Inequality and Macroeconomics: Facts and Theories

Lecture 1: Facts for the United States and other developed economies

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May 2024

Outline

▷ Why macro and inequality?

▷ A quick primer on inequality measurement

▷ 50 years of dynamics of inequality in the United States

▷ Some cross country comparisons

Income per capita

- ▷ Each year/quarter residents of a country create value (e.g. cars, books, haircuts) which translates into income
- ▷ For example, *on average,* in 2023 each US resident created around $80k of Gross Domestic Product (GDP)
- ▷ Traditional macro studies this quantity over time, or across countries

Traditional Macro Numbers

	Level (2017$)	Growth, 2017-18	Growth 2008-09
Bottom 5%	2100 (Ethiopia)	-0.7% (Nigeria)	-7% (Mexico)
Bottom 10%	4100 (Cambodia)	0.5% (Brazil)	-6% (Japan)
Median	11300 (Indonesia)	3.9% (Indonesia)	3.2% (Indonesia)
Top 10%	45000 (France)	5.9% (China)	8.5% (China)
Top 5%	61000 (US)	5.9% (China)	8.5% (China)

Sample size: 190 countries, Source: World Bank WDI

▷ Level: factor of 30 differences between rich and poor

▷ Growth: 15% differences between growth miracles and growth disasters

Income Inequality

▷ Income inequality measures how income is distributed across households/persons, within a country

Income inequality in the US

▷ Income concept: per capita, per household disposable income

	Level (2017$)	Growth, 2017-18	Growth 2008-09
Bottom 5%	4200	-72%	-70%
Bottom 10%	7200	-55%	-54%
Median	2200	1.4%	-1.4%
Top 10%	56000	115%	92%
Top 5%	74000	226%	171%

Sample size: 60k households, Source: CPS

▷ Level: factor of 20 differences between rich and poor

   ▷ Within US differences almost as large as US and Ethiopia

▷ Growth: Differences over 200% between slow and fast growers

   ▷ Household growth differences orders of magnitude larger than country differences

Macro and Inequality

▷ Modern macro not only about aggregate dynamics but also **dynamics of distributions across agents** as distributions **matter per se**, **affect** and **are affected** by macroeconomic outcomes

Key Questions

▷ Does a macro outcome (i.e. a recession, a period of rapid growth) affect differently units (households/firms) in the economy?

▷ Does the distribution of different units affect the likelihood a given macro outcome (i.e. how does a more unequal wealth distribution affect aggregate saving and interest rates) ?

Key Concepts

▷ Different units (households/firms) in the economy react differently to a given shock

▷ To understand response of the economy to the shock need to keep track of relevant heterogeneity/inequality

Macro and Inequality: setting the stage for these lectures

▷ Main focus is on household/persons inequality

▷ Early on: data

▷ Later on: theory, positive and normative

How do we measure inequality?

Common inequality measures: Quantile ratios, Gini Index, Variance of Logs, Shares

▷ 90/10 ratio $= \frac{\text{Quantity (Income, Wealth, Happiness) of household at the top 10\%}}{\text{Same quantity for household at the bottom 10\%}}$

▷ robust to top-coding, miss the tails

▷ Gini index: measure of concentration
   ▷ 1 if only one household has it all (income, wealth..)
   ▷ 0 if quantity is equally distributed across households
   ▷ 1/2 - Integral of the Lorenz curve, $L(x)$, fraction of quantity received by the x-quantile of the distribution

▷ Shares: share of quantity going to the top x%

▷ Variance of Logs: exclude 0s, affected by the bottom

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▷ Measures Matter!

A famous inequality picture
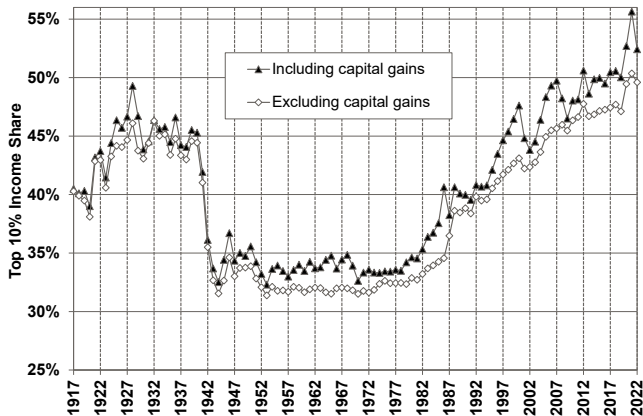
- ▷ Piketty and Saez, 2003, updated to 2022
- ▷ Unit is tax return (administrative data)
- ▷ Quantity is market income (pre-taxes, pre-transfers)

▷ Fascinating picture, however not enough to fully understand dynamics of inequality in the United States

Dimensions of inequality: from "wages" to "welfare"

▷ Several intervening choices, institutions and shocks in between individual wages and household consumption (more closely connected to welfare)

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  ❷ income pooling within family

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  1 individual labor supply
  2 income pooling within family
  3 government taxes and transfers

Dimensions of inequality: from "wages" to "welfare"

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1. individual labor supply
2. income pooling within family
3. government taxes and transfers
4. borrowing/saving/insurance through financial markets

▷ Some mechanisms acts as dampening forces, others as amplifying forces

Organizing device: household budget constraint

$$c + a' = a + \sum_{i=1}^{N} w_i h_i + U + T^G - \tau$$

- ▷ w_i individual wage
- ▷ $w_i h_i$ individual earnings (labor supply)
- ▷ $\sum_{i=1}^{N} w_i h_i$ hh earnings (pooling)
- ▷ $\sum_{i=1}^{N} w_i h_i + U$ hh market income (unearned income)
- ▷ $\sum_{i=1}^{N} w_i h_i + U + T^G$ hh pretax income (govt transfers)
- ▷ $\sum_{i=1}^{N} w_i h_i + T^G + U - \tau$ hh disposable income (taxes)
- ▷ a' end of period wealth (capital gains, saving)
- ▷ c consumption expenditures

