Macroeconomics 4

Heterogeneity in Macroeconomics

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Goal and scope of the course

- The course is meant as an introduction to the contemporaneous general-equilibrium approach to modeling heterogeneity in macroeconomics.
- In particular, it aims at providing the essential theoretical and quantitative tools needed to master some of the current workhorse models.
- Furthermore, a relatively broad overview of the most interesting and relevant contributions is provided.

SUMMARY OF PROGRAM

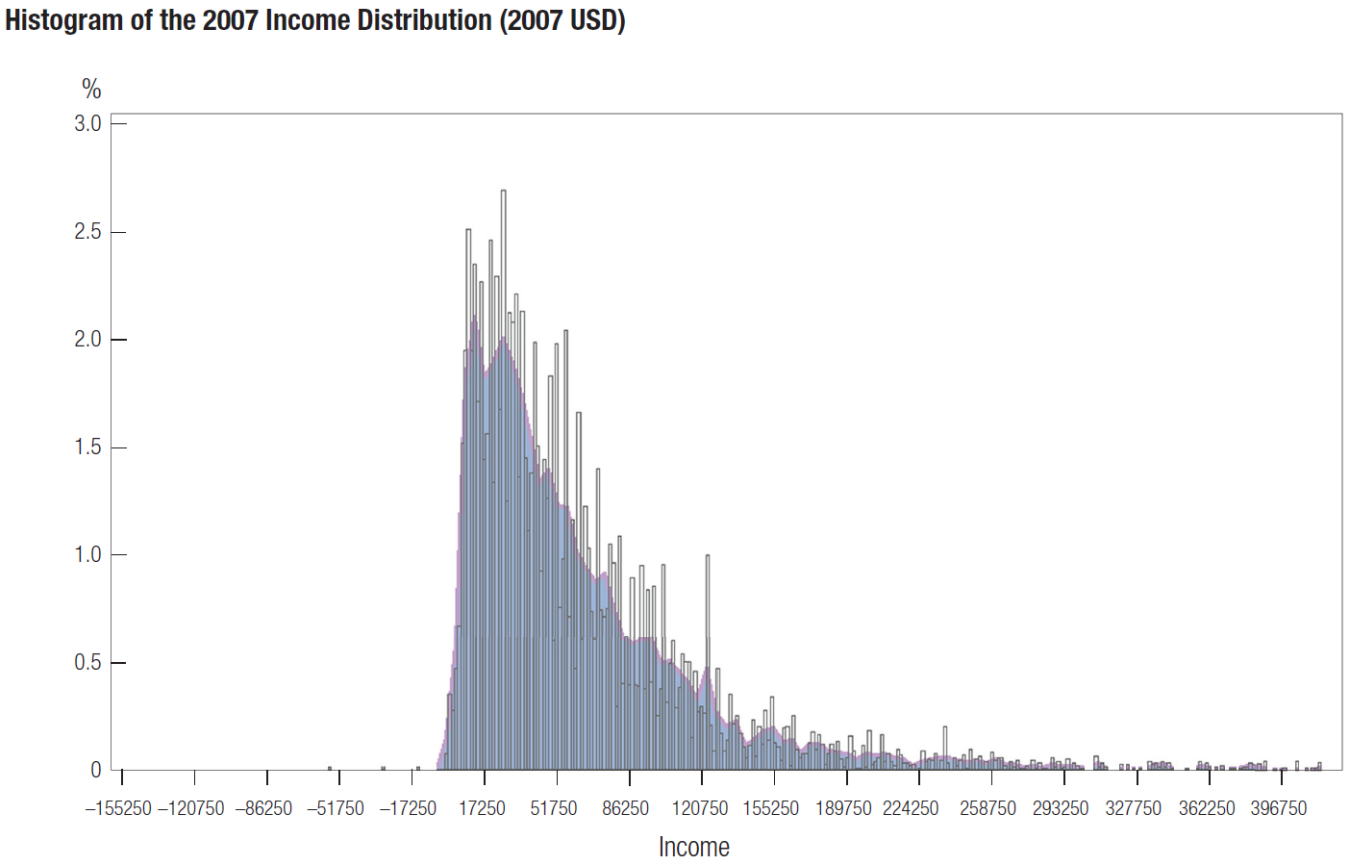
- LECTURE 1: Cross-sectional facts for macroeconomists,
- LECTURE 2: Aggregation,
- LECTURE 3: Heterogeneity under complete markets,
- LECTURE 4: Buffer-stock saving,
- LECTURE 5: Occasionally binding constraints,
- LECTURE 6-8: Bewley-type models,
- LECTURE 9: Idiosyncratic investment risk and entrepreneurship,
- LECTURE 10-11: Krusell-Smith-type models,
- LECTURE 12: Further developments and current research.

Introduction

- Macroeconomists have two main concerns with regard to inequality:
  - What determines the joint distribution of earnings (or labor income) and wealth.
  - How the explicitly account for inequality shapes the the answers to the standard questions in macroeconomics.
- Hence, the are two broad branches in the literature:
  - the branch primarily interested in understanding the causes of inequality, which focuses on **theories of earnings inequality**,
  - the branch concerned whit the consequences of inequality for the aggregate performance of the economy, which focuses on **theories of wealth inequality given the process for earnings**.
- This course will focus on the second branch almost exclusively.

Income inequality in the US

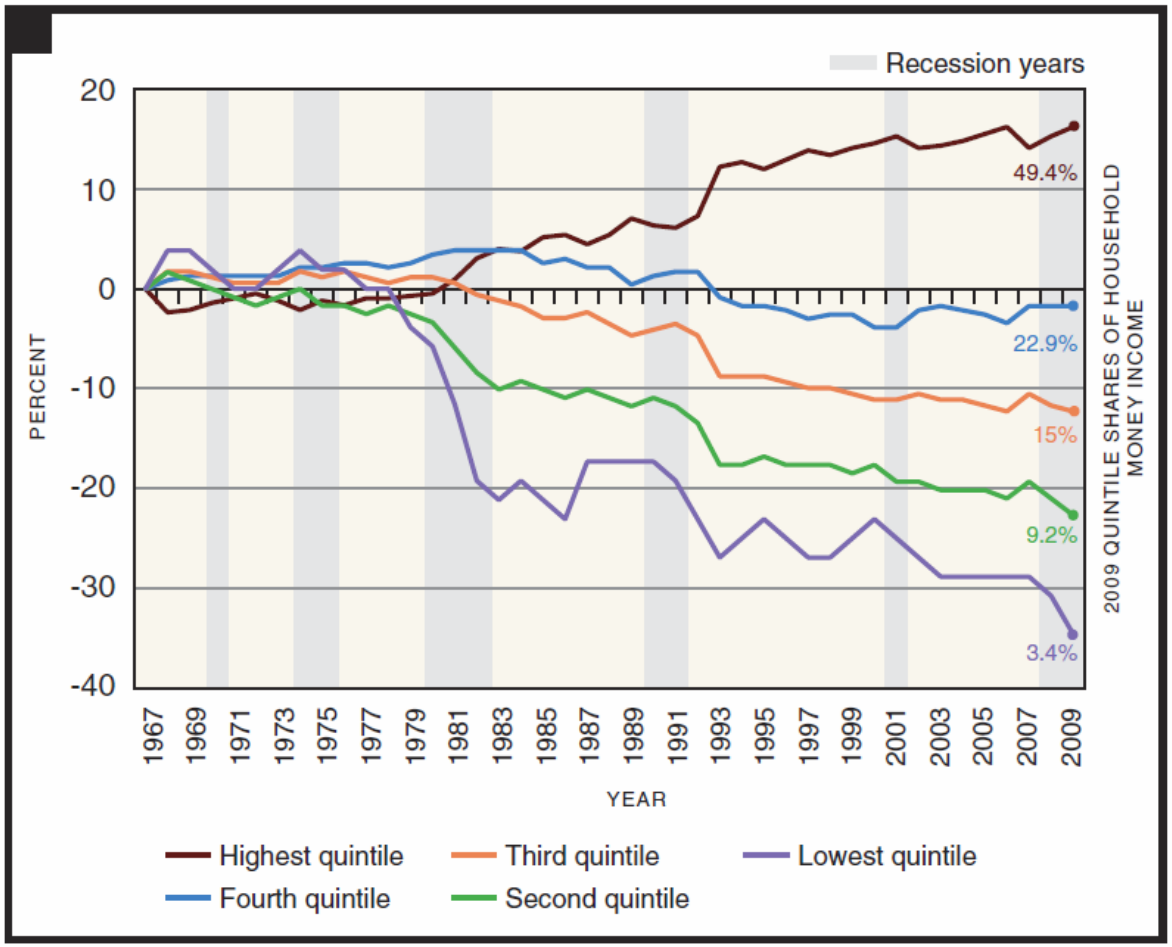
- We will start from some narrative evidence on income and wealth inequality in the US.



