

Distributional and Ecological Challenges to our Economic System

8th PKES Summer School, 27 June 2019

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Outline

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Part 1: Distribution within countries

Part 1: Distribution within countries

Definitions

Income vs Wealth

- ▶ **income**: flow of money streams over a time period (e.g. a year)
- ▶ **(net) wealth**: stock of assets (net of liabilities) at a certain point in time (e.g. end of year)
- ▶ what drives wealth (mechanics):
 - ▶ income not used for consumption (i.e. savings, flow) accumulates into assets (stocks)
 - ▶ level of income and income taxes
 - ▶ capital gains on existing assets (revaluations in national accounts)
 - ▶ inheritance/bequests

Functional vs Personal Income Distribution

- ▶ Functional Distribution of Income (Factor Distribution)
 - ▶ distribution between factors of production: capital (dividends, rents, interest, realized capital gains) and labour (wages)
 - ▶ labour or wage share: share of wages in national income
 - ▶ adjusted wage share: adjusted for change in self-employment
- ▶ Personal Distribution of Income (Size Distribution)
 - ▶ distribution of total income (labour+capital) between individuals/households
 - ▶ Gini coefficient, Top X% income share, Theil index, inverse Pareto alpha, etc.

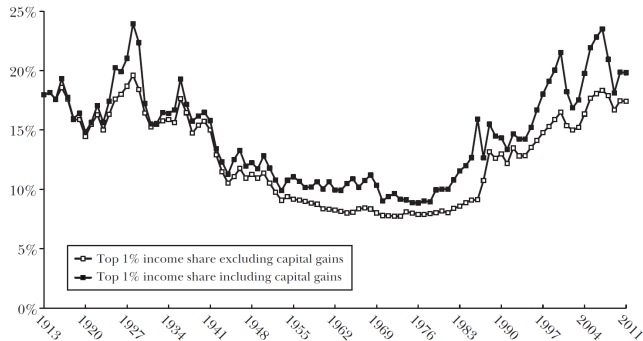
Primary vs Secondary Distribution of Income

- ▶ Primary distribution: distribution of market income, before taxes and transfers
- ▶ Secondary distribution: distribution after taxes and transfers

Part 1: Distribution within countries

The distribution of income and wealth: The last 100 years

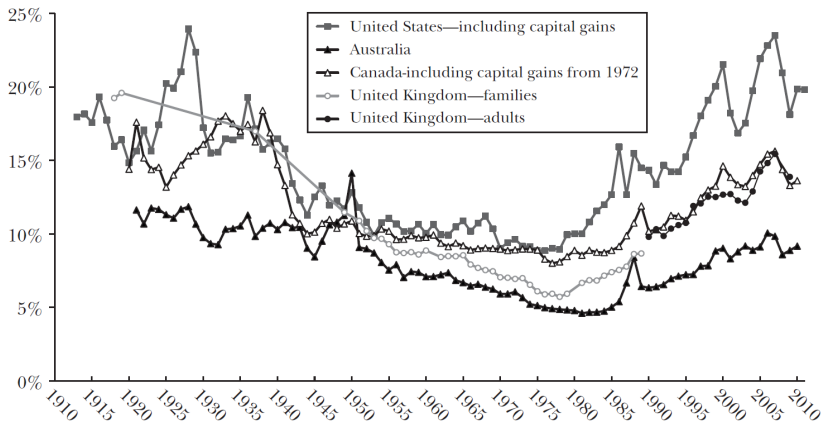
Top 1 Percent Income Share in the United States



Source: Source is Piketty and Saez (2003) and the World Top Incomes Database.

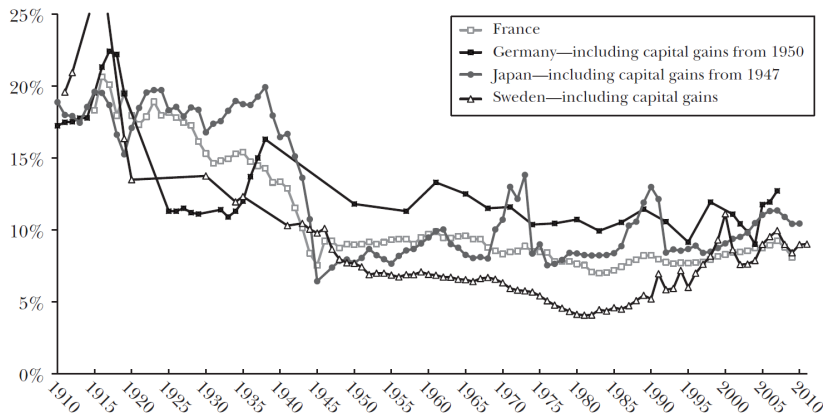
Notes: The figure reports the share of total income earned by top 1 percent families in the United States from 1913 to 2011. Income is defined as pre-tax market income; it excludes government transfers and nontaxable fringe benefits. The figure reports series including realized capital gains (solid squares) and series excluding realized capital gains (hollow squares).

A: Top 1 Percent Income Shares in English-speaking Countries (U-Shape)



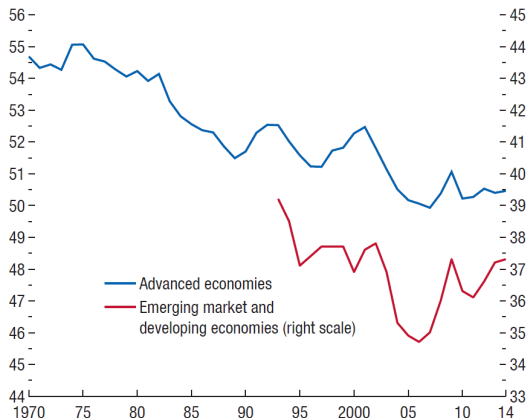
Source: Alvaredo et al. (2013). Pre-tax market income.

B: Top 1 Percent Income Shares in Continental Europe and Japan (L-Shape)



Source: Alvaredo et al. (2013). Pre-tax market income.

"It should be noted that the estimates for France and the United Kingdom do not include capital gains, the estimates for Canada, Germany, Japan, and Sweden include realized capital gains after the year therein shown, and the estimates for Australia include them only partially and at varying degrees over time."
Alvaredo et al. (2013)



Sources: CEIC database; Karabarbounis and Neiman (2014); national authorities; Organisation for Economic Co-operation and Development; and IMF staff calculations.

Labour Share: For advanced economies the figure shows averages weighted by nominal GDP in current U.S. dollars. For emerging market and developing economies the figure shows year fixed effects weighted least squares regressions (using nominal GDP weights) that also include country fixed effects. Year fixed effects are normalized to reflect the level of the labor share in 2000. Source: Dao, Das, Koczan, and Weicheng (2017)

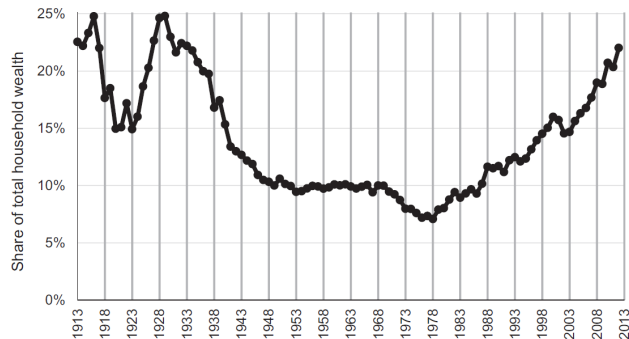


FIGURE I

Top 0.1% Wealth Share in the United States, 1913–2012

The figure plots the share of total household wealth owned by the richest 0.1% of families in the United States from 1913 to 2012. The unit is the family (either a single person aged 20 or above or a married couple, in both cases with children dependents if any). The top 0.1% is defined relative to the total number of families in the population. In 2012, the top 0.1% included about 160,000 families with a net wealth above \$20.6 million.

Source: Saez and Zucman (2016)

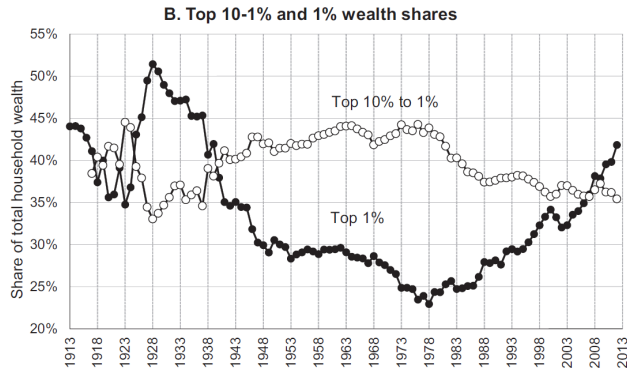


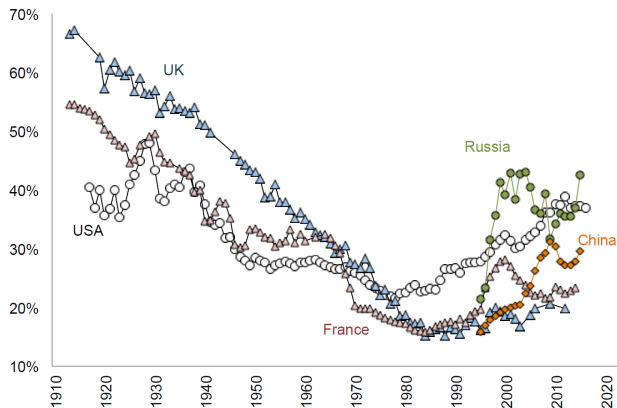
FIGURE VI

Top Wealth Shares in the United States, 1913–2012

Panel B plots the top 1% and next 9% wealth shares in the United States from 1913 to 2012. For our estimates, the unit is the family (single adult person aged 20 or more, with or without children dependents, or married couple with or without dependents). For the SCF, the unit is the household (a household can include several families) and wealth includes durables such as cars but excludes defined benefit funded pensions.

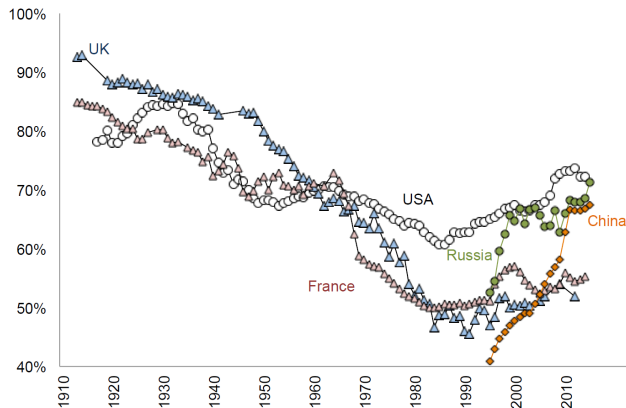
Source: Saez and Zucman (2016)

Figure 4: Top 1% wealth share in emerging and rich countries



This figure compares the top 1% wealth share across countries. Estimates are obtained by combining tax data, survey data, and household balance sheets. The unit of observation is the adult individual with wealth equally split among married couples. Source: Zucman (2019)

Figure 5: Top 10% wealth share in emerging and rich countries



This figure compares the top 10% wealth share across countries. Estimates are obtained by combining tax data, survey data, and household balance sheets. The unit of observation is the adult individual with wealth equally split among married couples.

Source: Zucman (2019)

Part 1: Distribution within countries

Theory: What drives inequalities

Two questions to start with

- ▶ Why do people earn different incomes?
(explain cross sectional heterogeneity)
- ▶ Why does the distribution of income change over time?
(explain trends over time)
- ▶ some of the explanations will be useful for both questions, some only for one of them

Overview: Different explanations of income inequality

- ▶ technology and skill-biased technological change
- ▶ declining bargaining power of workers
 - ▶ globalization
 - ▶ financialization
 - ▶ concentration
 - ▶ labour market institutions (welfare state retrenchment)
- ▶ rent extraction and superstar firm
- ▶ tax changes
- ▶ ability vs luck

Skill-biased technological change

- ▶ technological change makes capital more productive
- ▶ firms strongly substitute labour for capital (elasticity of substitution > 1)
- ▶ as a result: labour share declines
- ▶ similarly some skills become more productive than others (programming, data analysis, ...) wage income distribution widens

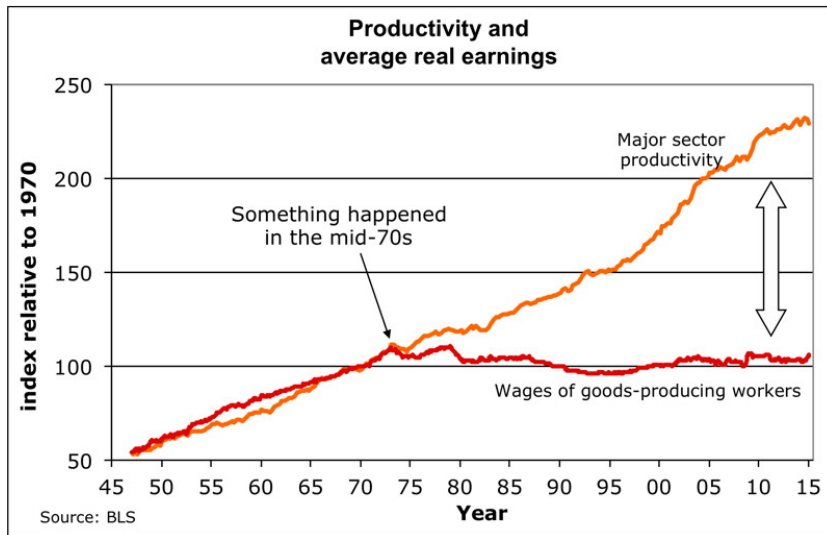
the increase in inequality is "natural"

Skill-biased technological change

- ▶ Do firms strongly substitute (elasticity > 1) capital for labour?
- ▶ empirical evidence inconclusive
 - ▶ direct evidence of SBTC
(Bassanini and Manfredi, 2014; Bentolila and Saint-Paul, 2003; European Commission, 2007; Hutchinson and Persyn, 2012; IMF, 2007, 2017)
 - ▶ no support for elasticity of substitution > 1
(Chirinko, 2008; Chirinko and Mallick, 2014)
- ▶ Guschanski and Onaran (2018) find only secondary role for SBTC
- ▶ Alvaredo et al. (2013) argue cross-country heterogeneity incompatible with SBTC argument

Bargaining power

- ▶ Deviating from standard Solow assumption: $\frac{\partial f(K,L)}{\partial L} = w$
- ▶ Wages do not necessarily reflect productivity increases

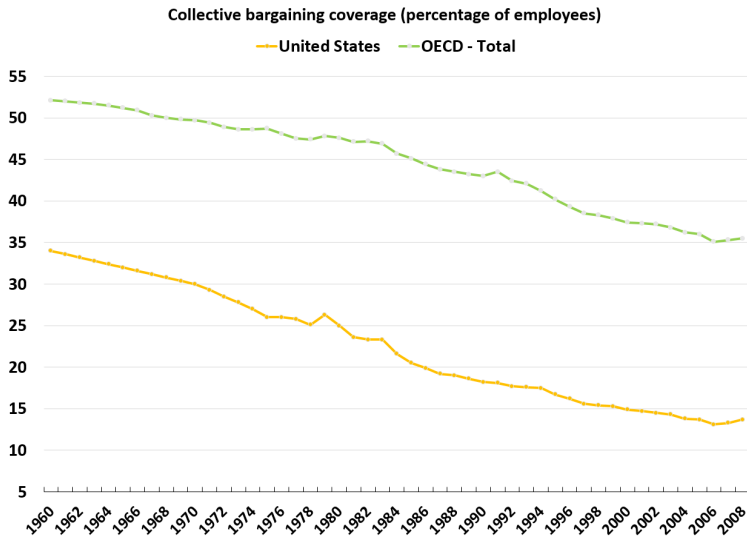


Reduction of bargaining power: channels

- ▶ globalization
 - ▶ reduction of trade barriers and capital controls
 - ▶ strengthen capital bargaining position (relocation)
- ▶ labour market institutions (welfare state retrenchment)
 - ▶ e.g. collective bargaining coverage and unemployment benefits
 - ▶ weaken labour's bargaining position

Reduction of bargaining power: channels

- ▶ concentration
 - ▶ higher markup (i.e. firms manage to charge high prices)
 - ▶ monopsony power (i.e. firms manage to pay low wages)
 - ▶ redistribution of value added towards capital
- ▶ financialization
 - ▶ alternative forms of profit for nonfinancial businesses
 - ▶ increased financial overhead costs
 - ▶ shareholder value orientation forces short term profitability focus
 - ▶ household sector indebtedness acts as disciplining force

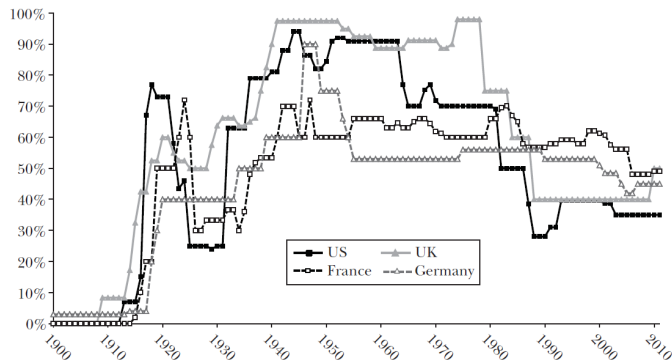


Rent extraction and superstar firm

- ▶ a small number of highly productive firms grows much faster than rest
- ▶ Why?
 - ▶ Network effects (Amazon, Google, Facebook)
 - ▶ Path dependency (Microsoft)
 - ▶ Brand value (Apple)
- ▶ leads to: reduction of aggregate labour share
- ▶ leads to: increasing wage dispersion if superstar firms pay well

Income Taxation

Top Marginal Income Tax Rates, 1900–2011

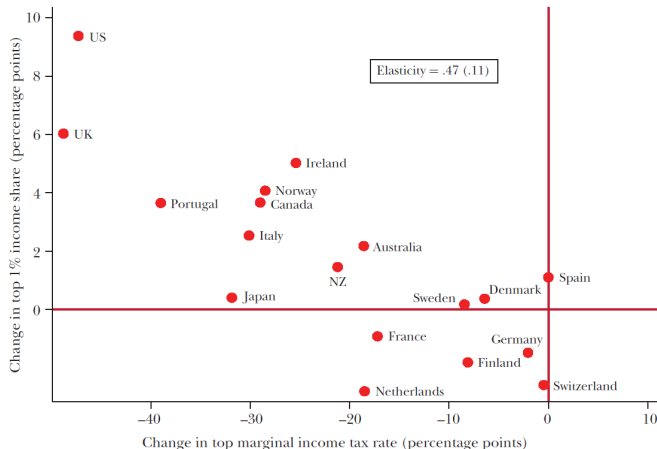


The figure depicts the top marginal individual income tax rate in the United States, United Kingdom, France, and Germany since 1900. The tax rate includes only the top statutory individual income tax rate applying to ordinary income with no tax preference. State income taxes are not included in the case of the United States. For France, we include both the progressive individual income tax and the flat rate tax Contribution Sociale Generalisee. Source: Piketty and Saez (2013)

Income Taxation

Changes in Top Income Shares and Top Marginal Income Tax Rates since 1960

(combining both central and local government income taxes)



The figure depicts the change in the top 1 percent income share against the change in the top income tax rate from 1960 to 2005/2009 for 18 OECD countries. If the country does not have top income share data for those years, we select the first available five years after 1960 and the most recent 5 years. For the following five countries, the data start after 1960: Denmark (1980), Ireland (1975), Italy (1974), Portugal (1976), Spain (1981). For Switzerland, the data end in 1995 (they end in 2005 or after for all the other countries). Top tax rates include both the central and local government top tax rates. The correlation between those changes is very strong. The elasticity estimates of the ordinary least squares regression of $\Delta \log(\text{top1\%share})$ on $\Delta \log(1 - \text{MTR})$ based on the depicted dots is 0.47 (0.11).

Source: Alvaredo et al. (2013)

Income Taxation

- ▶ NOTE: we are talking about distribution of income before tax and transfers
- ▶ Alvaredo et al. (2013) discuss several channels:
 - ▶ incentive for executives to bargain more aggressively at expense of other workers
 - ▶ incentive to spend more time on bargaining and own remuneration than growth of firm
 - ▶ shareholder value orientation
 - ▶ correlation only: actual cause is deregulation + growth of financial and legal services
 - ▶ change in social norms: collective remuneration vs individual bargaining and performance pay

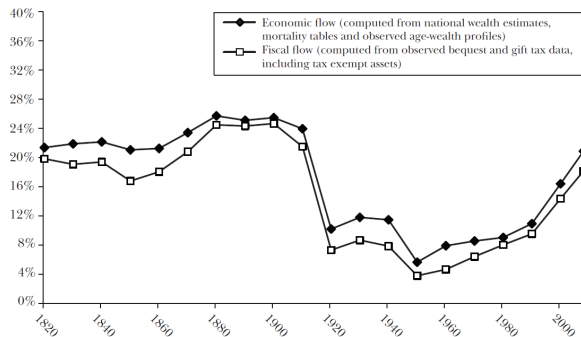
Income Taxation

- ▶ Income taxation also crucial determinant of wealth distribution
- ▶ Saez and Zucman (2016) argue unequal income distribution and differences in saving rates drive wealth inequality

Inheritance

Figure 5

Annual Inheritance Flow as a Fraction of Disposable Income, France 1820–2008



Source: Piketty (2011).

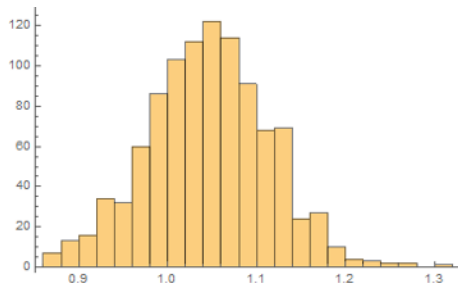
Notes: The annual inheritance flow is defined as the total market value of all assets (tangible and financial assets, net of financial liabilities) transmitted at death or through *inter vivos* gifts. Disposable income was as high as 90–95 percent of national income during the 19th century and early 20th century (when taxes and transfers were almost nonexistent), while it is now about 70 percent of national income.

Luck

- ▶ if income varies randomly (e.g. stock market returns) and wealth can be inherited . . .
- ▶ then the distribution of wealth becomes fairly unequal over time
- ▶ basic mechanism
 - ▶ extraordinary luck generates extraordinary wealth
 - ▶ inheritance allows luck to accumulate
 - ▶ (+ "Mathew effect" (affluent households enjoy higher returns due to scale and/or power) speeds up this process)

Luck: A simulation

- ▶ Population $N = 10,000$ agents and simulate for $T = 200$ periods
- ▶ each agent i starts in round $t = 0$ with wealth $w_{i,0} = 10$
- ▶ each round each agent faces a return on their wealth of $r_i \sim N(1.04; 0.07)$
- ▶ What kind of wealth distribution emerges after 200 rounds?



Luck: A simulation

- ▶ Let's look at the upper tail: top 1% of agents ($n = 100$)
- ▶ Test hypothesis that tail exhibits a Log-Normal Distribution[12.2; 0.293]
 - ▶ p-value: 0.0149967
- ▶ Test hypothesis that tail exhibits a Pareto Distribution[147,381, 3.53]
 - ▶ p-value: 0.886979
- ▶ What's special about a Pareto Distribution[$\mu; \alpha$]?
 - ▶ mean is ∞ for $\alpha \leq 1$
 - ▶ variance is ∞ for $\alpha \leq 2$

Luck: A simulation

- ▶ Why is this interesting?
- ▶ interpretation
 - ▶ starting from complete equality
 - ▶ everybody has same returns up to stochastic variation
 - ▶ BUT: extraordinarily lucky agents benefit from unusually high draws (returns)
 - ▶ AND: inheritance (i.e. same agent "lives for 200 periods") allows to accumulate luck
- ▶ → equal starting condition yields striking inequalities (so equality needs to be constantly restored)

See: Yakovenko and Rosser (2009)

Part 1: Distribution within countries

Example: Estimating Wealth Tax Revenues

Data Source: Wealth and Asset Survey (WAS)

Estimate Tax Revenues of Wealth Tax in the UK based on the WAS.

- ▶ Bi-annual survey of UK households about their income, assets and liabilities
- ▶ Managed by the Office for National Statistics
- ▶ Introduced in 2006 (wave 1); consecutive waves in 2008, 2010, 2012, 2014 (2016 should be available soon; 4 year delay)
- ▶ results based on waves 2008, 2010, 2012

Methodology: Raw vs Corrected Data

- ▶ There is evidence from other countries and good reason to believe that the very wealthy do not take part in this survey! (differential unit non-response)
- ▶ What that means is we obtain a biased picture of the wealth distribution if we use the (raw) WAS data
- ▶ (By "raw" WAS data I mean using the data as it comes from the ONS)
- ▶ One way of trying to mitigate the problem is to use a statistical model, to model the missing part of the distribution
- ▶ What kind of model: we fit a Pareto distribution
- ▶ The key feature of the Pareto distribution is its **heavy tail**

Wealth in the UK based on raw and corrected Data

We are looking here at **net wealth** (i.e. total assets minus total liabilities) of **households**!

	WAS wave 2 2008-2010	WAS wave 3 2010-2012	WAS wave 4 2012-2014
total wealth raw (bn pound)	5,482	5,905	6,599
total wealth corrected (bn pound)	5,756	6,026	7,038
number of millionaires raw	553,565	630,794	887,219
number of millionaires corrected	579,836	653,365	933,479

Tax Scenarios

- ▶ **Linear Model 1:** no tax up to £500k
1% above £500k
- ▶ **Linear Model 2:** no tax up to £1 million
1% above £1 million
- ▶ **Progressive Model 1:** no tax up to £1 million
0.3% between £1 million and £2 million
and 0.7% above
- ▶ **Progressive Model 2:** no tax up to £700k
0.5% between £700k and £2 million
1% between £2 million and £3 million
1.5% above £3 million

Estimated Revenues

billion pounds	raw			corrected		
	2008	2010	2012	2008	2010	2012
linear model 1	10.0	13.9	17.5	12.7	15.0	21.8
linear model 2	4.2	7.3	9.1	6.7	8.3	13.1
progressive model 1	1.9	3.9	4.7	3.6	4.5	7.3
progressive model 2	4.6	8.9	10.6	8.0	10.1	16.0

Conclusions

- ▶ Wealth tax(es) have substantial potential to generate revenues
- ▶ Two problems: evasion
- ▶ and under representation of wealthy households (despite Pareto model)
- ▶ Both problems have opposite effects

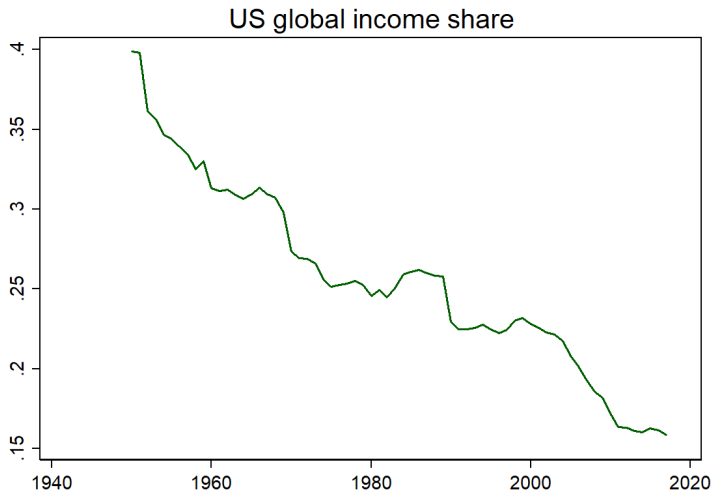
Part 2: Distribution between countries

Part 2: Distribution between countries

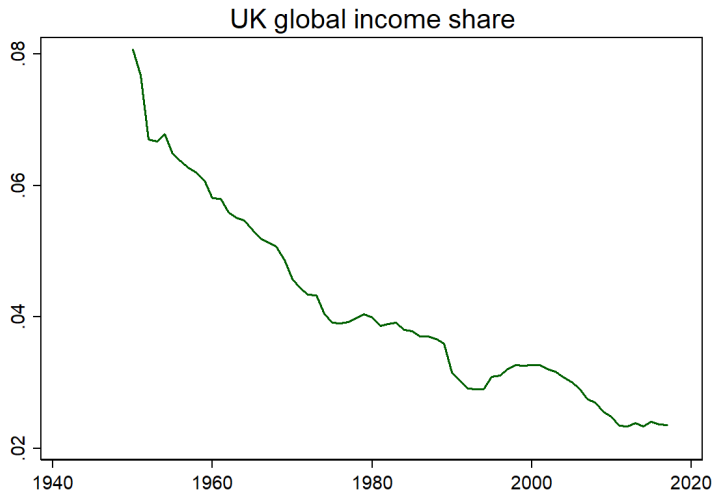
Global Distribution of Income and Wealth

Global Income Distribution

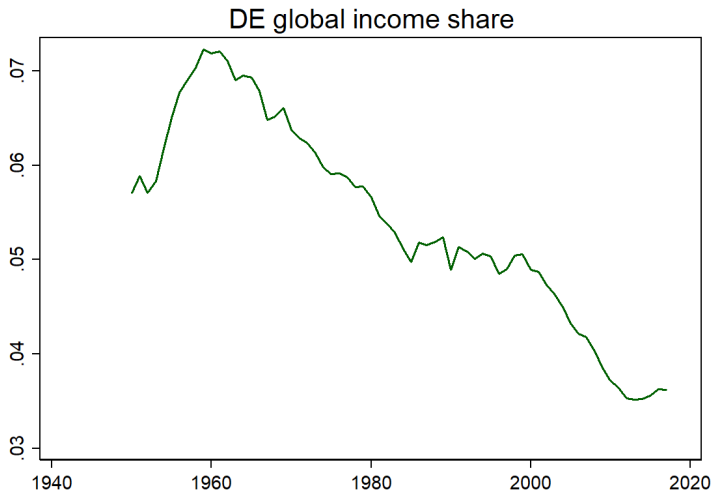
- ▶ Industrialized countries represent a declining share of the global economy
- ▶ Global income distribution equalizes (mainly due to China + India)
- ▶ There is the phenomenon of the "squeezed" global middle class (i.e. bottom 90% of the West): Elephant Graph!



"Income" is measured as GDP at current PPPs from PEN World Table 9.1.



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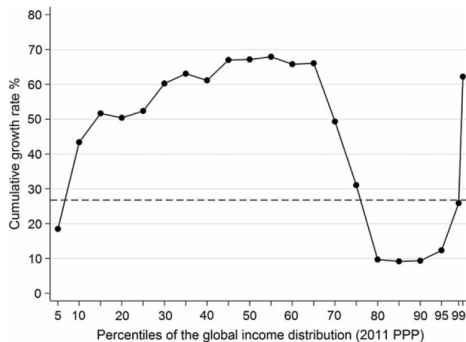


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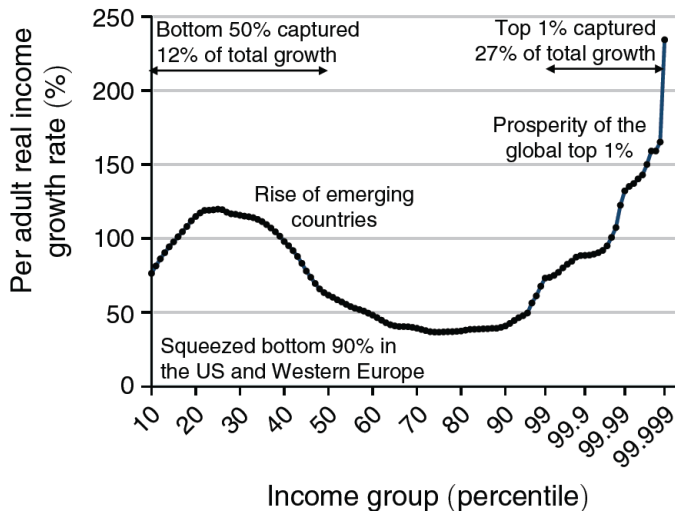
FIGURE A.1. Global Growth Incidence Curve 1988–2008 (2011 PPP)



Here come the elephants!
Source: Lakner and Milanovic (2015)

Notes: Y-axis displays the growth rate in average income of the fractile group (in 2011 PPP USD). Population-weighted. Growth incidence evaluated at ventile groups (e.g., bottom 5%); top ventile is split into top 1% and 4% between P95 and P99. The horizontal line shows the growth rate in the mean of 26.74% (1.19% p.a.).

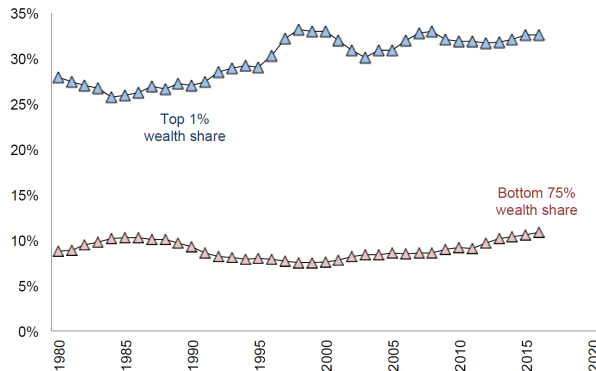
Source: Authors' analysis based on data described in the text.



Source: Alvaredo, Chancel, Piketty, Saez, and Zucman (2018)

What about the global wealth distribution?

Figure 6: The world distribution of wealth
(China + Europe + United States)



Source: Zucman
(2019)

Notes: This figure shows the evolution of global wealth inequality, proxied by wealth inequality in China plus Europe plus the United States. The wealth threshold for an individual to be part of the Top 1% richest in China plus Europe plus the United States is 1,125,000 euros. Source: World Inequality Database (Alvaredo et al., 2018).

Figure 7: Global wealth growth by percentile, 1987–2017
(China + Europe + United States)



Source: Zucman
(2019)

Notes: This figures shows the growth of wealth per adult by quantile of the global wealth distribution over the period 1987–2017. Global wealth inequality is proxied by wealth inequality in China plus Europe plus the United States. Source: World Inequality Database (Alvaredo et al., 2018).

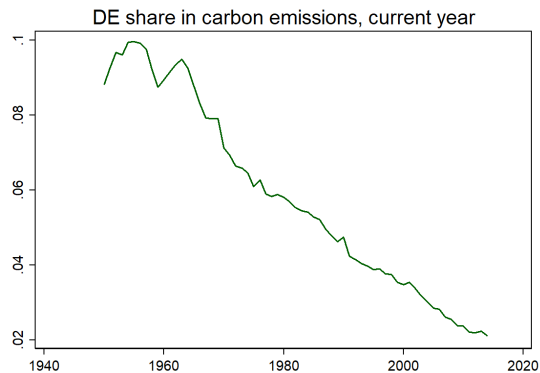
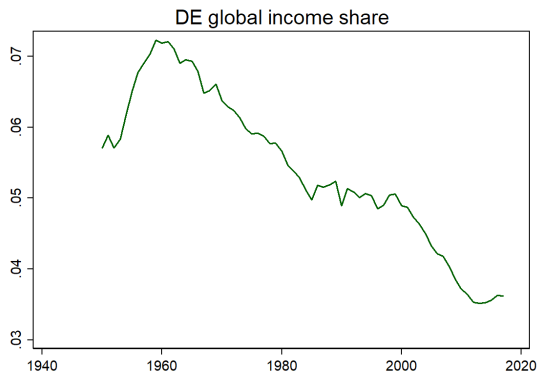
Part 2: Distribution between countries

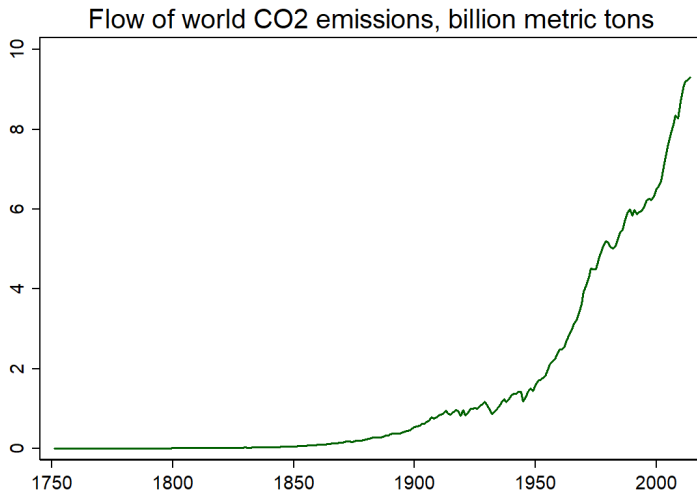
Distribution of CO² emissions

CO² Emissions

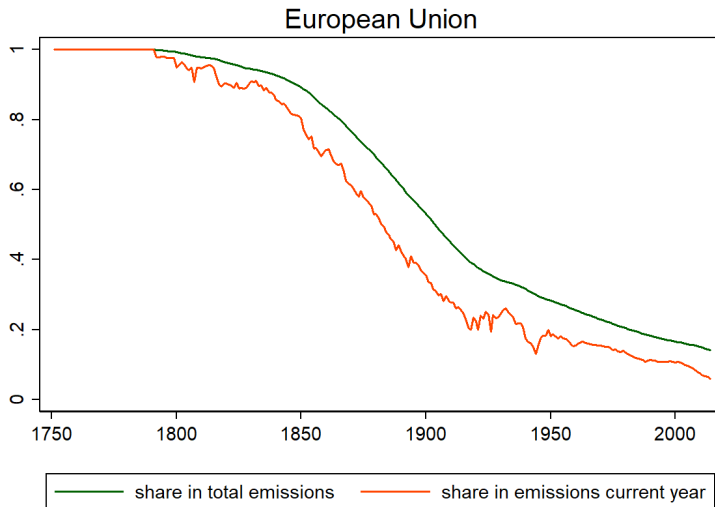
- ▶ Two main sources of CO² (and other greenhouse gas) emissions: 1) fossil fuel usage and 2) land use change and agriculture
- ▶ Fossil fuel accounts for 64% of all human induced emissions of carbon dioxide over last 150 years
- ▶ Let's take a look how these global emissions are distributed across countries and time

