# AEA Continuing Education Program

# Inequality and Innovation

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# Inequality and Innovation

## Lecture Slides 6: Facts on Inequality, Classical Optimal Income Taxation Model, Responses to Top Taxation, and Capital Taxation.

Stefanie Stantcheva
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January 7, 2019

# Key Facts on Inequality and Mobility

## Macro-aggregates: Labor vs. Capital Income

Labor income $wl \simeq 75\%$ of national income $z$

Capital income $rk \simeq 25\%$ of national income $z$ (has increased in recent decades)

Wealth stock $k \simeq 400 - 500\%$ of national income $z$ (is increasing)

Rate of return on capital $r \simeq 5\%$

$\alpha = \beta \cdot r$ where $\alpha = rk/z$ share of capital income and $\beta = k/z$ wealth to income ratio

In GDP, gross capital share is higher (35%) because it includes depreciation of capital ($\simeq$ 10% of GDP)

National Income = GDP - depreciation of capital + net foreign income

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## Income Inequality: Labor vs. Capital Income

Capital Income (or wealth) is more concentrated than Labor Income. In the US:

Top 1% wealth holders have 40% of total wealth (Saez-Zucman 2014). Bottom 50% wealth holders hold almost no wealth.

Top 1% incomes earn about 20% of total national income on a pre-tax basis (Piketty-Saez-Zucman, 2016)

Top 1% labor income earners have about 15% of total labor income

## Income Inequality Measurement

Inequality can be measured by indexes such as Gini, log-variance, quantile income shares which are functions of the income distribution $F(z)$

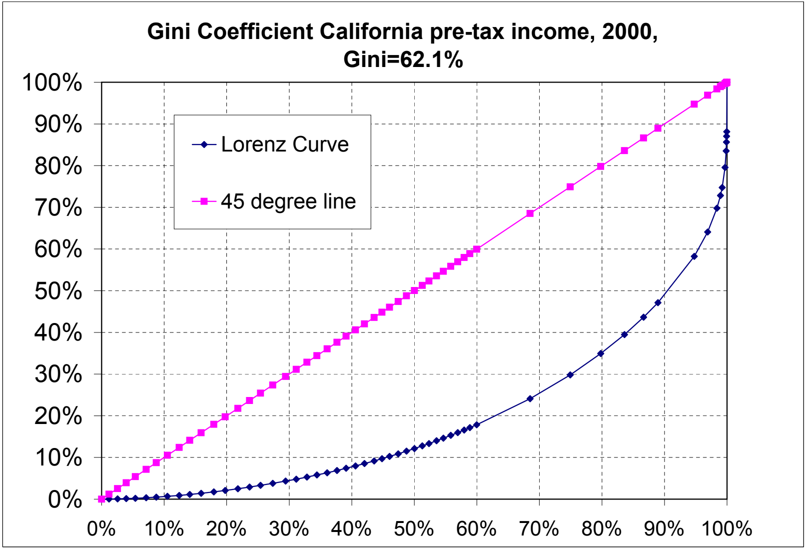
Gini = 2 * area between 45 degree line and Lorenz curve

Lorenz curve $L(p)$ at percentile $p$ is fraction of total income earned by individuals below percentile $p$

$0 \leq L(p) \leq p$

Gini=0 means perfect equality

Gini=1 means complete inequality (top person has all the income)




Source: Annual Report 2001 California Franchise Tax Board

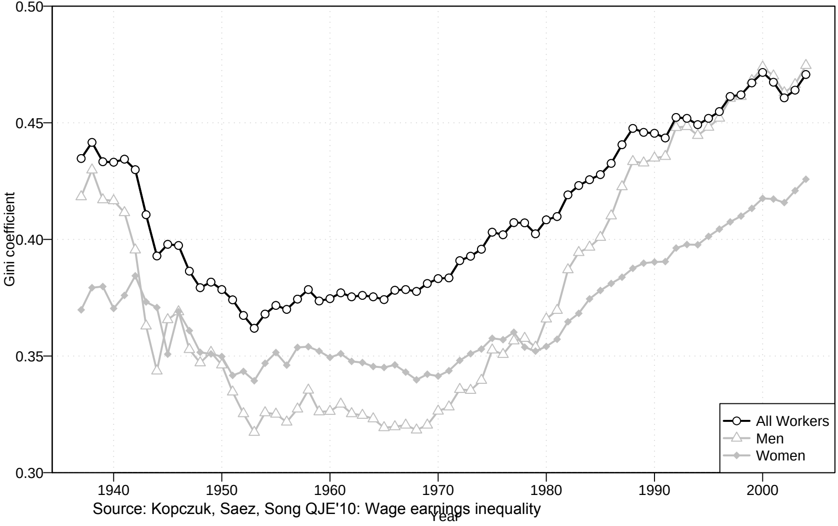
## Key Empirical Facts on Income/Wealth Inequality

1) In the US, labor income inequality has increased substantially since 1970: due to skilled biased technological progress vs. institutions (min wage and Unions) [Autor-Katz'99]

2) US top income shares dropped dramatically from 1929 to 1950 and increased dramatically since 1980. Bottom 50% incomes have stagnated in real terms since 1980 [Piketty-Saez-Zucman '16 distribute full National Income]

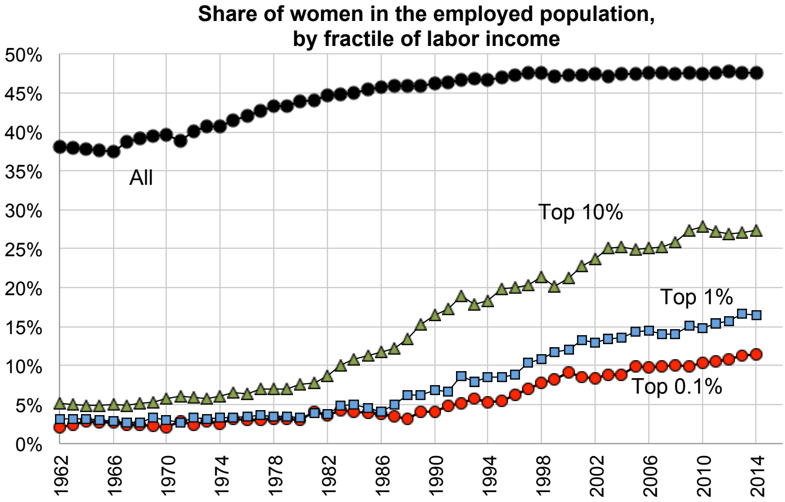
3) Fall in top income shares from 1900-1950 happened in most OECD countries. Surge in top income shares has happened primarily in English speaking countries, and not as much in Continental Europe and Japan [Atkinson, Piketty, Saez JEL'11]

**Figure 1: Gini coefficient**

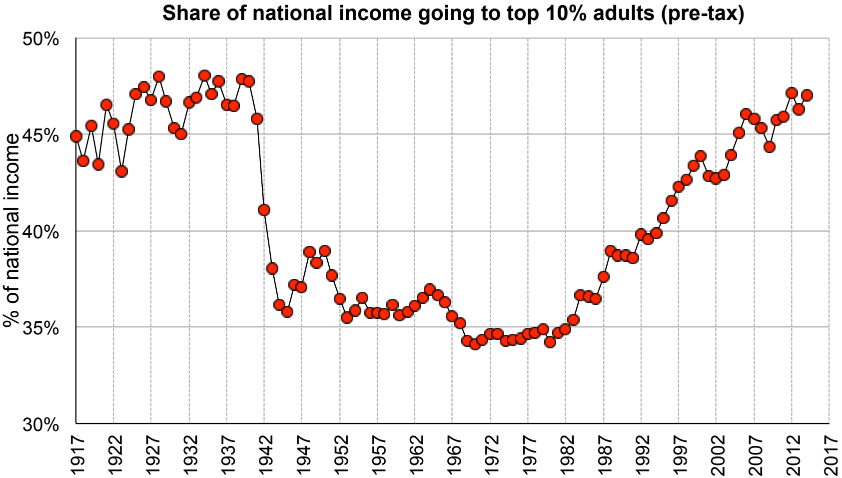



Source: Kopczuk, Saez, Song QJE'10: Wage earnings inequality

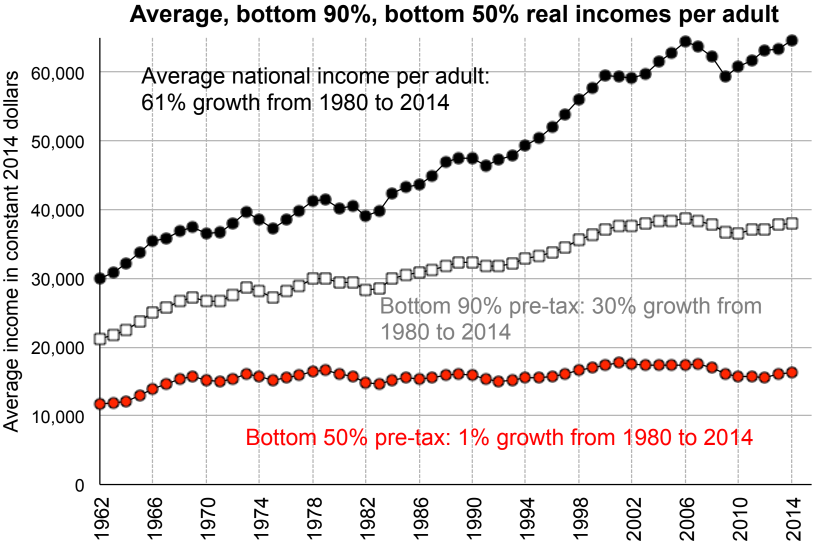
# Men still make 85% of the top 1% of the labor income distribution

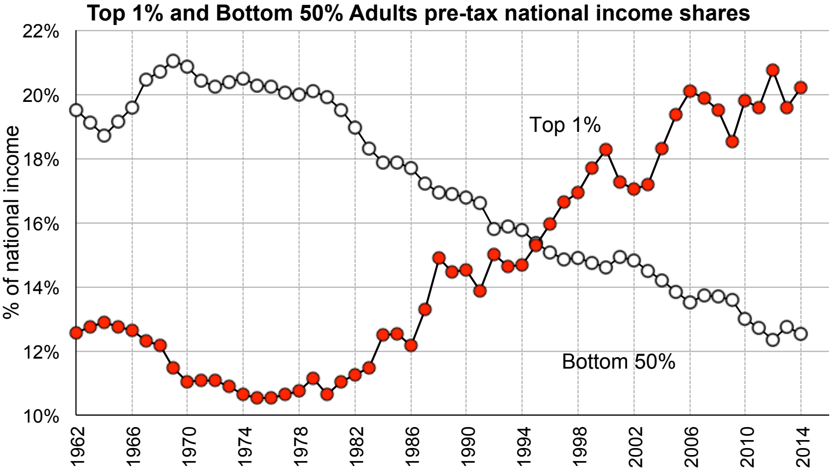



Source: Appendix Table II-F1.

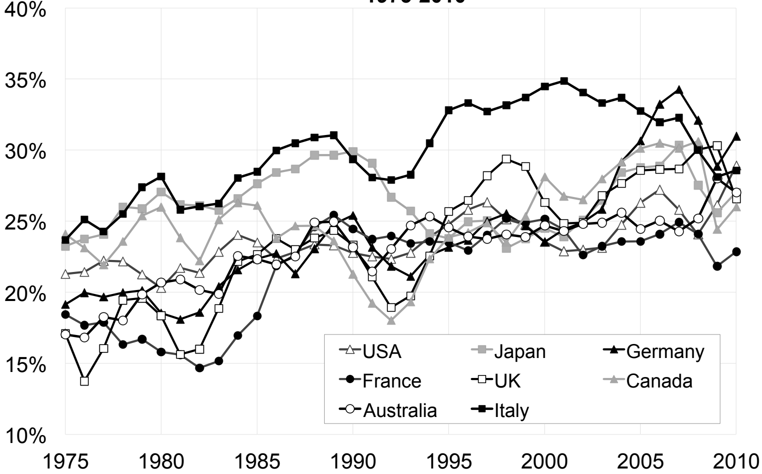


Source: Appendix Tables II-B1 and II-C1


Average, bottom 90%, bottom 50% real incomes per adult
Average income in constant 2014 dollars
0
10,000
20,000
30,000
40,000
50,000
60,000
1962
1966
1970
1974
1978
1982
1986
1990
1994
1998
2002
2006
2010
2014
Average national income per adult:
61% growth from 1980 to 2014
Bottom 90% pre-tax: 30% growth from
1980 to 2014
Bottom 50% pre-tax: 1% growth from 1980 to 2014

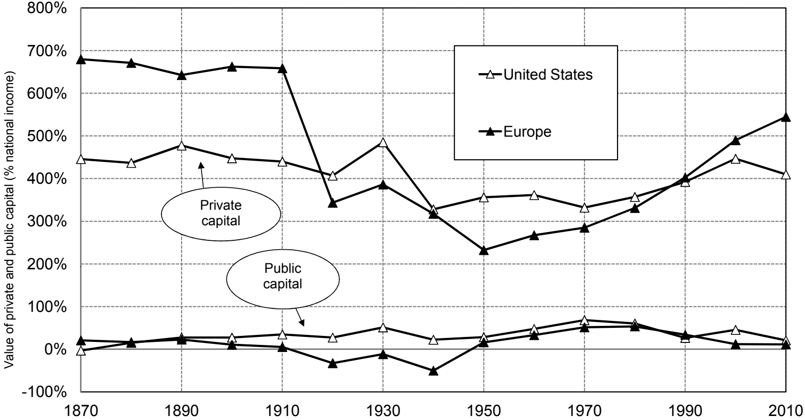

Top 1% and Bottom 50% Adults pre-tax national income shares
% of national income
22%
20%
18%
16%
14%
12%
10%
Top 1%
Bottom 50%
1962
1966
1970
1974
1978
1982
1986
1990
1994
1998
2002
2006
2010
2014

## Figure 12: Capital shares in factor-price national income 1975-2010




Source: Piketty and Zucman (2014)

**Figure 5.1. Private and public capital: Europe and America, 1870-2010**




The fluctuations of national capital in the long run correspond mostly to the fluctuations of private capital (both in Europe and in the U.S.). Sources and series: see piketty.pse.ens.fr/capital21c.

Source: Piketty (2014)

## Key Empirical Facts on Income/Capital Inequality Cross-Sectionally

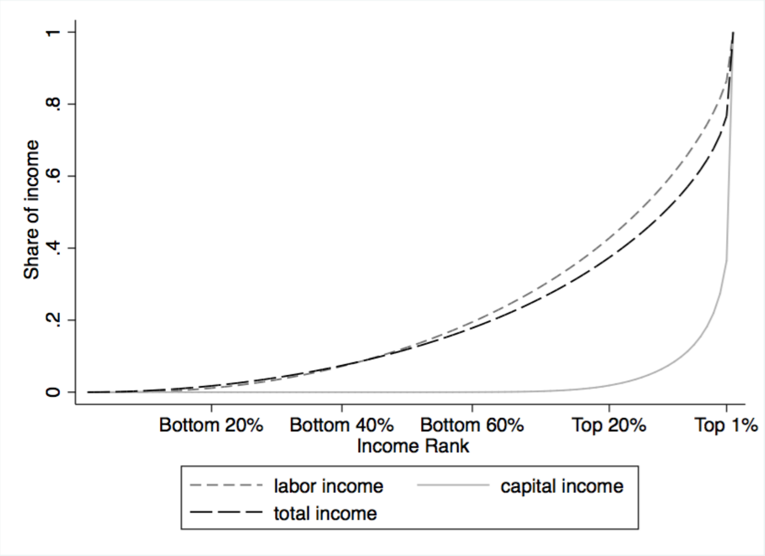
Based on IRS tax returns data from Saez and Zucman (2015) for 2007.

Fact 1: Capital income is more unequally distributed than labor income.

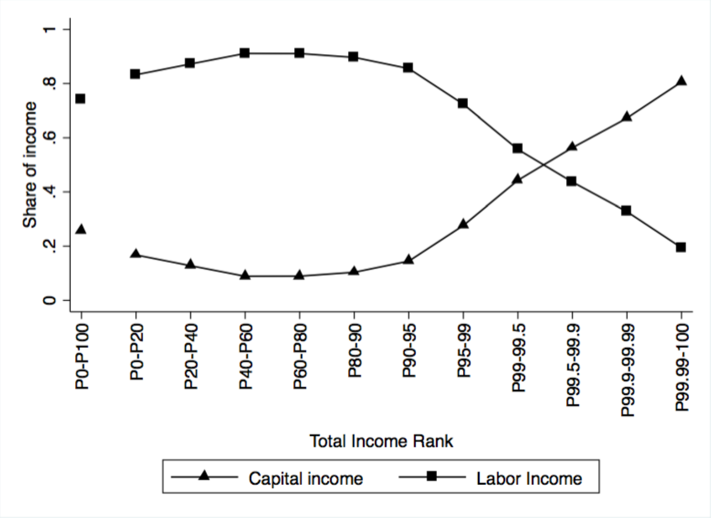
Fact 2: At the top, total income is mostly capital income.

Fact 3: Two-dimensional heterogeneity: even conditional on labor income, a lot of inequality in capital income.

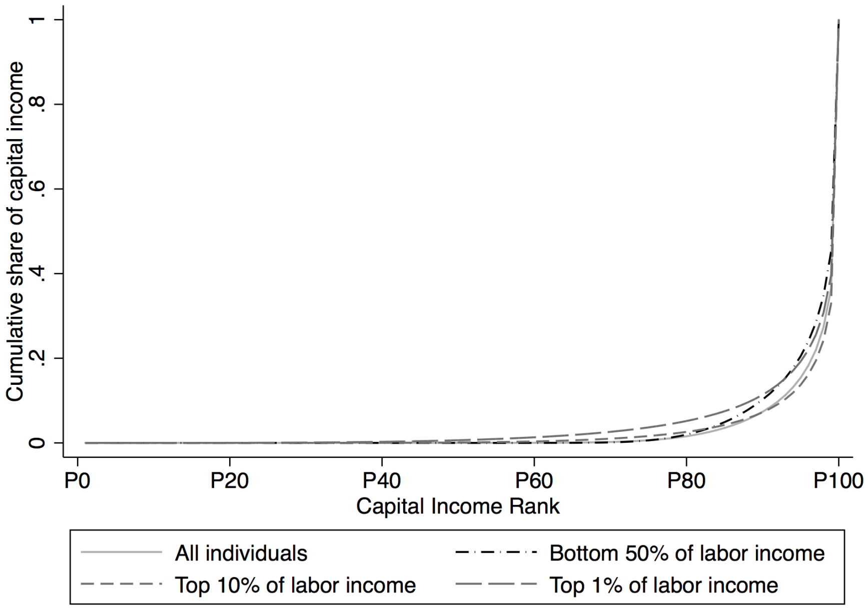
# Labor, Capital, and Total Income Distributions (Fact 1)

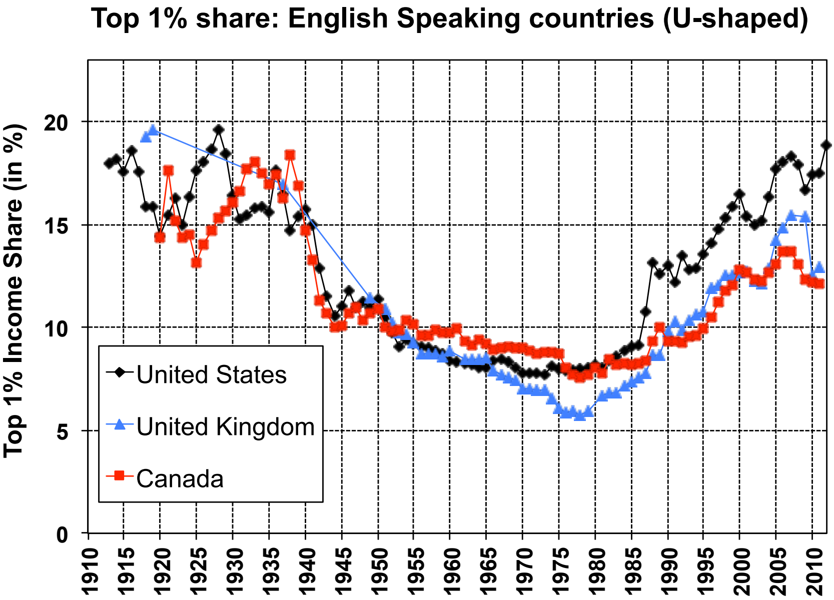


# Labor, Capital, and Total Income Distributions (Fact 2)

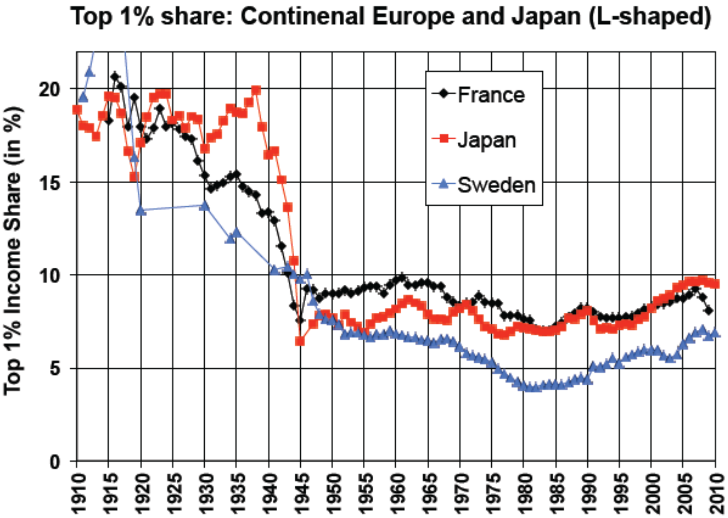


# Capital Income Conditional on Labor Income (Fact 3)





Top 1% share: English Speaking countries (U-shaped)
Top 1% Income Share (in %)
0
5
10
15
20
1910
1915
1920
1925
1930
1935
1940
1945
1950
1955
1960
1965
1970
1975
1980
1985
1990
1995
2000
2005
2010
United States
United Kingdom
Canada




Source: THE WORLD TOP INCOMES DATABASE

## Measuring Intergenerational Income Mobility

Strong consensus that children's success should not depend too much on parental income [Equality of Opportunity]

Studies linking adult children to their parents can measure link between children and parents income

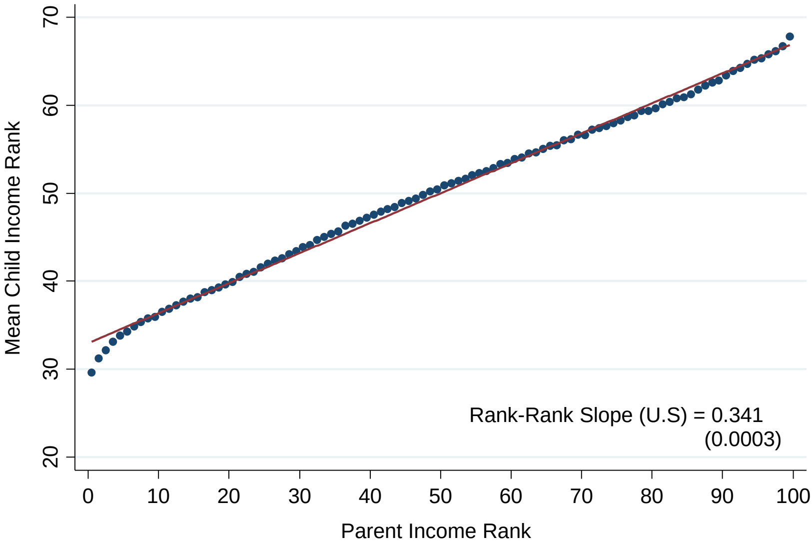
Simple measure: average income rank of children by income rank of parents [Chetty et al. 2014]

1) US has less mobility than European countries (especially Scandinavian countries such as Denmark)

2) Substantial heterogeneity in mobility across cities in the US

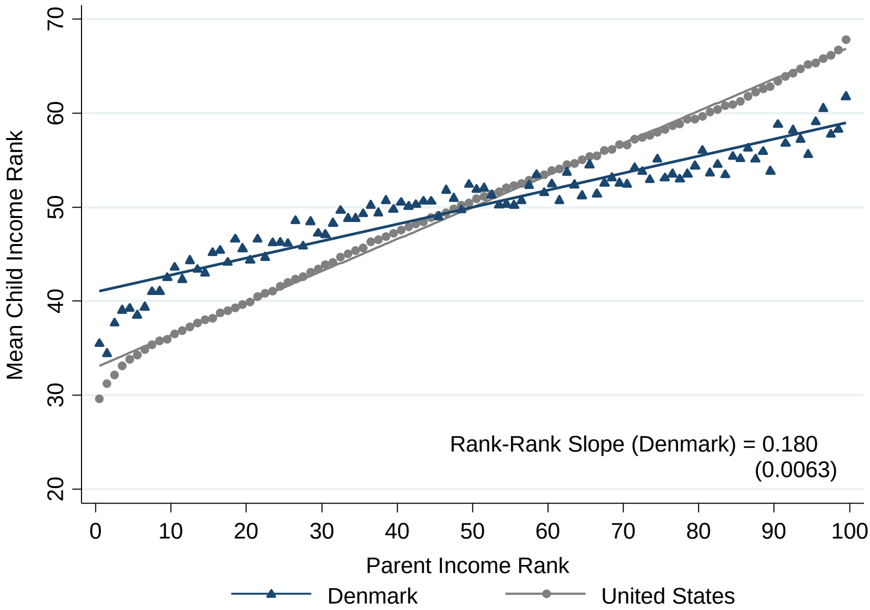
3) Places with low race/income segregation, low income inequality, good K-12 schools, high social capital, high family stability tend to have high mobility [these are correlations and do not imply causality]

**A. Mean Child Income Rank vs. Parent Income Rank in the U.S.**




Source: Chetty, Hendren, Kline, Saez (2014)

**B. United States vs. Denmark**

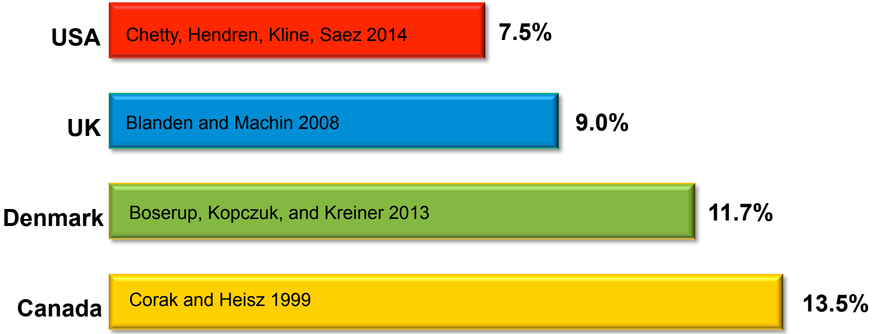



Source: Chetty, Hendren, Kline, Saez (2014)

Source: Chetty et al. (2014)

# The American Dream?

- Probability that a child born to parents in the bottom fifth of the income distribution reaches the top fifth:



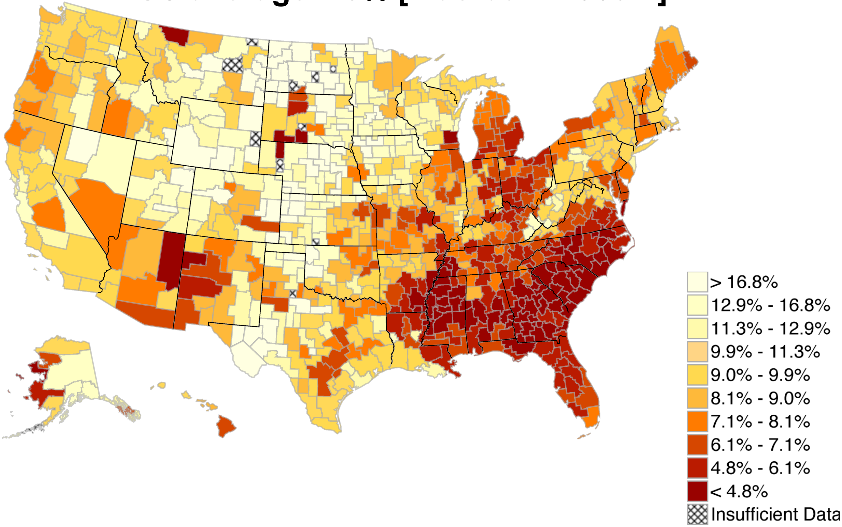

→ Chances of achieving the "American Dream" are almost two times higher in Canada than in the U.S.

Source: Chetty et al. (2014)

# The Geography of Upward Mobility in the United States

## Probability of Reaching the Top Fifth Starting from the Bottom Fifth

## US average 7.5% [kids born 1980-2]




*Note: Lighter Color = More Upward Mobility*

*Download Statistics for Your Area at www.equality-of-opportunity.org*

Source: Chetty et al. (2014)

# The Geography of Upward Mobility in the United States

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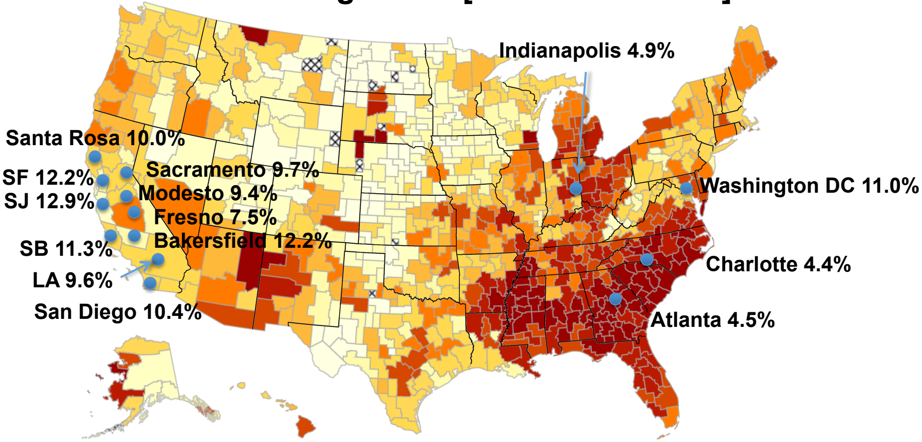



*Note: Lighter Color = More Upward Mobility*
*Download Statistics for Your Area at www.equality-of-opportunity.org*

TABLE 1. Upward Mobility in the 50 Largest Metro Areas: The Top 10 and Bottom 10

| Rank | Commuting Zone | Odds of Reaching Top Fifth from Bottom Fifth | Rank | Commuting Zone | Odds of Reaching Top Fifth from Bottom Fifth |
|---|---|---|---|---|---|
| 1 | San Jose, CA | 12.9% | 41 | Cleveland, OH | 5.1% |
| 2 | San Francisco, CA | 12.2% | 42 | St. Louis, MO | 5.1% |
| 3 | Washington, D.C. | 11.0% | 43 | Raleigh, NC | 5.0% |
| 4 | Seattle, WA | 10.9% | 44 | Jacksonville, FL | 4.9% |
| 5 | Salt Lake City, UT | 10.8% | 45 | Columbus, OH | 4.9% |
| 6 | New York, NY | 10.5% | 46 | Indianapolis, IN | 4.9% |
| 7 | Boston, MA | 10.5% | 47 | Dayton, OH | 4.9% |
| 8 | San Diego, CA | 10.4% | 48 | Atlanta, GA | 4.5% |
| 9 | Newark, NJ | 10.2% | 49 | Milwaukee, WI | 4.5% |
| 10 | Manchester, NH | 10.0% | 50 | Charlotte, NC | 4.4% |

Note: This table reports selected statistics from a sample of the 50 largest commuting zones (CZs) according to their populations in the 2000 Census. The columns report the percentage of children whose family income is in the top quintile of the national distribution of child family income conditional on having parent family income in the bottom quintile of the parental national income distribution—these probabilities are taken from Online Data Table VI of Chetty et al., 2014a.

Source: Chetty et al., 2014a.

# Optimal Income Taxation

Main reference is “"Optimal Labor Income Taxation" Thomas Piketty, and Emmanuel Saez, NBER Working Paper No. 18521, published in Handbook of Public Economics, Volume 5, 2013, 391-474.

Available at https://eml.berkeley.edu/~saez/.

## Govt Redistribution with Taxes and Transfers

Government taxes individuals based on income and consumption and provides transfers: $z$ is pre-tax income, $y = z - T(z) + B(z)$ is post-tax income

1) If inequality in $y$ is less than inequality in $z$ $\Leftrightarrow$ tax and transfer system is redistributive (or progressive)

2) If inequality in $y$ is more than inequality in $z$ $\Leftrightarrow$ tax and transfer system is regressive

a) If $y = z \cdot (1 - t)$ with constant $t$, tax/transfer system is neutral

b) If $y = z \cdot (1 - t) + G$ where $G$ is a universal (lumpsum) allowance, then tax/transfer system is progressive

c) If $y = z - T$ where $T$ is a uniform tax (poll tax), then tax/transfer system is regressive

Current tax/transfer systems in rich countries look roughly like b)

## US Distributional National Accounts

Piketty-Saez-Zucman NBER'16 distribute both pre-tax and post-tax US national income across adult individuals

Pre-tax income is income before taxes and transfers

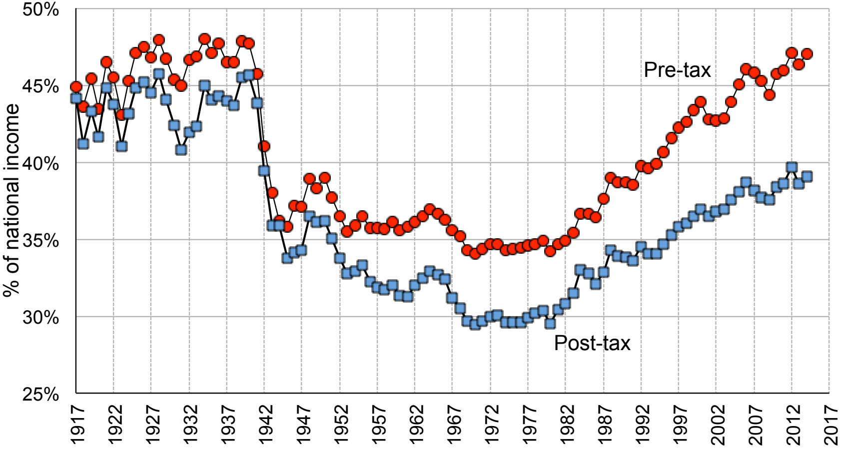
Post-tax income is income net of all taxes and adding all transfers and public good spending

Both concepts add up to national income and provide a comprehensive view of the mechanical impact of government redistribution

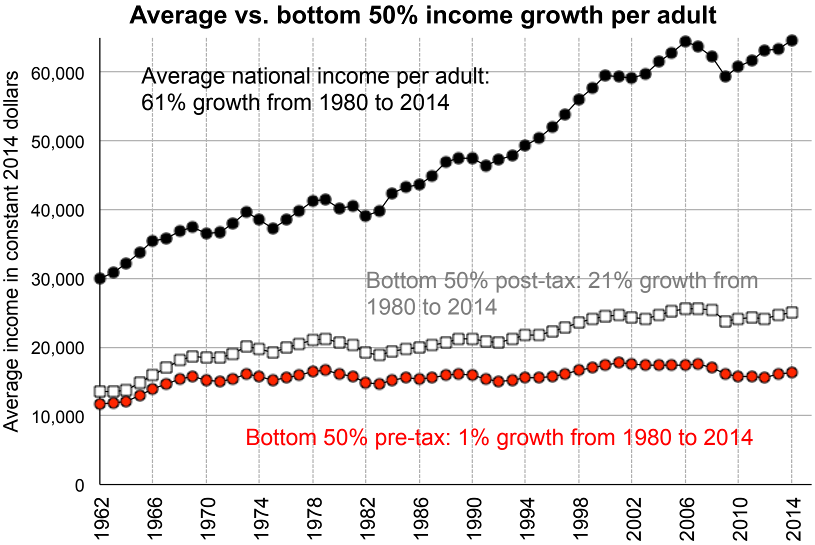
National Income Distribution 2014 from Piketty, Saez, and Zucman NBER '16

| | | Pre-tax income | | Post-tax income | |
|---|---|---|---|---|---|
| **Income group** | **Number of adults** | **Average income** | **Income share** | **Average income** | **Income share** |
| Full Population | 234,400,000 | $64,600 | 100% | $64,600 | 100% |
| Bottom 50% | 117,200,000 | $16,200 | 12.5% | $25,000 | 19.4% |
| Middle 40% | 93,760,000 | $65,400 | 40.5% | $67,200 | 41.6% |
| Top 10% | 23,440,000 | $304,000 | 47.0% | $252,000 | 39.0% |
| Top 1% | 2,344,000 | $1,300,000 | 20.2% | $1,010,000 | 15.6% |
| Top 0.1% | 234,400 | $6,000,000 | 9.3% | $4,400,000 | 6.8% |
| Top 0.01% | 23,440 | $28,100,000 | 4.4% | $20,300,000 | 3.1% |
| Top 0.001% | 2,344 | $122,000,000 | 1.9% | $88,700,000 | 1.4% |

Top 10% national income share: pre-tax vs. post-tax




Source: Appendix Tables II-B1 and II-C1



Average vs. bottom 50% income growth per adult
Average income in constant 2014 dollars
0
10,000
20,000
30,000
40,000
50,000
60,000
Average national income per adult:
61% growth from 1980 to 2014
Bottom 50% post-tax: 21% growth from
1980 to 2014
Bottom 50% pre-tax: 1% growth from 1980 to 2014
1962
1966
1970
1974
1978
1982
1986
1990
1994
1998
2002
2006
2010
2014

## US tax/transfer System: Progressivity and Evolution

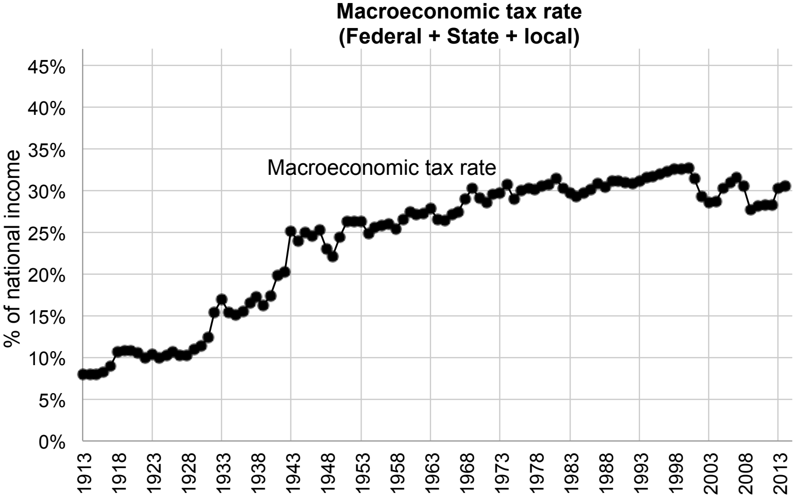
**0) US Tax/Transfer system is progressive overall:** pre-tax national income is less equally distributed than post-tax/post-transfer national income

**1) Medium Term Changes:** Federal Tax Progressivity has declined since 1970 but govt redistribution through transfers has increased (Medicaid, Social Security retirement, DI, UI various income support programs)

**2) Long Term Changes:** Before 1913, US taxes were primarily tariffs, excises, and real estate property taxes [slightly regressive], minimal welfare state (and hence small govt)

http://www.treasury.gov/education/fact-sheets/taxes/ustax.shtml

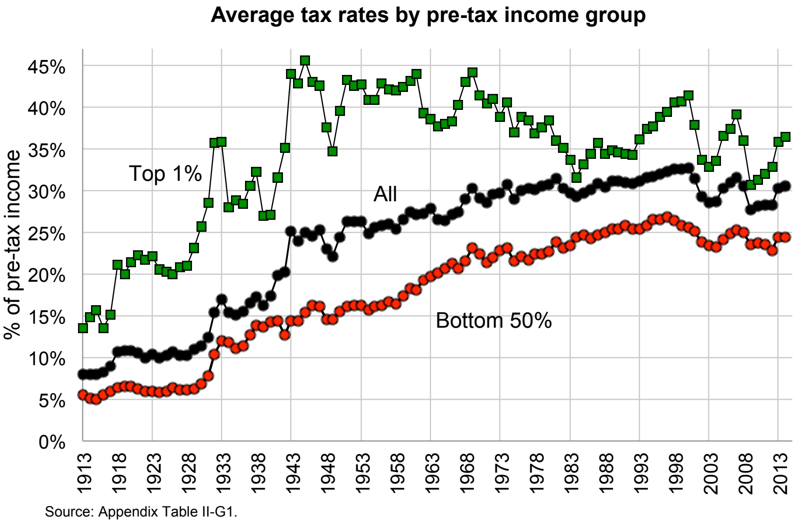
# The macro rate of tax rose until the 1960s and has been constant since then




Source: Appendix Table II-G1.

Source: Piketty, Saez, Zucman (2016)

# Tax progressivity has declined since the 1960s




Source: Piketty, Saez, Zucman (2016)

## Federal US Tax System: Overview

1) Individual income tax (on both labor+capital income) [progressive](40% of fed tax revenue)

2) Payroll taxes (on labor income) financing social security programs [about neutral] (40% of revenue)

3) Corporate income tax (on capital income) [progressive if incidence on capital income] (15% of revenue)

4) Estate taxes (on capital income) [very progressive] (1% of revenue)

5) Minor excise taxes [regressive] (3% of revenue)

## State+Local Tax System: Overview

1) Individual+Corporate income taxes [progressive] (1/3 of state+local tax revenue)

2) Sales + Excise taxes (tax on consumption = income - savings) [about neutral] (1/3 of revenue)

3) Real estate property taxes (on capital income) [slightly progressive] (1/3 of revenue)

http://www.census.gov/govs/www/qtax.html

# KEY CONCEPTS FOR TAXES/TRANSFERS

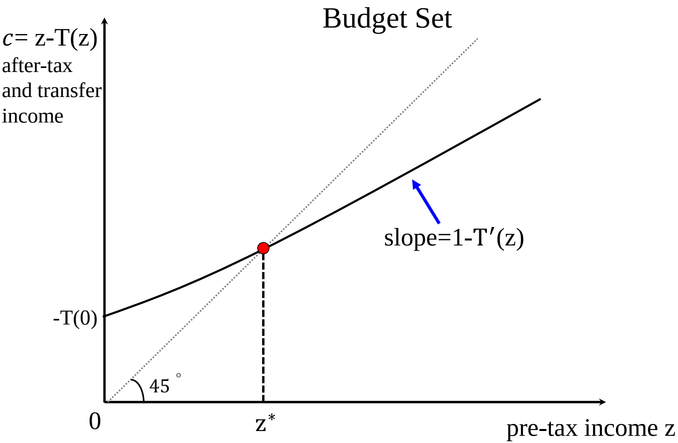
1) Transfer benefit with zero earnings $-T(0)$ [sometimes called demogrant or lumpsum grant]

2) Marginal tax rate (or phasing-out rate) $T'(z)$: individual keeps $1 - T'(z)$ for an additional \$1 of earnings (intensive labor supply response)

3) Participation tax rate $\tau_p = [T(z) - T(0)]/z$: individual keeps fraction $1 - \tau_p$ of earnings when moving from zero earnings to earnings $z$ (extensive labor supply response):

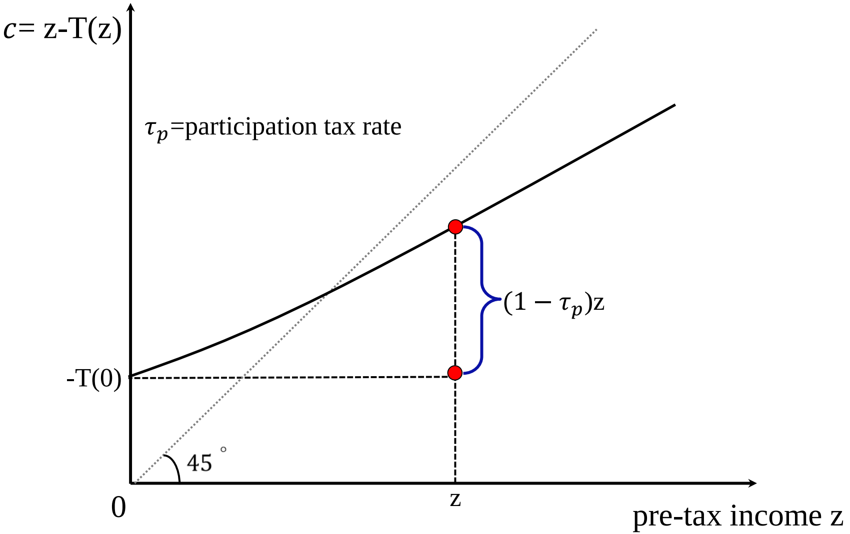
$$z - T(z) = -T(0) + z - [T(z) - T(0)] = -T(0) + z \cdot (1 - \tau_p)$$

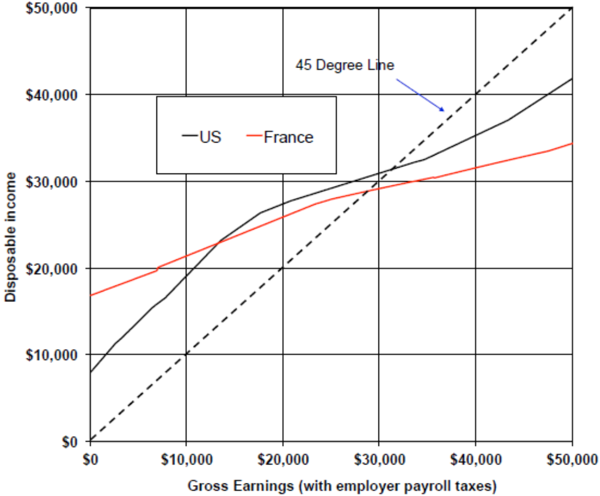
4) Break-even earnings point $z^*$: point at which $T(z^*) = 0$




If line is steeper is that more or less redistribution?

What is perfect redistribution? What is no redistribution?


$c$= z-T(z)
$\tau_p$=participation tax rate
$(1-\tau_p)$z
-T(0)
45 $^\circ$
0
z
pre-tax income z




Source: Piketty, Thomas, and Emmanuel Saez (2012)

# OPTIMAL TAXATION: SIMPLE MODEL WITH NO BEHAVIORAL RESPONSES

Utility $u(c)$ strictly increasing and concave

Same for everybody where $c$ is after tax income.

