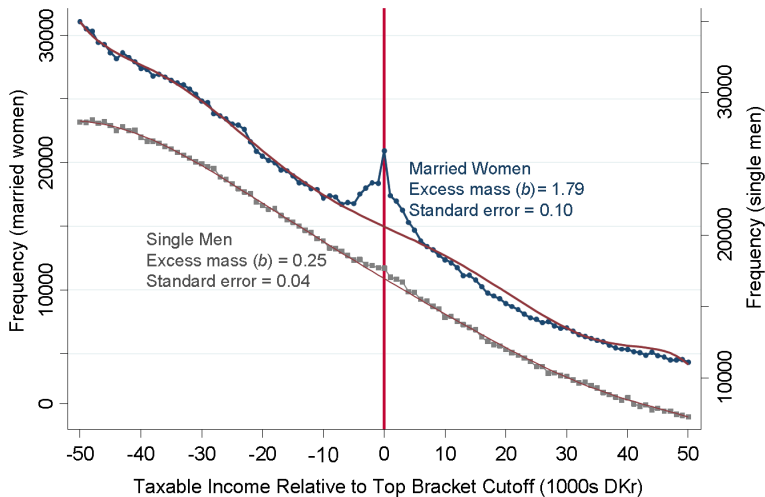
SOURCE : Chetty, Friedman, Olsen, and Pistaferri (2011), Fig. III.a, p. 775.

Figure 11 – Income Distribution for Wage Earners Around Top Tax Cutoff



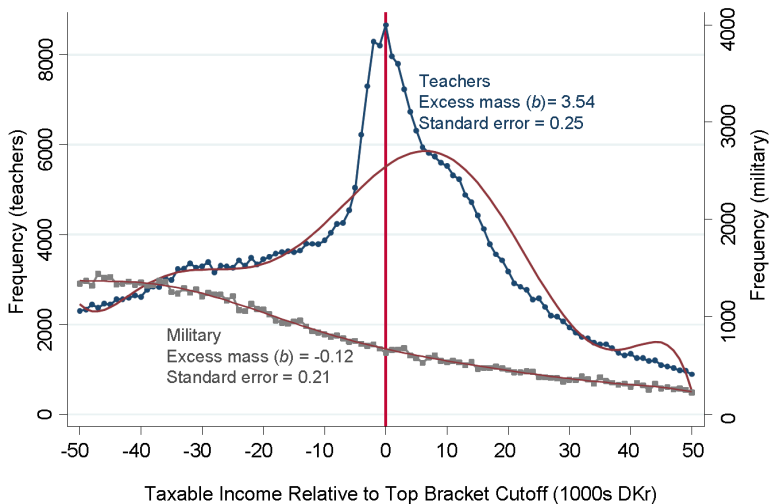
SOURCE : Chetty, Friedman, Olsen, and Pistaferri (2011), Fig. III.a, p. 775.

Figure 12 – Married Women vs. Single Men



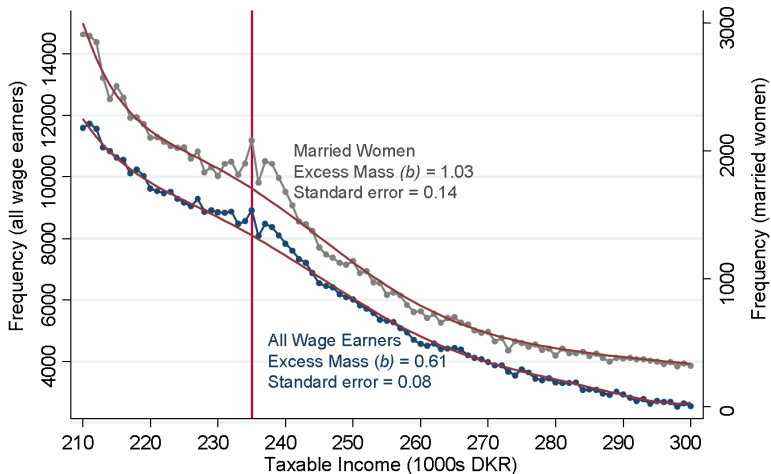
SOURCE : Chetty, Friedman, Olsen, and Pistaferri (2011), Fig. III.b, p. 775.

Figure 13 – Teachers vs. Military



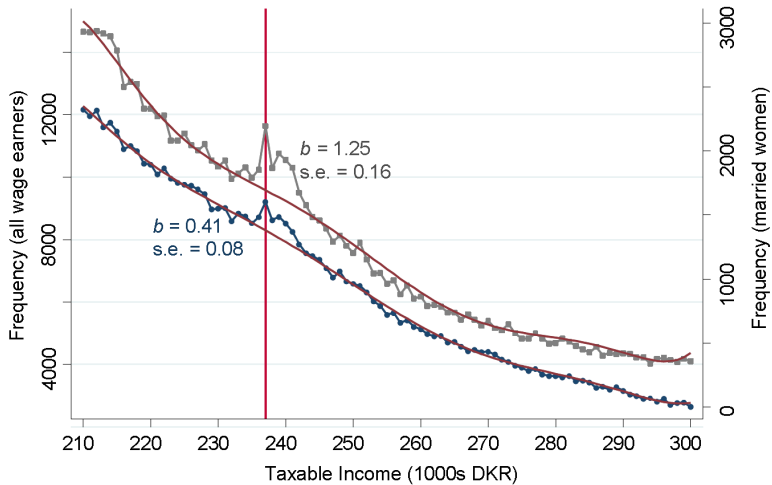
SOURCE : Chetty, Friedman, Olsen, and Pistaferri (2011), Fig. III.c, p. 775.

Figure 14 – Taxable income distributions in 1994



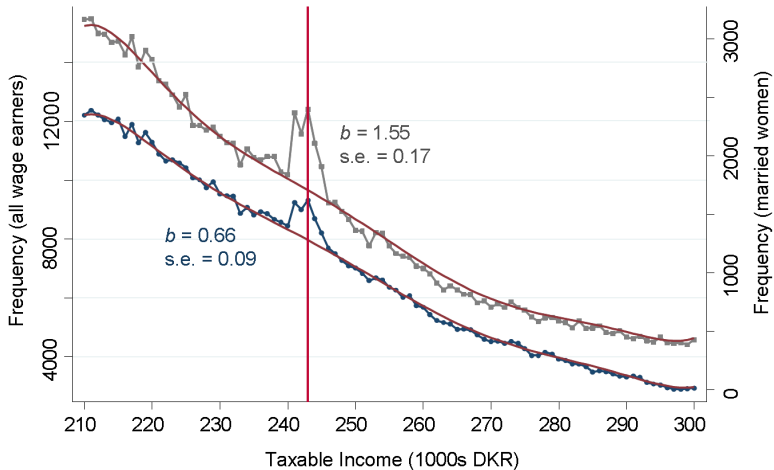
SOURCE : Chetty, Friedman, Olsen, and Pistaferri (2011), Fig. IV.a, p. 780.

Figure 15 – Taxable income distributions in 1995



SOURCE : Chetty, Friedman, Olsen, and Pistaferri (2011), Fig. IV.b, p. 780.