Source: Survey of Consumer Finances, 2007

Income inequality in the US

FIGURE 2. Percent Change in Shares of Adjusted Household Income by Quintile (Share of Income of Each Quintile Relative to Share in 1967)

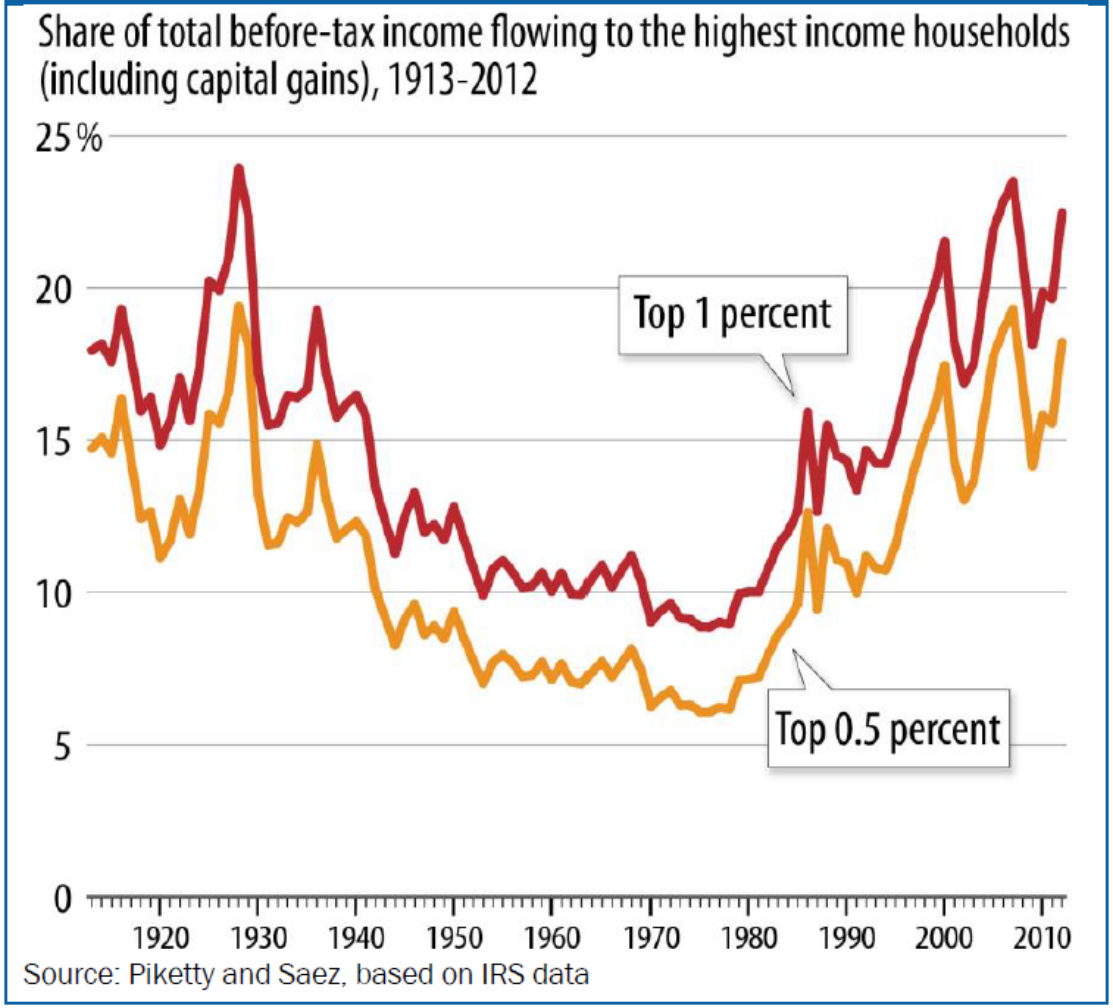


Source:DeNavas-Walt, Proctor, and Smith (2010), Table A-2, pages 40–43.

Income inequality in the US

Figure 3

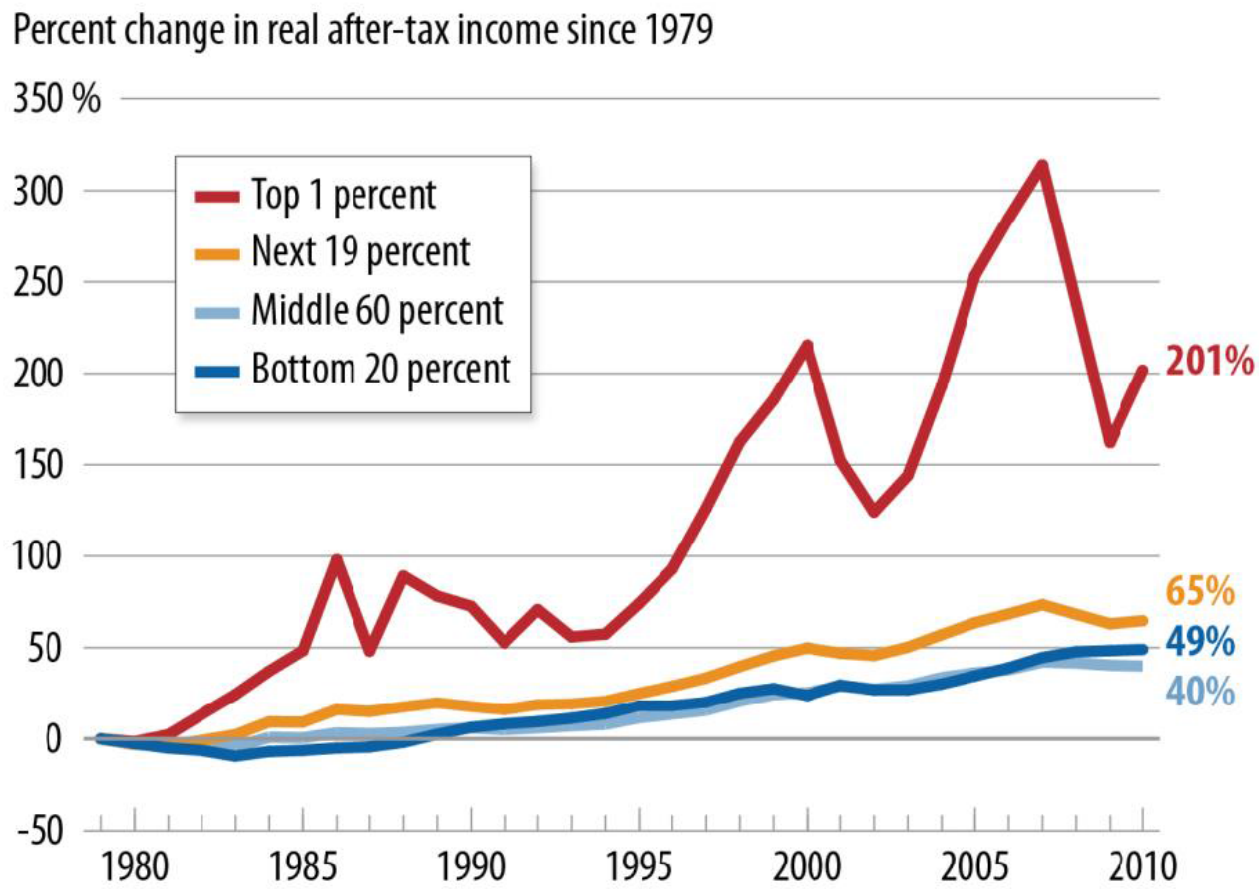
Income Concentration at the Top Has Risen Sharply Since the 1970s



Income inequality in the US

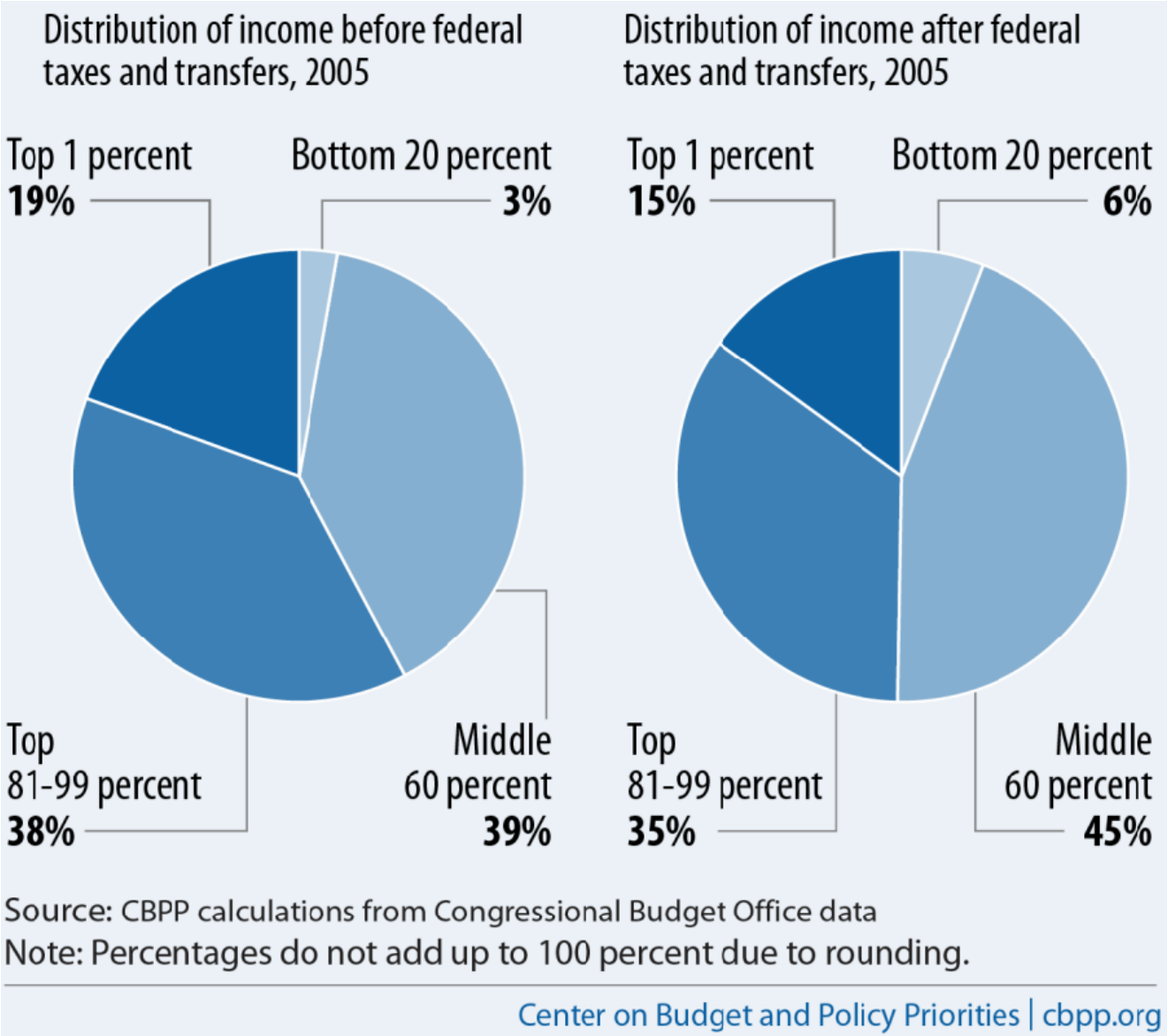
Figure 2

Income Gains at the Top Dwarf Those of Low- and Middle-Income Households

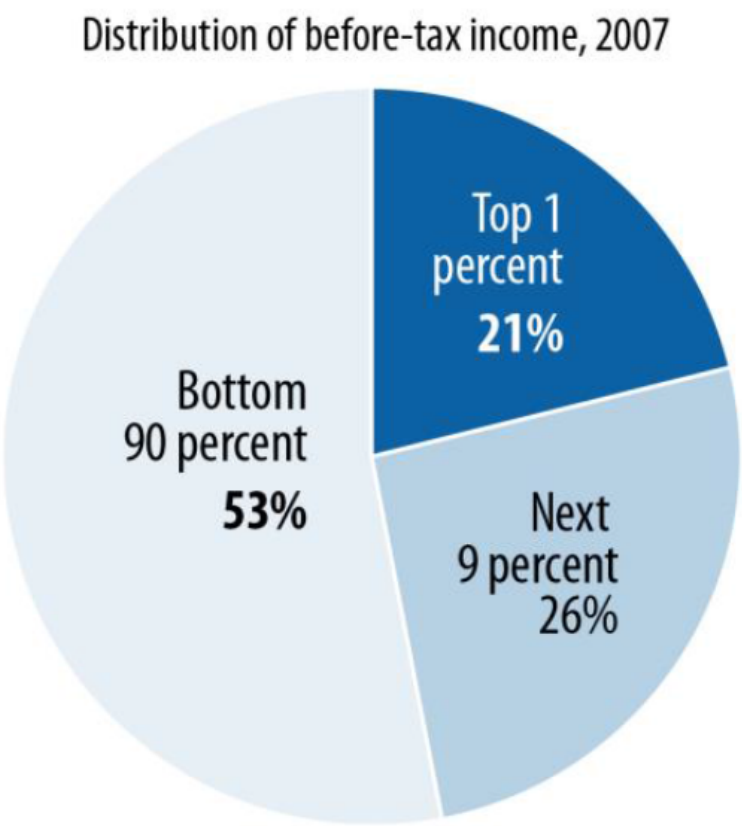


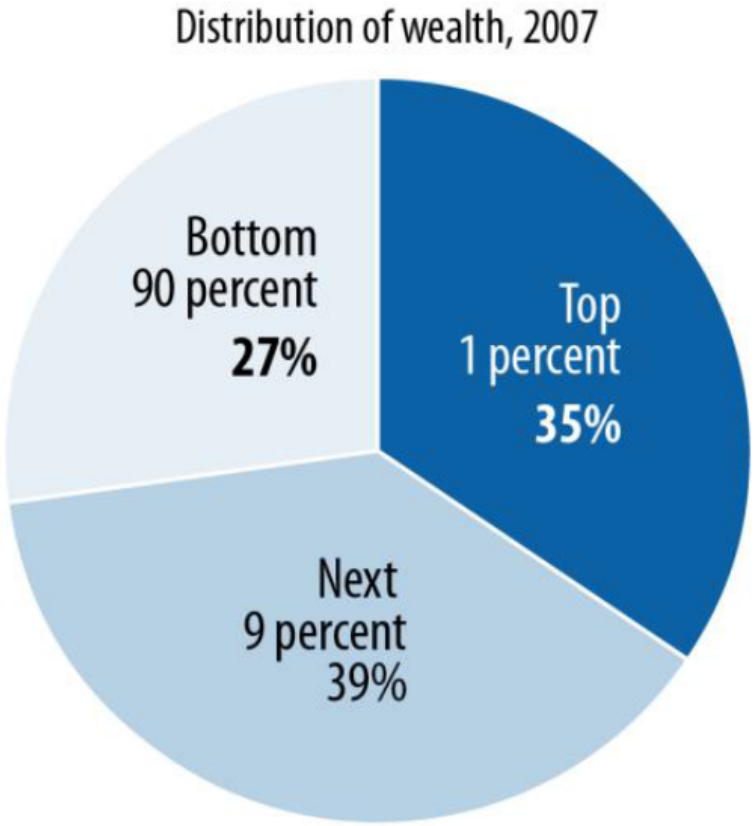
Source: Congressional Budget Office

Income inequality in the US



Wealth inequality in the US





Wealth inequality in Italy

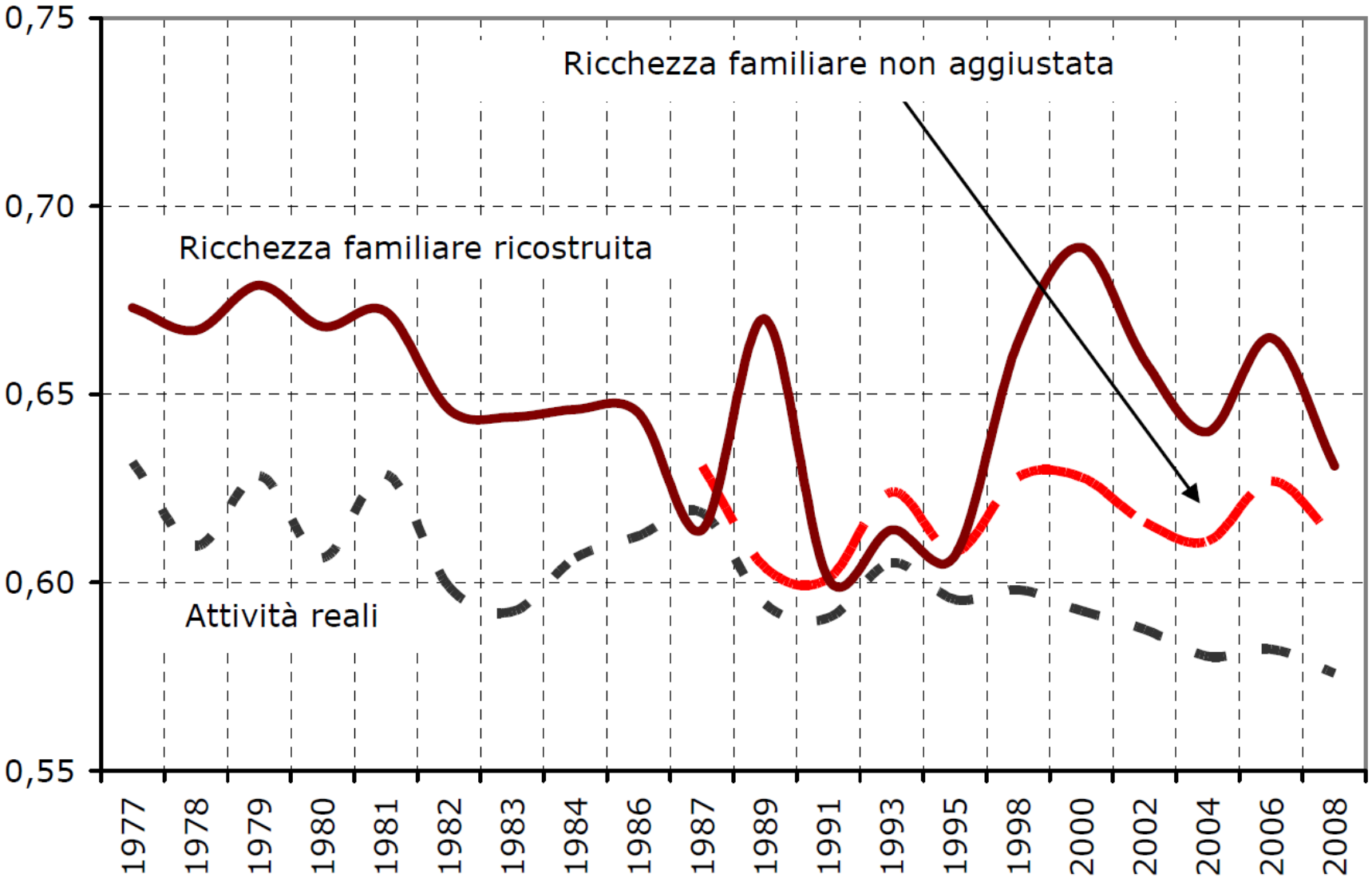


Fig. 2. Indice di concentrazione di Gini della ricchezza netta, 1977-2008

Wealth inequality in Italy

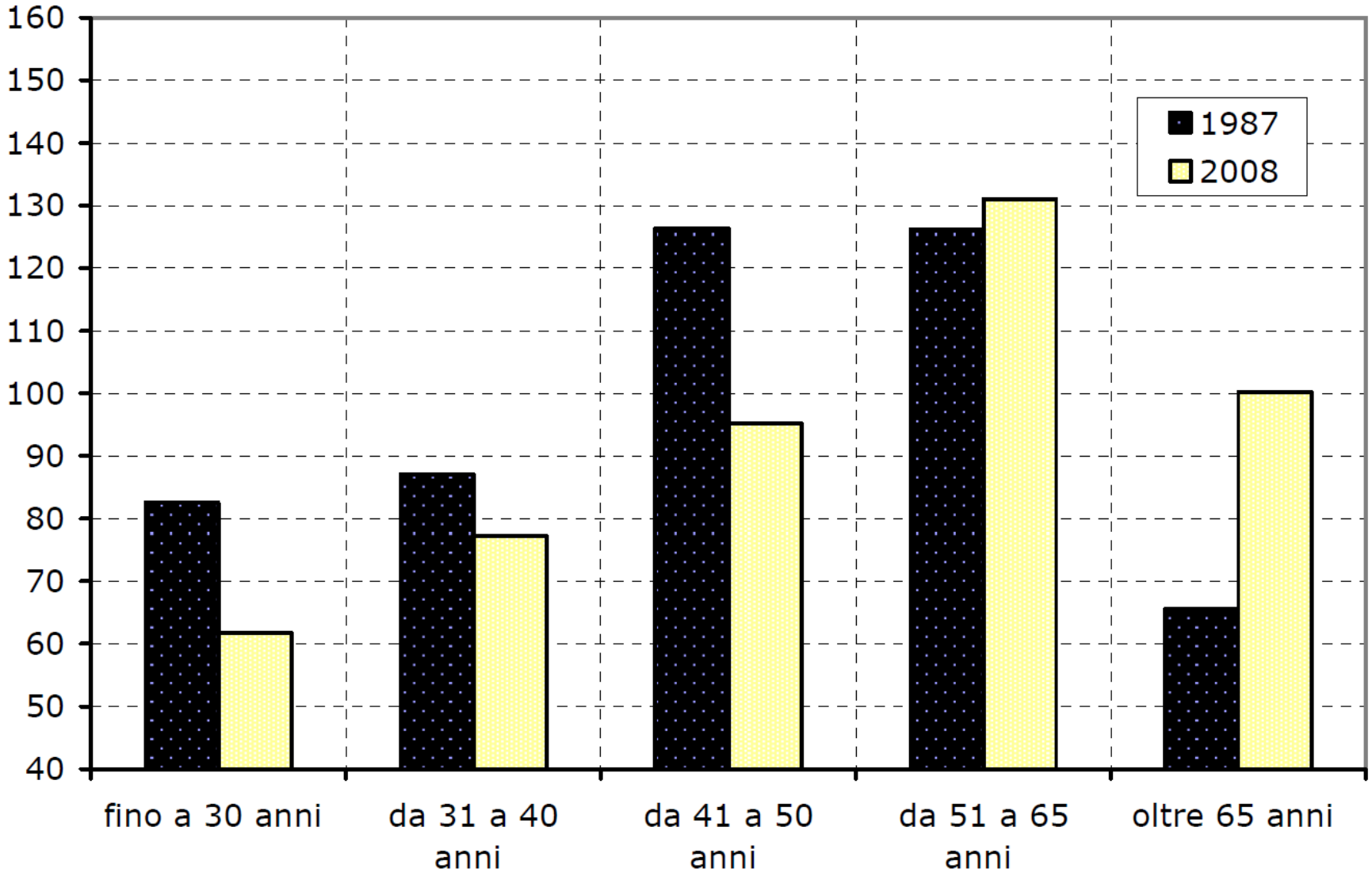


Fig. 3. *Ricchezza media per età, 1987-2008 (indice; media di anno = 100)*

A coherent framework

- Modern Heterogeneous Agents (HA) models allow for the equilibrium determination of the joint distribution of wages, hours worked, income, consumption, and wealth.

- Evidently, we need to establish whether their aggregate and distributional implications are consistent with the data.

- Krueger et al. (2010), and other papers in the same issue of the *RED*, in particular Heathcote et al. (2010) and Jappelli and Pistaferri (2010), present a systematic empirical analysis of the time trends in the distributions for wages, hours worked, income, consumption, and wealth for nine countries.

- Those papers organize the data in a way that is consistent with standard macroeconomic theory.

Household's budget constraint

- Consider the budget constraint of a household in a typical HA model:

$$c + a' = y^L + a + y^A + b + T.$$

- Definitions:
  - c: consumption expenditure,
  - a': value of future asset holdings,
  - y^L: pre-tax labor earnings of all members,
  - a: value of beginning-of-period assets,
  - y^A: private asset income,
  - b: net private inter-vivos and bequest transfers,
  - T: transfers minus taxes from the government.

Household's budget constraint

- If labor supply is endogenous, pre-tax labor earnings of a household with two potential earners can be written as:

$$y^L = w_m l_m + w_f l_f$$

  where l_j represent hours worked and w_j hourly wages.

- Wages are assumed to follow an exogenous stochastic process.

- We will discuss the evolution over time of
  - hours worked, l_j,
  - pre-government income, $y^L + y^A + b$,
  - disposable income, $y^D = y^L + y^A + b + T$,
  - consumption, c,
  - wealth, a.

Data sources

- For the US:
  - **Current Population Survey** (CPS): source of official US gov. stats on employment and unemployment; representative of the civilian non-instit. pop.; the unit of obs. is a housing unit.
  - **Panel Study of Income Dynamics** (PSID): a longitudinal study of a sample of US individuals and the family units in which they reside; originally designed to study the dyn. of income and poverty.
  - **Consumer Expenditure Survey** (CEX): the only US data set that provides detailed information about household cons. expenditures.
  - **Survey of Consumer Finances** (SCF): managed by the Board of the FED, it's the best source of micro-level data on household-level assets and liabilities.
- For Italy:
  - **Survey of Household Income and Wealth** (SHIW), a rep. survey of the Italian pop. conducted by the Bank of Italy.

Micro data vs. NIPA

- In all countries, the **time trends** in PER CAPITA INCOME from *NIPA* are reproduced well by the corresponding micro data, although the levels tend to be understated a bit.

- In just about all countries, the PER CAPITA CONSUMPTION **levels** from micro data are *significantly* lower than the corresponding *NIPA* figures.
  - This can partly be attributed to differences in the definition of consumption.

- In most countries, the **trends** in PER CAPITA CONSUMPTION from the micro data line up well with the corresponding *NIPA* data.
  - Exceptions: *US* and *UK*, who show a slower growth of consumption based on micro data.

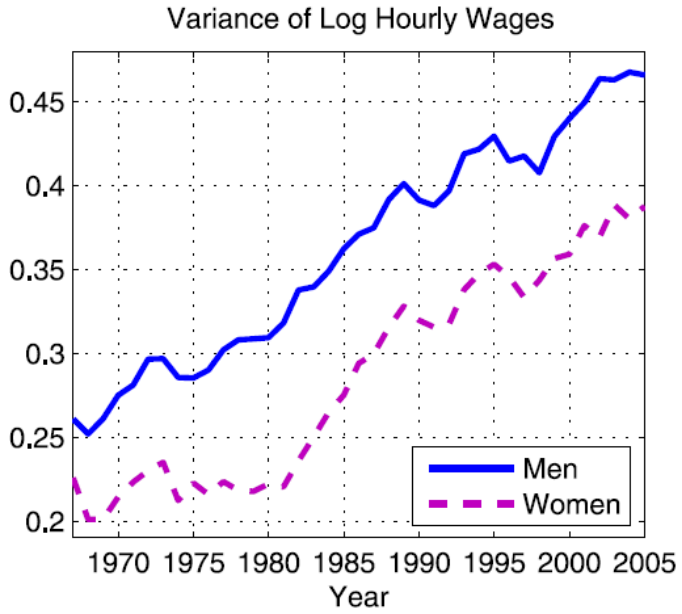
Wage inequality and wage premia

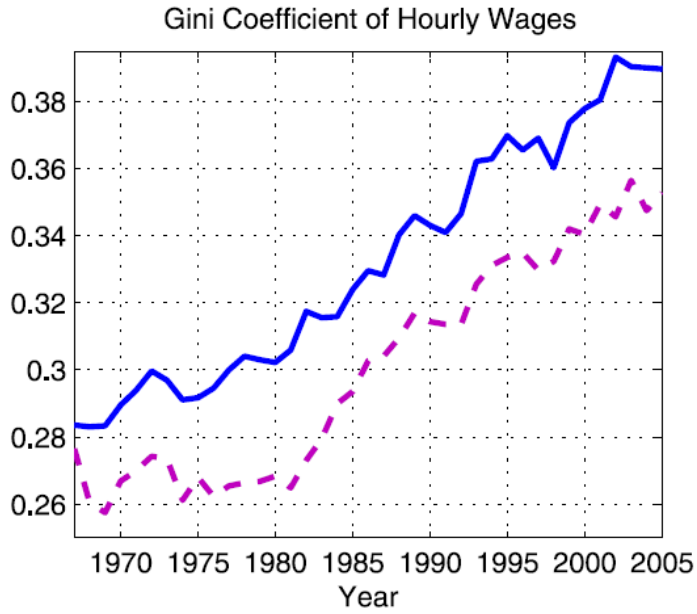
Wage inequality and wage premia.

Country	Level in year 2000				Change				
	Var. log w	College premium	Exp. premium	Gender premium	College premium	Exp. premium	Gender premium	Var. log w	Period
Canada	0.45	1.80	1.32	1.33	0.22	0.31	−0.11	0.17	1978–2006
Germany	0.27	1.38	1.27	1.28	−0.08	0.22	−0.15	0.05	1983–2003
Italy	0.17*	1.51	1.34	1.03	−0.08	0.11	−0.05	0.03	1987–2006
Mexico	0.62	1.88	1.23	1.21	0.40	0.22	−0.06	0.04	1989–2002
Russia	0.77*	1.50	1.05*	1.49	−0.06	0.05*	−0.07	−0.13*	1998–2005
Spain[a]	0.23	1.48	1.43	1.16	−0.33	0.07	−0.21	−0.18	1985–1996
Sweden[b]	0.18	1.61	1.20	1.22	0.14	−0.02	−0.05	−0.09	1990–2001
UK	0.33	1.62*	1.25*	1.32	0.12*	0.20*	−0.21	0.10	1978–2005
USA	0.44*	1.80*	1.38*	1.36	0.40*	0.28*	−0.25*	0.21*	1980–2006
Average	**0.38**	**1.62**	**1.27**	**1.27**	**0.11**	**0.17**	**−0.10**	**0.04**	

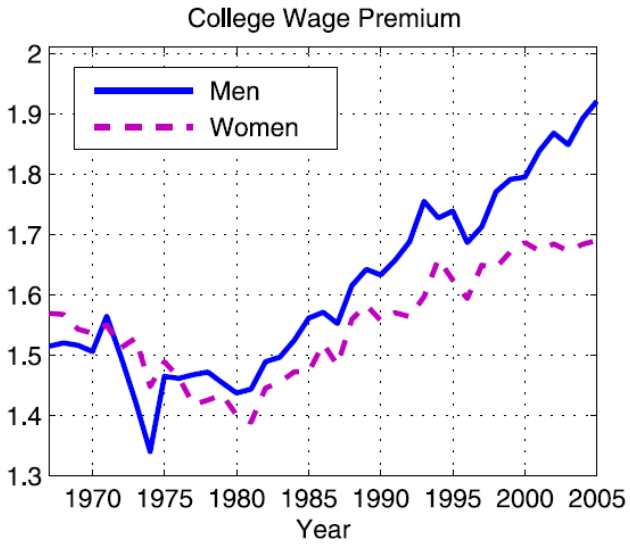
- Canada, UK, and US experienced a **sharp increase** in wage dispersion: the var. of male log w rose by ~40% over 1980-2005.
- Among continental Europe countries, only Spain and Sweden feature a recognizable trend: a **sharp decline** in inequality.
- The skill premium **increased** in US, UK, Canada, and Mexico, and **declined** everywhere else.
- Finally, the gender gap **shrank** in every country but Sweden.

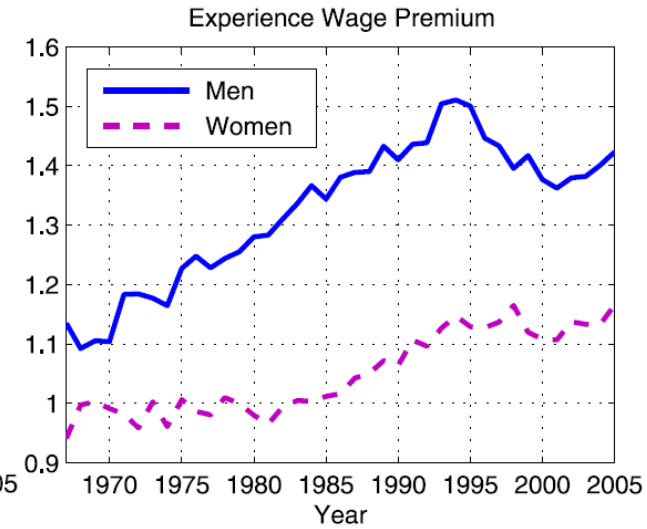
Wage inequality in the US (above) and Italy (below)

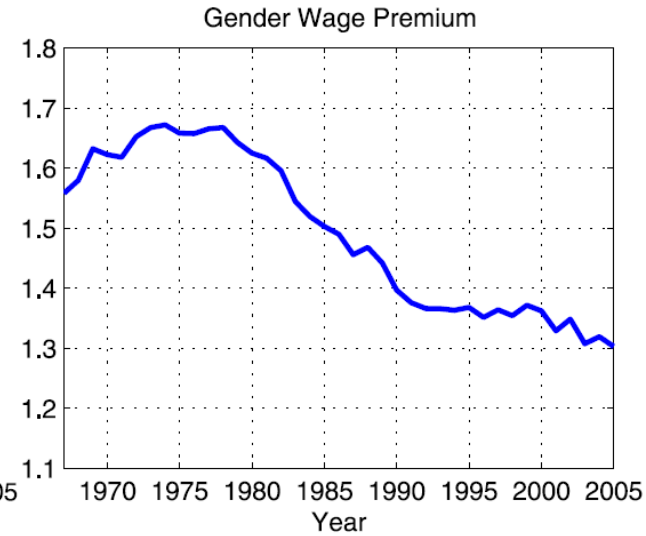


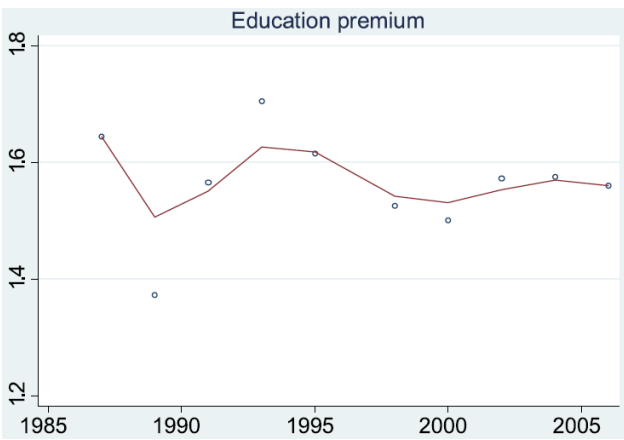


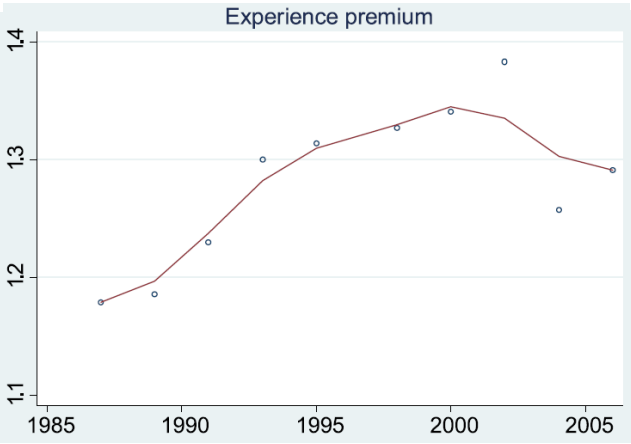
Wage premia in the US (above) and Italy (below)

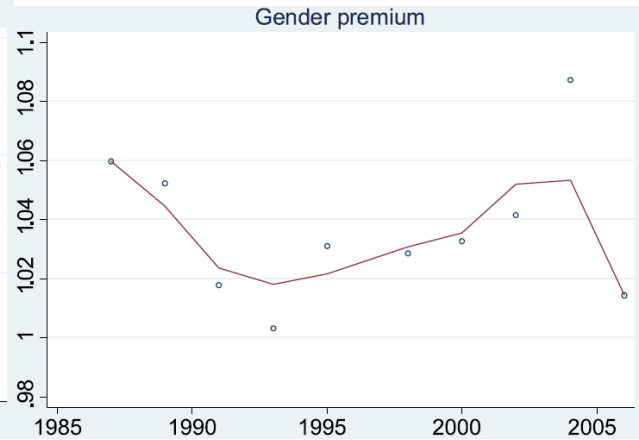












From wages to individual earnings

- Inequality is systematically **larger** in ind. earnings than in wages.
- We can decompose the **variance of log earnings** as:

$$Var\left[ln\left(y^{L}\right)\right] = Var\left[ln\left(w\right)\right] + Var\left[ln\left(l\right)\right] + Cov\left[ln\left(w\right), ln\left(l\right)\right].$$

- The **dispersion** of log hours is sizable, especially for women.
- The **correlation** between log wages and log hours is generally negative, between -0.1 and -0.3, but close to zero for women.
  - This may happen when income effects dominate.
- In US, UK, and Canada wage dispersion rises steadily since 1975, dispersion in hours remains constant for men, but falls for women, while wage-hours correlation increases steadily until the mid 80s.
- Result: a **sharp rise** in individual earnings inequality compared to wage inequality, in particular for men.

Individual earnings inequality in the US

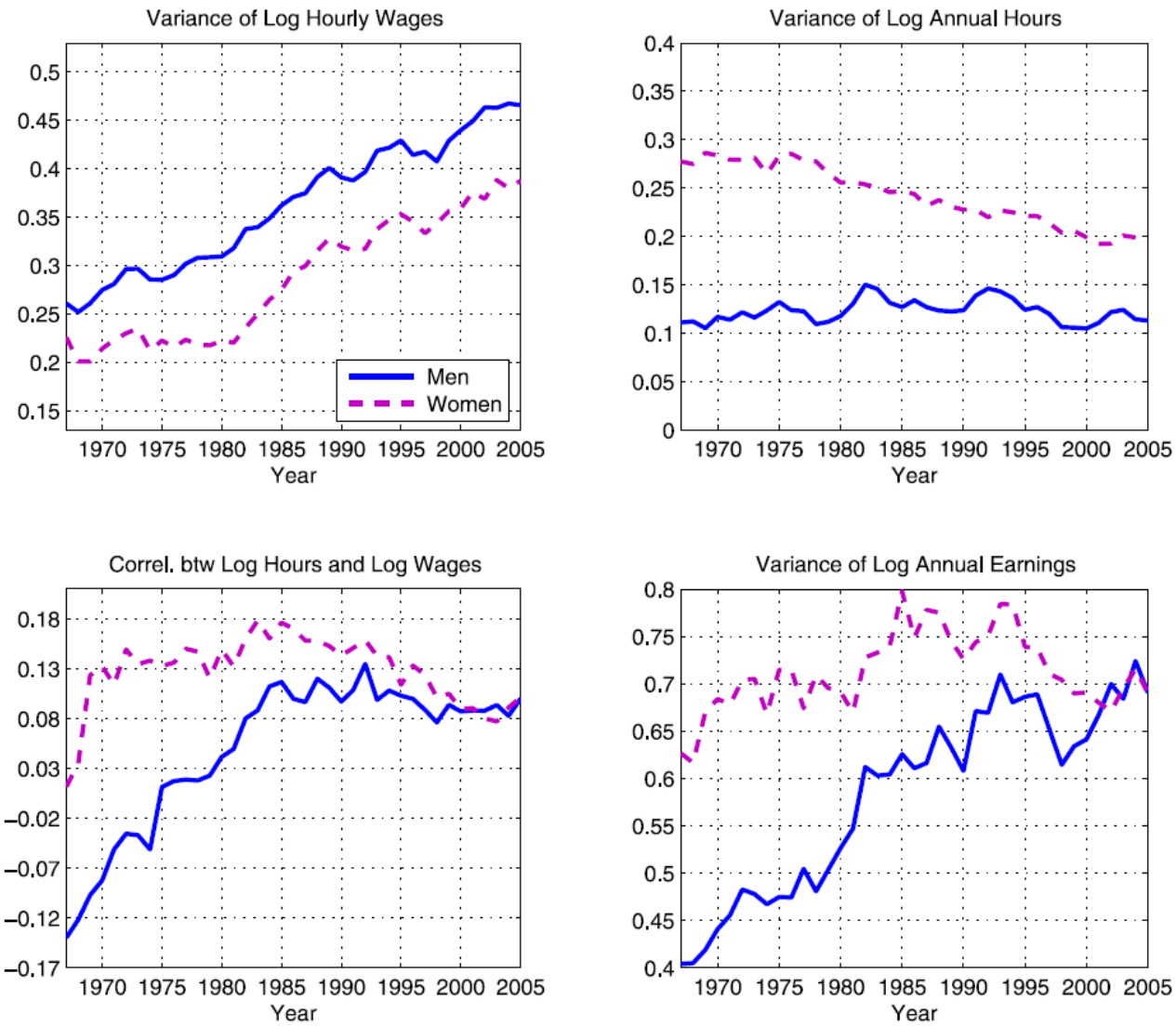
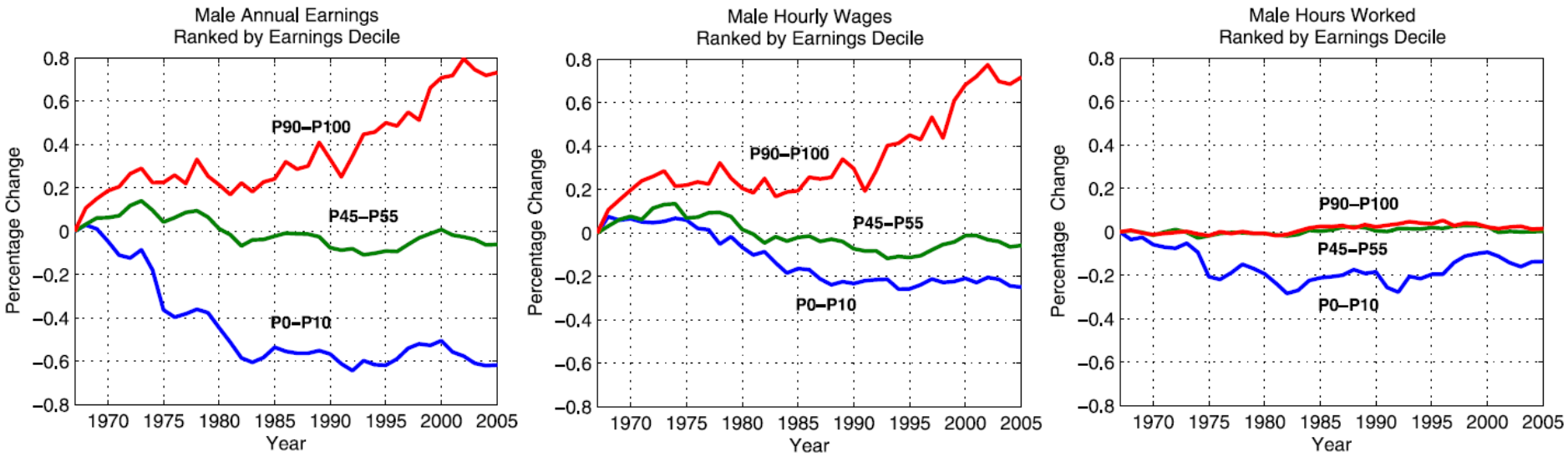


Fig. 6. Inequality in labor supply and earnings of men and women (CPS).

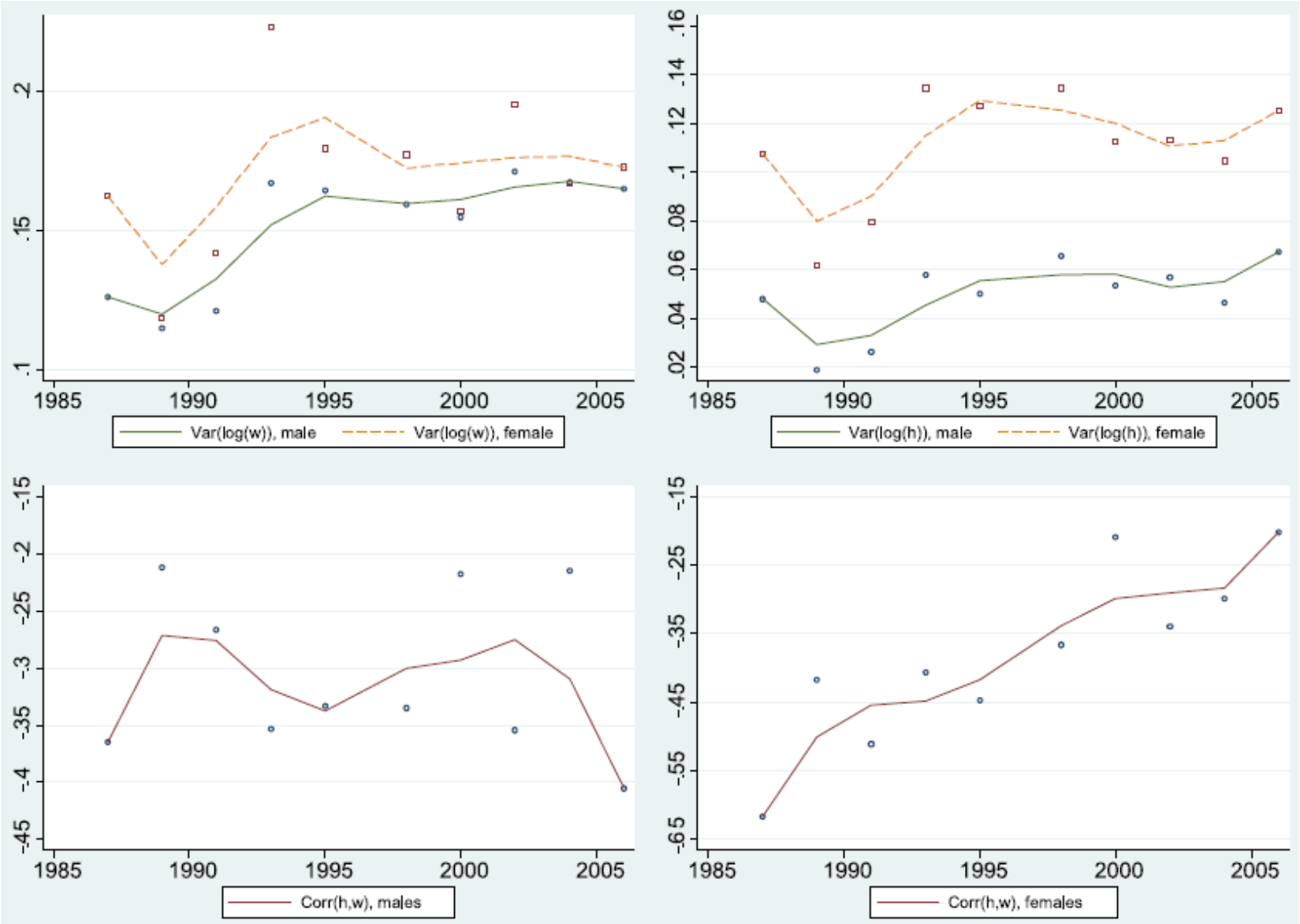
Individual earnings inequality in the US



- The decline in agg. demand and skill-biased tech. change during the 70s translated into a moderate fall in wages **and** hours for low skilled men, because of unions and the minimum wage; the weakening of these constraints in the 80s reversed the dynamics.