Five Surveys

1 Current Population Survey (March CPS), 1967-2021
  ▷ repeated cross-section (+short panel), ≃60,000 households per year: **employment**, income

2 American Community Survey (ACS), 2000-2021
  ▷ repeated cross-section, ≃ **1m** households per year: income

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3 Consumer Expenditure Survey (CEX), 1980-2021
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   - ▷ rotating short panel: $\simeq$15,000 households: income, **consumption expenditures**, wealth

4. **Panel Study of Income Dynamics (PSID), 67-96, 98(2)18**
   - ▷ **long panel**, $\simeq$6000 households: income, consumption, wealth

5. **Survey of Consumer Finance (SCF), 1988(3)2018**
   - ▷ repeated cross section, $\simeq$4000 households: income and **wealth**

Sample selection

1 Sample A

    ▷ "Clean" version of raw data: drop households with members that have incomplete or implausible info (i.e. wage below 1/2 the minimum)

    ▷ used for **population-level** statistics (comparison with NIPA)

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2 Sample B

- ▷ Households in A with at least one member age 25-60
- ▷ used for household-level (earnings, income, consumption) statistics

Sample selection

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   - ▷ used for population-level statistics (comparison with NIPA)

2. **Sample B**
   - ▷ Households in A with at least one member age 25-60
   - ▷ used for household-level (earnings, income, consumption) statistics

3. **Sample C**
   - ▷ individuals from households B, age 25-60 who work at least 260 hours per year
   - ▷ used for individual-level (wages, hours) statistics

Sample A, Summary Statistics, 2018

	CPS	ACS	PSID	CE	SCF
# of households	66,929	1,215,264	8422	14,793	5813
Avg head age	51.8	52.5	54.1	53.0	51.5
Avg HH size	2.44	2.45	2.14	2.21	2.44
% white head	78.2	76.1	77.2	81.5	66.6
% college head	36.4	35.5	35.6	36.7	35.2
% 0 earnings	26.7	25.8	27.8	34.6	26.9
% earnings $> 500k$	0.5	0.5	0.4	0.2	0.7

Macro facts in micro data, DNA, Piketty, Saez and Zucman, 2018

▷ Check that aggregate micro data match standard macro data

Wage and salary income pc, sample A
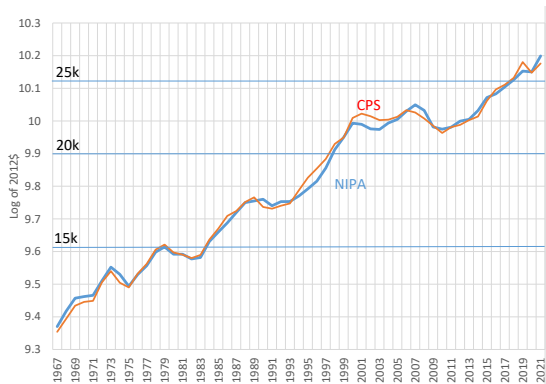
▷ March CPS matches NIPA well

Wage and salary income pc, sample A
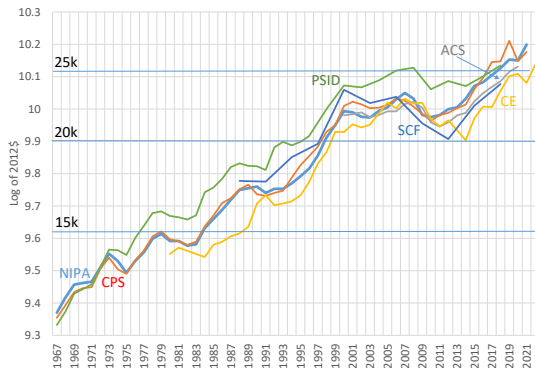
- ▹ March CPS matches NIPA well
- ▹ Broad agreement with NIPA for other surveys
- ▹ In PSID & CE more persistent Great Recession

Pretax (personal) income pc, sample A
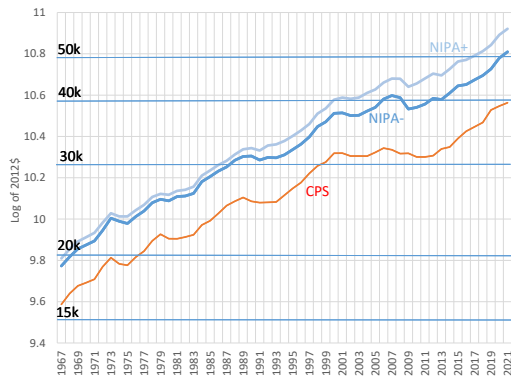
- ▷ NIPA- and CPS: wages, capital and business income, non-med transfers, FICA (same categories)
- ▷ NIPA+: medicare/aid, owner renteq, employer contrib. (different categories)
- ▷ Significant and growing missing pre-tax income from CPS
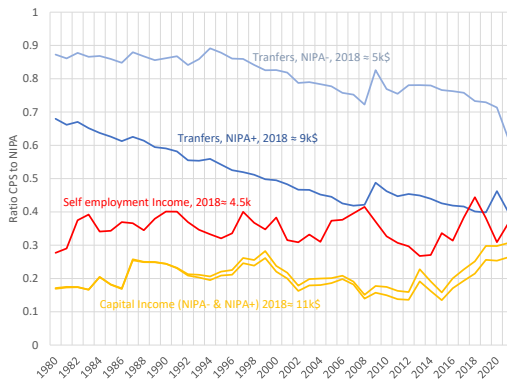
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Gaps between NIPA and surveys (CPS)

- ▷ Capital and bus. inc. much lower in CPS than NIPA
- ▷ CPS transfers declining share of NIPA+ because of medical

Gaps between NIPA and surveys (CPS)
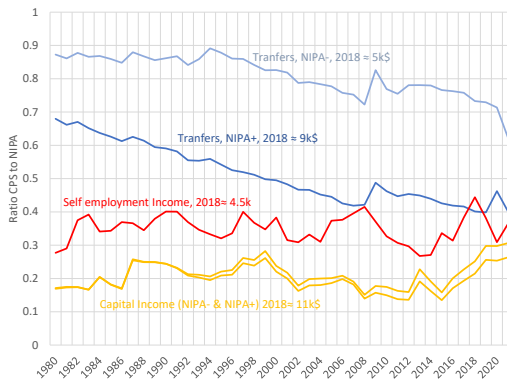
- ▷ Capital and bus. inc. much lower in CPS than NIPA
- ▷ CPS transfers declining share of NIPA+ because of medical
- ▷ Later assess impact of missing income on inequality

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Consumption expenditures pc, sample A

Non Durables   **Durables**
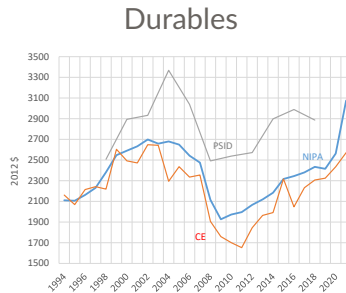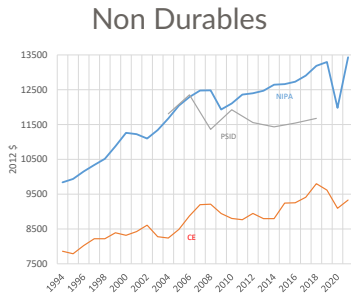
Non health, non housing

- ▷ recent years allow evaluation of PSID v/s CE
- ▷ CE better matches NIPA growth in recent years and closer to NIPA than PSID
- ▷ both capture cyclical variations (COVID?)

Household net worth pc, sample A
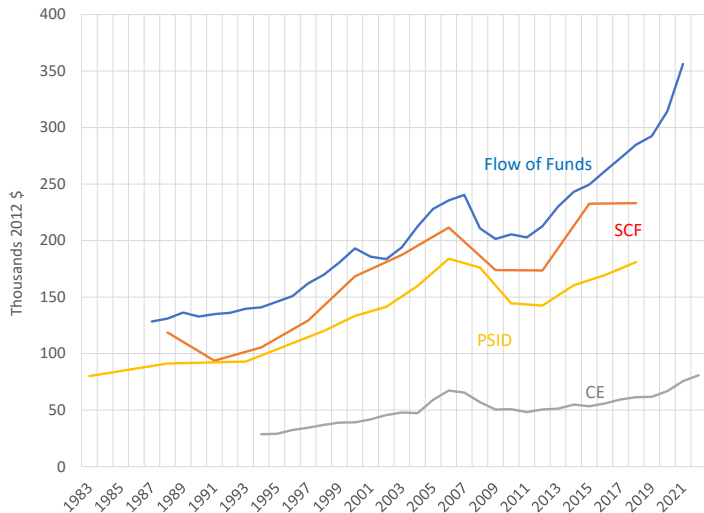
- ▷ gap between surveys and FoF
- ▷ SCF close to FoF
- ▷ CE wealth very low

Inequality dynamics roadmap

- ▷ individual wages $\rightarrow$
- ▷ individual earnings $\rightarrow$
- ▷ HH earnings/income $\rightarrow$
- ▷ HH expenditures and wealth

Overall wage inequality, sample C, CPS
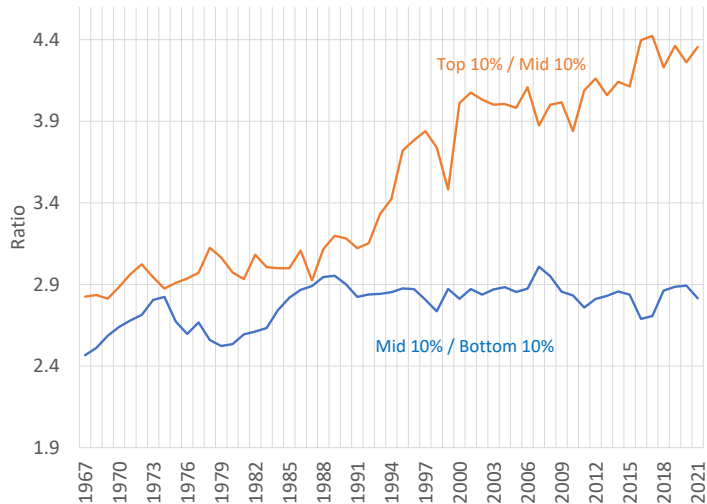
- ▷ Not cyclical
- ▷ Bottom: flat
- ▷ Top: starts increasing in 1990s, keeps raising after GR

Wage inequality by gender, sample C, CPS
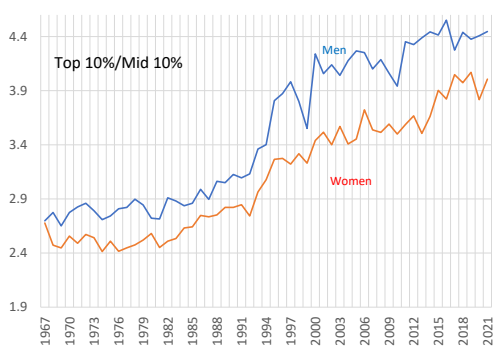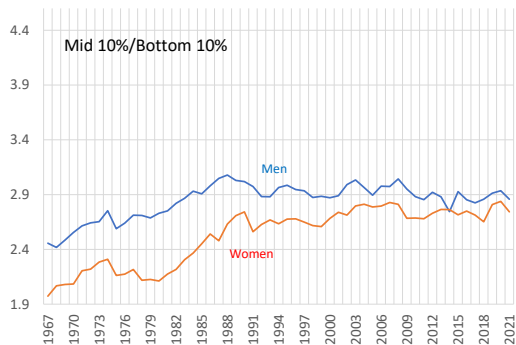
▷ Similar patterns across genders