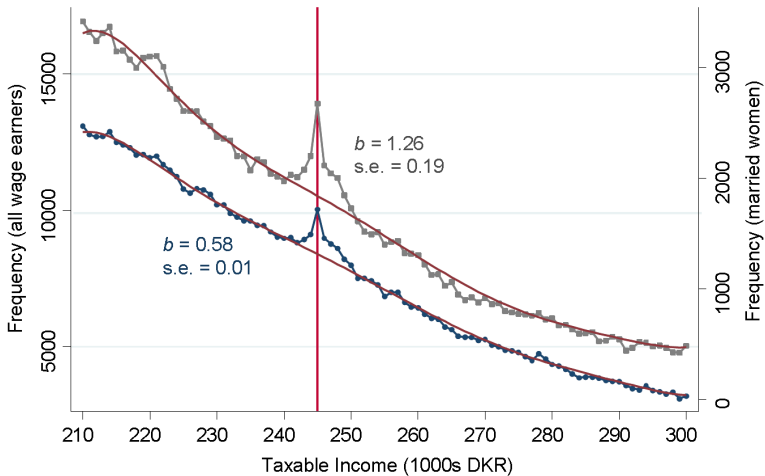
Figure 16 – Taxable income distributions in 1996



SOURCE : Chetty, Friedman, Olsen, and Pistaferri (2011), Fig. IV.c, p. 780.

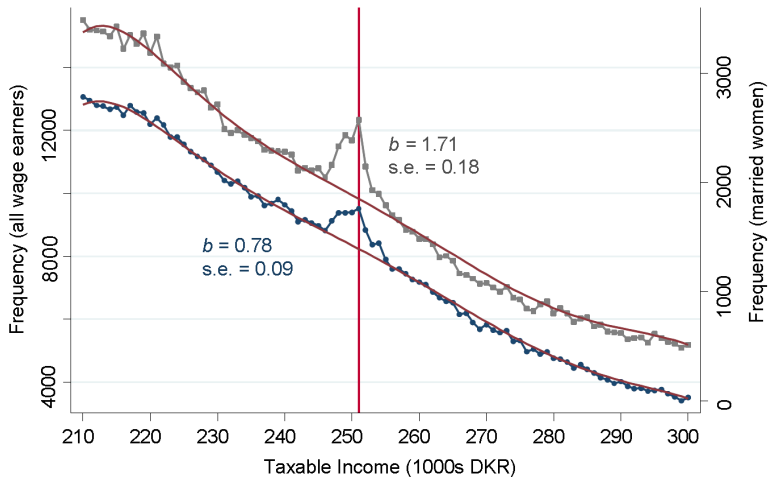


Figure 17 – Taxable income distributions in 1997



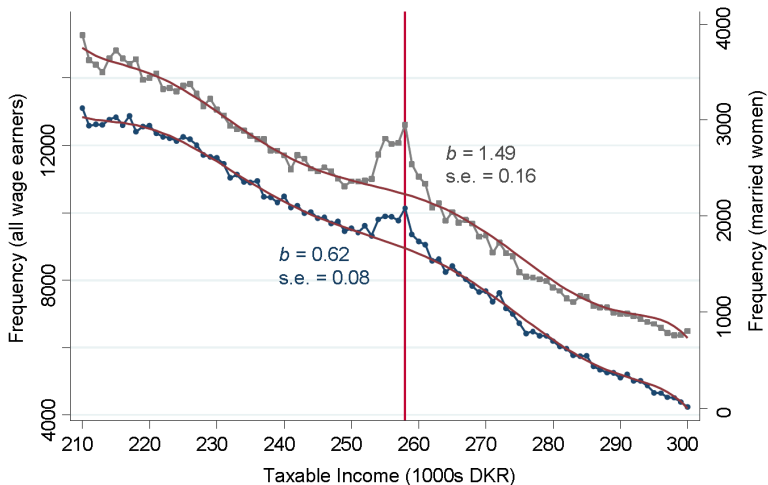
SOURCE : Chetty, Friedman, Olsen, and Pistaferri (2011), Fig. IV.d, p. 780.

Figure 18 – Taxable income distributions in 1998



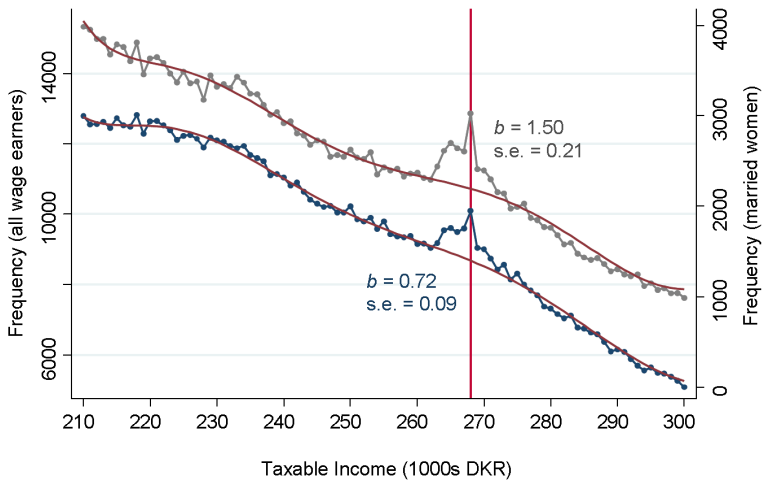
SOURCE : Chetty, Friedman, Olsen, and Pistaferri (2011), Fig. IV.e, p. 780.

Figure 19 – Taxable income distributions in 1999



SOURCE : Chetty, Friedman, Olsen, and Pistaferri (2011), Fig. IV.f, p. 780.

Figure 20 – Taxable income distributions in 2000



SOURCE : Chetty, Friedman, Olsen, and Pistaferri (2011), Fig. IV.g, p. 780.

- **Results**

- Search costs attenuate observed behavioural responses :  
find larger elasticities around large kink points
- Groups with more flexibility respond more (secondary earners, self-employed)
- Overall elasticities estimated from bunching are small in magnitude (perhaps because frictions prevent full response)

# International mobility

- **Important public debate**
  - Concern that top skilled individuals move to low tax countries
  - Bigger concern than supply-side story within country

# International mobility

- **Important public debate**

- Concern that top skilled individuals move to low tax countries
- Bigger concern than supply-side story within country

- **Recent research on tax induced migration**

- U.S. State variations (Moretti and Wilson, 2015 ; Young et al. 2015)
- Special schemes for football players (Kleven, Landaïs and Saez, AER 2013)
- Danish tax scheme (Kleven, Landaïs, Saez and Schultz, QJE 2013)
- EU job posting policy (Muñoz, QJE 2023)
- Recent survey (Kleven, Landaïs, Muñoz and Stantcheva, JEL 2020)

- **European football market**
  - Bosman ruling (1995) : elimination of the rule for maximum 3 foreign players
  - Beckham law in Spain (2004) : top MTR reduced from 45% to 24% for foreign workers



# Kleven, Landais and Saez (AER, 2013)

- **European football market**

- Bosman ruling (1995) : elimination of the rule for maximum 3 foreign players
- Beckham law in Spain (2004) : top MTR reduced from 45% to 24% for foreign workers

- **Empirical strategy**

- (i) Cross-country correlations between MTR and number of foreign players (before/after Bosman ruling)
- (ii) Exploit Beckham 2004 law in Spain using synthetic control method

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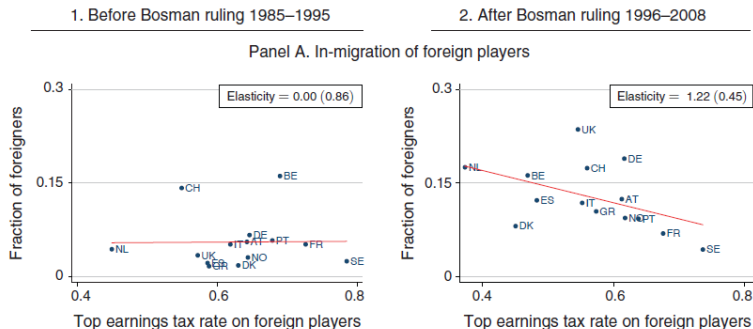
- (i) Cross-country correlations between MTR and number of foreign players (before/after Bosman ruling)
- (ii) Exploit Beckham 2004 law in Spain using synthetic control method

