Inequality, Heterogeneity, and Aggregate Consumption

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Outline

- Trends in inequality

- Does inequality matter for aggregate consumption?
  - Heterogeneity in consumption responses to income changes
  - Some selected evidence

- What kind of inequality has increased?
  - Transitory vs. permanent
  - Income vs. consumption inequality and measurement issues

- Consumption and the Great Recession
  - Labor-related permanent shocks?

Background

- Most countries have witnessed a dramatic increase in wage inequality over the last three decades

- Evidence on other measures of welfare inequality (consumption, wealth, etc.) is more nuanced and (at least for the US) more controversial

Changes in wage, income and consumption inequality in the US
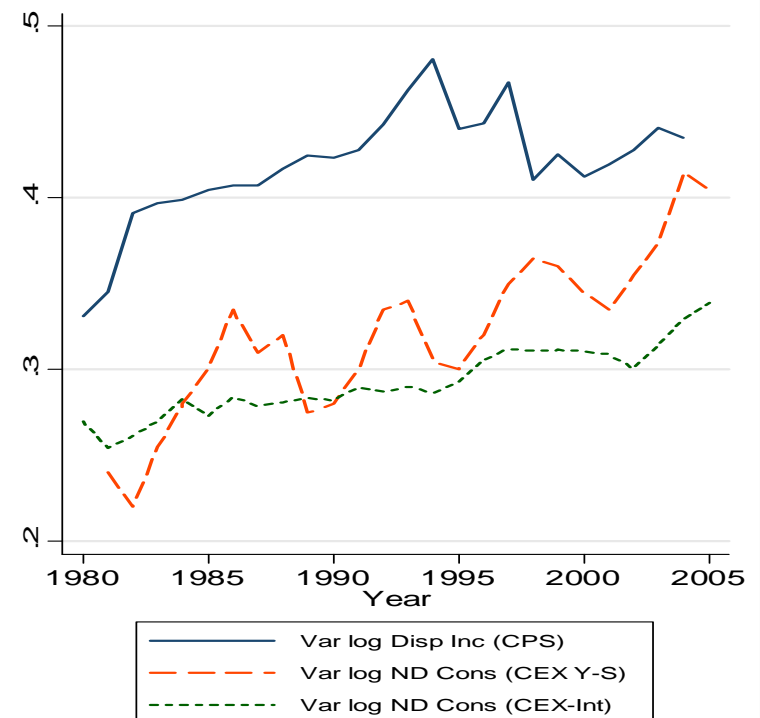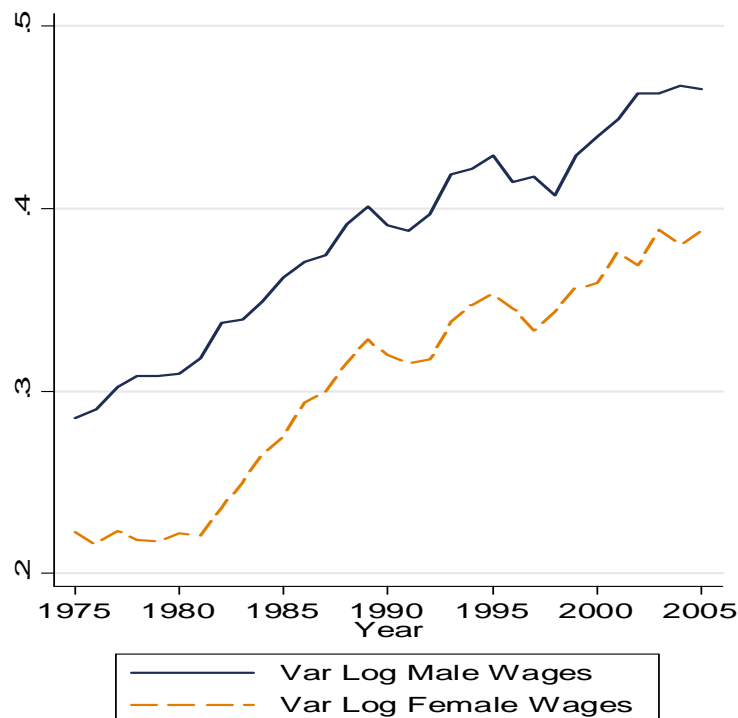
Sources: Heathcote, Perri and Violante (2010), Aguiar and Bils (2011)

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Facts and causes

- During the 1980s inequality increased due to wage growth^{top} > wage growth^{middle} > wage growth^{bottom}

- Since the early 1990s, increase in inequality explained by top quantiles growing very fast, while the distance between the middle and the bottom actually declines

- Reasons:
  - Skill biased technological changes
  - Institutional issues: MW, decline of unions
  - International trade
  - Low skill Immigration
  - Changing pay-setting norms, «Winner-take-all», etc.
  - ...

Should policymakers care about these distributional changes?

- Social equity issues

- Intergenerational mobility issues

- Effects on aggregate consumption

When does inequality matter?

- Standard consumption theories (PIH)
  - Inequality does not matter for aggregate consumption because MPCs are homogenous across consumers

- But standard theory is based on strong assumptions
  - Perfect credit markets, simple preferences, no bequest motive, atomistic consumers, etc.
  - Once one factors these things in, good theoretical basis to expect heterogeneous MPCs

Reasons for MPC heterogeneity

- Liquidity constraints
  - Consumers at corners have higher MPC than unconstrained consumers
- Precautionary savings
  - Consumption function is concave (Carroll and Kimball, 1996)
- Bequest
  - Bequests are luxury goods (Blinder, 1975)
- «Behavioral» theories
  - Some people are «myopic», others are not; some people consume a higher proportion of their income to keep up with the Joneses, etc.

- Note – These theories point towards higher MPCs at low levels of income/wealth

Hence…

- Some broad phenomena (i.e., rise in income inequality) may be non-neutral with respect to aggregate demand
  - Short run: Redistributive or «targeted» policies might be expansionary

- Indeed…
  - It is often suggested that the effectiveness of fiscal policy (tax stimulus etc.) can be improved by "targeting" groups that are most likely to have large responses
    - "*… an anti-recession plan would be aimed at increasing current spending […] But the [Bush tax] plan targets the bulk of individual tax reductions at high income households, who are less likely to be the short-horizon consumers who would spend a significant share of increases in after-tax income.*" (Auerbach and Gale, 2001)
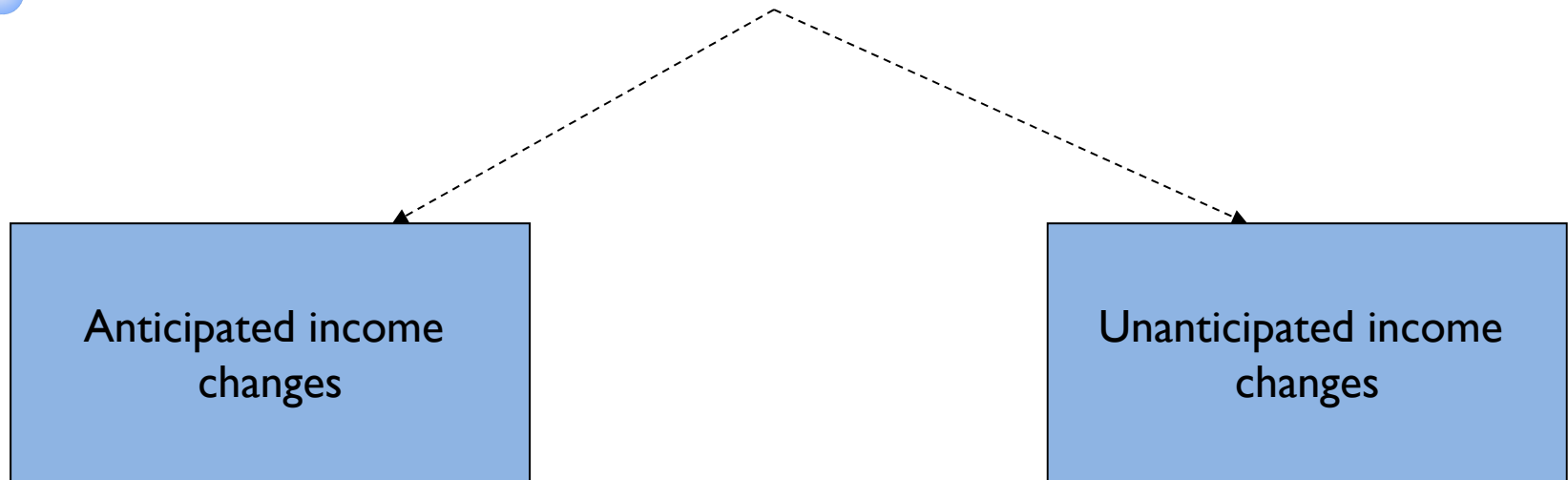   - Ricardian neutrality, etc.

Empirical issues:
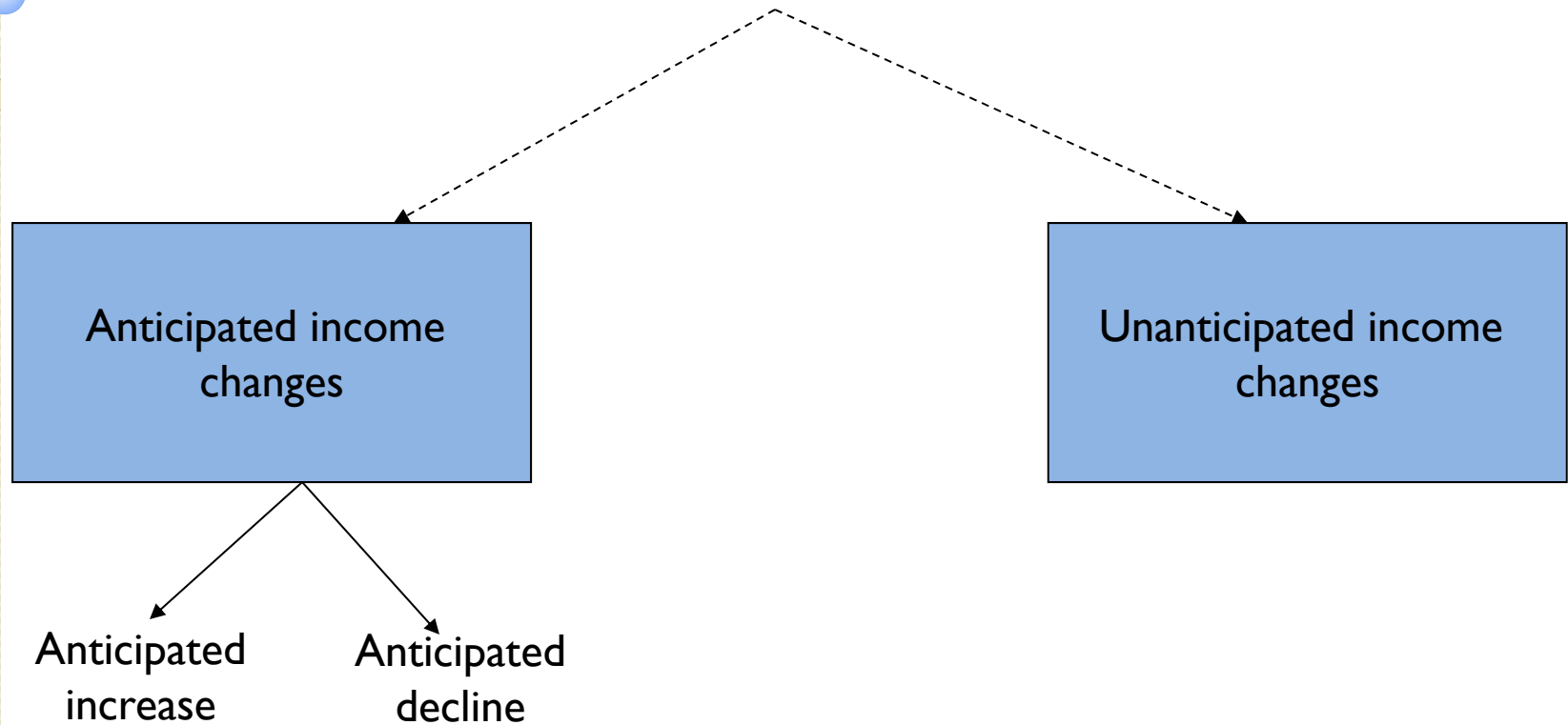# What do we mean by MPC?

- The MPC is implicitly defined by the nature of the change in economic resources (income, etc.) we consider
  - Anticipated/Unanticipated
  - Permanent/Transitory
  - