Introduction to
Inequality, Poverty, Taxes and Transfers
(loosely follows Gruber Chapters 17-18)

131 Undergraduate Public Economics

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Recall: Two General Rules for Government Intervention

1) Market Failures: Government intervention can help if there are market failures

2) Redistribution: Free market generates inequality. Public cares about economic disparity. Govt taxes and spending can reduce inequality

Role 2: Redistribution

Even with no market failures, free market outcome might generate substantial inequality

Inequality matters because humans are social beings: people evaluate their economic well-being relative to others, not in absolute terms $\Rightarrow$ Public cares about inequality

In advanced economies, people pool 30-50% of their income through their government to fund many transfer programs

Do taxes and transfers affect economic behavior?

$\Rightarrow$ Generates an efficiency and equity trade-off (size of economic pie vs. distribution of the economic pie)

Income Inequality: Labor vs. Capital Income

Economic production happens with labor and capital

Individuals derive market income (before tax) from **labor** (work) and **capital** (ownership): $z = wl + rk$ where w is wage, l is labor supply, k is capital, r is rate of return on capital

1) **Labor income inequality** is due to differences in working abilities (education, talent, physical ability, etc.), work effort (hours of work, effort on the job, etc.), and luck (labor effort might succeed or not)

2) **Capital income inequality** is due to differences in wealth k (due to past saving behavior and inheritances received), and in rates of return r

Capital Income (or wealth) is much more concentrated than Labor Income

Macro-aggregates: Labor vs. Capital Income

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

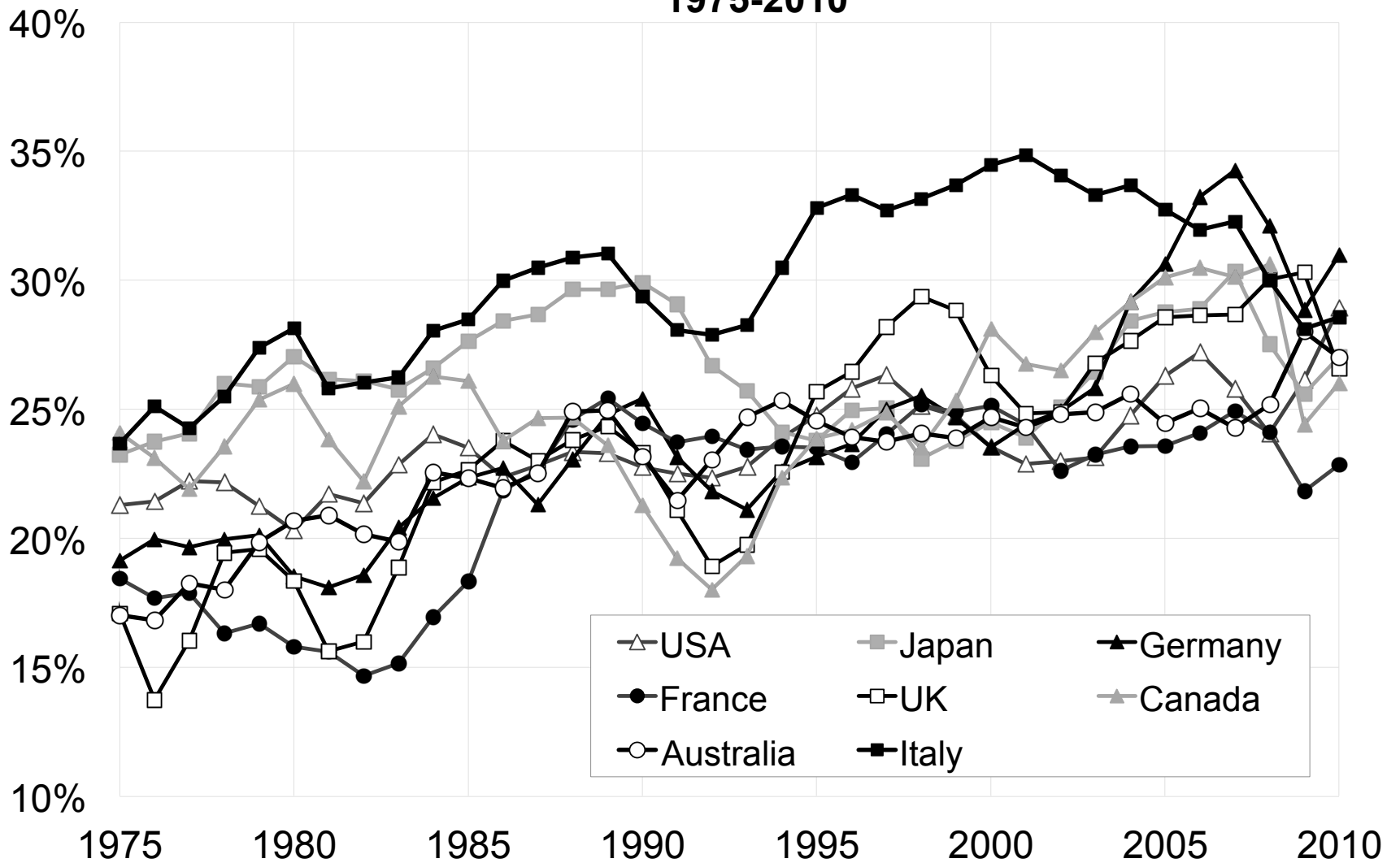Labor income $wl \simeq 75\%$ of market income z

Capital income $rk \simeq 25\%$ of market income z

Private wealth $k \simeq 400 - 500\%$ of market income z (increased a lot in the US in last decade to 550% in 2020)

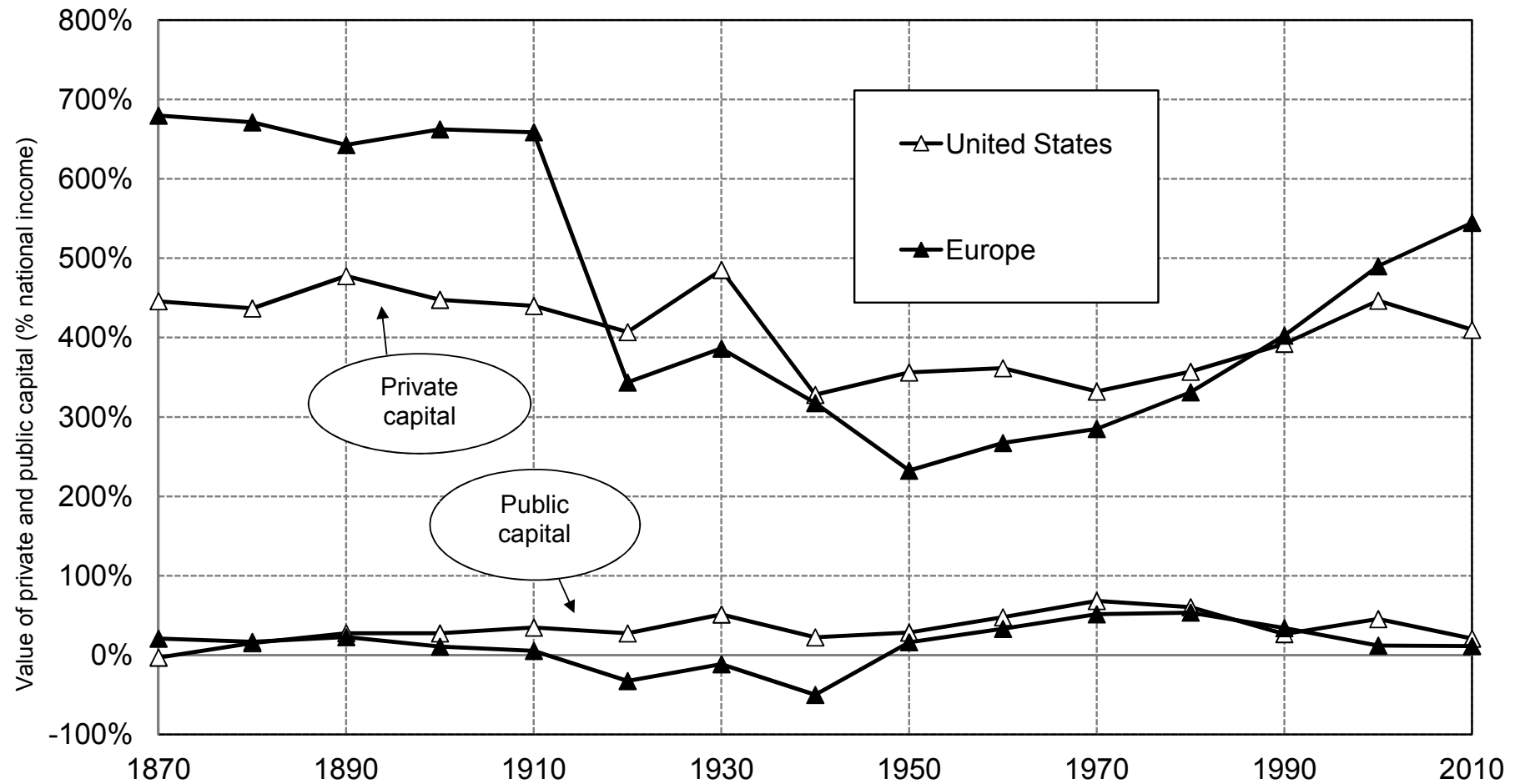Rate of return on wealth $r \simeq 5 - 6\%$

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

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)

Income Inequality Measurement

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

Most famous inequality index: **Gini coefficient**

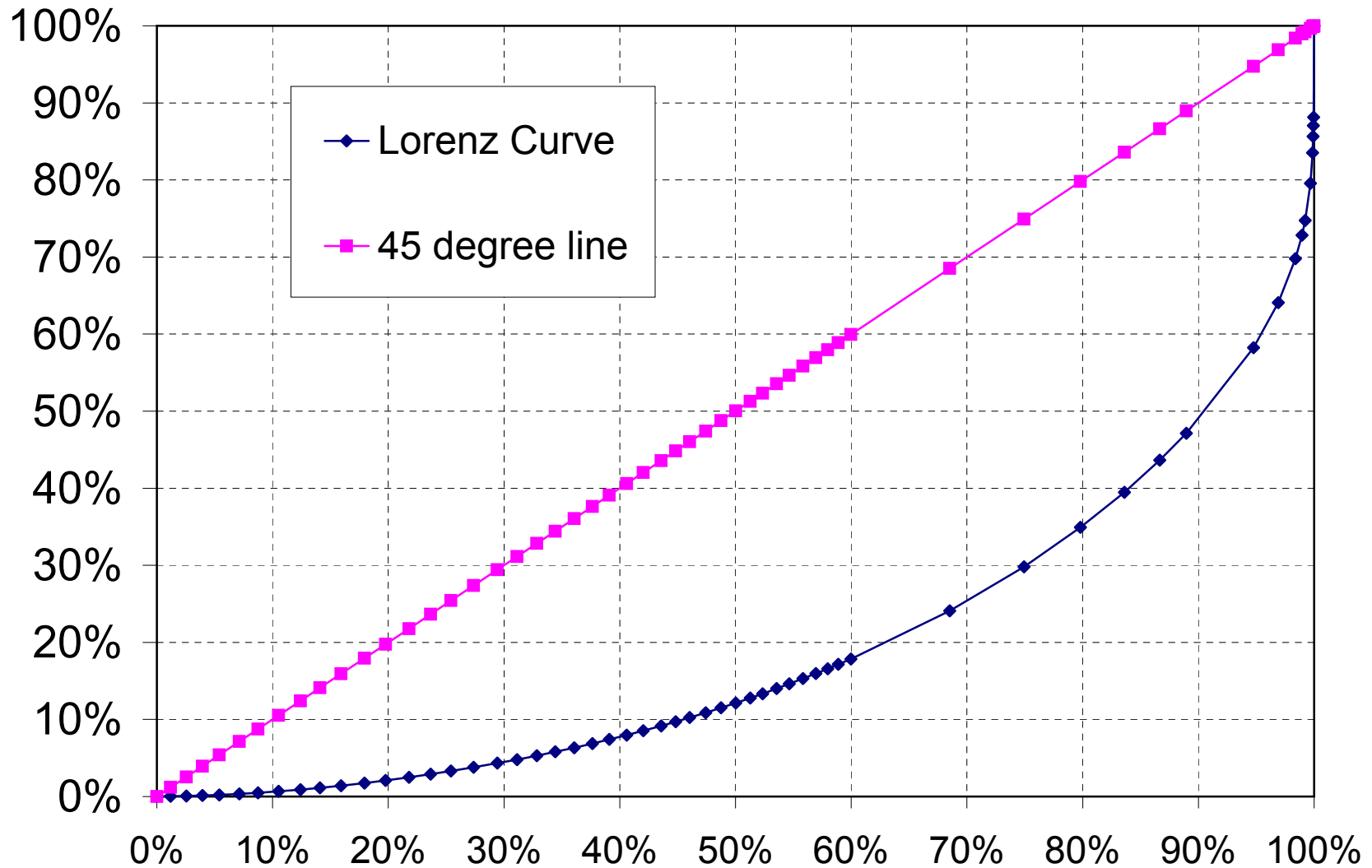Gini = 2 * area between 45 degree line and Lorenz curve

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

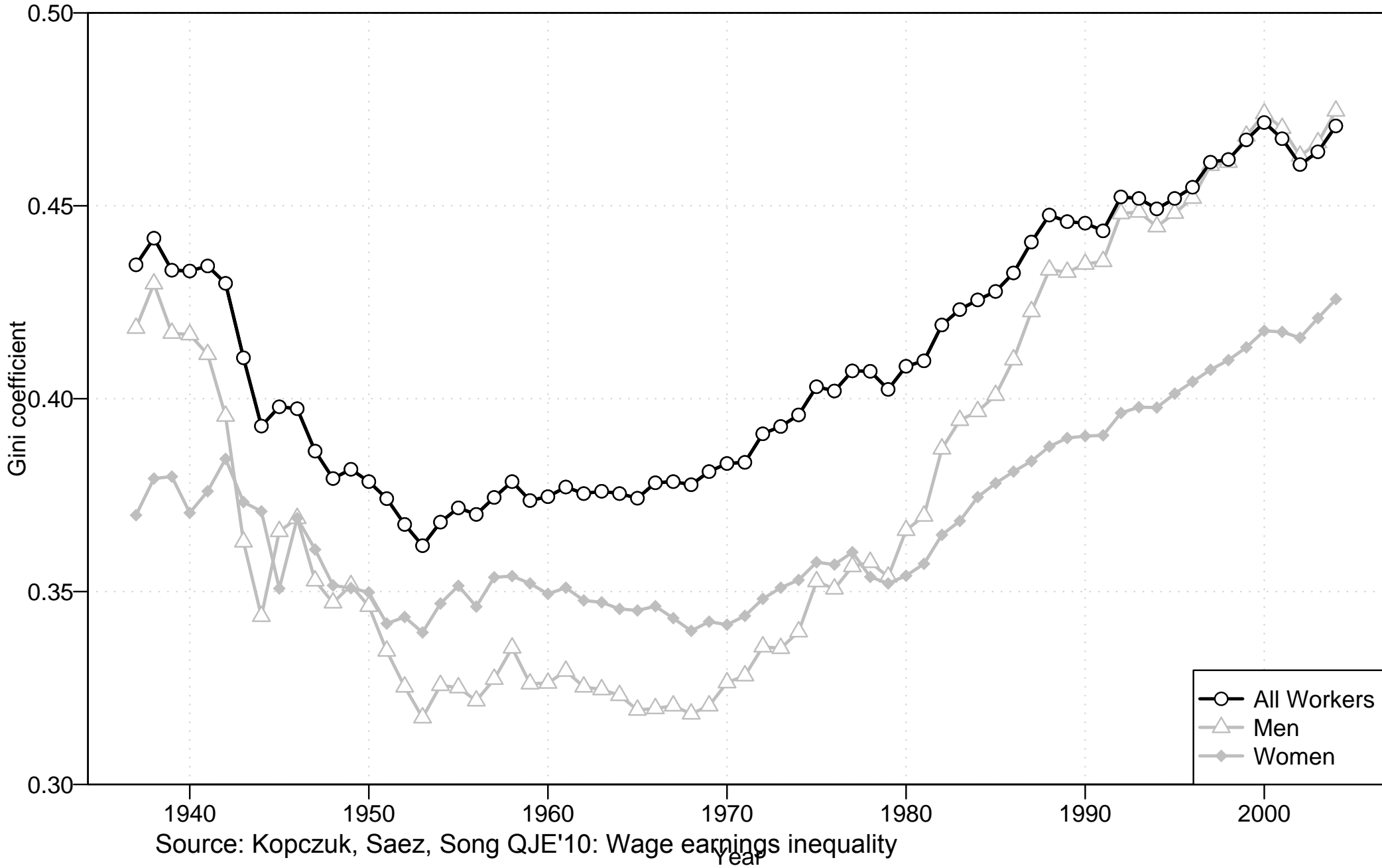Gini=1 means complete inequality (top person has all the income)

Gini Coefficient California pre-tax income, 2000, Gini=62.1%
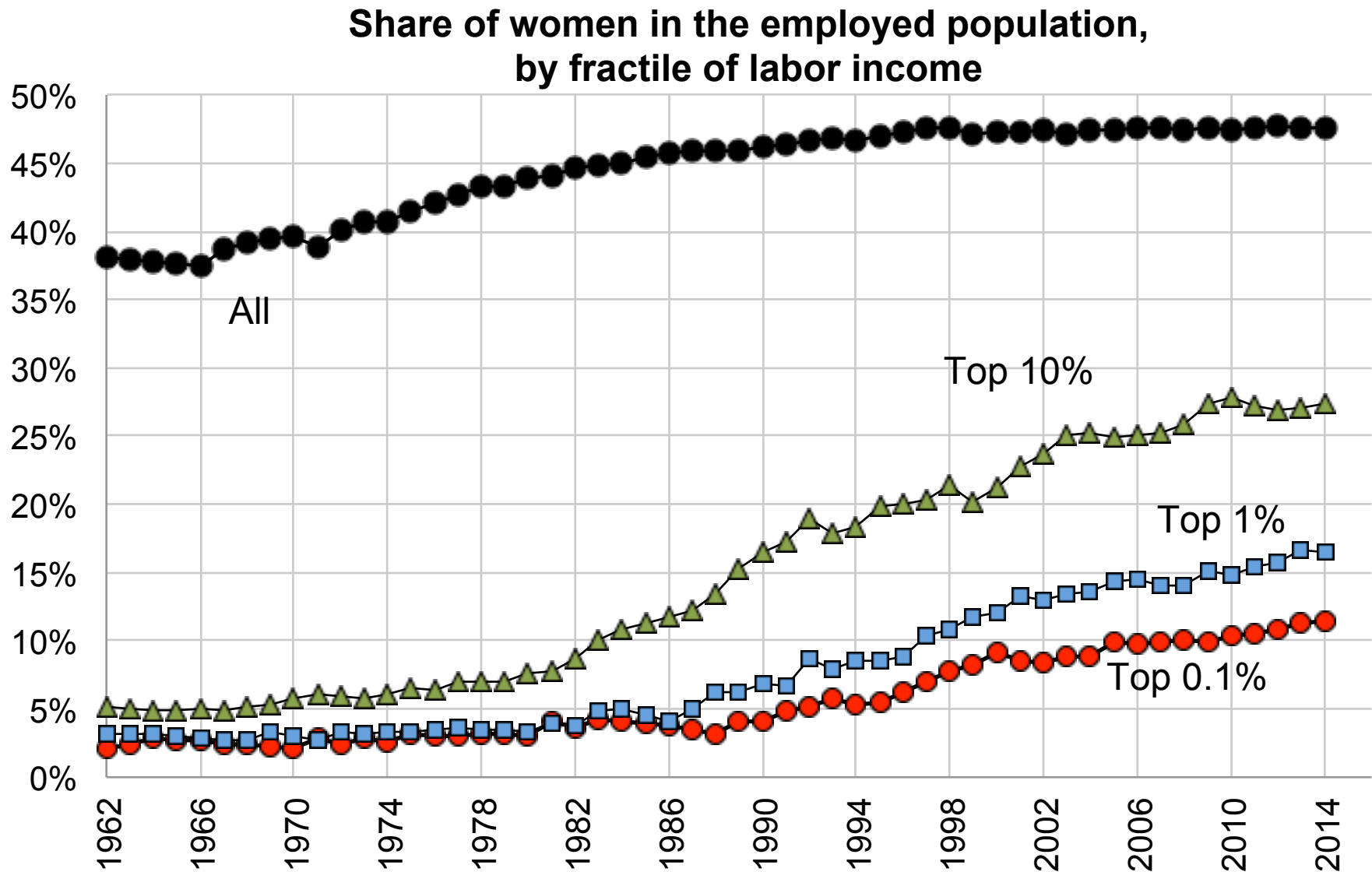

Legend:
- Lorenz Curve
- 45 degree line

Key Empirical Facts on Income Inequality

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

2) Gender gap has decreased but remains substantial especially at the very top

3) In the US, top income shares dropped dramatically from 1929 to 1950 and increased dramatically since 1980

4) Bottom 50% pre-tax income per adult have stagnated since 1980 in spite of a 60% increase in average national income

4) 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, not as much in Continental Europe and Japan [Atkinson, Piketty, Saez JEL'11]

Figure 1: Gini coefficient

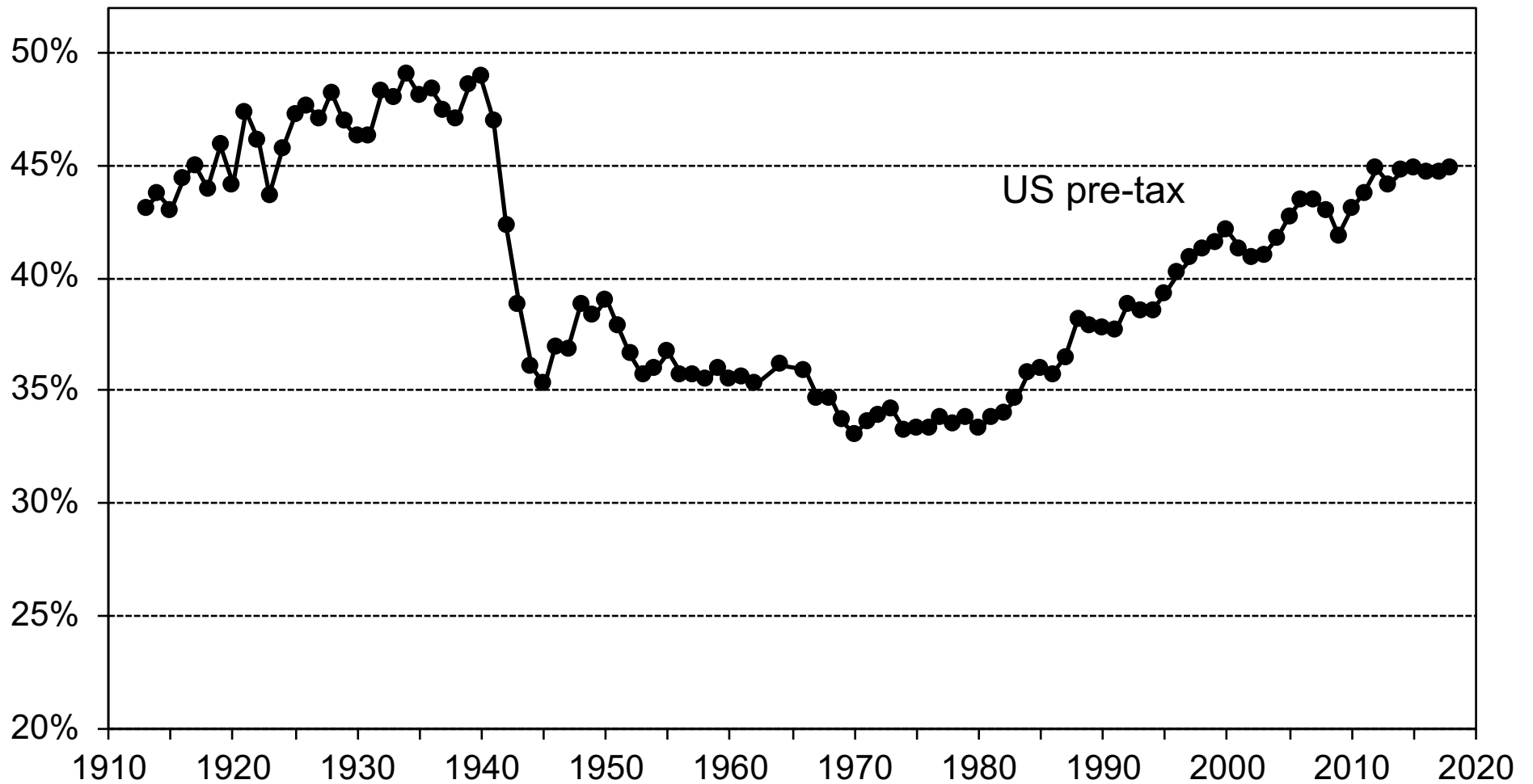Source: Kopczuk, Saez, Song QJE'10: Wage earnings inequality

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

Share of women in the employed population, by fractile of labor income

All

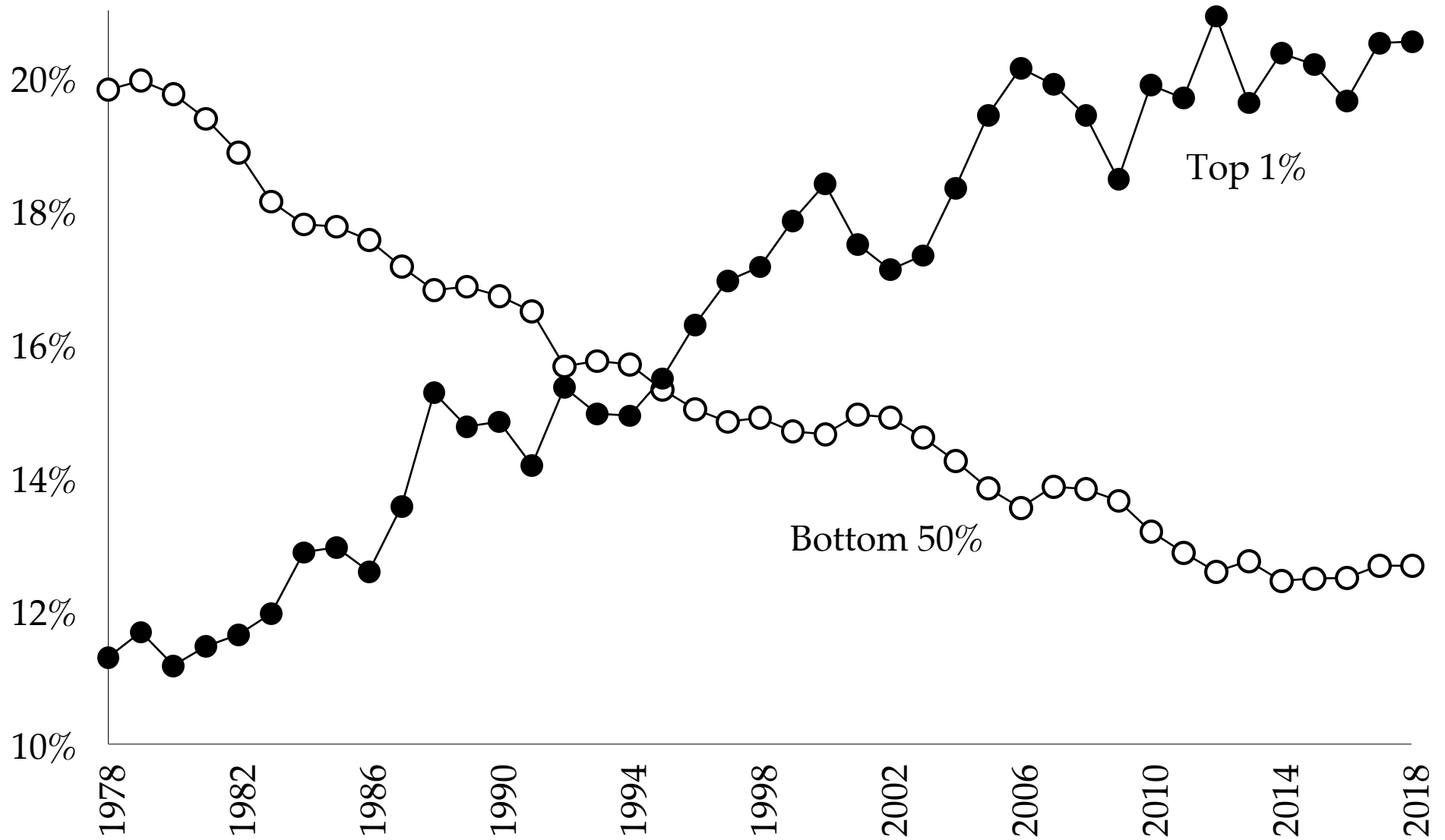Top 10%

Top 1%

Top 0.1%

Source: Appendix Table II-F1.

Top 10% Pre-tax Income Share in the US, 1913-2018
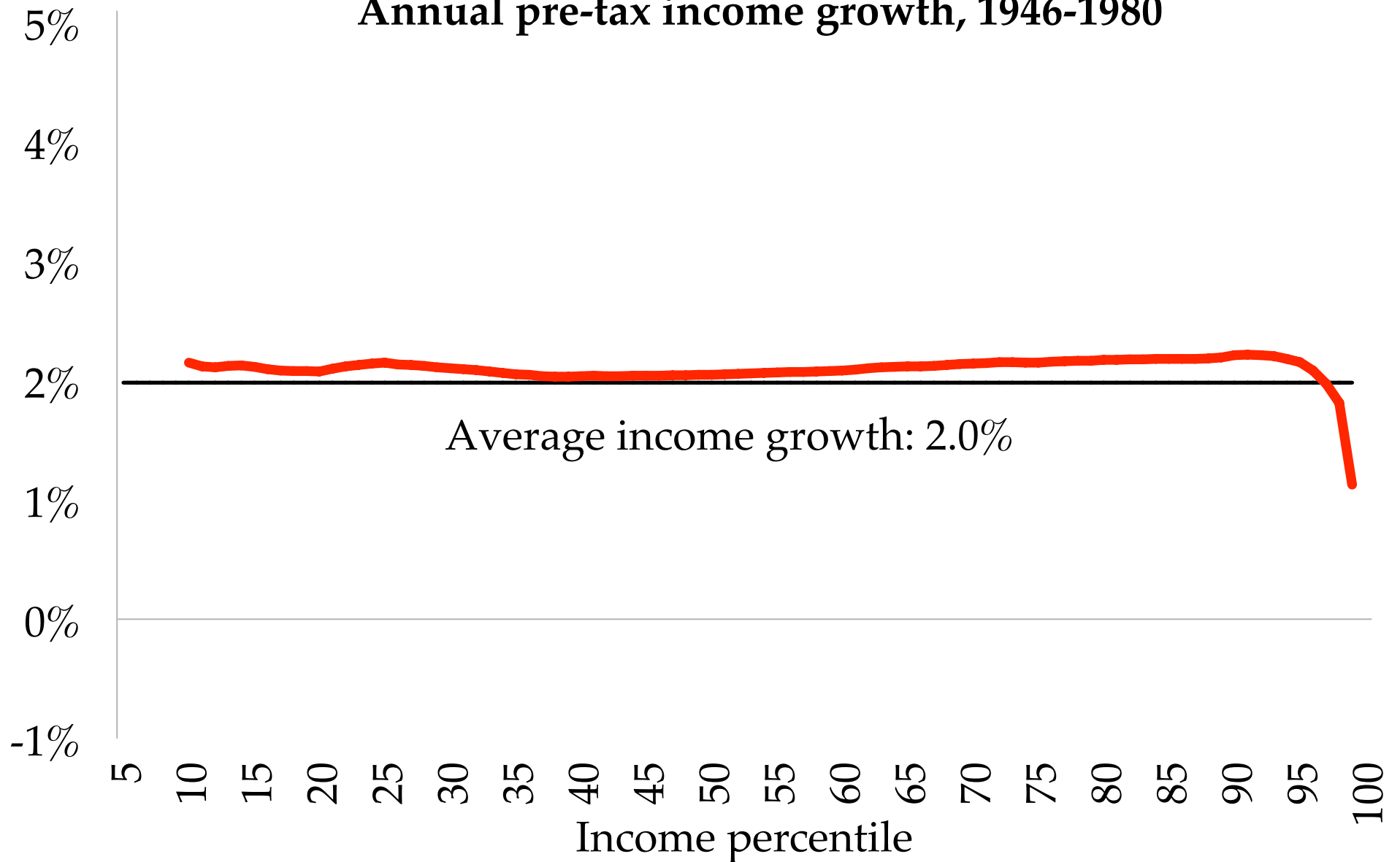
US pre-tax

Top income shares of pretax national income among adults aged 20+ (income within couples equally split).
Source is World Inequality Database wid.world (from Piketty, Saez, Zucman 2018).

Share of pre-tax national income

Top 1%

Bottom 50%

Source: Saez and Zucman (2019), Figure 1.1

Annual pre-tax income growth, 1946-1980

Average income growth: 2.0%

Income percentile

Annual pre-tax income growth, 1980-2018

Top 0.001%

P99.99 →

P99.9 →

P99 →

Macro growth: 1.4%

People's growth: 0.65%

Income percentile
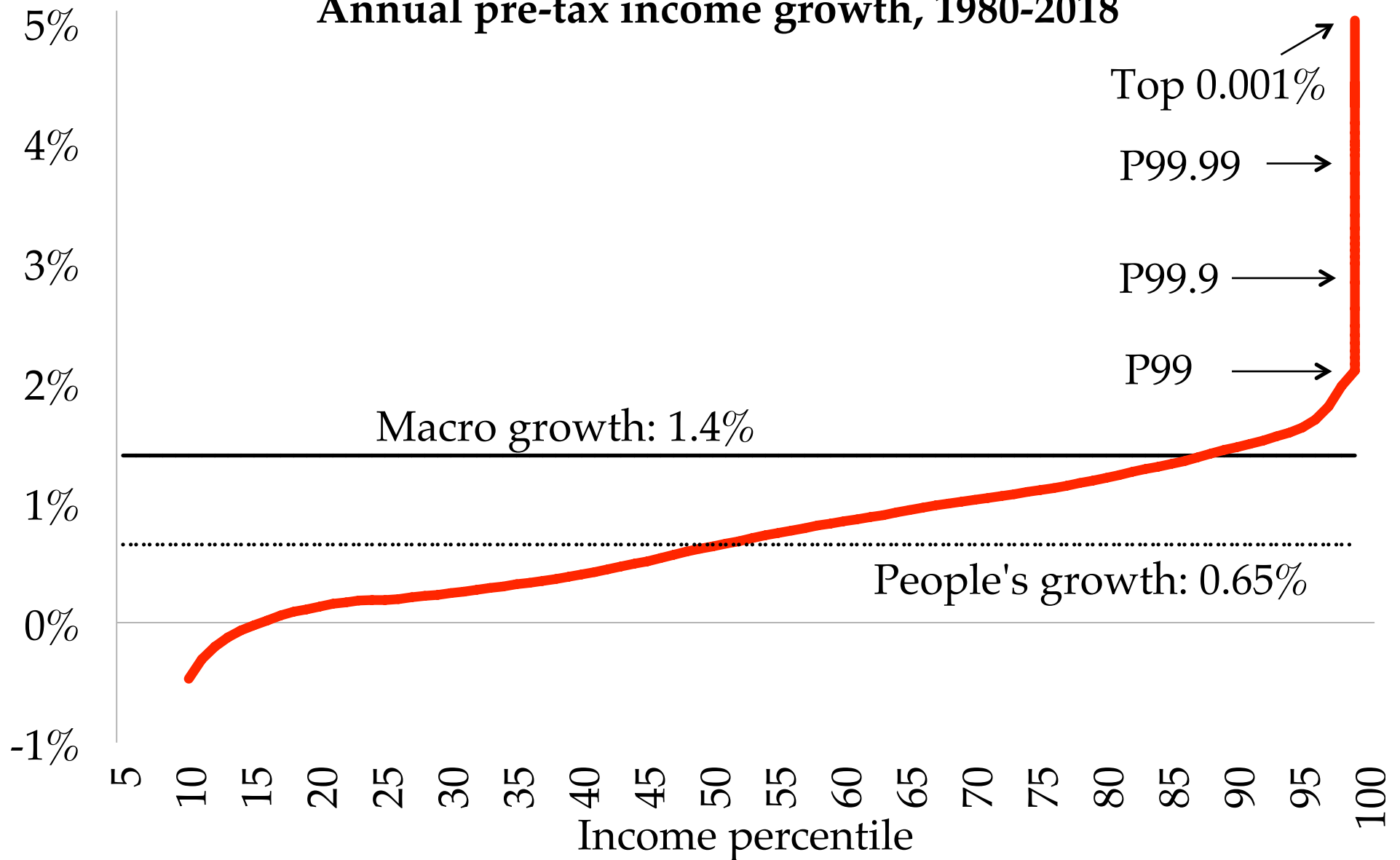
With equitable growth since 1980, pre-tax incomes in 2018 would be higher by:
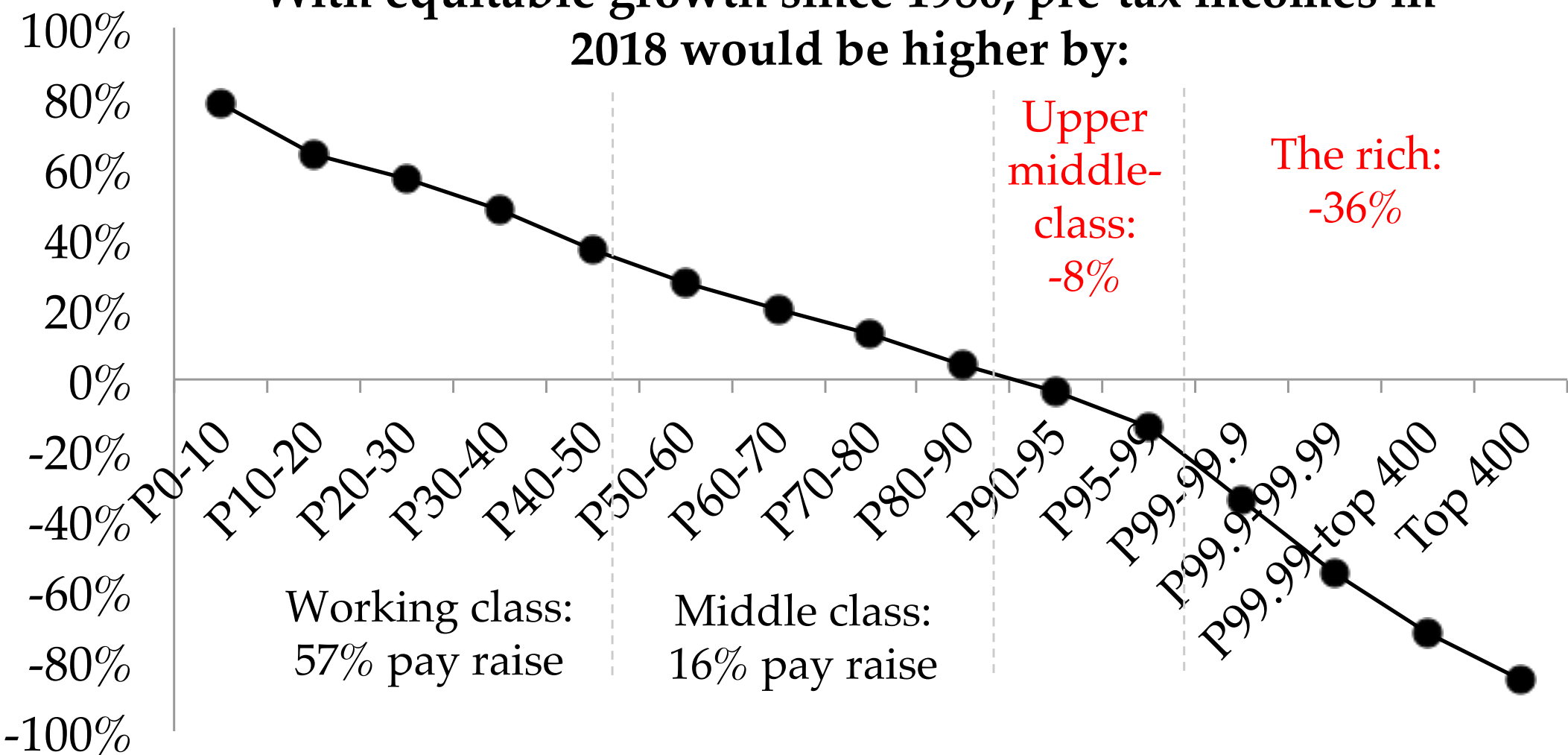
Upper middle-class: -8%

The rich: -36%

Working class: 57% pay raise

Middle class: 16% pay raise

P0-10 P10-20 P20-30 P30-40 P40-50 P50-60 P60-70 P70-80 P80-90 P90-95 P95-99 P99-99.9 P99.9-99.99 P99.99-top 400 Top 400
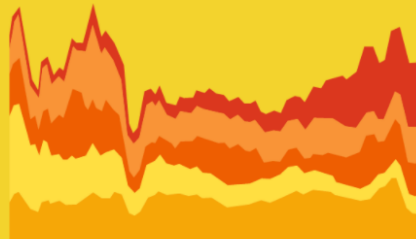
WORLD VIEW

Compare inequality between countries on an interactive world map

COUNTRY GRAPHS

Follow the evolution of inequality within countries with user-friendly graphs

DATA TABLES

Download our open-access datasets
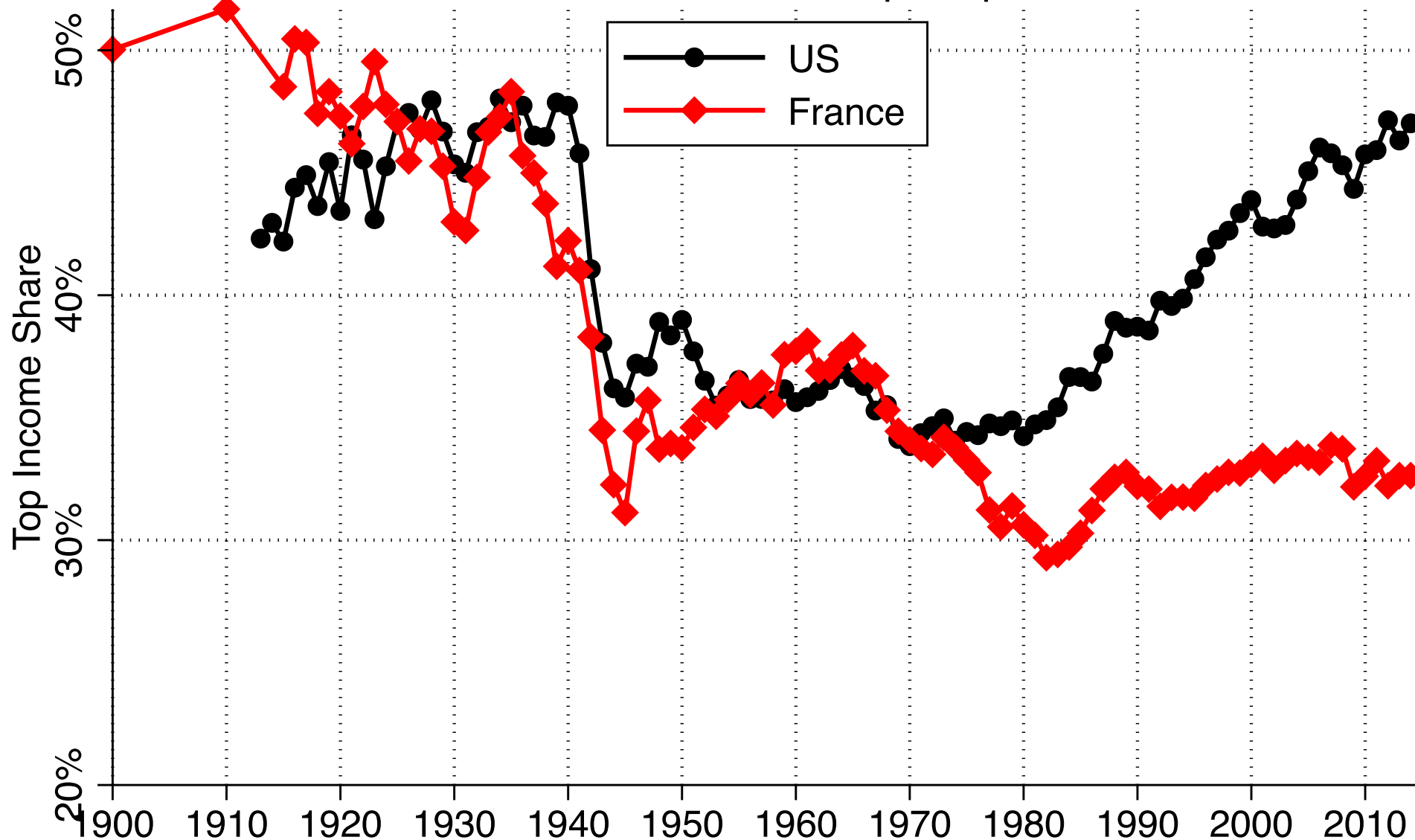
Top 10% Income Shares Across Countries
Pre-tax National Income, equal-split adults

Source: WID.world

Top 10% Income Shares Across Countries
Pre-tax National Income, equal-split adults

Legend:
- US (black)
- France (red)
- Russia (blue)

Y-axis: Top Income Share (20%, 30%, 40%, 50%)
X-axis: 1900, 1910, 1920, 1930, 1940, 1950, 1960, 1970, 1980, 1990, 2000, 2010

Source: WID.world

Top 10% Income Shares Across Countries
Pre-tax National Income, equal-split adults

Legend: US, France, Russia, China

Y-axis: Top Income Share (20%, 30%, 40%, 50%)

X-axis: 1900, 1910, 1920, 1930, 1940, 1950, 1960, 1970, 1980, 1990, 2000, 2010

Source: WID.world

Top 10% Income Shares Across Countries
Pre-tax National Income, equal-split adults

Legend:
- US
- France
- Russia
- China
- India

Y-axis: Top Income Share (20%, 30%, 40%, 50%)
X-axis: 1900, 1910, 1920, 1930, 1940, 1950, 1960, 1970, 1980, 1990, 2000, 2010

Source: WID.world

POVERTY RATE DEFINITIONS

1) **Absolute:** Fraction of population with disposable income (normalized by family size) below **poverty threshold** z^* fixed in real terms (e.g., World Bank uses \$1.90/day in 2011 dollars)

2) **Relative:** Fraction of population with disposable income (normalized by family size) below **poverty threshold** z^* fixed relative to median (European Union uses 60% of median)

Absolute poverty falls in the long run with economic growth [nobody in the US is World Bank poor] but relative poverty does not

Absolute poverty captures both growth and inequality effects while relative poverty captures only inequality effects

The fact that inequality stays in the debate in spite of huge growth since 1800 shows that relative income is the relevant concept (see e.g. Luttmer 2005 for an empirical study)

$\Rightarrow$ Health measures (mortality, stunting) are the only relevant absolute measures of deprivation in the long-run

FIGURE 1.3 Number of Extreme Poor by Region, 1990–2030
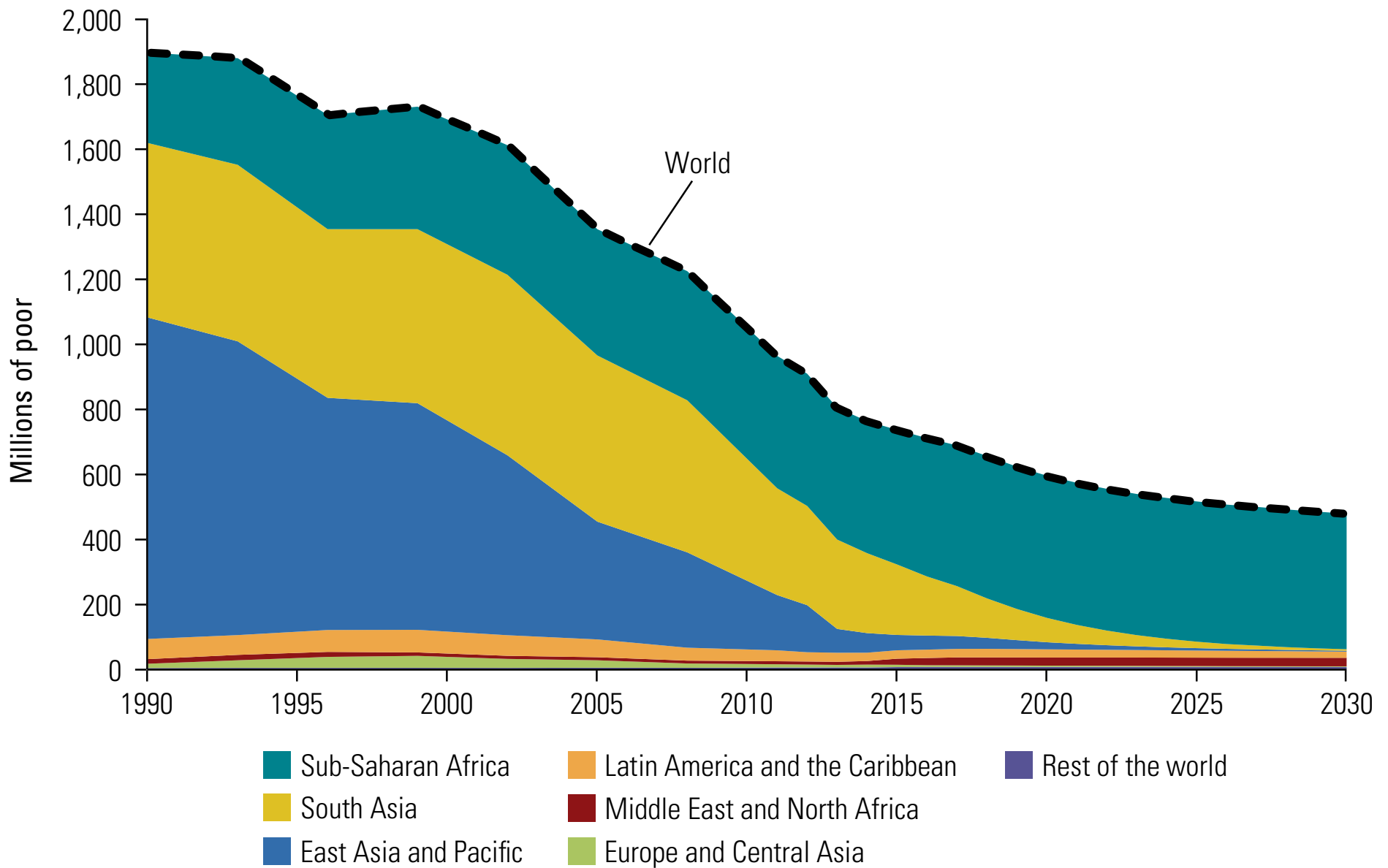
Source: PovcalNet (online analysis tool), http://iresearch.worldbank.org/PovcalNet/. World Bank, Washington, DC, World Development Indicators; World Economic Outlook; Global Economic Prospects; Economist Intelligence Unit.

Poverty Rate Disposable Income Definition

Most intuitive notion of poverty is based on consumption c [not pre-tax income z]

$$c = z - T(z) + B(z) + E - s$$

where $T(z)$ is tax, $B(z)$ govt transfers, E net private transfers (charity, family, friends), s is net savings/borrowing

Consumption c is difficult to measure

Disposable Income $z - T(z) + B(z)$ [post-tax income] measured in traditional Current Population Survey (CPS)

FAMILY SCALE

Ideally, poverty should be defined at the individual level based on individual consumption [e.g., kids better off when mother or grandmother controls income instead of father, Duflo '03]

However, many consumption goods are shared within the family [e.g., housing, joint meals, etc.] and it is difficult to measure consumption at individual level

Measured poverty is therefore based on consumption or disposable income at the family level [or unit sharing resources] and everybody within the family has same poverty status

Bigger families need more resources but economies of scale in consumption: scale disposable income by family size

US POVERTY RATE DEFINITION

Based on **money income** = market income before taxes + cash govt transfers + cash private transfers

In-kind market income and transfers (employer health insurance, Medicaid, nutrition, public housing) do NOT count
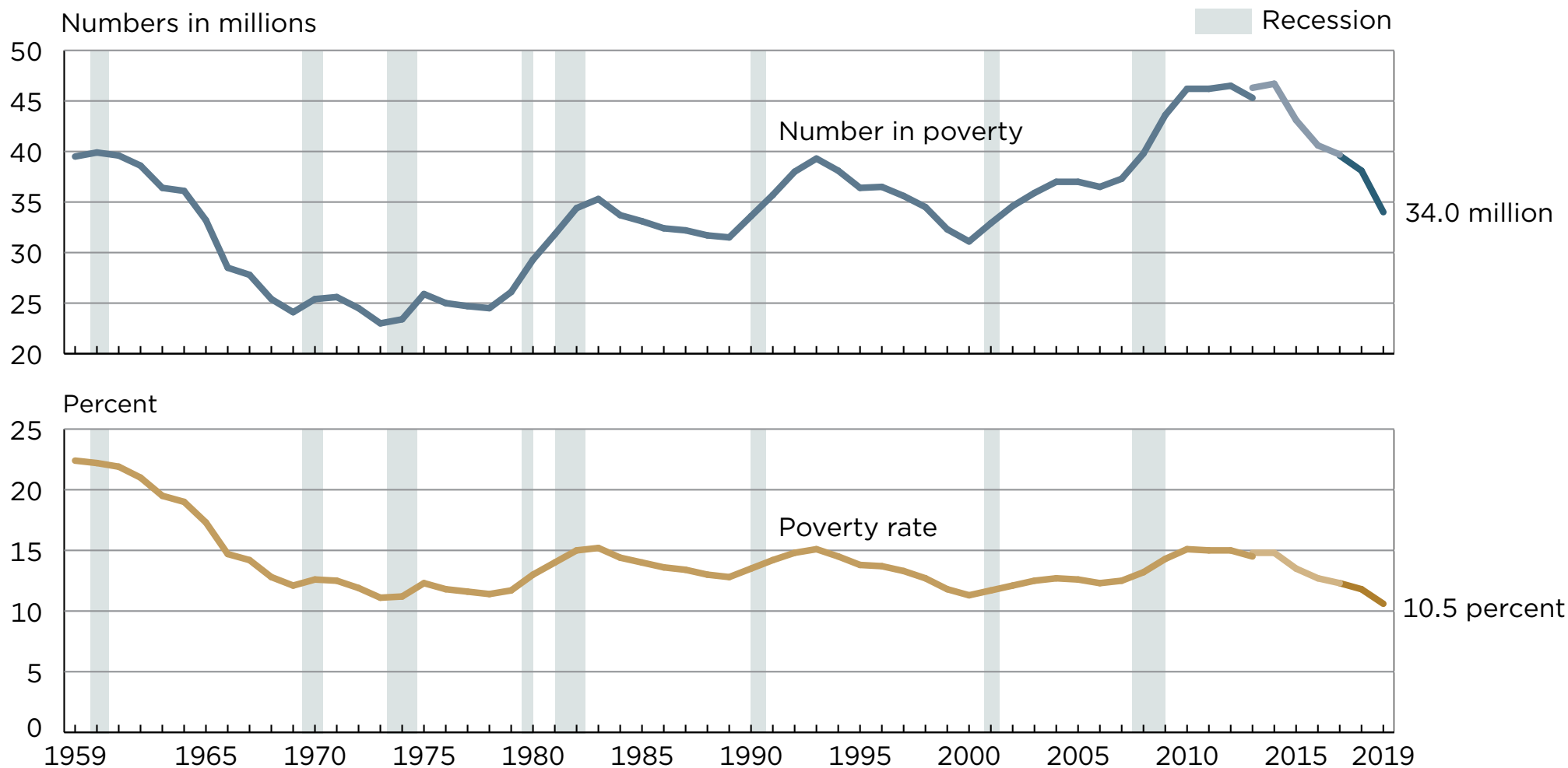
Income and employee payroll taxes are NOT deducted, Income tax credits (EITC, Child Tax Credit) are NOT added

Threshold depends on household size/structure: e.g., $20K/year for single parent with 2 kids

Thresholds adjusted annually using the official CPI

In 2020: $13K for single adult, $17K family of 2, $22K for family of 3, $26K for 4

Figure 7.
Number in Poverty and Poverty Rate: 1959 to 2019
(Population as of March of the following year)

Numbers in millions

Recession

Number in poverty

34.0 million

Percent

Poverty rate

10.5 percent

1959　1965　1970　1975　1980　1985　1990　1995　2000　2005　2010　2015　2019

Note: The data for 2017 and beyond reflect the implementation of an updated processing system. The data for 2013 and beyond reflect the implementation of the redesigned income questions. See Table B-5 for historical footnotes. The data points are placed at the midpoints of the respective years. For information on recessions, see Appendix A. For information on confidentiality protection, sampling error, nonsampling error, and definitions, see <https://www2.census.gov/programs-surveys/cps/techdocs/cpsmar20.pdf>.

Source: U.S. Census Bureau, Current Population Survey, 1960 to 2020 Annual Social and Economic Supplements (CPS ASEC).

Figure 1

Trends in Individual Poverty Rates and Real GDP per Capita, 1959–2003
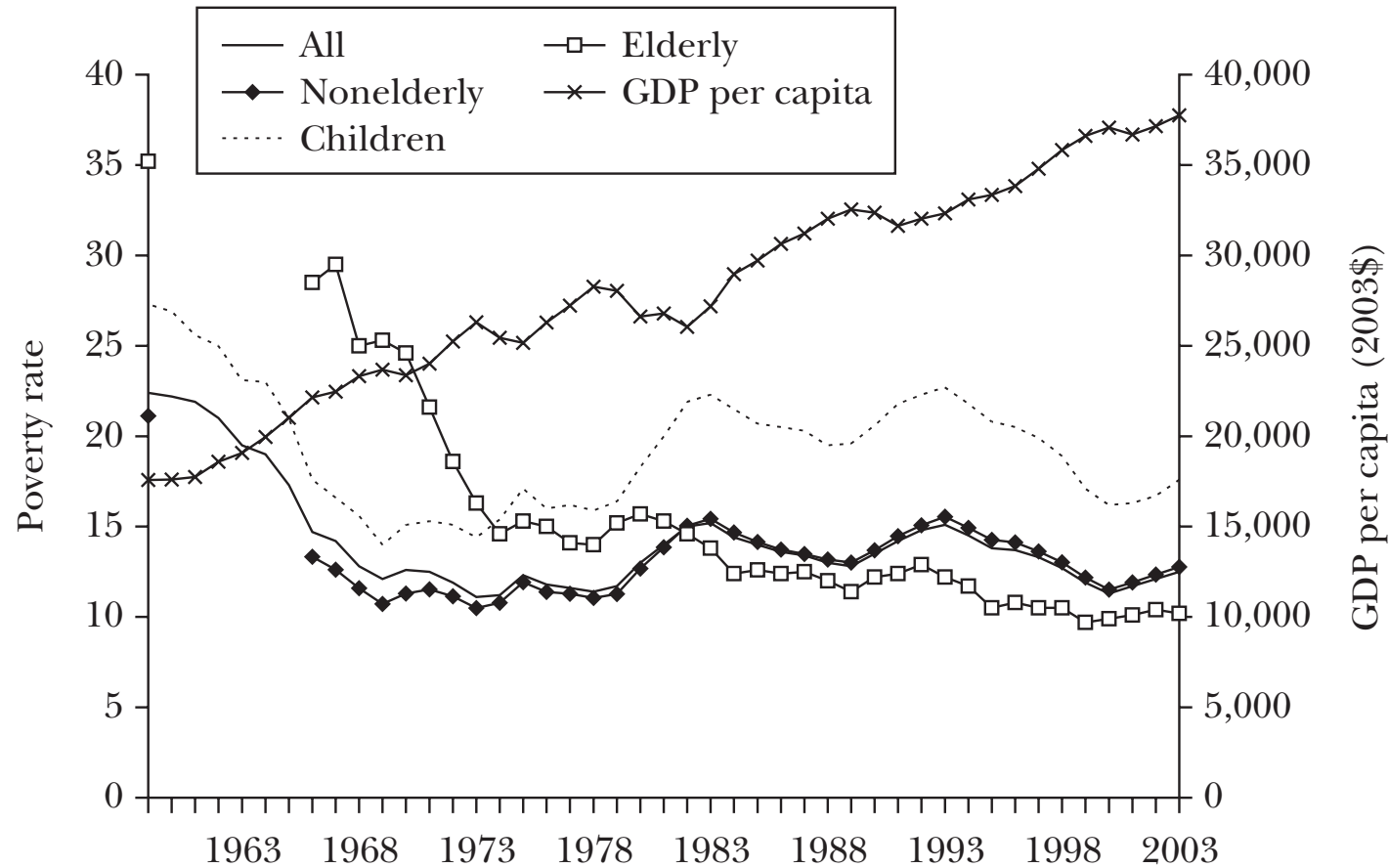
Source: Poverty rates are from U.S. Bureau of the Census, Current Population Survey, Annual Social and Economic Supplements. The GDP per capita series is from the Economic Report of the President (2005).

Note: The poverty rate data are unavailable for some subgroups for 1960–1965.

Factors Explaining Evolution of Poverty

Based on Hoynes-Page-Stevens JEP'06

1) Increasing pre-tax inequality: stagnant bottom wages in spite of economic growth per capita [large effect]

2) Changes in family structure: single parent families $\uparrow$ from 7% in 1967 to 14.4% in 2003 $\Rightarrow$ Increases poverty rate by 4 pts [large effect]

3) Increase in female labor force participation $\Rightarrow$ Reduces poverty rate [significant effect only since 1980]

4) Immigration: accounts for about 0.7 points in the poverty rate increase from 1969 to 1999 [small effect]

5) Means-tested transfers [medium effect because they are concentrated below poverty line]

ISSUES WITH US POVERTY RATE DEFINITION

Definition was close to disposable income when measuring poverty started but no longer:

1) In-kind transfers have grown substantially [Medicaid]

2) Payroll tax and Income tax credits (EITC, Child Tax Credit) have grown substantially for low income families

3) Official CPI overstates inflation [and understates real economic growth] because it is not chained [i.e., does not take into account that relative price changes lead to changes in consumption]

Politically difficult to change definition
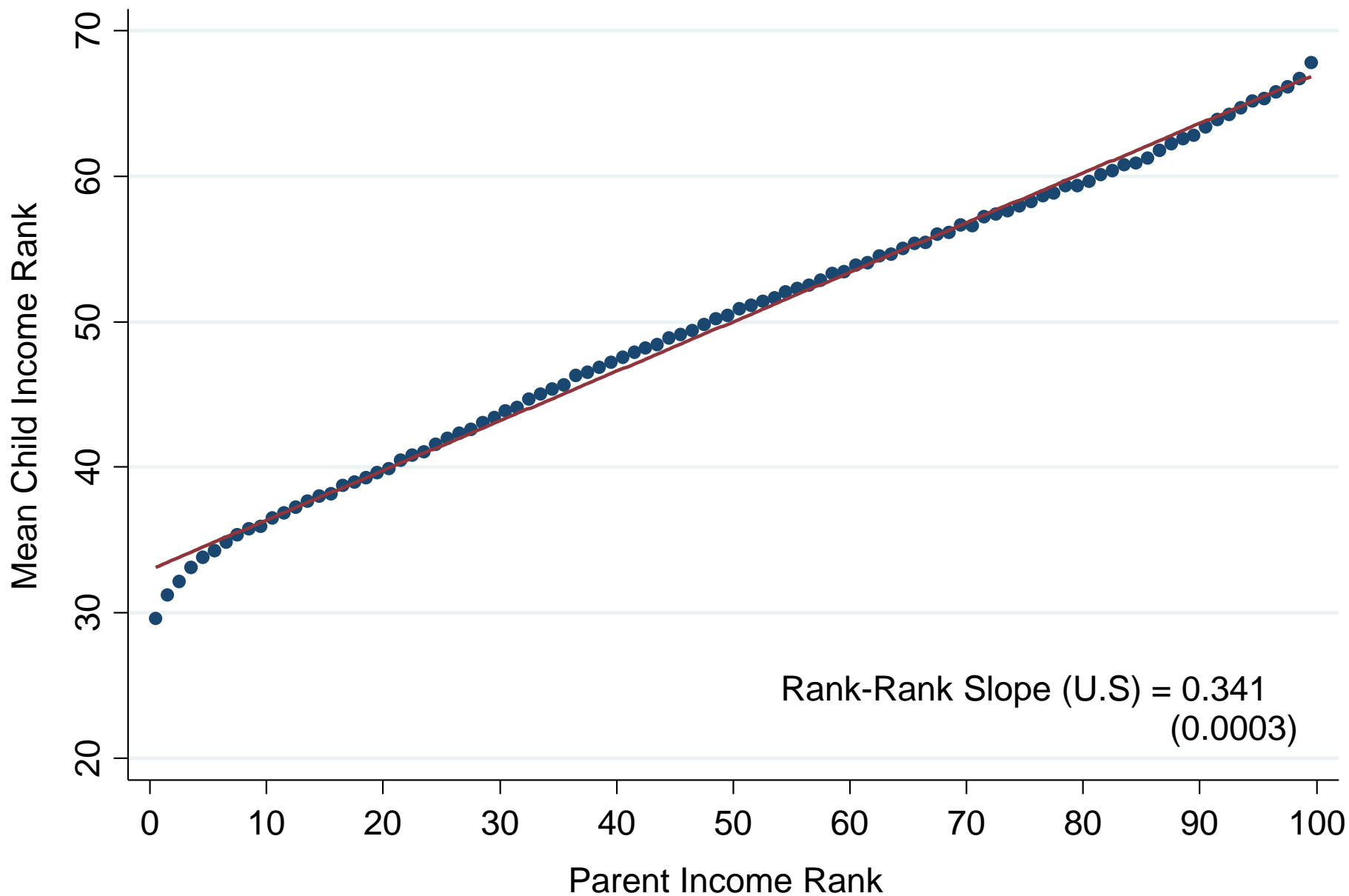
Measuring Intergenerational Income Mobility

Strong consensus that children's success should not depend too much on parental income

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. '14)

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 segregation, low income inequality, good K-12 schools, high social capital, high family stability tend to have high mobility [this is a correlation not necessarily causal]

4) Substantial racial disparity in mobility (Chetty et al. 2020)

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

Rank-Rank Slope (U.S) = 0.341
(0.0003)

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

B. United States vs. Denmark

Rank-Rank Slope (Denmark) = 0.180
(0.0063)

Parent Income Rank

Mean Child Income Rank

Denmark — United States
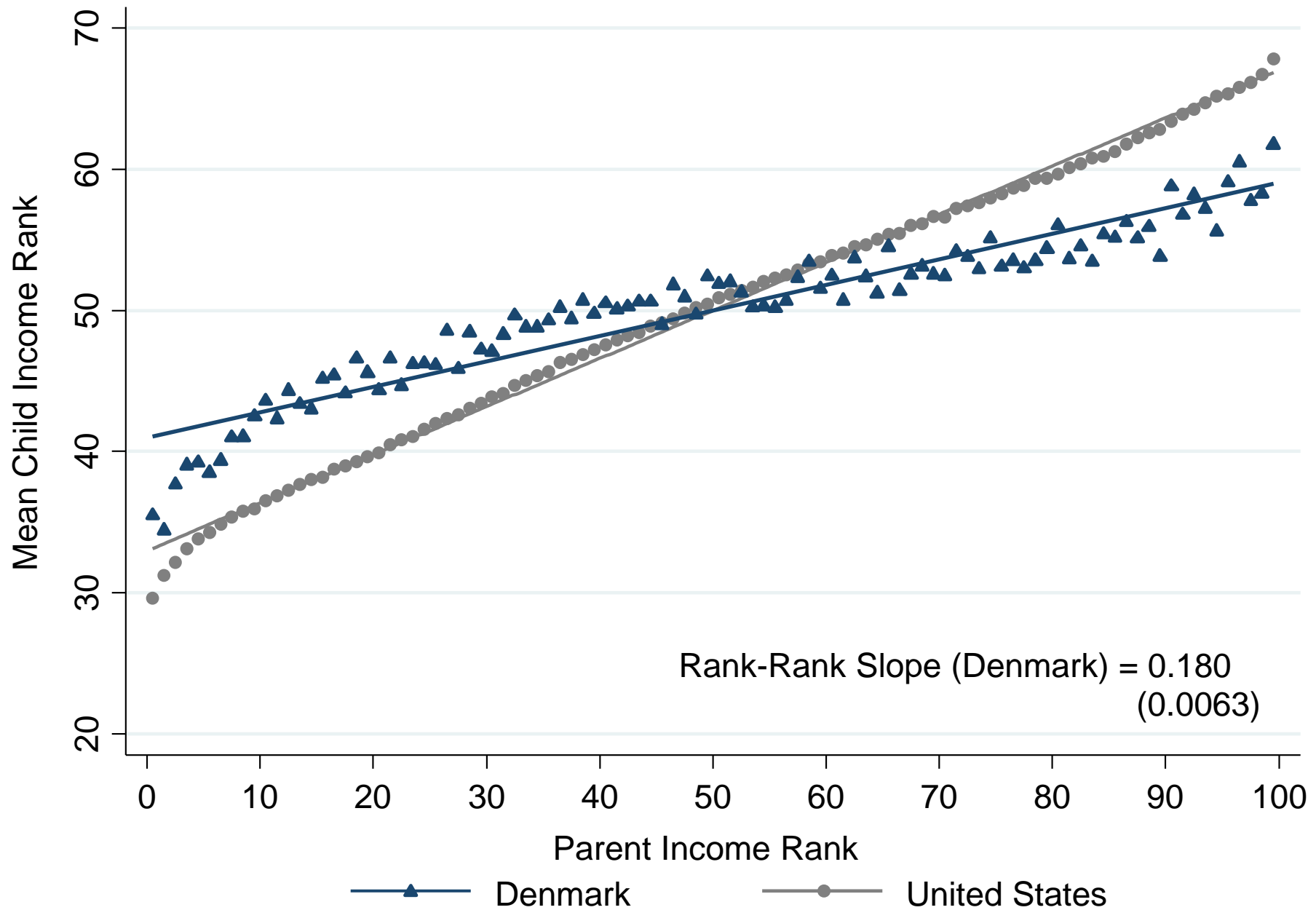
Source: Chetty, Hendren, Kline, Saez (2014)

The American Dream?

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

USA	Chetty, Hendren, Kline, Saez 2014	**7.5%**
UK	Blanden and Machin 2008	**9.0%**
Denmark	Boserup, Kopczuk, and Kreiner 2013	**11.7%**
Canada	Corak and Heisz 1999	**13.5%**
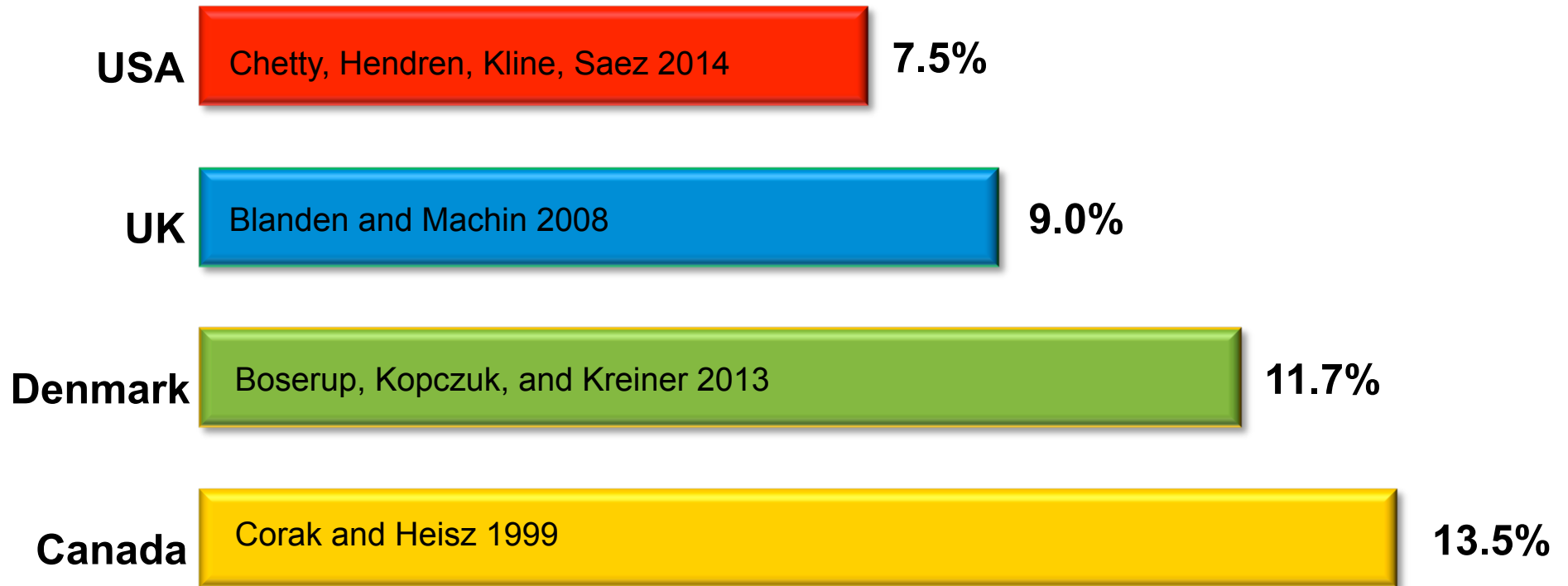
→ Chances of achieving the "American Dream" are almost two times higher in Canada than in the U.S.

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]
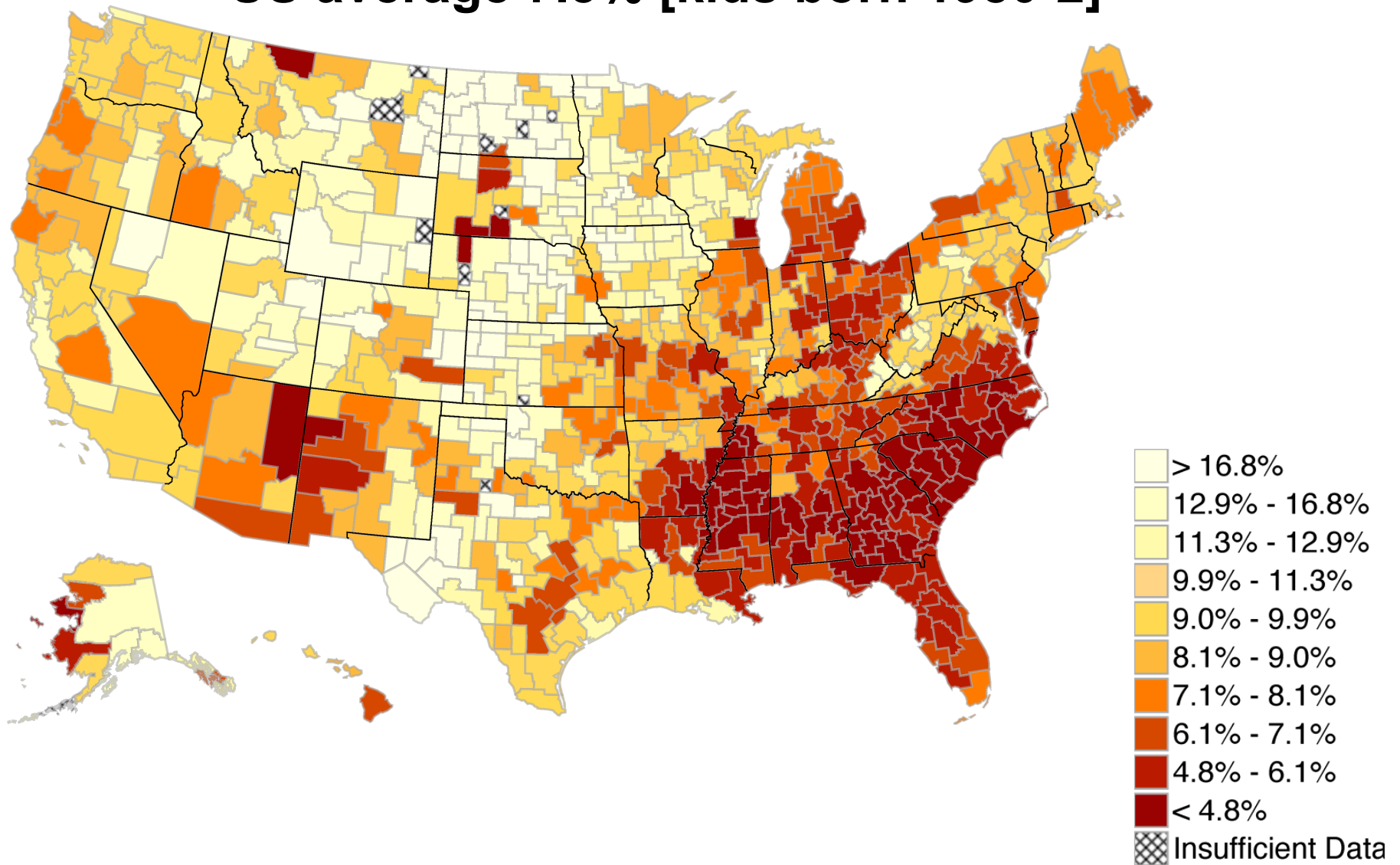
Legend:
- > 16.8%
- 12.9% - 16.8%
- 11.3% - 12.9%
- 9.9% - 11.3%
- 9.0% - 9.9%
- 8.1% - 9.0%
- 7.1% - 8.1%
- 6.1% - 7.1%
- 4.8% - 6.1%
- < 4.8%
- Insufficient Data

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

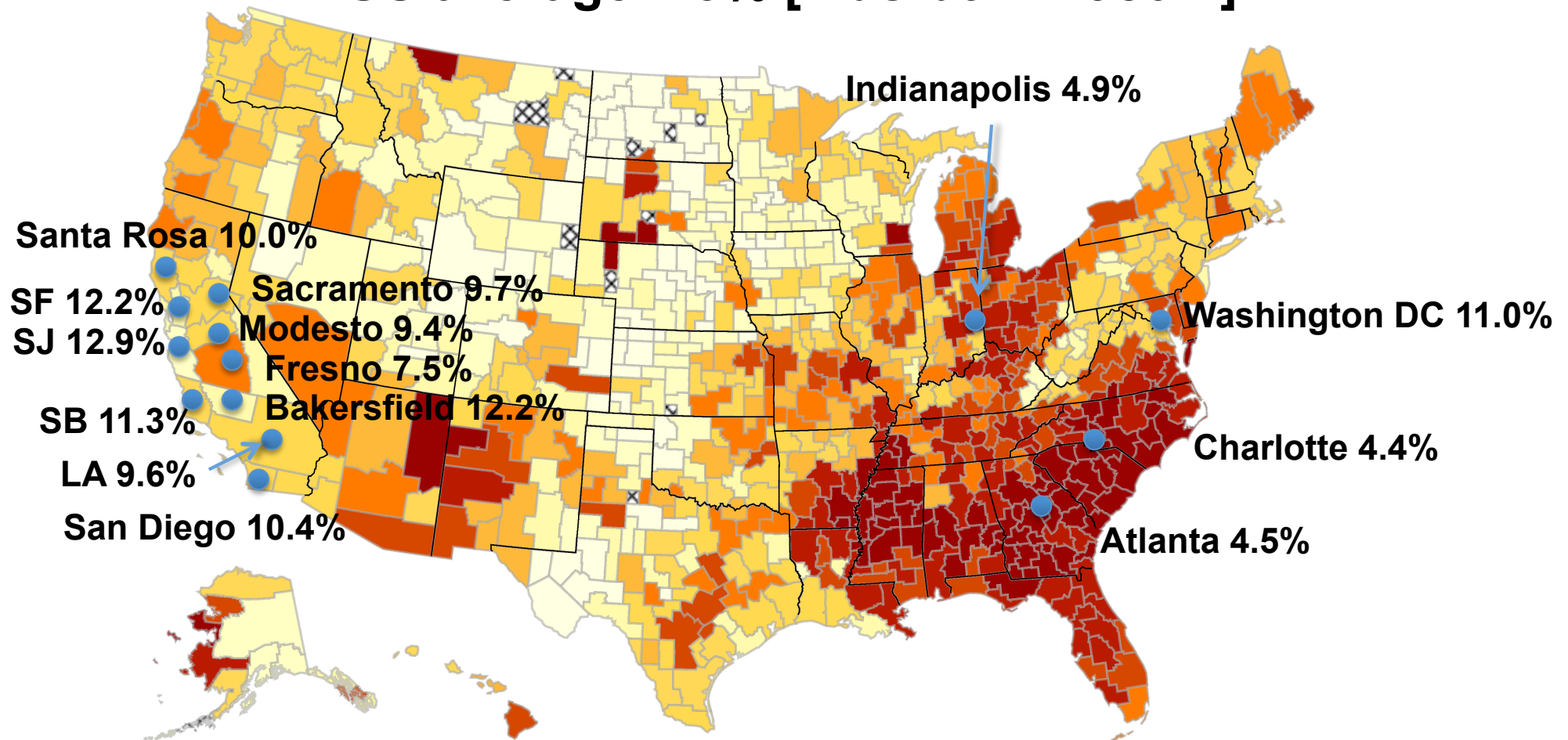# The Geography of Upward Mobility in the United States
Odds of Reaching the Top Fifth Starting from the Bottom Fifth
US average 7.5% [kids born 1980-2]

Indianapolis 4.9%

Santa Rosa 10.0%

SF 12.2%

SJ 12.9%

Sacramento 9.7%

Modesto 9.4%

Fresno 7.5%

SB 11.3%

Bakersfield 12.2%

LA 9.6%

San Diego 10.4%

Washington DC 11.0%

Charlotte 4.4%

Atlanta 4.5%

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

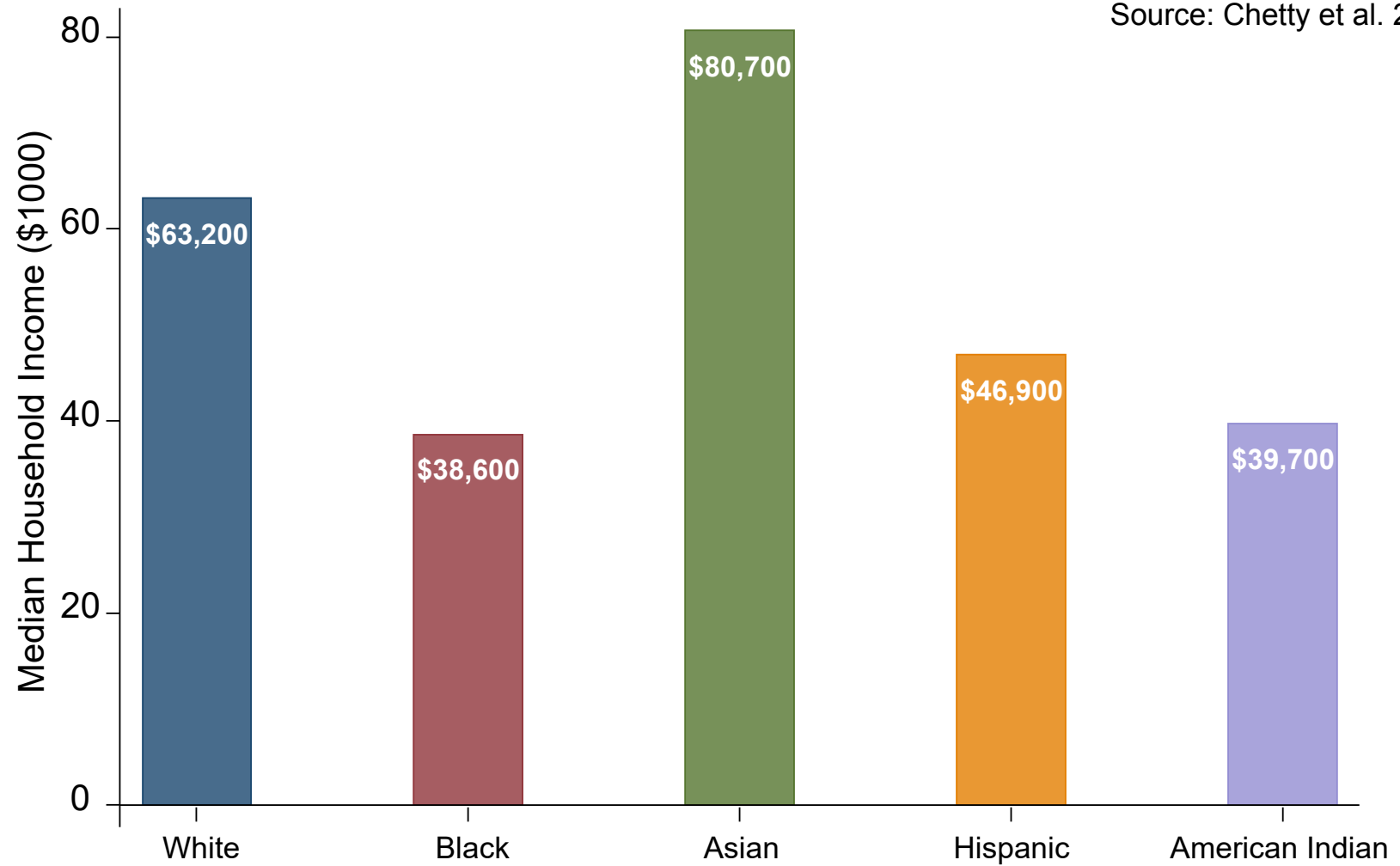TABLE 1. Upward Mobility in the 50 Largest Metro Areas: The Top 10 and Bottom 10

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.

# Median Household Income by Race and Ethnicity in 2016

Source: Chetty et al. 2020

Y-axis: Median Household Income ($1000)

- White: $63,200
- Black: $38,600
- Asian: $80,700
- Hispanic: $46,900
- American Indian: $39,700

Note: We focus here and in subsequent analyses on four non-Hispanic single-race groups (white, black, Asian, American Indian and Alaska Native) and Hispanics. Source: American Community Survey 2016.

Mean Child Income Rank vs. Parent Income Rank by Race and Ethnicity

Source: Chetty et al. 2020

Mean Child Household Income Rank

Parent Household Income Rank

- White
- Black
- American Indian
- Hispanic
- Asian
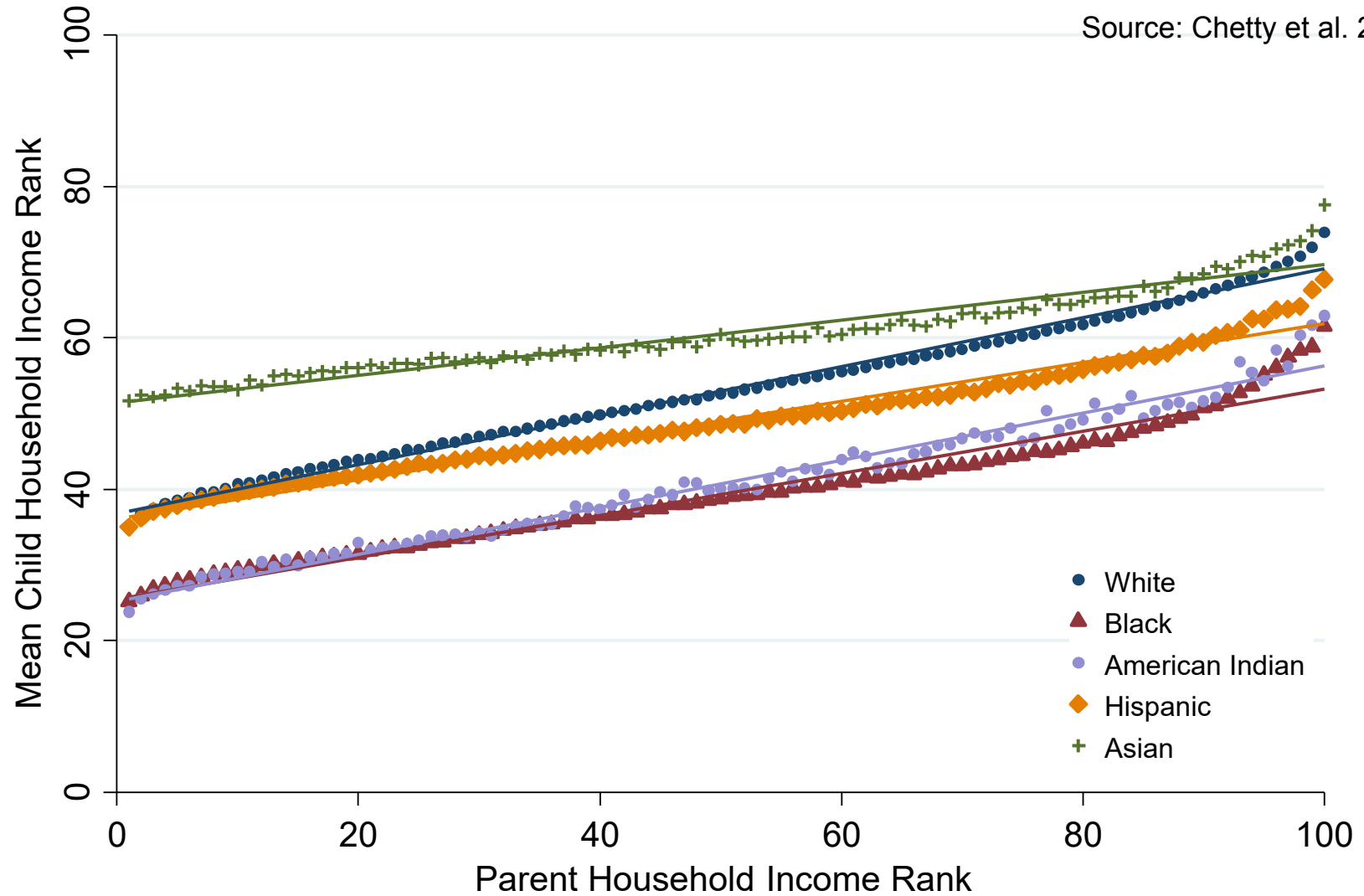
Govt Redistribution with Taxes and Transfers

Govt 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 transfer, then tax/transfer system is progressive

Actual tax/transfer systems in rich countries roughly like b) with G welfare state transfers [education, health, retirement]

US Distributional National Accounts

Piketty-Saez-Zucman (2018) distribute both pre-tax and post-tax US **national income** across adult individuals

National income = GDP - depreciation of capital + net foreign income = broadest measure of income

Pre-tax income is income before taxes and transfers: z

Post-tax income is income net of all taxes and adding all transfers and public good spending: $y = z - T(z) + G$

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

US Top 10% Income Shares pre-tax vs. post-tax, 1913-2018
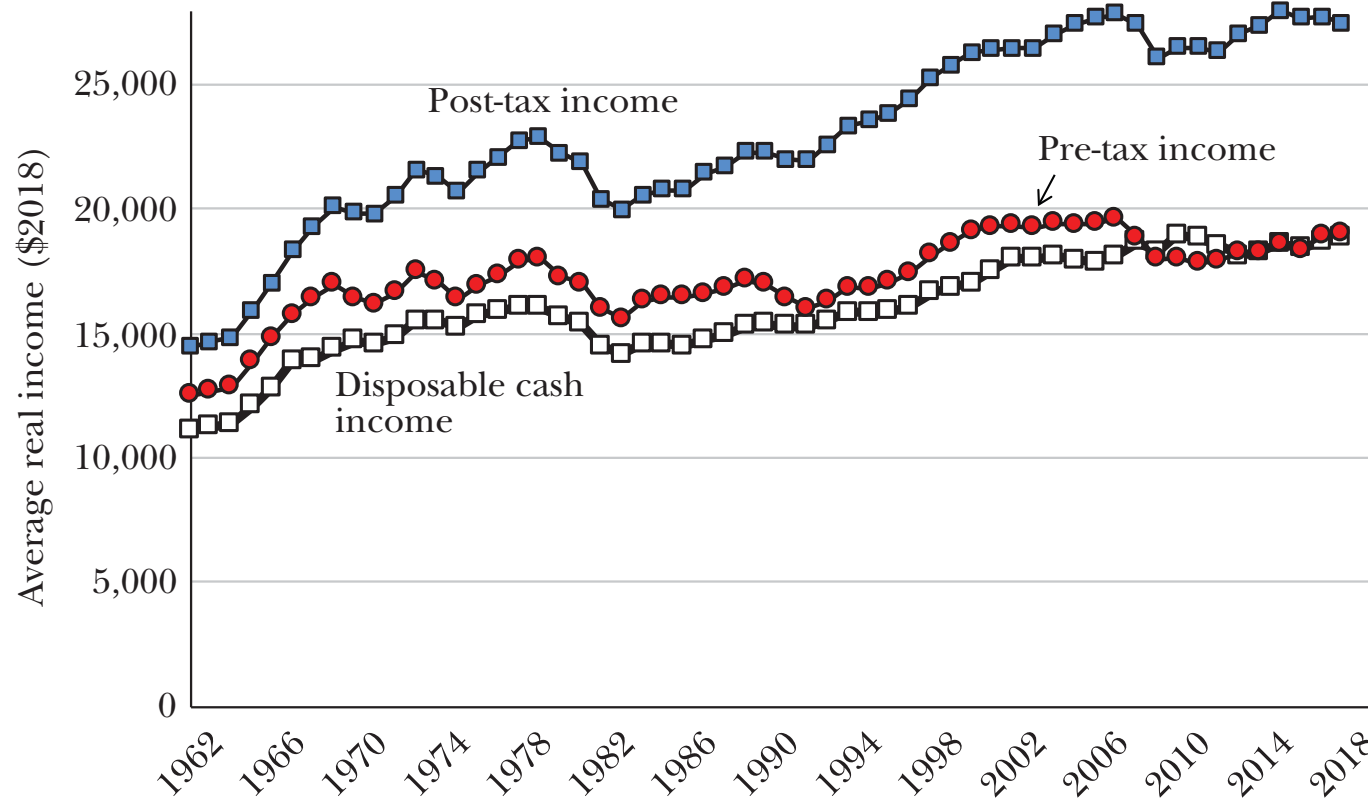

US pre-tax
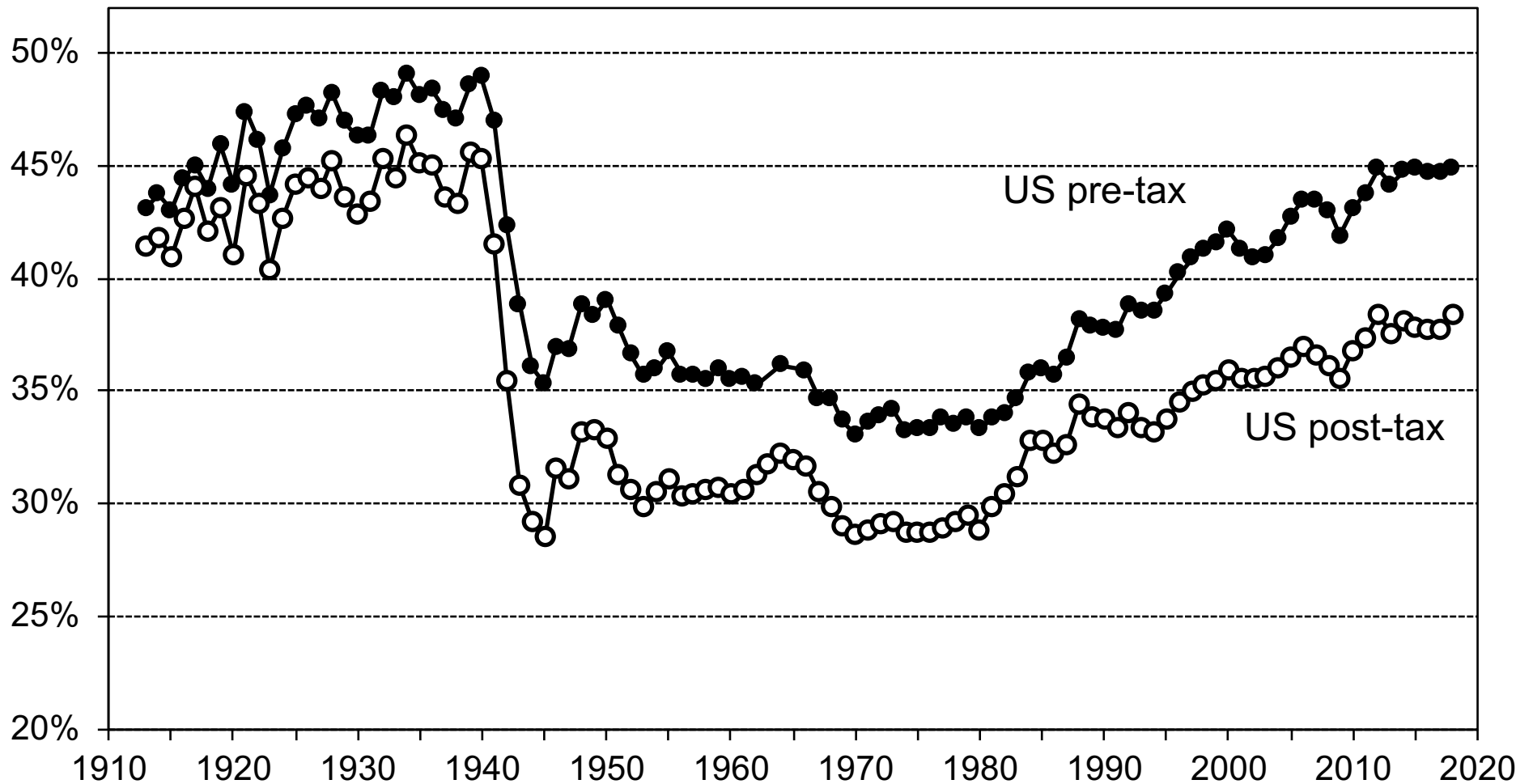
US post-tax

Top income shares of pretax and posttax national income among adults (income within married couples equally split). Source is Piketty, Saez, Zucman (2018) for US and Piketty et al. (2020) for France.

Figure 6

The Evolution of Bottom 50 Percent Incomes

Source: Saez and Zucman JEP2020

Source: Piketty, Saez, and Zucman (2018), updated September 2020.
Note: The figure depicts the evolution of the real incomes per adult (in 2018 dollars) for the bottom half of the income distribution for three income concepts: (1) pre-tax income before deducting taxes or adding government transfers (concept sums up to national income), (2) post-tax income that deducts all taxes and adds all transfers (cash and in-kind) and collective public expenditures minus the government deficit (also sums up to national income), (3) disposable cash income which is pre-tax income minus all taxes plus cash (or quasi-cash) transfers, i.e., (3) does not include in-kind transfers (primarily Medicaid and Medicare) and collective public expenditures that are included in (2).

Federal US Tax System (2/3 of total taxes)

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 [regressive] (40% of revenue)

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

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

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

Fed agencies (CBO, Treasury, Joint Committee on Taxation) and think-tanks (Tax Policy Center) provide distributional Fed tax tables

State+Local Tax System (1/3 of total taxes)

Decentralized governments can experiment, be tailored to local views, create tax competition and make redistribution harder (famous Tiebout 1956 model) hence favored by conservatives

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

2) Sales taxes + Excise taxes (tax on consumption) [very regressive] (1/3 of revenue)

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

See ITEP (2018) "Who Pays" for systematic state level distributional tax tables

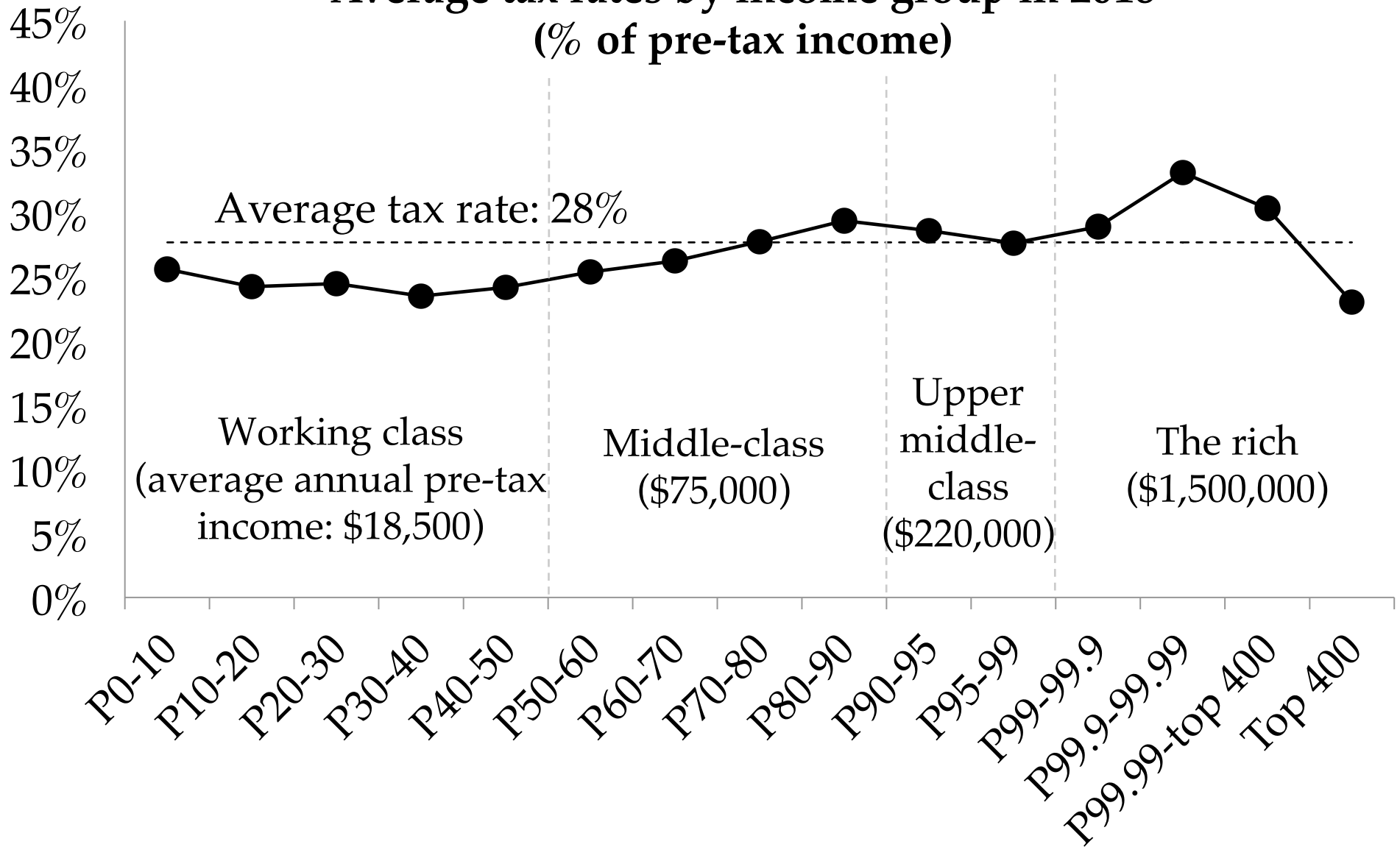US Census provides Census of Government data

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
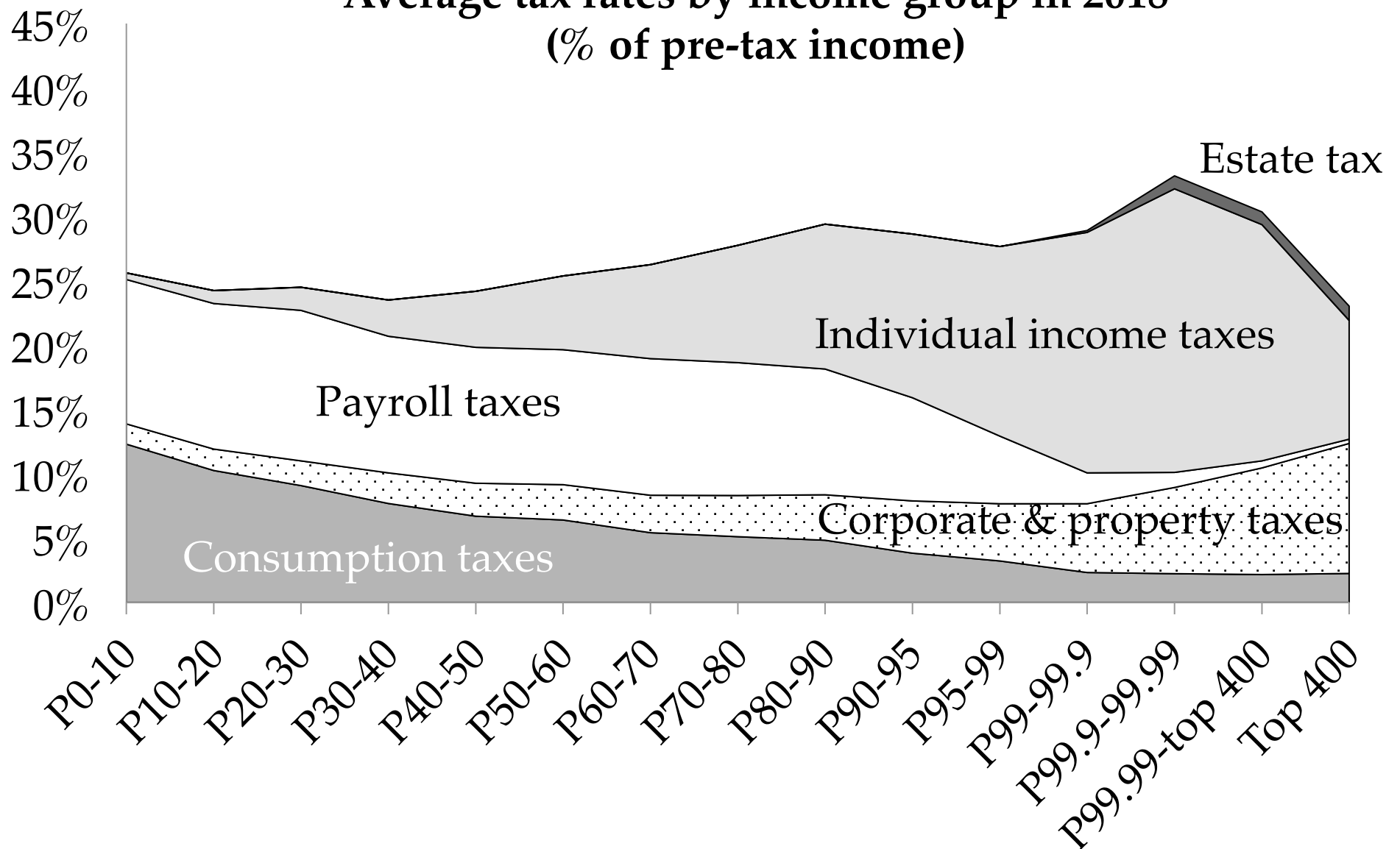
1) Medium Term Changes: US Tax Progressivity has declined since 1950 (Saez and Zucman 2019) but govt redistribution through transfers has increased (Medicaid, Social Security retirement, DI, UI various income support programs)

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)

Average tax rates by income group in 2018
(% of pre-tax income)

Average tax rate: 28%

Working class
(average annual pre-tax
income: $18,500)

Middle-class
($75,000)

Upper
middle-
class
($220,000)

The rich
($1,500,000)

45%
40%
35%
30%
25%
20%
15%
10%
5%
0%

P0-10
P10-20
P20-30
P30-40
P40-50
P50-60
P60-70
P70-80
P80-90
P90-95
P95-99
P99-99.9
P99.9-99.99
P99.99–top 400
Top 400

Average tax rates by income group in 2018 (% of pre-tax income)

Estate tax

Individual income taxes

Payroll taxes

Corporate & property taxes

Consumption taxes

45%
40%
35%
30%
25%
20%
15%
10%
5%
0%

P0-10 · P10-20 · P20-30 · P30-40 · P40-50 · P50-60 · P60-70 · P70-80 · P80-90 · P90-95 · P95-99 · P99-99.9 · P99.9-99.99 · P99.99-top 400 · Top 400

Average tax rates by income group (% of pre-tax income)

Working class　Middle-class　Upper middle-class　The rich

1950　1960　1970　1980　1990　2000　2010　2018

P0-10　P10-20　P20-30　P30-40　P40-50　P50-60　P60-70　P70-80　P80-90　P90-95　P95-99　P99-99.9　P99.9-99.99　P99.99-top 400　Top 400
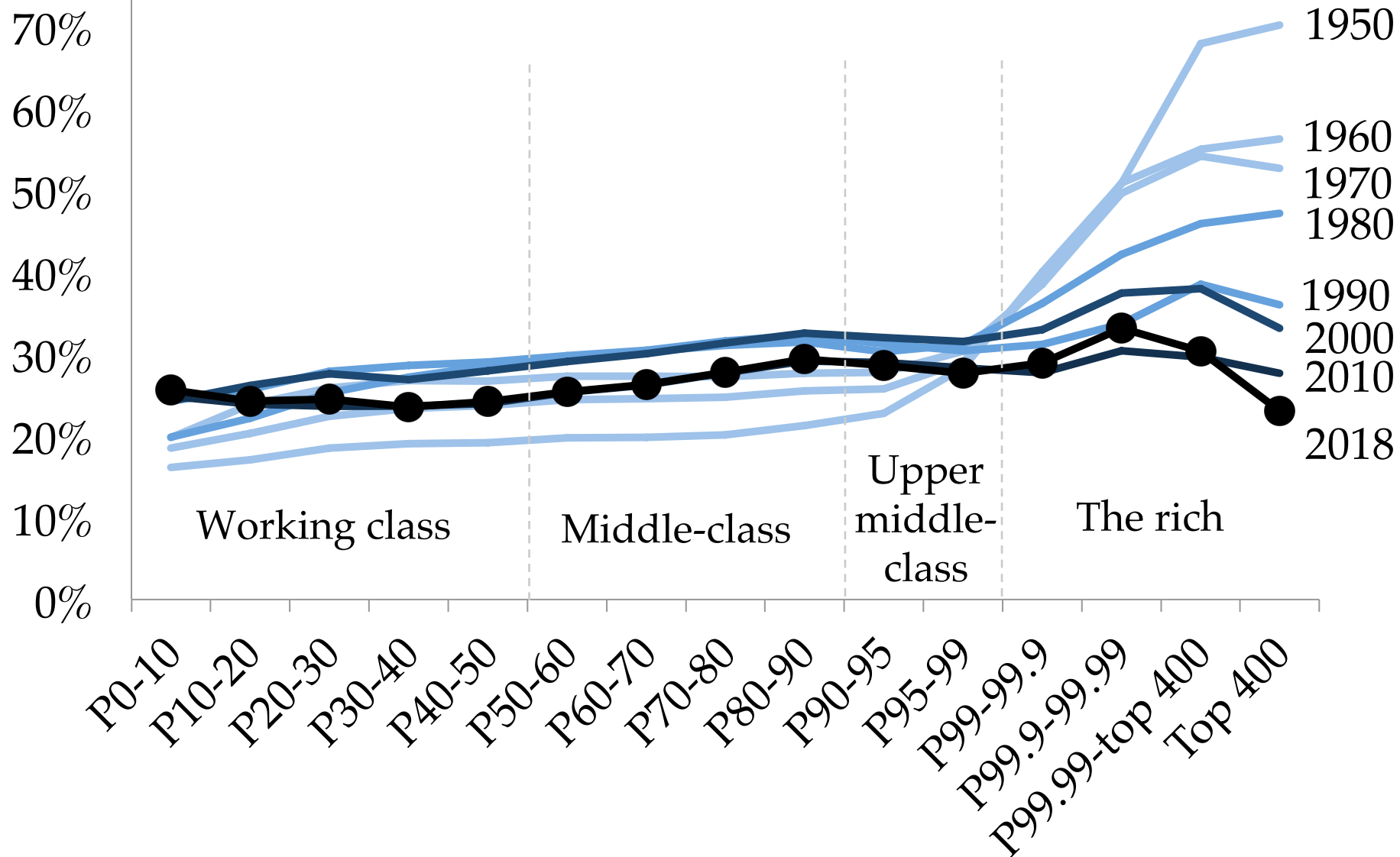
Plan for Lectures on Taxation/Redistribution

1) Tax incidence, efficiency costs of taxation, optimal commodity taxation

2) Taxation of labor income:

Optimal design of labor income taxation and means-tested transfers

Empirical analysis of tax and transfer programs on labor supply and earnings

3) Taxation of capital income (savings, wealth, and corporate profits)

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