Income is $z$ and is fixed for each individual, $c = z - T(z)$ where $T(z)$ is tax on $z$. $z$ has density distribution $h(z)$

Government maximizes **Utilitarian** objective:

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

subject to **budget constraint** $\int T(z)h(z)dz \geq E$ (multiplier $\lambda$)

# SIMPLE MODEL WITH NO BEHAVIORAL RESPONSES

Form lagrangian: $L = [u(z - T(z)) + \lambda \cdot T(z)] \cdot h(z)$

First order condition (FOC) in $T(z)$:

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

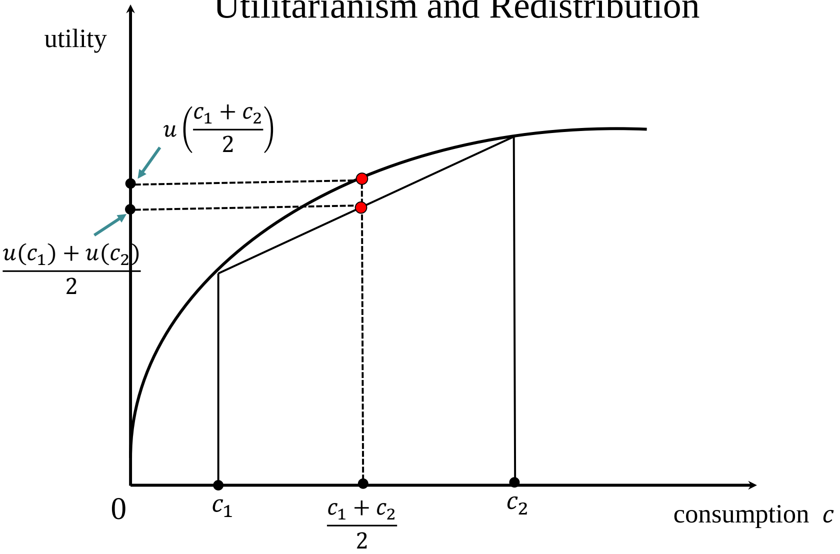
$\Rightarrow z - T(z) =$ constant for all $z$.

$\Rightarrow c = \bar{z} - E$ where $\bar{z} = \int zh(z)dz$ average income.

100% marginal tax rate. Perfect equalization of after-tax income.

Utilitarianism with decreasing marginal utility leads to perfect egalitarianism [Edgeworth, 1897]

# Utilitarianism and Redistribution



# ISSUES WITH SIMPLE MODEL

1) **No behavioral responses:** Obvious missing piece: 100% redistribution would destroy incentives to work and thus the assumption that $z$ is exogenous is unrealistic

$\Rightarrow$ Optimal income tax theory incorporates behavioral responses (Mirrlees REStud '71): **equity-efficiency trade-off**

2) **Issue with Utilitarianism:** Even absent behavioral responses, many people would object to 100% redistribution [perceived as confiscatory]

$\Rightarrow$ Citizens' views on fairness impose **bounds** on redistribution.

The issue is the restricted nature of social preferences that can be captured by most social welfare functions.

We will discuss preferences for redistribution in another lecture!

# MIRRLEES OPTIMAL INCOME TAX MODEL

We will solve the Mirrleesian model later. For now, let's look at the spirit of optimal tax evolution.

**1) Standard labor supply model:** Individual maximizes $u(c, l)$ subject to $c = wl - T(wl)$ where $c$ consumption, $l$ labor supply, $w$ wage rate, $T(.)$ nonlinear income tax $\Rightarrow$ taxes affect labor supply

**2) Individuals differ in ability $w$:** $w$ distributed with density $f(w)$.

**3) Govt social welfare maximization:** Govt maximizes

$$SWF = \int G(u(c, l))f(w)dw$$

($G(.)$ $\uparrow$ concave) subject to

(a) budget constraint $\int T(wl)f(w)dw \geq E$ (multiplier $\lambda$)

(b) individuals' labor supply $l$ depends on $T(.)$

# MIRRLEES MODEL RESULTS

Optimal income tax trades-off redistribution and efficiency (as tax based on $w$ only not feasible)

$\Rightarrow$ $T(.) < 0$ at bottom (transfer) and $T(.) > 0$ further up (tax) [full integration of taxes/transfers]

Mirrlees formulas complex, only a couple fairly general results:

1) $0 \leq T'(.) \leq 1$, $T'(.) \geq 0$ is non-trivial (rules out EITC) [Seade '77]

2) Marginal tax rate $T'(.)$ should be zero at the top (if skill distribution bounded) [Sadka '76-Seade '77]

3) If everybody works and lowest $wl > 0$, $T'(.) = 0$ at bottom

# HISTORY: BEYOND MIRRLEES

Mirrlees '71 had a huge impact on information economics: models with asymmetric information in contract theory

Discrete 2-type version of Mirrlees model developed by Stiglitz JpubE '82 with individual FOC replaced by Incentive Compatibility constraint [high type should not mimick low type]

Till late 1990s, Mirrlees results not closely connected to empirical tax studies and little impact on tax policy recommendations

Since late 1990s, Diamond AER'98, Piketty '97, Saez ReStud '01 have connected Mirrlees model to practical tax policy / empirical tax studies

[new approach summarized in Diamond-Saez JEP'11 and Piketty-Saez Handbook'13]

# WELFARE EFFECT OF SMALL TAX REFORM

Indirect utility: $V(1-\tau, R) = \max_z u((1-\tau)z + R, z)$ where $R$ is virtual income intercept

Small tax reform: $d\tau$ and $dR$:

$$dV = u_c \cdot [-zd\tau + dR] + dz \cdot [(1-\tau)u_c + u_z] = u_c \cdot [-zd\tau + dR]$$

**Envelope theorem:** no effect of $dz$ on $V$ because $z$ is already chosen to maximize utility ($(1-\tau)u_c + u_z = 0$)

$[-zd\tau + dR]$ is the mechanical change in disposable income due to tax reform

Welfare impact of a small tax reform is given by $u_c$ times the money metric mechanical change in tax

# WELFARE EFFECT OF SMALL TAX REFORM (II)

!! Remains true of any nonlinear tax system $T(z)$

Just need to look at $dT(z)$, mechanical change in taxes, or $dT_i$ for agent $i$.

$dV_i$ = Welfare impact is $-u_c dT(z_i)$.

When is the welfare impact not just the mechanical change in disposable income?

**Envelope Theorem:** For a constrained problem

$$V(\theta) = \max_x F(x, \theta) \quad \text{s.t.} \quad c \geq G(x, \theta)$$

$$V'(\theta) = \frac{\partial F}{\partial \theta}(x^*(\theta), \theta) - \lambda^*(\theta) \frac{\partial G}{\partial \theta}(x^*(\theta), \theta)$$

# SOCIAL WELFARE FUNCTIONS (SWF)

Welfarism = social welfare based solely on individual utilities

Any other social objective will lead to Pareto dominated outcomes in some circumstances (Kaplow and Shavell JPE'01) Why?

Most widely used welfarist SWF:

1) Utilitarian: $SWF = \int_i u^i$

2) Rawlsian (also called Maxi-Min): $SWF = \min_i u^i$

3) $SWF = \int_i G(u^i)$ with $G(.) \uparrow$ and concave, e.g., $G(u) = u^{1-\gamma}/(1-\gamma)$ (Utilitarian is $\gamma = 0$, Rawlsian is $\gamma = \infty$)

4) General Pareto weights: $SWF = \int_i \mu_i \cdot u^i$ with $\mu_i \geq 0$ exogenously given

# SOCIAL MARGINAL WELFARE WEIGHTS

Key sufficient statistics in optimal tax formulas are **Social Marginal Welfare Weights** for each individual:

Social Marginal Welfare Weight on individual $i$ is $g_i = G'(u^i)u^i_c/\lambda$ ($\lambda$ multiplier of govt budget constraint) measures \$ value for govt of giving \$1 extra to person $i$

No income effects $\Rightarrow \int_i g_i = 1$: giving \$1 to all costs \$1 (population has measure 1) and increase SWF (in \$ terms) by $\int_i g_i$

$g_i$ typically depend on tax system (endogenous variable)

Utilitarian case: $g_i$ decreases with $z_i$ due to decreasing marginal utility of consumption

Rawlsian case: $g_i$ concentrated on most disadvantaged (typically those with $z_i = 0$)

# OPTIMAL LINEAR TAX RATE: FORMULA

Government chooses $\tau$ to maximize

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

Govt FOC (using the envelope theorem as $z^i$ maximizes $u^i$):

$$0 = \int_i G'(u^i)u^i_c \cdot \left[-z^i + Z - \tau \frac{dZ}{d(1-\tau)}\right],$$

$$0 = \int_i G'(u^i)u^i_c \cdot \left[(Z - z^i) - \frac{\tau}{1-\tau} eZ\right],$$

First term $(Z - z^i)$ is mechanical redistributive effect of $d\tau$, second term is efficiency cost due to behavioral response of $Z$

$\Rightarrow$ we obtain the following optimal linear income tax formula

$$\tau = \frac{1-\bar{g}}{1-\bar{g}+e} \quad \text{with} \quad \bar{g} = \frac{\int g_i \cdot z_i}{Z \cdot \int g_i}, \quad g_i = G'(u^i)u^i_c$$

# OPTIMAL LINEAR TAX RATE: FORMULA

$$\tau = \frac{1-\bar{g}}{1-\bar{g}+e} \quad \text{with} \quad \bar{g} = \frac{\int g_i \cdot z_i}{Z \cdot \int g_i}, \quad g_i = G'(u^i)u^i_c$$

$0 \leq \bar{g} < 1$ if $g_i$ is decreasing with $z_i$ (social marginal welfare weights fall with $z_i$).

$\bar{g}$ low when (a) inequality is high, (b) $g^i \downarrow$ sharply with $z^i$

Formula captures the equity-efficiency trade-off **robustly** ($\tau \downarrow \bar{g}$, $\tau \downarrow e$)

Rawlsian case: $g_i \equiv 0$ for all $z_i > 0$ so $\bar{g} = 0$ and $\tau = 1/(1+e)$

# OPTIMAL TOP INCOME TAX RATE (SAEZ '01)

Consider constant MTR $\tau$ above fixed $z^*$. Goal is to derive optimal $\tau$

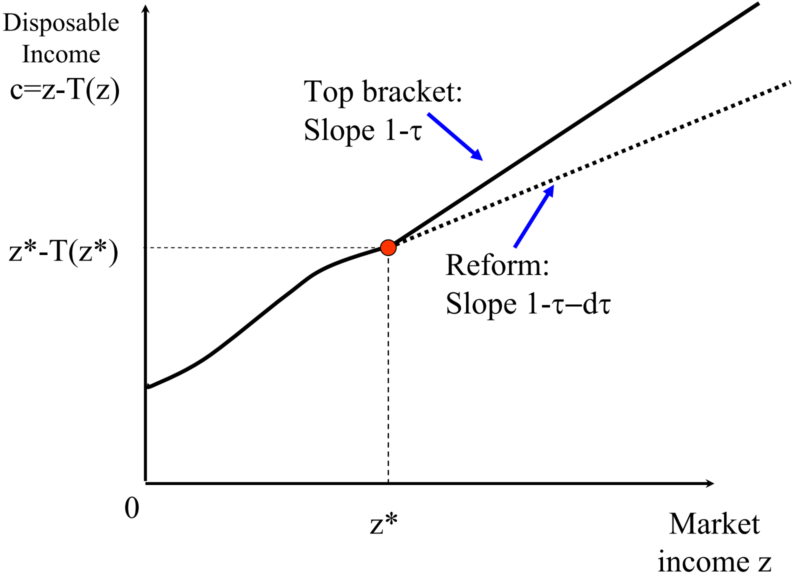
Assume w.l.o.g there is a continuum of measure one of individuals above $z^*$

Let $z(1-\tau)$ be their average income [depends on net-of-tax rate $1-\tau$], with elasticity $e = [(1-\tau)/z] \cdot dz/d(1-\tau)$

! Careful, what is $e$?

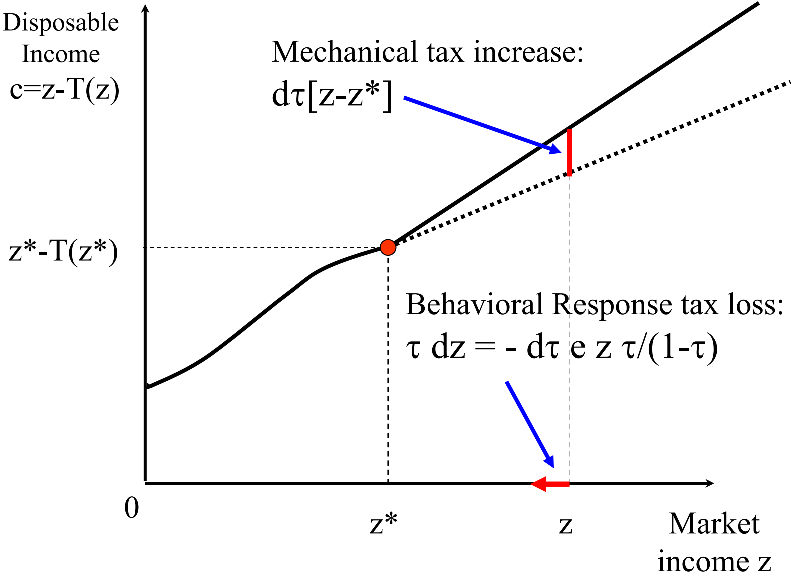
Note that $e$ is a mix of income and substitution effects (see Saez '01)

# Optimal Top Income Tax Rate (Mirrlees ’71 model)




Source: Diamond and Saez JEP'11

# Optimal Top Income Tax Rate (Mirrlees '71 model)




Source: Diamond and Saez JEP'11

# OPTIMAL TOP INCOME TAX RATE

Consider small $d\tau > 0$ reform above $z^*$.

1) **Mechanical increase** in tax revenue:

$$dM = [z - z^*]d\tau$$

2) **Welfare effect:**

$$dW = -\bar{g}dM = -\bar{g}[z - z^*]d\tau$$

where $\bar{g}$ is the social marginal welfare weight for top earners

3) **Behavioral response** reduces tax revenue:

$$dB = \tau \cdot dz = -\tau \frac{dz}{d(1-\tau)} d\tau = -\frac{\tau}{1-\tau} \cdot \frac{1-\tau}{z} \frac{dz}{d(1-\tau)} \cdot zd\tau$$

$$\Rightarrow dB = -\frac{\tau}{1-\tau} \cdot e \cdot zd\tau$$

# OPTIMAL TOP INCOME TAX RATE

$$dM + dW + dB = d\tau \left[ (1-\bar{g})[z - z^*] - e\frac{\tau}{1-\tau} z \right]$$

Optimal $\tau$ such that $dM + dW + dB = 0 \Rightarrow$

$$\frac{\tau}{1-\tau} = \frac{(1-\bar{g})[z-z^*]}{e \cdot z}$$

$$\tau = \frac{1-\bar{g}}{1-\bar{g}+a \cdot e} \quad \text{with} \quad a = \frac{z}{z-z^*}$$

Optimal $\tau \downarrow \bar{g}$ [redistributive tastes]

Optimal $\tau \downarrow$ with $e$ [efficiency]

Optimal $\tau \downarrow a$ [thinness of top tail]

## SUFFICIENT STATS FORMULA

Pause for a bit: did we say anything about underlying characteristics of people?

Note how general the formula is!

Sufficient statistics, observables only.

# ZERO TOP RATE RESULT

Suppose top earner earns $z^T$

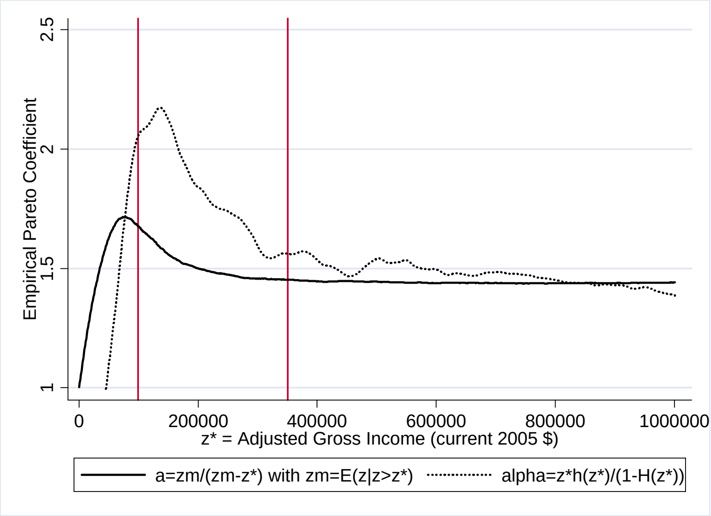
When $z^* \to z^T \Rightarrow z \to z^T$

$$dM = d\tau[z - z^*] << dB = d\tau \cdot e \cdot \frac{\tau}{1-\tau} z \quad \text{when} \quad z^* \to z^T$$

Intuition: extra tax applies only to earnings above $z^*$ but behavioral response applies to full $z \Rightarrow$

Optimal $\tau$ should be zero when $z^*$ close to $z^T$ (Sadka-Seade zero top rate result) but result applies only to top earner

Top is uncertain: If actual distribution is finite draw from an underlying Pareto distribution then expected revenue maximizing rate is $1/(1 + a \cdot e)$ (Diamond and Saez JEP'11)




Source: Diamond and Saez JEP'11

# OPTIMAL TOP INCOME TAX RATE

Empirically: $a = z/(z - z^*)$ very stable above $z^* = \$400K$

Pareto distribution $1 - F(z) = (k/z)^\alpha$, $f(z) = \alpha \cdot k^\alpha / z^{1+\alpha}$, with $\alpha$ Pareto parameter

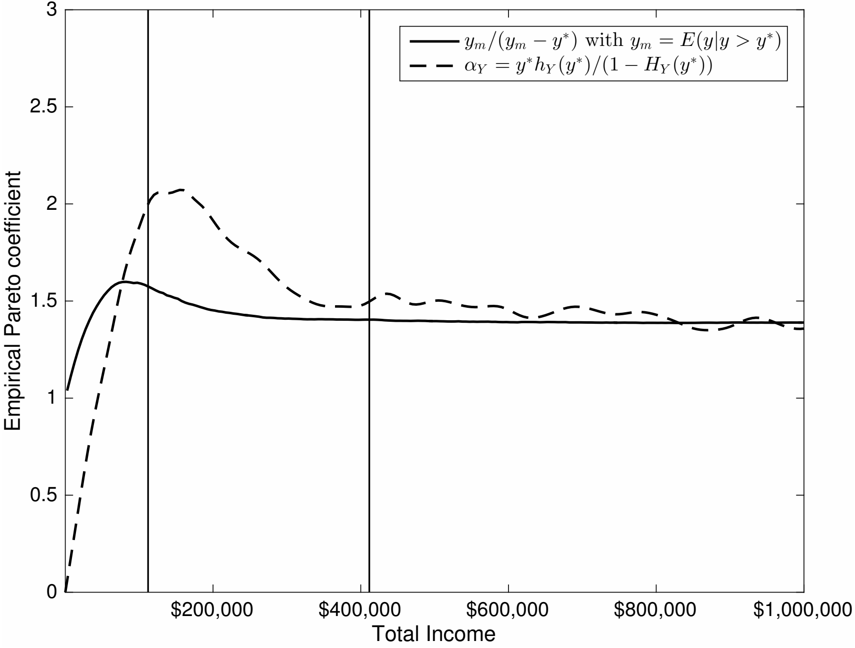
$$z(z^*) = \frac{\int_{z^*}^{\infty} sf(s)ds}{\int_{z^*}^{\infty} f(s)ds} = \frac{\int_{z^*}^{\infty} s^{-\alpha}ds}{\int_{z^*}^{\infty} s^{-\alpha-1}ds} = \frac{\alpha}{\alpha - 1} \cdot z^*$$

$\alpha = z/(z - z^*) = a$ measures *thinness* of top tail of the distribution

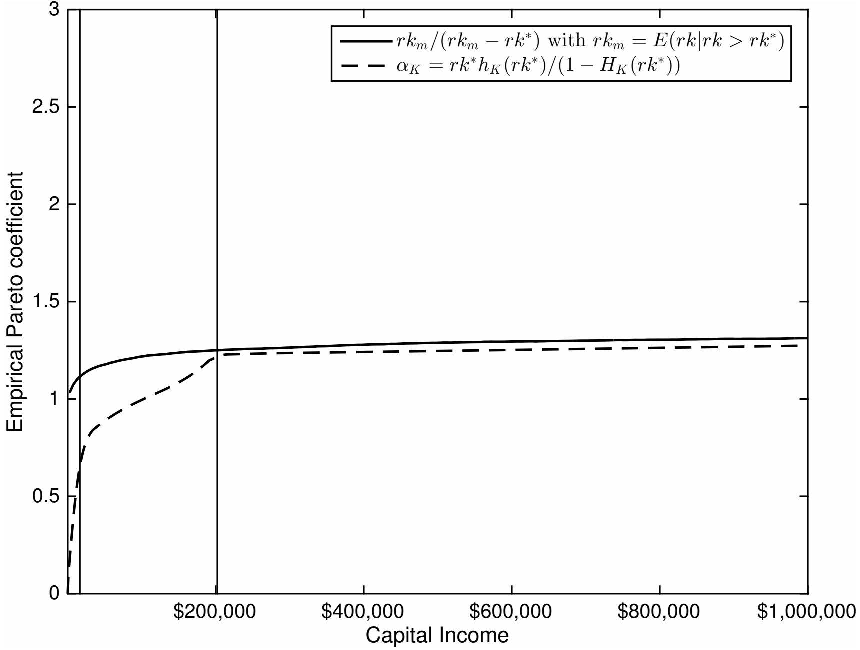
Empirically $a \in (1.5, 3)$, US has $a = 1.5$, Denmark has $a = 3$

$$\tau = \frac{1 - \bar{g}}{1 - \bar{g} + a \cdot e}$$

Only difficult parameter to estimate is $e$



$y_m/(y_m - y^*)$ with $y_m = E(y|y > y^*)$
$\alpha_Y = y^* h_Y(y^*)/(1 - H_Y(y^*))$
Empirical Pareto coefficient
0
0.5
1
1.5
2
2.5
3
$200,000
$400,000
$600,000
$800,000
$1,000,000
Total Income


$rk_m/(rk_m - rk^*)$ with $rk_m = E(rk|rk > rk^*)$
$\alpha_K = rk^* h_K(rk^*)/(1 - H_K(rk^*))$
Empirical Pareto coefficient
Capital Income
0
0.5
1
1.5
2
2.5
3
$200,000
$400,000
$600,000
$800,000
$1,000,000

# TAX REVENUE MAXIMIZING TAX RATE

Utilitarian criterion with $u_c \to 0$ when $c \to \infty \Rightarrow \bar{g} \to 0$ when $z^* \to \infty$

Rawlsian criterion (maximize utility of worst off person) $\Rightarrow \bar{g} = 0$ for any $z^* > \min(z)$

In the end, $\bar{g}$ reflects the value that society puts on marginal consumption of the rich

$\bar{g} = 0 \Rightarrow$ Tax Revenue Maximizing Rate $\tau = 1/(1 + a \cdot e)$ (upper bound on top tax rate)

Example: $a = 2$ and $e = 0.25 \Rightarrow \tau = 2/3 = 66.7\%$

Laffer linear rate is a special case with $z^* = 0$, $z^m/z^* = \infty = a/(a-1)$ and hence $a = 1$, $\tau = 1/(1+e)$

# EXTENSIONS AND LIMITATIONS

1) Model includes only intensive earnings response. Extensive earnings responses [entrepreneurship decisions, migration decisions] $\Rightarrow$ Formulas can be modified

2) Model does not include **fiscal externalities**: part of the response to $d\tau$ comes from **income shifting** which affects other taxes $\Rightarrow$ Formulas can be modified

3) Model does not include **classical externalities**: (a) charitable contributions, (b) positive spillovers (trickle down) [top earners underpaid], (c) negative spillovers [top earners overpaid]

Classical general equilibrium effects on prices are NOT externalities and do not affect formulas [Diamond-Mirrlees AER '71, Saez JpubE '04]

# GENERAL NON-LINEAR INCOME TAX $T(z)$

(1) Lumpsum grant given to everybody equal to $-T(0)$

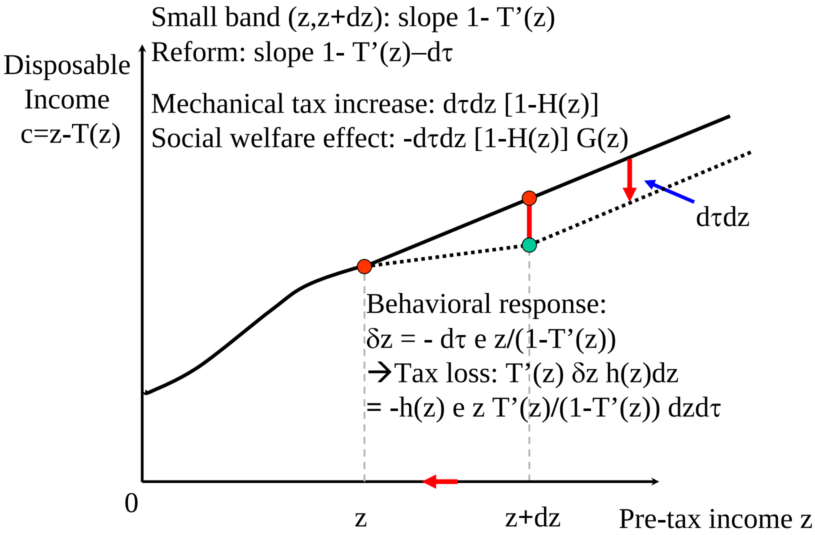
(2) Marginal tax rate schedule $T'(z)$ describing how (a) lump-sum grant is taxed away, (b) how tax liability increases with income

Let $H(z)$ be the income CDF [population normalized to 1] and $h(z)$ its density [endogenous to $T(.)$]

Let $g(z)$ be the social marginal value of consumption for taxpayers with income $z$ in terms of public funds [formally $g(z) = G'(u) \cdot u_c / \lambda$]: no income effects $\Rightarrow \int g(z)h(z)dz = 1$

Redistribution valued $\Rightarrow g(z)$ decreases with $z$

Let $G(z)$ the *average* social marginal value of $c$ for taxpayers with income above $z$ [$G(z) = \int_z^\infty g(s)h(s)ds/(1 - H(z))$]




Source: Diamond and Saez JEP'11

# GENERAL NON-LINEAR INCOME TAX

Assume away income effects $\varepsilon^c = \varepsilon^u = e$ [Diamond AER'98 shows this is the key theoretical simplification]

Consider small reform: increase $T'$ by $d\tau$ in small band $z$ and $z + dz$

Mechanical effect $dM = dzd\tau[1 - H(z)]$

Welfare effect $dW = -dzd\tau[1 - H(z)]G(z)$

Behavioral effect: substitution effect $\delta z$ inside small band $[z, z + dz]$:
$dB = h(z)dz \cdot T' \cdot \delta z = -h(z)dz \cdot T' \cdot d\tau \cdot z \cdot e_{(z)}/(1 - T')$

Optimum $dM + dW + dB = 0$

## GENERAL NON-LINEAR INCOME TAX

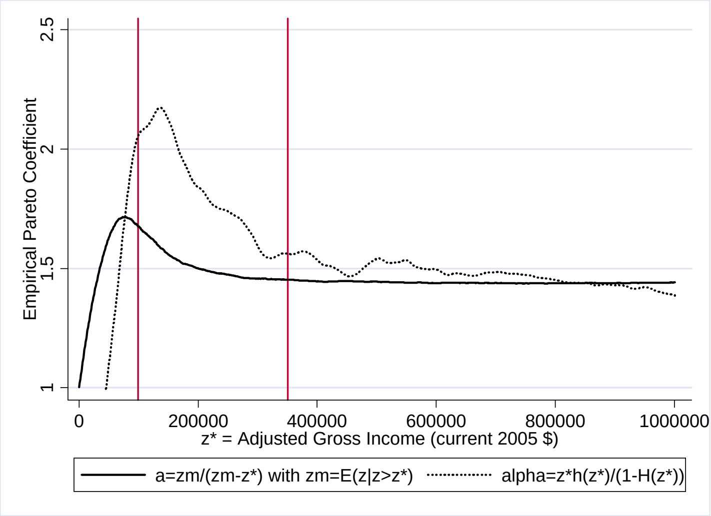
$$T'(z) = \frac{1 - G(z)}{1 - G(z) + \alpha(z) \cdot e_{(z)}}$$

1) $T'(z)$ decreases with $e_{(z)}$ (elasticity efficiency effects)

2) $T'(z)$ decreases with $\alpha(z) = (zh(z))/(1 - H(z))$ (local Pareto parameter)

3) $T'(z)$ decreases with $G(z)$ (redistributive tastes)

Asymptotics: $G(z) \to \bar{g}$, $\alpha(z) \to a$, $e_{(z)} \to e \Rightarrow$ Recover top rate formula $\tau = (1 - \bar{g})/(1 - \bar{g} + a \cdot e)$




Source: Diamond and Saez JEP'11

## Negative Marginal Tax Rates Never Optimal

Suppose $T' < 0$ in band $[z, z + dz]$

Increase $T'$ by $d\tau > 0$ in band $[z, z + dz]$: $dM + dW > 0$ and $dB > 0$ because $T'(z) < 0$

$\Rightarrow$ Desirable reform

$\Rightarrow$ $T'(z) < 0$ cannot be optimal

EITC schemes are not desirable in Mirrlees '71 model

# Responses to Top Income Taxes

"Optimal Taxation of Top Incomes: A Tale of Three Elasticities"
Thomas Piketty, Emmanuel Saez, and Stefanie Stantcheva.

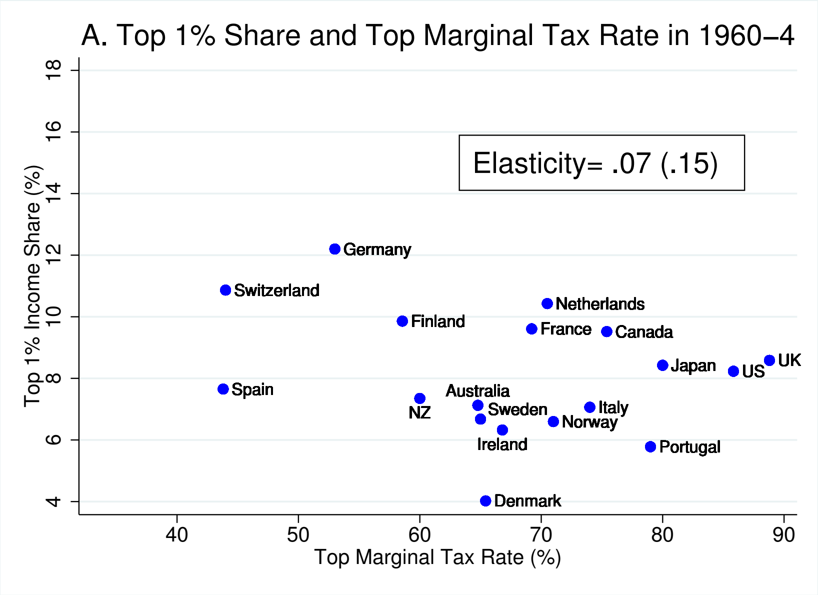
https://scholar.harvard.edu/stantcheva/publications/optimal-taxation-top-incomes-tale-three-elasticities

## TOP RATES AND TOP INCOMES INTERNATIONAL EVIDENCE

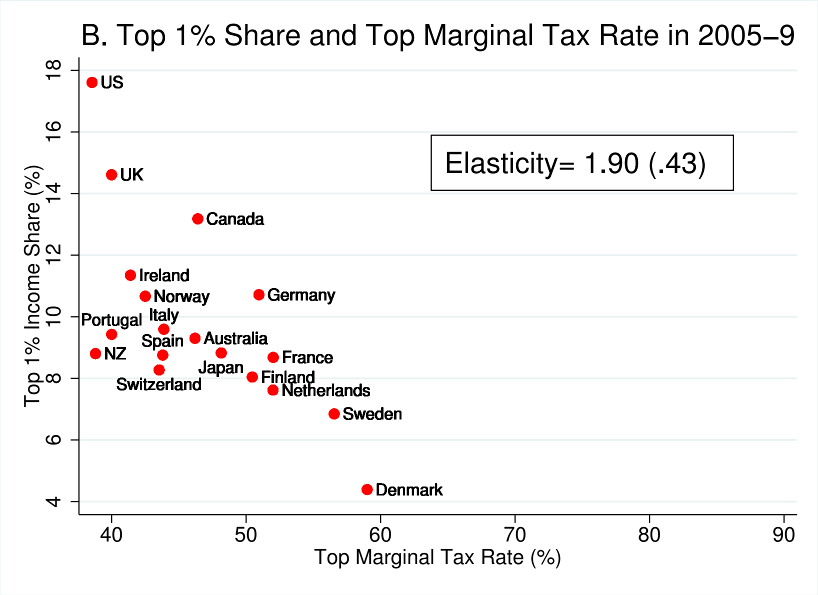
1) Use pre-tax top 1% income share data from 18 OECD countries since 1960 using the **World Top Incomes Database**

2) Compute top (statutory) individual income tax rates using OECD data [including both central and local income taxes].

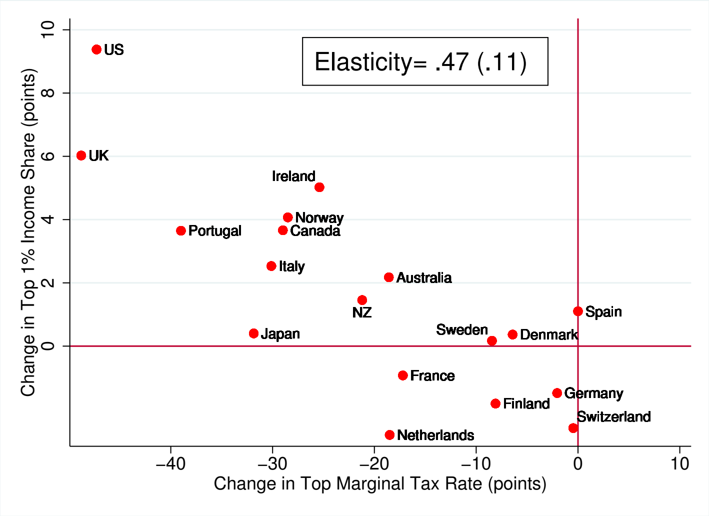
Plot top 1% pre-tax income share against top MTR in 1960-4, in 2005-9, and 1960-4 vs. 2005-9




Source: Piketty, Saez, Stantcheva AEJ-EP (2014)




Source: Piketty, Saez, Stantcheva AEJ-EP (2014)




Change in Top Tax Rate and Top 1% Share, 1960-4 to 2005-9

Source: Piketty, Saez, Stantcheva AEJ-EP (2014)

# Top tax rates and top 1% income share 1960-2009

**Table 2: International Evidence on Top Income Elasticities**

| | All 18 countries and fixed periods | | | Bootstrapping period and country set | | |
|---|---|---|---|---|---|---|
| | 1960-2010 | 1960-1980 | 1981-2010 | Median | 5th percentile | 95th percentile |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| **A. Effect of the Top Marginal Income Tax Rate on Top 1% Income Share** | | | | | | |
| **Regression: log(Top 1% share) = a + e*log(1-Top MTR) + ε** | | | | | | |
| No controls | 0.324 | 0.163 | 0.803 | 0.364 | 0.128 | 0.821 |
| | (0.034) | (0.039) | (0.053) | (0.043) | (0.085) | (0.032) |
| Time trend control | 0.375 | 0.182 | 0.656 | 0.425 | 0.191 | 0.761 |
| | (0.042) | (0.030) | (0.056) | (0.045) | (0.091) | (0.032) |
| Country fixed effects | 0.314 | 0.007 | 0.626 | 0.267 | 0.008 | 0.595 |
| | (0.025) | (0.039) | (0.044) | (0.035) | (0.070) | (0.026) |
| Number of observations | 774 | 292 | 482 | 286 | 132 | 516 |

# ECONOMIC EFFECTS OF TAXING THE TOP 1%

Strong empirical evidence that **pre-tax** top incomes are affected by top tax rates

3 potential scenarios with very different policy consequences

**1) Supply-Side:** Top earners work less and earn less when top tax rate increases ⇒ Top tax rates should not be too high

**2) Tax Avoidance/Evasion:** Top earners avoid/evade more when top tax rate increases

⇒ a) Eliminate loopholes, b) Then increase top tax rates

**3) Rent-seeking:** Top earners extract more pay (at the expense of the 99%) when top tax rates are low ⇒ High top tax rates are desirable

## Real changes vs. tax Avoidance? (Piketty-Saez-Stantcheva)

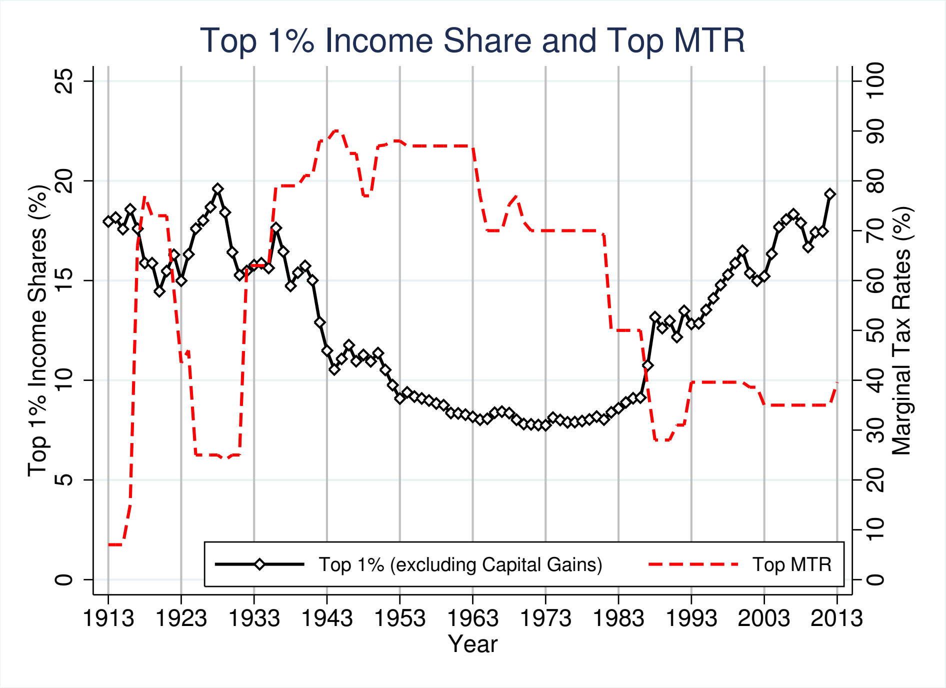
Correlation between **pre-tax** top incomes and top tax rates

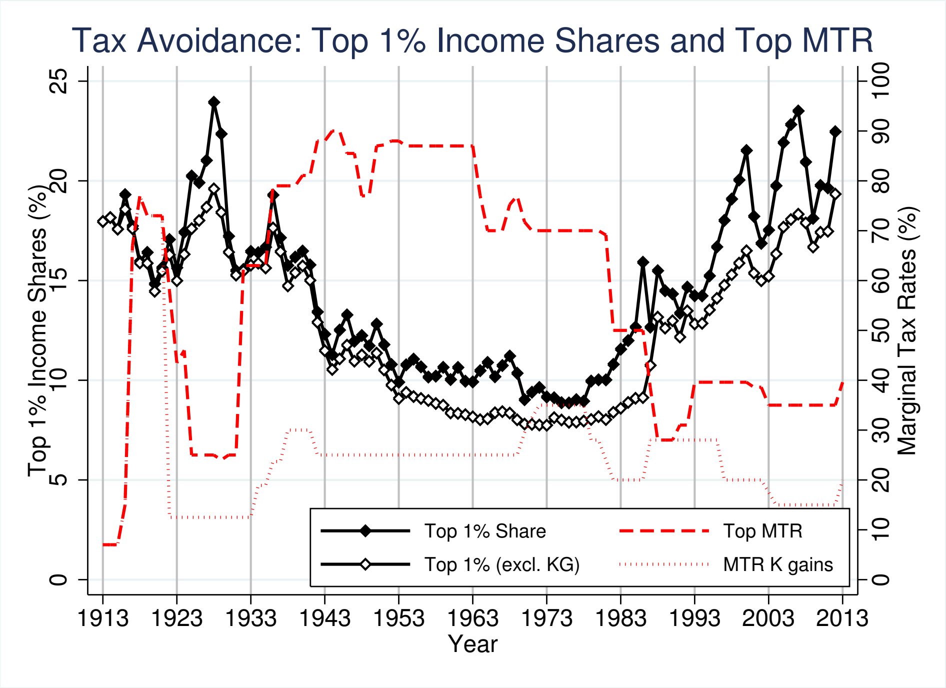
If this is due to tax avoidance, US real top income shares were as high as today in the 1960s-70s but top earners reported a smaller fraction of their incomes

$\Rightarrow$ correlation should be much stronger when using narrow taxable income definition than when using comprehensive income definition (including realized capital gains)

Empirical correlation is very similar ruling out the pure tax avoidance scenario

Future work: construct even broader measures of comprehensive top incomes (unrealized capital gains, non-taxable income forms, etc.)


Top 1% Income Share and Top MTR
Top 1% Income Shares (%)
Marginal Tax Rates (%)
Year
0
5
10
15
20
25
0
10
20
30
40
50
60
70
80
90
100
1913
1923
1933
1943
1953
1963
1973
1983
1993
2003
2013
Top 1% (excluding Capital Gains)
Top MTR



Tax Avoidance: Top 1% Income Shares and Top MTR
Top 1% Income Shares (%)
Marginal Tax Rates (%)
Year
0
5
10
15
20
25
0
10
20
30
40
50
60
70
80
90
100
1913
1923
1933
1943
1953
1963
1973
1983
1993
2003
2013
Top 1% Share
Top 1% (excl. KG)
Top MTR
MTR K gains

## Real changes vs. tax Avoidance? Charitable giving

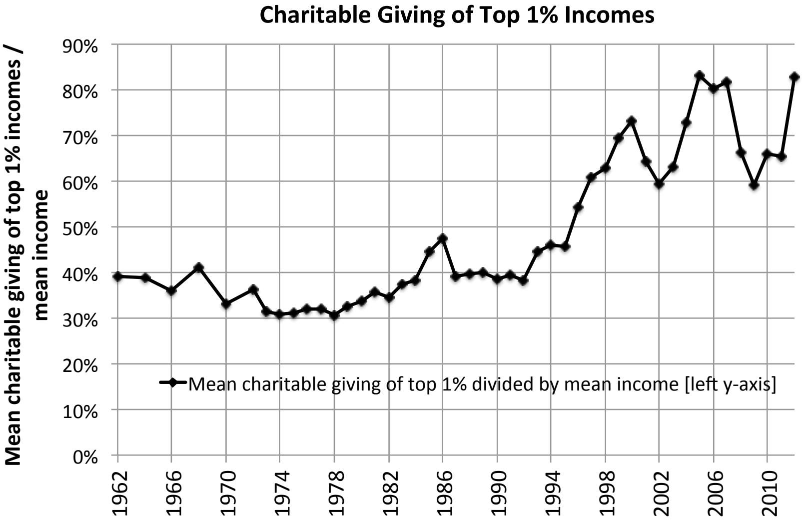
Test using charitable giving behavior of top income earners

Because charitable is tax deductible, incentives to give are stronger when tax rates are higher

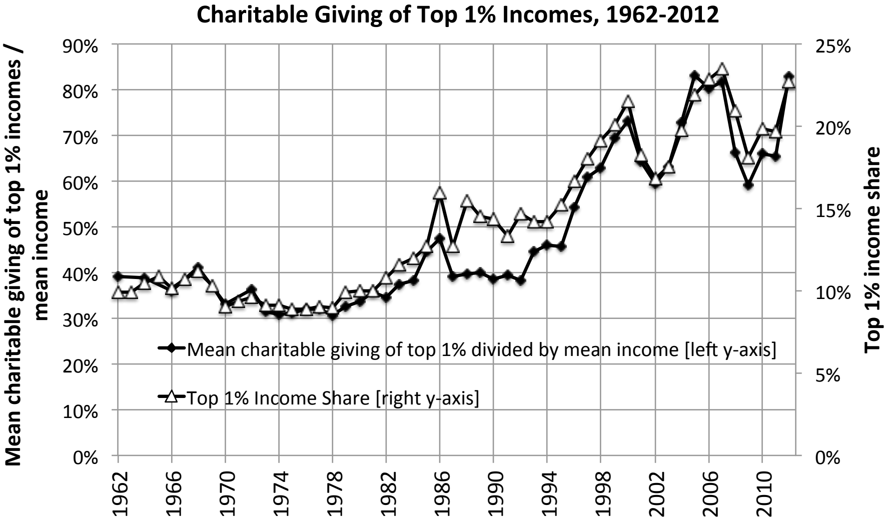
Under the tax avoidance scenario, reported incomes and reported charitable giving should move in opposite directions

Empirically, charitable giving of top income earners has grown in close tandem with top incomes

$\Rightarrow$ Incomes at the top have grown for real




Source: Appendix Table XX. The figure depicts average charitable giving of top 1% inomes (normalized by average income per family) on the left y-axis.




Source: Appendix Table XX. The figure depicts average charitable giving of top 1% inomes (normalized by average income per family) on the left y-axis. For comparison, the figure reports the top 1% income share (on the right y-axis).

## Supply-Side or Rent-Seeking? (Piketty-Saez-Stantcheva)

Correlation between **pre-tax** top incomes and top tax rates

If rent-seeking: growth in top 1% incomes should come at the expense of bottom 99% (and conversely)

Two macro-preliminary tests:

1) In the US, top 1% incomes grow slowly from 1933 to 1975 and fast afterwards. Bottom 99% incomes grow fast from 1933 to 1975 and slowly afterwards $\Rightarrow$ Consistent with rent-seeking effects

2) Look at cross-country correlation between economic growth and top tax rate cuts $\Rightarrow$ No correlation supports trickle-up

One micro-test using CEO pay data

# CEO Pay in the US: Empirical Strategy

- Effect of general performance on pay (OLS):

$$pay_{it} = \beta * p_{it} + \gamma_i + \chi_t + \alpha_X * X_{it} + \varepsilon_{it}$$

$pay_{it}$: CEO pay in firm $i$ at time $t$, $p_{it}$: performance measure, $\gamma_i$: firm FE, $\chi_t$: time FE, $X_{it}$: CEO controls (age, tenure).

- Effect of luck performance on pay (IV):
  1. **Stage**: Effect of luck on performance measure

$$p_{it} = b * p_{luck,it} + g_i + c_t + \alpha_X * X_{it} + e_{it} \qquad (1)$$

$p_{luck,it}$: luck measure (asset-weighted average industry performance). Part of performance due to (observable) luck $\hat{p}_{it}$ = prediction from (1).

  2. **Stage**: Estimate sensitivity of pay to predictable changes in $p_{it}$:

$$y_{it} = \beta_{luck} * \hat{p}_{it} + \gamma_i + \chi_t + \alpha_X * X_{it} + \varepsilon_{it}$$

If $\beta_{luck} \neq 0$: pay for luck.

If $\beta_{luck} \geq \beta$: no filtering at all of luck component.

# CEO Pay in the US: Luck and performance measures

- Performance measures:
  1. Net Income
  2. Shareholder Wealth (log)
- Measure of pay: Total Pay
- Measure of luck: Mean asset-weighted performance of other firms in industry.
- Data: Forbes 800 + Execucomp, COMPUSTAT-CRSP.
- Years: **1970-2010**
- Analysis repeated for high tax period (pre-1986) and low tax period (post-1987) to study effect of tax rates.

## Table 3: US CEO Pay Evidence, 1970-2010

| **Firm performance measure** | Log(net income) | | | Log(stock-market value) | | |
|---|---|---|---|---|---|---|
| **Outcome (LHS variable)** | Log(CEO pay) | Log(CEO pay) | Log(industry level workers pay) | Log(CEO pay) | Log(CEO pay) | Log(industry level workers pay) |
| **OLS vs. IV** | OLS | Industry luck IV | Industry level OLS regression | OLS | Industry luck IV | Industry level OLS regression |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| **A. Effect of firm performance on log-pay in high-top tax rate period (1970-1986)** | | | | | | |
| Firm performance (RHS variable) | 0.23*** | 0.34*** | 0.00 | 0.28*** | 0.22* | 0.00 |
| | (0.013) | (0.072) | (0.010) | (0.022) | (0.123) | (0.015) |
| Number of observations | 8,632 | 8,503 | 890 | 9,005 | 8,865 | 898 |
| **B. Effect of firm performance on log-pay in low-top tax rate period (1987-2010)** | | | | | | |
| Firm performance (RHS variable) | 0.27*** | 0.70*** | -0.02 | 0.37*** | 0.95*** | -0.02 |
| | (0.012) | (0.148) | (0.020) | (0.021) | (0.309) | (0.023) |
| Number of observations | 14,914 | 14,697 | 1,422 | 17,775 | 17,593 | 1,443 |
| **C. Test for difference between low- and high- top tax rate periods** | | | | | | |
| Difference Panel B - Panel A | 0.04*** | 0.36* | -0.019 | 0.09*** | 0.72** | -0.023 |
| p-value of difference | 0.01 | 0.06 | 0.440 | 0.00 | 0.05 | 0.46 |

# CEO Pay in the US: Results

- Incomplete filtering of luck component in CEO pay: $\beta_{luck} \neq 0$.
- Pay for luck is large and almost no filtering: $\beta_{luck} \geq \beta$.
- Pay for luck much stronger in low tax period, consistent with bargaining model.

# CEO Pay in the US: Discussion

Could pay for luck be consistent with optimal contracting view?

- CEO incentivized to predict luck shocks? But why reward average performance (2SLS uses no between firm variation) and why reward less when MTR higher?
- Maybe not bargaining but impossibility to filter out luck?
  - Badly governed firms exhibit more pay for luck (BM and our results - not shown for sake of time).
  - Still means there is a lot of "non-deserved" pay!
- Most important criticism: CEO human capital value increasing in industry performance?
  - Strikingly, workers' wages show no 'pay for luck' (columns 3 and 6).

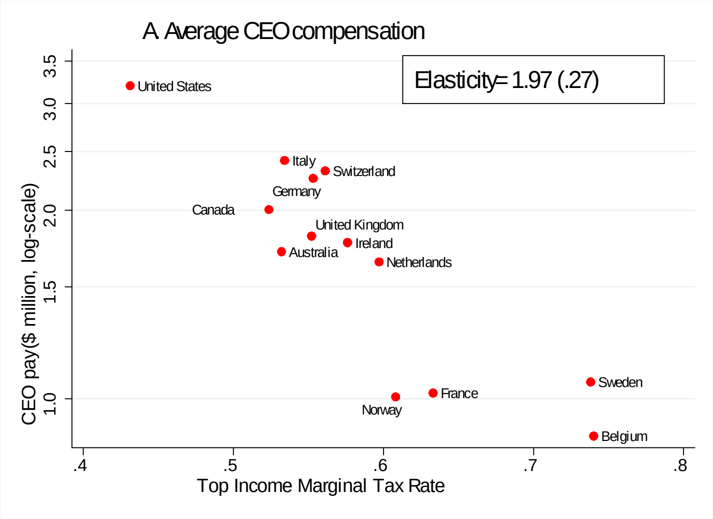
# International CEO pay: Data

- Fernandez et. al. (2012) data:
  - Compensation (BoardEx + Execucomp)
  - Stock ownership (LionShares)
  - Firm Performance (Worldscope and Datastream)
  - Firm governance (various sources)

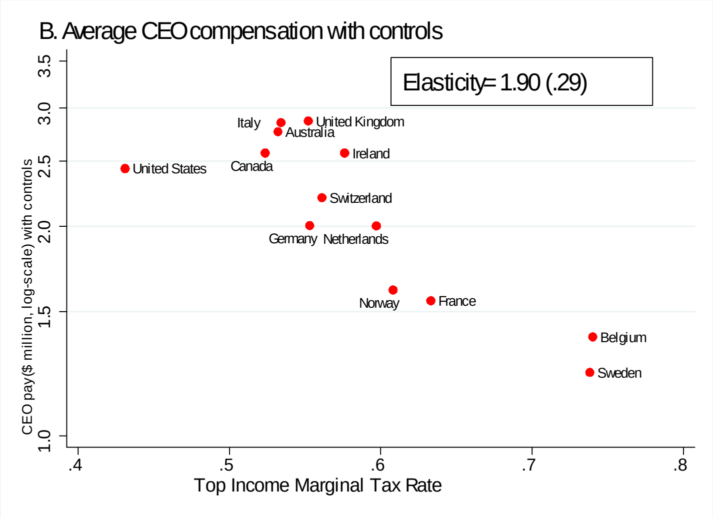
1. Does controlling for firm performance still leave CEO pay dependent on top tax rates?
2. Does effect of top tax rate on CEO pay depend on firm governance?

# International CEO pay: Reward for Performance

- Does controlling for firm performance still leave CEO pay dependent on top tax rates?
  - In supply side story, should not (increase in labor effort translates into firm performance).
  - In bargaining story, additional negative effect of top tax rate on CEO pay through rent-seeking.
  - Requires very comprehensive set of measures of firm performance (use firm sales, stock market return and std dev, leverage, Tobin's q)
- Result:
  - Without controls for firm performance, elasticity 1.97 of CEO pay to top retention rate
  - With controls: elasticity 1.9.
  - Almost none of the effect of top MTR goes through firm performance (i.e., productive CEO effort?)



A Average CEO compensation
Elasticity= 1.97 (.27)
United States
Italy
Switzerland
Germany
Canada
United Kingdom
Ireland
Australia
Netherlands
Sweden
France
Norway
Belgium
CEO pay($ million, log-scale)
3.5
3.0
2.5
2.0
1.5
1.0
.4
.5
.6
.7
.8
Top Income Marginal Tax Rate


B. Average CEO compensation with controls
Elasticity= 1.90 (.29)
CEO pay($ million, log-scale) with controls
1.0
1.5
2.0
2.5
3.0
3.5
.4
.5
.6
.7
.8
Top Income Marginal Tax Rate
Italy
United Kingdom
Australia
Ireland
United States
Canada
Switzerland
Germany
Netherlands
Norway
France
Belgium
Sweden

# International CEO pay: Governance

- Does effect of top tax rate on CEO pay depend on firm governance?
  - In badly governed firms, pay should react more to tax rates as both real supply side response and bargaining response add up.
- Index of (good) governance :
  - Insider ownership
  - Institutional ownership
  - Whether CEO also chairman of board
  - Average number of outside board positions of board members
  - Fraction of independent board directors.
- Result:
  - Retention rate increases CEO pay, but less so in well-governed firms
  - Huge elasticity of bonuses and equity pay to tax rates, very small one for salaries (extraction easier through discretionary bonuses and equity pay?)

# International CEO Pay: Governance

Table 4: International CEO Pay Evidence

| Outcome (LHS variable) | Log(CEO pay) | Log(CEO pay) | Log(CEO pay) | Log(CEO pay) | Log(CEO salary) | Log(CEO bonus and equity pay) |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| **Explanatory variables (RHS variables)** | | | | | | |
| log(1-Top MTR) | 1.97*** | 1.90*** | 1.92*** | 1.90*** | 0.35* | 4.68*** |
| | (0.27) | (0.286) | (0.336) | (0.328) | (0.189) | (0.782) |
| Governance index | | | -0.10*** | -0.19*** | -0.02 | -0.26 |
| | | | (0.020) | (0.038) | (0.072) | (0.201) |
| log(1-Top MTR)*Governance index | | | | -0.13** | 0.06 | -0.03 |
| | | | | (0.057) | (0.089) | (0.281) |
| Firm and CEO controls | no | yes | yes | yes | yes | yes |
| Number of observations | 2,959 | 2,844 | 2,711 | 2,711 | 2,691 | 2,711 |

# A Simpler Theory of Capital Taxation

“A Simpler Theory of Optimal Capital Taxation” Emmanuel Saez and Stefanie Stantcheva.

https://scholar.harvard.edu/stantcheva/publications/simpler-theory-capital-taxation

## The Need for a Simpler Model for Optimal Capital Taxation

Econ literature: complex models and results (individual preferences, shocks, govt objective, policy tools)

Hard to address some of the salient policy questions:

e.g.: shifting between K and L income, different types of capital, heterogeneity in agents' preferences or returns, nonlinear K taxation, social fairness considerations...

Goal: connect theory to public debate by providing framework to address many policy questions.

Derive robust optimal capital tax formulas in terms of estimable elasticities and distributional parameters

# Goals and Contributions

1) Start with dynamic model with linear utility for consumption and concave utility for wealth.

> Microfoundations: bequest motives, entrepreneurship, services from wealth, social considerations.
>
> $\Rightarrow$ Transitional dynamics instantaneous $\Rightarrow$ Simple, tractable theory.
>
> *Put simplicity to use*: new formulas for policy-relevant cases (nonlinear tax, cross-effects, shifting, consumption tax, ..) and normative considerations.

2) Generalize to model with concave utility $\Rightarrow$ Same optimal K tax formulas apply, with *appropriately defined elasticity of the tax base.*

> Qualitatively: Lessons and intuitions from simpler model still valid.
>
> Quantitatively: Sluggish adjustments reflected in elasticity.
>
> The faster K adjustments, the closer to simpler model.

3) Numerically explore optimal taxation using U.S. IRS data.

# Related Literature

Key Results on K Taxation :

*Neoclassical*: Judd (1985), Chamley (1986), Straub and Werning (2015).

*Incomplete markets:* Aiyagari (1995), Farhi (2010).

*NDPF/ Inverse Euler Equation*: Kocherlakota (2005), Golosov, Tsyvinski, Werning (2006), Golosov and Tsyvinski (2006), Farhi and Werning (2012), Abraham, Koehne, Pavoni (2014), Scheuer and Wolitzky (2016).

Quantitative Models: Conesa, Kitao and Krueger (2008), Chen, Guvenen, Kambourov, Kuruscu, Ocampo (2016).

Estate Taxation: Farhi and Werning (2008), Piketty and Saez (2013), De Nardi and Yang (2015).

Sufficient Stats in Dynamic Models: Golosov, Tsyvinski, Werquin (2014), Badel and Huggett (2016).

# Outline

# A Simpler Model of Capital Taxation

# A Simpler Model of Capital Taxation

For exposition: Exogenous and uniform labor income $z$

Heterogeneous discount rate $\delta_i$ (assume $\delta_i > r$)

Exogenous and uniform rate of return $r$ on wealth $k$, income: $rk$

Time invariant tax $T_K(rk)$

Initial wealth $k_i^{init}$, exogenous.

Individual $i$ has instantaneous utility $u_i(c,k) = c + a_i(k)$

linear in consumption $c$ and increasing and concave in wealth $k$.

Maximizes:

$$U_i = \delta_i \cdot \int_{t=0}^{\infty} [c_i(t) + a_i(k_i(t))] e^{-\delta_i t}$$

$$\text{s.t. } \frac{dk_i(t)}{dt} = rk_i(t) - T_K(rk_i(t)) + z_i(t) - c_i(t)$$

# Solving the Individual's Maximization Problem

$$U_i = \delta_i \cdot \int_{t=0}^{\infty} [c_i(t) + a_i(k_i(t))] e^{-\delta_i t}$$

$$\text{s.t. } \frac{dk_i(t)}{dt} = rk_i(t) - T_K(rk_i(t)) + z_i(t) - c_i(t)$$

Hamiltonian: $\quad c_i(t) + a_i(k_i(t)) + \lambda_i(t) \cdot [rk_i(t) - T_K(rk_i(t)) + z_i(t) - c_i(t)]$

$$\text{FOC in } c_i(t): \quad \lambda_i(t) = 1 \Rightarrow \text{ constant multiplier}$$

$$\text{FOC in } k_i(t): \quad a_i'(k_i(t)) + \lambda_i(t) \cdot r \cdot (1 - T_K') = -\frac{d\lambda_i(t)}{dt} + \delta_i \cdot \lambda_i(t)$$

$$\Rightarrow a_i'(k_i(t)) = \delta_i - \bar{r} \quad \text{where} \quad \bar{r} = r \cdot (1 - T_K')$$

# Steady State

Utility for wealth puts limit on impatience to consume ($\delta_i > \bar{r}$)

MU for wealth $a_i'(k) = \delta_i - \bar{r}$ = value lost in delaying consumption

Wealth accumulation depends on heterogeneous preferences $a_i(\cdot), \delta_i$, and net-of-tax return $\bar{r}$ (substitution effects, no income effects)

$\Rightarrow$ Heterogeneity in (non-degenerate) steady-state wealth.

At time $0$: jump from $k_i^{init}$ to $k_i(t)$ (consumption quantum Dirac jump):

$$U_i = \underbrace{rk_i(t) - T_K(rk_i(t)) + z_i(t)}_{c_i(t)} + a_i(k_i(t)) + \delta_i \cdot (k_i^{init} - k_i(t))$$

Dynamic model equivalent to a static model:

$$U_i = c_i + a_i(k_i) + \delta_i \cdot (k_i^{init} - k_i) \quad \text{with} \quad c_i = rk_i - T_K(rk_i) + z_i$$

Announced vs. unannounced tax reforms have same effect.

# Foundations of Wealth in the Utility (I)

Idea that wealth brings utility *only* from consumption flow quite restrictive:

Weber's *"spirit of capitalism,"*

Keynes (1919, 1931) *"love of money as a possession"*, *"the virtue of the cake [savings] was that it was never to be consumed."*

Smith (1759) lamented wealth could lend social status and moral prestige.

Does not fit the data well:

1. Cannot account for high wealth holdings (Carroll, 1997, 2000, Quadrini, 1999).
2. Hard to generate saving behavior that makes wealth much more concentrated than labor income (Benhabib and Bisin, 2016).
3. Important two-dimensional heterogeneity in the data in K and L income.

# Foundations of Wealth in the Utility: Warm Glow Bequest Motive

If agent dies at date $T$, his utility is:

$$V_i(T) = \int_0^T u_i(c_i(t))e^{-\rho_i t}dt + e^{-\delta_i T}\phi_i(k_i(T))$$

$\rho_i$ is the discount rate of agent $i$, $\phi_i(k_i(T))$ is warm glow utility from the bequest $k_i(T)$ left at time $T$.

If $T$ stochastic and follows a Poisson process with rate $p_i$ for agent $i$, then, "perpetual youth" model of Yaari (1965) and Blanchard (1985) implies:

$$V_i = \int_0^\infty e^{-(\rho_i+p_i)t} \cdot [u_i(c_i(t)) + p_i \cdot \phi_i(k_i(t))] \, dt$$

Equivalent to our model with $\delta_i = \rho_i + p_i$ and $a_i(k_i(t)) = p_i \cdot \phi_i(k_i(t))$.

De Nardi (2004) shows this can explain large wealth holdings at the top and better match the lifecycle profiles of savings.

# Foundations of Wealth in the Utility: Entrepreneurship

Utility flow from running a business/being an entrepreneur: benefits net of effort or disutility cost.

Non-pecuniary benefits or costs are important determinants for occupational choice (Hamilton, 2000; Hurst and Pugsley, 2010).

Entrepreneur receives return $r_i$ on capital.

E.g.: $a_i(k) = \eta_i k^\gamma / \gamma$, entrepreneur would choose: $r_i(1 - \tau_K) = \delta_i - \eta_i k_i^{\gamma-1}$.

Also applies to agents managing wealth portfolio (activity that yields return and costs/brings utility/disutility).

# Foundations of Wealth in the Utility: Service Flows from Wealth

Like "money in the utility" models. Poterba and Rotemberg (1987): different assets provide services like security or liquidity, similar to other durables.

Since different goods included in utility, excluding wealth "arbitrary."

Utility flows from assets needed to better fit data.

Prominent example: housing. (Piazzesi et al., 2007; Stokey, 2009; Kiyotaki et al., 2011), with different utility from renting and owning (e.g.: owner can modify house to fit taste).

# Foundations of Wealth in the Utility: Motivated Beliefs, Reputation Concerns

Motivated beliefs (Benabou and Tirole, 2016) that fulfill psychological roles, e.g.: self-confidence, moral self-esteem or reputation, etc..

Shape of $a_i(k)$ depends on exact motivation (can be arbitrarily heterogeneous).

"Affective": wealth makes one look better, including self-signaling.

"Functional": wealth makes others provide services to me.

# Government Optimization

Government sets a time invariant budget balanced $T_K(\cdot)$ to maximize its social objective

$$\int_i g_i \cdot U_i(c_i, k_i) di \quad \text{with} \quad g_i \geq 0 \quad \text{social marginal welfare weight}$$

Optimal $T_K(\cdot)$ depends on three key ingredients:

**(1) Social preferences:** $g_i$ = value of $1 extra given to $i$ ($\int_i g_i = 1$).

**(2) Efficiency costs:** Elasticitiy $e_K = (\bar{r}/k) \cdot (dk/d\bar{r})$ measures how wealth $k$ responds to $\bar{r} = r \cdot (1 - T'_K)$

**(3) Distribution of capital income:** $H_K(rk)$ (for nonlinear tax).

# Optimal Linear Capital Taxation at rate $\tau_K$

$k^m(\bar{r}) \equiv \int_i k_i di$ average wealth (depends on $\bar{r}$ with elasticity $e_K$).

Revenues $\tau_K k^m(\bar{r})$ rebated lump-sum.

$\tau_K$ maximizes $SWF = \int_i g_i \cdot U_i(c_i, k_i) di$ with

$$U_i = \underbrace{rk_i \cdot (1 - \tau_K) + \tau_K \cdot rk^m(\bar{r}) + z_i}_{c_i} + a_i(k_i) + \delta_i \cdot (k_i^{init} - k_i)$$

Standard optimal tax derivation (using envelope thm for $k_i$):

$$\frac{dSWF}{d\tau_K} = rk^m \cdot \underbrace{\int_i g_i \cdot \left(1 - \frac{k_i}{k^m}\right)}_{\substack{\text{Mechanical Revenue} \\ \text{net of Welfare Effect}}} - rk^m \cdot \underbrace{\frac{\tau_K}{1 - \tau_K} \cdot e_K}_{\text{Behavioral Effect}}$$

Optimal $\tau_K$ such that $dSWF / d\tau_K = 0$.

# Optimal Linear Capital Tax $\tau_K$

$$\tau_K = \frac{1-\bar{g}_K}{1-\bar{g}_K+e_K} \quad \text{with} \quad \bar{g}_K = \frac{\int_i g_i \cdot k_i}{\int_i k_i} \quad \text{and} \quad e_K = \frac{\bar{r}}{k^m} \cdot \frac{dk^m}{d\bar{r}} > 0$$

Zero capital tax result: $\tau_K = 0$ only if:

$\bar{g}_K = 1$ (no inequality in $rk$, or no redistributive concerns $g_i \equiv 1$), or

$e_K = \infty$.

$\tau_K > 0$ as long as $g_i$ decreasing in $k_i$, or wealth concentrated among low $g_i$ agents.

$\tau_K = 1/(1+e_K)$ is revenue-maximizing in Rawlsian case: $g_i = 0$ if $k_i > 0$.

Top revenue maximizing rate: $\tau_K = 1/(1+a_K^{top} \cdot e_K^{top})$ with $a_K^{top}$ the Pareto tail parameter for top bracket.

# Optimal Nonlinear Capital Tax

$$T'_K(rk) = \frac{1 - \bar{G}_K(rk)}{1 - \bar{G}_K(rk) + \alpha_K(rk) \cdot e_K(rk)}$$

1) $\bar{G}_K(rk) \equiv \frac{\int_{\{i:rk_i \geq rk\}} g_i d_i}{P(rk_i \geq rk) \int_i g_i di}$ is the average $g_i$ above capital income level $rk$

2) $\alpha_K(rK)$ the local Pareto parameter of capital income distribution

3) $e_K(rk)$ the local elasticity of $k$ wrt to $1 - T'_K(rk)$ at income level $rk$

Capital income is very concentrated (top 1% capital income earners have 60%+ of total capital income)
$\Rightarrow$ Asymptotic formula:
$T'_K(\infty) = (1 - G_K(\infty))/(1 - G_K(\infty) + \alpha_K(\infty) \cdot e_K(\infty))$ relevant for most of the tax base

# Putting the Model to Use: Topics

# Equity Considerations: The Ant and the Grasshopper

Credit: Adelya Tumasyeva

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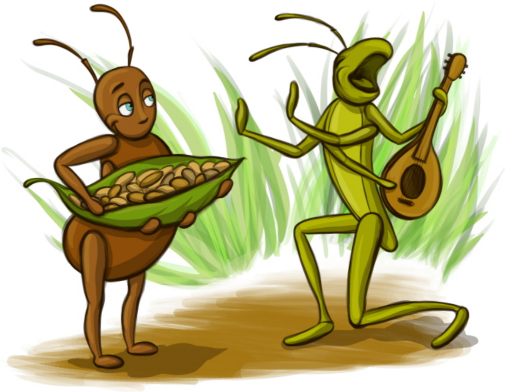
# Equity Considerations: The Ant and the Grasshopper



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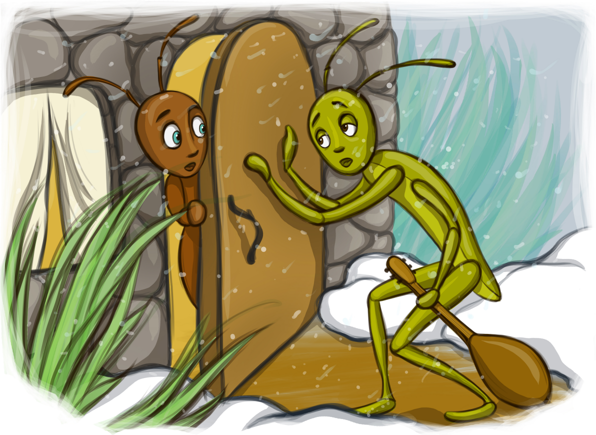


Credit: Adelya Tumasyeva

# Equity Considerations: The Ant and the Grasshopper

Credit: Adelya Tumasyeva

# Equity Considerations for Capital Taxation: Generalized Welfare Weights

**(1) Inequality in wealth deemed fair and wealth is not a tag**

Equality of opportunity argument: grasshopper had same savings opportunities as ant, conditional on labor earnings.

Capital accumulated by sacrificing consumption, why punish saving behavior?

What if ant had higher work (grain harvesting) ability? $\rightarrow$ role for nonlinear labor income tax.

$\rightarrow g_i$ independent of and uncorrelated with $k_i \rightarrow \tau_K = 0$.

# Equity Considerations for Capital Taxation: Generalized Welfare Weights

**(2) Inequality in wealth viewed as unfair**

Even conditional on labor earnings, high wealth comes from higher patience $\delta_i$ or higher valuation of wealth $a_i$ – unfair heterogeneity, like earnings ability.

or parental wealth ($k_i^{init}$) – ant's parents left extra grain.

or higher returns $r_i$ (luck) – ant speculated on grain-forward derivatives.

$\rightarrow g_i$ decreasing in $k_i \rightarrow \tau_K > 0$.

# Equity Considerations for Capital Taxation: Generalized Welfare Weights

**(3) Wealth as a tag**

May or may not care about $k$ per se ($g_i$ may not depend on $k_i$ directly).

But wealth may be tag for aspects that enter $g_i$ negatively: parental background (see Saez-Stantcheva), ability.

Having more grain means more likely to come from rich family.

$\bar{G}_K(rk)$ is representation index of agents from poor background at income $rk$.

$\rightarrow corr(g_i, k_i) < 0 \rightarrow \tau_K > 0$.

# Adding in Labor Income Responses & Labor Taxation

Add in choice of labor income, with potentially arbitrary heterogeneity in disutility $h_i(z)$.

$$U_i = rk_i + z_i - T(rk_i + z_i) + a_i(k_i) + \delta_i \cdot (k_i^{init} - k_i) - h_i(z_i)$$

$$T_L'(z) = \frac{1 - \bar{G}_L(z)}{1 - \bar{G}_L(z) + \alpha_L(z) \cdot e_L(z)}$$

1) $\bar{G}_L(z) \equiv \frac{\int_{\{i:z_i \geq z\}} g_i d_i}{P(z_i \geq z) \int_i g_i di}$ is the average $g_i$ above labor income level $z$

2) $\alpha_L(z)$ the local Pareto parameter of capital income distribution

3) $e_L(z)$ the local elasticity of $k$ wrt to $\bar{r}$ at income level $rk$

Separable labor and capital taxes each set according to Mirrlees (1971) and Saez (2001) formulas.

## Joint Preferences in Capital and Labor and Cross-Elasticities

Agent's dynamic problem is again equivalent to maximizing:

$$U_i = c_i + v_i(k_i, z_i) + \delta_i(k_i^{init} - k_i) \quad \text{with} \quad c_i = \bar{r}k_i + z_i - T_L(z_i)$$

Choice $(c, k, z)$ is such that:

$$v_{iz}(k_i, z_i) = 1 - T_L'(z_i), \quad v_{ik}(k_i, z_i) = \delta_i - \bar{r}, \quad c_i = \bar{r}k_i + z_i - T_L(z_i)$$

Optimal capital tax (at any, possibly non-optimal $\tau_L$):

$$\tau_K = \frac{1 - \bar{g}_K - \tau_L \frac{z^m}{k^m} e_{Z,(1-\tau_K)}}{1 - \bar{g}_K + e_K}$$

$$\text{with} \quad \bar{g}_K = \frac{\int_i k_i g_i}{k^m}, \quad e_{Z,(1-\tau_K)} = \frac{dz^m}{d(1-\tau_K)} \frac{(1-\tau_K)}{z^m}$$

# Comprehensive nonlinear income taxation $T(rk+z)$

Govt uses solely comprehensive taxation $T(y)$ with $y_i \equiv rk_i + z_i$

$$U_i = rk_i + z_i - T(rk_i + z_i) + a_i(k_i) + \delta_i \cdot (k_i^{init} - k_i) - h_i(z_i)$$

Standard Mirrlees' formula applies to comprehensive income tax problem

$$T'(y) = \frac{1 - \bar{G}_Y(y)}{1 - \bar{G}_Y(y) + \alpha_Y(y) \cdot e_Y(y)}$$

with $\bar{G}_Y(y) \equiv \frac{\int_{\{i:y_i \geq y\}} g_i d_i}{P(y_i \geq y) \int_i g_i di}$

$\alpha_Y(y)$ local Pareto parameter for $y$ distribution,

$e_Y(y)$ local elasticity of $y$ with respect to $1 - T'$.

# Tax shifting and Comprehensive Taxation

Suppose individual $i$ can shift $x$ dollars from labor income to capital income at utility cost $d_i(\underset{+}{x})$

Reported labor income $z_L$ and capital income $z_K$ are elastic to tax differential $\tau_L - \tau_K$

If shifting elasticity is infinite, then $\tau_L = \tau_K$ is optimal

If shifting elasticity is finite, then optimal $\tau_L, \tau_K$ closer than they would be absent any shifting

If shifting elasticity is large then $e_K$ can appear large, but wrong to set $\tau_K$ at $1/(1 + e_K)$ in that case

# Heterogeneous Returns

**Heterogeneous returns** $r_i$ important in practice:

Same sufficient stats formula, but replace:

$$\bar{g} = \frac{\int_i g_i \cdot r_i k_i}{\int_i r_i k_i} \quad \text{and} \quad e_K = \frac{(1-\tau_K)}{\int_i r_i k_i} \cdot \frac{d \int_i r_i k_i}{d(1-\tau_K)}$$

Values of $e_K$ (responsiveness of $k$ to taxes) and $\bar{g}_K$ (social judgement about capital income) could be affected.

# Different Types of Capital Assets

Could have $\neq$ elasticities (housing vs. financial assets)

Different social judgments or distributional characteristics $\bar{g}_K^j$.

Formulas hold asset by asset, determined by: $\bar{g}_K^j$, $e_K^j$, and cross-elasticities $e_{K^s,(1-\tau_K^j)}$.

$$\tau_K^j = \frac{1 - \bar{g}_K^j}{1 - \bar{g}_K^j + e_K^j}$$

$$\bar{g}_K^j = \frac{\int_i g_i \cdot k_i^j}{\int_i k_i^j}, \quad e_K^j = \frac{\bar{r}^j}{k^{m,j}} \cdot \frac{dk^{m,j}}{d\bar{r}^j} > 0, \quad e_{K^s,(1-\tau_K^j)} = \frac{\bar{r}^j}{k^{m,s}} \cdot \frac{dk^{m,s}}{d\bar{r}^j}$$

# Different Types of Capital Assets

Could have $\neq$ elasticities (housing vs. financial assets)

Different social judgments or distributional characteristics $\bar{g}_K^j$.

Formulas hold asset by asset, determined by: $\bar{g}_K^j$, $e_K^j$, and cross-elasticities $e_{K^s,(1-\tau_K^j)}$.

$$\tau_K^j = \frac{1 - \bar{g}_K^j - \sum_{s \neq j} \tau_K^s \frac{k^{m,s}}{k^{m,j}} e_{K^s,(1-\tau_K^j)}}{1 - \bar{g}_K^j + e_K^j}$$

$$\bar{g}_K^j = \frac{\int_i g_i \cdot k_i^j}{\int_i k_i^j}, \quad e_K^j = \frac{\bar{r}^j}{k^{m,j}} \cdot \frac{dk^{m,j}}{d\bar{r}^j} > 0, \quad e_{K^s,(1-\tau_K^j)} = \frac{\bar{r}^j}{k^{m,s}} \cdot \frac{dk^{m,s}}{d\bar{r}^j}$$

# Consumption taxation: The Policy Debate

Can a consumption tax be better than a wealth tax and more progressive than a tax on labor income?

Bill Gates: *"Imagine three types of wealthy people. One guy is putting his capital into building his business. Then there's a woman who's giving most of her wealth to charity. A third person is mostly consuming, spending a lot of money on things like a yacht and plane. While it's true that the wealth of all three people is contributing to inequality, I would argue that the first two are delivering more value to society than the third. I wish Piketty had made this distinction, because it has important policy implications."*

# Consumption Taxation in our Model

Consider linear consumption tax at (inclusive) tax rate $\tau_C$ so that:

$$\frac{dk_i(t)}{dt} = r(1-\tau_K)k_i(t) + z_i(t) - T_L(z_i(t)) - c_i(t)/(1-\tau_C)$$

Agents care about real wealth $k^r = k \cdot (1-\tau_C)$.

Even with wealth-in-utility, $\tau_C$ equivalent labor tax + tax on initial wealth (Kaplow, 1994, Auerbach, 2009).

Thought experiment: equal labor income.

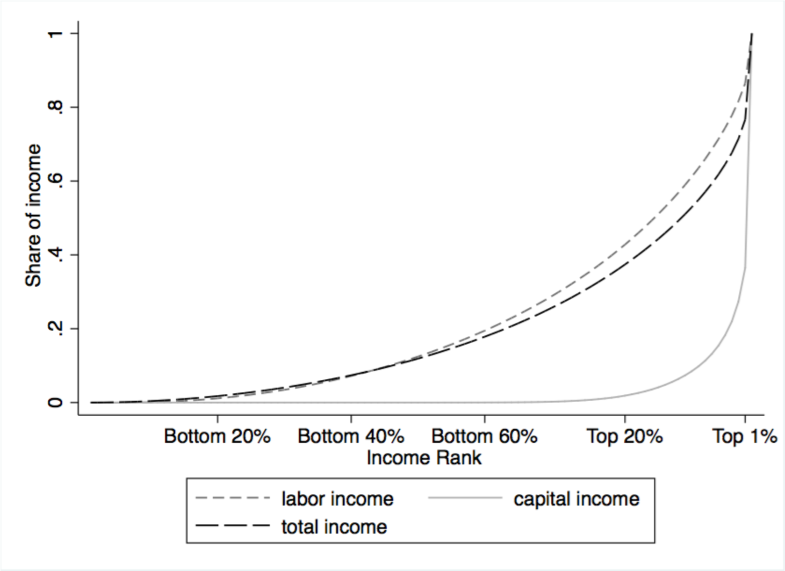
With $\tau_C$, wealthy look like pay more taxes, but paid less when accumulated more nominal wealth. Real wealth inequality unaffected.

With 2-dim heterogeneity: labor tax not sufficient (Atkinson-Stiglitz).

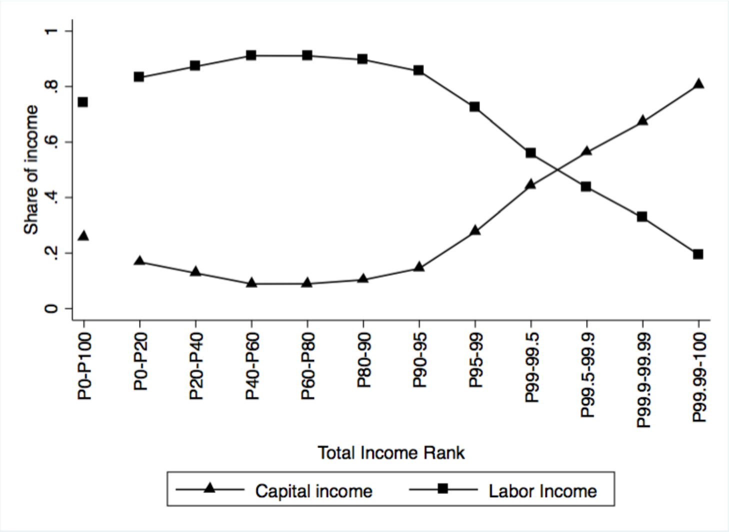
$\Rightarrow \tau_C$ cannot address steady-state capital income inequality

# Numerical Application to the U.S.

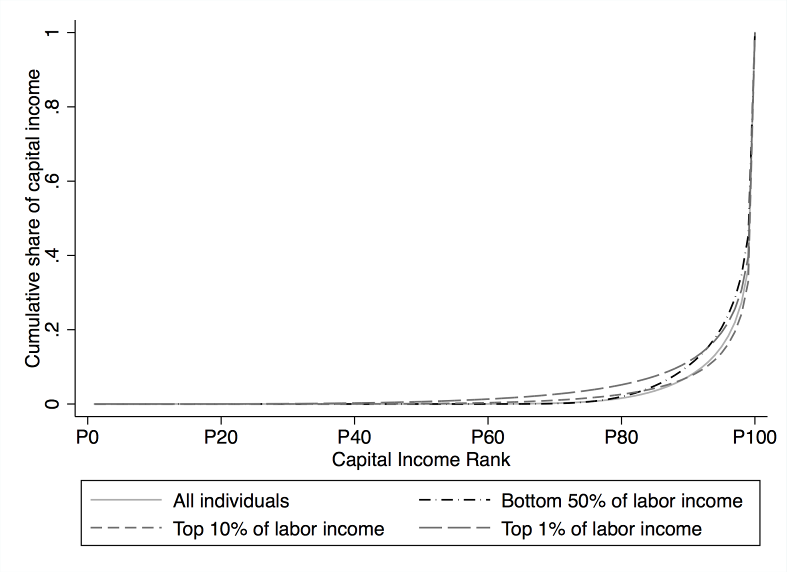
# Fact 1: K income more unequally distributed than L income



# Fact 2: At the top, total income is mostly capital income



# Fact 3: Two-dimensional heterogeneity, inequality in K income even conditional on L income



# Methodology for Computing Optimal Tax Rates

Suppose constant elasticity of labor, capital, and total income ($e_L, e_K, e_Y$) and that choice at zero tax represents preference type: $(\theta_i, \eta_i)$.

Based on the IRS micro data, use pairs $(z_i, rk_i)$ to invert individual choices to obtain $(\theta_i, \eta_i)$.

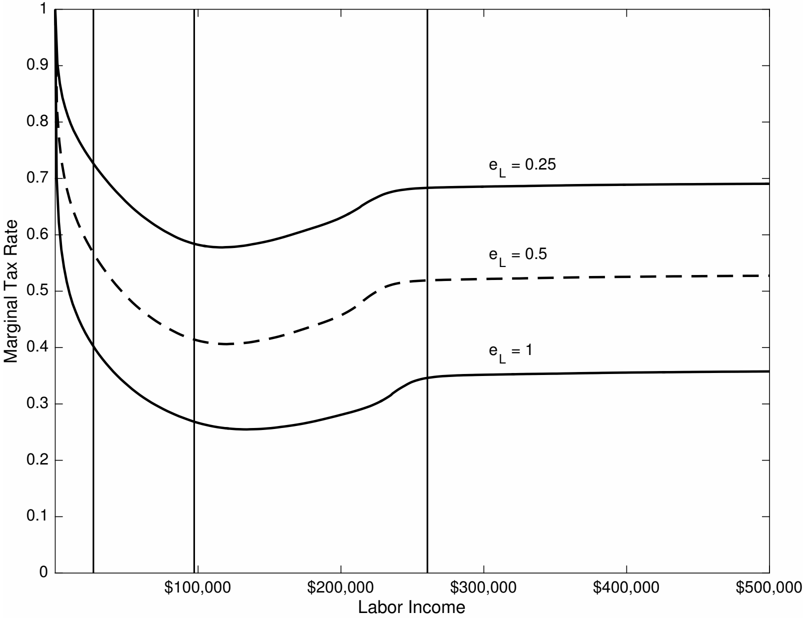
Non-parametrically fit type distributions and empirical Pareto parameters.

Solve for optimal $T'_K$, $T'_L$, and $T'_Y$ using sufficient stats formulas.

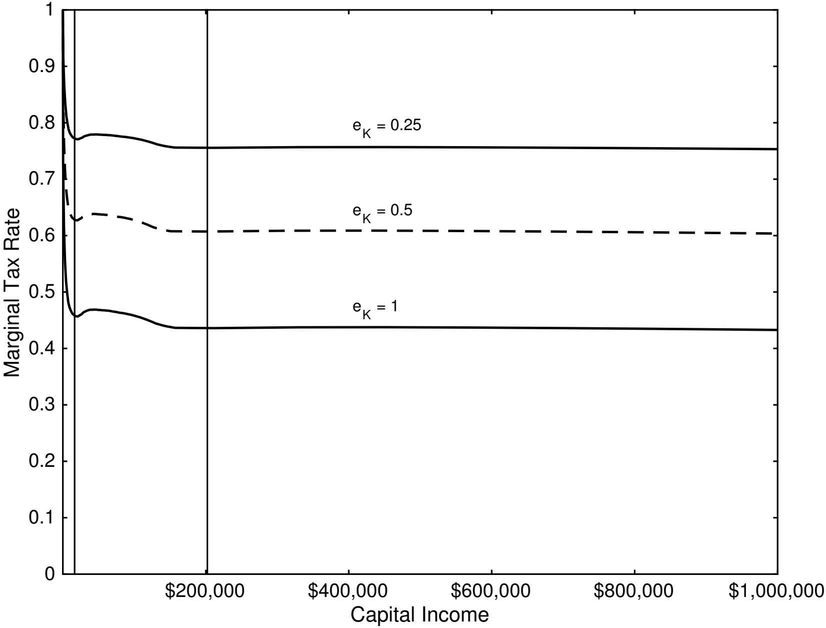
For capital – our simpler theory provides a much easier way to compute optimal tax rates based on the data.

Simulations set $g_i = \frac{1}{\text{disposable income}_i}$ and use several values for elasticities.

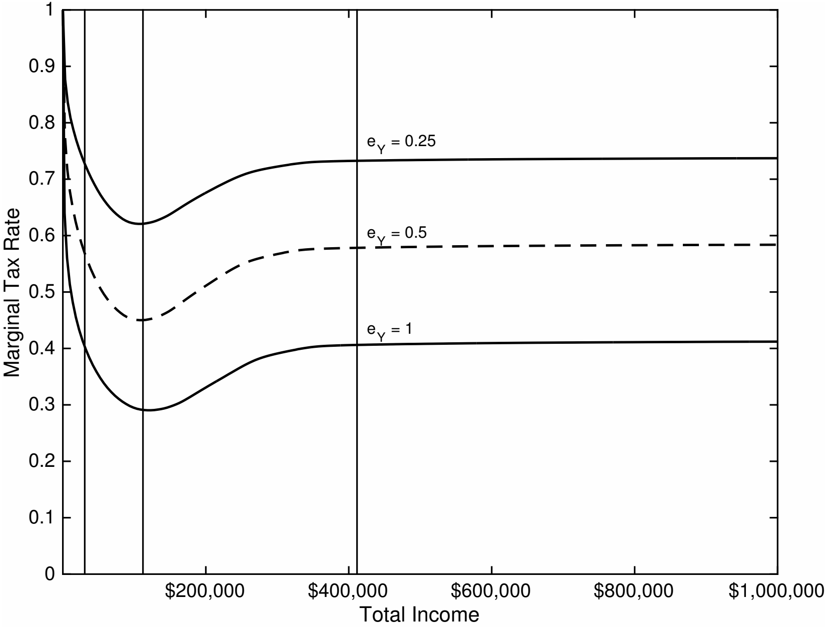
# Optimal Labor Income Tax Rate $T_L'(z)$



# Optimal Capital Income Tax Rate $T'_K(rk)$



# Optimal Tax Rate on Comprehensive Income $T'_Y(y)$



# Generalized Model

## The generalized model

Utility is

$$V_i(\{c_i(t), k_i(t), z_i(t)\}_{t\geq 0}) = \delta_i \cdot \int_{t=0}^{\infty} u_i(c_i(t), k_i(t), z_i(t)) e^{-\delta_i t} dt$$

with $u_i(\underset{+}{c}, \underset{+}{k}, \underset{-}{z})$ **concave in c**, concave in $k$, concave in $z$

$\Rightarrow$ consumption smoothing $\Rightarrow$ sluggish transitional dynamics (a sum of anticipatory and build-up effects).

Convergence to steady state no longer instantaneous:
$u_{ik}/u_{ic} = \delta_i - \bar{r}$, $u_{ic} \cdot (1 - T_L') = -u_{iz}$ and $c = rk + z - T(rk, z)$.

Social welfare:

$$SWF = \int_i \omega_i V_i(\{c_i(t), k_i(t), z_i(t)\}_{t\geq 0})$$

# Optimal Linear Capital Tax in the Steady State

Given $\tau_K$ and $\tau_L$, rebated lump-sum $\rightarrow$ convergence to steady state.

At time 0, start from steady state, consider unanticipated small reform $d\tau_K$, with elasticities:

$e_K(t) = dk^m(t)/d\bar{r}(\bar{r}/k^m(t)) \rightarrow e_K$.

$e_{L,(1-\tau_K)} = dz^m/d\bar{r}(\bar{r}/z^m)$.

Optimal linear capital income tax in steady state:

$$\tau_K = \frac{1 - \bar{g}_K - \tau_L \frac{z^m}{k^m} e_{L,1-\tau_K}}{1 - \bar{g}_K + \bar{e}_K}$$

If fast responses $\bar{e}_K \approx e_K$, quantitative results of simpler model hold.

Slow adjustment: $\bar{e}_K < e_K$.
But is it reasonable to exploit short-run sluggishness?

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If fast responses $\bar{e}_K \approx e_K$, quantitative results of simpler model hold.

Slow adjustment: $\bar{e}_K < e_K$.
But is it reasonable to exploit short-run sluggishness?

# General analysis of reforms

Comparison to standard dynamic objective:
$SWF_d = \int_i \omega_i \cdot V_i(\{c_i(t), k_i(t), z_i(t)\}_{t\geq 0})$

Any reform can be summarized by:

$$\bar{e}_K = \underbrace{\delta \int_{t<T} e_K(t) e^{-\delta(t-T)} dt}_{e_K^{ante}} + \underbrace{\delta \int_{t\geq T} e_K(t) e^{-\delta(t-T)} dt}_{e_K^{post}}$$

$$\bar{e}_K = e_K^{ante} + e_K^{post}$$

Simpler model: $\bar{e}_K = e_K$.

Generalized model: $\bar{e}_K = e_K^{ante} + e_K^{post}$ (if anticipated), $\bar{e}_K = e_K^{post}$ if not anticipated.

In every model: difference between primitives vs. reform considered.

## Comparison with Previous Dynamic Models

$e_K$ steady state: Chamley-Judd model:

Infinite (degenerate) steady state elasticity $e_K = \infty$.

Aiyagari and wealth-in-utility have $e_K < \infty$.

$e_K^{ante}$ anticipation elasticity:

If reform announced infinitely in advance, $e^{ante} = \infty$, always, with full certainty.

Reasonable?

$e^{ante} < \infty$ if uncertainty (Aiyagari).

$e_K^{post}$ adjustment to reform: sluggish in all models, except with no transitional dynamics (linear utility).

# Conclusion

Tractable model for K taxation centered on efficiency-equity tradeoff.

**Step 1:** Linear utility model with wealth in the utility.

Microfounded: bequest motive, entrepreneurship, services from wealth, social norms.

Simplicity allows us to consider various policy relevant issues: shifting, consumption taxation, cross-elasticities, ...

**Step 2:** Extend results to general model.

Qualitative intuitions and results still apply if define elasticity $\bar{e}_K$ properly.

Quantitative difference: sluggish adjustments, reflected in elasticity.

Sufficient stats map easily to the data to simulate optimal tax rates.

Asymptotic optimal capital tax rate relevant for most of capital distribution, given that capital highly concentrated.

# Inequality and Innovation

## Lecture Slides 7: Taxation and the Mobility of Inventors, Theory of and Evidence on Social Preferences

Stefanie Stantcheva
(Harvard University)

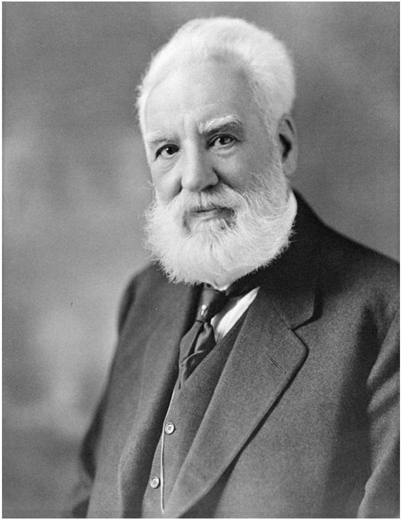
January 8, 2019

# Taxation and the International Mobility of Inventors

“Taxation and the International Mobility of Inventors” by Ufuk Akcigit, Salome Baslandze, and Stefanie Stantcheva.

https://scholar.harvard.edu/stantcheva/publications/taxation-and-international-mobility-inventors

# Alexander G. Bell



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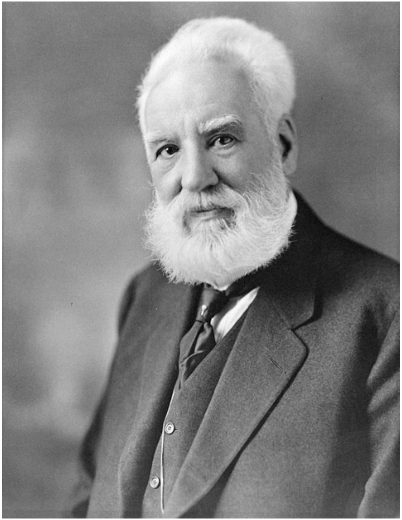


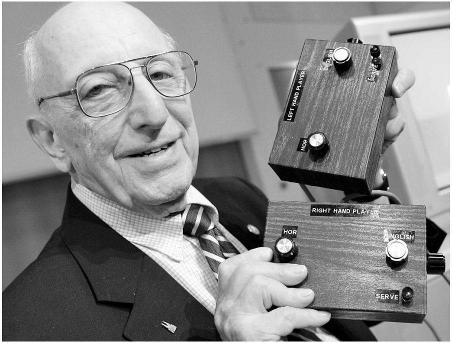
- Inventor of the telephone (1876).
- Created Bell Telephone Company (1877).
- By 1886: more than 150,000 people in U.S. own telephones.

# James L. Kraft

# James L. Kraft

- Invented a pasteurization technique for cheese and established his company.
- Created Kraft Foods Inc.
- His company grew into a conglomerate responsible for creating some of the United States' most popular food products and employing more than 100,000 people.

# Ralph Baer


LEFT HAND PLAYER
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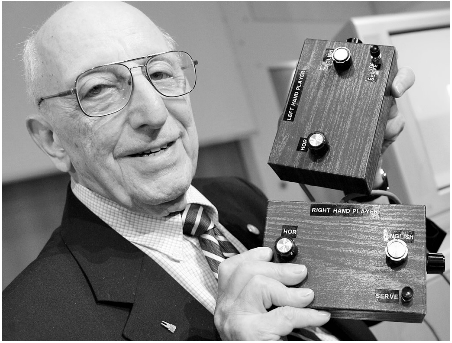


- Created TV game unit with paddle controls.
- Today, the video gaming industry is worth $66 billion.

# Introduction

- ... and the list goes on.
- In addition to being very prolific inventors, these innovators had something else in common:
- They were all immigrants.
- What determines the patterns of migration of highly skilled people?

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# Taxes and International Migration: Anecdotes but Little Evidence

- Is the "brain drain" in response to taxes real? Lots of anecdotes:
  - NYT, 2013: 'The Myth of the Rich Who Flee From Taxes"
  - Forbes, 2 days later: "Sorry New York Times, Tax Flight of the Rich Is Not a Myth."
  - Famous people migrating for tax reasons? Rolling Stones to France (!), David Bowie to Switzerland, Rod Stewart to California, Sting to Ireland, Gerard Depardieu's Russian citizenship, Edoardo Saverin (facebook co-founder) to Singapore, ...
- Scarcity of rigorous evidence due to a lack of **international panel data**.
  - Exceptions: Kleven, Landais and Saez (2013) on football players.
- This paper: study the effect of taxes on the **international mobility of inventors**.

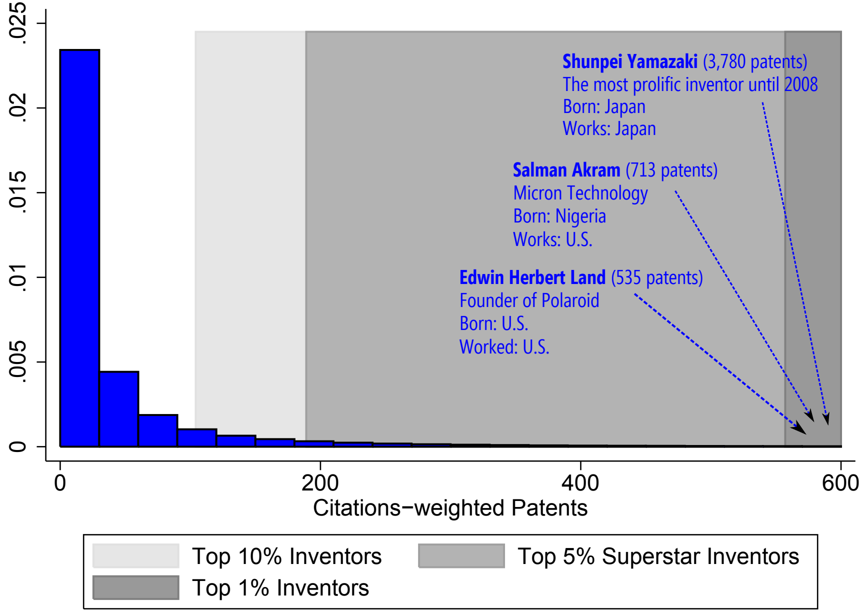
# Study the Effects of Taxes on Migration using Patent Data

- Use a **unique international panel data** to overcome challenges:
  - **Patent data** from the USPTO and EPO, 1977-2000.
  - Track inventors in 8 big patenting countries: CA, CH, DE, FR, IT, JP, UK, US through residential addresses.
- Study effects of **top tax rates** on **"superstar"** inventors' locations.
- Patent data gives direct measures of inventor quality.
- Detailed controls for ***counterfactual*** earnings in each potential location.

**Three levels of analysis:**

1. Macro country-year level migration flows (country-by-year variation).
2. Country case studies (quasi-experimental variation from reforms).
3. Micro inventor level location choice model (differential impact of top MTR within country-year. Inventor quality $\rightarrow \uparrow$ propensity to be treated).

# Superstar Inventors in a Highly Skewed Quality Distribution



# Preview of Findings

- Superstar top 1% inventors' location choice significantly affected by top tax rates.
- If have worked for multinationals more sensitive to tax differentials.
- If company has localized research activity, less sensitive.

# Related literature

Skilled Migration: Kerr (2013), Foley and Kerr (2013), Miguelez and Moreno (2014), Miguelez (2013), Breschi, Lissoni and Tarasconi (2014).

Taxation and Migration: Kleven, Landais and Saez (2013), Kleven, Landais, Saez and Schultz (2014), Bakija and Slemrod (2004), Liebig *et al.* (2007), Moretti and Wilson (2014, 2015).

Theoretical Taxation Models with Migration: Mirrlees (1982), Wilson (1980,1982), Simula and Trannoy (2010), Lehmann, Simula and Trannoy (2014).

# Outline

1. Data and Inventor Quality Measures
2. Macro Country-year Level Migration Flows
3. Country Case Studies: Quasi-experimental variation
4. Micro Inventor Level Location Choice Model
5. Robustness and Extensions

# Outline

# Three Data sources: DID, EPO, PCT

- Inventors: employees, researchers, self-employed.
- "Assignee" is legal owner (firm or individual), can be $\neq$ from inventor. Focus on employees.

## Main Data: Disambiguated Inventor Data

- USPTO: 4.2 million patent records, 3.1 million inventors in 1975-2010.
- 18% of worldwide direct patent filings (26% of all patents).
- Disambiguated names with residential addresses (Lai *et al.*, 2012).

## Additional Data 1: European Patent Office (EPO) data

- Very recent disambiguation, higher representation of EU patents.

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USPTO Stats EPO Stats Details

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# Inventor Quality Measures and Ranking

Patent quality increases inventor income, directly and *indirectly*.

**Quality measures** (dynamic and lagged)

1. Citations-weighted patents (benchmark)
2. Patent count
3. Average citations per patent
4. Max citations per patent
5. Patent breadth (claims-weighted patents)
6. Impact breadth (# tech classes citing patent).

▸ Correlations ▸ Patent breadth, breadth of impact

$\longrightarrow$ Dynamic, Persistent, Life-time ranking

**Inventor Ranking**

- Group countries by patenting intensity (robust): 1. U.S., 2. JP, 3. EU + CA
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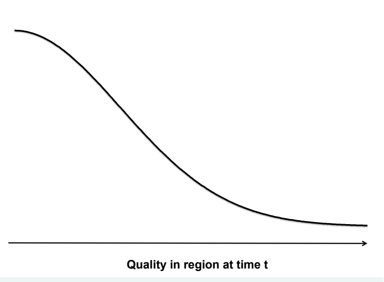

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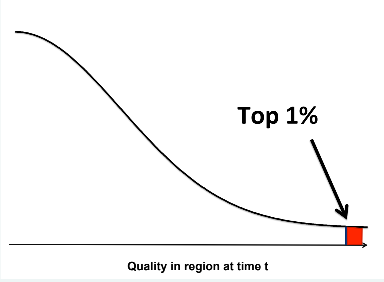

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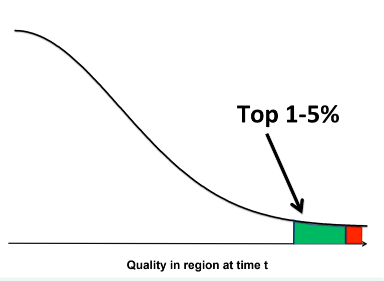

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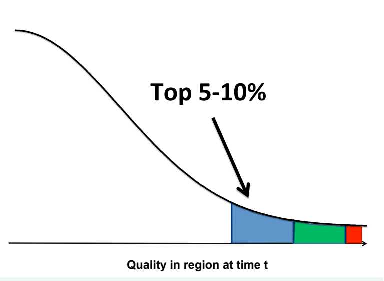

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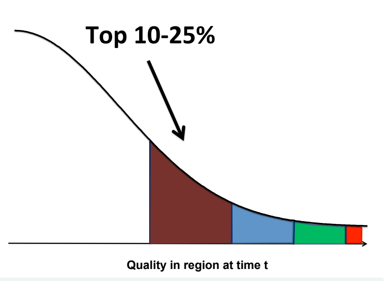

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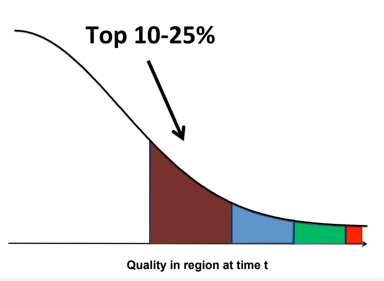
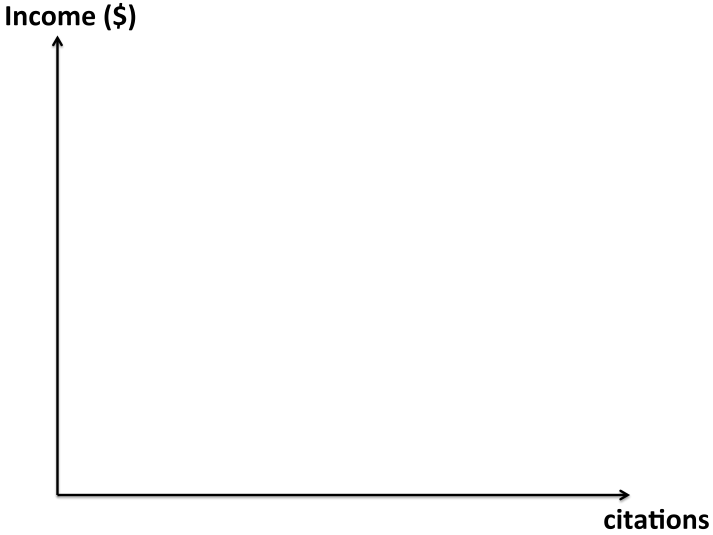


# Link between Inventor Quality and Income in IRS data




Source: Bell *et al.* (2015).

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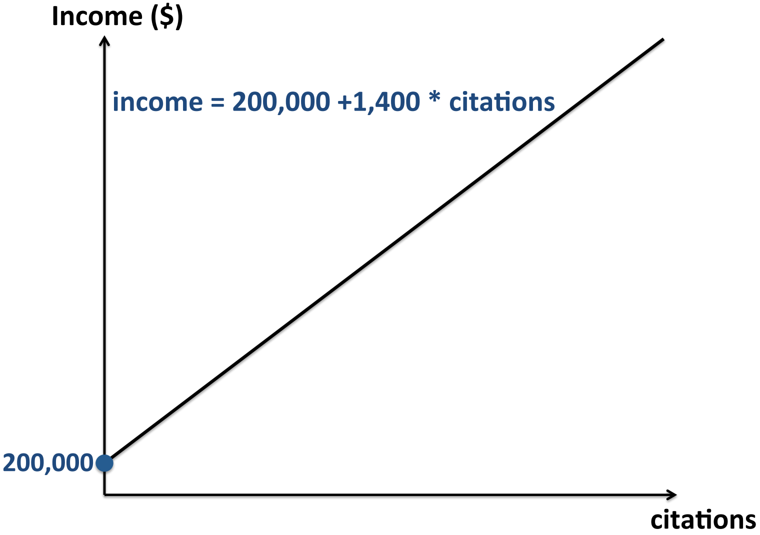


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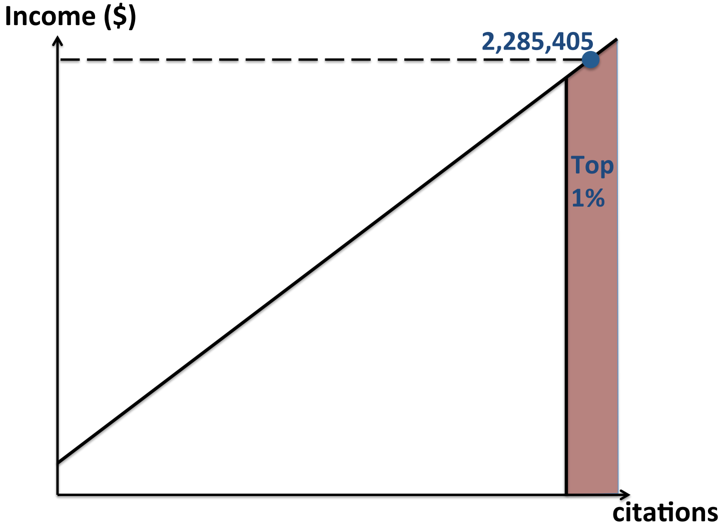


Source: Bell *et al.* (2015).

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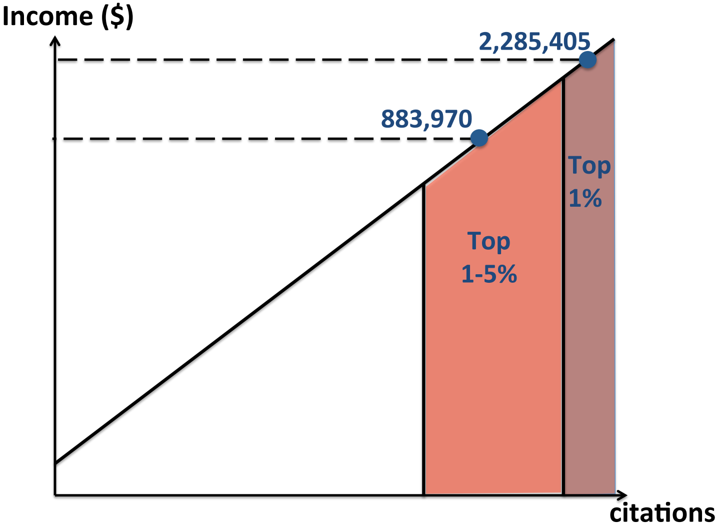
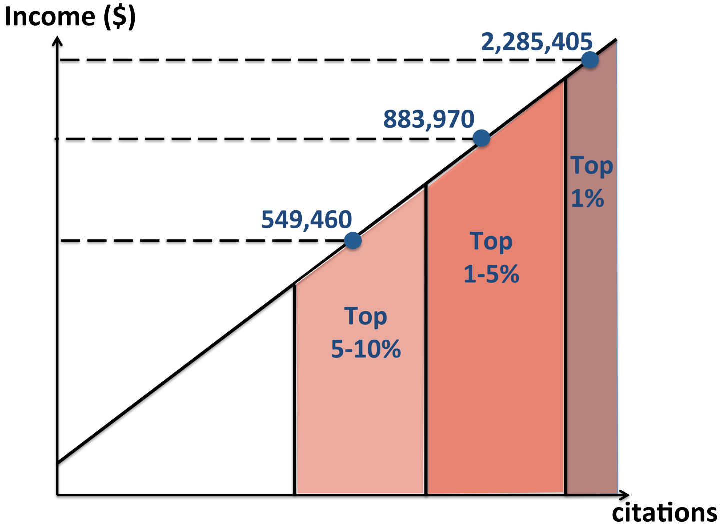


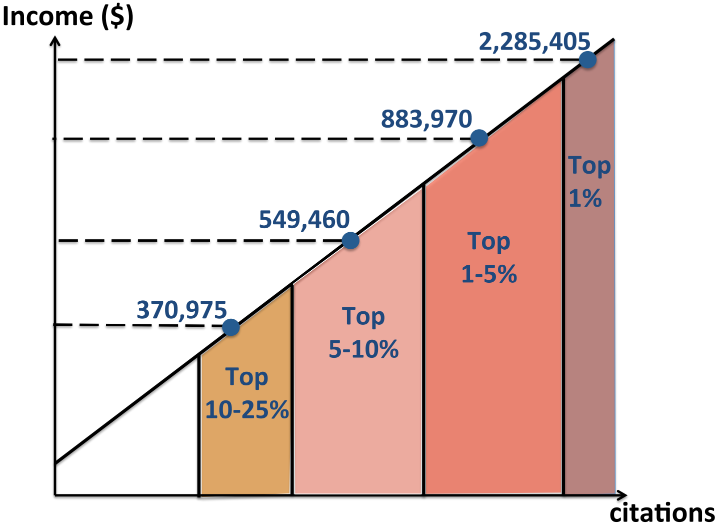

Source: Bell *et al.* (2015).

# Link between Inventor Quality and Income in IRS data



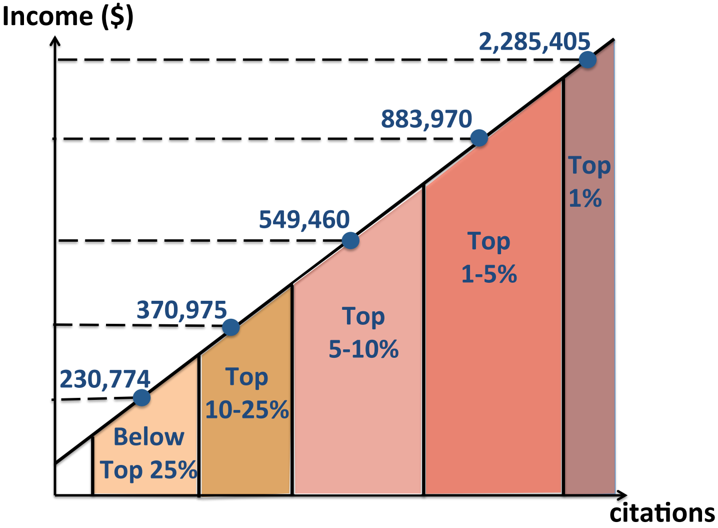

Source: Bell *et al.* (2015).

# Link between Inventor Quality and Income in IRS data



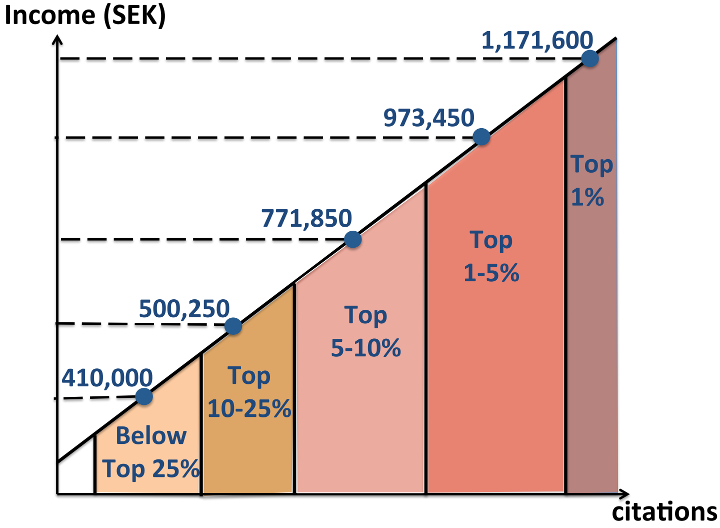

Source: Bell *et al.* (2015).

# Link between Inventor Quality and Income in IRS data



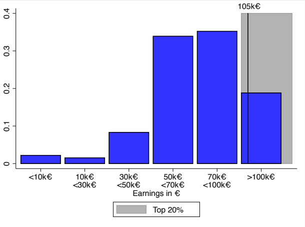

Source: Bell *et al.* (2015).

# Link between Inventor Quality and Income in Swedish and Finnish Admin data

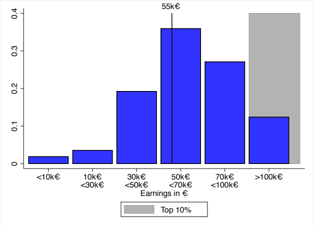



Source: Olof Ejermo and Otto Toivaannen.

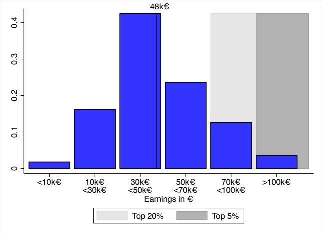
# Survey Income Distributions + Link Quality-Income



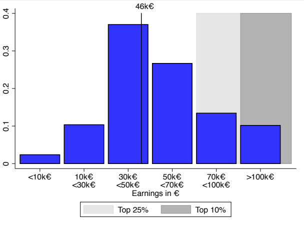

(a) Switzerland



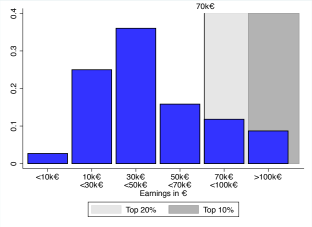

(b) Germany



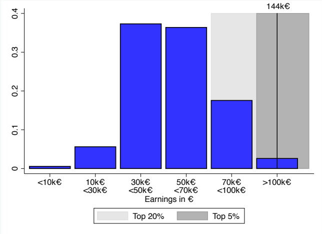

(c) France




(d) Great Britain

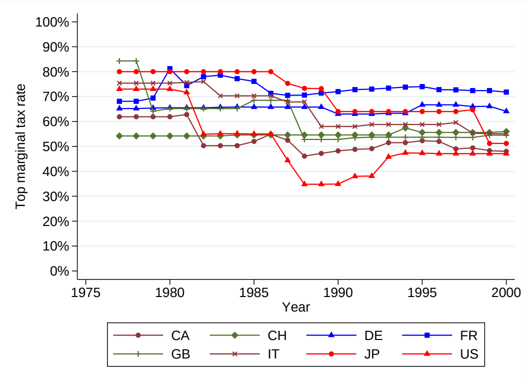



(e) Italy




(f) Japan

# Migration Elasticities to Top Marginal Tax Rates

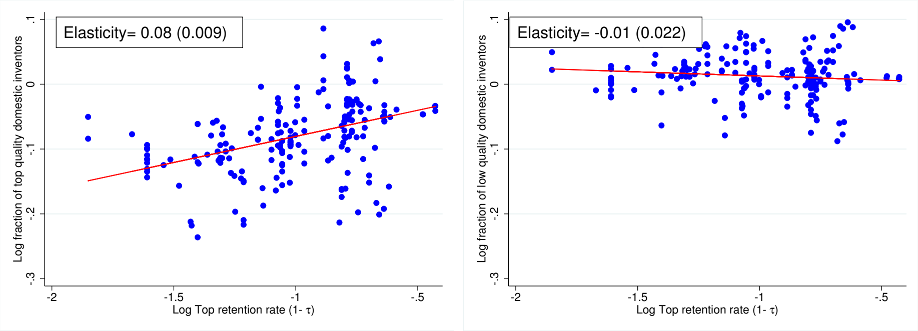



Effective top MTRs from *Piketty, Saez, and Stantcheva (2014)* (90 top MTR changes).

- "Success tax," focal policy tool.
- "Reduced-form" elasticity: MTR $\approx$ instrument for ATR. Exogenous to income.
- Firm and worker responses, institutional features (e.g.: visas).
- Other taxes? 1) sample of employees only, 2) check corporate & capital gains tax, 3) lower bound.

# Outline

# Top $(1-\tau)$ and % of Domestic Inventors in Home Country



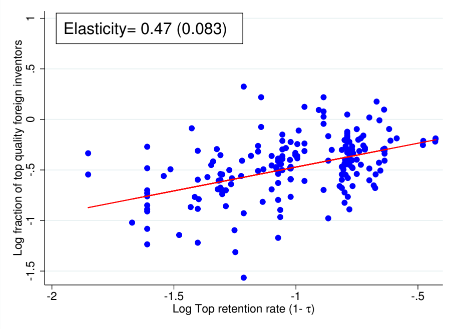

(a) Top quality inventors (b) Low quality inventors

Additional macro level results in the paper:

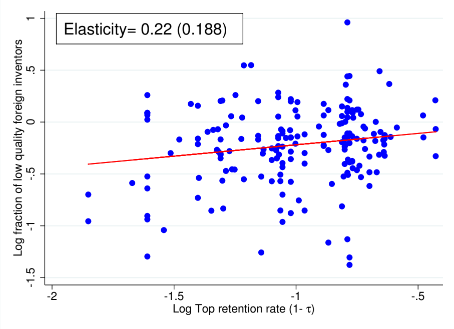
- Domestic and Foreign inventors.
- For different quality levels, in different datasets.
- With leads and lags.

▸ Tax lead ▸ Event Study

# Top $(1-\tau)$ and % of Foreign Inventors




(a) Top quality inventors




(b) Low quality inventors

Log outcomes at the country-year level. Partial residual plots controlling for country's patent stock, GDP per capita, country fixed effects, year fixed effects. Elasticities reported (standard errors clustered at the country level).

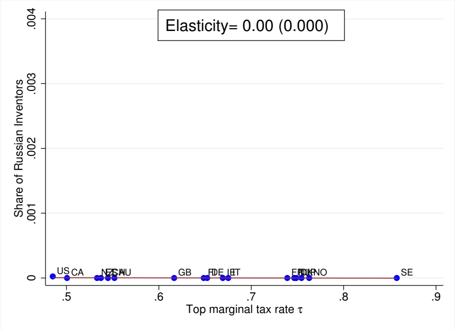
# Cross-country Summary:
## Top $(1-\tau)$ and % of domestic and foreign inventors

| | Benchmark DID | | PCT |
|---|---|---|---|
| | Top quality inventors | Low quality inventors | All inventors |
| | (1) | (2) | (3) |
| Domestic Elasticity | 0.080*** | -0.013 | 0.074* |
| | (0.009) | (0.022) | (0.038) |
| Foreign Elasticity | 0.471*** | 0.219 | 0.985* |
| | (0.083) | (0.188) | (0.483) |
| (Domestic) Observations | 192 | 192 | 244 |
| (Foreign) Observations | 191 | 188 | 238 |

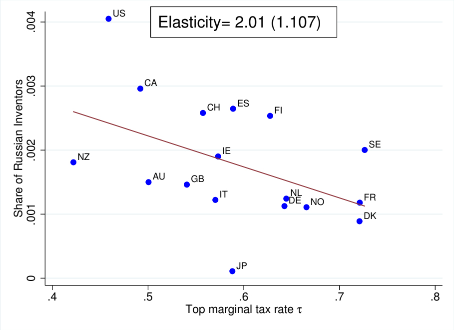
Regressions control for country fixed effects, year fixed effects, log GDP per capita and log number of patents in the country in that year.

# Outline

# Russian Inventors' Migration and Top Tax Rates Pre and Post Soviet Union Collapse

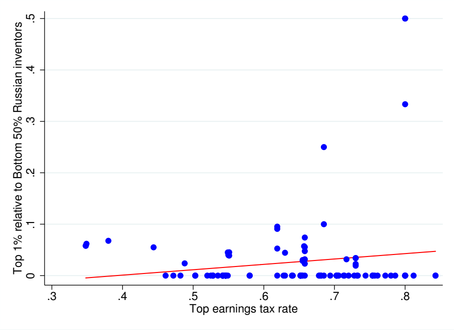



(a) Pre Soviet Union Collapse: No possible migration

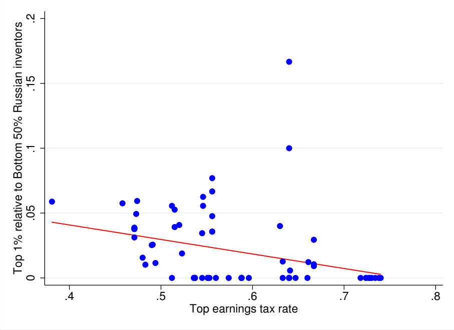



(b) Post Soviet Union Collapse: Migration negatively correlated with top $\tau$.

# Top Quality versus Low Quality Russian Inventors' Migration




(a) Pre Soviet Union collapse

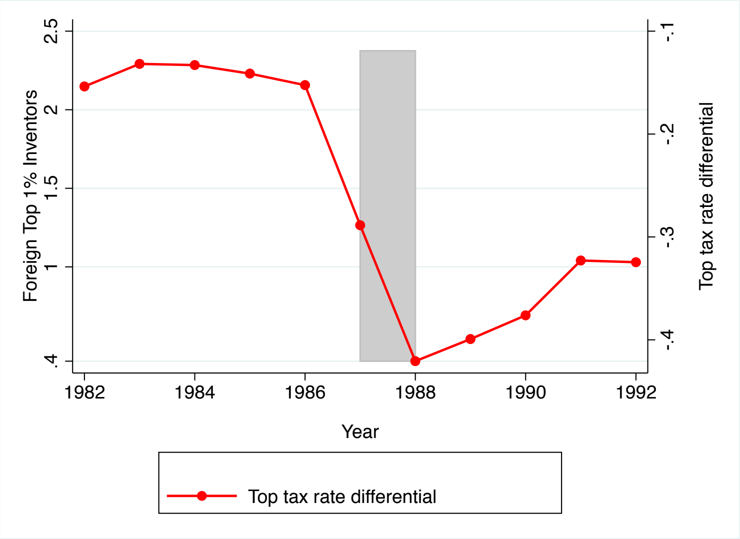



(b) Post Soviet Union collapse: $-0.11^{***}(0.028)$

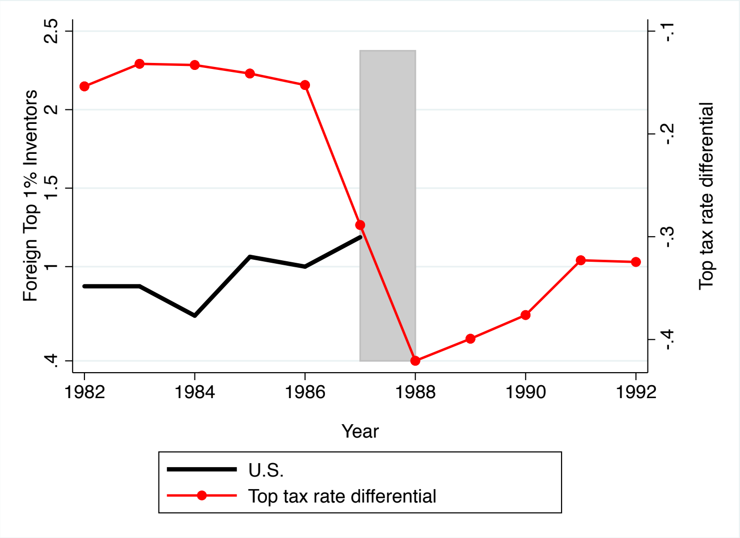
**Elasticities**:

| | (1) Top 1% | (2) Top 1-50% |
|---|---|---|
| Pre Soviet Union collapse | 0.0878 | 0.0779 |
| | (0.193) | (0.131) |
| Post Soviet Union collapse | 1.154*** | 0.398** |
| | (0.263) | (0.191) |
| Observations | 192 | 192 |

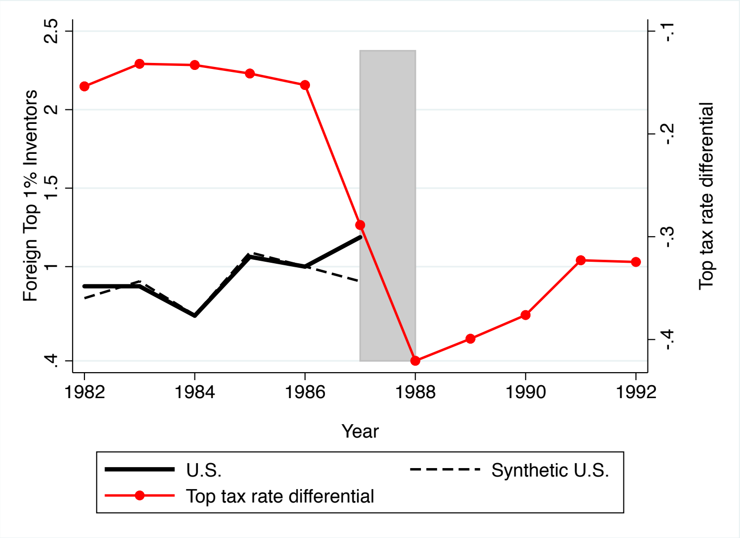
# Case Study: U.S. TRA 1986



# Case Study: U.S. TRA 1986



# Case Study: U.S. TRA 1986



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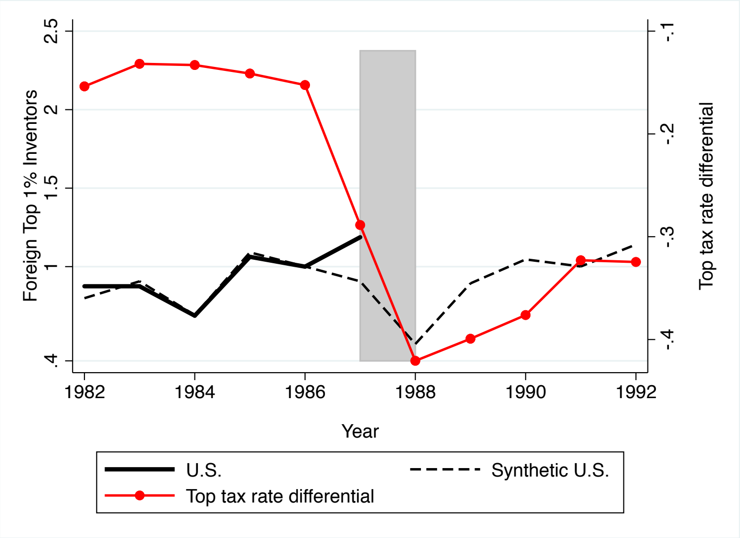

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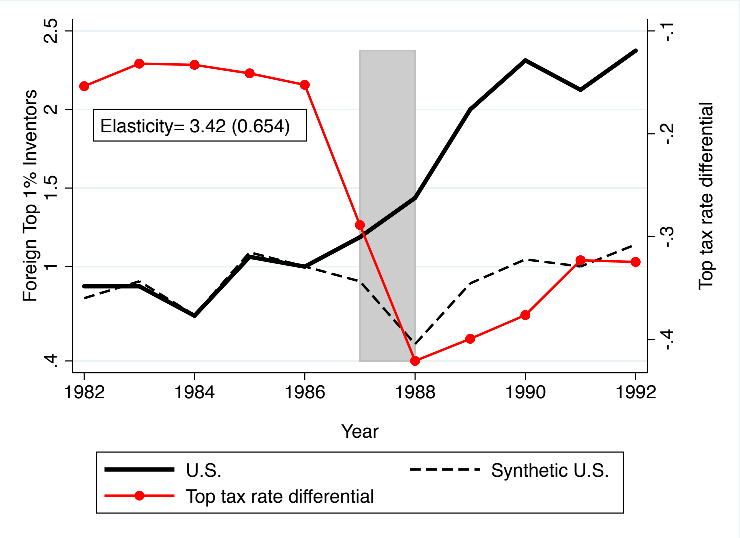
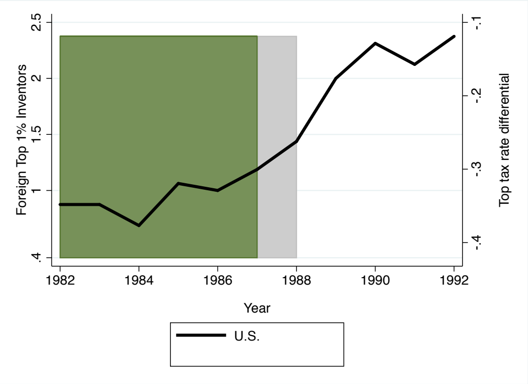


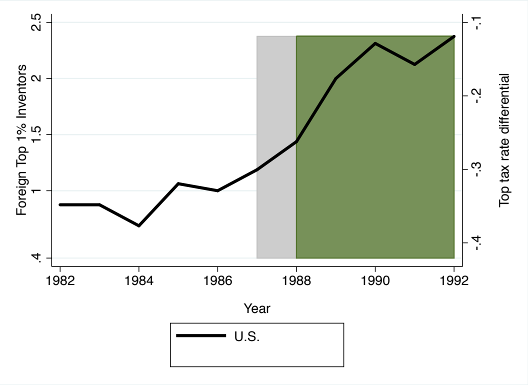
# Case Study: U.S. TRA 1986




Structural break in growth of foreign top 1% relative to lower quality inventors.

| Inventor quality | Pre T.R.A 1986 | Post T.R.A 1986 |
|---|---|---|
| Top 1% | 6.8% | 16.4% |
| Top 10-25% | 13% | 11.4% |

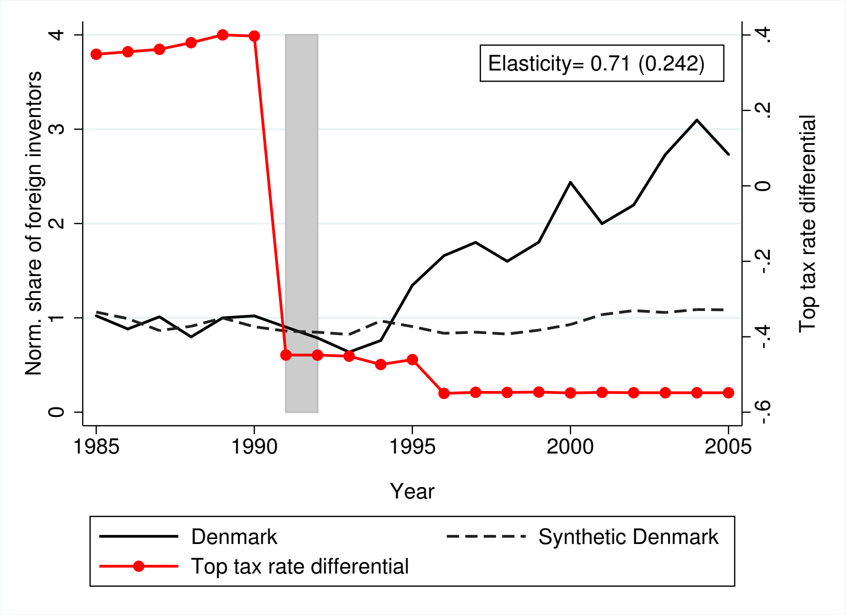
# Case Study: U.S. TRA 1986




Structural break in growth of foreign top 1% relative to lower quality inventors.

| Inventor quality | Pre T.R.A 1986 | Post T.R.A 1986 |
|---|---|---|
| Top 1% | 6.8% | 16.4% |
| Top 10-25% | 13% | 11.4% |

# Case Study: Denmark's 1992 Preferential Tax Reform



# Outline

$$Pr(y_{it} = c) = f(\alpha_{r_{it}} \log\left(1 - \text{top MTR}^{i}_{ct}\right) + \beta_c \mathbf{x}_{ti} + \eta \mathbf{x}_{cti} + \zeta \mathbf{x}_{ct})$$

$x_{ti}$: individual covariates ($\times$ country FE), control for *counterfactual* earnings. Age, tech field, works for multinational, ranking
+ quality $\times$ country FE
+ quality $\times$ country FE $\times$ trend
+ quality $\times$ country FE $\times$ trend $\times$ tech field.

$x_{cti}$: individual-country pair covariates: home dummy, patent stock in inventor's tech field, distance, common language.

- $x_{ct}$: country covariates.

$$Pr(y_{it} = c) = f\left(\alpha_{r_{it}} \log\left(1 - \text{top MTR}^{i}_{ct}\right) + \beta_c \mathbf{x}_{ti} + \eta \mathbf{x}_{cti} + \zeta \mathbf{x}_{ct}\right)$$

$x_{ti}$: individual covariates ($\times$ country FE), control for *counterfactual* earnings. Age, tech field, works for multinational, ranking
+ quality $\times$ country FE
+ quality $\times$ country FE $\times$ trend
+ quality $\times$ country FE $\times$ trend $\times$ tech field.

$x_{cti}$: individual-country pair covariates: home dummy, patent stock in inventor's tech field, distance, common language.

- $x_{ct}$: country covariates.

$$Pr(y_{it} = c) = f(\alpha_{r_{it}} \log\left(1 - \text{top MTR}^{i}_{ct}\right) + \beta_c \mathbf{x}_{ti} + \eta \mathbf{x}_{cti} + \zeta \mathbf{x}_{ct})$$

$x_{ti}$: individual covariates ($\times$ country FE), control for *counterfactual* earnings. Age, tech field, works for multinational, ranking
+ quality $\times$ country FE
+ quality $\times$ country FE $\times$ trend
+ quality $\times$ country FE $\times$ trend $\times$ tech field.

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+ quality $\times$ country FE
+ quality $\times$ country FE $\times$ trend
+ quality $\times$ country FE $\times$ trend $\times$ tech field.

$x_{cti}$: individual-country pair covariates: home dummy, patent stock in inventor's tech field, distance, common language.

- $x_{ct}$: country covariates.
- **Country-by-year variation**: patent stock, GDP per capita, country FEs, year FEs, country-specific time trends.
  - Contemporaneous country-specific policies?
  - Loads general equilibrium effects and sorting on coefficient of top tax (e.g.: inflow of higher ability inventors could displace low ability inventors if rigid demand).

$$Pr(y_{it} = c) = f(\alpha_{r_{it}} \log(1 - \text{top MTR}^i_{ct}) + \beta_c \mathbf{x}_{ti} + \eta \mathbf{x}_{cti} + \zeta \mathbf{x}_{ct})$$

$x_{ti}$: individual covariates ($\times$ country FE), control for *counterfactual* earnings. Age, tech field, works for multinational, ranking
+ quality $\times$ country FE
+ quality $\times$ country FE $\times$ trend
+ quality $\times$ country FE $\times$ trend $\times$ tech field.

$x_{cti}$: individual-country pair covariates: home dummy, patent stock in inventor's tech field, distance, common language.

- $x_{ct}$: country covariates.
- **Superstars vs. Non-superstars**: include country $\times$ year FE.
  - Logic: Top 1% and slightly lower quality inventors very comparable.
  - Only inventors actually in top tax bracket are directly affected by top tax.
  - Higher quality $\rightarrow$ Higher income $\rightarrow$ higher propensity to be treated by top MTR (MTR $\approx$ ATR).

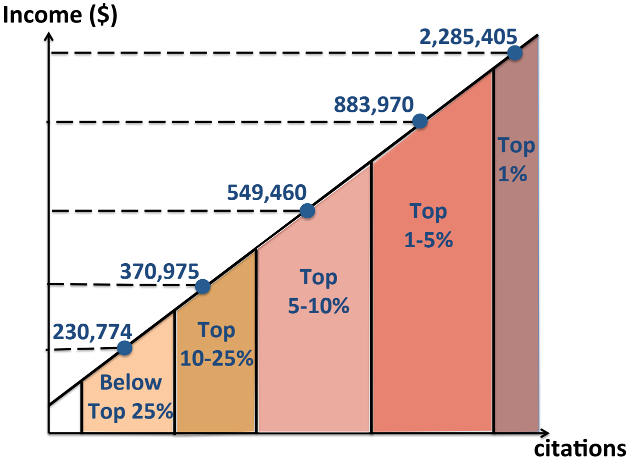
$$Pr(y_{it} = c) = f\left(\alpha_{r_{it}} \log\left(1 - \text{top MTR}^i_{ct}\right) + \beta_c \mathbf{x}_{ti} + \eta \mathbf{x}_{cti} + \zeta \mathbf{x}_{ct}\right)$$

$x_{ti}$: individual covariates ($\times$ country FE), control for *counterfactual* earnings. Age, tech field, works for multinational, ranking
+ quality $\times$ country FE
+ quality $\times$ country FE $\times$ trend
+ quality $\times$ country FE $\times$ trend $\times$ tech field.

$x_{cti}$: individual-country pair covariates: home dummy, patent stock in inventor's tech field, distance, common language.

- $x_{ct}$: country covariates.
- **Superstars vs. Non-superstars**: include country $\times$ year FE.
  - Logic: Top 1% and slightly lower quality inventors very comparable.
  - Only inventors actually in top tax bracket are directly affected by top tax.
  - Higher quality $\rightarrow$ Higher income $\rightarrow$ higher propensity to be treated by top MTR (MTR $\approx$ ATR).

# Choice of the Control Group?




Trade-off in the choice of the control group.

→ Provide set of effects of $(1 - \text{MTR})$ on all quality groups.

→ Provide elasticity of top 1% relative to several control groups $g \in \{\text{top 5-10\%, top10-25\%, below top 25\%}\}$.

# Country-by-year Variation and General Equilibrium Effects

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| Log Retention Rate × Top 1 | 0.890** | 0.891** | 0.965** | 0.951** |
| | (0.365) | (0.377) | (0.384) | (0.383) |
| Log Retention Rate × Top 1-5 | 0.447** | 0.456** | 0.527*** | 0.507** |
| | (0.182) | (0.197) | (0.199) | (0.203) |
| Log Retention Rate × Top 5-10 | 0.141 | 0.155 | 0.227 | 0.202 |
| | (0.142) | (0.148) | (0.147) | (0.148) |
| Log Retention Rate × Top 10-25 | -0.131 | -0.107 | -0.0296 | -0.0533 |
| | (0.113) | (0.114) | (0.108) | (0.106) |
| Log Retention Rate × Below Top 25 | -0.415*** | -0.358** | -0.275 | -0.285 |
| | (0.150) | (0.171) | (0.176) | (0.176) |
| Quality× Country FE | NO | YES | YES | YES |
| Quality × Country FE × Year | NO | NO | YES | YES |
| Quality×Country FE×Year×Field FE | NO | NO | NO | YES |
| Domestic elasticity | 0.02 | 0.02 | 0.024 | 0.023 |
| s.e | (0.009) | (0.009) | (0.009) | (0.009) |
| Foreign elasticity | 0.75 | 0.751 | 0.807 | 0.798 |
| s.e | (0.305) | (0.319) | (0.324) | (0.322) |
| Observations | 8,645,464 | 8,617,464 | 8,617,464 | 8,617,464 |

# Superstars vs. Non-Superstars

| | | (1) | (2) | (3) | (4) |
|---|---|---|---|---|---|
| Log Retention Rate × Top 1 | | 1.328** | 1.456** | 1.399** | $\boxed{1.352^{**}}$ |
| | | (0.644) | (0.642) | (0.667) | $\boxed{(0.669)}$ |
| Log Retention Rate × Top 1-5 | | 0.885* | 1.022** | 0.961* | 0.907* |
| | | (0.514) | (0.514) | (0.532) | (0.536) |
| Log Retention Rate × Top 5-10 | | 0.576 | 0.719 | 0.658 | 0.599 |
| | | (0.495) | (0.483) | (0.501) | (0.506) |
| Log Retention Rate × Top 10-25 | | 0.303 | 0.456 | 0.398 | 0.341 |
| | | (0.486) | (0.466) | (0.481) | (0.484) |
| Log Retention Rate × Below Top 25 | | 0.022 | 0.207 | 0.153 | 0.110 |
| | | (0.493) | (0.471) | (0.478) | (0.482) |
| Quality× Country FE | | NO | YES | YES | YES |
| Quality × Country FE × Year | | NO | NO | YES | YES |
| Quality× Country FE× Year× Field FE | | NO | NO | NO | YES |
| Control: Top 5-10 | Domestic elasticity | 0.02 | 0.02 | 0.02 | 0.02 |
| | s.e | (0.009) | (0.009) | (0.009) | (0.009) |
| | Foreign elasticity | 0.63 | 0.62 | 0.62 | 0.63 |
| | s.e | (0.314) | (0.321) | (0.318) | (0.319) |
| Control: Top 10-25 | Domestic elasticity | 0.03 | 0.02 | 0.02 | 0.02 |
| | s.e | (0.009) | (0.009) | (0.009) | (0.009) |
| | Foreign elasticity | 0.86 | 0.84 | 0.84 | 0.85 |
| | s.e | (0.323) | (0.334) | (0.335) | (0.334) |
| Control: Below Top 25 | Domestic elasticity | 0.03 | 0.03 | 0.03 | 0.03 |
| | s.e | (0.009) | (0.010) | (0.011) | (0.011) |
| | Foreign elasticity | 1.09 | 1.05 | 1.04 | 1.04 |
| | s.e | (0.340) | (0.376) | (0.382) | (0.381) |
| Observations | | 8,645,464 | 8,617,464 | 8,617,464 | 8,617,464 |

# Superstars vs. Non-Superstars

| | | (1) | (2) | (3) | (4) |
|---|---|---|---|---|---|
| Log Retention Rate × Top 1 | | 1.328** | 1.456** | 1.399** | 1.352** |
| | | (0.644) | (0.642) | (0.667) | (0.669) |
| Log Retention Rate × Top 1-5 | | 0.885* | 1.022** | 0.961* | 0.907* |
| | | (0.514) | (0.514) | (0.532) | (0.536) |
| Log Retention Rate × Top 5-10 | | 0.576 | 0.719 | 0.658 | 0.599 |
| | | (0.495) | (0.483) | (0.501) | (0.506) |
| Log Retention Rate × Top 10-25 | | 0.303 | 0.456 | 0.398 | 0.341 |
| | | (0.486) | (0.466) | (0.481) | (0.484) |
| Log Retention Rate × Below Top 25 | | 0.022 | 0.207 | 0.153 | 0.110 |
| | | (0.493) | (0.471) | (0.478) | (0.482) |
| Quality× Country FE | | NO | YES | YES | YES |
| Quality × Country FE × Year | | NO | NO | YES | YES |
| Quality× Country FE× Year× Field FE | | NO | NO | NO | YES |
| Control: Top 5-10 | Domestic elasticity | 0.02 | 0.02 | 0.02 | 0.02 |
| | s.e | (0.009) | (0.009) | (0.009) | (0.009) |
| | Foreign elasticity | 0.63 | 0.62 | 0.62 | 0.63 |
| | s.e | (0.314) | (0.321) | (0.318) | (0.319) |
| Control: Top 10-25 | Domestic elasticity | 0.03 | 0.02 | 0.02 | 0.02 |
| | s.e | (0.009) | (0.009) | (0.009) | (0.009) |
| | Foreign elasticity | 0.86 | 0.84 | 0.84 | 0.85 |
| | s.e | (0.323) | (0.334) | (0.335) | (0.334) |
| Control: Below Top 25 | Domestic elasticity | 0.03 | 0.03 | 0.03 | 0.03 |
| | s.e | (0.009) | (0.010) | (0.011) | (0.011) |
| | Foreign elasticity | 1.09 | 1.05 | 1.04 | 1.04 |
| | s.e | (0.340) | (0.376) | (0.382) | (0.381) |
| Observations | | 8,645,464 | 8,617,464 | 8,617,464 | 8,617,464 |

# Superstars vs. Non-Superstars

| | | (1) | (2) | (3) | (4) |
|---|---|---|---|---|---|
| Log Retention Rate × Top 1 | | 1.328** | 1.456** | 1.399** | 1.352** |
| | | (0.644) | (0.642) | (0.667) | (0.669) |
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| | | (0.514) | (0.514) | (0.532) | (0.536) |
| Log Retention Rate × Top 5-10 | | 0.576 | 0.719 | 0.658 | 0.599 |
| | | (0.495) | (0.483) | (0.501) | (0.506) |
| Log Retention Rate × Top 10-25 | | 0.303 | 0.456 | 0.398 | 0.341 |
| | | (0.486) | (0.466) | (0.481) | (0.484) |
| Log Retention Rate × Below Top 25 | | 0.022 | 0.207 | 0.153 | 0.110 |
| | | (0.493) | (0.471) | (0.478) | (0.482) |
| Quality× Country FE | | NO | YES | YES | YES |
| Quality × Country FE × Year | | NO | NO | YES | YES |
| Quality× Country FE× Year× Field FE | | NO | NO | NO | YES |
| Control: Top 5-10 | Domestic elasticity | 0.02 | 0.02 | 0.02 | $\boxed{0.02}$ |
| | s.e | (0.009) | (0.009) | (0.009) | (0.009) |
| | Foreign elasticity | 0.63 | 0.62 | 0.62 | 0.63 |
| | s.e | (0.314) | (0.321) | (0.318) | (0.319) |
| Control: Top 10-25 | Domestic elasticity | 0.03 | 0.02 | 0.02 | 0.02 |
| | s.e | (0.009) | (0.009) | (0.009) | (0.009) |
| | Foreign elasticity | 0.86 | 0.84 | 0.84 | 0.85 |
| | s.e | (0.323) | (0.334) | (0.335) | (0.334) |
| Control: Below Top 25 | Domestic elasticity | 0.03 | 0.03 | 0.03 | 0.03 |
| | s.e | (0.009) | (0.010) | (0.011) | (0.011) |
| | Foreign elasticity | 1.09 | 1.05 | 1.04 | 1.04 |
| | s.e | (0.340) | (0.376) | (0.382) | (0.381) |
| Observations | | 8,645,464 | 8,617,464 | 8,617,464 | 8,617,464 |

# Superstars vs. Non-Superstars

| | | (1) | (2) | (3) | (4) |
|---|---|---|---|---|---|
| Log Retention Rate × Top 1 | | 1.328** | 1.456** | 1.399** | 1.352** |
| | | (0.644) | (0.642) | (0.667) | (0.669) |
| Log Retention Rate × Top 1-5 | | 0.885* | 1.022** | 0.961* | 0.907* |
| | | (0.514) | (0.514) | (0.532) | (0.536) |
| Log Retention Rate × Top 5-10 | | 0.576 | 0.719 | 0.658 | 0.599 |
| | | (0.495) | (0.483) | (0.501) | (0.506) |
| Log Retention Rate × Top 10-25 | | 0.303 | 0.456 | 0.398 | 0.341 |
| | | (0.486) | (0.466) | (0.481) | (0.484) |
| Log Retention Rate × Below Top 25 | | 0.022 | 0.207 | 0.153 | 0.110 |
| | | (0.493) | (0.471) | (0.478) | (0.482) |
| Quality× Country FE | | NO | YES | YES | YES |
| Quality × Country FE × Year | | NO | NO | YES | YES |
| Quality× Country FE× Year× Field FE | | NO | NO | NO | YES |
| Control: Top 5-10 | Domestic elasticity | 0.02 | 0.02 | 0.02 | 0.02 |
| | s.e | (0.009) | (0.009) | (0.009) | (0.009) |
| | Foreign elasticity | 0.63 | 0.62 | 0.62 | 0.63 |
| | s.e | (0.314) | (0.321) | (0.318) | (0.319) |
| Control: Top 10-25 | Domestic elasticity | 0.03 | 0.02 | 0.02 | 0.02 |
| | s.e | (0.009) | (0.009) | (0.009) | (0.009) |
| | Foreign elasticity | 0.86 | 0.84 | 0.84 | 0.85 |
| | s.e | (0.323) | (0.334) | (0.335) | (0.334) |
| Control: Below Top 25 | Domestic elasticity | 0.03 | 0.03 | 0.03 | $\boxed{0.03}$ |
| | s.e | (0.009) | (0.010) | (0.011) | (0.011) |
| | Foreign elasticity | 1.09 | 1.05 | 1.04 | 1.04 |
| | s.e | (0.340) | (0.376) | (0.382) | (0.381) |
| Observations | | 8,645,464 | 8,617,464 | 8,617,464 | 8,617,464 |

# Implied Migration Elasticities across Countries

| Country | Domestic elasticity | Foreign elasticity | Percentage change in domestic inventors | Percentage change in foreign inventors |
|---|---|---|---|---|
| United States | 0.003 | 0.97 | 0.1 | 18.4 |
| Great Britain | 0.36 | 1.24 | 8.0 | 27.2 |
| Canada | 0.31 | 1.23 | 6.1 | 23.7 |
| Germany | 0.05 | 1.22 | 1.4 | 33.9 |
| France | 0.12 | 1.23 | 4.4 | 43.6 |
| Italy | 0.13 | 1.23 | 3.0 | 27.4 |
| Japan | 0.01 | 1.23 | 0.2 | 25.2 |
| Switzerland | 0.18 | 1.23 | 4.2 | 27.9 |

Columns 3, 4: Implied % change after 10 pp decline in top tax rates in 2000.

# Implied Economic Gains across Countries (in million USD)

| | Small Patent Value | | Large Patent Value | |
|---|---|---|---|---|
| Tax Change: | 5 percentage points | 10 percentage points | 5 percentage points | 10 percentage points |
| Country | | | | |
| United States | 59.1 | 118.2 | 1,248.0 | 2,496.1 |
| Great Britain | 17.6 | 35.2 | 371.2 | 742.5 |
| Canada | 17.6 | 35.3 | 372.4 | 744.8 |
| Germany | 17.8 | 35.7 | 376.6 | 753.2 |
| France | 10.9 | 21.9 | 230.8 | 461.6 |
| Italy | 3.0 | 5.9 | 62.6 | 125.3 |
| Japan | 8.6 | 17.3 | 182.1 | 364.2 |
| Switzerland | 5.5 | 11.0 | 116.6 | 233.3 |

$$dV_{ct} = \frac{d(1-\tau_{ct})}{(1-\tau_{ct})} \times (\varepsilon_d^c \times N_c^d + \varepsilon_f^c \times N_c^f) \times N_p \times V_p$$

- Small Patent Value: 2.7 mln USD; Large Patent Value: 57 mln USD.
- Spillovers? Patent breadth?

# The Role of Companies

| | | (1) | (2) |
|---|---|---|---|
| Log Retention Rate × Top 1 | | 1.345** | 1.366** |
| | | (0.676) | (0.692) |
| Log Retention Rate × Top 1-5 | | 0.819 | 0.649 |
| | | (0.550) | (0.593) |
| Log Retention Rate × Top 5-10 | | 0.453 | 0.313 |
| | | (0.516) | (0.581) |
| Log Retention Rate × Top 10-25 | | 0.122 | 0.0350 |
| | | (0.509) | (0.550) |
| Log Retention Rate × Below Top 25 | | -0.314 | -0.430 |
| | | (0.524) | (0.565) |
| Log Retention Rate × Not Multinational | | $\boxed{-0.219^{*}}$ | |
| | | $\boxed{(0.124)}$ | |
| Log Retention Rate × Activity abroad | | | -1.506*** |
| | | | (0.151) |
| Quality× Country FE | | YES | YES |
| Quality × Country FE × Year | | YES | YES |
| Quality× Country FE× Year× Field FE | | YES | YES |
| Control: Top 5-10 | Domestic elasticity | 0.022 | 0.288 |
| | s.e | (0.009) | (0.083) |
| | Foreign elasticity | 0.756 | 1.038 |
| | s.e | (0.327) | (0.301) |
| Control: Top 10-25 | Domestic elasticity | 0.030 | 0.363 |
| | s.e | (0.009) | (0.089) |
| | Foreign elasticity | 1.038 | 1.313 |
| | s.e | (0.330) | (0.322) |
| Control: Below Top 25 | Domestic elasticity | 0.041 | 0.492 |
| | s.e | (0.010) | (0.095) |
| | Foreign elasticity | 1.407 | 1.771 |
| | s.e | (0.342) | (0.341) |
| Observations | | 7,060,896 | 6,169,624 |

other taxes

# The Role of Companies

| | | (1) | (2) |
|---|---|---|---|
| Log Retention Rate × Top 1 | | 1.345** | 1.366** |
| | | (0.676) | (0.692) |
| Log Retention Rate × Top 1-5 | | 0.819 | 0.649 |
| | | (0.550) | (0.593) |
| Log Retention Rate × Top 5-10 | | 0.453 | 0.313 |
| | | (0.516) | (0.581) |
| Log Retention Rate × Top 10-25 | | 0.122 | 0.0350 |
| | | (0.509) | (0.550) |
| Log Retention Rate × Below Top 25 | | -0.314 | -0.430 |
| | | (0.524) | (0.565) |
| Log Retention Rate × Not Multinational | | -0.219* | |
| | | (0.124) | |
| Log Retention Rate × Activity abroad | | | $\boxed{-1.506^{***}}$ |
| | | | $\boxed{(0.151)}$ |
| Quality× Country FE | | YES | YES |
| Quality × Country FE × Year | | YES | YES |
| Quality× Country FE× Year× Field FE | | YES | YES |
| Control: Top 5-10 | Domestic elasticity | 0.022 | 0.288 |
| | s.e | (0.009) | (0.083) |
| | Foreign elasticity | 0.756 | 1.038 |
| | s.e | (0.327) | (0.301) |
| Control: Top 10-25 | Domestic elasticity | 0.030 | 0.363 |
| | s.e | (0.009) | (0.089) |
| | Foreign elasticity | 1.038 | 1.313 |
| | s.e | (0.330) | (0.322) |
| Control: Below Top 25 | Domestic elasticity | 0.041 | 0.492 |
| | s.e | (0.010) | (0.095) |
| | Foreign elasticity | 1.407 | 1.771 |
| | s.e | (0.342) | (0.341) |
| Observations | | 7,060,896 | 6,169,624 |

other taxes

# Outline

# Robustness checks and Extensions

- Alternative quality measures:
  - All the other 5 measures (based on citations, patent breadth, breadth of impact...)
  - "Life time" or "persistent" quality measures.
- Unbalanced nature of the data: selection based on patenting?
  - Use patent counts as quality measure $\rightarrow$ does not drive results.
  - Imputing data for missing years.
  - Heckman selection model on U.S.-Canada exploiting 1994 reform.
- Long term vs. Short term mobility.
- Repeat everything on European Patent Office data.
- Drop all inventors who ever move to U.S. from DID and EPO data.

# Alternative Quality Measures and Imputing Data

| | | Alternative quality Measures | | | | Imputing location |
|---|---|---|---|---|---|---|
| | | (1) | (2) | (3) | (4) | (5) |
| Log Retention Rate × Top 1 | | 1.290** | 0.282 | 2.529*** | 1.665** | 1.444** |
| | | (0.633) | (0.634) | (0.720) | (0.692) | (0.621) |
| Log Retention Rate × Top 1-5 | | 1.061** | 0.434 | 2.059*** | 1.265** | 1.097** |
| | | (0.493) | (0.458) | (0.636) | (0.546) | (0.481) |
| Log Retention Rate × Top 5-10 | | 0.578 | 0.415 | 1.354** | 0.685 | 0.876** |
| | | (0.507) | (0.443) | (0.655) | (0.500) | (0.433) |
| Log Retention Rate × Top 10-25 | | 0.368 | 0.550 | 0.690 | 0.270 | 0.680* |
| | | (0.513) | (0.444) | (0.653) | (0.508) | (0.408) |
| Log Retention Rate × Below Top 25 | | 0.0947 | 1.384*** | 0.129 | 0.0705 | 0.745* |
| | | (0.574) | (0.459) | (0.534) | (0.514) | (0.406) |
| Quality× Country FE | | YES | YES | YES | YES | YES |
| Quality × Country FE × Year | | YES | YES | YES | YES | YES |
| Quality× Country FE× Year× Field FE | | YES | YES | YES | YES | YES |
| Control: Top 5-10 | Domestic elasticity | 0.013 | 0.000 | 0.012 | 0.021 | 0.015 |
| | s.e | (0.007) | (0.007) | (0.004) | (0.009) | (0.010) |
| | Foreign elasticity | 0.599 | -0.119 | 1.132 | 0.863 | 0.486 |
| | s.e | (0.315) | (0.429) | (0.485) | (0.377) | (0.337) |
| Control: Top 10-25 | Domestic elasticity | 0.018 | -0.003 | 0.015 | 0.028 | 0.019 |
| | s.e | (0.007) | (0.007) | (0.004) | (0.009) | (0.010) |
| | Foreign elasticity | 0.773 | -0.241 | 1.770 | 1.227 | 0.653 |
| | s.e | (0.326) | (0.424) | (0.477) | (0.351) | (0.330) |
| Control: Below Top 25 | Domestic elasticity | 0.025 | -0.018 | 0.021 | 0.034 | 0.017 |
| | s.e | (0.009) | (0.009) | (0.004) | (0.010) | (0.011) |
| | Foreign elasticity | 1.004 | -0.994 | 2.310 | 1.404 | 0.597 |
| | s.e | (0.397) | (0.513) | (0.474) | (0.428) | (0.351) |
| Observations | | 8,617,464 | 8,617,464 | 8,617,464 | 8,617,464 | 17,173,640 |

more robustness

# Breadth of Impact and Patent breadth

| | | (1) | (2) |
|---|---|---|---|
| Log Retention Rate × Top 1 | | 1.253* | 1.191* |
| | | (0.646) | (0.693) |
| Log Retention Rate × Top 1-5 | | 1.103** | 0.777 |
| | | (0.508) | (0.622) |
| Log Retention Rate × Top 5-10 | | 0.944* | 0.506 |
| | | (0.484) | (0.593) |
| Log Retention Rate × Top 10-25 | | 0.658 | 0.494 |
| | | (0.489) | (0.566) |
| Log Retention Rate × Below Top 25 | | 0.532 | 0.194 |
| | | (0.537) | (0.490) |
| Quality× Country FE | | YES | YES |
| Quality × Country FE × Year | | YES | YES |
| Quality× Country FE× Year× Field FE | | YES | YES |
| Control: Top 5-10 | Domestic elasticity | 0.007 | 0.017 |
| | s.e | (0.008) | (0.010) |
| | Foreign elasticity | 0.271 | 0.576 |
| | s.e | (0.346) | (0.327) |
| Control: Top 10-25 | Domestic elasticity | 0.012 | 0.017 |
| | s.e | (0.008) | (0.009) |
| | Foreign elasticity | 0.523 | 0.586 |
| | s.e | (0.346) | (0.322) |
| Control: Below Top 25 | Domestic elasticity | 0.014 | 0.025 |
| | s.e | (0.011) | (0.011) |
| | Foreign elasticity | 0.633 | 0.837 |
| | s.e | (0.485) | (0.385) |
| Observations | | 8,617,464 | 8,617,464 |

▸ Patent breadth, breadth of impact

# Heckman Selection Model

- Binary Heckman selection model on U.S.- or Canadian inventors.
  - Reason: Theoretical and practical difficulty of multinomial choice with selection.
- Dependent variable is 1 if inventor locates in the U.S.
- Selection on the extensive margin: patent or not.
- Exploit the "Patent Term and Publication Reform Act of 1994" reform: change in patent terms.
  - Patent term of 17 years counted from grant year changed to 20 years from application year.
  - In data, patent grant period is 2 years so effective increase in patent protection length.
  - First stage: increases probability of patenting.
  - Especially binding in industries with long patent lifecycle (e.g., pharma) based on patent renewal data.

# Results: Heckman Selection Model on Canada-U.S.

| | (1) Probit | (2) Selection |
|---|---|---|
| US log retention rate × Top 1 | 1.406*** | 1.404*** |
| | (0.196) | (0.197) |
| US log retention rate × Top 1 - 5 | 0.180 | 0.178 |
| | (0.199) | (0.200) |
| US log retention rate × Top 5 - 10 | 0.135 | 0.132 |
| | (0.141) | (0.141) |
| US log retention rate × Top 10 - 25 | 0.109 | 0.107 |
| | (0.107) | (0.107) |
| US log retention rate × Below top 25 | -0.0320 | -0.0331 |
| | (0.107) | (0.107) |
| First stage | | |
| Post reform (1994) dummy | | 0.101*** |
| | | (0.0382) |
| Observations | 568,888 | 1,160,331 |

long patent life cycles

# Long-term Mobility: Moving Abroad without Moving Back

| | | (1) | (2) | (3) |
|---|---|---|---|---|
| Log Retention Rate × Top 1 | | 2.350*** | 2.176** | 2.642*** |
| | | (0.843) | (0.879) | (0.899) |
| Log Retention Rate × Top 1-5 | | 1.787** | 1.566** | 1.828** |
| | | (0.742) | (0.771) | (0.843) |
| Log Retention Rate × Top 5-10 | | 1.447** | 1.136 | 1.434* |
| | | (0.704) | (0.741) | (0.812) |
| Log Retention Rate × Top 10-25 | | 1.253* | 0.871 | 1.165 |
| | | (0.700) | (0.751) | (0.797) |
| Log Retention Rate × Below Top 25 | | 1.028 | 0.418 | 0.703 |
| | | (0.728) | (0.787) | (0.824) |
| Log Retention Rate × Not Multinational | | | -0.154 | |
| | | | (0.160) | |
| Log Retention Rate × Activity abroad | | | | -1.672*** |
| | | | | (0.202) |
| Quality× Country FE | | YES | YES | YES |
| Quality × Country FE × Year | | YES | YES | YES |
| Quality× Country FE× Year× Field FE | | YES | YES | YES |
| Control: Top 5-10 | Domestic elasticity | 0.011 | 0.012 | 0.229 |
| | s.e | (0.005) | (0.005) | (0.070) |
| | Foreign elasticity | 0.761 | 0.892 | 1.196 |
| | s.e | (0.357) | (0.364) | (0.367) |
| Control: Top 10-25 | Domestic elasticity | 0.012 | 0.018 | 0.280 |
| | s.e | (0.005) | (0.005) | (0.072) |
| | Foreign elasticity | 0.924 | 1.119 | 1.464 |
| | s.e | (0.366) | (0.366) | (0.376) |
| Control: Below Top 25 | Domestic elasticity | 0.016 | 0.022 | 0.366 |
| | s.e | (0.006) | (0.006) | (0.077) |
| | Foreign elasticity | 1.114 | 1.506 | 1.923 |
| | s.e | (0.417) | (0.386) | (0.405) |
| Observations | | 8,414,376 | 6,881,984 | 6,012,592 |

# Benchmarks results with the EPO data

| | | Benchmark | Alternative quality measures | | | |
|---|---|---|---|---|---|---|
| | | (1) | (2) | (3) | (4) | (5) |
| Log Retention Rate × Top 1 | | 2.108*** | 2.181*** | 3.019*** | 2.722*** | 1.011 |
| | | (0.647) | (0.677) | (0.765) | (0.646) | (0.732) |
| Log Retention Rate × Top 1-5 | | 1.952*** | 1.906*** | 2.586*** | 2.147*** | 1.075* |
| | | (0.564) | (0.591) | (0.646) | (0.557) | (0.606) |
| Log Retention Rate × Top 5-10 | | 1.600*** | 1.439*** | 2.297*** | 1.885*** | 1.350** |
| | | (0.517) | (0.553) | (0.668) | (0.543) | (0.606) |
| Log Retention Rate × Top 10-25 | | 1.142** | 1.193** | 1.836*** | 1.264** | 1.585*** |
| | | (0.457) | (0.531) | (0.709) | (0.502) | (0.573) |
| Log Retention Rate × Below Top 25 | | 0.839* | 1.117* | 0.834 | 0.756 | 2.060*** |
| | | (0.446) | (0.608) | (0.571) | (0.557) | (0.533) |
| Quality× Country FE | | YES | YES | YES | YES | YES |
| Quality × Country FE × Year | | YES | YES | YES | YES | YES |
| Quality× Country FE× Year× Field FE | | YES | YES | YES | YES | YES |
| Control: Top 5-10 | Domestic elasticity | 0.008 | 0.010 | 0.003 | 0.013 | -0.003 |
| | s.e | (0.007) | (0.007) | (0.003) | (0.005) | (0.006) |
| | Foreign elasticity | 0.495 | 0.729 | 0.720 | 0.822 | -0.331 |
| | s.e | (0.406) | (0.504) | (0.505) | (0.330) | (0.467) |
| Control: Top 10-25 | Domestic elasticity | 0.016 | 0.012 | 0.005 | 0.022 | -0.006 |
| | s.e | (0.007) | (0.006) | (0.003) | (0.005) | (0.006) |
| | Foreign elasticity | 0.943 | 0.969 | 1.180 | 1.430 | -0.562 |
| | s.e | (0.443) | (0.488) | (0.470) | (0.315) | (0.452) |
| Control: Below Top 25 | Domestic elasticity | 0.020 | 0.014 | 0.011 | 0.030 | -0.014 |
| | s.e | (0.009) | (0.007) | (0.002) | (0.007) | (0.009) |
| | Foreign elasticity | 1.240 | 1.045 | 2.176 | 1.929 | -1.024 |
| | s.e | (0.533) | (0.566) | (0.444) | (0.428) | (0.696) |
| Observations | | 8,449,929 | 8,449,929 | 8,449,929 | 8,449,929 | 8,449,929 |

no movers

# Conclusion

- Superstar inventors react to top tax rates – elasticities are not large.
  - Comparing superstars to non-superstars for identification.
- Those who worked for multinationals most sensitive.
- Career concerns seem to matter for location.
- Very promising data, for a wide range of other questions in PF.
- Open Question: What is the economic costs from taxation when including the migration margin and potential spillovers from inventors?

# Generalized Social Welfare Weights for Policy

“Generalized Social Welfare Weights for Optimal Tax Policy” by Emmanuel Saez and Stefanie Stantcheva.

https://scholar.harvard.edu/stantcheva/publications/generalized-social-welfare-weights-optimal-tax-theory

# Standard Welfarist Approach: Critiques and Puzzles

- Maximize concave function or weighted sum of individiual utilities.

$$\max_{T(.)} SWF = \max_{T(.)} \int_i \omega_i \cdot u_i$$

- Special case: utilitarianism, $\omega_i = 1$.
- Cannot capture elements important in tax practice:
  - Source of income: earned versus luck.
  - Counterfactuals: what individuals *would* have done absent tax system.
  - Horizontal Equity concerns that go against "tagging."
- Utilitarianism critique: 100% redistribution optimal with concave $u(.)$ and no behavioral responses
- Methodological and conceptual critique: Policy makers use reform-approach rather than posit and maximize objective.

# A Novel Approach to Model Social Preferences

- Tax reform approach: weighs gains and losses from tax changes.

$$\delta T(z) \text{ desirable iff: } -\int_i g_i \cdot \delta T(z_i) > 0 \text{ with } g_i \equiv G'(u_i)\frac{\partial u_i}{\partial c}$$

- Optimality: no budget neutral reform can increase welfare.

- Weights directly come from social welfare function, are restrictive.

# A Novel Approach to Model Social Preferences

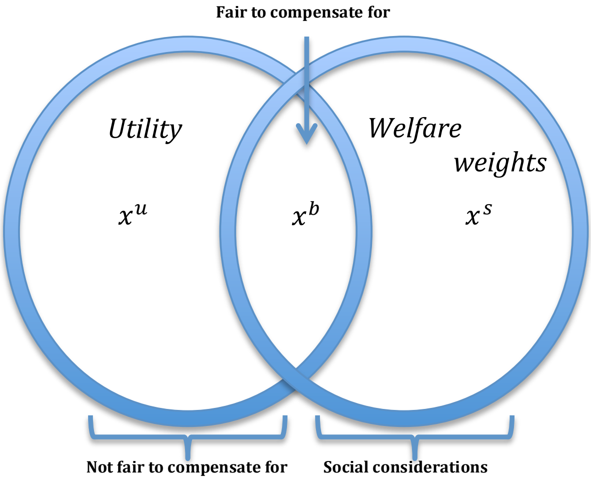
- Tax reform approach: weighs gains and losses from tax changes.

  Change in welfare: $-\int_i g_i \cdot \delta T(z_i)$ with $g_i \equiv g(c_i, z_i; x_i^s, x_i^b)$.

- Replace restrictive social welfare weight by generalized social marginal welfare weights.
  - $g_i$ measures social value of $\$1$ transfer for person $i$.
  - Specified to directly capture fairness criteria.
  - Not necessarily derived from SWF

# Generalized social welfare weights approach

$$u_i = u(c_i - v(z_i; x_i^u, x_i^b)) \qquad g_i = g(c_i, z_i; x_i^s, x_i^b)$$



# Resolve Puzzles and Unify Alternative Approaches

- Resolve puzzles: Can depend on luck vs. deserved income, can capture counterfactuals ("Free Loaders"), can model horizontal equity concerns.
- Unify main alternatives to utilitarianism: Rawlsianism, Libertarianism, Equality of Opportunity, Poverty Alleviation, Fair Income Taxation.
- Pareto efficiency guaranteed (locally) by non-negative weights.
- As long as weights depend on taxes paid (in addition to consumption): non-trivial theory of taxation even absent behavioral responses.
- Positive tax theory: Can estimate weights from revealed social choices.

# Related Literature

Recent Optimal Tax Theory: Golosov, Tsyvinski, and Werquin (2013) (dynamic tax reforms), Farhi and Werning (2013) (bequest taxation), Piketty and Saez (2013) (bequest taxation).

Critiques of Utilitarianism: Nozick (1974), Feldstein (2012), Mankiw (2010, 2013) and Weinzierl (2012).

Alternatives to Utilitarianism and Welfarism: Roemer *et al.* (2013), Besley and Coate (1992), Kanbur, Keen, and Tuomala (1994), Fleurbaey and Maniquet (2008).

# Outline

1. Outline of the Approach
2. Resolving Puzzles of the Standard Approach
3. Link With Alternative Justice Principles
4. Empirical Testing and Estimation Using Survey Data
5. Conclusion

# Outline

# General Model

- Mass 1 of individuals indexed by $i$.
- Utility from consumption $c_i$ and income $z_i$ (no income effects):

$$u_i = u(c_i - v(z_i; x_i^u, x_i^b))$$

where $x_i^u$ and $x_i^b$ are vectors of characteristics

- $u(.)$ increasing, $v$ decreasing in $z_i$.
- Typical income tax: $T(z)$, hence $c_i = z_i - T(z_i)$.
  - More general tax systems, with conditioning variables possible, depending on what is observable and politically feasible.

# Small Tax Reform Approach

Consider a small tax reform $\delta T(z)$
[formally $\delta T(z)$ = small reform in direction $\Delta T(z)$: $\delta T(z) = \varepsilon \cdot \Delta T(z)$ with $\varepsilon \to 0$]

- Small reform $\delta T(z)$ affects individual $i$ utility by $\delta u_i$ and earnings by $\delta z_i$
- By envelope theorem: $\delta u_i = -\frac{\partial u_i}{\partial c} \cdot \delta T(z_i)$
- $\Rightarrow$ Mechanical $-\delta T(z_i)$ measures money-metric welfare impact on $i$
- Change in tax paid by individual $i$ is $\delta T(z_i) + T'(z_i)\delta z_i$.

## Definition

A reform $\delta T(z)$ is budget neutral if and only if $\int_i [\delta T(z_i) + T'(z_i)\delta z_i] = 0$.

# Generalized social welfare weights approach

## Definition

The generalized social marginal welfare weight on individual $i$ is:

$$g_i = g(c_i, z_i; x_i^s, x_i^b)$$

$g$ is a function, $x_i^s$ is a vector of characteristics which only affect the social welfare weight, while $x_i^b$ is a vector of characteristics which also affect utility.

- Recall utility is: $u_i = u(c_i - v(z_i; x_i^u, x_i^b))$
- Characteristics $x^s$, $x^u$, $x^b$ may be unobservable to the government.
    - $x^b$: fair to redistribute, enters utility – e.g. ability to earn
    - $x^s$: fair to redistribute, not in utility – e.g. family background
    - $x^u$: unfair to redistribute, enters utility – e.g. taste for work

# Optimality Criterion with Generalized Weights

## Definition

**Tax reform desirability criterion.** Small budget neutral tax reform $\delta T(z)$ desirable **iff** $\int_i g_i \cdot \delta T(z_i) < 0$, with $g_i$ the generalized social marginal welfare weight on $i$ evaluated at $(z_i - T(z_i), z_i, x_i^s, x_i^b)$.

- Reform only requires knowing $g_i$ and responses $\delta z_i$ around current $T(z)$

## Definition

**Optimal tax criterion.** $T(z)$ optimal **iff**, for any small budget neutral reform $\delta T(z)$, $\int_i g_i \cdot \delta T(z_i) = 0$, with $g_i$ the generalized social marginal welfare weight on $i$ evaluated at $(z_i - T(z_i), z_i, x_i^s, x_i^b)$.

- No budget neutral reform can locally improve welfare as evaluated using generalized weights (local approach by definition)

# Aggregating Standard Weights at Each Income Level

Taxes depend on $z$ only: express everything in terms of observable $z$.
$H(z)$: CDF of earnings, $h(z)$: PDF of earnings [both depend on $T(.)$]

## Definition

$\bar{G}(z)$ is the (relative) average social marginal welfare weight for individuals earning at least $z$:

$$\bar{G}(z) \equiv \frac{\int_{\{i:z_i \geq z\}} g_i}{Prob(z_i \geq z) \cdot \int_i g_i}$$

$\bar{g}(z)$ is the average social marginal welfare weight at $z$ defined so that

$$\int_z^\infty \bar{g}(z') dH(z') = \bar{G}(z)[1 - H(z)]$$

# Nonlinear Tax Formula Expressed with Welfare Weights

### Proposition

The optimal marginal tax at $z$:

$$T'(z) = \frac{1 - \bar{G}(z)}{1 - \bar{G}(z) + \alpha(z) \cdot e(z)}$$

$e(z)$: average elasticity of $z_i$ w.r.t $1 - T'$ at $z_i = z$
$\alpha(z)$: local Pareto parameter $zh(z)/[1 - H(z)]$.

Proof follows the same "small reform" approach of Saez (2001): increase $T'$ in a small band $[z, z + dz]$ and work out effect on budget and weighted welfare

# Proof

- Reform $\delta T(z)$ increases marginal tax by $\delta\tau$ in small band $[z, z + dz]$.
- Mechanical revenue effect: extra taxes $dz\delta\tau$ from each taxpayer above $z$: $dz\delta\tau[1 - H(z)]$ is collected.
- Behavioral response: those in $[z, dz]$, reduce income by $\delta z = -ez\delta\tau/(1 - T'(z))$ where $e$ is the elasticity of earnings $z$ w.r.t $1 - T'$. Total tax loss $-dz\delta\tau \cdot h(z)e(z)zT'(z)/(1 - T'(z))$ with $e(z)$ the average elasticity in the small band.
- Net revenue collected by the reform and rebated lump sum is: $dR = dz\delta\tau \cdot \left[1 - H(z) - h(z) \cdot e(z) \cdot z \cdot \frac{T'(z)}{1-T'(z)}\right]$.
- Welfare effect of reform: $-\int_i g_i \delta T(z_i)$ with $\delta T(z_i) = -dR$ for $z_i \leq z$ and $\delta T(z_i) = \delta\tau dz - dR$ for $z_i > z$. Net effect on welfare is $dR \cdot \int_i g_i - \delta\tau dz \int_{\{i: z_i \geq z\}} g_i$.
- Setting net welfare effect to zero, using $(1 - H(z))\bar{G}(z) = \int_{\{i: z_i \geq z\}} g_i / \int_i g_i$ and $\alpha(z) = zh(z)/(1 - H(z))$, we obtain the tax formula.

# Linear Tax Formula Expressed with Welfare Weights

The optimal linear tax rate, such that $c_i = z_i \cdot (1-\tau) + \tau \cdot \int_i z_i$ can also be expressed as a function of an income weighted average marginal welfare weight (Piketty and Saez, 2013).

## Proposition

The optimal linear income tax is:

$$\tau = \frac{1-\bar{g}}{1-\bar{g}+e} \quad \text{with} \quad \bar{g} \equiv \frac{\int_i g_i \cdot z_i}{\int_i g_i \cdot \int_i z_i}$$

$e$: elasticity of $\int_i z_i$ w.r.t $(1-\tau)$.

# Applying Standard Formulas with Generalized Weights

- Individual weights need to be "aggregated" up to characteristics that tax system can conditioned on.
  - E.g.: If $T(z, x^b)$ possible, aggregate weights at each $(z, x^b) \to \bar{g}(z, x^b)$.
  - If standard $T(z)$, aggregate at each $z$: $\bar{G}(z)$ and $\bar{g}(z)$.
- Then apply standard formulas. Nests standard approach.
- If $g_i \geq 0$ for all $i$, (local) Pareto efficiency guaranteed.
- Can we back out weights? Optimum $\Leftrightarrow$ max $SWF = \int_i \omega_i \cdot u_i$ with *Pareto weights* $\omega_i = g_i / u_{ci} \geq 0$ where $g_i$ and $u_{ci}$ are evaluated at the optimum allocation
  - Impossible to posit correct weights $\omega_i$ without *first* solving for optimum

# Outline

# 1. Optimal Tax Theory with Fixed Incomes

**Modelling fixed incomes in our general model.**

- Focus on redistributive issues.
- $z = z_i$ is fixed for each individual (fully inelastic labor supply).
- Concave uniform utility $u_i = u(c_i)$

**Standard utilitarian approach.**

- Optimum: $c = z - T(z)$ is constant across $z$, full redistribution.
- Is it acceptable to confiscate incomes fully?
- Very sensitive to utility specification
- Heterogeneity in consumption utility? $u_i = u(x_i^c \cdot c_i)$

# 1. Tax Theory with Fixed Incomes: Generalized Weights

## Definition

Let $g_i = g(c_i, z_i) = \tilde{g}(c_i, z_i - c_i)$ with $\tilde{g}_c \leq 0$, $\tilde{g}_{z-c} \geq 0$.

i) Utilitarian weights: $g_i = g(c_i, z_i) = \tilde{g}(c_i)$ for all $z_i$, with $\tilde{g}(\cdot)$ decreasing.

ii) Libertarian weights: $g_i = g(c_i, z_i) = \tilde{g}(z_i - c_i)$ with $\tilde{g}(\cdot)$ increasing.

- Weights depend negatively on $c$ – "ability to pay" notion.
- Depend positively on tax paid – taxpayers contribute socially more.
- Optimal tax system: weights need to be equalized across all incomes $z$:

$$\tilde{g}(z - T(z), T(z)) \text{ constant with } z$$

# 1. Tax Theory with Fixed Incomes: Optimum

## Proposition

The optimal tax schedule with no behavioral responses is:

$$T'(z) = \frac{1}{1 - \tilde{g}_{z-c}/\tilde{g}_c} \quad \text{and} \quad 0 \leq T'(z) \leq 1. \tag{1}$$

## Corollary

Standard utilitarian case, $T'(z) \equiv 1$. Libertarian case, $T'(z) \equiv 0$.

- Empirical survey shows respondents indeed put weight on both disposable income and taxes paid.
- Between the two polar cases,
  $g(c, z) = \tilde{g}(c - \alpha(z - c)) = \tilde{g}(z - (1 + \alpha)T(z))$ with $\tilde{g}$ decreasing.
- Can be empirically calibrated and implied optimal tax derived.

# 2. Luck versus Deserved Income: Setting

- Fairer to tax luck income than earned income and to insure against luck shocks.

- Provides micro-foundation for weights increasing in taxes, decreasing in consumption.

- $y^d$: deserved income due to effort

- $y^l$: luck income, not due to effort, with average $Ey^l$.

- $z = y^d + y^l$: total income.

- Society believes earned income fully deserved, luck income not deserved. Captured by binary set of weights:

$$g_i = 1(c_i \leq y_i^d + Ey^l)$$

$g_i = 1$ if taxed more than excess luck income (relative to average).

# 2. No behavioral responses: Observable Luck Income

- If luck income observable, can condition taxes on it: $T_i = T(z_i, y_i^l)$.
- Aggregate weights for each $(z, y^l)$ pair:
  $\bar{g}(z, y^l) = 1(z - T(z, y^l) \leq z - y^l + Ey^l)$.
- Optimum: everybody's luck income must be $Ey^l$ with
  $T(z, y^l) = y^l - Ey^l + T(z)$ and $T(z) = 0$.
- Example: Health care costs.

# 2. No behavioral responses: Unobservable Luck Income

- Can no longer condition taxes on luck income: $T_i = T(z_i)$.
- Aggregating weights:
  $\tilde{g}(c, z - c) = Prob(c_i \leq z_i - y_i^l + Ey^l | c_i = c, z_i = z)$.
- Under reasonable assumptions, provides micro-foundation for weights $\tilde{g}(c, z - c)$ decreasing in $c$, increasing in $z - c$.
- If bigger $z - c$ at $c$ constant, means bigger $z$. Then, $y^l$ increases but typically by less than $z$, hence person more deserving, and hence $\tilde{g}(c, z - c) \uparrow$.
- Optimum should equalize $\tilde{g}(z - T(z), z)$ across all $z$.
- Non-trivial theory of optimal taxation, even without behavioral responses.

# 3. Transfers and Free Loaders: Setting

- Behavioral responses closely tied to social weights: biggest complaint against redistribution is "free loaders."
- Generalized welfare weights can capture "counterfactuals."
- Consider linear tax model where $\tau$ funds demogrant transfer.
- $u_i = u(c_i - v(z_i; \theta_i)) = u(c_{z_i} - \theta_i \cdot z_i)$ with $z_i \in \{0, 1\}$.
- Individuals can choose to not work, $z = 0$, $c_i = c_0$.
- If they work, earn $z = \$1$, consume $c_1 = (1 - \tau) + c_0$.
- Cost of work $\theta$, with cdf $P(\theta)$, is private information.
- Individual: work iff $\theta \leq c_1 - c_0 = (1 - \tau)$.
- Fraction working: $P(1 - \tau)$.
- $e$: elasticity of aggregate earnings $P(1 - \tau)$ w.r.t $(1 - \tau)$.

# 3. Transfers and Free Loaders: Optimal Taxation

**Apply linear tax formula**:

- $\tau = (1 - \bar{g})/(1 - \bar{g} + e)$
- In this model, $\bar{g} = \int_i g_i z_i / (\int_i g_i \cdot \int_i z_i) = \bar{g}_1 / [P \cdot \bar{g}_1 + (1 - P) \cdot \bar{g}_0]$ with: $\bar{g}_1$ the average $g_i$ on workers, and $\bar{g}_0$ the average $g_i$ on non-workers.

**Standard Approach**:

- $g_i = u'(c_0)$ **for all non-workers** so that $\bar{g}_0 = u'(c_0)$.
- Hence, approach does not allow to distinguish between the deserving poor and free loaders.
- We can only look at actual situation: work or not, not "why" one does not work.
- Contrasts with public debate and historical evolution of welfare

# 3. Transfers and Free Loaders: Generalized Welfare Weights

- Distinguish people according to what would have done absent transfer.
- **Workers**: Fraction $P(1-\tau)$. Set $g_i = u'(c_1 - \theta_i)$.
- **Deserving poor**: would not work even absent any transfer: $\theta > 1$. Fraction $1 - P(1)$. Set $g_i = u'(c_0)$.
- **Free Loaders**: do not work because of transfer: $1 \geq \theta > (1-\tau)$. Fraction $P(1) - P(1-\tau)$. Set $g_i = 0$.
- Cost of work enters weights – fair to compensate for (i.e., not laziness).
- Average weight on non-workers $\bar{g}_0 = u'(c_0) \cdot (1 - P(1))/(1 - P(1-\tau)) < u'(c_0)$ lower than in utilitarian case.
- Reduces optimal tax rate not just through $e$ but also through $\bar{g}_0$.

# 3. Transfers and Free Loaders: Remarks and Applications

- Ex post, possible to find suitable Pareto weights $\omega(\theta)$ that rationalize same tax.
  - $\omega(\theta) = 1$ for $\theta \leq (1 - \tau^*)$ (workers)
  - $\omega(\theta) = 1$ for $\theta \geq 1$ (deserving poor)
  - $\omega(\theta) = 0$ for $(1 - \tau^*) < \theta < 1$ (free loaders).
- But: these weights depend on optimum tax rate $\tau^*$.
- Other applications:
  - **Desirability of in-work benefits** if weight on non-workers becomes low enough relative to workers.
  - **Transfers over the business cycle**: composition of those out of work depends on ease of finding job.

# Outline

# 1. Libertarianism and Rawlsianism

**Libertarianism:**

- Principle: "Individual fully entitled to his pre-tax income."
- Morally defensible if no difference in productivity, but different preferences for work.
- $g_i = g(c_i, z_i) = \tilde{g}(c_i - z_i)$, increasing ($x_i^s$ and $x_i^b$ empty).
- Optimal formula yields: $T'(z_i) \equiv 0$.

**Rawlsianism:**

- Principle: "Care only about the most disadvantaged."
- $g_i = g(u_i - \min_j u_j) = 1(u_i - \min_j u_j = 0)$, with $x_i^s = u_i - \min_j u_j$ and $x^b$ is empty.
- If least advantaged people have zero earnings independently of taxes, $\bar{G}(z) = 0$ for all $z > 0$.
- Optimal formula yields: $T'(z) = 1/[1 + \alpha(z) \cdot e(z)]$ (maximize demogrant $-T(0)$).

# 2. Equality of Opportunity: Setting

- Standard utility $u(c - v(z/w_i))$ with $w_i$ ability to earn
- $w_i$ is result of i) family background $B_i \in \{0, 1\}$ (which individuals not responsible for) and ii) merit (which individuals are responsible for) = rank $r_i$ conditional on background.
- Advantaged background gives earning ability $w$ advantage: $w(r_i|B_i = 1) > w(r_i|B_i = 0)$
- Society is willing to redistribute across backgrounds, but not across incomes conditional on background.
- $\Rightarrow$ Conditional on earnings, those coming from $B_i = 0$ are more meritorious [because they rank higher in merit]
- $\bar{c}(r) \equiv (\int_{(i:r_i=r)} c_i)/Prob(i : r_i = r)$: average consumption at rank $r$.
- $g_i = g(c_i; \bar{c}(r_i)) = 1(c_i \leq \bar{c}(r_i))$

# 2. Equality of Opportunity: Results

- Suppose government cannot condition taxes on background.
- $\bar{G}(z)$: **Representation index**: % from disadvantaged background earning $\geq z$ relative to % from disadvantaged background in population.
- Implied Social Welfare function as in Roemer et al. (2003).
- $\bar{G}(z)$ decreasing since harder for those from disadvantaged background to reach upper incomes.
- If at top incomes, representation is zero, revenue maximizing top tax rate.
- Justification for social welfare weights decreasing with income not due to decreasing marginal utility (utilitarianism).

# 2. Equality of Opportunity vs. Utilitarian Tax Rates

| | Equality of Opportunity | | | Utilitarian (log-utility) | |
|---|---|---|---|---|---|
| | Fraction from low background (=parents below median) above each percentile | Implied social welfare weight G(z) above each percentile | Implied optimal marginal tax rate at each percentile | Utilitarian social welfare weight G(z) above each percentile | Utilitarian optimal marginal tax rate at each percentile |
| | (1) | (2) | (3) | (4) | (5) |
| **Income percentile** | | | | | |
| z= 25th percentile | 44.3% | 0.886 | 53% | 0.793 | 67% |
| z= 50th percentile | 37.3% | 0.746 | 45% | 0.574 | 58% |
| z= 75th percentile | 30.3% | 0.606 | 40% | 0.385 | 51% |
| z= 90th percentile | 23.6% | 0.472 | 34% | 0.255 | 42% |
| z= 99th percentile | 17.0% | 0.340 | 46% | 0.077 | 54% |
| z= 99.9th percentile | 16.5% | 0.330 | 47% | 0.016 | 56% |

Chetty *et al.* (2013) intergenerational mobility data for the U.S.

Above $99^{th}$ percentile, stable representation, hence stable tax rates.

Optimal tax rate lower than in utilitarian case.

# Outline

# Online Survey: Goals and Setup

**Two goals of empirical application:**

1. Discover notions of fairness people use to judge tax and transfer systems.
   - Focus on themes addressed in theoretical part.
2. Quantitatively calibrate simple weights

**Online Platform:**

- Amazon mTurk (Kuziemko, Norton, Saez, Stantcheva, 2015).
- 1100 respondents with background information.

# Evidence against utilitarianism

- Respondents asked to compare families w/ different combinations of $z$, $z - T(z)$, $T(z)$.
- Who is most deserving of a \$1000 tax break?
- **Both disposable income and taxes paid matter** for deservedness
  - Family earning \$40K, paying \$10K in taxes judged more deserving than family earning \$50K, paying \$10K in taxes
  - Family earning \$50K, paying \$15K in taxes judged more deserving than family earning \$40K, paying \$5K in taxes
- **Frugal vs. Consumption-loving** person with same net income

| Consumption-lover more deserving | Frugal more deserving | Taste for consumption irrelevant |
|---|---|---|
| 4% | 22% | 74% |

**Which of the following two individuals do you think is most deserving of a $1,000 tax break?**

Individual A earns $50,000 per year, pays $10,000 in taxes and hence nets out $40,000. She greatly enjoys spending money, going out to expensive restaurants, or traveling to fancy destinations. She always feels that she has too little money to spend.

Individual B earns the same amount, $50,000 per year, also pays $10,000 in taxes and hence also nets out $40,000. However, she is a very frugal person who feels that her current income is sufficient to satisfy her needs.

- Individual A is most deserving of the $1,000 tax break
- Individual B is most deserving of the $1,000 tax break
- Both individuals are exactly equally deserving of the tax $1,000 break

>>

Source: survey in Saez and Stantcheva (2013)

# Does society care about effort to earn income?

- **Hard-working vs. Easy-going person with same net income**
- "*A earns \$30,000 per year, by working in two different jobs, 60 hours per week at \$10/hour. She pays \$6,000 in taxes and nets out \$24,000. She is very hard-working but she does not have high-paying jobs so that her wage is low.*"
- "*B also earns the same amount, \$30,000 per year, by working part-time for 20 hours per week at \$30/hour. She also pays \$6,000 in taxes and hence nets out \$24,000. She has a good wage rate per hour, but she prefers working less and earning less to enjoy other, non-work activities.*"

| Hardworking more deserving | Easy-going more deserving | Hours of work irrelevant conditional on total earnings |
|---|---|---|
| 43% | 3% | 54% |

# Do people care about "Free Loaders" and Behavioral Responses to Taxation?

Starting from same benefit level, which person most deserving of more benefits?

| | Disabled unable to work | Unemployed looking for work | Unemployed not looking for work | On welfare not looking for work |
|---|---|---|---|---|
| Average rank (1-4) | 1.4 | 1.6 | 3.0 | 3.5 |
| % assigned 1st rank | 57.5% | 37.3% | 2.7% | 2.5% |
| % assigned last rank | 2.3% | 2.9% | 25% | 70.8% |

# Calibrating Social Welfare Weights

- Calibrate $\tilde{g}\left(c, T\right) = \tilde{g}\left(c - \alpha T\right)$
- 35 fictitious families, w/ different net incomes and taxes
- Respondents rank them pair-wise (5 random pairs each)

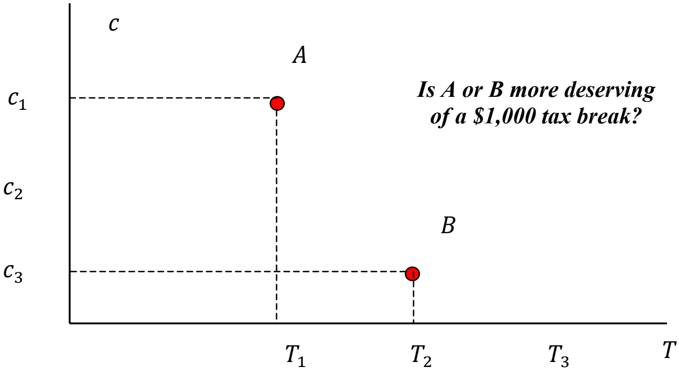
Which of these two families is most deserving of the $1,000 tax break?

- Family earns $100,000 per year, pays $50,000 in taxes, and hence nets out $50,000
- Family earns $25,000 per year, pays $1,250 in taxes, and hence nets out $23,750

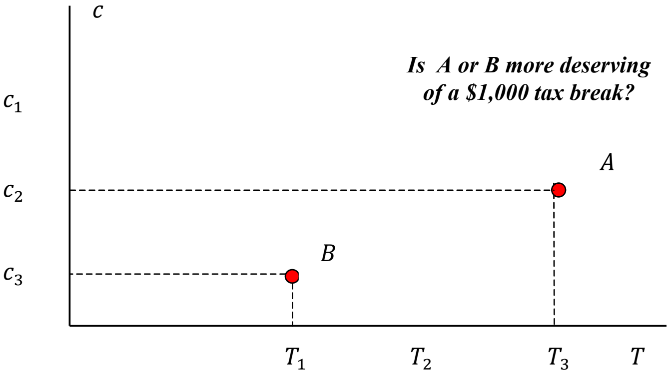
Which of these two families is most deserving of the $1,000 tax break?

- Family earns $50,000 per year, pays $2,500 in taxes, and hence nets out $47,500
- Family earns $500,000 per year, pays $170,000 in taxes, and hence nets out $330,000

# Eliciting Social Preferences



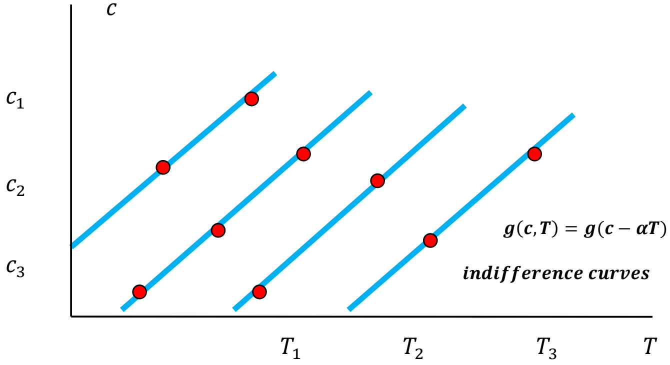
# Eliciting Social Preferences



# Eliciting Social Preferences

$S_{ijt} = 1$ if $i$ ranked 1st in display $t$ for respondent $j$, $\delta T_{ijt}$ is difference in taxes, $\delta c_{ijt}$ difference in net income for families in pair shown.

$$S_{ijt} = \beta_0 + \beta_T \delta T_{ijt} + \beta_c \delta c_{ijt} \qquad \alpha = \frac{\delta c}{\delta T}|_S = -\frac{\beta_T}{\beta_c} = -slope$$



# Eliciting Social Preferences

| Sample | Full | Excludes cases with income of \$1m | Excludes cases with income of \$500K+ | Excludes cases with income \$500K+ and \$10K or less | Liberal subjects only | Conservative subjects only |
|---|---|---|---|---|---|---|
| | Probability of being deemed more deserving in pairwise comparison | | | | | |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| d(Tax) | 0.0017*** | 0.0052*** | 0.016*** | 0.015*** | 0.00082*** | 0.0032*** |
| | (0.0003) | (0.0019) | (0.0019) | (0.0022) | (0.00046) | (0.00068) |
| d(Net Income) | -0.0046*** | -0.0091*** | -0.024*** | -0.024*** | -0.0048*** | -0.0042*** |
| | (0.00012) | (0.00028) | (0.00078) | (0.00094) | (0.00018) | (0.00027) |
| Number of observations | 11,450 | 8,368 | 5,816 | 3,702 | 5,250 | 2,540 |
| Implied $\alpha$ | 0.37 | 0.58 | 0.65 | 0.64 | 0.17 | 0.77 |
| | (0.06) | (0.06) | (0.07) | (0.09) | (0.12) | (0.16) |
| Implied marginal tax rate | 73% | 63% | 61% | 61% | 85% | 57% |

# Outline

# Conclusion

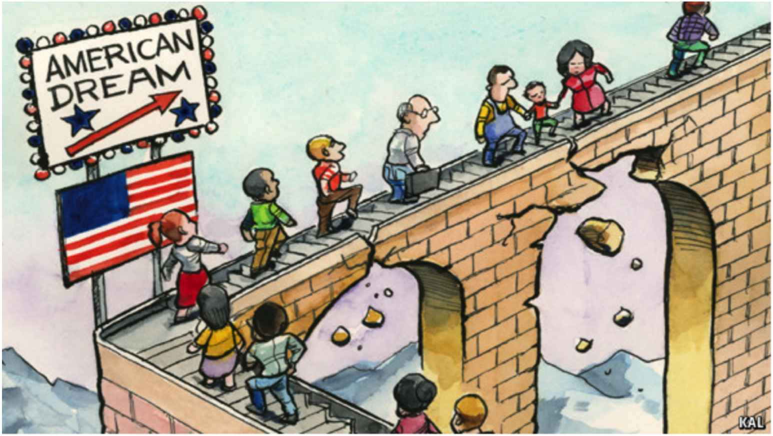
- Generalized marginal social welfare weights are fruitful way to extend standard welfarist theory of optimal taxation.
  - Allow to dissociate individual characteristics from social criteria.
  - Which characteristics are fair to compensate for?
- Helps resolve puzzles of traditional welfarist approach.
- Unifies existing alternatives to welfarism.
- Weights can **prioritize social justice principles** in lexicographic form:
  1. Injustices created by tax system itself (horizontal equity)
  2. Compensation principle (health, family background)
  3. Luck component in earnings ability
  4. Utilitarian concept of decreasing marginal utility of consumption.

"Intergenerational Mobility and Support for Redistribution" by Alberto Alesina, Stefanie Stantcheva, and Edoardo Teso.

https://scholar.harvard.edu/stantcheva/publications/intergenerational-mobility-and-support-redistribution

# Intergenerational Mobility and Preferences for Redistribution

Alberto Alesina, Stefanie Stantcheva, and Edoardo Teso



# (Stereo)typically Documented Views

**Americans:**

- Econ system mostly “fair," American dream alive
- Wealth is reward for ability and effort
- Poverty due to inability to take advantage of opportunity
- Effort pays off

**Continental Europeans:**

- Econ system is basically unfair
- Wealth due to family history, connections, sticky social classes
- Poverty due to bad luck, society’s inability to help the needy
- Effort may payoff

- 70% of Americans versus 35% of Europeans believe you can climb social ladder if you work hard (WVS)
- Yet, intergenerational mobility not systematically higher in the US (Chetty *et al.* 2014)

# This Paper: Research Questions

- Do people have realistic views about intergenerational mobility?
- What are their views on fairness, such as the role of effort vs. luck?
- Link between perceived intergenerational mobility and preferred redistribution policies?
  - **Equality of opportunities** policies (education, bequest taxes)
  - **Equality of outcome** policies (social insurance, progressive income taxation)?
- Correlation and Causality (experimental).
- Heterogeneity by socio-economic background, political views, own mobility experience?

# Method: Surveys and Randomized Experiments

- Online surveys on representative samples in the US, UK, France, Italy, and Sweden. Stats
- Research agenda ahead.
- Can collect more data to reduce noise, further treatments to test channels. Suggestions very welcome!
- Survey structure: Background/ Fairness / Randomized: Info on Mobility / Perceptions of Mobility / Policies / Randomized: Views on government
- Sample collected (mainly) September/October 2016
  $N \approx 2,000$ for IT, UK, FR, $N \approx 4000$ for U.S., $N \approx 1,500$ for SE.

# Main Findings

- Americans are more optimistic than Europeans, but:
  - Americans too optimistic, especially about "American dream."
  - Europeans too pessimistic, especially about staying stuck in poverty.
- People believe effort matters, but not for making it to the very top.
- Pessimism on mobility $\leftrightarrow$ support for redistribution (especially "equality of opportunity policies.")
- Experiment: more pessimistic $\rightarrow$ increases support for redistribution... but only among left-wing respondents.
- Strong polarization between left and right wing on government, redistribution: same information, very different effects.

# Outline of this Talk

1. Data on Actual Intergenerational Mobility
2. Survey and Methodology
3. Mobility Perceptions and Misperceptions
4. Role of Effort
5. Geography of Perceptions in the U.S.
6. Perceptions of Mobility and Policy Preferences
7. Randomized Information Experiment

# Related Literature

Theory: Galor and Zeira (1993), Piketty (1995), Alesina and Angeletos (1995), Owen & Weil (1998), Benabou & Ok (2001), Benabou (2002), Benabou & Tirole (2006), Galor (2011), Saez & Stantcheva (2016).

Empirical Evidence on belief differences and redistribution: Alesina & Glaeser (2004), Alesina & La Ferrara (2005).

Empirical Studies of Social Mobility: Gottschalk and Spolaore (2002), Solon (2002), Jantti *et al.* (2006), Goldin and Katz (2009), Blanden (2011), Fryer and Katz (2013), Corak (2013), Chetty, Hendren, Kline, and Saez (2014), Akcigit, Grigsby, and Nicholas (2016), Aghion, Akcigit, Hyytinen, and Toivanen (2016).

Experimental manipulation of beliefs: Kuziemko, Norton, Saez, and Stantcheva (2015), Perez-Truglia and Cruces (2016), Karadja, Mollerstrom and Seim (2016), Cruces *et al.* (2013), Newman *et al.* (2014), George (2016).

Policies for Mobility: Chetty, Hendren, & Katz (2016), Abramitzky (2011, 2017), Hoxby and Turner (2013, 2015),

Polarization: Gentzkow, Shapiro and Taddy (2017), Gentzkow, Boxell, and Shapiro (2017).

# Data on Actual Intergenerational Mobility

## Sources of Data on Intergenerational Mobility

- US: Administrative tax-return data (Chetty *et al.*, 2014) Detail
- UK: sample of 2806 parents-children, from the British Cohort Study
- France: sample of 4,581 parents and 1,444 children, from survey "Formation et Qualification professionnelle", INSEE
- Italy: Administrative tax-return data (Acciari *et al.* 2016)
- Sweden: 20% random sample from Statistics Sweden's administrative registers (Jantti *et al.*, 2006)
- Currently (we think), best data available. Future research may compare our respondents' answers to better data). Levels interesting per se.

# Survey and Methodology

# Survey Structure

- **Background** socio-economic questions, own social mobility experience, political experience.
- **Fairness**: Fair system, reasons poor, reasons rich. Detail
- **Randomized "information"** experiment to shift views on extent of social mobility. Randomization
- **Perceptions of intergenerational mobility** in own country.
- **Policies:** Overall intervention, overall support for equality of opportunity, income taxes, estate tax, budget.
- **Government:** views on role and capacities of government (order randomized, pre or post info treatment).

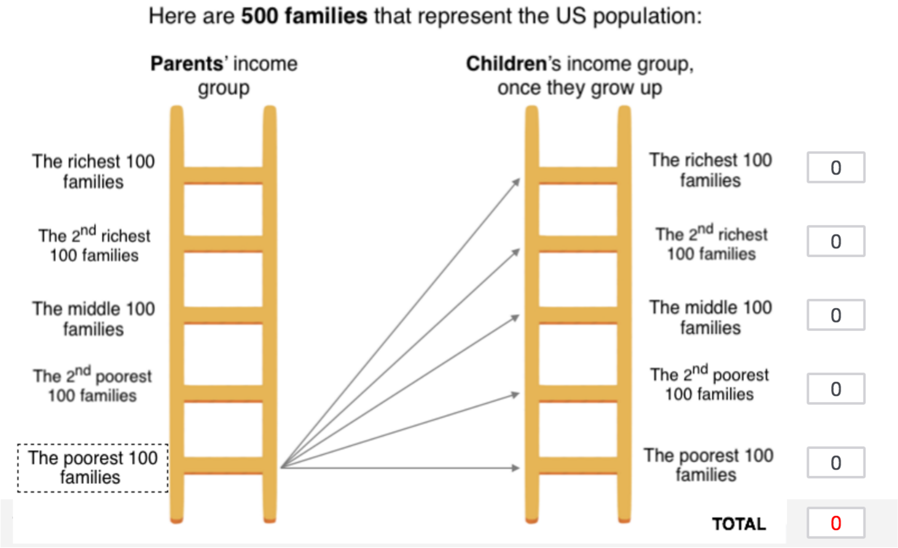
# Eliciting Beliefs on Upward Mobility

*For the following questions, we focus on 500 families that represent the U.S. population. We divide them into five groups on the basis of their income, with each group containing 100 families. These groups are: the poorest 100 families, the second poorest 100 families, the middle 100 families, the second richest 100 families, and the richest 100 families.*

*In the following questions, we will ask you to evaluate the chances that children born in one of the poorest 100 families, once they grow up, will belong to any of these income groups.*

*Please fill out the entries to the right of the figure below to tell us, in your opinion, how many out of 100 children coming from the poorest 100 families will grow up to be in each income group.*

# Eliciting respondent's beliefs on upward mobility



# Eliciting Beliefs on Upward Mobility (II)

Qualitative questions for robustness:

> *Do you think the chances that a child from the poorest 100 families will grow up to be among the richest 100 families are: [Close to zero, Low, Fairly Low, Fairly High, High*].

"American dream question:"

> *How do you feel about the following statement? "In [country] everybody has a chance to make it and be economically successful."*

Ask about mobility conditional on "effort" and "talent."

> *Consider 100 children coming from the poorest 100 families. These children are very determined and put in hard work both at school and, later in life, when finding a job and doing that job.*
>
> *Consider 100 children coming from the poorest 100 families. These children are very talented.*

Robustness: provided absolute cutoffs for quintiles: no change.

# Questions on Policies

**Logic**: Split desired policies into components

i) overall government involvement and intervention,

ii) how to share a given tax burden,

iii) how to allocate a given budget.

**Income taxes** on top 1%, next 9%, next 40%, bottom 50%. Detail

**Budget allocation** on 1) Defense/ Security, 2) Infrastructure, 3) Education, 4) SS, Medicare, DI, and SSI, 5) Social Insurance and Income Support Programs, 6) Health. Detail

**Estate tax**: Rate support. Detail

**Support for equality of opportunity policies**: subject to other policies being reduced (qualitative, robust, no free lunch). Detail

# Questions on Role and Capacities of Government

Randomized block (outcomes/ pre-existing characteristics):

- Trust in government
- Tools of the government
- Are unequal opportunities a problem?

Scope of government: to reduce unequal opportunities for children from rich and poor backgrounds, from 1 to 7.

Is lowering or raising taxes better for reducing unequal opportunities? Detail

## Ensuring reasonable answers

Appeal to people's social responsibility. ▸ Detail

Warn that "careless answers" will be flagged.

Constrain answers to add up to 100. Tabulating answers – few strange patterns. ▸ Detail

Attention check question (0.88%), Meade and Craig (2012).

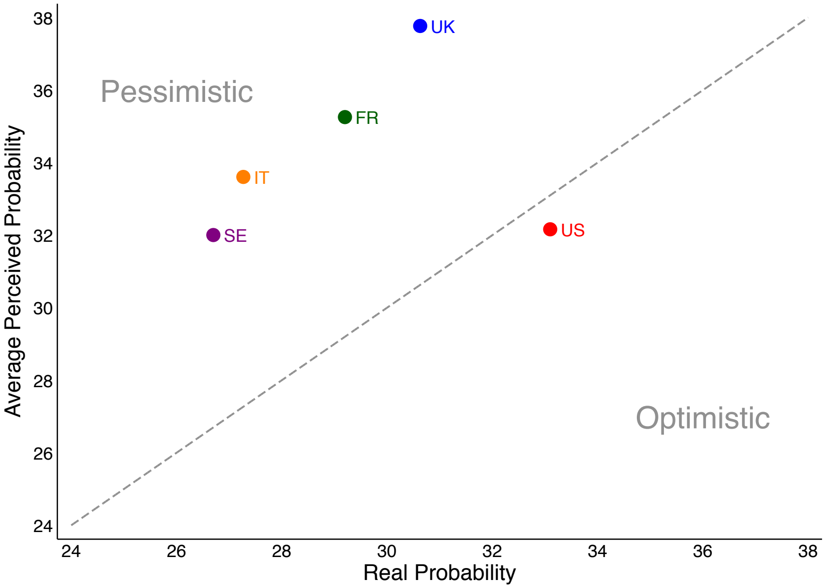
Time spent on separate questions' pages and overall survey time.

Ask for feedback post survey, whether felt survey was biased (18%).

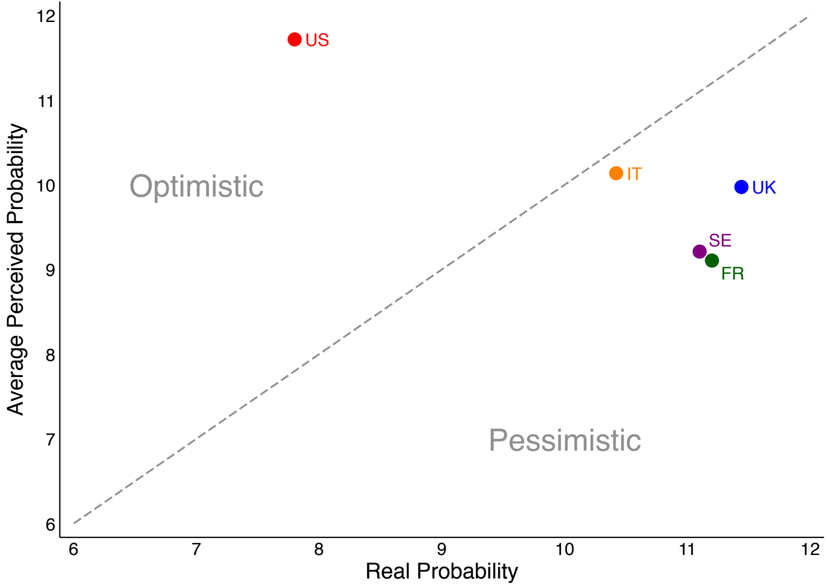
Asked for questions in different orders (ascending vs. descending) and on different pages.

# Mobility Perceptions and Misperceptions

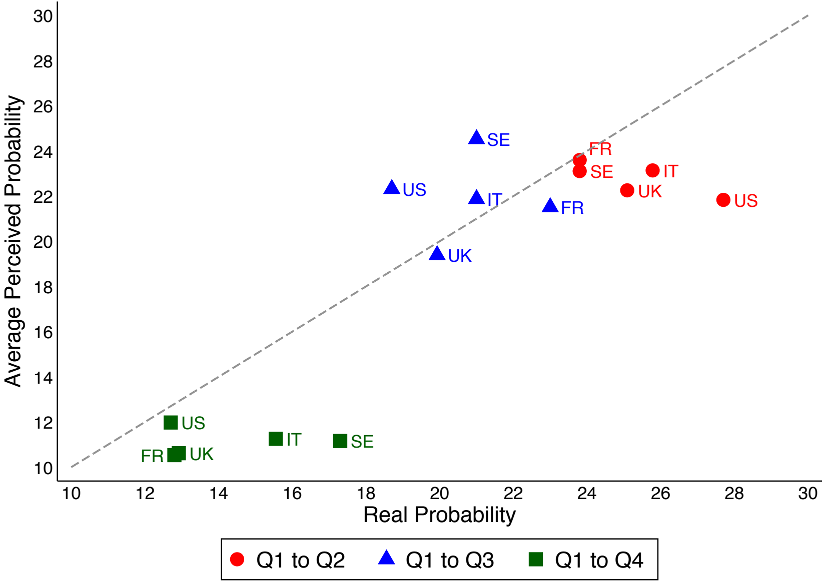
# Probability of Staying in Bottom Quintile (Actual vs. Perceived)



# Probability of Moving to Top Quintile (Actual vs. Perceived)



# Probability of Moving to Quintiles Q2, Q3, and Q4



# Accuracy of Individual Level Perceptions

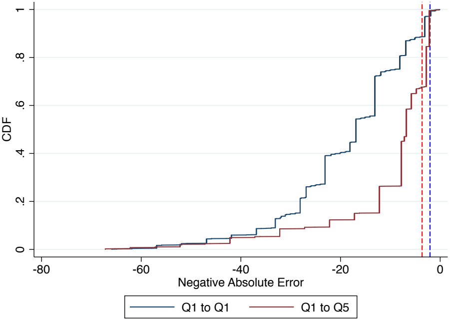



Figure 1: United States

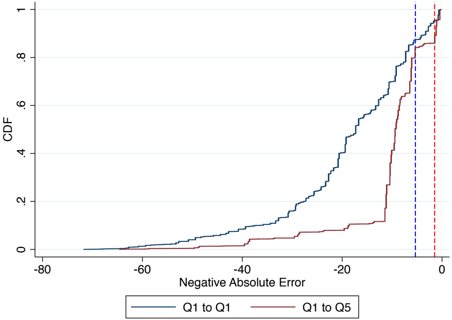
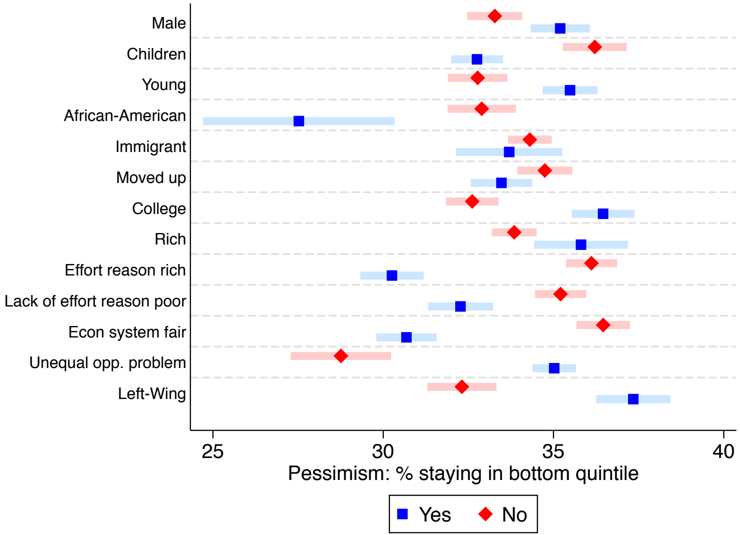



Figure 2: Europe

% of individuals less accurate than average:

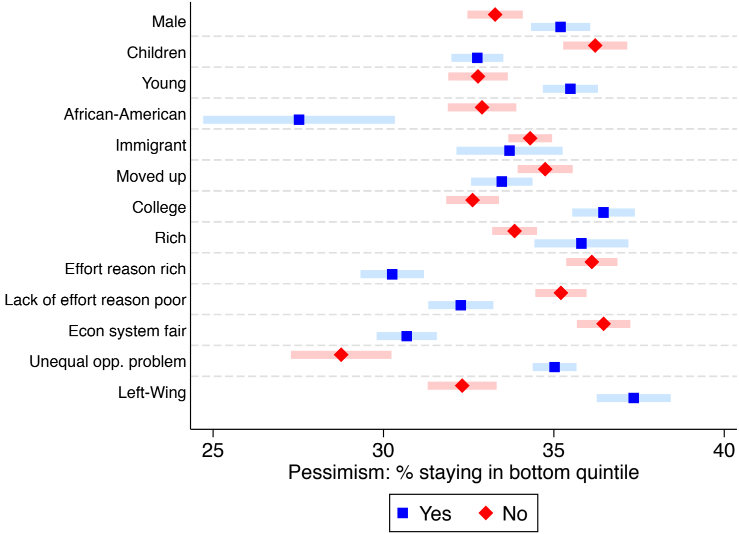
| | Q1 to Q1 | Q1 to Q5 |
|---|---|---|
| U.S. | 99.4% | 68.1% |
| Europe | 85.5% | 89.4% |

# Which Groups are More Pessimistic?




Men, people without children, high income, college-educated, young, non African-American, those who do not believe in effort, think unequal opp. are problem.

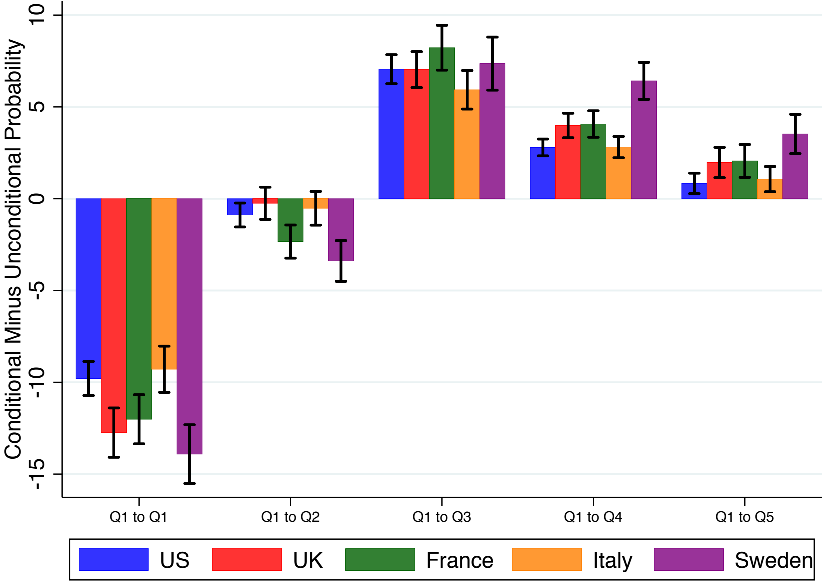
# Which Groups are More Pessimistic?




Strongest predictor are political views (left/right wing).

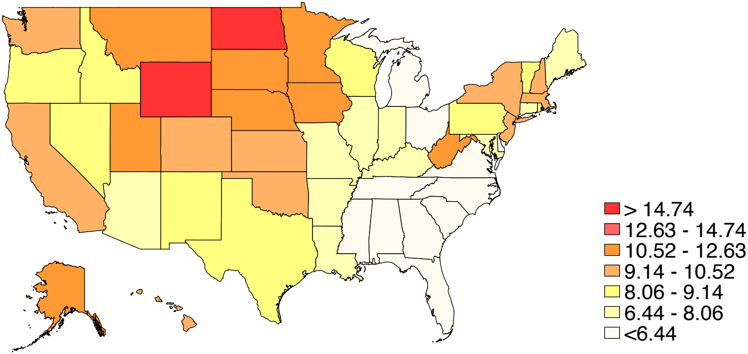
# Role of Effort

# Does Effort Change the Perceived Mobility?

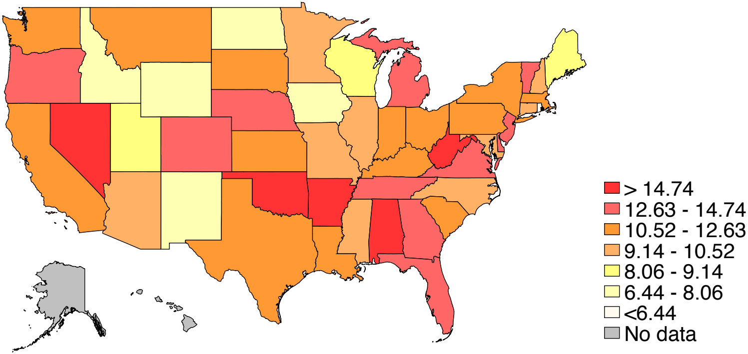


# Geography of Perceptions in the U.S.

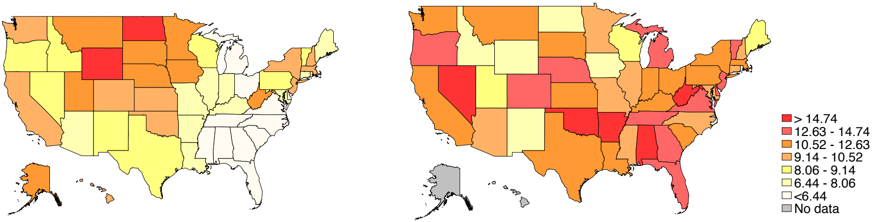
# Actual probability of moving from bottom to top quintile



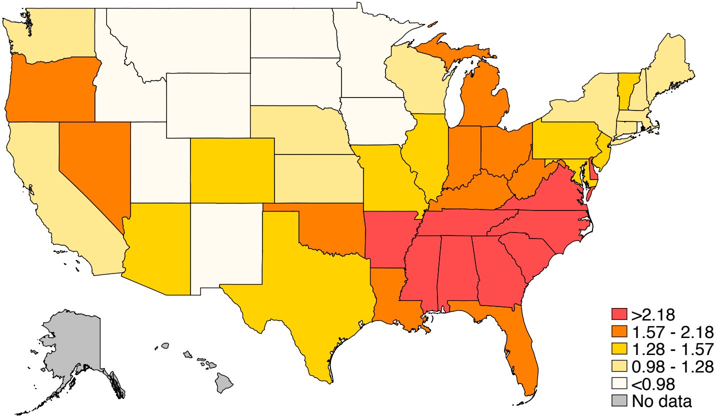
# Perceived probability of moving from bottom to top



# Actual and perceived probability of moving from bottom to top quintile

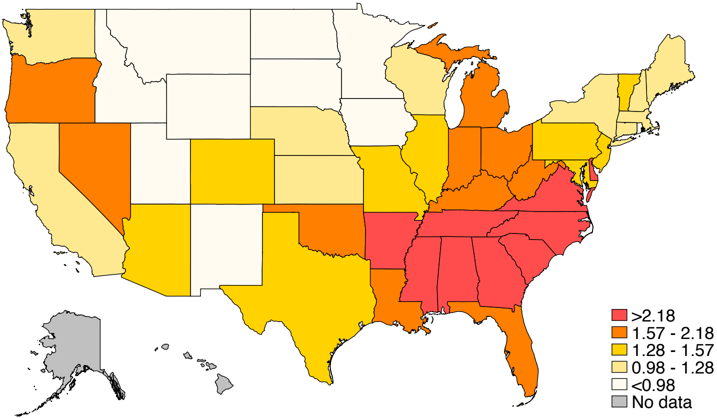


# Ratio of actual local and perceived probability of moving from bottom to top



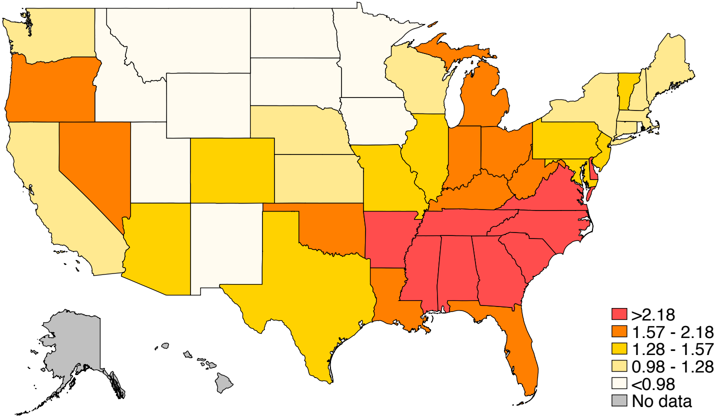

What are local perceptions correlated with, controlling for individual-level characteristics? ▸ National

# Ratio of actual local and perceived probability of moving from bottom to top




Include: manufacturing share, college grads, income, etc...

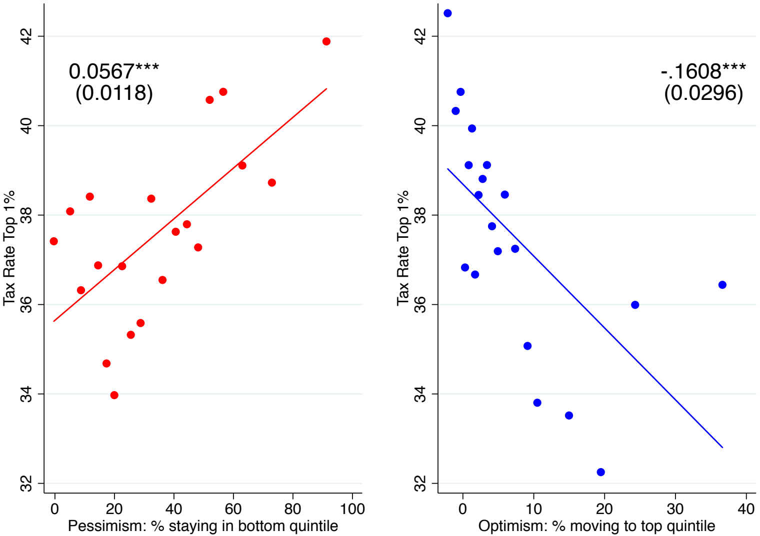
# Ratio of actual local and perceived probability of moving from bottom to top



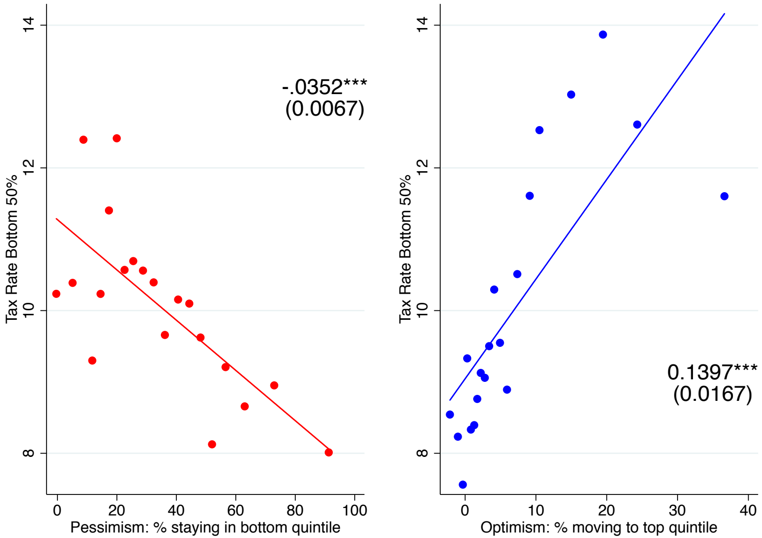

Strongest predictors of optimism: 1) high racial segregation 2) low income segregation (controlling for both at same time).

# Perceptions of Mobility and Policy Preferences

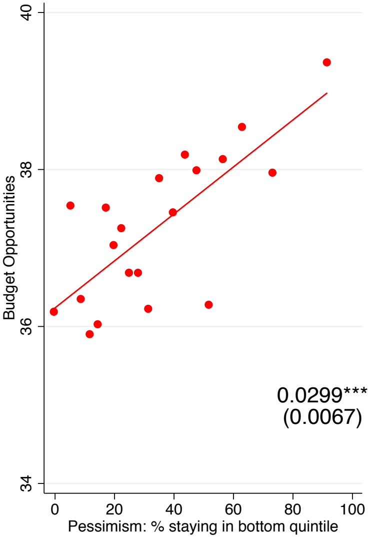
# Pessimism, Optimism, and Top Tax Rate



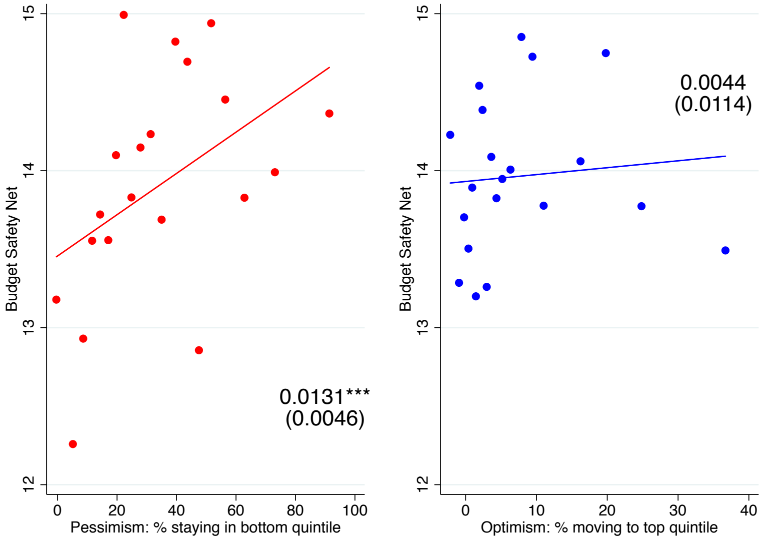
# Pessimism, Optimism, and Bottom Tax Rate



# Strong Correlation with Equality of Opportunity Policies: Education and Health



# Weaker Correlation with Safety Net Policies



# Policy Preferences Strongly Related to Pessimism for Left-Wing Respondents..

| | Budget Opp. (1) | Support Estate Tax (2) | Support Equality Opp. Policies (3) | Government Interv. (4) | Unequal Opp. Very Serious Problem (5) | Budget Safety Net (6) | Tax Rate Top 1 (7) | Tax Rate Bottom 50 (8) |
|---|---|---|---|---|---|---|---|---|
| ***A. Unconditional Beliefs*** | | | | | | | | |
| Q1 to Q1 × Left-Wing | 0.030*** | 0.001** | 0.006*** | 0.004*** | 0.002*** | 0.020*** | 0.069*** | -0.041*** |
| | (0.011) | (0.000) | (0.001) | (0.001) | (0.000) | (0.008) | (0.020) | (0.011) |
| Q1 to Q1 × Right-Wing | 0.019 | -0.000 | 0.003** | 0.003** | 0.001** | 0.003 | 0.039* | -0.033*** |
| | (0.012) | (0.001) | (0.001) | (0.002) | (0.000) | (0.008) | (0.021) | (0.012) |
| p-value diff. | 0.506 | 0.026 | 0.082 | 0.659 | 0.024 | 0.140 | 0.288 | 0.598 |

# ... but not for Right-Wing Respondents

| | Budget Opp. (1) | Support Estate Tax (2) | Support Equality Opp. Policies (3) | Government Interv. (4) | Unequal Opp. Very Serious Problem (5) | Budget Safety Net (6) | Tax Rate Top 1 (7) | Tax Rate Bottom 50 (8) |
|---|---|---|---|---|---|---|---|---|
| ***A. Unconditional Beliefs*** | | | | | | | | |
| Q1 to Q1 × Left-Wing | 0.030*** | 0.001** | 0.006*** | 0.004*** | 0.002*** | 0.020*** | 0.069*** | -0.041*** |
| | (0.011) | (0.000) | (0.001) | (0.001) | (0.000) | (0.008) | (0.020) | (0.011) |
| Q1 to Q1 × Right-Wing | 0.019 | -0.000 | 0.003** | 0.003** | 0.001** | 0.003 | 0.039* | -0.033*** |
| | (0.012) | (0.001) | (0.001) | (0.002) | (0.000) | (0.008) | (0.021) | (0.012) |
| p-value diff. | 0.506 | 0.026 | 0.082 | 0.659 | 0.024 | 0.140 | 0.288 | 0.598 |

# Same Pattern for Optimism (Q1 to Q5 probability)

| | Budget Opp. (1) | Support Estate Tax (2) | Support Equality Opp. Policies (3) | Government Interv. (4) | Unequal Opp. Very Serious Problem (5) | Budget Safety Net (6) | Tax Rate Top 1 (7) | Tax Rate Bottom 50 (8) |
|---|---|---|---|---|---|---|---|---|
| ***A. Unconditional Beliefs*** | | | | | | | | |
| Q1 to Q5 × Left-Wing | -0.080*** | -0.001 | -0.006*** | -0.003 | -0.002*** | -0.013 | -0.054* | 0.060*** |
| | (0.018) | (0.001) | (0.002) | (0.002) | (0.001) | (0.013) | (0.032) | (0.018) |
| Q1 to Q5 × Right-Wing | -0.009 | 0.001 | -0.002 | 0.002 | 0.001 | -0.003 | -0.001 | 0.039** |
| | (0.019) | (0.001) | (0.002) | (0.003) | (0.001) | (0.013) | (0.034) | (0.019) |
| p-value diff. | 0.007 | 0.094 | 0.153 | 0.142 | 0.003 | 0.582 | 0.258 | 0.418 |
| Observations | 4290 | 4289 | 4290 | 4290 | 4290 | 4290 | 3442 | 3442 |

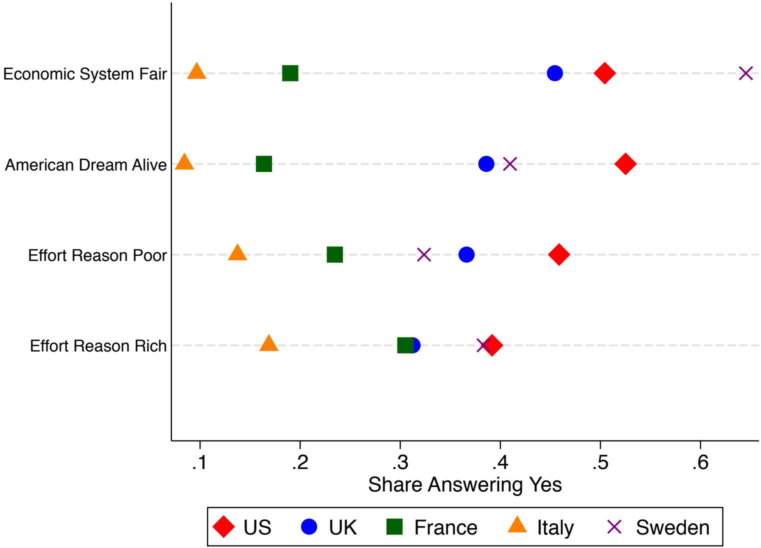
# Beliefs Conditional on Effort are Correlated with Policy Preferences Even for Right Wing Respondents

| | Budget Opp. (1) | Support Estate Tax (2) | Support Equality Opp. Policies (3) | Government Interv. (4) | Unequal Opp. Very Serious Problem (5) | Budget Safety Net (6) | Tax Rate Top 1 (7) | Tax Rate Bottom 50 (8) |
|---|---|---|---|---|---|---|---|---|
| ***A. Unconditional Beliefs*** | | | | | | | | |
| Q1 to Q1 $\times$ Left-Wing | 0.007 | 0.001* | 0.004** | 0.003 | 0.002*** | 0.033*** | 0.052** | -0.002 |
| | (0.016) | (0.001) | (0.002) | (0.002) | (0.001) | (0.011) | (0.026) | (0.016) |
| Q1 to Q1 $\times$ Right-Wing | 0.041** | 0.001 | 0.005*** | 0.006** | 0.002** | 0.029** | 0.041 | 0.007 |
| | (0.019) | (0.001) | (0.002) | (0.003) | (0.001) | (0.013) | (0.031) | (0.018) |
| p-value diff. | 0.165 | 0.608 | 0.711 | 0.520 | 0.396 | 0.818 | 0.781 | 0.714 |

No significant difference between left and right wing respondents for the beliefs conditional on effort.

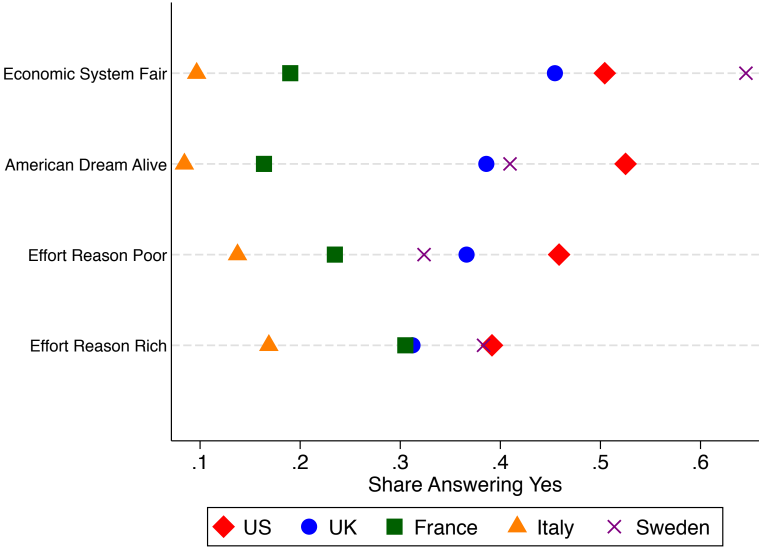
# Perceptions of Fairness and Government

# Fairness Perceptions by Country



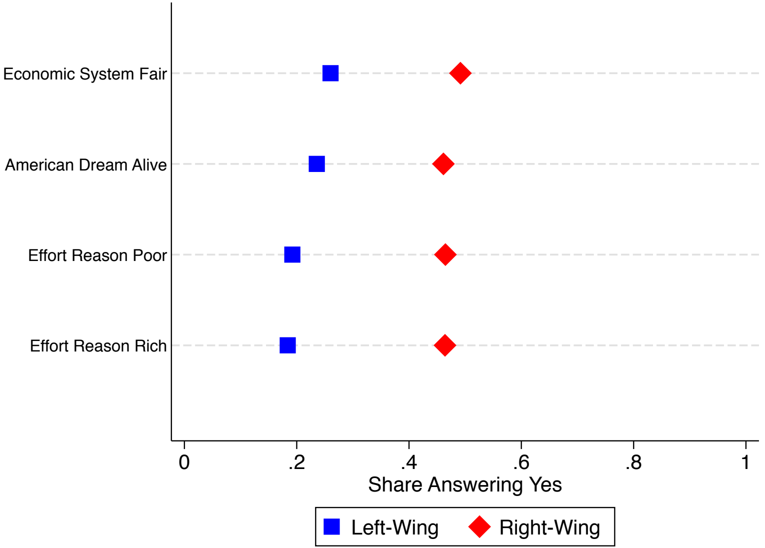

Widespread discontent. U.S. and SE more optimistic (market vs. welfare state?). IT and FR terribly pessimistic.

# Fairness Perceptions by Country




U.S. respondents believe more in effort, large variation across countries.

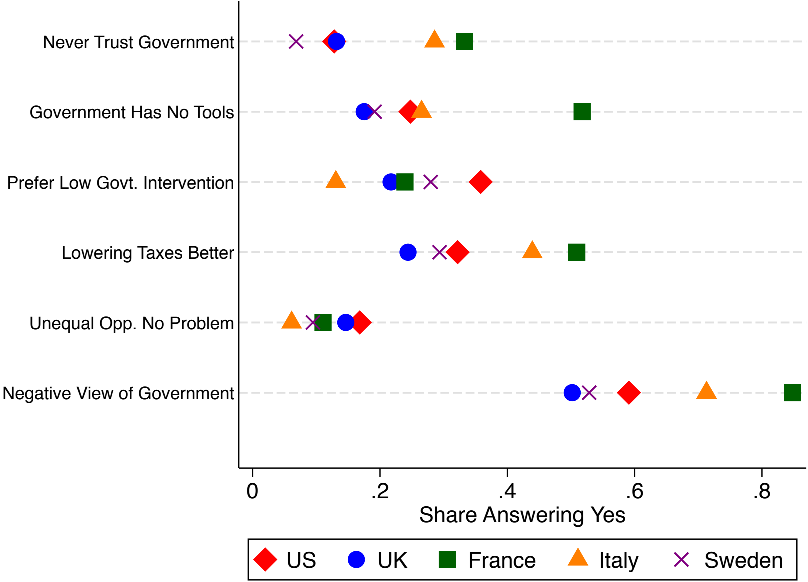
# Fairness Perceptions: Left versus Right




Left-wing more pessimistic than right-wing.

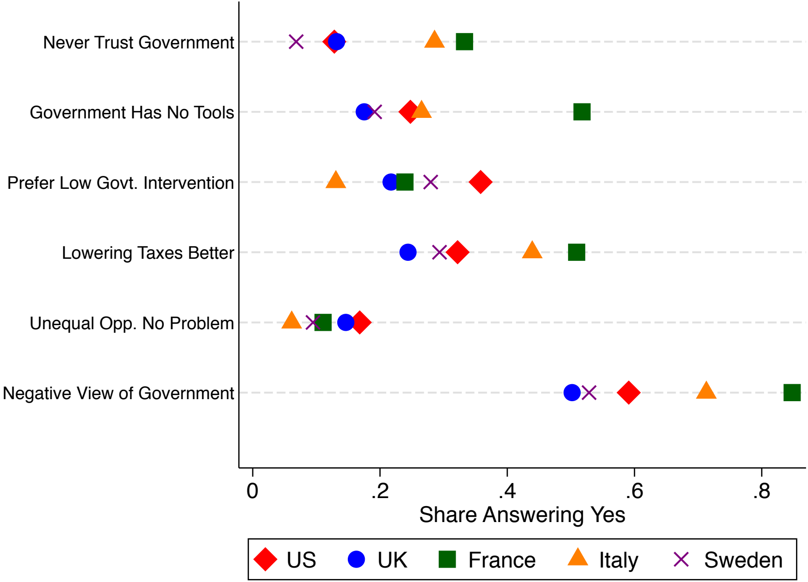
Right-wing respondents believe much more in role of individual effort.

# Bad Views of Government by Country



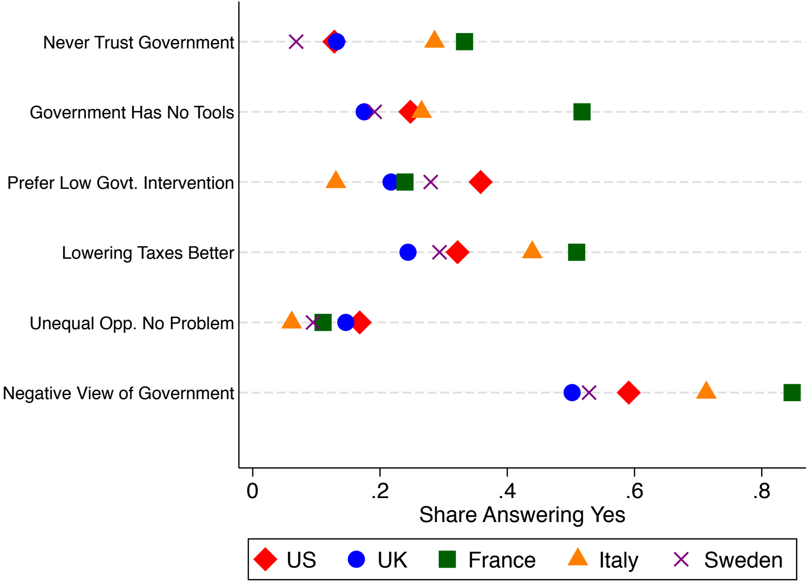

Distrust in government extremely high (FR and IT).

# Bad Views of Government by Country



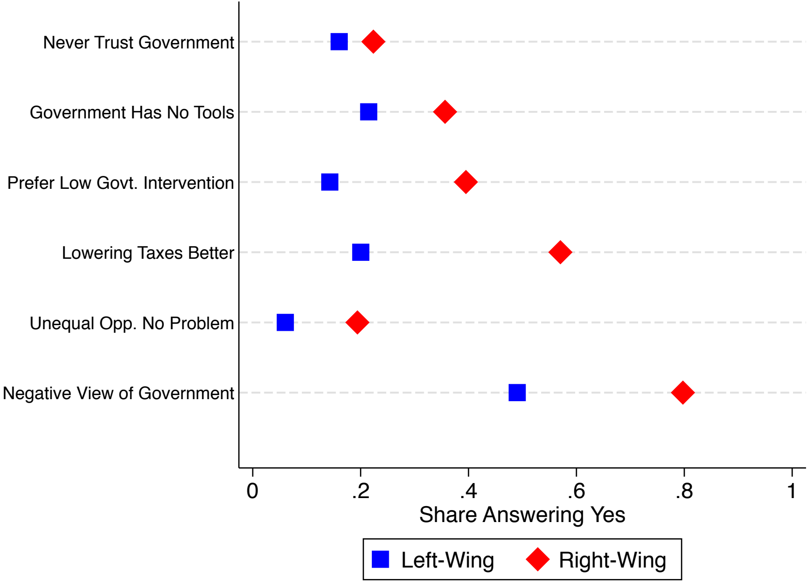

But views are multidimensional: many think the government has some tools,

# Bad Views of Government by Country



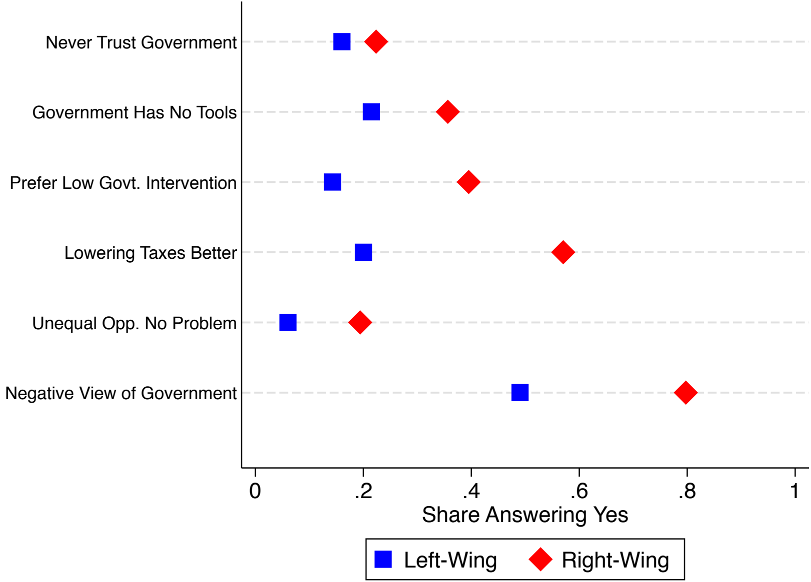

Everyone agrees lack of opportunities are a problem.

# Bad Views of Government by Left and Right



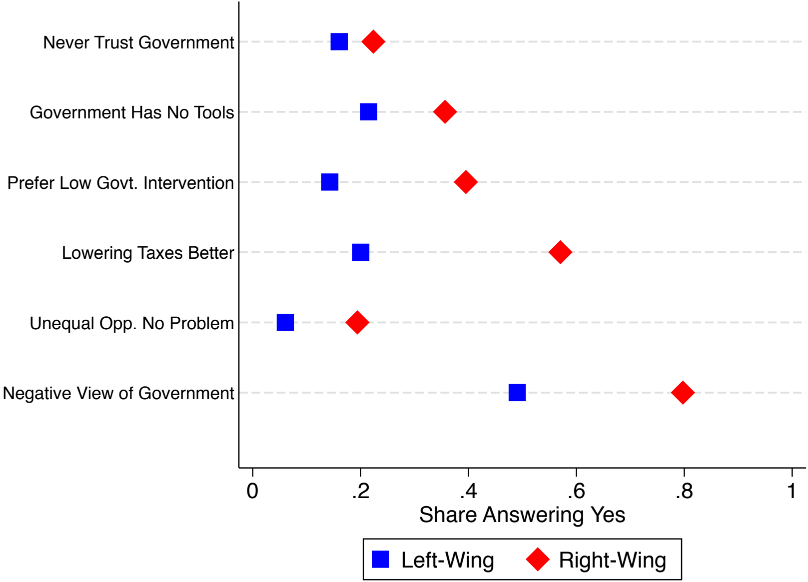

Important to take into account multidimensional perceptions.

# Bad Views of Government by Left and Right




Left and Right distrust government, agree unequal opportunities are a problem,

# Bad Views of Government by Left and Right




A composite measure of "against government" shows big contrast.

# Randomized Perception Experiment

# Randomized Perception Experiment

**Causal relationship** views on mobility $\rightarrow$ policy preferences?

Or simply individual characteristics (e.g.: political affiliation).

Cannot exogenously shift actual social mobility $\rightarrow$ shift perceptions instead.

Our randomized treatment satisfies four criteria:

1. Shift perceptions towards more pessimism (Treatment here)
2. Homogeneous across countries.
3. Does not allude to any policies or to government at all.
4. Accurate, not misleading.

# First Stage Treatment Effect on Perceptions...

| | Q1 to Q1 (1) | Q1 to Q2 (2) | Q1 to Q3 (3) | Q1 to Q4 (4) | Q1 to Q5 (5) | Q1 to Q4 (Qual.) (6) | Q1 to Q5 (Qual.) (7) | American Dream Alive (8) |
|---|---|---|---|---|---|---|---|---|
| ***A. Unconditional Beliefs*** | | | | | | | | |
| Treated × Left-Wing | 10.209*** | -2.126*** | -6.093*** | -2.053*** | 0.063 | -0.189*** | -0.180*** | -0.010 |
| | (0.980) | (0.488) | (0.532) | (0.353) | (0.603) | (0.032) | (0.035) | (0.016) |
| Treated × Right-Wing | 11.145*** | -2.181*** | -6.139*** | -2.236*** | -0.589 | -0.225*** | -0.236*** | -0.045*** |
| | (0.979) | (0.487) | (0.531) | (0.352) | (0.602) | (0.032) | (0.035) | (0.016) |
| p-value diff. | 0.499 | 0.937 | 0.951 | 0.713 | 0.445 | 0.422 | 0.248 | 0.140 |
| Cont. Mean Left | 37.476 | 23.005 | 20.713 | 9.700 | 9.105 | 2.183 | 1.747 | 0.238 |
| Cont. Mean Right | 32.387 | 22.843 | 23.374 | 11.156 | 10.240 | 2.409 | 1.999 | 0.459 |
| Observations | 8585 | 8585 | 8585 | 8585 | 8585 | 8585 | 8585 | 8585 |

Homogeneous across left and right wing respondents (no significant difference).

# .. Also Conditional on Effort

| | Q1 to Q1 (1) | Q1 to Q2 (2) | Q1 to Q3 (3) | Q1 to Q4 (4) | Q1 to Q5 (5) | Q1 to Q4 (Qual.) (6) | Q1 to Q5 (Qual.) (7) |
|---|---|---|---|---|---|---|---|
| ***B. Beliefs Conditional On Effort*** | | | | | | | |
| Treated × Left-Wing | 8.342*** | 0.837 | -5.101*** | -3.064*** | -1.013 | -0.172*** | -0.172*** |
| | (1.191) | (0.671) | (0.944) | (0.552) | (0.749) | (0.049) | (0.054) |
| Treated × Right-Wing | 8.816*** | 0.819 | -5.383*** | -3.309*** | -0.943 | -0.209*** | -0.151*** |
| | (1.158) | (0.653) | (0.918) | (0.537) | (0.728) | (0.048) | (0.052) |
| p-value diff. | 0.775 | 0.985 | 0.831 | 0.751 | 0.947 | 0.592 | 0.779 |
| Cont. Mean Left | 27.044 | 22.368 | 27.885 | 12.925 | 9.777 | 2.743 | 2.304 |
| Cont. Mean Right | 21.007 | 20.905 | 31.275 | 15.391 | 11.422 | 3.066 | 2.640 |
| Observations | 5118 | 5118 | 5118 | 5118 | 5118 | 5117 | 5117 |

# Treatment Effects Persist One Week Later

| | First Survey All Respondents (1) | First Survey Who Took Follow Up (2) | Follow up Respondents (3) |
|---|---|---|---|
| ***Q1 to Q1*** | | | |
| Treated | 8.308*** | 9.254*** | 5.671*** |
| | (0.899) | (1.748) | (1.675) |
| ***Q1 to Q2*** | | | |
| Treated | -1.731*** | -1.428 | -0.968 |
| | (0.444) | (0.920) | (0.943) |
| ***Q1 to Q3*** | | | |
| Treated | -5.479*** | -6.676*** | -3.945*** |
| | (0.491) | (1.019) | (1.013) |
| ***Q1 to Q4*** | | | |
| Treated | -1.733*** | -1.879*** | -1.417** |
| | (0.335) | (0.642) | (0.688) |
| ***Q1 to Q5*** | | | |
| Treated | 0.636 | 0.729 | 0.659 |
| | (0.582) | (1.243) | (1.069) |
| ***Q1 to Q4 (Qual.)*** | | | |
| Treated | -0.230*** | -0.140** | -0.110* |
| | (0.030) | (0.062) | (0.066) |
| ***Q1 to Q5 (Qual.)*** | | | |
| Treated | -0.245*** | -0.116* | -0.044 |
| | (0.034) | (0.070) | (0.071) |
| Obs. | 3354 | 815 | 815 |

# No Significant Treatment Effect on Policies in Full Sample

| | Budget Opp. (1) | Support Estate Tax (2) | Support Equality Opp. Policies (3) | Government Interv. (4) | Unequal Opp. Very Serious Problem (5) | Budget Safety Net (6) | Tax Rate Top 1 (7) | Tax Rate Bottom 50 (8) | Govt. Tools (9) | Redistribution Index (10) |
|---|---|---|---|---|---|---|---|---|---|---|
| ***A. Treatment Effects*** | | | | | | | | | | |
| Treated | 0.108 | 0.002 | 0.010 | -0.020 | 0.046*** | 0.225 | 0.357 | 0.155 | -0.017 | 0.013 |
| | (0.227) | (0.010) | (0.022) | (0.030) | (0.013) | (0.160) | (0.398) | (0.226) | (0.013) | (0.009) |
| ***B. Treatment Effects for Left and Right Wing*** | | | | | | | | | | |
| Treated X Left-Wing | 0.823** | 0.032* | 0.078** | 0.124** | 0.103*** | 0.111 | 0.551 | 0.257 | -0.008 | 0.052*** |
| | (0.398) | (0.017) | (0.039) | (0.053) | (0.022) | (0.281) | (0.686) | (0.389) | (0.023) | (0.015) |
| Treated X Right-Wing | 0.031 | -0.001 | -0.025 | -0.020 | 0.018 | 0.200 | 0.661 | -0.386 | -0.049** | 0.006 |
| | (0.397) | (0.017) | (0.039) | (0.053) | (0.022) | (0.281) | (0.691) | (0.392) | (0.023) | (0.015) |
| p-value diff. | 0.159 | 0.164 | 0.061 | 0.056 | 0.007 | 0.823 | 0.910 | 0.245 | 0.211 | 0.030 |
| Observations | 8585 | 8584 | 8585 | 8585 | 4281 | 8585 | 6851 | 6851 | 4281 | 8585 |

Redistribution Index: Kling, Liebman and Katz (2007).

# Hides underlying Heterogeneity: Significant Treatment Effects on Policies Only For Left-Wing...

| | Budget Opp. (1) | Support Estate Tax (2) | Support Equality Opp. Policies (3) | Government Interv. (4) | Unequal Opp. Very Serious Problem (5) | Budget Safety Net (6) | Tax Rate Top 1 (7) | Tax Rate Bottom 50 (8) | Govt. Tools (9) | Redistribution Index (10) |
|---|---|---|---|---|---|---|---|---|---|---|
| ***A. Treatment Effects*** | | | | | | | | | | |
| Treated | 0.108 | 0.002 | 0.010 | -0.020 | 0.046*** | 0.225 | 0.357 | 0.155 | -0.017 | 0.013 |
| | (0.227) | (0.010) | (0.022) | (0.030) | (0.013) | (0.160) | (0.398) | (0.226) | (0.013) | (0.009) |
| ***B. Treatment Effects for Left and Right Wing*** | | | | | | | | | | |
| Treated X Left-Wing | 0.823** | 0.032* | 0.078** | 0.124** | 0.103*** | 0.111 | 0.551 | 0.257 | -0.008 | 0.052*** |
| | (0.398) | (0.017) | (0.039) | (0.053) | (0.022) | (0.281) | (0.686) | (0.389) | (0.023) | (0.015) |
| Treated X Right-Wing | 0.031 | -0.001 | -0.025 | -0.020 | 0.018 | 0.200 | 0.661 | -0.386 | -0.049** | 0.006 |
| | (0.397) | (0.017) | (0.039) | (0.053) | (0.022) | (0.281) | (0.691) | (0.392) | (0.023) | (0.015) |
| p-value diff. | 0.159 | 0.164 | 0.061 | 0.056 | 0.007 | 0.823 | 0.910 | 0.245 | 0.211 | 0.030 |
| Observations | 8585 | 8584 | 8585 | 8585 | 4281 | 8585 | 6851 | 6851 | 4281 | 8585 |

Stronger treatment effects (and difference between left and right) on equality of opportunity policies.

# ... No Treatment Effects on Policies For Right-Wing

| | Budget Opp. (1) | Support Estate Tax (2) | Support Equality Opp. Policies (3) | Government Interv. (4) | Unequal Opp. Very Serious Problem (5) | Budget Safety Net (6) | Tax Rate Top 1 (7) | Tax Rate Bottom 50 (8) | Govt. Tools (9) | Redistribution Index (10) |
|---|---|---|---|---|---|---|---|---|---|---|
| ***A. Treatment Effects*** | | | | | | | | | | |
| Treated | 0.108 | 0.002 | 0.010 | -0.020 | 0.046*** | 0.225 | 0.357 | 0.155 | -0.017 | 0.013 |
| | (0.227) | (0.010) | (0.022) | (0.030) | (0.013) | (0.160) | (0.398) | (0.226) | (0.013) | (0.009) |
| ***B. Treatment Effects for Left and Right Wing*** | | | | | | | | | | |
| Treated X Left-Wing | 0.823** | 0.032* | 0.078** | 0.124** | 0.103*** | 0.111 | 0.551 | 0.257 | -0.008 | 0.052*** |
| | (0.398) | (0.017) | (0.039) | (0.053) | (0.022) | (0.281) | (0.686) | (0.389) | (0.023) | (0.015) |
| Treated X Right-Wing | 0.031 | -0.001 | -0.025 | -0.020 | 0.018 | 0.200 | 0.661 | -0.386 | -0.049** | 0.006 |
| | (0.397) | (0.017) | (0.039) | (0.053) | (0.022) | (0.281) | (0.691) | (0.392) | (0.023) | (0.015) |
| p-value diff. | 0.159 | 0.164 | 0.061 | 0.056 | 0.007 | 0.823 | 0.910 | 0.245 | 0.211 | 0.030 |
| Observations | 8585 | 8584 | 8585 | 8585 | 4281 | 8585 | 6851 | 6851 | 4281 | 8585 |

For right-wing respondent, even negative effect on trust in government's ability.

# Explaining the Treatment Effect: Polarization on Role of Government

*Yet the message of the right is increasingly: It's not your fault that you're a loser; it's the government's fault.*

J.D. Vance, Hillbilly Elegy: A Memoir of a Family and Culture in Crisis

- First stage effect present for both left and right wing, but no effect on policy preferences.
- Lack of causal effect mirrors lack of correlation for the right wing.
- Worse views with government are correlated with lower support for redistribution ..
- ... and right-wing respondents have (had) terrible views of government.

# Conclusion

- Inaccurate perceptions can be tested and improved thanks to better data.
- But: Polarization along political spectrum means that same information (exogenous, causal) has very different impacts.
  - This is not just about people having different information sets to start with (which they have).
- Geographical patterns intriguing: where do people get their information from?
- Link between racial and immigration perceptions in U.S. and Europe and support for redistribution (on-going work!).

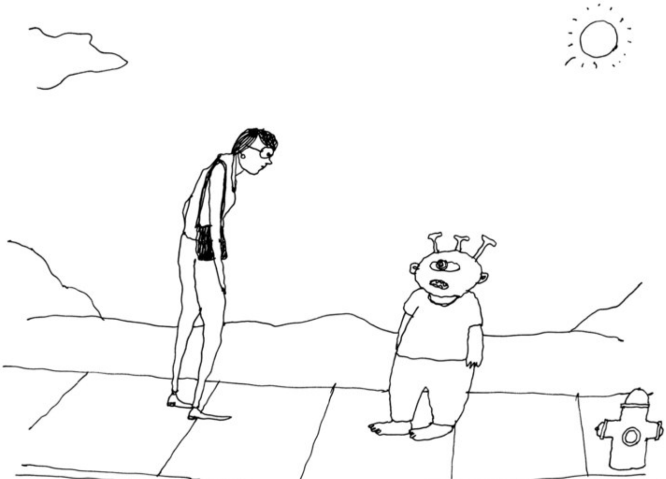
"Immigration and Redistribution" by Alberto Alesina, Armando Miano, and Stefanie Stantcheva.

https://scholar.harvard.edu/stantcheva/publications/immigration-and-support-redistribution

# Immigration and Redistribution

Alberto Alesina, Armando Miano, and Stefanie Stantcheva

*Well, I live in Atlanta, but I guess you are asking where I am from originally?*




YOU'RE FIRED.
"Give me your tired, your poor..."


WELCOME!
OME!
DON'T ~~WEL~~COME!


STOP
INVASIONE


55% DES FRANÇAIS OPPOSÉS
À L'ACCUEIL DES MIGRANTS
FRANCE
TOUCHE PAS À MA PORTE

# We Study Two Broad Questions

**How do people (mis)perceive immigration?**

Are perceptions of immigration, about the number, origin, religion, unemployment, education, poverty, correct amongst natives of the host countries?

What are natives' views on immigration policies?

What are perceptions of and views on immigration correlated with?

**What is the link between immigration and redistribution?**

Are perceptions of immigration and views about redistribution correlated? And do perceptions of immigrants "cause" preferences for redistribution?

# Method and Setting

Large-scale surveys in 6 countries: France, Germany, Italy, Sweden, UK, and US, total of $\approx$ 22,500 respondents.

Done through commercial survey companies in Nov 2017-Feb 2018.

Sample sizes: 4,500 in US, 4,000 in FR, DE, IT, and UK, 2,000 in SE;

**Survey components:**

Background info, perception of immigrants (number, origin, religion, hard work, economic conditions, support), policy preferences (redistribution + immigration).

**Randomized treatments**:

**Priming**: “Order” treatment asks about immigration before redistributive policies.

**Information** (Facts) on 1) number, 2) origins of immigrants.

**Anecdote** on “hard-working” immigrant.

## Main Findings: Perceptions of Immigration Substantially and Systematically Wrong

Across countries and respondent characteristics:

- Stark overestimation of the number of immigrants
- Stark overestimation of share of Muslim (underestimate Christians)
- Underestimation of immigrants education, employment, contribution to welfare state.

Larger misperceptions for respondents who are: i) in immigrant intensive, low-skill jobs, ii) without college, iii) female, and iv) right wing.

- Left and right-wing equally misperceive % of immigrants, but right-wing believe immigrants have "less desirable" in their views characteristics.

Support for redistribution and immigration strongly correlated.

- Number of immigrants per se does not matter: perceived composition of immigrants (origin, work effort..) does.

## Main Findings: Effects of Information

Factual information on share and origins has no effect.

Just making people think about immigrants (“order treatment”) generates a strongly negative reaction in terms of redistribution.

Recall negative baseline perceptions about immigrants.

Anecdotes work somewhat too: “Hard work” on its own can generate some more support for redistribution.

However, if people are also prompted to think in detail about immigrants’ characteristics (which they are wrong about), priming effect dominates.

# Related Literature (Political Science, Sociology, some Econon) I

Perceptions of Immigrants Hanson, Scheve, and Slaughter (2007); Hainmueller and Hiscox (2010); Hainmueller and Hopkins (2010); Hainmueller and Hopkins (2015); Card, Dustmann and Preston (2012); Bansak, Hainmueller, and Hangartner (2016), Naumann (2018); Herda (2010, 2013); Mayda and Facchini (2009, 2012).

Immigration and Redistribution: Luttmer (2001); Hansen (2003); Finseraas (2008); Senik et al. (2009); Luttmer and Singhal (2011); Dahlberg, Edmark, and Lundqvist (2012); Emmenegger and Klemmensen (2013); Magni-Berton (2014); Chevalier et al. (2017); Bisin and Verdier (2017); Eger and Breznau (2017);

Information and Support for immigration: Grigorieff, Roth, and Ubfal (2018); Facchini, Margalit and Nakata (2016) (informational campaign in Japan on econ contribution of immigrants).

Information Experiments: Kuziemko, Norton, Saez, and Stantcheva (2015), Perez-Truglia and Cruces (2016), Karadja, Mollerstrom and Seim (2017), Cruces *et al.* (2013), Newman *et al.* (2014), Alesina, Stantcheva and Teso (2018).

# Related Literature (Political Science, Sociology, some Econ) II

Our contributions:

1. Cross-country, large-scale, standardized survey plus experiment;
2. Elicit detailed perceptions of immigrants along many dimensions (more relevant than % of immigrants);
3. Study link between these perceptions and redistribution policy (in addition to immigration policy).
4. Shift experimentally 3 distinct aspects of immigration (number, origin, economic contribution) in isolation;

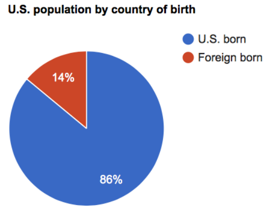
# Data Collection: Surveys and Experiments

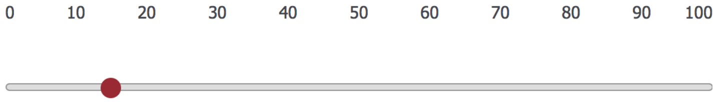
# Survey Structure

- **Background** socio-economic questions, sector, immigrant parents, political experience.
- **Treatments** about immigration. [Randomized]
  - T1: Number, T2: Origin, T3: Hard work of immigrants.
- **Immigration Block:** [Randomized]
  - **Perceptions of Immigrants**. Number, origin, effort, "Free Riding", economic conditions (education, poverty, unemployment, transfers).
  - **Immigration Policies:** Citizenship, when to receive benefits, whether govt should care equally, when are immigrants "truly" American.
- **Redistribution Block:** [Randomized]
  - **Redistributive Policies:** Overall involvement, income support policies, income taxes, budget + Donation question.
  - **Role of Government:** Trust, tools to reduce inequality, is inequality a problem, scope for government to intervene in redistribution.

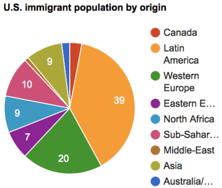
# Eliciting Perceptions on Number of Immigrants

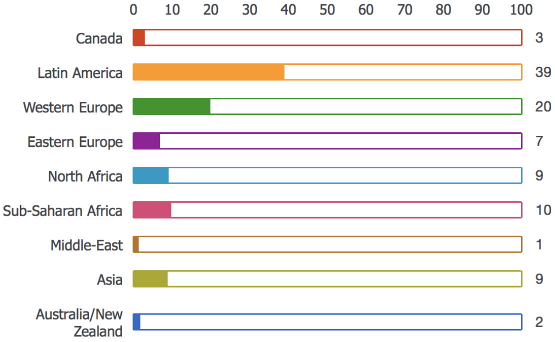
The pie chart below represents all the people currently living in the U.S. Out of all these people currently living in the U.S., how many do you think are legal immigrants? Move the slider to indicate how many out of every 100 people you think are legal immigrants.



# Eliciting perceptions on Origin of Immigrants



# Eliciting Perceptions on Effort of Immigrants

*Which has more to do with why an immigrant living in the U.S. is poor? [Lack of effort on his or her own part; Circumstances beyond his or her control]*

*Which has more to do with why an immigrant living in the U.S. is rich? [Because she or he worked harder than others; Because she or he had more advantages than others]*

# Economic Conditions of immigrants

*Out of every 100 people born in the U.S. how many are currently unemployed? By "unemployed" we mean people who are currently not working but searching for a job (and maybe unable to find one).*

*Now let's compare this to the number of unemployed among legal immigrants. Out of every 100 legal immigrants how many do you think are currently unemployed?*

*Out of every 100 people born in the U.S., how many live below the poverty line? The poverty line is the estimated minimum level of income needed to secure the necessities of life.*

*Let's compare this to poverty among legal immigrants. Out of every 100 legal immigrants in the U.S. today, how many do you think live below the poverty line?*

*U.S. born residents receive government transfers in the form of public assistance, Medicaid, child credits, unemployment benefits, free school lunches, food stamps or housing subsidies when needed. How much do you think each legal immigrant receives on average from such government transfers? An average immigrant receives... [No transfers/.../More than ten times as much as a US born resident]*

## Are people "Biased" Against Immigrants?

*Imagine two people, John and Mohammad, currently living in the U.S. with their families. John is born in the U.S., while Mohammad legally moved to the U.S. five years ago. They are both 35, have three children, and earn the same low income from their jobs.*

*In your opinion does Mohammad pay more, the same, or less in income taxes than John? [A lot more; more; the same; less; a lot less]*

*In your opinion does Mohammad, who is an immigrant, receive more, the same, or less government transfers (such as public assistance, Medicaid, child credits, unemployment benefits during unemployment spells, free school lunches, food stamps or housing subsidies) than John? [A lot more; more; the same; less; a lot less]*

# Questions on Policies

**Logic**: Split desired policies into components

i) government involvement and intervention in redistribution,

ii) how to share a given tax burden,

iii) how to allocate a given budget.

**Support for policies to reduce inequality:** schooling, housing, income support. Subject to other policies being reduced. Detail

**Income taxes** on top 1%, next 9%, next 40%, bottom 50%. Detail

**Budget allocation** on 1) Defense/ Security, 2) Infrastructure, 3) Education, 4) SS, Medicare, DI, and SSI, 5) Social Insurance and Income Support Programs, 6) Health, 7) Affordable housing. Detail

# Questions on Role and Capacities of Government

Are income differences between rich and poor people a problem?

Tools of the government to reduce income inequality?

Scope of government to reduce income inequality, from 1 to 7.

Trust in government ▸ Detail

# Donation Question

*By taking this survey, you are automatically enrolled in a **lottery to win $1000**. In a few days you will know whether you won the $1000. The payment will be made to you in the same way as your regular survey pay, so no further action is required on your part. In case you won, would you be willing to **donate part or all of your $1000 gain for a good cause**? Below you will find 2 charities which help people in the U.S. deal with the hurdles of everyday life. You can enter how many dollars out of your $1000 gain you would like to donate to each of them. If you are one of the lottery winners, you will be paid, in addition to your regular survey pay, $1000 minus the amount you donated to charity. We will directly pay your desired donation amount to the charity or charities of your choosing.*

**Charities:**

- US: Feeding America, The Salvation Army
- France: Les restos du cœur, Emmaüs
- Germany: SOS Kinderdorf, Tafel
- Italy: Caritas, Save the Children Italia
- Sweden: Frälsningsarmén, Majblomman
- UK: Save the Children U.K., The Salvation Army

# Ensuring reasonable answers

Appeal to people's social responsibility. ▸ Detail

Warn that "careless answers" will be flagged.

Constrain answers to add up to 100. Tabulating answers – few strange patterns. ▸ Detail

Attention check questions (99.5%), Meade and Craig (2012).

Time spent on separate questions' pages and overall survey time.

Ask for feedback post survey, whether felt survey was biased (16%).

Check careless response patterns (clicking same "middle" answer).

Order of immigration and policy questions (treatment per se).

# Data Sources

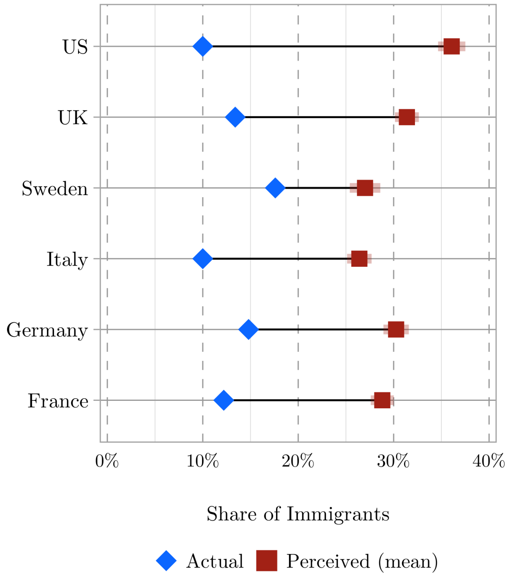
- Number of immigrants and origin: Pew Research Center (US); UN, Trends in International Migrant Stock (UK, Italy, France, Germany); OECD, International Migration Database (Sweden)
- Religion: Pew Research Center
- Unemployment: Pew Research Center (US); OECD, International Migration Outlook (UK, Italy, France, Germany, Sweden)
- Poverty and Education: Current Population Survey, Pew Research Center and Center for Migration Studies (US); Eurostat (UK, Italy, France, Germany and Sweden)

# OUTLINE OF THE DESCRIPTIVE PART

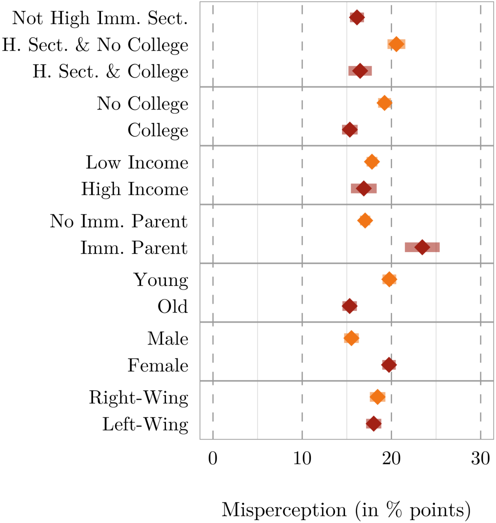
1. Perceptions of immigrants (number, origin, economic circumstances) by country and by respondent characteristics.
2. Views on policies – about immigration and redistribution.
    1. General pattern of support for immigration and redistribution across countries and respondent characteristics.
    2. Correlations of immigrant perceptions, support for immigration and support for redistribution.

# Perception of Immigrants

# Perceived vs. Actual Number of Immigrants (By Country)

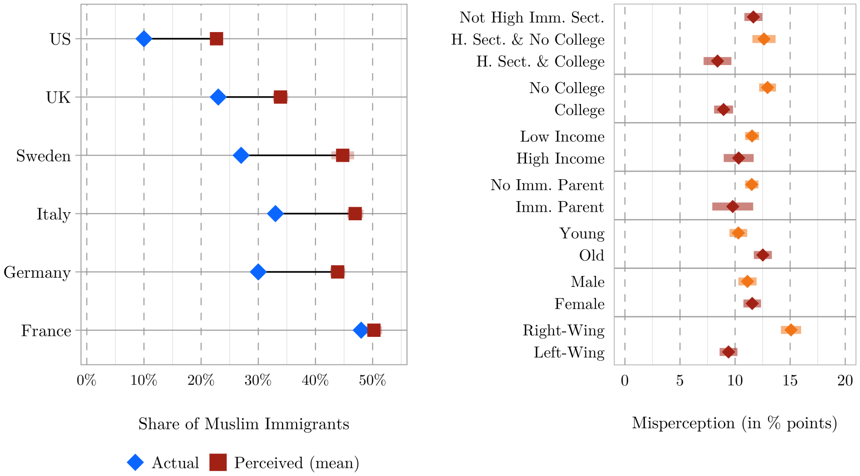


# Misperception of Number of Immigrants



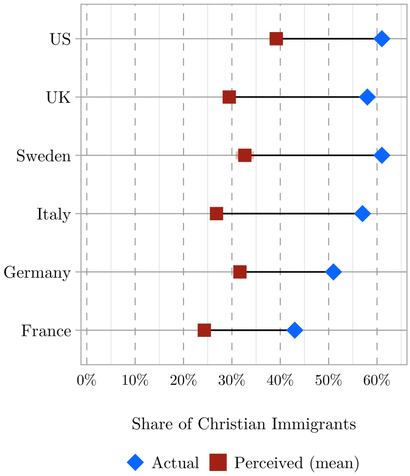

Who misperceives more? Those 1) in high immigration sectors with low education, 2) without college, 3) who are young, 4) who have an immigrant parent, 5) women. US Sectors

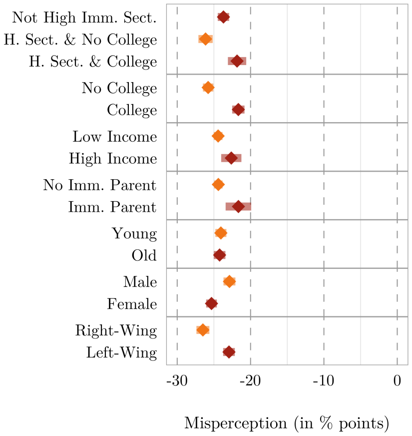
# Perceived vs. Actual Share of Muslim Immigrants




Middle East
North Africa

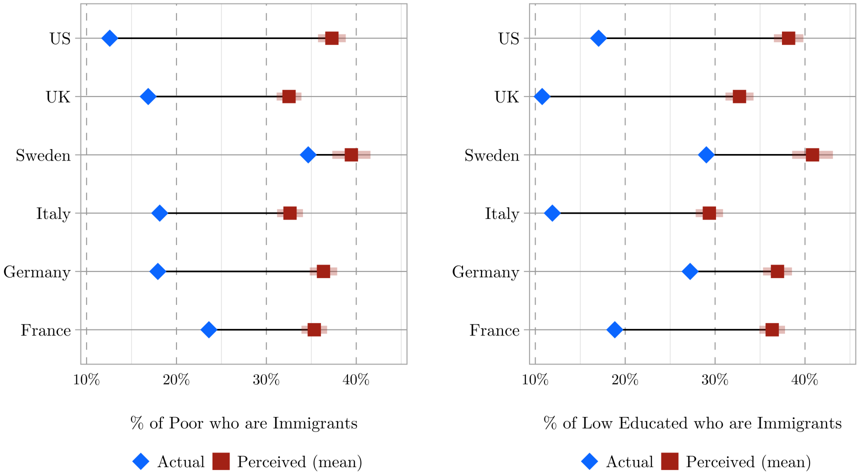
# Perceived vs. Actual Share of Christian Immigrants



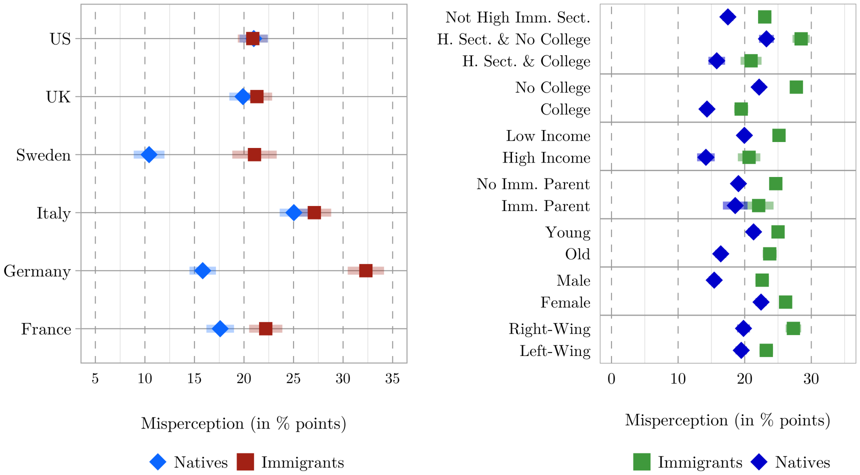




Latin America

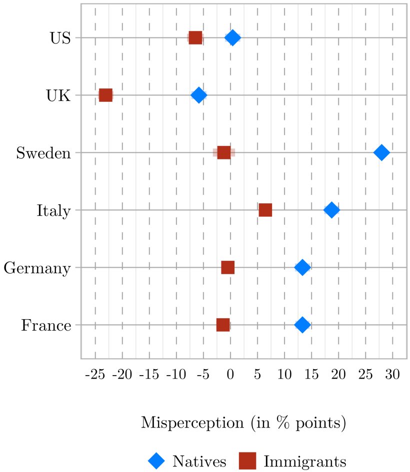
# Perceived vs Actual Representation of Immigrants among Poor and Low-Educated

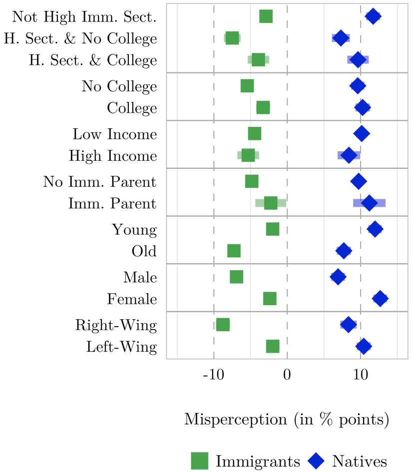


# Misperception of Unemployment - Immigrants vs. Natives

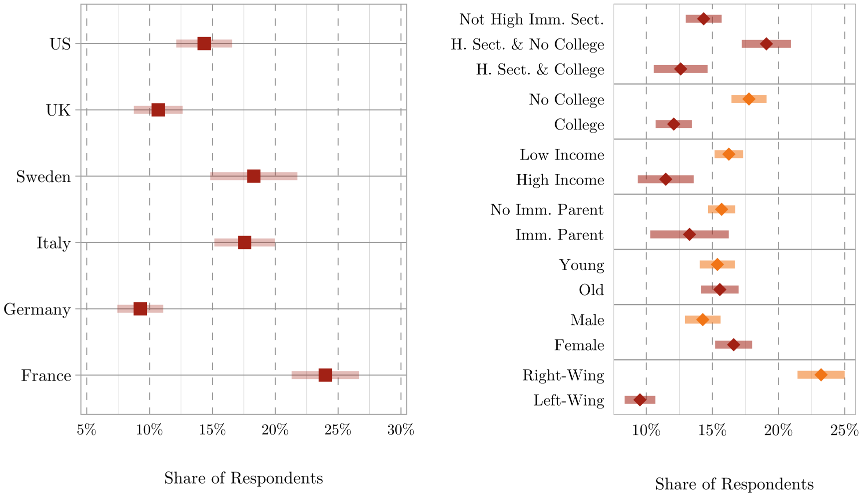


# Misperceptions of Share of High-Educated - Immigrants vs. Natives



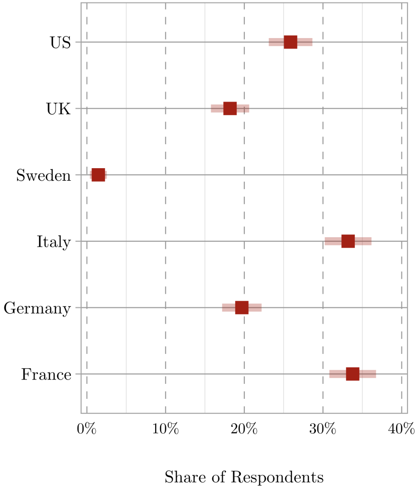



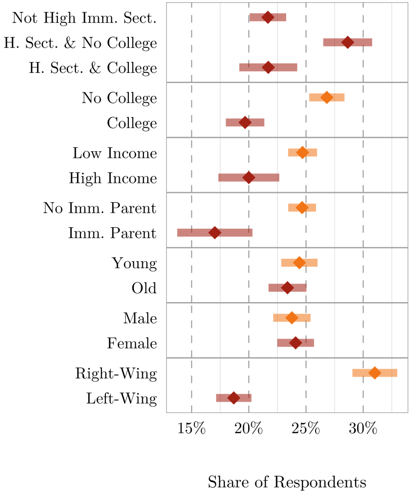
# Share of Respondents who believe average immigrant gets twice the amount of transfers of natives




▸ Relative Transfers

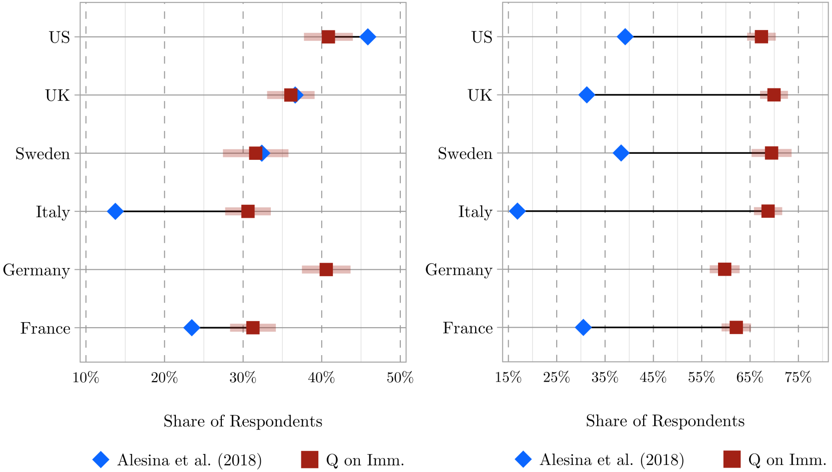
# "Bias": Does Mohammad Get More Transfers and Pay Less Taxes all Else Equal?




Across all countries, and respondent characteristics, a non trivial share think all else equal Mohammad gets more transfers and pays less taxes. France and Italy are most "biased." Low educated in high immigrant sectors, non college educated, the poor, and right wing are most biased.

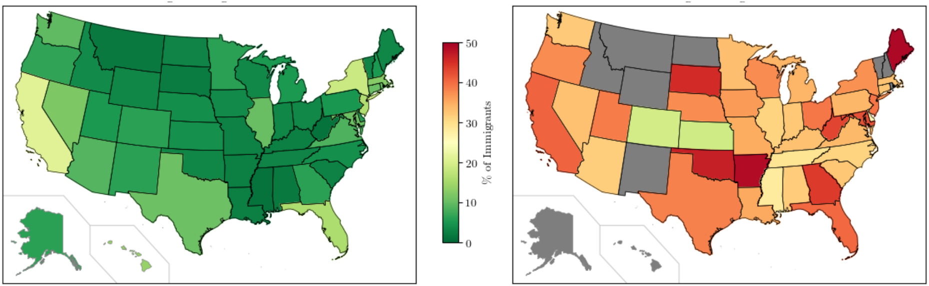
# % of Respondents who Think Poor Immigrants Don't Put in Effort and that Rich Immigrants Worked Hard




Countries vary on whether they think poor immigrants or poor natives are most likely to be lazy. U.S. is an outlier (also thinks poor are lazy in general). All countries agree that IF an immigrant got rich, they must have worked hard (IT & FR – sticky social classes, inherited advantages?)

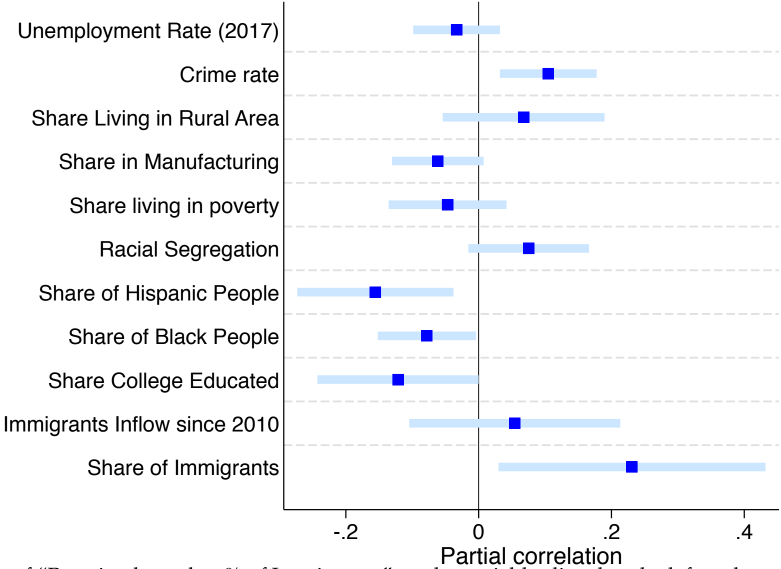
# The Impact of Local Factors on Perceptions

# Perceptions across the U.S.




Actual share of legal immigrants in each state in 2014 (left) vs. average perception of national share of legal immigrants by state (right)

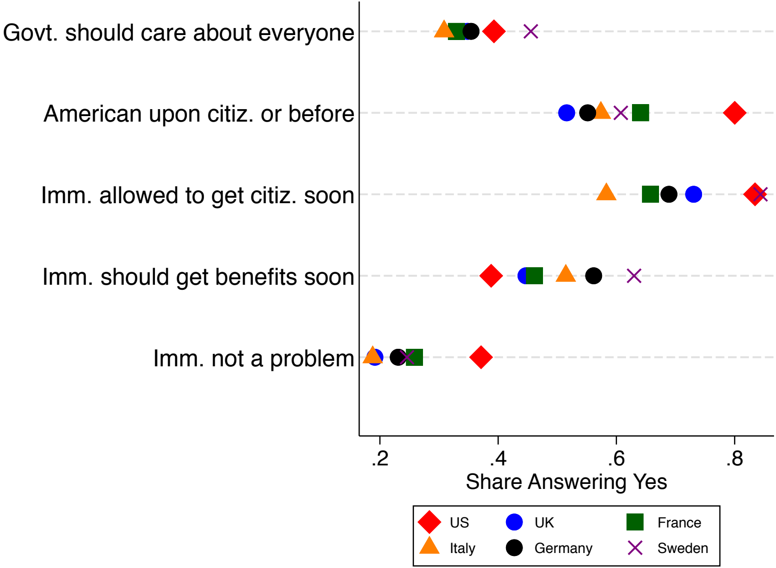
# CZ Level Characteristics and Perceived % of Immigrants (U.S.)




Regression of "Perceived number % of Immigrants" on the variables listed to the left and personal characteristics (jointly).

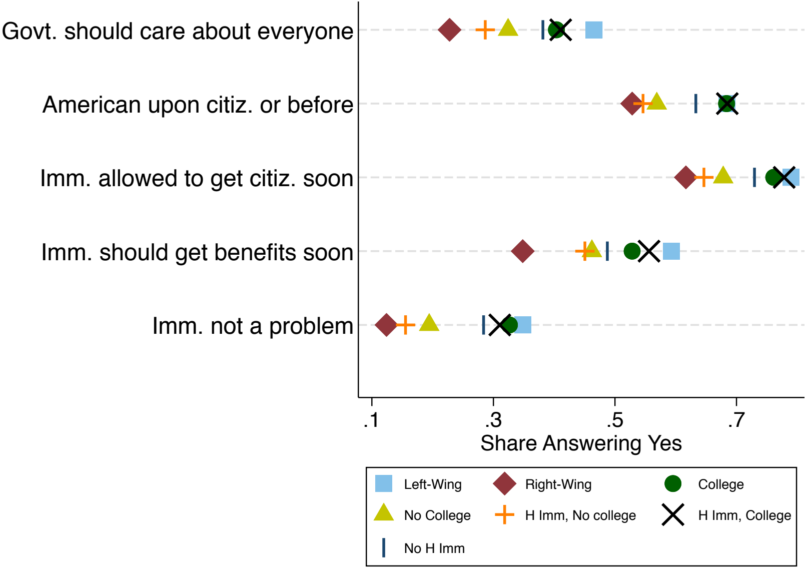
# Descriptive Part about Support for Redistribution and Immigration

# Support for Immigration (By Country)




Different dimensions of support for immigration are important.
U.S. most supportive of immigration, but not of benefits for immigrants (or in general).

# Support for Immigration (By Group)



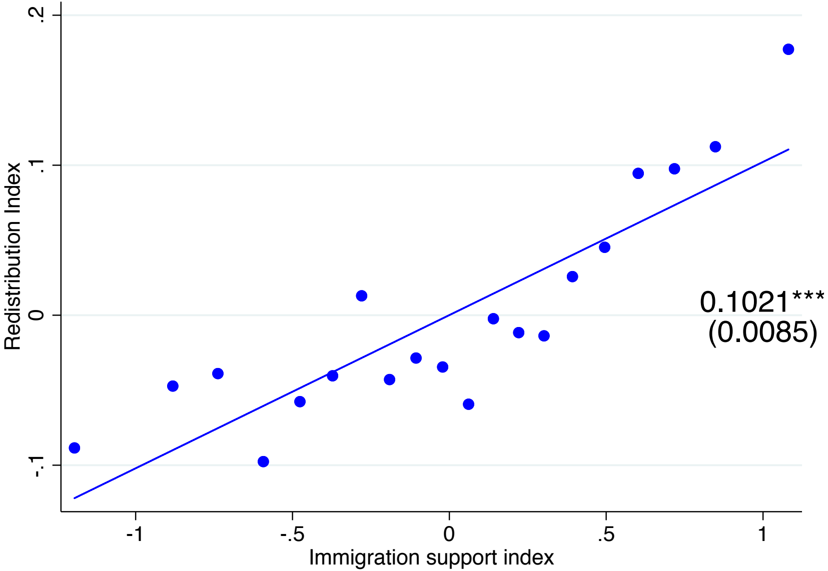

Ranked by immigration support: Left wing > High immigration sector + college ≥ college > No high immigration sector > No college > No college in high immigration sector > Right-wing.

# Immigration Perceptions and Redistribution: Correlations

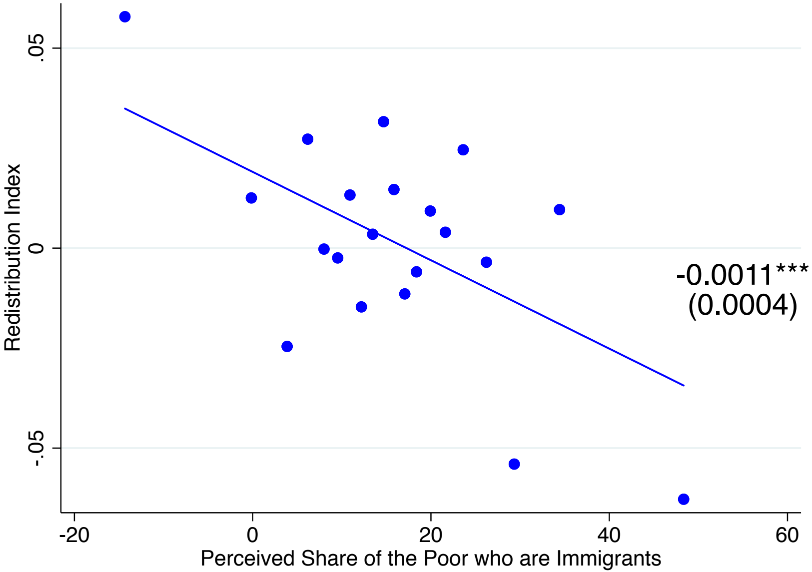
# Measuring Support for Immigration and Redistribution

- **Immigration support index**: standardized z-score index, combines
  - Immigration is not a problem (Dummy).
  - Immigrants should get benefits 3 years after arrival or sooner (Dummy).
  - Immigrants should be allowed to apply for citizenship 5 years after arrival or sooner (Dummy).
  - Immigrants truly "American" when get citizenship or sooner (Dummy).
  - Should the government care about everybody? (1 = only care about natives to 7 = care equally about all).
- **Redistribution index**: standardized z-score index, combines
  - Tax rates on top 1% (+) and retention rate ($1 - \tau$) on bottom 50%.
  - Budget allocated to Heath, Education, Safety Net and Pensions.
  - Support spending on schooling, housing, income support (Dummy).
  - Income inequality is a serious problem (Dummy).

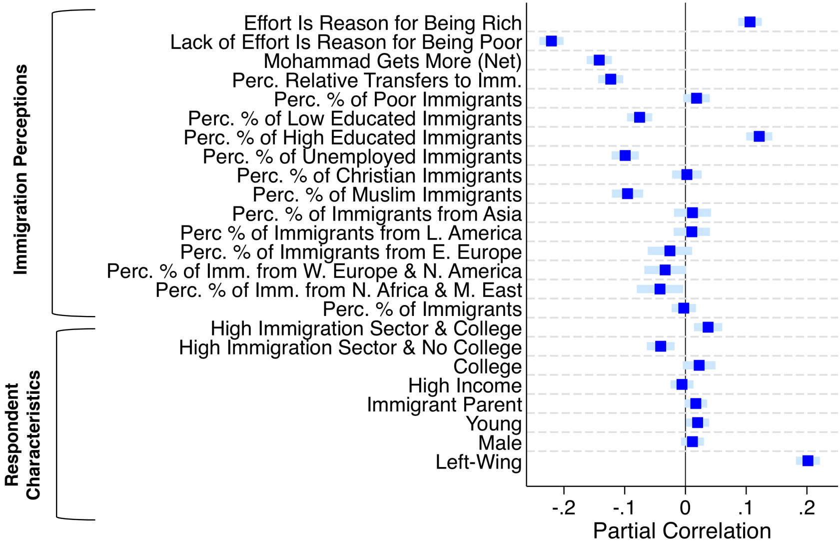
# Support for Immigration and for Redistribution are Very Strongly Correlated



# Perceived Share of Poor Who Are Immigrants and Support for Redistribution

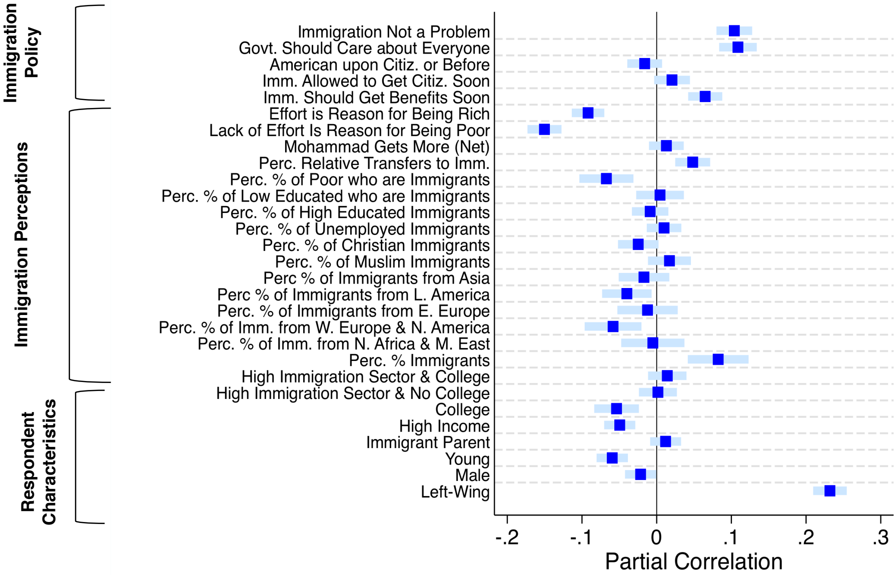


# What Predicts Support for Immigration?




Support for immigration index regressed jointly on z-scores of all variables on the left + country FE.

# What Predicts Support for Redistribution?




Support for redistribution index regressed jointly on z-scores of all variables on the left + country FE.

# Immigration perceptions and Redistribution: Experimental Evidence

# Treatment: “Order of the Questions”

1. **Immigration Block:** [Randomized]
   - **Perceptions of Immigrants**. Number, origin, effort, “Free Riding”, economic conditions (education, poverty, unemployment, transfers).
   - **Immigration Policies:** Citizenship, when to receive benefits, whether govt should care equally, when are immigrants “truly” American.
2. **Redistribution Block:** [Randomized]
   - **Redistributive Policies:** Overall involvement, income support policies, income taxes, budget + Donation question.
   - **Role of Government:** Trust, tools to reduce inequality, is inequality a problem, scope for government to intervene in redistribution.

# Effects on Redistribution Preferences of Thinking of Immigrants

| | Imm Support Index (1) | Tax Top 1 (2) | Tax Bottom 50 (3) | Social Budget (4) | Govt. Should Care about Inequality (5) | Donation Above Median (6) |
|---|---|---|---|---|---|---|
| Imm Questions First | | -1.680*** | 0.904*** | 0.119 | 0.0312 | -0.0479*** |
| | | (0.429) | (0.276) | (0.323) | (0.0429) | (0.0138) |
| Share of Immigrants | 0.0238** | -0.557 | 0.178 | 0.102 | 0.00577 | -0.0165 |
| | (0.0119) | (0.432) | (0.278) | (0.325) | (0.0434) | (0.0140) |
| Origins of Immigrants | 0.00573 | -0.101 | 0.168 | -0.155 | 0.0249 | 0.00208 |
| | (0.0119) | (0.431) | (0.278) | (0.325) | (0.0434) | (0.0140) |
| Hard Work of Immigrants | 0.0463*** | 0.0276 | 0.0764 | 0.746** | 0.114*** | 0.00910 |
| | (0.0119) | (0.429) | (0.276) | (0.323) | (0.0433) | (0.0139) |
| Share of Immigrants X Imm. Q. First | | 0.536 | -0.130 | -0.425 | 0.0360 | 0.0173 |
| | | (0.613) | (0.395) | (0.462) | (0.0611) | (0.0197) |
| Origins of Immigrants X Imm. Q. First | | 0.352 | -0.543 | 0.00797 | -0.00529 | -0.0115 |
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| Observations | 19765 | 17752 | 17752 | 17739 | 19761 | 19765 |
| Control mean | 0.00 | 36.91 | 10.88 | 56.43 | 5.06 | 0.45 |

Tax rate on Top 1% decreases by 1.7 which is 5% of the control mean and 60% of the left-right wing gap. Tax rate on Bottom 50% increases by 0.9, which is 8% of the control mean and 70% of the left-right wing gap.

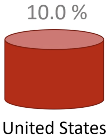
# Information Treatment: Number of Immigrants

Today, what share of the population of the United States are legal immigrants?

Link to video: https://youtu.be/2bVzfv0a-fE

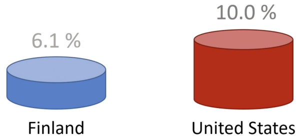
# Information Treatment: Number of Immigrants

Today, legal immigrants make up 10.0 % of all people in the United States.



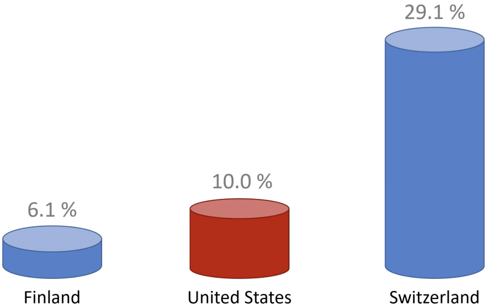
# Information Treatment: Number of Immigrants

For comparison, among rich countries, the lowest share of legal immigrants is 6.1 %.



# Information Treatment: Number of Immigrants

For comparison, among rich countries, the lowest share of legal immigrants is 6.1 %. The largest share of legal immigrants is 29.1 %.



# Information Treatment: Origin of Immigrants


Link to video: https://youtu.be/-603kdm_GkA

# Information Treatment: Origin of Immigrants

# Information Treatment: Origin of Immigrants

# Information Treatment: Origin of Immigrants

The number of little stick men is proportional to the true number of immigrants coming from each region

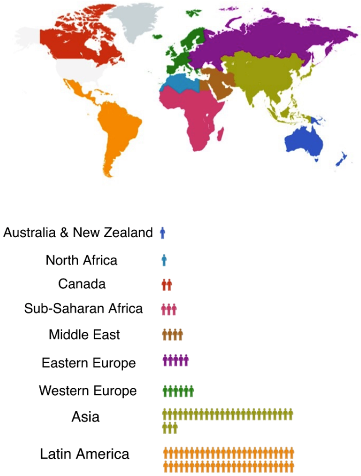
Latin America

# Information Treatment: Origin of Immigrants

Asia

Latin America

# Information Treatment: Origin of Immigrants



# “Anecdote” Treatment: Hard Work of Immigrants

Emma legally came to the U.S. at age 25.

She lives with her husband - a construction worker - and two small children in a one-bedroom apartment.

For the past 5 years, she has been working in a retail store.

Link to video: https://youtu.be/_1SoLYX8OyE

# “Anecdote” Treatment: Hard Work of Immigrants

She starts work at 5 am every day of the week, earning the minimum wage for such tasks as restocking the shelves, helping customers, mopping the floor and cleaning the bathrooms.

# “Anecdote” Treatment: Hard Work of Immigrants


When her day shift at the store ends at 3 pm, Emma starts her second job as a cleaning lady.

She takes two buses to get to her clients.

# “Anecdote” Treatment: Hard Work of Immigrants


She finishes around 7 pm and gets home by 8 pm.

# “Anecdote” Treatment: Hard Work of Immigrants


She then makes dinner for her family and sometimes helps the children with their homework before they go to bed.

# "Anecdote" Treatment: Hard Work of Immigrants


Emma takes online courses. She stays up until midnight to work on her courses.

She cannot take out a loan to go to a full-time college.

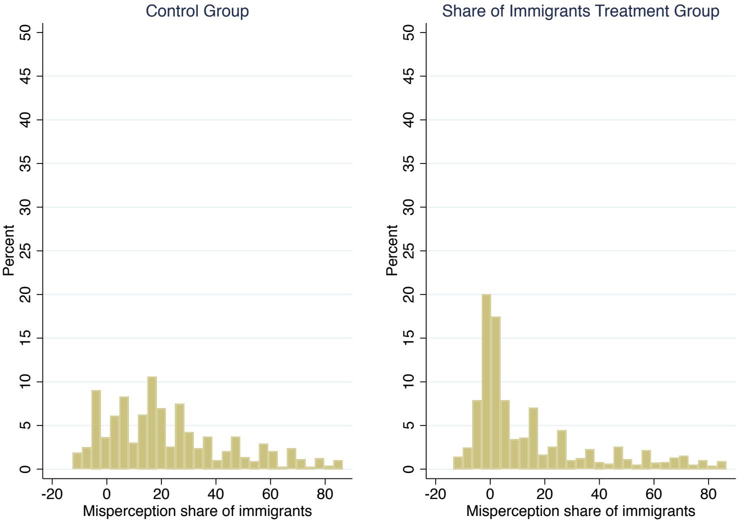
# “Anecdote” Treatment: Hard Work of Immigrants

Emma and her husband have no free time, no weekends, and haven’t taken any holidays since arriving in the U.S..

Despite working two jobs and barely making ends meet, Emma is very happy to be in the U.S..

She hopes that thanks to her hard work she will one day be able to start her own small business.

# Misperception on Number of Immigrants – Control vs. T1 in US




▸ Italy ▸ UK ▸ Frace ▸ Germany ▸ Sweden

# First Stage: (Mis)perceptions Not Very Responsive to Facts

| | All Immigrants (misp.) (1) | Accurate Perception All Immigrants (2) | M. East and N. Africa (misp.) (3) | N. America, W. and E. Europe (misp.) (4) | Muslim (misp.) (5) | Christian (misp.) (6) | Lack of Effort Reason Poor (7) |
|---|---|---|---|---|---|---|---|
| Share of Immigrants | -5.509*** | 0.241*** | -0.0757 | -0.152 | -0.394 | -0.0538 | 0.000297 |
| | (0.426) | (0.00602) | (0.298) | (0.352) | (0.394) | (0.395) | (0.00912) |
| Origins of Immigrants | 1.918*** | 0.00276 | -4.721*** | 1.500*** | -1.803*** | 2.486*** | -0.000234 |
| | (0.428) | (0.00605) | (0.298) | (0.352) | (0.393) | (0.394) | (0.00913) |
| Hard Work of Immigrants | 0.522 | -0.00465 | -0.306 | 0.257 | -0.606 | 0.588 | -0.0535*** |
| | (0.427) | (0.00603) | (0.298) | (0.351) | (0.392) | (0.394) | (0.00912) |
| Observations | 17659 | 17659 | 17741 | 17731 | 17627 | 17695 | 19721 |
| Control mean | 16.29 | 0.04 | 12.88 | -6.12 | 10.50 | -23.90 | 0.36 |

**Share of immigrants treatment**:
Misperception of number ↓ 5.5% relative; share of respondents who are accurate is 28% vs. 4.3% in control group.
**Origins of immigrants treatment**:
↓ misperception from Middle East & North Africa by 36% relative to control; ↓ Muslim by 17%. Still very off!
**Hard work of immigrants treatment:**

5% less likely to say that lack of effort is reason why immigrants poor; 14% reduction relative to control.

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# First Stage Effects: Persistence in the Follow-Up (US only)

| | All immigrants (misp.) (1) | Accurate Perception All immigrants (2) | M. East and N. Africa (misp.) (3) | L. America (misp.) (4) | Muslim (misp.) (5) | Christian (misp.) (6) | Lack of Effort reason poor (7) |
|---|---|---|---|---|---|---|---|
| **Panel A: First survey who took the follow-up** | | | | | | | |
| Share of Immigrants | -7.045*** | 0.230*** | 1.515 | -1.016 | 0.578 | 3.745* | 0.0110 |
| | (2.051) | (0.0217) | (1.032) | (1.574) | (1.302) | (2.048) | (0.0405) |
| Origins of Immigrants | 1.671 | -0.0214 | -7.220*** | 15.12*** | -3.436** | 5.457*** | -0.0418 |
| | (2.107) | (0.0223) | (1.060) | (1.617) | (1.338) | (2.105) | (0.0417) |
| Hard Work of Immigrants | 1.035 | 0.00854 | 1.889* | 0.278 | 1.008 | 0.336 | -0.0889** |
| | (2.030) | (0.0215) | (1.020) | (1.556) | (1.287) | (2.025) | (0.0400) |
| Control mean | 21.29 | 0.02 | 14.86 | -16.85 | 12.08 | -22.66 | 0.45 |
| **Panel B: Follow-up respondents** | | | | | | | |
| Share of Immigrants | -1.369 | 0.0201 | 0.853 | -1.303 | 0.539 | 3.411* | -0.0124 |
| | (1.851) | (0.0161) | (1.023) | (1.420) | (1.229) | (1.947) | (0.0401) |
| Origins of Immigrants | -1.301 | -0.0177 | -2.808*** | 7.234*** | -0.566 | 2.148 | -0.0370 |
| | (1.902) | (0.0165) | (1.051) | (1.459) | (1.263) | (2.001) | (0.0413) |
| Hard Work of Immigrants | -1.246 | -0.00130 | 1.057 | 0.640 | 1.102 | -1.584 | -0.0822** |
| | (1.832) | (0.0159) | (1.012) | (1.403) | (1.215) | (1.925) | (0.0396) |
| Observations | 1032 | 1032 | 1033 | 1034 | 1034 | 1034 | 1032 |
| Control mean | 21.08 | 0.03 | 15.95 | -18.61 | 11.05 | -21.85 | 0.47 |

Some persistence, but large decay of an already weak effect. “Origins of Immigrants" on Middle East+ North Africa. “Hard work” treatment most persistent.

# Effects on Policy Preferences

| | Imm Support Index (1) | Tax Top 1 (2) | Tax Bottom 50 (3) | Social Budget (4) | Govt. Should Care about Inequality (5) | Donation Above Median (6) |
|---|---|---|---|---|---|---|
| Imm Questions First | | -1.680*** | 0.904*** | 0.119 | 0.0312 | -0.0479*** |
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**Share of immigrant treatment:** ↑ support for immigration by 5% of left-right wing gap.
**Hard Work of Immigration treatment:** ↑ support for immigration by 10% of left-right wing gap; ↑ social spending by 1.5% relative to control group and by 15% of left-right wing gap; ↑ government should care about inequality by 2% of control group and 10% of left-right wing gap.

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# Understanding the Treatment Effects on Redistribution Preferences

Order treatment has negative effect because of the very negative baseline views that people have of immigrants.

Info treatments don't move perceptions or policy preferences much:

- So, does info not matter?
- Share of immigrants per se was not *correlated* with support for redistribution, conditional on other immigrant characteristics.
- Origin of immigrants may be less straightforward and hard to understand (could have told people share of different religions directly).
- Also: Each info treatment in itself contains a "mini" order treatment.

"Anecdote" about hard work has positive effect on its own.

- But even that positive effects disappear when making people think about detailed characteristics of immigrants.

# Heterogeneous Treatment Effects: Order Treatment

| | Tax Top 1 (1) | Tax Bottom 50 (2) | Social Budget (3) | Govt. Should Care about Inequality (4) | Donation Above Median (5) |
|---|---|---|---|---|---|
| Imm. Q First X Right | -2.091*** | 1.024** | -0.604 | 0.0328 | -0.0526** |
| | (0.652) | (0.420) | (0.491) | (0.0664) | (0.0212) |
| Imm. Q First X Left | -1.428** | 0.801** | 0.384 | 0.0644 | -0.0480** |
| | (0.611) | (0.394) | (0.459) | (0.0622) | (0.0199) |
| p-value diff. | 0.458 | 0.699 | 0.142 | 0.729 | 0.875 |
| Imm. Q First X College | -1.354** | 0.457 | 0.332 | 0.0175 | -0.0575*** |
| | (0.668) | (0.431) | (0.505) | (0.0678) | (0.0217) |
| Imm. Q First X No College | -1.938*** | 1.227*** | -0.0376 | 0.0414 | -0.0406** |
| | (0.548) | (0.353) | (0.411) | (0.0559) | (0.0179) |
| p-value diff. | 0.499 | 0.167 | 0.571 | 0.786 | 0.547 |
| Imm. Q First x Male | -1.542** | 0.870** | 0.0958 | 0.00192 | -0.0717*** |
| | (0.605) | (0.390) | (0.460) | (0.0615) | (0.0197) |
| Imm. Q First x Female | -1.858*** | 0.964** | 0.123 | 0.0605 | -0.0240 |
| | (0.593) | (0.383) | (0.443) | (0.0605) | (0.0193) |
| p-value diff. | 0.709 | 0.864 | 0.966 | 0.498 | 0.084 |
| Imm. Q First x H imm | -2.335*** | 1.141** | -0.208 | 0.0290 | -0.0814*** |
| | (0.747) | (0.482) | (0.560) | (0.0759) | (0.0242) |
| Imm. Q First x Not H imm | -1.425*** | 0.820** | 0.262 | 0.0334 | -0.0316* |
| | (0.514) | (0.332) | (0.388) | (0.0525) | (0.0168) |
| p-value diff. | 0.316 | 0.583 | 0.490 | 0.962 | 0.091 |
| Control mean | 37.73 | 10.40 | 56.40 | 5.04 | 0.47 |
| Observations | 4561 | 4561 | 4562 | 5063 | 5064 |

# Heterogeneous Treatment Effects: Order Treatment

| | Tax Top 1 (1) | Tax Bottom 50 (2) | Social Budget (3) | Govt. Should Care about Inequality (4) | Donation Above Median (5) |
|---|---|---|---|---|---|
| Imm. Q First X Right | -2.091*** | 1.024** | -0.604 | 0.0328 | -0.0526** |
| | (0.652) | (0.420) | (0.491) | (0.0664) | (0.0212) |
| Imm. Q First X Left | -1.428** | 0.801** | 0.384 | 0.0644 | -0.0480** |
| | (0.611) | (0.394) | (0.459) | (0.0622) | (0.0199) |
| p-value diff. | 0.458 | 0.699 | 0.142 | 0.729 | 0.875 |
| Imm. Q First X College | -1.354** | 0.457 | 0.332 | 0.0175 | -0.0575*** |
| | (0.668) | (0.431) | (0.505) | (0.0678) | (0.0217) |
| Imm. Q First X No College | -1.938*** | 1.227*** | -0.0376 | 0.0414 | -0.0406** |
| | (0.548) | (0.353) | (0.411) | (0.0559) | (0.0179) |
| p-value diff. | 0.499 | 0.167 | 0.571 | 0.786 | 0.547 |
| Imm. Q First x Male | -1.542** | 0.870** | 0.0958 | 0.00192 | -0.0717*** |
| | (0.605) | (0.390) | (0.460) | (0.0615) | (0.0197) |
| Imm. Q First x Female | -1.858*** | 0.964** | 0.123 | 0.0605 | -0.0240 |
| | (0.593) | (0.383) | (0.443) | (0.0605) | (0.0193) |
| p-value diff. | 0.709 | 0.864 | 0.966 | 0.498 | 0.084 |
| Imm. Q First x H imm | -2.335*** | 1.141** | -0.208 | 0.0290 | -0.0814*** |
| | (0.747) | (0.482) | (0.560) | (0.0759) | (0.0242) |
| Imm. Q First x Not H imm | -1.425*** | 0.820** | 0.262 | 0.0334 | -0.0316* |
| | (0.514) | (0.332) | (0.388) | (0.0525) | (0.0168) |
| p-value diff. | 0.316 | 0.583 | 0.490 | 0.962 | 0.091 |
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| | (0.611) | (0.394) | (0.459) | (0.0622) | (0.0199) |
| p-value diff. | 0.458 | 0.699 | 0.142 | 0.729 | 0.875 |
| Imm. Q First X College | -1.354** | 0.457 | 0.332 | 0.0175 | -0.0575*** |
| | (0.668) | (0.431) | (0.505) | (0.0678) | (0.0217) |
| Imm. Q First X No College | -1.938*** | 1.227*** | -0.0376 | 0.0414 | -0.0406** |
| | (0.548) | (0.353) | (0.411) | (0.0559) | (0.0179) |
| p-value diff. | 0.499 | 0.167 | 0.571 | 0.786 | 0.547 |
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| Imm. Q First x Not H imm | -1.425*** | 0.820** | 0.262 | 0.0334 | -0.0316* |
| | (0.514) | (0.332) | (0.388) | (0.0525) | (0.0168) |
| p-value diff. | 0.316 | 0.583 | 0.490 | 0.962 | 0.091 |
| Control mean | 37.73 | 10.40 | 56.40 | 5.04 | 0.47 |
| Observations | 4561 | 4561 | 4562 | 5063 | 5064 |

# Heterogeneous Treatment Effects: Hard Work of Immigrants Treatment

| | Imm Support Index (1) | Tax Top 1 (2) | Tax Bottom 50 (3) | Social Budget (4) | Govt. Should Care about Inequality (5) | Donation Above Median (6) |
|---|---|---|---|---|---|---|
| Hard Work of Imm. X Right | 0.0751*** | -1.192* | 0.554 | 0.281 | 0.105 | -0.00840 |
| | (0.0259) | (0.659) | (0.429) | (0.494) | (0.0662) | (0.0216) |
| Hard Work of Imm. X Left | 0.00678 | 0.447 | -0.114 | 0.785* | 0.136** | 0.0235 |
| | (0.0240) | (0.608) | (0.396) | (0.457) | (0.0614) | (0.0200) |
| p-value diff. | 0.053 | 0.068 | 0.252 | 0.454 | 0.729 | 0.279 |
| Hard Work of Imm. X College | 0.0423 | -0.894 | 0.239 | 0.816 | 0.0892 | 0.0396* |
| | (0.0264) | (0.670) | (0.436) | (0.506) | (0.0674) | (0.0220) |
| Hard Work of Imm. X No College | 0.0408* | 0.638 | -0.0188 | 0.683* | 0.129** | -0.00998 |
| | (0.0217) | (0.550) | (0.358) | (0.412) | (0.0555) | (0.0181) |
| p-value diff. | 0.964 | 0.078 | 0.648 | 0.838 | 0.644 | 0.082 |
| Hard Work of Imm. X Male | 0.0622*** | 0.531 | -0.175 | 0.236 | 0.0547 | 0.000926 |
| | (0.0239) | (0.606) | (0.394) | (0.456) | (0.0610) | (0.0199) |
| Hard Work of Imm. X Female | 0.0210 | -0.473 | 0.335 | 1.230*** | 0.170*** | 0.0188 |
| | (0.0236) | (0.596) | (0.388) | (0.447) | (0.0602) | (0.0196) |
| p-value diff. | 0.219 | 0.238 | 0.357 | 0.120 | 0.178 | 0.523 |
| Hard Work of Imm. X H Imm. | 0.0660** | 0.930 | -0.531 | 0.168 | 0.117 | -0.0177 |
| | (0.0293) | (0.745) | (0.484) | (0.557) | (0.0748) | (0.0244) |
| Hard Work of Imm. X Not H Imm. | 0.0285 | -0.417 | 0.378 | 1.015*** | 0.110** | 0.0234 |
| | (0.0205) | (0.518) | (0.337) | (0.390) | (0.0523) | (0.0170) |
| p-value diff. | 0.293 | 0.138 | 0.123 | 0.213 | 0.945 | 0.168 |
| Control mean | 0.00 | 37.73 | 10.40 | 56.40 | 5.04 | 0.47 |

# Heterogeneous Treatment Effects: Hard Work of Immigrants Treatment

| | Imm Support Index (1) | Tax Top 1 (2) | Tax Bottom 50 (3) | Social Budget (4) | Govt. Should Care about Inequality (5) | Donation Above Median (6) |
|---|---|---|---|---|---|---|
| Hard Work of Imm. X Right | 0.0751*** | -1.192* | 0.554 | 0.281 | 0.105 | -0.00840 |
| | (0.0259) | (0.659) | (0.429) | (0.494) | (0.0662) | (0.0216) |
| Hard Work of Imm. X Left | 0.00678 | 0.447 | -0.114 | 0.785* | 0.136** | 0.0235 |
| | (0.0240) | (0.608) | (0.396) | (0.457) | (0.0614) | (0.0200) |
| p-value diff. | 0.053 | 0.068 | 0.252 | 0.454 | 0.729 | 0.279 |
| Hard Work of Imm. X College | 0.0423 | -0.894 | 0.239 | 0.816 | 0.0892 | 0.0396* |
| | (0.0264) | (0.670) | (0.436) | (0.506) | (0.0674) | (0.0220) |
| Hard Work of Imm. X No College | 0.0408* | 0.638 | -0.0188 | 0.683* | 0.129** | -0.00998 |
| | (0.0217) | (0.550) | (0.358) | (0.412) | (0.0555) | (0.0181) |
| p-value diff. | 0.964 | 0.078 | 0.648 | 0.838 | 0.644 | 0.082 |
| Hard Work of Imm. X Male | 0.0622*** | 0.531 | -0.175 | 0.236 | 0.0547 | 0.000926 |
| | (0.0239) | (0.606) | (0.394) | (0.456) | (0.0610) | (0.0199) |
| Hard Work of Imm. X Female | 0.0210 | -0.473 | 0.335 | 1.230*** | 0.170*** | 0.0188 |
| | (0.0236) | (0.596) | (0.388) | (0.447) | (0.0602) | (0.0196) |
| p-value diff. | 0.219 | 0.238 | 0.357 | 0.120 | 0.178 | 0.523 |
| Hard Work of Imm. X H Imm. | 0.0660** | 0.930 | -0.531 | 0.168 | 0.117 | -0.0177 |
| | (0.0293) | (0.745) | (0.484) | (0.557) | (0.0748) | (0.0244) |
| Hard Work of Imm. X Not H Imm. | 0.0285 | -0.417 | 0.378 | 1.015*** | 0.110** | 0.0234 |
| | (0.0205) | (0.518) | (0.337) | (0.390) | (0.0523) | (0.0170) |
| p-value diff. | 0.293 | 0.138 | 0.123 | 0.213 | 0.945 | 0.168 |
| Control mean | 0.00 | 37.73 | 10.40 | 56.40 | 5.04 | 0.47 |

# Heterogeneous Treatment Effects: Hard Work of Immigrants Treatment

| | Imm Support Index (1) | Tax Top 1 (2) | Tax Bottom 50 (3) | Social Budget (4) | Govt. Should Care about Inequality (5) | Donation Above Median (6) |
|---|---|---|---|---|---|---|
| Hard Work of Imm. X Right | 0.0751*** | -1.192* | 0.554 | 0.281 | 0.105 | -0.00840 |
| | (0.0259) | (0.659) | (0.429) | (0.494) | (0.0662) | (0.0216) |
| Hard Work of Imm. X Left | 0.00678 | 0.447 | -0.114 | 0.785* | 0.136** | 0.0235 |
| | (0.0240) | (0.608) | (0.396) | (0.457) | (0.0614) | (0.0200) |
| p-value diff. | 0.053 | 0.068 | 0.252 | 0.454 | 0.729 | 0.279 |
| Hard Work of Imm. X College | 0.0423 | -0.894 | 0.239 | 0.816 | 0.0892 | 0.0396* |
| | (0.0264) | (0.670) | (0.436) | (0.506) | (0.0674) | (0.0220) |
| Hard Work of Imm. X No College | 0.0408* | 0.638 | -0.0188 | 0.683* | 0.129** | -0.00998 |
| | (0.0217) | (0.550) | (0.358) | (0.412) | (0.0555) | (0.0181) |
| p-value diff. | 0.964 | 0.078 | 0.648 | 0.838 | 0.644 | 0.082 |
| Hard Work of Imm. X Male | 0.0622*** | 0.531 | -0.175 | 0.236 | 0.0547 | 0.000926 |
| | (0.0239) | (0.606) | (0.394) | (0.456) | (0.0610) | (0.0199) |
| Hard Work of Imm. X Female | 0.0210 | -0.473 | 0.335 | 1.230*** | 0.170*** | 0.0188 |
| | (0.0236) | (0.596) | (0.388) | (0.447) | (0.0602) | (0.0196) |
| p-value diff. | 0.219 | 0.238 | 0.357 | 0.120 | 0.178 | 0.523 |
| Hard Work of Imm. X H Imm. | 0.0660** | 0.930 | -0.531 | 0.168 | 0.117 | -0.0177 |
| | (0.0293) | (0.745) | (0.484) | (0.557) | (0.0748) | (0.0244) |
| Hard Work of Imm. X Not H Imm. | 0.0285 | -0.417 | 0.378 | 1.015*** | 0.110** | 0.0234 |
| | (0.0205) | (0.518) | (0.337) | (0.390) | (0.0523) | (0.0170) |
| p-value diff. | 0.293 | 0.138 | 0.123 | 0.213 | 0.945 | 0.168 |
| Control mean | 0.00 | 37.73 | 10.40 | 56.40 | 5.04 | 0.47 |

# Heterogeneous Treatment Effects: Hard Work of Immigrants Treatment

| | Imm Support Index (1) | Tax Top 1 (2) | Tax Bottom 50 (3) | Social Budget (4) | Govt. Should Care about Inequality (5) | Donation Above Median (6) |
|---|---|---|---|---|---|---|
| Hard Work of Imm. X Right | 0.0751*** | -1.192* | 0.554 | 0.281 | 0.105 | -0.00840 |
| | (0.0259) | (0.659) | (0.429) | (0.494) | (0.0662) | (0.0216) |
| Hard Work of Imm. X Left | 0.00678 | 0.447 | -0.114 | 0.785* | 0.136** | 0.0235 |
| | (0.0240) | (0.608) | (0.396) | (0.457) | (0.0614) | (0.0200) |
| p-value diff. | 0.053 | 0.068 | 0.252 | 0.454 | 0.729 | 0.279 |
| Hard Work of Imm. X College | 0.0423 | -0.894 | 0.239 | 0.816 | 0.0892 | 0.0396* |
| | (0.0264) | (0.670) | (0.436) | (0.506) | (0.0674) | (0.0220) |
| Hard Work of Imm. X No College | 0.0408* | 0.638 | -0.0188 | 0.683* | 0.129** | -0.00998 |
| | (0.0217) | (0.550) | (0.358) | (0.412) | (0.0555) | (0.0181) |
| p-value diff. | 0.964 | 0.078 | 0.648 | 0.838 | 0.644 | 0.082 |
| Hard Work of Imm. X Male | 0.0622*** | 0.531 | -0.175 | 0.236 | 0.0547 | 0.000926 |
| | (0.0239) | (0.606) | (0.394) | (0.456) | (0.0610) | (0.0199) |
| Hard Work of Imm. X Female | 0.0210 | -0.473 | 0.335 | 1.230*** | 0.170*** | 0.0188 |
| | (0.0236) | (0.596) | (0.388) | (0.447) | (0.0602) | (0.0196) |
| p-value diff. | 0.219 | 0.238 | 0.357 | 0.120 | 0.178 | 0.523 |
| Hard Work of Imm. X H Imm. | 0.0660** | 0.930 | -0.531 | 0.168 | 0.117 | -0.0177 |
| | (0.0293) | (0.745) | (0.484) | (0.557) | (0.0748) | (0.0244) |
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| | (0.0205) | (0.518 | (0.337) | (0.390) | (0.0523) | (0.0170) |
| p-value diff. | 0.293 | 0.138 | 0.123 | 0.213 | 0.945 | 0.168 |
| Control mean | 0.00 | 37.73 | 10.40 | 56.40 | 5.04 | 0.47 |

## Summary of Heterogeneous Treatment Effects

We look at heterogeneous treatment effects of the three groups with most different ex ante perceptions of immigrants:

1. Left vs. right wing
2. College vs. non college-educated
3. Low-skilled in immigration intensive sectors vs. others.

Two main findings:

All previously described effects hold, but groups with are anti-government redistribution (right wing) react in terms of charity donations only.

Groups with most negative baseline views of immigrants react most negatively to being prompted to think about immigrants (non college educated, right wing, low skill in immigration intensive sectors).

# Conclusion

Perceptions of immigrants systematically very wrong and negative.

Support for redistribution correlated with perceived free riding & lack of hard work of immigrants, not so much with their number.

Just making people think about immigrants brings out baseline (very negative) views and generates negative impact on redistribution.

Natives' views about immigrants can be strategically manipulated by anti-immigration policies.

They can also be manipulated by anti-redistribution parties to gain support for their views about redistribution even when they don't care much about immigration per se.

Next step: Minorities, established for a long time in each country.