FROM ENDOWMENTS TO WELFARE:
DIMENSIONS OF INEQUALITY ACROSS TIME AND SPACE

Fabrizio Perri
University of Minnesota, Minneapolis FED, CEPR and NBER

Based on works with Jonathan Heathcote, Dirk Krueger, Luigi Pistaferri and Gianluca Violante

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Review of Economic Dynamics special issue

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- RED special issue: consistently document facts about key dimensions of dynamics of cross-sectional facts in several countries

   - USA, UK, Canada, Italy, Germany, Spain, Sweden, Russia, Mexico

Plan of the talk

- Dynamics of inequality in United States
- Some cross sectional comparisons
- Dynamics of inequality in the 2009 crisis

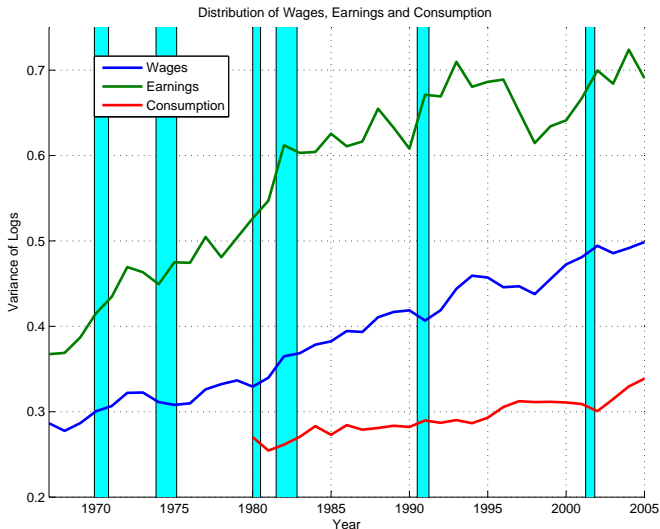# Economic inequality in the United States

Distribution of Wages
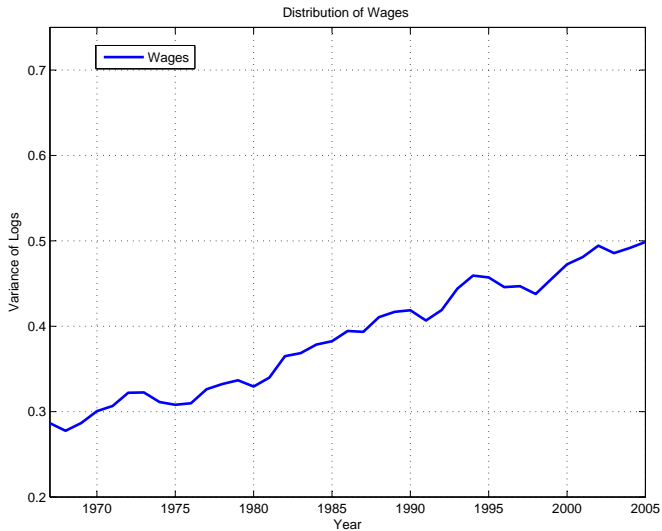
- Large and steady increase in wage inequality

Economic inequality in the United States

Distribution of Wages and Earnings
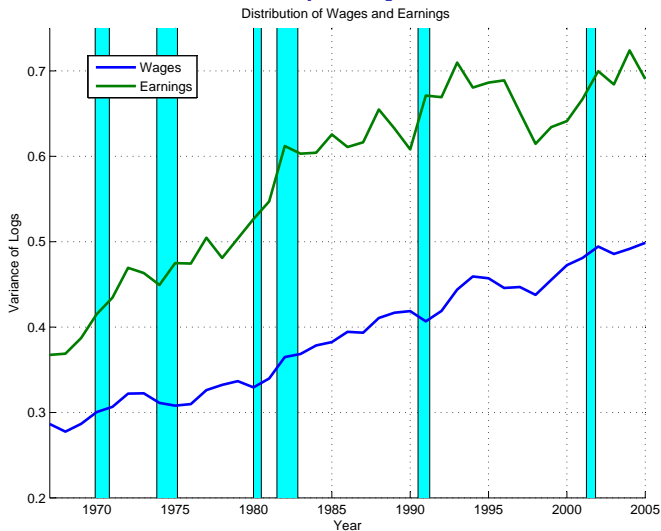
- Large and less steady increase in earnings inequality

Economic inequality in the United States

Distribution of Wages, Earnings and Consumption

- Smaller rise in household consumption inequality

From "endowments" to "welfare"

- Several intervening choices, institutions and shocks in between individual wages and household consumption

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  1. individual labor supply

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Aim of this work is to shed light on:

- transmission of inequality from endowments to welfare
- The connection between between dynamics of inequality and aggregate dynamics

Organizing device: household budget constraint

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

- w_i individual wage

- $w_i h_i$ individual labor supply

- $\sum_{i=1}^{N} w_i h_i$ family labor supply

- $\sum_{i=1}^{N} w_i h_i + T^P + d$ family/social networks + financial markets

- $\sum_{i=1}^{N} w_i h_i + T^P + d + T^G - \tau$ public transfers and tax system

- $c = ... + a - a'$ borrowing/saving/insurance

Four micro data sets representative of US population

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Sample selection

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

Macro facts in micro data

Macro facts in micro data

Wage & Salary Income Per-capita

Personal Income Per-capita (NIPA)
vs
Money Income Per-capita (CPS)
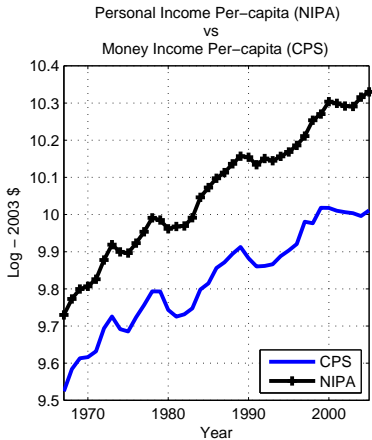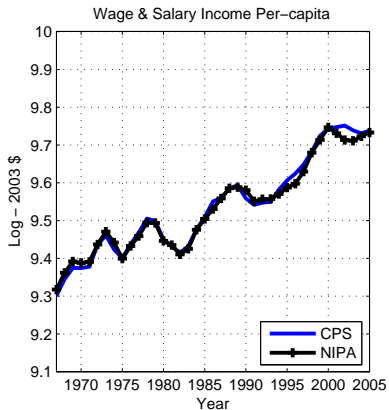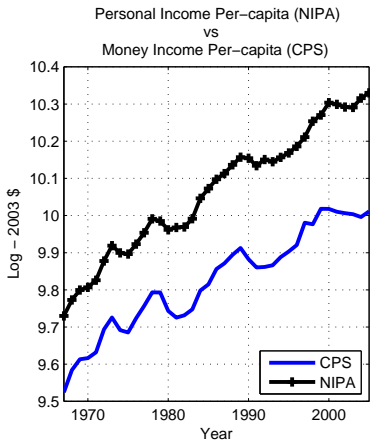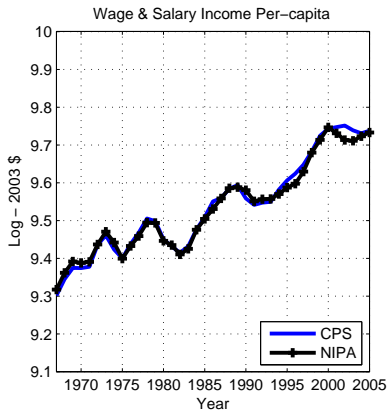
- Labor income p.c. in CPS aligns well with NIPA
- Income more volatile in CPS: "cash/in-kind" & "by/on behalf"