- Labor demand shifts in favor of skilled workers increased both their wage and earnings, without much effect on hours.

Individual earnings inequality in Italy



From individual earnings to disposable income

- **Family labor supply** - The impact of family labor supply is *unclear*: in some countries, households earnings are more disperse than individual earnings, in others the opposite is true.

- **Private transfers and bequests** - The magnitude of private transfers is generally *tiny*; exceptions are Italy and Mexico, where inequality drops considerably once private transfers are included.

- **Capital income** - Capital income has *little impact* on the var. of log income, because: *i*) median asset income is small; *ii*) capital income is often severely under-reported; *iii*) asset income is highly concentrated at the top.

- **Fiscal redistribution** - Fiscal redistribution *compresses* the level of inequality in every country studied; transfers have the largest effect on the bottom of the distribution, taxes on the top.

From disposable income to consumption

Level of inequality in year 2000.

Country	Bottom (50/10)			Top (90/50)		
	Disp. inc.	Cons.	Gap	Disp. inc.	Cons.	Gap
Canada	2.21	1.95	0.26	2.00	1.85	0.15
Germany	2.05	1.70	0.35	1.80	1.81	−0.01
Italy	2.45	1.91	0.54	1.93	1.88	0.05
Mexico	8.00	5.10	2.90	4.75	4.00	0.75
Russia	3.02	2.70	0.32	2.60	2.60	0.00
Spain*	2.04	1.82	0.22	2.00	1.90	0.10
Sweden	1.58	1.62	−0.04	1.64	1.73	−0.09
UK	2.82	NA	NA	2.08	NA	NA
USA	2.64	2.00	0.64	2.21	2.0	0.21
Average	**2.98**	**2.35**	**0.65**	**2.33**	**2.22**	**0.15**

* The level for Spain refers to year 1996.

- The relationship between inequality in disp. income and inequality in consumption is **very similar** across countries.
- Some **stylized facts**:
  - The level of inequality in disp. income is larger at the bottom that at the top of the distribution.
  - The level of inequality in disp. income is larger than inequality in cons.
  - The gap is larger at the bottom than at the top of the distribution.

Disposable income vs. consumption in the US

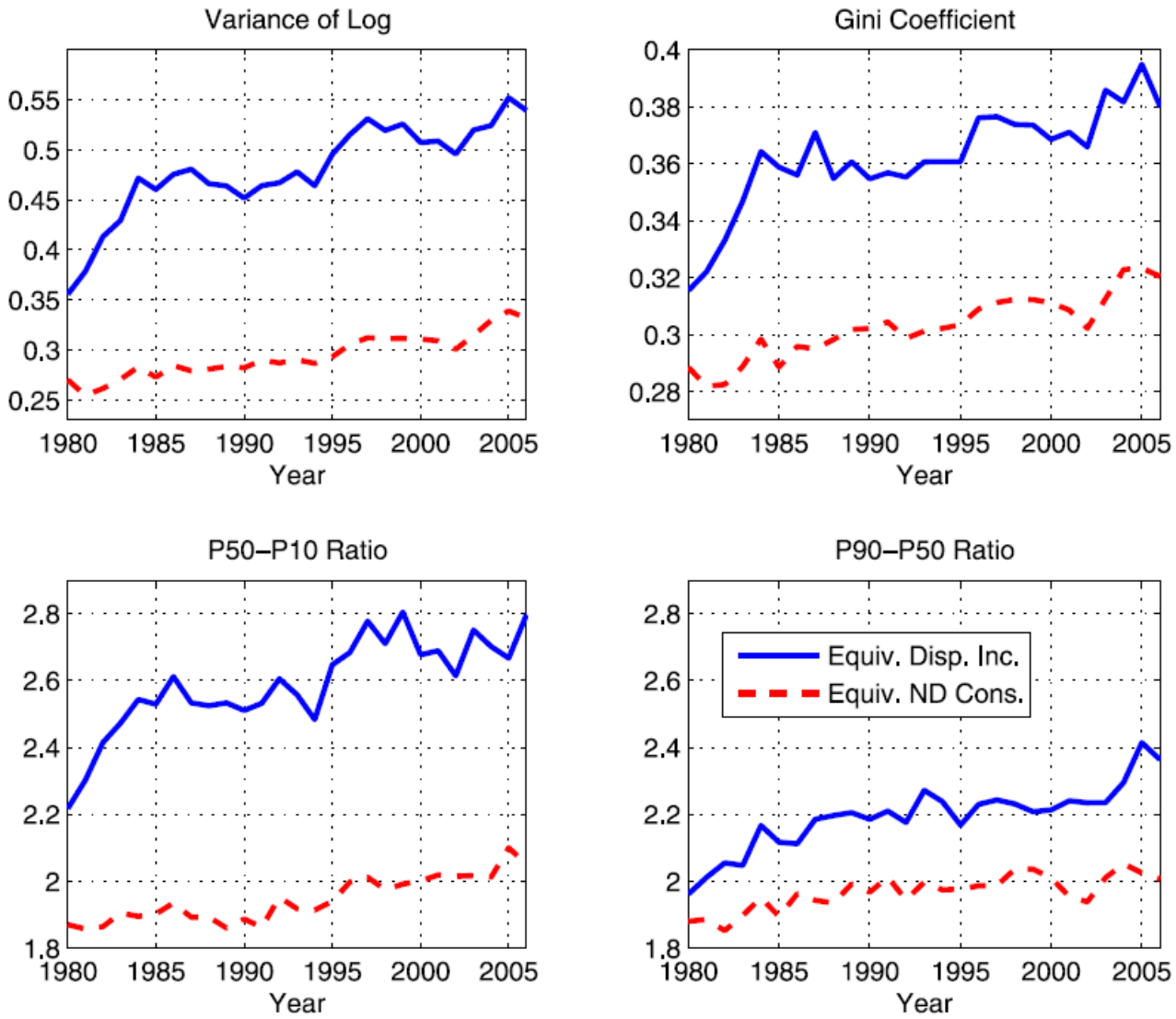
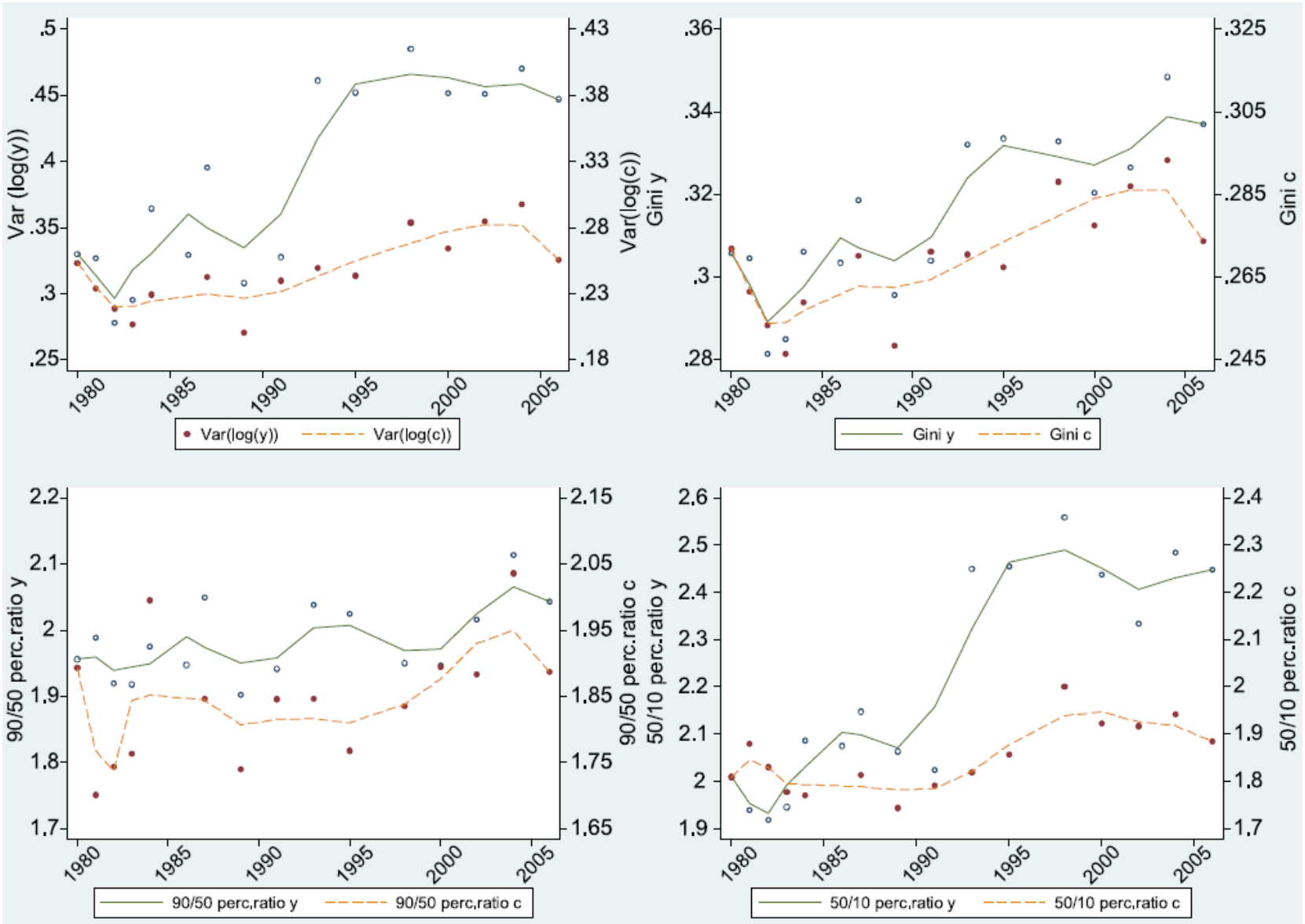


Fig. 13. From disposable income to consumption (CEX).