▷ Women wage catch-up mask within gender increase in wage inequality at the bottom in the 1980s

Wage premia

College Premium

Wage premia

College Premium

Men

Women

Wage premia

College Premium

Men

Women

Age Premium

Men

Women
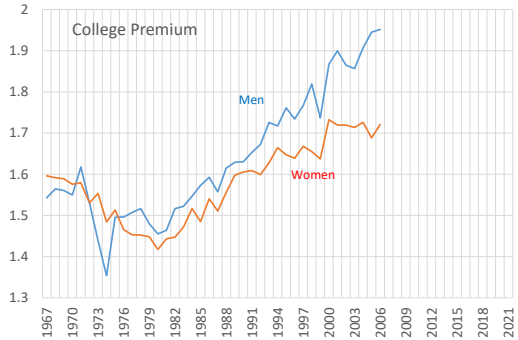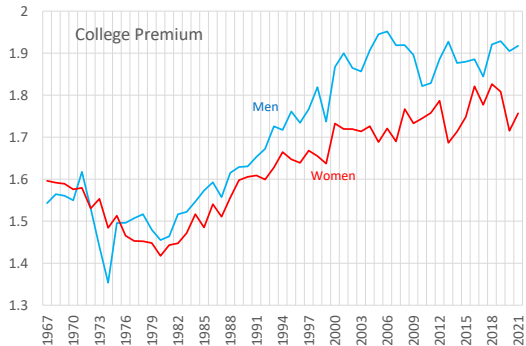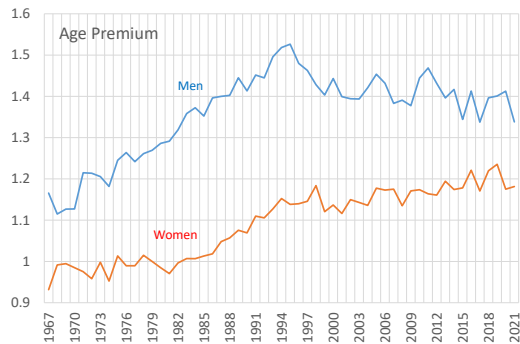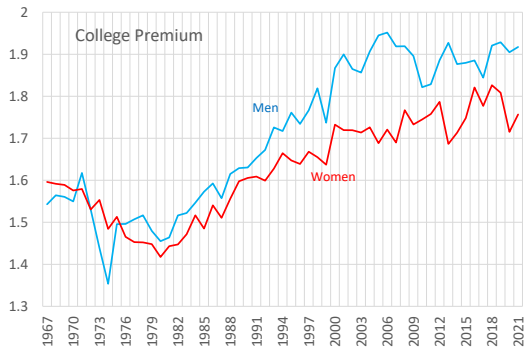
▷ post GR: end of the rise in college premium (also true for post-college premium)

Wage gaps
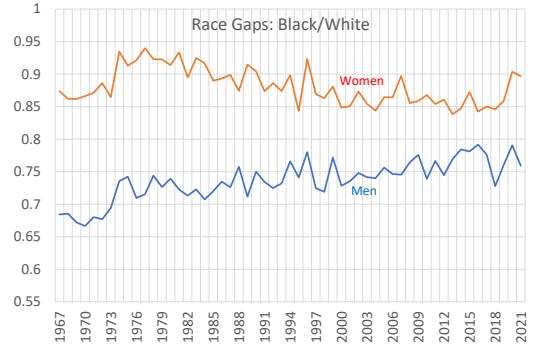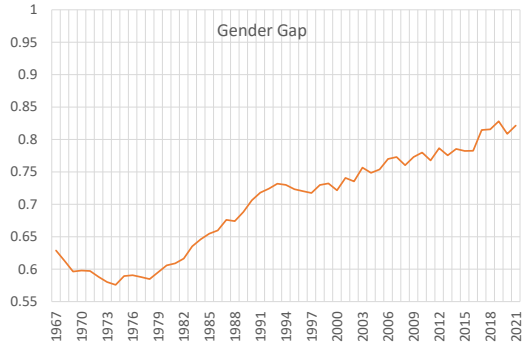
- ▷ Post GR: further closing (at slower pace) of gender gap
- ▷ Little change in race gap

Wage-gender gaps across the wage distribution

Gender wage gaps by wage-group
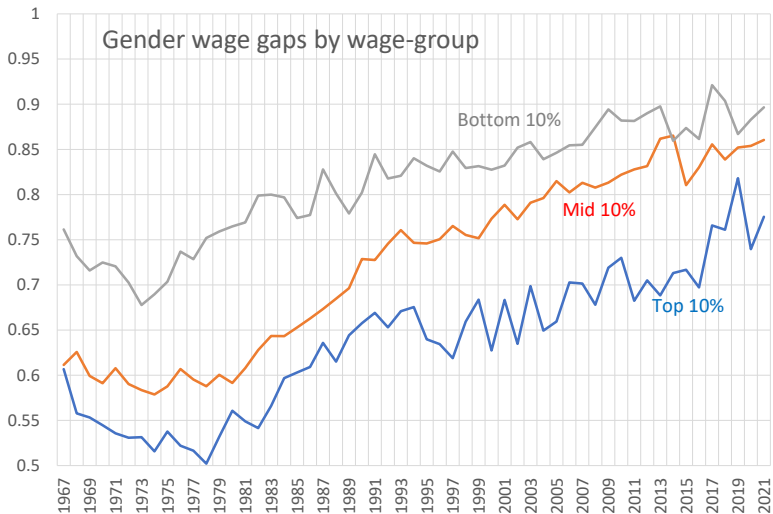
- ▷ Wage-gender gap larger at the top
- ▷ Faster catch up in the middle

Wage inequality: residual v/s observables

▷ For each year/gender regress $log(w_{it})$ on a series of controls including: age, race, education, occupation (routine v/s non routine)

▷ lines report fraction of variance explained by observables and variance not explained
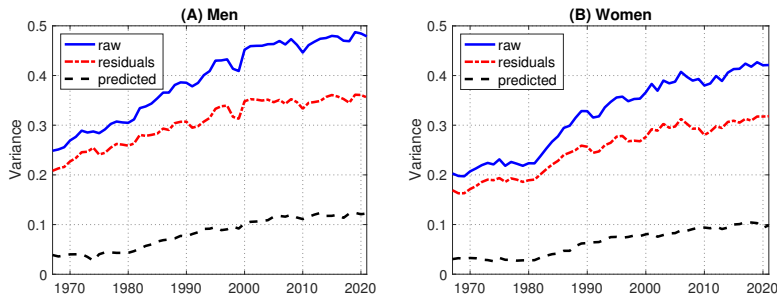
▷ Observables account for about 30% of the level and the increase in wage inequality

▷ Residual wage inequality is important!

Earnings inequality: within and between firms

(A) Overall decomposition

(B) Workers at firms with 20 to 10,000 employees

(C) Workers at mega firms (10,000+ employees)
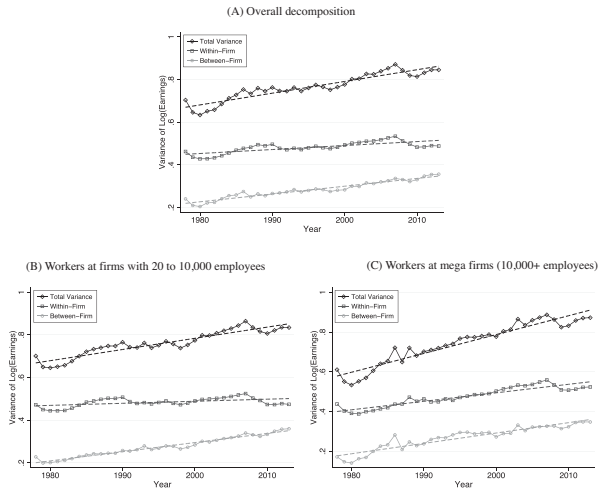
FIGURE II

Decomposition of the Variance of Log Annual Earnings within and between Firms: All, Smaller, and Mega Firms

▷ Song, Price, Guvenen, Bloom and von Wachter (2018)

▷ A large part of the increase in inequality is explained by growing earning gaps *between* firms

Wage inequality in the US over the past 50 years

▷ Initially increases both at the top and at the bottom

▷ Later years mostly increases at the top

▷ Only 30% explained by observables

From Wages to Earnings

Measures of men earnings: sample B

(B) Middle 10%

Measures of men earnings: sample B

(B) Middle 10%

(A) Top 10%

(C) Bottom 20%
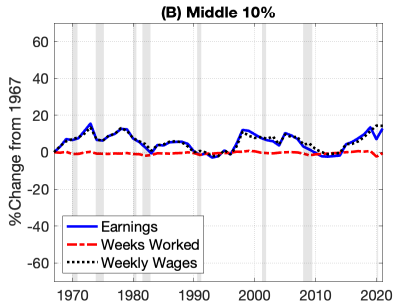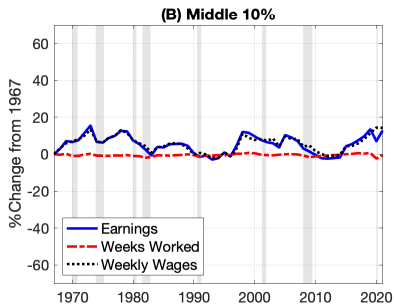
▷ men earnings inequality increase both at the top and bottom

▷ top: only secular driven by wages

▷ bottom: cyclical and secular, driven by hours

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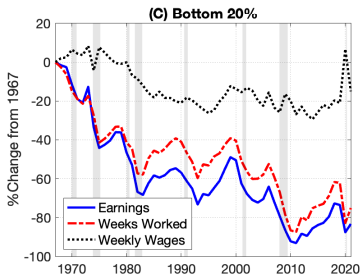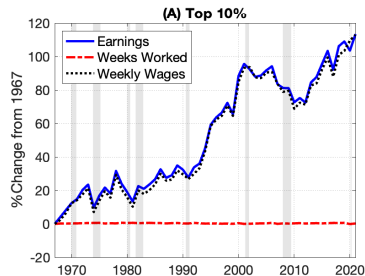
Earnings Gender Gaps

Hours (sample B)
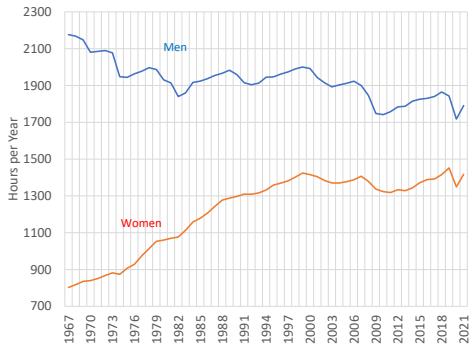
Wages (sample C)
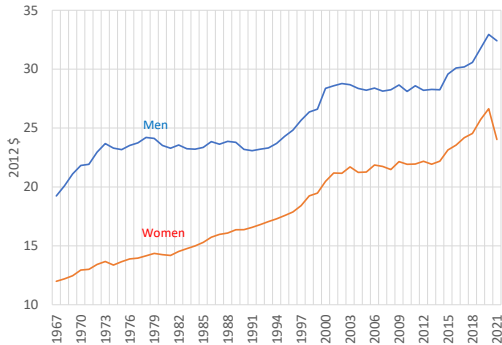
- ▷ 1967-1997: women faster wage and hours growth: great earnings equalization and women account for majority of the growth in labor earnings in US!
- ▷ 1997-2020: hours equalization over, wage equalization slower
- ▷ Gender gap in hours AND wages stuck around 25%