Accounting for labor income growth: males/females
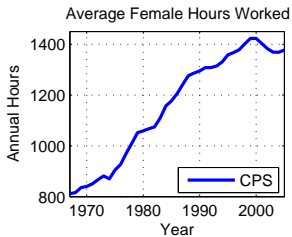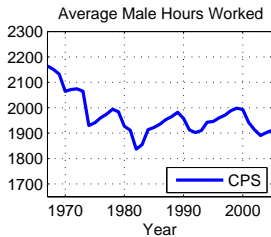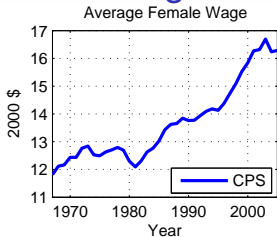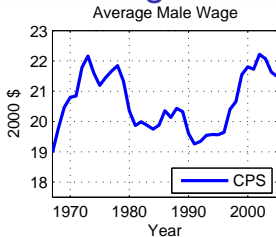
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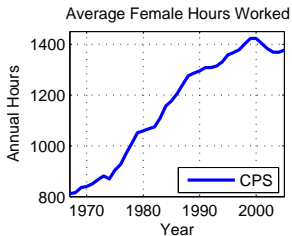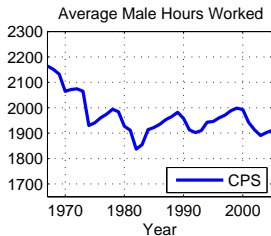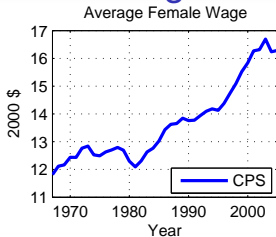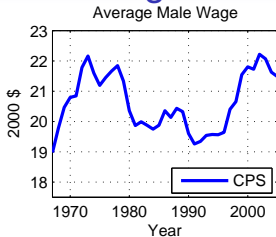
- 2/3 of the growth in labor income attributable to females
- The remaining 1/3 due to increased correlation btwn male wage and hours

Individual wage inequality in CPS: men
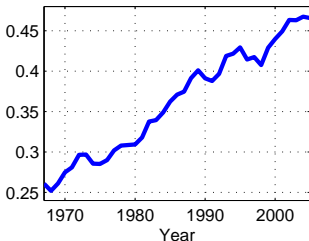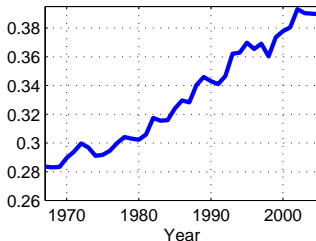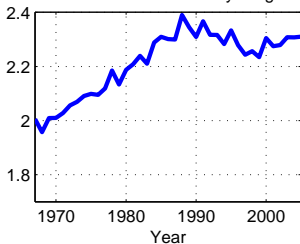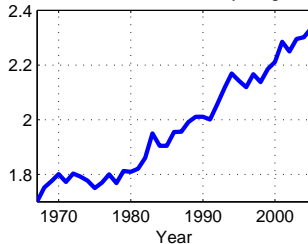
Decomposing wage inequality in CPS
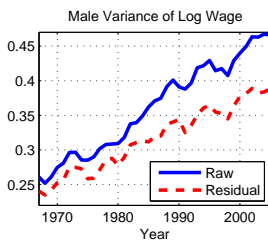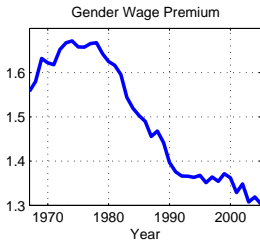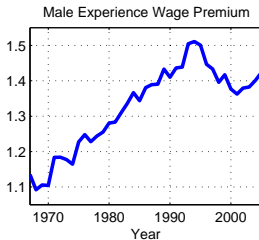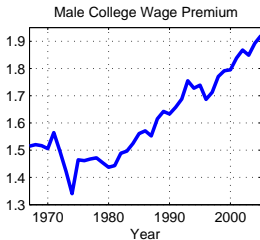
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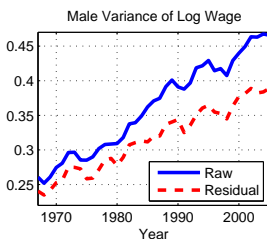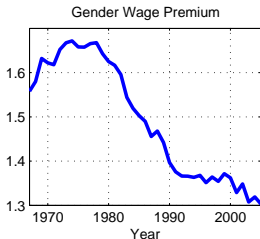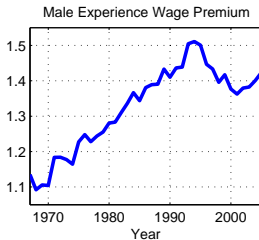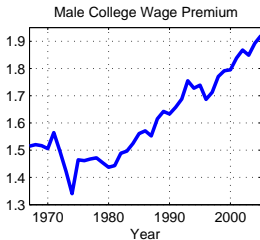
- Trend in residual dispersion robust to specification of regression

Wage Inequality in other countries

Country	Level in year 2000				Change				Period
	Var. log w	College premium	Exp. premium	Gender premium	College premium	Exp. premium	Gender premium	Var. log w	
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	

A * indicates the statistic is from data on males only. Wage premia and wage dispersion for women is typically smaller.

(a) Data on changes refer to after-tax annual earnings

(b) Data on levels is for 1992

Recap: individual wage inequality

1. In US Continuous increase since late 1960s

   - 1970s: concentrated at the bottom
   - 1980s: throughout the distribution
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2. Two-thirds of the increase is residual

   - virtually 100% residual in the 1970s
   - only about 50% residual after 1980

   - In other countries rather different experiences: points to the important role of national institutions

Role of individual labor supply: CPS men
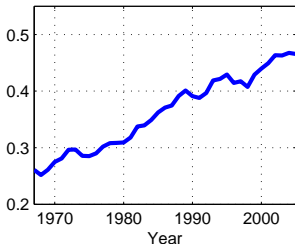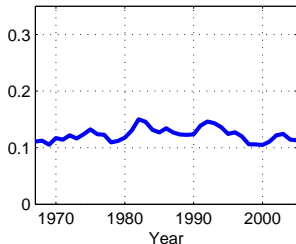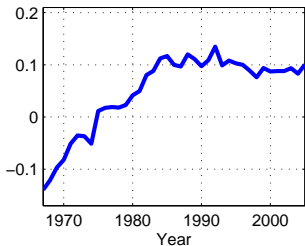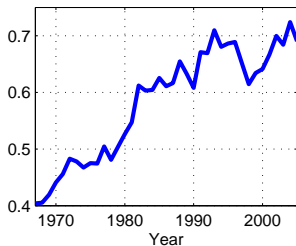
Understanding men earnings inequality
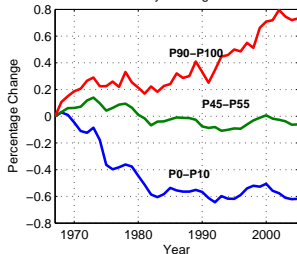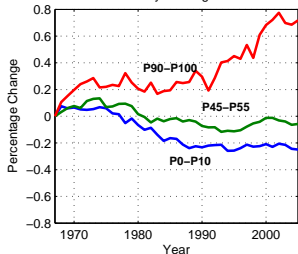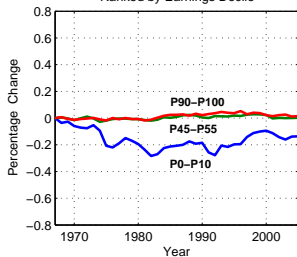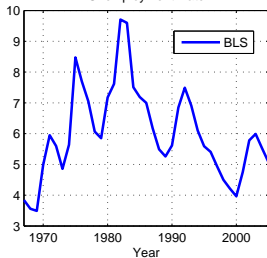
# Recap: men's earnings inequality

1. Steady increase, until early 1990s

   - During 1970s-1980s, rise is twice as big as for wages

2. Reflects rising correlation between wages and hours worked

   - Driven by workers in the bottom half of the distribution, whose hours strongly affected by unemployment dynamics

3. After the 1990s compression at the bottom, driven by hours increasing inequality at the top, driven by wages
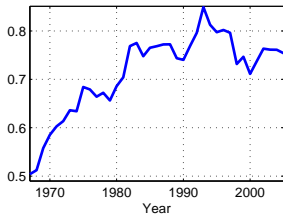
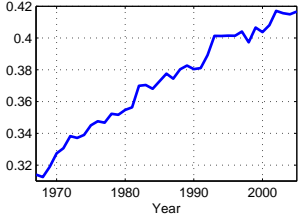# Wages and hours for women: CPS
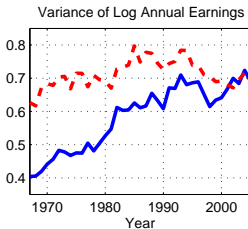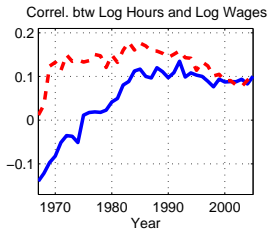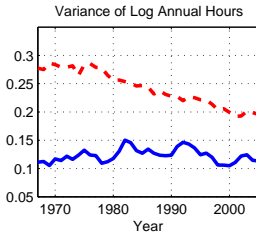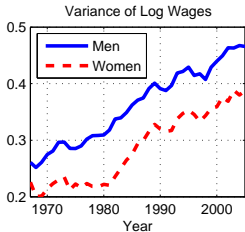
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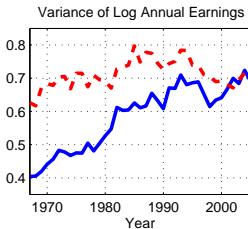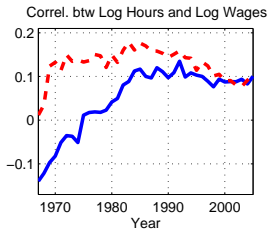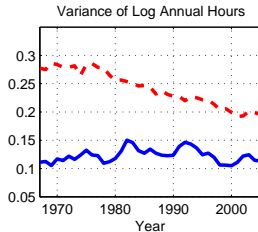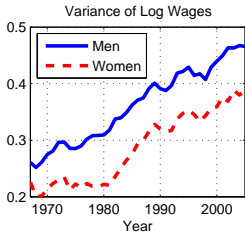
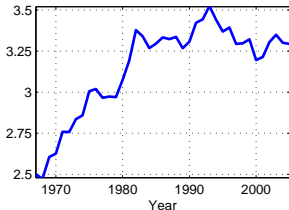- Women increasingly like men

From individuals to households
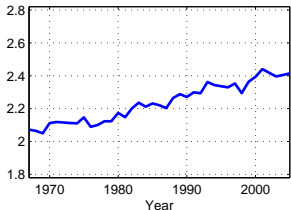
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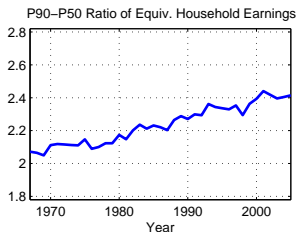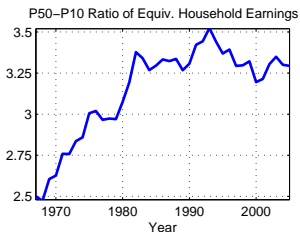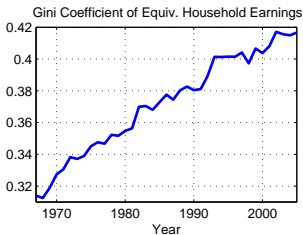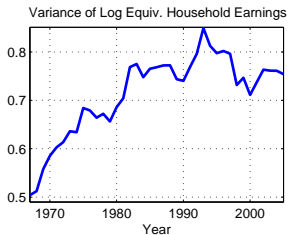
- Var and Gini relate to bottom and top of distribution, respectively

Factors affecting within-household insurance

Net effect

Variance of Log Earnings / Gini of Household Earnings — Main Earner, Household
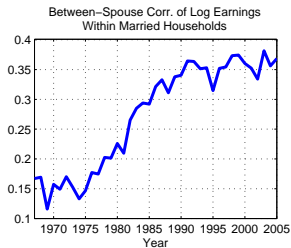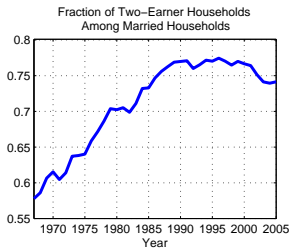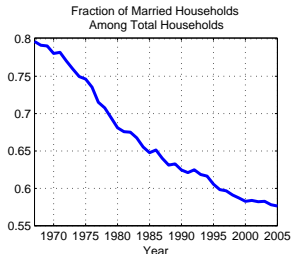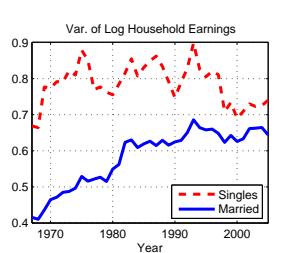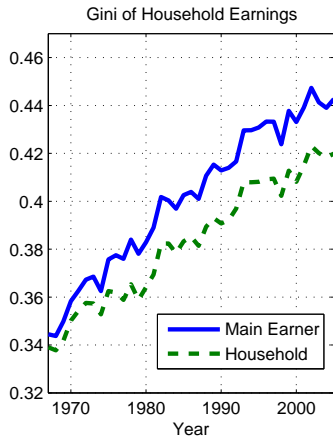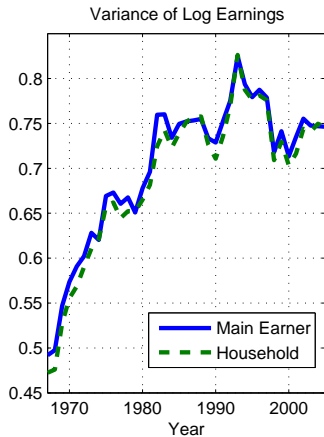
- Bigger role for within-household income pooling at the top?

Income pooling within the household

- Married households have lower dispersion (income pooling)
  - but... increasing fraction of singles

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- Net result: Small impact of secondary earners on inequality trends: larger in Gini (top) than in Var. (bottom)

    - Why so small at the bottom? More singles, fewer working spouses among poor households

Cyclicality of household earnings inequality

Equivalized Household Earnings

Cyclicality of household earnings inequality

Equivalized Household Earnings
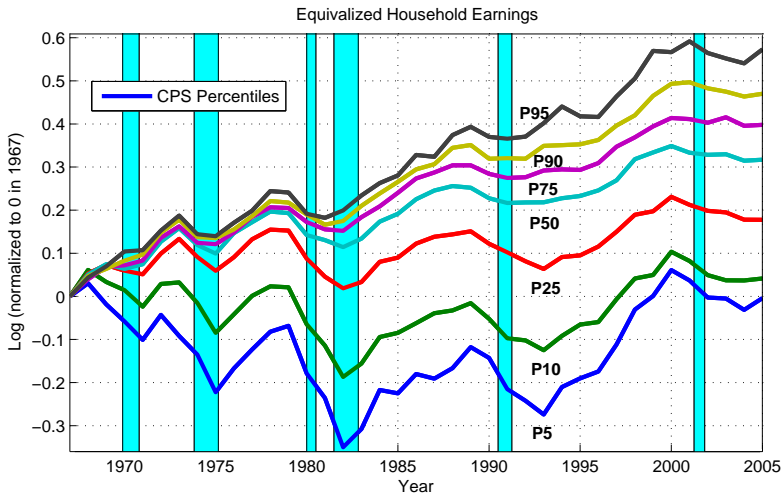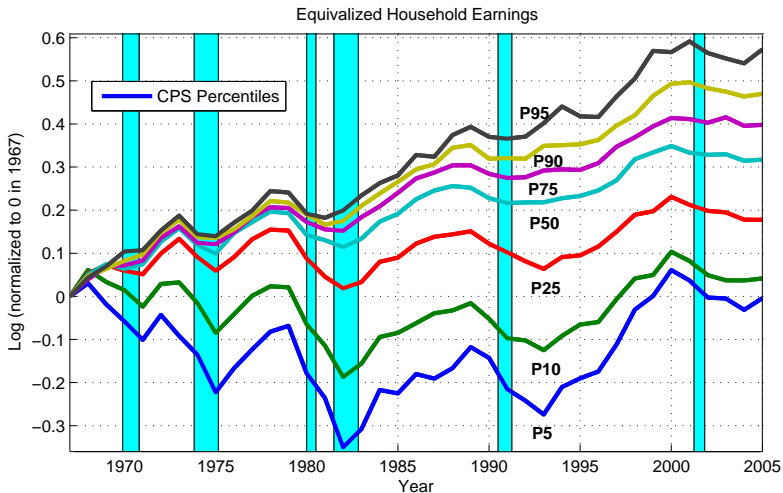
- Much more cyclicality at the bottom

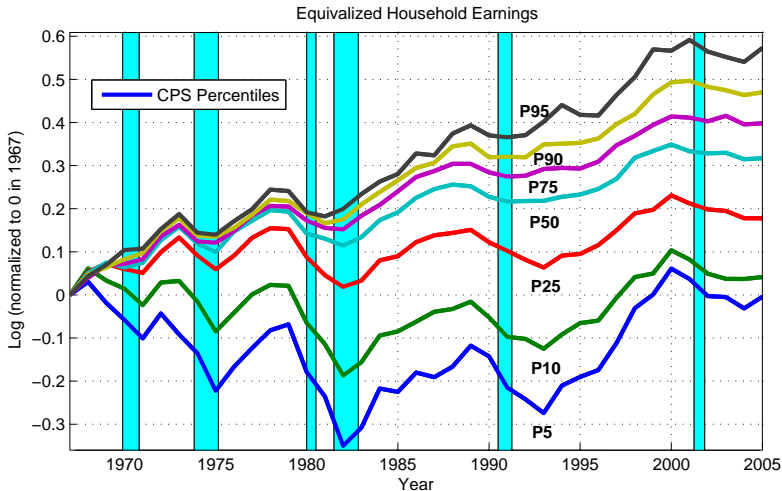# Cyclicality of household earnings inequality

Equivalized Household Earnings

- Earnings inequality widens in recessions (more on this later)

Role of private transfers

Role of private transfers

Variance of Log

Gini
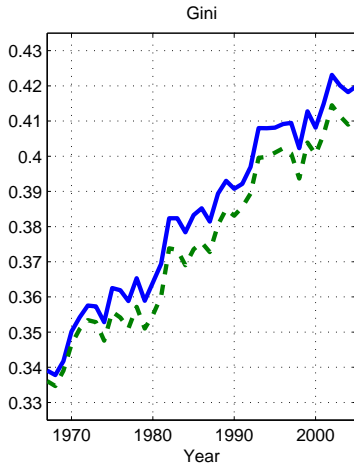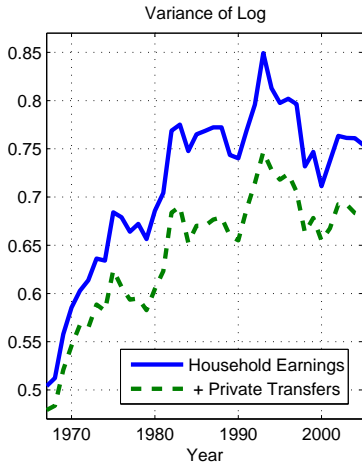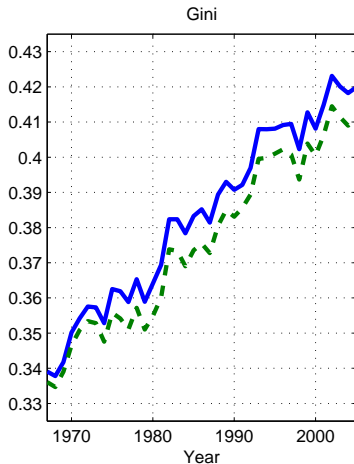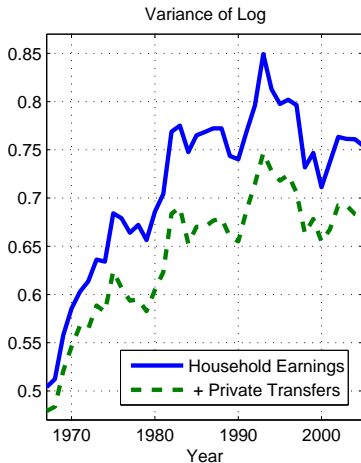
- Private transfers (mostly pensions) reduce level of inequality at the bottom

Role of asset income

Role of asset income

Variance of Log

Gini
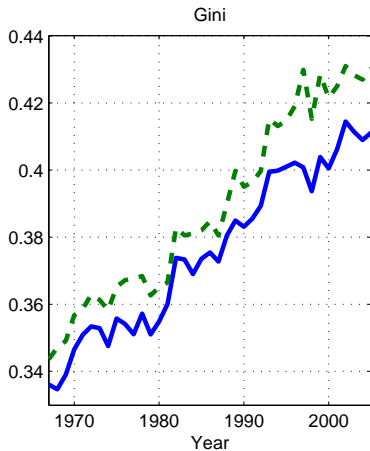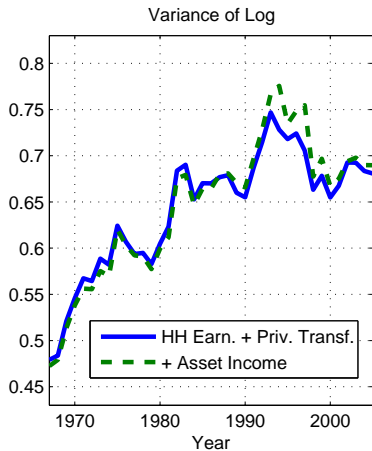
HH Earn. + Priv. Transf.
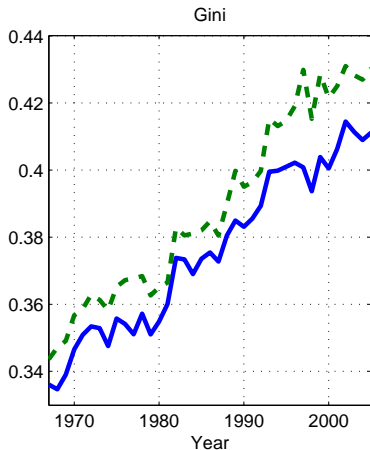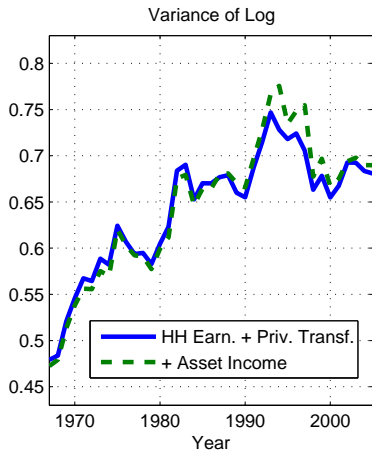
+ Asset Income

- Asset income amplifies inequality at the top

Role of public transfers

Variance of Log

Gini
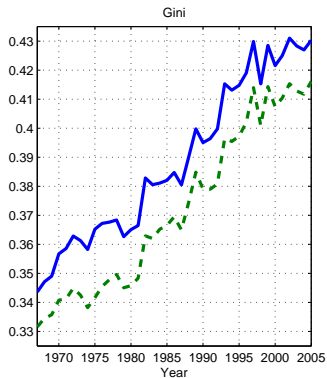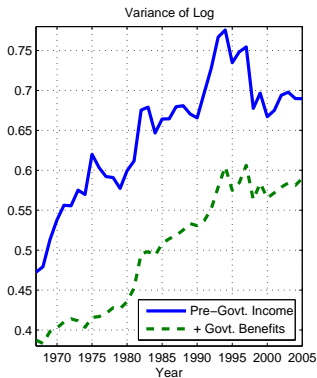
- Public transfers greatly reduce level of inequality at the bottom

Role of public transfers
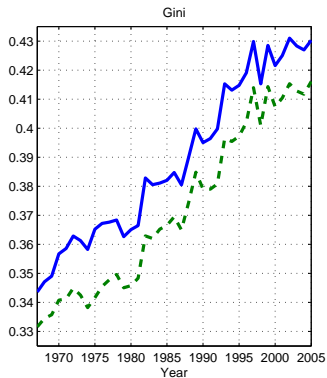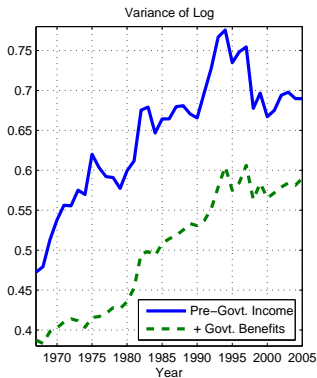
Variance of Log

Gini

- Public transfers greatly reduce level of inequality at the bottom
- Very effective in 1970s, much less after 1980s, reflecting lower unemployment, more on 2009 later

Role of public transfers
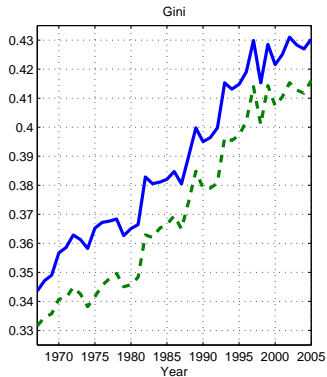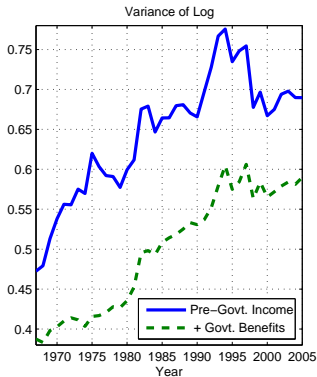
- Public transfers greatly reduce level of inequality at the bottom
- Very effective in 1970s, much less after 1980s, reflecting lower unemployment, more on 2009 later
- Cyclical variation at the bottom smoother after public benefits (UI)

Role of tax system

Variance of Log

Gini
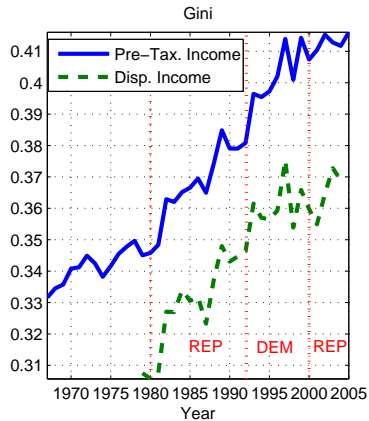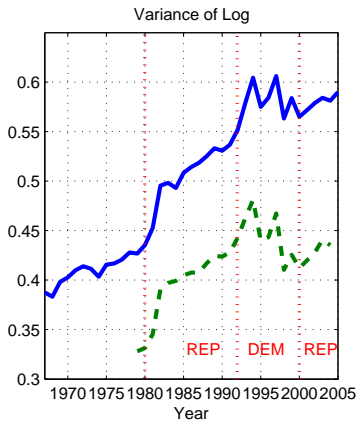
Role of tax system
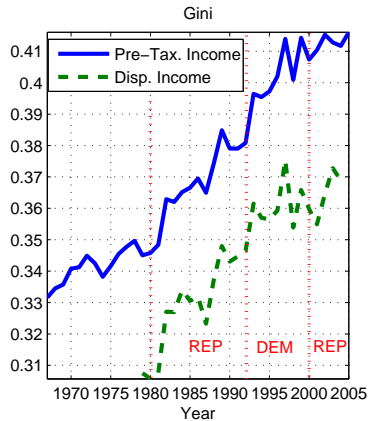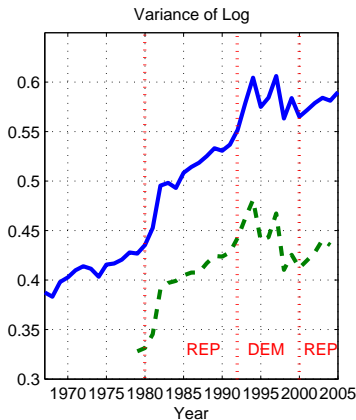
- Taxes greatly reduce level of inequality throughout the distribution

- Taxes have reduced rise of inequality at the bottom (introduction of EITC)

Role of government in other countries: var logs

Country	Level in year 2000		Change		Period
	Pre-gov. income	Post-gov. income	Pre-gov. income	Post-gov. income	
Canada	0.50	0.25	0.16	0.05	1978-2005
Germany	0.63	0.40	0.42	0.04	1984-2004
Italy[a]	0.72	0.73	0.06	0.07	1987-2006
Mexico	2.10	1.70	1.15	0.75	1989-2002
Russia[b]	0.86	0.60	-0.11	-0.09	1994-2005
Spain[c]	0.73	0.56	-0.20	-0.09	1993-2000
Sweden	0.95	0.38	0.36	0.05	1978-2004
UK[d]	0.55	0.32	0.22	0.13	1978-2005
USA	0.67	0.41	0.11	0.11	1979-2005
Average	**0.86**	**0.59**	**0.24**	**0.11**	

(a) Data on pre-gov. income are already after tax

(b) Data on pre-gov. income are already after tax and refer to working households

(c) Data on pre-gov. income are already after tax

(d) Data refer to households with at least one worker

Role of government in other countries: var logs

Country	Level in year 2000		Change		Period
	Pre-gov. income	Post-gov. income	Pre-gov. income	Post-gov. income	
Canada	0.50	0.25	0.16	0.05	1978-2005
Germany	0.63	0.40	0.42	0.04	1984-2004
Italy[a]	0.72	0.73	0.06	0.07	1987-2006
Mexico	2.10	1.70	1.15	0.75	1989-2002
Russia[b]	0.86	0.60	-0.11	-0.09	1994-2005
Spain[c]	0.73	0.56	-0.20	-0.09	1993-2000
Sweden	0.95	0.38	0.36	0.05	1978-2004
UK[d]	0.55	0.32	0.22	0.13	1978-2005
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The case of Sweden
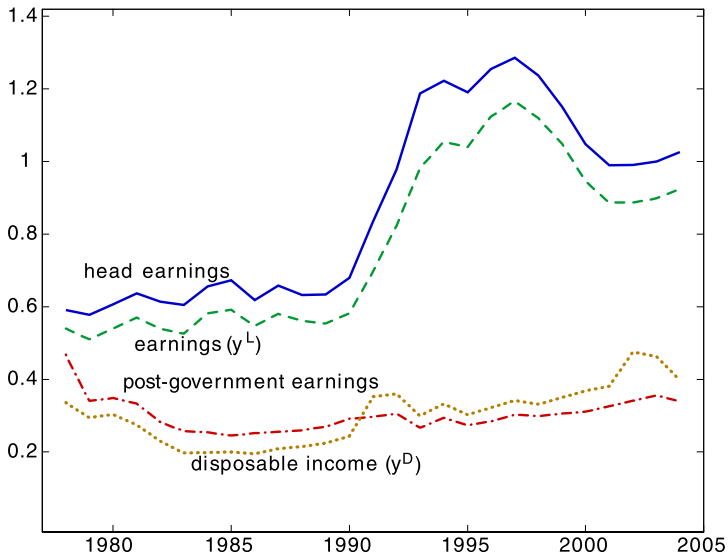
Recap: household income dispersion

- Private transfers somewhat reduce inequality at bottom

- Asset income increases inequality at the top, but it is underestimated

- Public transfers play a significant role for redistribution and stabilization – less since 1980s

- Taxes greatly reduce level and rise of inequality

- The impact of government policies on levels and trends of inequality qualitatively similar but quantitatively very different across countries

Macro facts in micro data: CEX

Macro facts in micro data: CEX

Macro facts in micro data: CEX

Income Per−capita | Nondurable Consumption Per−capita
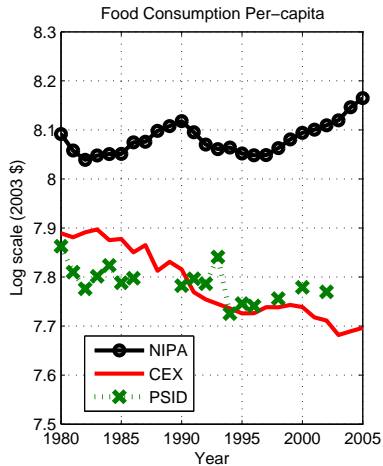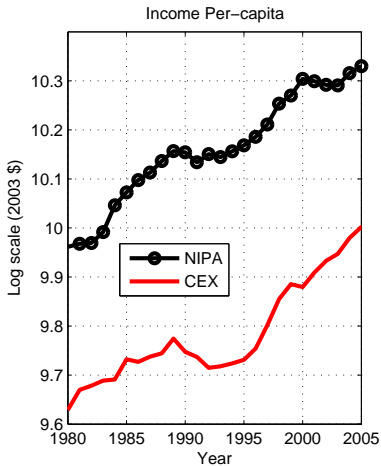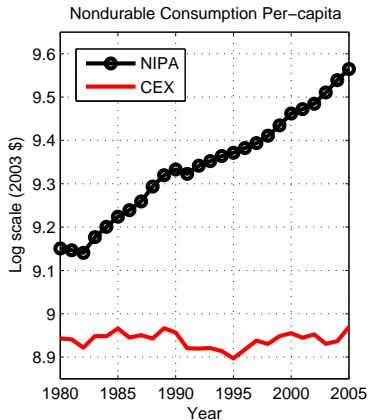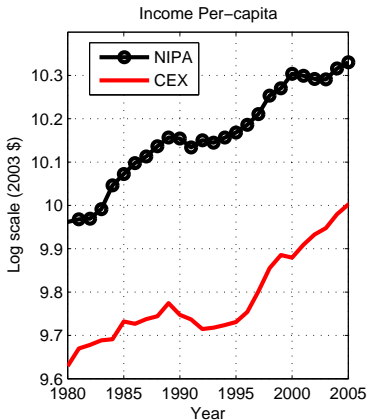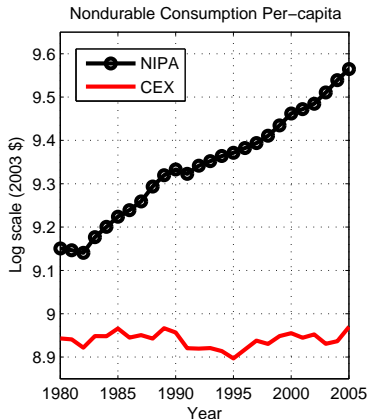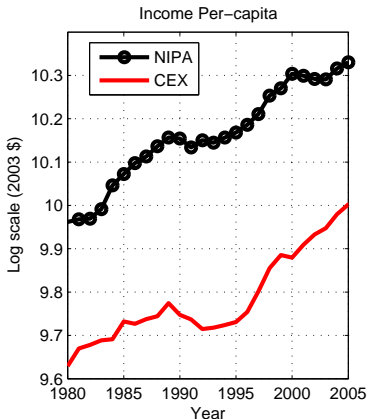
- Trends in consumption p.c. do not align well with NIPA
- Trends align much better in the 2003-2009 period

Comparison CPS-CEX: household earnings

Variance of Log   Gini
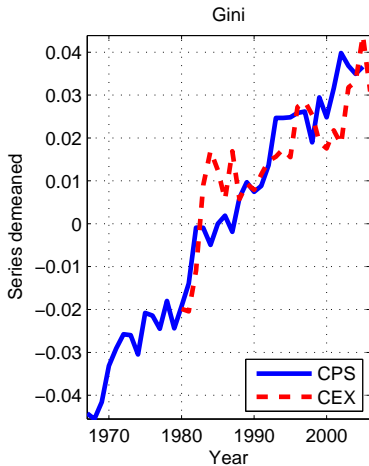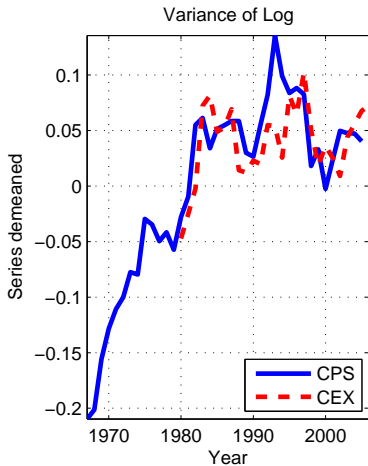
- Earnings inequality trends line up very well

Comparison CPS-CEX: disposable income
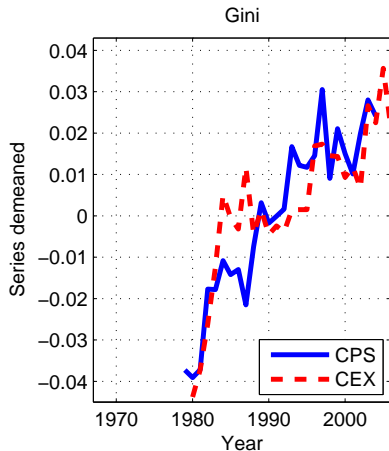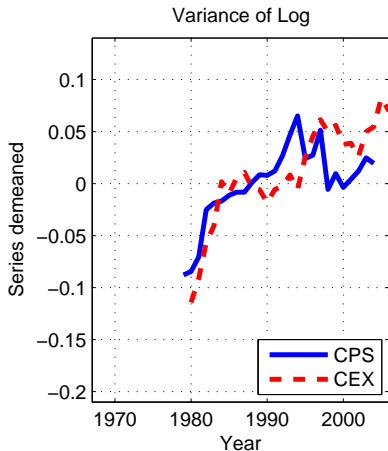
- Somewhat larger increase in CEX (taxes reported differently)

From disposable income to consumption
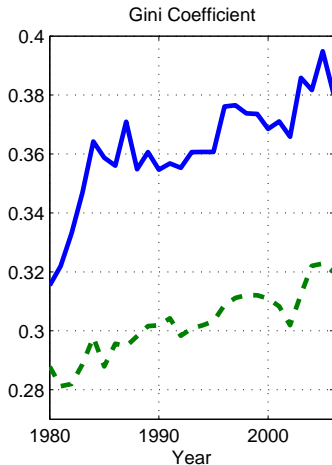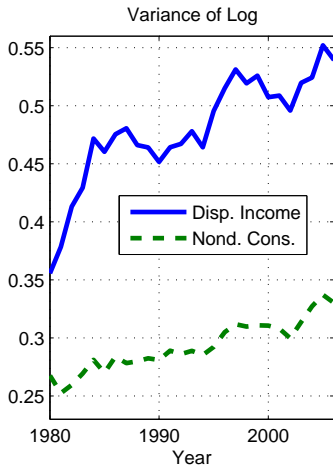
- Level con ineq. much lower than disposable income
- Δ cons. ineq. less than half than Δ disp. income ineq.

Contrasting compression at top and bottom
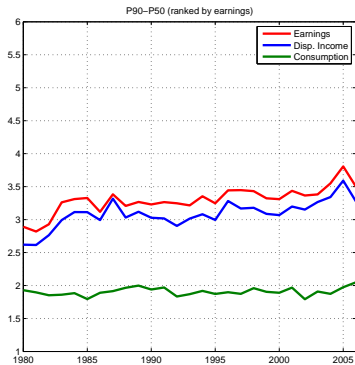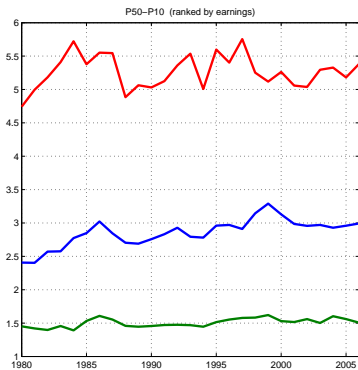
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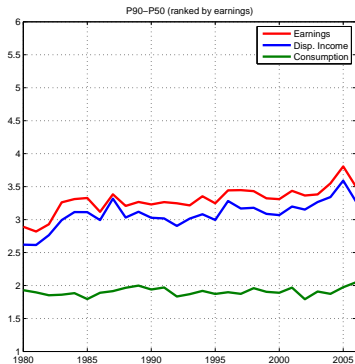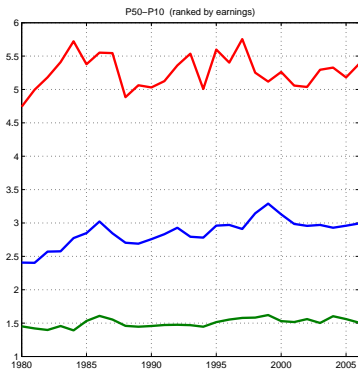
- More compression at the bottom than at the top, both from earnings to disp. income, and going from disp. income to consumption

Compression at the top and bottom in other countries

	Bottom (50/10)			Top (90/50)		
Country	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

Why more consumption compression at the bottom?