CO² Emissions

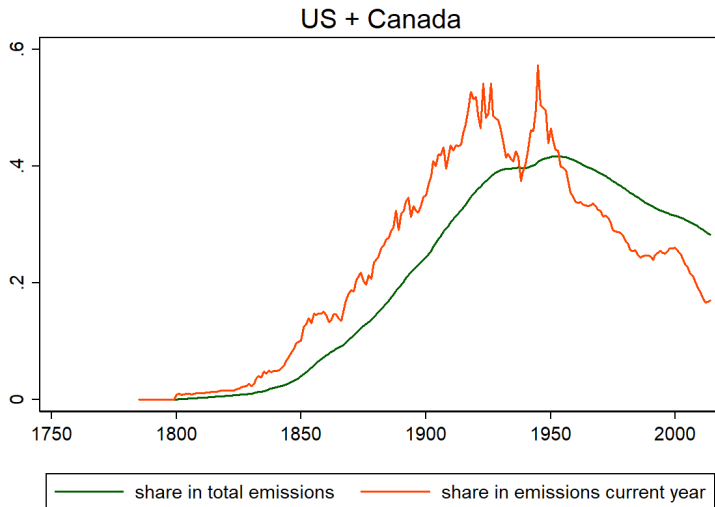




Based on data from the Carbon Dioxide Information Analysis Center. Mass of carbon, multiply by 3.67 to convert to mass of CO₂.

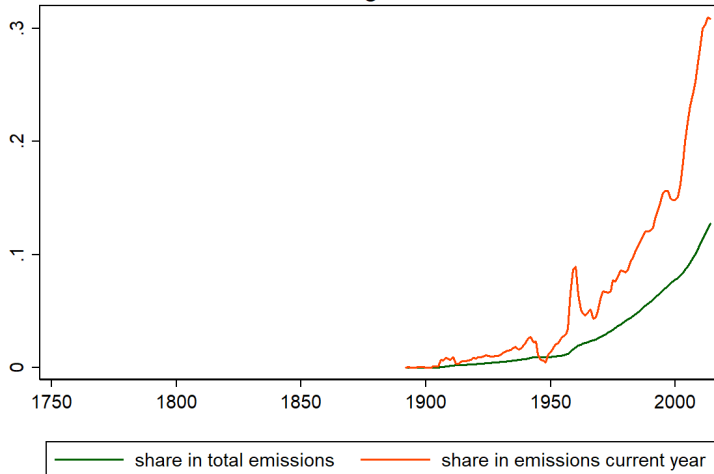


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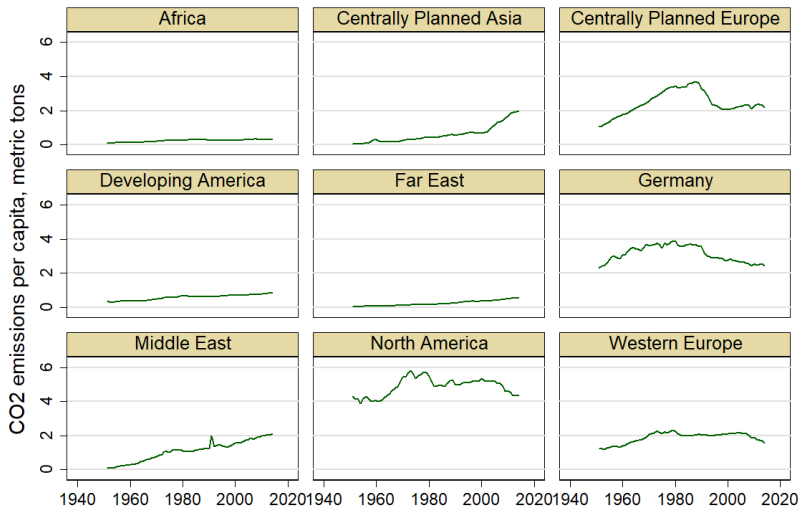


Based on data from
the Carbon Dioxide
Information Analysis
Center.

China + Mongolia + Vietnam



Based on data from
the Carbon Dioxide
Information Analysis
Center.



Based on data from the Carbon Dioxide Information Analysis Center. Mass of carbon, multiply by 3.67 to convert to mass of CO².

CO² Emissions

1. Economic growth was (and still is) directly linked with emissions
 - ▶ wealth is accumulated past economic activity means accumulated emissions:
public support for wealth taxation
2. No significant decline in global emissions
3. Western Countries started much earlier and thus contributed more to total stock of emission
4. "China"'s current per capita emissions ($\approx 2t$) about half of US' ($> 4t$) and slightly more than Western Europe's ($< 2t$)
5. What we don't see in this data is who ultimately consumes emissions. Outsourcing production and importing finished goods reduces carbon footprint.

Part 3: Conclusion

1. Wealth and income inequalities extremely high (within countries)
2. Serious about (re)introducing wealth and inheritance taxes and progressive income taxation (short run)
3. If wealth is accumulated past income, it is accumulated emissions

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