From individuals to households

Measuring the impact of household pooling

▷ Start from sample B

▷ Select households with either 1 or 2 members of age 25-60

▷ Construct two individual earning measures

$$y_i, \text{Individual Earnings}$$
$$\bar{y}_i = \frac{\sum_{H(i)} y_i}{N(i)}, \text{Pooled earnings within household}$$

▷ For singles $y_i = \bar{y}_i$

▷ Measure of household pooling

$$HP_t = \frac{var(y_{it}) - var(\bar{y}_{it})}{var(y_{it})} \in [0, 1]$$

The role of households in reducing inequality
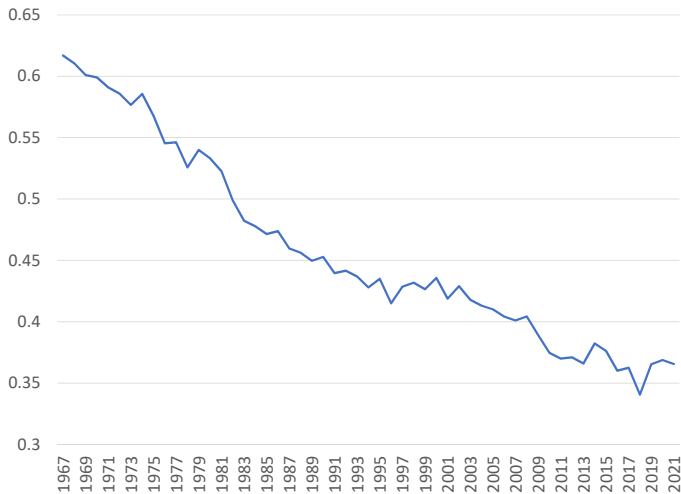
▷ Going from individual to household reduces inequality, but less so over time

Decomposing the HP index

$$HP_t = \frac{1}{4}\frac{var\left(y^c_{i_1 t}\right) + var\left(y^c_{i_2 t}\right)}{var\left(y_{it}\right)}\underbrace{\left(1 - s_0\right)}_{\text{Within Gender Inequality}} + \frac{1}{2}\underbrace{\frac{\left(Y^c_{1t} - Y^c_{2t}\right)^2}{var\left(y_{it}\right)}\left(1 - s_0\right)}_{\text{Gender Gap}}$$

$$-\underbrace{\frac{1}{2}\frac{cov\left(y^c_{i_1 t}, y^c_{i_2 t}\right)}{var\left(y_{it}\right)}\left(1 - s_0\right)}_{\text{Sorting}}$$

$$-\underbrace{\frac{var\left(y^c_{it}\right) - var\left(\bar{y}^c_{it}\right)}{var\left(y_{it}\right)}\left(s_t - s_0\right)}_{\text{Household formation}}$$
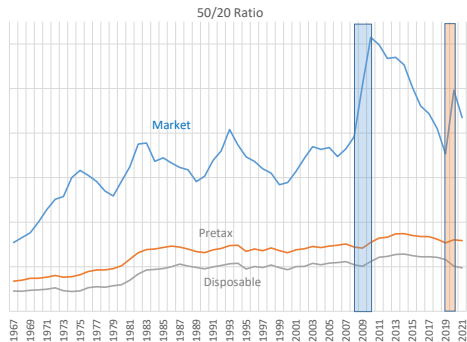
Decomposing the index
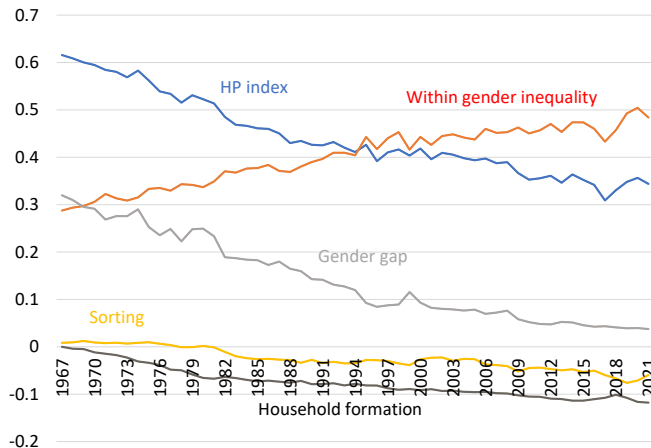
- ▷ Fall in wage gap, increased singles and sorting: reduce household pooling
- ▷ Increase in within gender inequality: increase household pooling

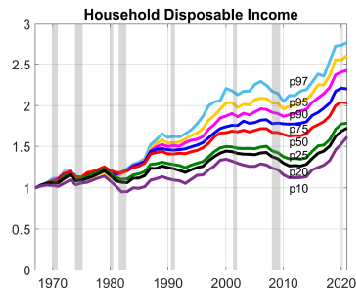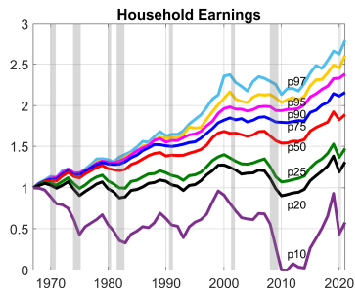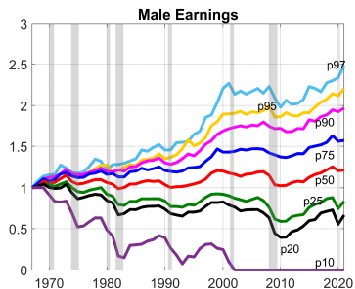# Measures of household income: Sample B, CPS, by mkt
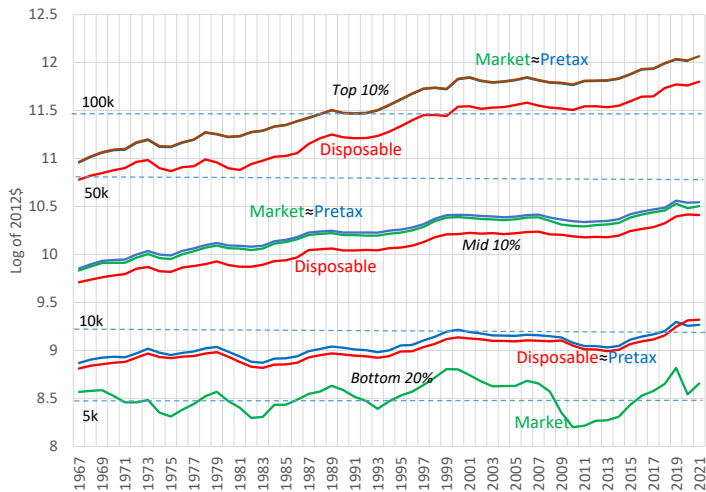
Household inequality: Sample B