Disposable income vs. consumption in Italy



Inequality over the business cycle

- **Wages**: there is no clear cross-country pattern.
- **Earnings and hours**: during recessions earnings inequality at the bottom of the distribution increases badly, because of the rise in unemployment.
- **Disp. income**: the extent to which the increase in earnings inequality translates into a rise in disp. income inequality depends on country specific policies; generally, disp. income inequality increases less than earnings inequality during recessions.
- **Consumption**: in recessions, an increase in cons. inequality is generally observed, but this increases is smaller than the increase in disp. income inequality.
- **Wealth**: there seems not to be a strong link between wealth inequality and the business cycle.

Inequality over the life cycle

- Deaton and Paxton (1994) argued that the slope of the age profile for income and cons. inequality can be informative about the nature of the income process and insurance opportunities available to households.

- If income follows a random walk, then the age profile of income inequality should be non decreasing (actually linearly increasing if the var. of the shock is constant across ages).

- In a model with both trans. and perm. shocks and CRRA utility, cons. inequality is expected to grow less strongly than income inequality over the life cycle due to self-insurance.

- The larger the transitory shocks, and the more opportunities for partial insurance against permanent shocks, the larger this gap becomes.

Inequality over the life cycle

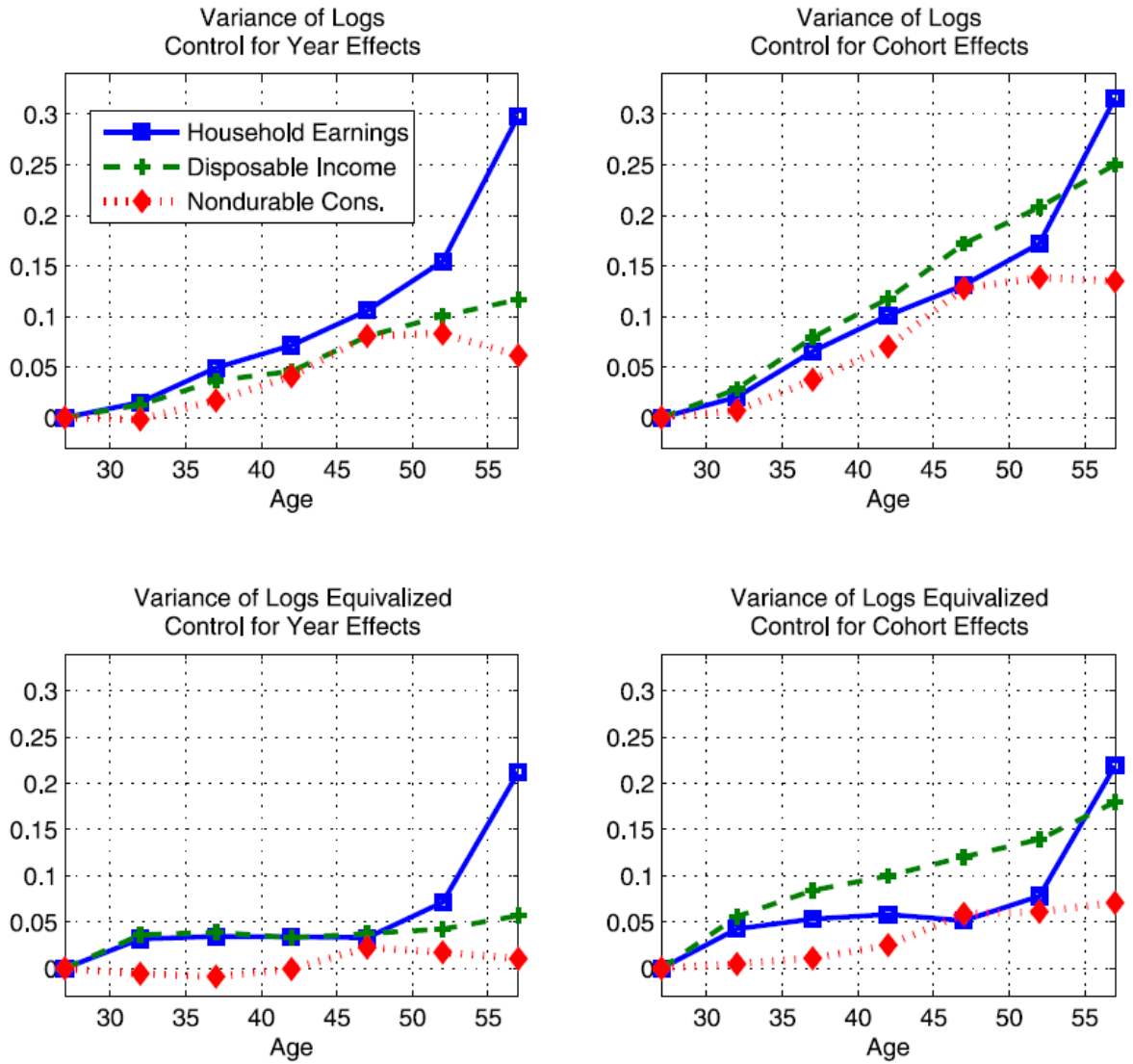


Fig. 14. Life-cycle inequality: controlling for time and cohort effects (CEX).

Does inequality matter for macro aggregates?

- OK, hopefully I managed to convince you that inequality is an empirically relevant feature of the real world. But does inequality really matter for macroeconomic aggregates?

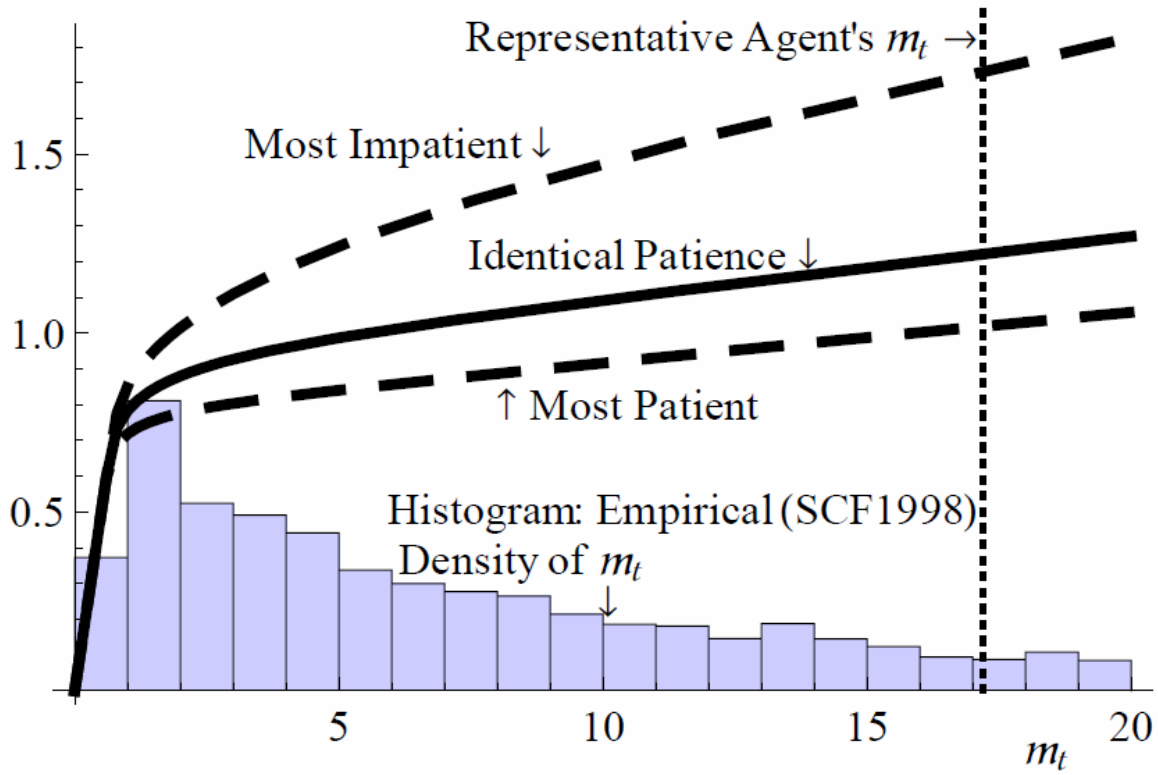


Figure 1 Consumption and the m Distribution (ratios to quarterly income)

References I

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