- Shocks that cause inequality at the bottom are more temporary
- More informal insurance
- Still an open research question

Changes in disposable income and consumption: top/bottom and other countries

Country	Bottom (50/10)			Top (90/50)			Period
	Disp. Inc.	Cons.	Gap	Disp. Inc.	Cons.	Gap	
Canada	0.38	0.20	0.18	0.10	0.07	0.03	1978-2006
Germany	0.35	0.00	0.35	0.15	0.10	0.05	1983-2003
Italy	0.22	0.09	0.13	0.05	0.01	0.04	1980-2006
Mexico	5.81	0.80	5.01	1.12	1.08	0.04	1989-2002
Russia	0.10	0.05	0.05	-0.16	-0.10	-0.06	1994-2005
Spain	-0.16	-0.13	-0.03	-0.18	0.01	-0.17	1985-1996
Sweden	0.13	0.02	0.11	0.21	0.10	0.11	1985-1998
UK	0.86	0.58	0.28	0.27	0.12	0.15	1978-2005
USA	0.55	0.25	0.30	0.40	0.15	0.25	1980-2006
Average	**0.91**	**0.21**	**0.71**	**0.22**	**0.17**	**0.05**	

Disposable income and consumption: a summary

- Disposable income inequality is higher and has increased more at the bottom than at the top
- Consumption inequality is smaller and has increased less than disposable income inequality

# Disposable income and consumption: a summary

- Disposable income inequality is higher and has increased more at the bottom than at the top
- Consumption inequality is smaller and has increased less than disposable income inequality
- The gap ("risk sharing") in level and growth is larger at the bottom than at the top

More on the link between disposable income and consumption
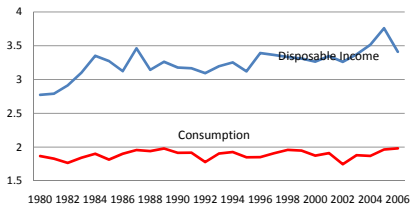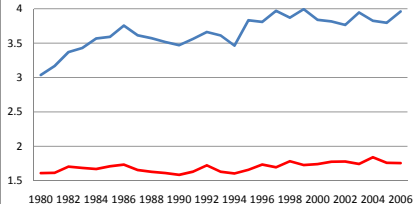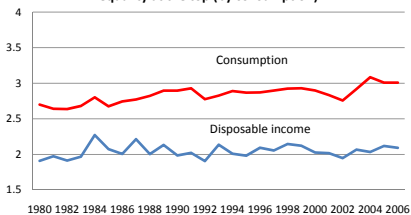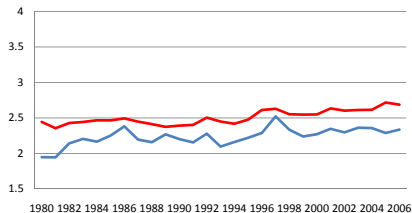
Why so little pass-through from income to consumption and why consumption inequality is increasing?

- Does the growing gap between income inequality and consumption inequality show up in wealth?

- Do independent movements in wealth drive consumption inequality?

- Turn to the Survey of Consumer Finances

Net worth-income ratios by income deciles (SCF)
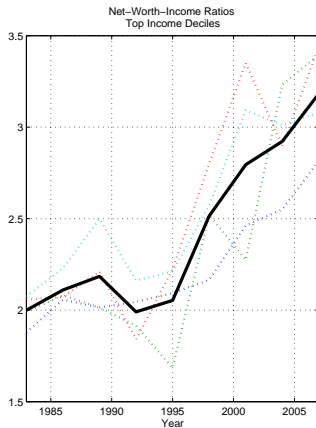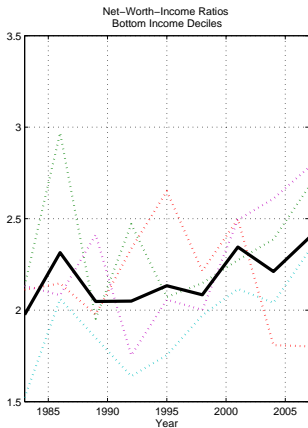
- Higher savings rates for high income households in the 1990s and 2000s

Thrift and luck

Unrealized K Gains–Income Ratios
Bottom Income Deciles

Unrealized K Gains–Income Ratios
Top Income Deciles
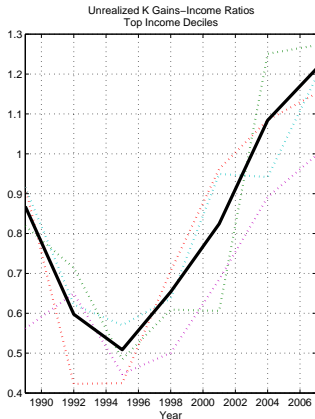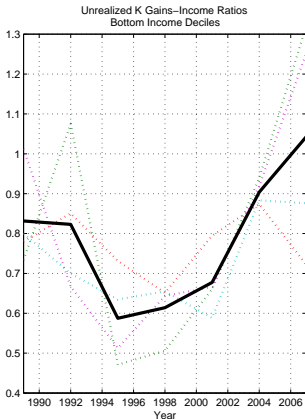
- Unrealized capital gains as a fraction of income differ across income distribution

A summary case study: The 2008 crisis

- Use recently available income and consumption cross section from 2008 CPS and CEX
- Pro: Consumption in CEX over the last 5 years tracks NIPA much better
- Caveat: the full extent of the crisis is not there yet

2008: Earnings dispersion, Consumption compression!
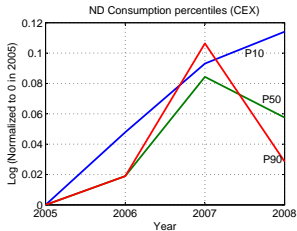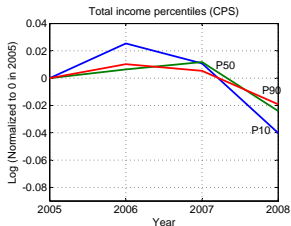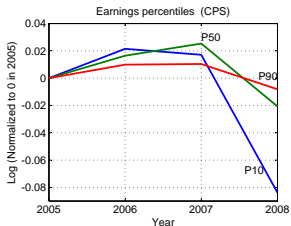
Conclusions

- To understand evolution of inequality and its implications for welfare need to consider explicitly choices/institutions that mediate between wages and consumption/leisure

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- Inequality increases permanently in recessions ⇒ unified theory of business cycles and long-run trends for inequality

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Conclusions

- To understand evolution of inequality and its implications for welfare need to consider explicitly choices/institutions that mediate between wages and consumption/leisure
- Inequality increases permanently in recessions ⇒ unified theory of business cycles and long-run trends for inequality
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Conclusions

- To understand evolution of inequality and its implications for welfare need to consider explicitly choices/institutions that mediate between wages and consumption/leisure
- Inequality increases permanently in recessions $\Rightarrow$ unified theory of business cycles and long-run trends for inequality
- Level and rise in consumption inequality smaller than rise in income inequality: transitory shocks, more insurance, both?
- Income inequality and its impact on consumption different at the top and bottom

- Independent role of wealth shocks on consumption inequality
- Current recession: in 2008 government policies have limited the increase of income inequality, wealth declines have lead to compression in consumption inequality

Saving and borrowing

- Scope for self-insurance via saving/borrowing depends on persistence of shocks

- Estimating persistence requires panel data: PSID

  - Permanent-transitory model with non-stationarity in parameters

Estimation of wage dynamics from PSID

- Focus on log male wages because closest definition to "exogenous endowments"

- Permanent-transitory model for (residual) wage dynamics

$$
\begin{aligned}
w_{i,t} &= z_{i,t} + \varepsilon_{i,t} \\
z_{i,t} &= z_{i,t-1} + \eta_{i,t}
\end{aligned}
$$

- What are the relative variances $v_{\eta,t}$ and $v_{\varepsilon,t}$?

- Minimum distance estimation:
  1. moments in levels
  2. moments in first-differences

- All moments apply to the same set of individuals

Two simple identification schemes

1. Using moments in levels:

$$
\begin{aligned}
var(w_{i,t}) - cov(w_{i,t}, w_{i,t+1}) &= v_{\varepsilon,t} \\
var(w_{i,t}) - var(w_{i,t-1}) &= v_{\eta,t} + v_{\varepsilon,t} - v_{\varepsilon,t-1}
\end{aligned}
$$

# Two simple identification schemes

1. Using moments in levels:

$$
\begin{aligned}
var(w_{i,t}) - cov(w_{i,t}, w_{i,t+1}) &= v_{\varepsilon,t} \\
var(w_{i,t}) - var(w_{i,t-1}) &= v_{\eta,t} + v_{\varepsilon,t} - v_{\varepsilon,t-1}
\end{aligned}
$$

2. Using moments in first-differences:

$$
\begin{aligned}
cov(w_{i,t} - w_{i,t-1}, w_{i,t+1} - w_{i,t}) &= -v_{\varepsilon,t} \\
var(w_{i,t} - w_{i,t-1}) &= v_{\eta,t} + v_{\varepsilon,t} + v_{\varepsilon,t-1}
\end{aligned}
$$

Two simple identification schemes

1. Using moments in levels:

$$
\begin{aligned}
var(w_{i,t}) - cov(w_{i,t}, w_{i,t+1}) &= v_{\varepsilon,t} \\
var(w_{i,t}) - var(w_{i,t-1}) &= v_{\eta,t} + v_{\varepsilon,t} - v_{\varepsilon,t-1}
\end{aligned}
$$

2. Using moments in first-differences:

$$
\begin{aligned}
cov(w_{i,t} - w_{i,t-1}, w_{i,t+1} - w_{i,t}) &= -v_{\varepsilon,t} \\
var(w_{i,t} - w_{i,t-1}) &= v_{\eta,t} + v_{\varepsilon,t} + v_{\varepsilon,t-1}
\end{aligned}
$$

3. If the model is correctly specified, asymptotically: same estimates
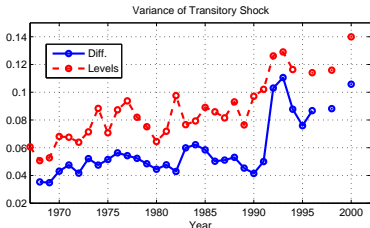
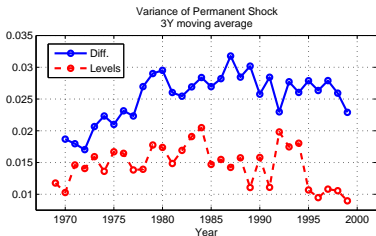# Comparison CPS-CEX-PSID: male wages
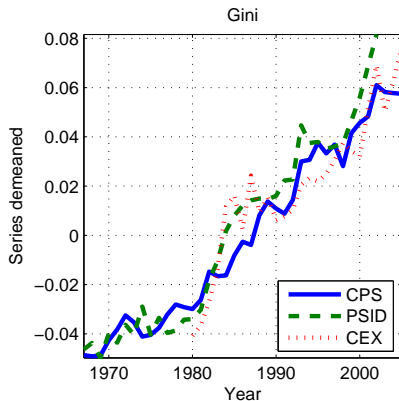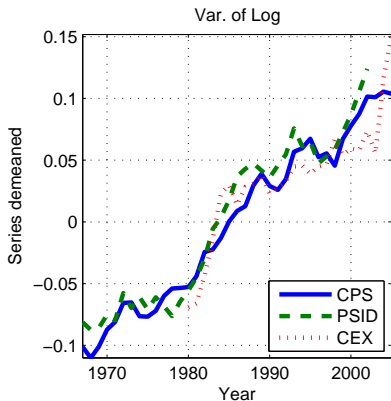
- Trends line up extremely well across all three surveys
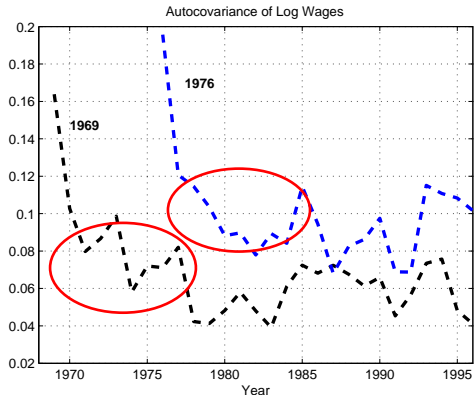
# Permanent-Transitory decomposition
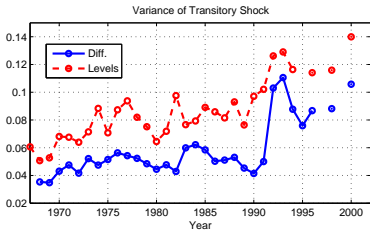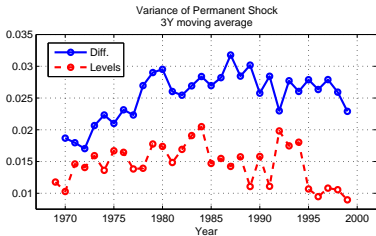
Permanent-Transitory decomposition

- Δ transitory variance twice as large in levels
- Early increase in permanent component
- Evidence of misspecification of the simple PT model

Autocovariance function of log wages

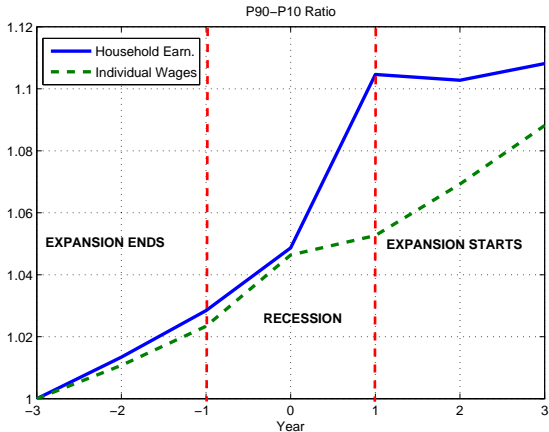- PT Model predicts L-shaped autocovariance, while decline appears smoother in the data

From disposable income to consumption (+ durables)
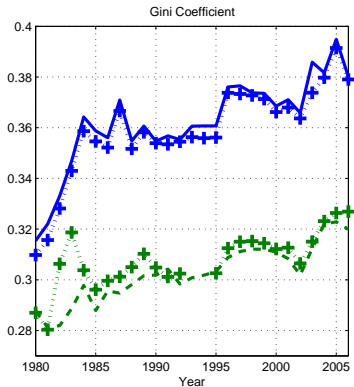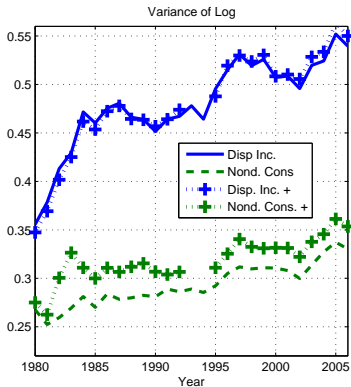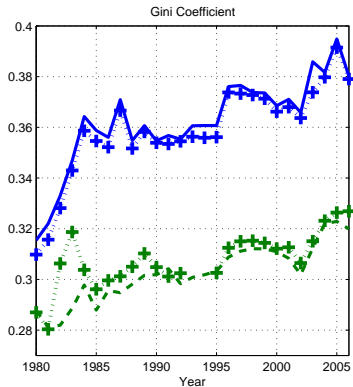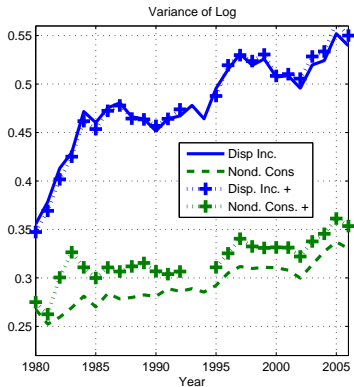

Variance of Log

Gini Coefficient

- Δ consumption inequality slightly larger when including also services from durables and housing

Cyclical dynamics of inequality

P90–P10 Ratio

- Household earnings inequality rises especially sharply during recessions, wage inequality not so much

From disposable income to consumption (+ durables)

- Δ consumption inequality slightly larger when including also services from durables and housing