50/20 Ratio

90/50 ratio
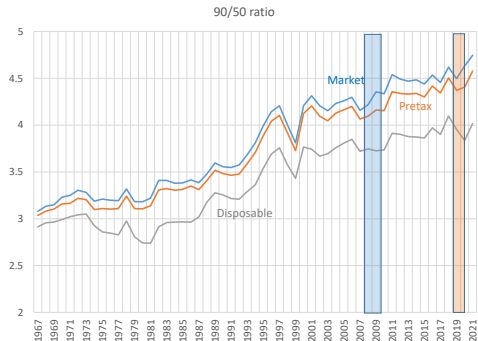
▷ Great Recession drove an increase in inequality, which has reversed at the bottom, not at the top

▷ COVID recession unprecedented redistribution

Summarizing income distributions

- ▷ Huge fanning out of male earnings, no growth at the median
- ▷ Smaller fanning out of household earnings (Rising female earnings), still no growth at the bottom
- ▷ Much smaller fanning out in disposable income – and growth at the bottom!

Main takeaways

▷ Market income of bottom 20% of households still at 1967 level (after the GR cycle)

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- ▷ Market income of bottom 20% of households still at 1967 level (after the GR cycle)
- ▷ Tax and transfers greatly affect trend and cycle of bottom 20%, and reduce income at the top
- ▷ Over past 15 years disposable income of the top keeps diverging
- ▷ COVID historically large redistribution

# Inequality impact of missing income in CPS

▷ CPS misses substantial fraction of capital and business income and transfers

▷ Assess inequality impact by rescaling CPS figures so that NIPA+/CPS ratio in income category

▷ Rescaling is not uniform across households because many households report 0 in a given category

▷ Implicitely assume CPS errors are only on intensive margin

Check: Share of top 10%
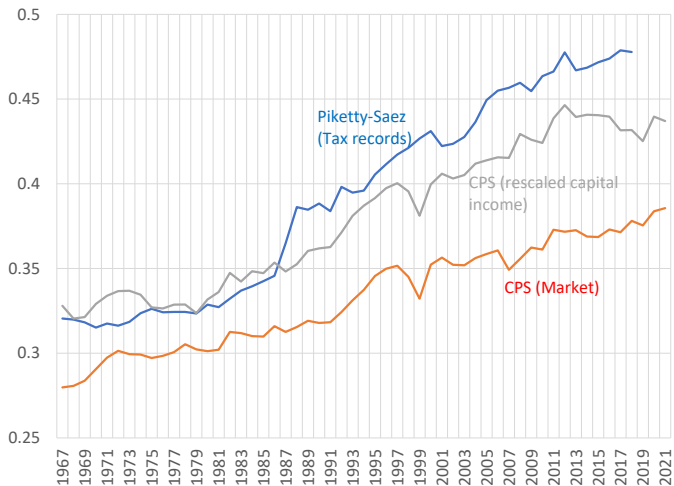
▷ Rescaling capital income has significant impact on both level and trend of inequality at the top

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Impact of rescaling on pre-tax inequality
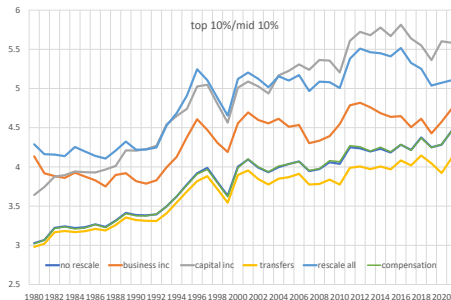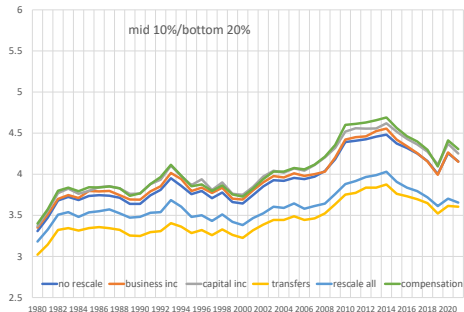
- ▷ rescaling capital inc increases ineq. level & growth at the top
- ▷ rescaling everything increases ineq. level but not growth at the top
- ▷ rescaling transfers lowers inequality level & growth at the bottom