- **Results**

- Significant migration responses : high elasticities (1.2-1.5)

# Kleven, Landais and Saez (AER, 2013)

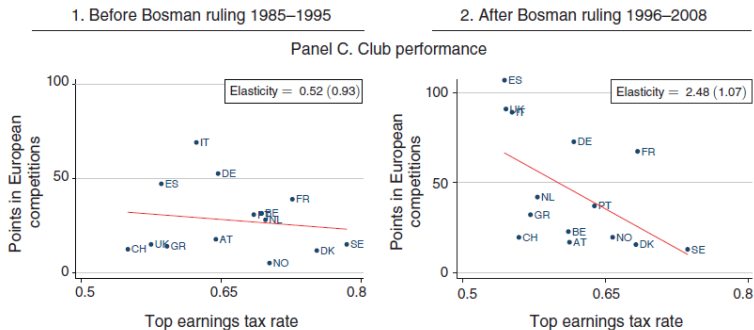
Figure 21 – Cross-Country Correlation between Tax Rates and Migration



SOURCE : Kleven, Landais and Saez (AER 2013), Fig. 1.A, p. 1904.

# Kleven, Landais and Saez (AER, 2013)

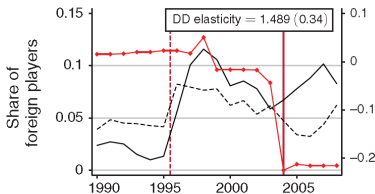
Figure 22 – Cross-Country Correlation between Tax Rates and Performance



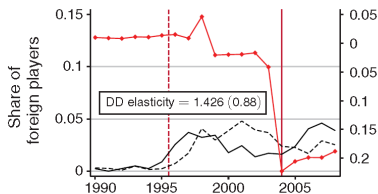
SOURCE : Kleven, Landais and Saez (AER 2013), Fig. 1.C, p. 1904.

## Figure 23 – Effects of the 2004 Beckham Law in Spain

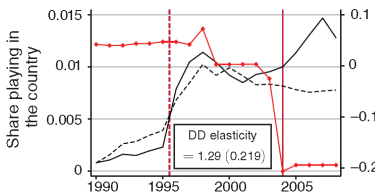
Panel A1. Top-quality players



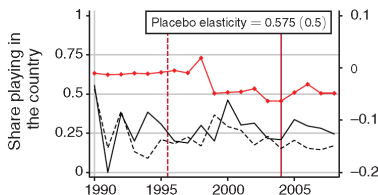
Panel A2. Lower-quality players



Panel B1. Eligible foreign players



Panel B2. Non-eligible foreign players



— Spain    - - - Synthetic Spain    -•- Δ Top tax rate

- **1991 Danish tax scheme**
  - Higher earners (above 100K euros) taxed at flat rate 25% for three years (instead of regular top rate of 59%)

# Kleven, Landais, Saez and Schultz (QJE, 2013)

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- Higher earners (above 100K euros) taxed at flat rate 25% for three years (instead of regular top rate of 59%)

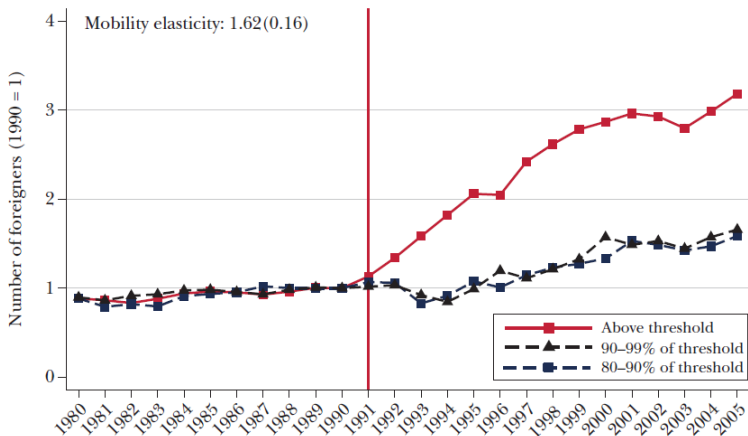
- **Data and methodology**

- Exploit Danish admin data
- DiD strategy (below/above threshold)

- **Results**

- Scheme double number of highly paid foreigners in Denmark
  - Very high elasticities (above 1)
- ⇒ Tax competition across countries will reduce ability to tax

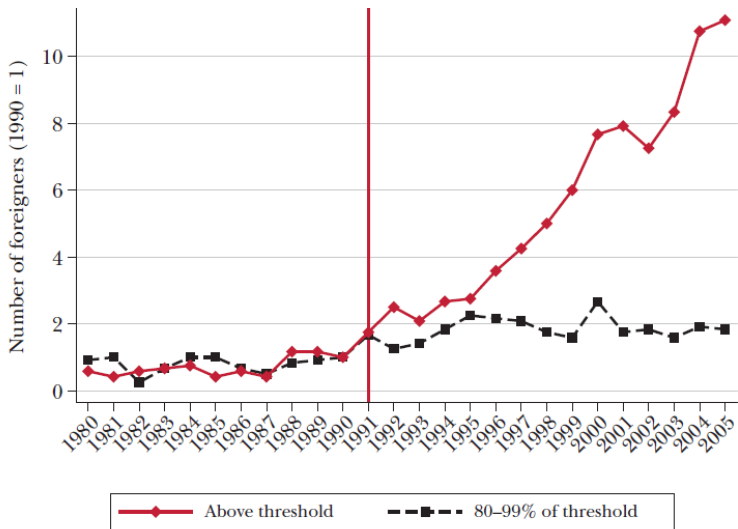
Figure 24 – Number of foreigners by income groups



SOURCE : Kleven, Landais, Saez and Schultz (2013), Fig. 1.

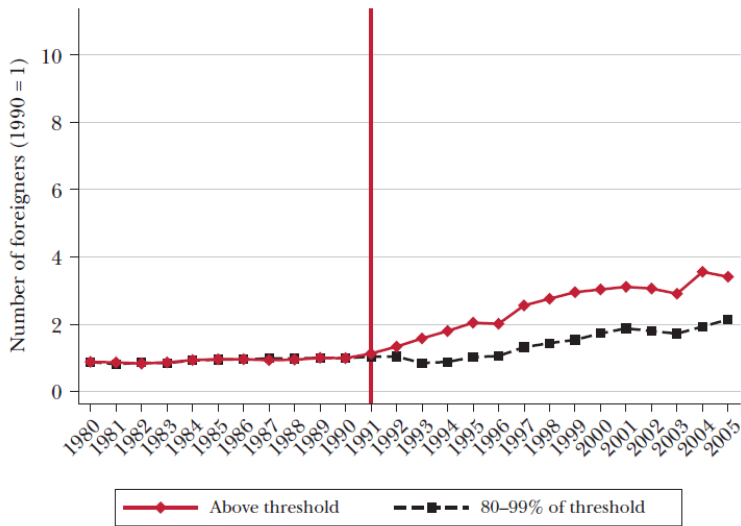


**Figure 25 – Effects of Danish Foreigner Tax Scheme – Sports and entertainment**



SOURCE : Kleven, Landais and Saez (AER 2013), Fig. 4.A.

Figure 26 – Effects of Danish Foreigner Tax Scheme – Other industries



SOURCE : Kleven, Landais and Saez (AER 2013), Fig. 4.B.

# V. Optimal labour income taxation

- ① Introduction to optimal taxation
- ② Mirrlees (1971) model
- ③ Applied optimal labour income taxation

# Optimal taxation

*"The purpose of the optimum tax literature (...) does not assume that policy is formed by some benevolent dictator who reads the Journal of Public Economics in order to find out what to do.*

*The purpose of the analysis is rather to illuminate the structure of the arguments, explaining the relationship between instruments, constraints, and objectives."*

Anthony B. Atkinson (1995, p. 17)

# Optimal taxation

- **General idea**
  - Normative approach about tax design
  - Describe objective of redistribution through social welfare function
  - Model the trade-off between equity and efficiency

# Optimal taxation

- **General idea**

- Normative approach about tax design
- Describe objective of redistribution through social welfare function
- Model the trade-off between equity and efficiency

- **Social welfare function**

- Welfarism : social welfare based solely on individual utilities
- SWF defines the way to model aggregate welfare

$$SWF = \int_i \mu_i u^i$$

with  $\mu_i$  the social weight on ind.  $i$

- Utilitarian or Benthamite SWF :  $\mu_i = 1$

# Simple optimal taxation model

- **Notations**

- Utility  $u(c)$  strictly increasing and concave, identical for all
- Pre-tax income  $z$  is fixed (i.e., no behavioural responses), with density distribution  $h(z)$
- $T(z)$  is tax schedule
- After-tax income  $c = z - T(z)$

# Simple optimal taxation model

- **Notations**

- Utility  $u(c)$  strictly increasing and concave, identical for all
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- $T(z)$  is tax schedule
- After-tax income  $c = z - T(z)$

- **Government welfare maximisation**

- With utilitarian SWF

$$\int_0^{\infty} u(z - T(z)) h(z) dz$$

- Subject to budget constraint  $\int T(z) h(z) dz \geq E(\lambda)$ , with  $E$  the revenue requirement for the gov.



# Simple optimal taxation model

- **Solving the model**

- Lagrangian :  $\mathcal{L} = [u(z - T(z)) + \lambda T(z)]h(z)$
- FOC in  $T(z)$

$$\frac{\partial \mathcal{L}}{\partial T(z)} = 0 = [-u'(z - T(z)) + \lambda]h(z)$$

$$u'(z - T(z)) = \lambda$$

$\Rightarrow z - T(z)$  is constant for all  $z$

$\Rightarrow$  after-tax income is the same for all

- **Utilitarianism and egalitarianism**

- Utilitarianism with decreasing marginal utility and no behavioural responses leads to perfect egalitarianism (Edgeworth, EJ 1897)

# Simple model : issues

## ① No behavioural responses

- Obvious problem : 100% MTR would destroy incentives to work and thus the assumption that pre-tax income is exogenous is unrealistic
  - Optimal income taxation needs to incorporate behavioural responses (Vickrey, 1945 ; Mirrlees, 1971)
- ⇒ efficiency-equity trade-off

# Simple model : issues

## ① No behavioural responses

- Obvious problem : 100% MTR would destroy incentives to work and thus the assumption that pre-tax income is exogenous is unrealistic
  - Optimal income taxation needs to incorporate behavioural responses (Vickrey, 1945 ; Mirrlees, 1971)
- ⇒ efficiency-equity trade-off

## ② Utilitarianism in question

- Even absent behavioural responses, many people would object to 100% redistribution
- Citizens' view on fairness impose bounds on redistribution
- Alternatives to utilitarianism have been discussed in the literature

# The Mirrlees model



James Mirrlees (1936–2018),  
British (Scottish) economist,  
Nobel Prize in 1996.

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  - Technical paper
  - Huge impact on information economics (e.g., models with asymmetric information in contract theory)
  - Until late 1990s not connected with empirical evidence

# The Mirrlees model



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- **Mirrlees (REStud, 1971)**
  - Technical paper
  - Huge impact on information economics (e.g., models with asymmetric information in contract theory)
  - Until late 1990s not connected with empirical evidence
- **An integrated tax/benefit system**
  - $T(.) < 0$  at the bottom (transfers)
  - $T(.) > 0$  further up

# Applied optimal income taxation

- **Few general results from Mirrlees model**

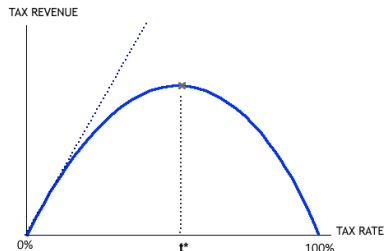
- 1 Non-negative MTR :  $T'(\cdot) > 0$  (i.e., rules out EITC/working tax credit)
- 2 MTR should be 0 at the top if the skill distribution is bounded

- **Connecting optimal models to data**

- Atkinson (1995), Diamond (AER 1998), Piketty (RFE 1997) and Saez (REStud 2001)
- General idea : deriving the optimal tax schedule as functions of elasticities and income distribution
- Surveys : Diamond and Saez (JEP 2011), Piketty and Saez (HPE 2013)

# Optimal linear income taxation

- **The popular Laffer curve**
  - Raising tax rates leads to behavioural effects
  - Revenue increases will be less than mechanical effects
  - Revenue curve inverted U-shape

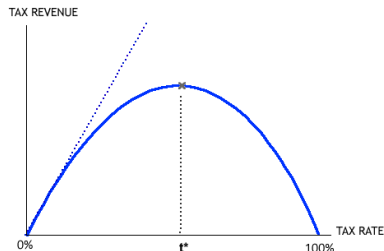




# Optimal linear income taxation

- **The popular Laffer curve**

- Raising tax rates leads to behavioural effects
- Revenue increases will be less than mechanical effects
- Revenue curve inverted U-shape



- **Notion known for a long time**

- Dupuit (1844) : revenue curve (cf. excess burden)

# Optimal linear income taxation

- **Optimal linear tax rate**

- Linear tax rate  $\tau$  with lump-sum grant  $T(0)$
- Individuals earn  $z$  and consume  $c = (1 - \tau)z + T(0)$
- Maximize  $u(c, z)$  to get  $z(1 - \tau, R)$  (labour supply choice)
- At the aggregate, total tax revenues  $R(\tau) = \tau Z(1 - \tau, R)$

# Optimal linear income taxation

- **Optimal linear tax rate**

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- Individuals earn  $z$  and consume  $c = (1 - \tau)z + T(0)$
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- At the aggregate, total tax revenues  $R(\tau) = \tau Z(1 - \tau, R)$

- **Revenue maximizing linear tax rate  $\tau^*$**

$$R'(\tau) = Z - \tau^* \frac{dZ}{d(1 - \tau)} = 0$$

$$\tau^* = \frac{1}{1 + e} \quad \text{with} \quad e = \frac{1 - \tau}{Z} \frac{dZ}{d(1 - \tau)}$$

- Top of the Laffer curve depends on  $e$  the elasticity of aggregate earnings to the net-of-tax rate

# Optimal linear income taxation

- **Generalized social welfare function**

- General SWF  $G(u^i)$  with Pareto weights  $\omega^i$
- Social marginal welfare weight  $g_i$  measures the € value for government of giving €1 extra to person  $i$  :  $g_i = \frac{\omega^i G'(u^i) u^i}{\lambda}$

$$SWF = \int_i \omega^i G$$

- **Gov. maximises generalized SWF**

- Gov. choose  $\tau$  to maximize :

$$\int_i \omega^i G[u^i((1 - \tau)z^i + \tau Z(1 - \tau) - E, z^i)] dvi(i)$$

# Optimal linear income taxation

- **Optimal linear rate**

- See derivation in Piketty and Saez (2013)

$$\tau^* = \frac{1 - \bar{g}}{1 - \bar{g} + e} \text{ with } \bar{g} = \frac{\int g_i z_i dv(i)}{Z}$$

- $\bar{g}$  average normalised social marginal welfare weight weighted by pre-tax income

# Optimal linear income taxation

- **Optimal linear rate**

- See derivation in Piketty and Saez (2013)

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- $\bar{g}$  average normalised social marginal welfare weight weighted by pre-tax income

- **Consequences on optimal tax rates**

- 1  $\tau^*$  decreases with aggregate elasticity  $e$
- 2  $\tau^*$  decreases with redistribution taste  $\bar{g}$   
e.g., no taste for redistribution ( $\bar{g} = 1$ ),  $\tau^* = 0$   
e.g., Rawlsian SWF ( $\bar{g} = 0$ ),  $\tau^* = \frac{1}{1+e}$
- 3  $\tau^*$  increases with inequality (higher inequality leads to lower  $\bar{g}$ )

# Optimal non-linear schedule

- Notations

- Denote  $T(z)$  the tax schedule at earnings level  $z$
- $T'(z)$  is the marginal tax schedule
- $H(z)$  is the cumulative distribution of taxpayers
- $h(z)$  is the density distribution of taxpayers
- $G(z)$  average social value of £1 for earners above  $z$

# Optimal non-linear schedule

- Small increase in the marginal tax schedule  $d\tau$  in the income range  $(z, z + dz)$

① Mechanical effect

$$dM = (1 - H(z))d\tau dz$$

② Behavioural response

$$dB = -e \times z \times d\tau \frac{T'(z)}{1 - T'(z)} h(z) dz$$

③ Welfare effect

$$dW = dMG(z)$$



# Optimal non-linear schedule

- Optimal marginal tax schedules

$$\frac{T'(z)}{1 - T'(z)} = \frac{1}{e} \frac{1 - H(z)}{zh(z)} (1 - G(z))$$

# Optimal non-linear schedule

- Optimal marginal tax schedules

$$\frac{T'(z)}{1 - T'(z)} = \frac{1}{e} \frac{1 - H(z)}{zh(z)} (1 - G(z))$$

- Determinants of the optimal tax schedule
  - 1 Elasticity of reported earnings  $e$
  - 2 Thinness of the income distribution
  - 3 Social value of consumption for individuals with given earnings level

# Optimal non-linear schedule

- Optimal marginal tax schedules

$$\frac{T'(z)}{1 - T'(z)} = \frac{1}{e} \frac{1 - H(z)}{zh(z)} (1 - G(z))$$

- Determinants of the optimal tax schedule
  - ① Elasticity of reported earnings  $e$
  - ② Thinness of the income distribution
  - ③ Social value of consumption for individuals with given earnings level
- Implications
  - Negative marginal tax rates are never optimal

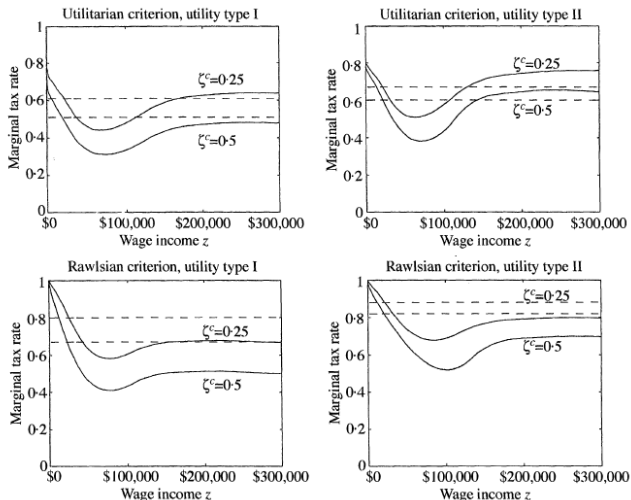
# Optimal non-linear schedule

- **Saez (REStud, 2001)**
  - Estimate optimal tax schedule on U.S. data
  - Estimate the shape of earnings distribution
  - Estimate earnings elasticity
  - Choose social welfare function
  - Estimate optimal tax schedule

# Optimal non-linear schedule

- **Saez (REStud, 2001)**
  - Estimate optimal tax schedule on U.S. data
  - Estimate the shape of earnings distribution
  - Estimate earnings elasticity
  - Choose social welfare function
  - Estimate optimal tax schedule
- **Brewer, Saez and Shephard (MR 2010)**
  - U.K. data for Mirrlees Review
  - Earnings elasticities estimated using 1980s tax changes
  - Large standard errors around estimates
  - e.g. top marginal tax rate in main scenario between 50.4% and 64.5%

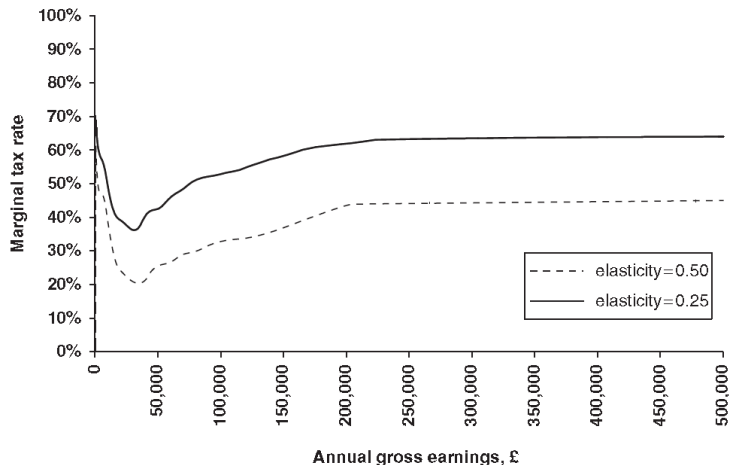
Figure 27 – Optimal tax simulations (U.S.)



SOURCE : Saez (2001), Fig. 5.

# Optimal non-linear schedule

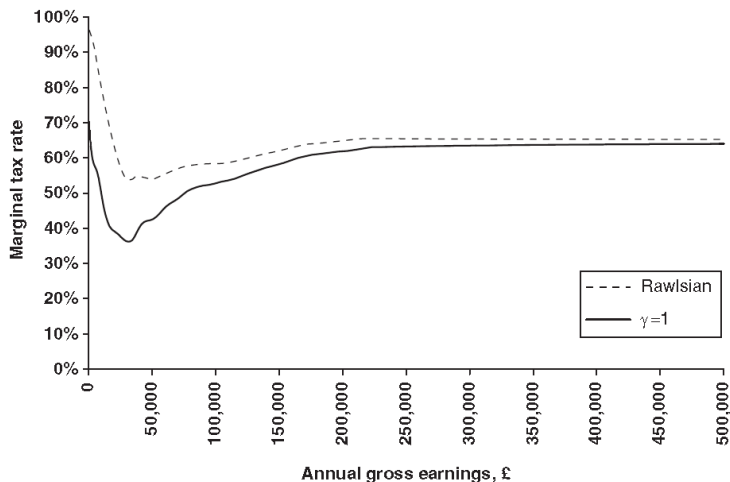
Figure 28 – Optimal tax sensitivity : labour elasticity



SOURCE : Brewer et al. (2010), Fig. 2.4A.

# Optimal non-linear schedule

Figure 29 – Optimal tax sensitivity : redistribution preference



SOURCE : Brewer et al. (2010), Fig 2.4B.



## VI. Policy : Taxing top incomes

- ① Evidence on elasticity of top incomes
- ② Policy debate : real responses vs avoidance vs rent seeking

# Evidence top incomes elasticity

- **Piketty and Saez (QJE, 2003)**

- Use application of Piketty *Les hauts revenus en France* (2001)
- Use tax returns to produce estimates of top income share for the U.S. (top 1%, top 0.1%, top 0.01%)
- Description of inequality over 1913-1998
- Suggest interpretation that tax policy or social norms behind the recent increase

- **World top income database**

- Large effort of data collection (A. Atkinson, T. Piketty, F. Alvaredo, E. Saez)
- Using tax returns computation of income shares across the world and over time
- Project based at PSE : Wealth and Income Database (WID.world)

# Top income shares times series

- **Saez, Slemrod and Giertz (JEL, 2012)**
  - Use top income share data for the U.S.
  - Relate change in  $s_t$  to change MTR, to get ETI

# Top income shares times series

- **Saez, Slemrod and Giertz (JEL, 2012)**
  - Use top income share data for the U.S.
  - Relate change in  $s_t$  to change MTR, to get ETI
- **Two empirical strategies**
  - 1 Tax reform episode

$$e = \frac{\log(s_1) - \log(s_0)}{\log(1 - \tau_1) - \log(1 - \tau_0)}$$

- 2 Full time series

$$\log(s_t) = \alpha + e \log(1 - \tau_t) + \nu_t$$

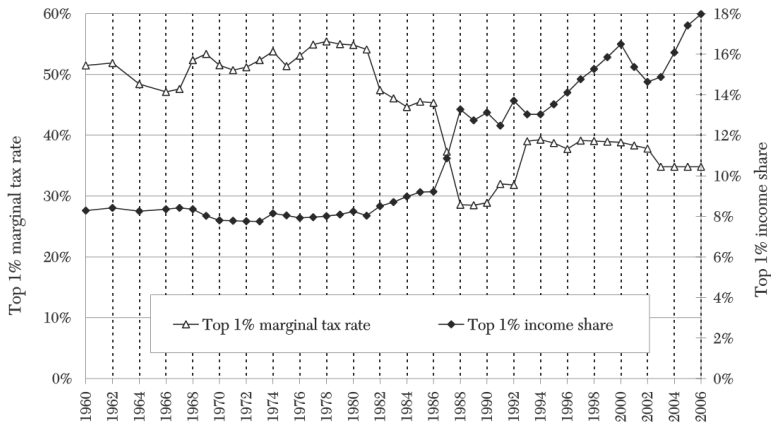
**Table 7 – Elasticity estimates using top income share time series**

	Top 1 percent (1)	Next 9 percent (2)
<b>Panel A. Tax reform episodes</b>		
1981 vs. 1984 (ERTA 1981)	0.60	0.21
1986 vs. 1988 (TRA 1986)	1.36	-0.20
1992 vs. 1993 (OBRA 1993)	0.45	
1991 vs. 1994 (OBRA 1993)	-0.39	
<b>Panel B. Full time series 1960–2006</b>		
No time trends	1.71	0.01
Linear time trend	0.82	-0.02
Linear and square time trends	0.74	-0.05
Linear, square, and cube time trends	0.58	-0.02

SOURCE : Saez, Slemrod and Giertz (2012), Tab. 1.

# Income share times series

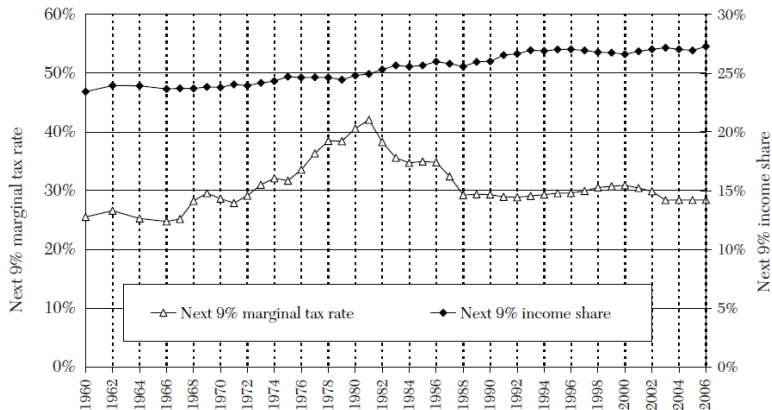
Figure 30 – Top 1 percent income share and marginal tax rate



SOURCE : Saez, Slemrod and Giertz (2012), Fig. 1.A.

# Income share times series

Figure 31 – Next 9% income share and marginal tax rate



SOURCE : Saez, Slemrod and Giertz (2012), Fig. 1.B.

# Income share times series

- **Long-run evidence in the U.S.**

- ① 1% share started to increase in 1981, precisely when top MTR was reduced
- ② Sharp jump in 1% share in 1986 with TRA86
- ③ 1% share increased further in the 1990s despite increase in the top MTR
- ④ No correlation for incomes in 90-99th percentile
- ⑤ Top income shares sometimes do not respond to large rate cuts

e.g., Kennedy tax cuts in the 1960s

- **Tax avoidance and fiscal externalities**

- ① Income shifting between corporate and personal tax base
- ② Inter-temporal shifting



# Income Shifting to Corporate Income

- **Corporate vs individual tax base**
  - Business owners have the choice between
    - corporation status
    - unincorporated business (pass-through entities)
  - Profits of corporation is taxed by
    - corporation income tax (CIT)  $\tau_{cit}$
    - distributed profit taxed by personal income tax (PIT) either by dividend tax  $\tau_{div}$  or by capital gains  $\tau_{cg}$
  - Profits of unincorporated business taxed by PIT  $\tau_{inc}$
- **Income shifting between corporate and personal tax base**
  - Relative tax advantage for incorporation if

$$(1 - \tau_{cit})(1 - \tau_{div}) > 1 - \tau_{inc}$$

# Anatomy of behavioural response

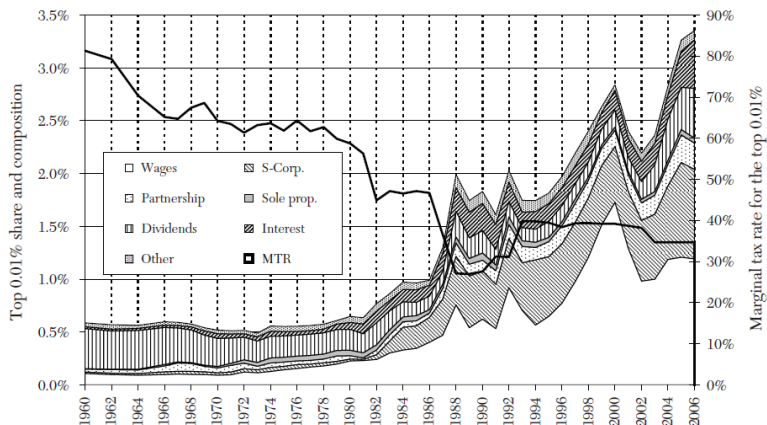
- **U.S. TRA 1986 reform**

- Before TRA 86,  $\tau_{inc}$  much higher than  $\tau_{cit}$
- So corporate status was more advantageous
- After 1986, better to shift to PIT : sole proprietorships, partnerships, S-corporations

- **Evidence of corporate income shifting**

- Large shifting from PIT to CIT after 1986 (Slemrod, 1995 ; Gordon and Slemrod, 2000)
- Explain the large ETI found for TRA86

**Figure 32 – The Top 0.01 Percent U.S. Income Share, Composition, and Marginal Tax Rate, 1960–2006**

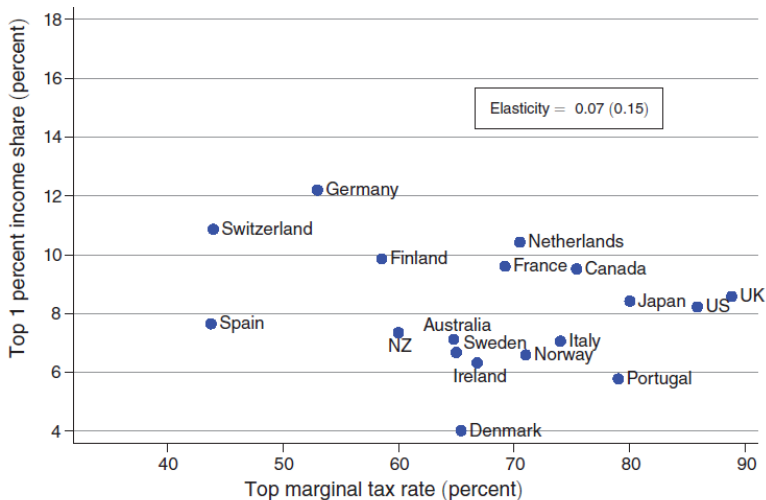


SOURCE : Saez, Slemrod and Giertz (2012), Fig. 2.

# International top incomes

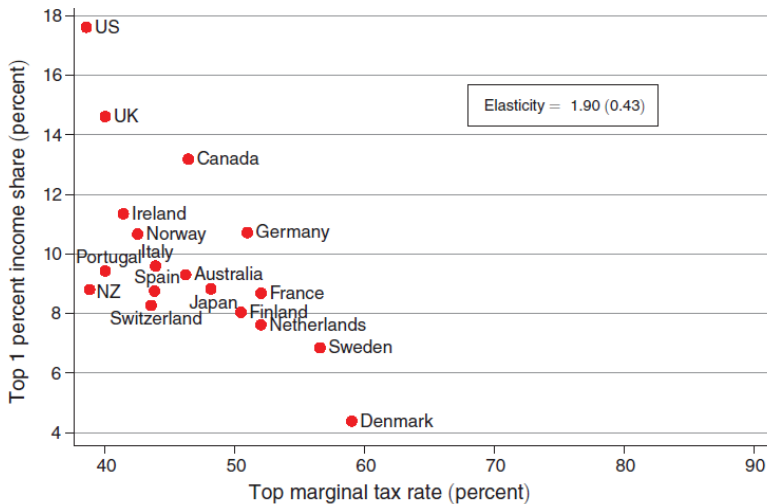
- **Piketty, Saez and Stantcheva (AEJ-EP, 2014)**
  - Exploit pre-tax top 1% income share from 18 OECD countries since 1960
  - Relate changes to MTR to infer elasticity
- **Results**
  - Very small elasticity in 1960-80 : 0.007
  - Large elasticity in 1981-2010 : 0.626
  - Test impact on GDP per capita : no significant effect

Figure 33 – Top 1 percent share and top marginal tax rate in 1960-1964



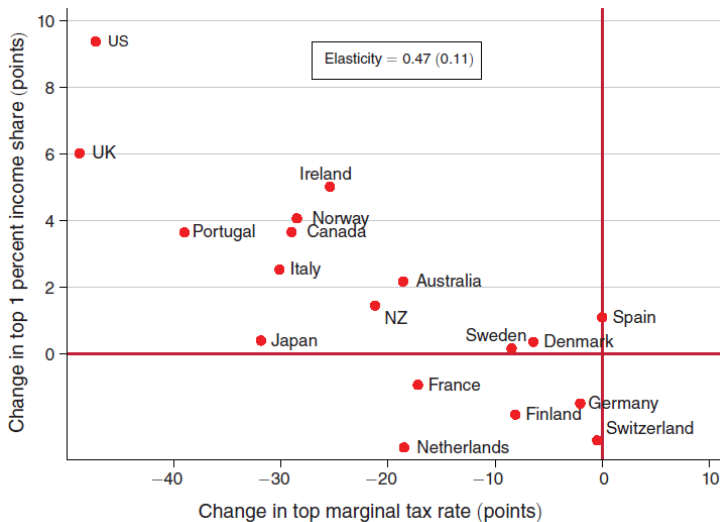
SOURCE : Piketty, Saez and Stantcheva (AEJ-EP 2014), Fig. 2.A.

Figure 34 – Top 1 percent share and top marginal tax rate in 2005-2009



SOURCE : Piketty, Saez and Stantcheva (AEJ-EP 2014), Fig. 2.B.

Figure 35 – Changes in Top Income Shares and Top Marginal Tax Rates



SOURCE : Piketty, Saez and Stantcheva (AEJ-EP 2014), Fig. 3.

# Income tax reforms

- **Large cuts in top marginal tax rates**
  - US, 1972 : top marginal tax rate from 72% to 60%
  - US, Tax Reform Act 1986 : top marginal tax rate from 50% to 28%
  - UK, 1979 : top marginal tax rate from 83% to 60%
  - UK, 1988 : top marginal tax rate from 60% to 40%
  - Sweden, 1991 : top marginal tax rate from 80% to 50%



# Income tax reforms

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- US, Tax Reform Act 1986 : top marginal tax rate from 50% to 28%
- UK, 1979 : top marginal tax rate from 83% to 60%
- UK, 1988 : top marginal tax rate from 60% to 40%
- Sweden, 1991 : top marginal tax rate from 80% to 50%

- **Modest reversal ?**

- Bush then Clinton tax increase in early 1990s : top marginal rate from 28% to 40%
- Brown in latest budget, increase from 40% to 50%.

# The side of the Laffer curve

- **Do tax cuts pay for themselves ?**
  - With Reagan, idea that tax cut would pay for themselves
  - Large deficits have followed the Tax Reform Act 1986
  - Tax increases from Bush senior and Clinton : large budget surplus  
⇒ Popular view that tax cuts visibly don't pay for themselves

# The side of the Laffer curve

- **Do tax cuts pay for themselves ?**
  - With Reagan, idea that tax cut would pay for themselves
  - Large deficits have followed the Tax Reform Act 1986
  - Tax increases from Bush senior and Clinton : large budget surplus  
⇒ Popular view that tax cuts visibly don't pay for themselves
- **On the wrong side of the Laffer curve ?**
  - Use the formula of linear taxation

$$\tau^* = \frac{1 - \bar{g}}{1 - \bar{g} + e}$$

- Choose different plausible elasticity  $e$
- Different redistribution taste  $\bar{g}$

# The side of the Laffer curve

Table 8 – Optimal linear tax rate formula

	Elasticity $e = 0.25$		Elasticity $e = 0.5$		Elasticity $e = 1$	
	$\bar{g}$	$\tau^*$	$\bar{g}$	$\tau^*$	$\bar{g}$	$\tau^*$
<b>A. Optimal linear rate <math>\tau^*</math></b>						
Rawlsian SWF	0	80%	0	67%	0	50%
Utilitarian SWF	0.61	61%	0.54	48%	0.44	36%
<b>B. Revealed preference for redistribution <math>\bar{g}</math></b>						
US tax level (35%)	0.87	35%	0.73	35%	0.46	35%
EU tax level (50%)	0.75	50%	0.50	50%	0.0	50%

SOURCES : Piketty and Saez (2013), Tab. 2.

# Policy debate w.r.t. top incomes

## Sources of top income inequality

### ① Technology

- Technology favours skilled workers
- IT favours entrepreneurs who can reach globally

### ② Supply side story

- People at the top work more : top income now higher because top marginal rates are lower

### ③ Tax avoidance story

- Top earners avoid less when top tax rate decreases
- International mobility

### ④ Rent-seeking

- Top earners extract more pay when top rates are low

# Policy debate w.r.t. top incomes

- **Three main positions**

- ① Lower top marginal tax rates (supply side)
- ② Broaden the tax base and international coordination (to reduce avoidance)
- ③ Increase top marginal tax rates (to lower rent-seeking)

# Policy debate w.r.t. top incomes

- **Three main positions**

- ① Lower top marginal tax rates (supply side)
- ② Broaden the tax base and international coordination (to reduce avoidance)
- ③ Increase top marginal tax rates (to lower rent-seeking)

- **Piketty, Saez and Stantcheva (AEJ-EP, 2014)**

- Discuss the optimal policy in terms of three elasticities
  - a) labour supply  $e_1$
  - b) tax avoidance  $e_2$
  - c) compensation bargaining  $e_3$

# Policy debate w.r.t. top incomes

- **Real changes vs. tax avoidance**
  - According to the tax avoidance story, increase in top income shares is overestimated  
⇒ U.S. top incomes shares were already high in the 1960s but reported income was smaller



# Policy debate w.r.t. top incomes

- **Real changes vs. tax avoidance**

- According to the tax avoidance story, increase in top income shares is overestimated  
⇒ U.S. top incomes shares were already high in the 1960s but reported income was smaller

- **Evidence against this scenario**

- (1) Correlation with MTR similar when using narrow tax-base measure (e.g., excluding capital gains)
- (2) Charitable giving (tax deductible) has grown along with top incomes

- **Evidence in favour of this explanation**

- Causal impact of change MTR have a hard time finding large real effects
- Evidence of tax avoidance (e.g., shifting)

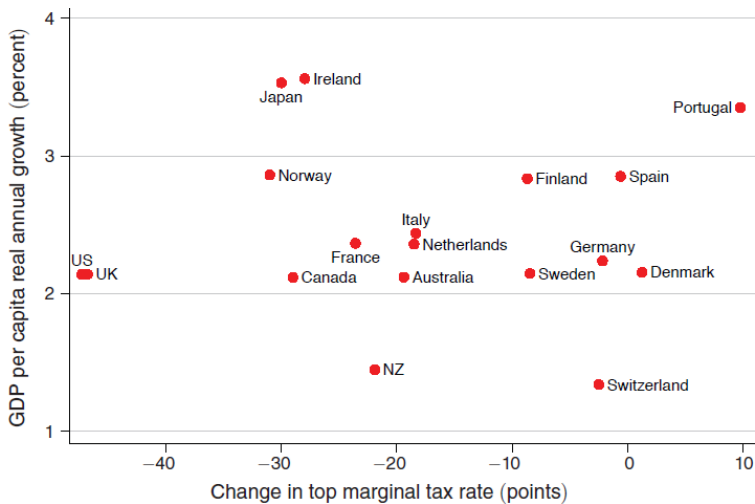
# Policy debate w.r.t. top incomes

- **Supply-side vs. rent seeking ?**
  - According to supply side story, lower MTR should have led to higher growth
  - According to rent-seeking story : higher top income share is at the expense of bottom 99%

# Policy debate w.r.t. top incomes

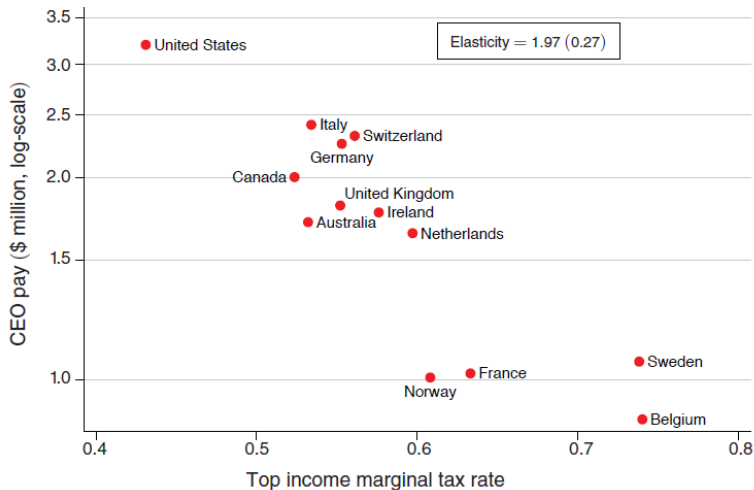
- **Supply-side vs. rent seeking ?**
  - According to supply side story, lower MTR should have led to higher growth
  - According to rent-seeking story : higher top income share is at the expense of bottom 99%
- **Evidence in favour**
  - (1) No correlation between MTR and growth
  - (2) CEO pay across countries negatively correlated with top MTR

Figure 36 – Growth and change in top marginal tax rate



SOURCE : Piketty, Saez and Stantcheva (AEJ-EP, 2014), Fig. 4.A.

Figure 37 – Average CEO compensation



SOURCE : Piketty, Saez and Stantcheva (AEJ-EP, 2014), Fig. 5.A.

Table 9 – Synthesis of various scenarios

Scenario 1 : Standard supply-side tax effects	Scenario 2 : Tax-avoidance effects		Scenario 3 : Compensation- bargaining effects
	(a) Current narrow tax base	(b) After base broadening	
<b>Panel A. Total elasticities</b> $e = e_1 + e_2 + e_3 = 0.5$			
$e_1 = 0.5$	$e_1 = 0.2$	$e_1 = 0.2$	$e_1 = 0.2$
$e_2 = 0.0$	$e_2 = 0.3$	$e_2 = 0.1$	$e_2 = 0.0$
$e_3 = 0.0$	$e_3 = 0.0$	$e_3 = 0.0$	$e_3 = 0.3$
<b>Panel B. Optimal top tax rate</b> $\tau^* = (1 + tae_2 + ae_3)/(1 + ae)$			
Pareto coefficient $a = 1.5$			
Pareto coefficient $t = 20\%$			
$\tau^* = 57\%$	$\tau^* = 62\%$	$\tau^* = 71\%$	$\tau^* = 83\%$

SOURCE : Piketty, Saez and Stantcheva (AEJ-EP, 2014), Tab. 5.

# Debate among economists

- **Mankiw, Weinzierl and Yagan (JEP 2009)**
  - ① Optimal MTR schedule could decline at high incomes
  - ② Flat tax and universal lump-sum transfer is close to optimal
  - ③ Capital income should not be taxed

# Debate among economists

- **Mankiw, Weinzierl and Yagan (JEP 2009)**
  - ① Optimal MTR schedule could decline at high incomes
  - ② Flat tax and universal lump-sum transfer is close to optimal
  - ③ Capital income should not be taxed
- **Diamond and Saez (JEP 2013)**
  - ① Very high earnings should be subject to rising MTR and higher rates than current U.S. policy for top earners
  - ② Tax/transfer policy toward low earners should include subsidization of earnings and should phase out the subsidization at a relatively high rate
  - ③ Capital income should be taxed



# Debate among economists

- **Mankiw (JEP 2013) : “defending the one percent”**
  - Technology and great innovators lead to wealth
  - Equality of opportunity is better than ex post equality
  - Utilitarianism is flawed as philosophical guideline

# Debate among economists

- **Mankiw (JEP 2013) : “defending the one percent”**
  - Technology and great innovators lead to wealth
  - Equality of opportunity is better than ex post equality
  - Utilitarianism is flawed as philosophical guideline
- **Piketty (2013)**
  - Confiscatory rates for top incomes are necessary
  - Optimal top marginal tax rate should be around 80%
  - Prevent rent-seeking, no objective to raise revenue

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