Household Expenditure Inequality: Sample B, CE

50/20 by Market Income

90/50 by Market Income
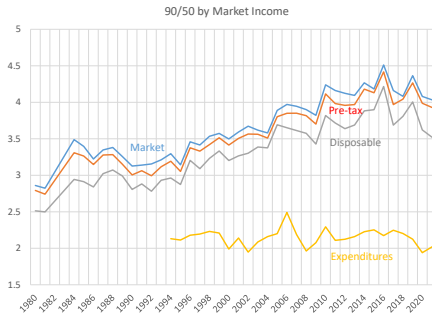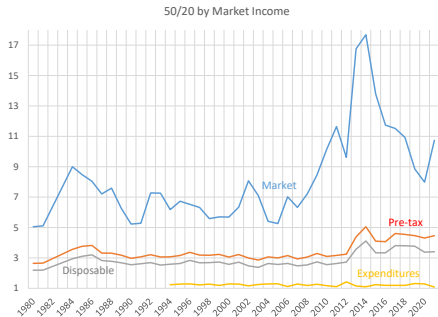
▷ Dynamics of income inequality in CE very similar to CPS

▷ Still no increase in expenditure inequality, neither at the top nor at the bottom

▷ Same results using PSID expenditures

Wealth Inequality: Sample B

Top 10% share
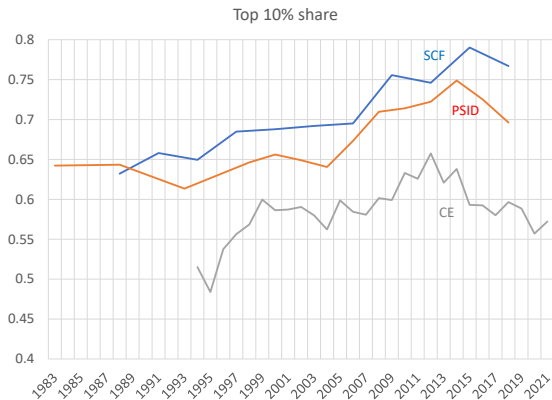
- ▷ Overall wealth inequality increasing
- ▷ Dynamics of wealth inequality driven by house and stock prices (Kuhn et al. 2020)
- ▷ In recent years (still missing COVID data) wealth inequality declining (raising home prices?)

Summarizing

Labor earnings, the main resource for most U.S. households, has become much more unequally distributed over the past half century

- ▷ Widening wage gaps at the top of the distribution (for men and women)
- ▷ Widening participation gaps at the bottom of the distribution (for men)

Three factors have mitigated the impact of this trend on inequality in living standards

1. Household resource pooling: women are working more
2. More government redistribution: taxes at the top and transfers at the bottom
3. Saving and borrowing: income-rich accumulated wealth, income-poor borrowed

Some international evidence

▷ Is the large increase in inequality a U.S. Specific phenomenon?

▷ Large but confusing literature on cross country inequality trends, and data comparison is an issue

▷ Two starting points: Krueger, Perri, Pistaferri and Violante (2010), Blanchet, Chancel and Gethin (2021)

US v/s Europe

Figure II
The Rise of Top Incomes in Europe and the United States, 1980-2017

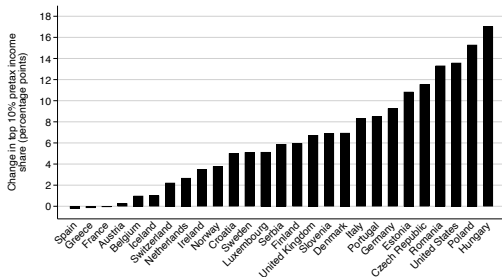(b) Percentage Point Change in Top 10% Pretax Income Share by Country, 1980-2017
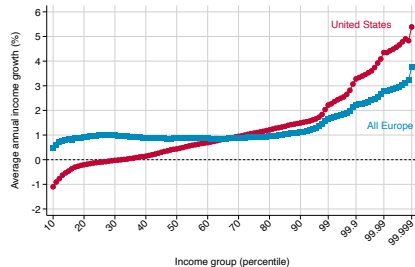

Figure III
The Distribution of Pretax Income Growth in Europe and the United States, 1980-2017

(b) Average Annual Pretax Income Growth by Percentile

▹ US has the largest increase in market income inequality (together with transition economies

▹ Some countries (FRA, SPA, BEL) experience no increase, others (ITA, UK, GER) sizeable

▹ US unique in having a large swath of population (30%) with zero or negative growth

US v/s Europe

Figure VII
Net Redistribution in Europe and the United States

(b) Net Transfer Received by the Bottom 50% by Country
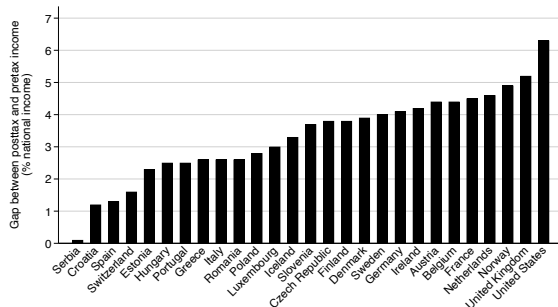
▷ US has the largest share of transfers to bottom 50%

▷ Important though to consider institutional differences (private v/s public health and education)

Inequality and Volatility

FIGURE 1 – DISPERSION IN EARNINGS GROWTH DECLINES IN ADMINISTRATIVE RECORDS

(A) Men

(B) Women
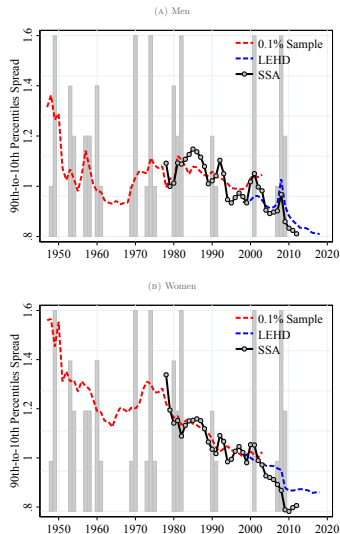
▷ So far focused on pure cross sectional measures

▷ When thinking about drivers of increase in inequality, useful to look at income dynamics (need panel dimension)

▷ Salgado, Bloom, Guvenen, Pistaferri and Sabelhaus (2023) use administrative data to show volatility is declining!

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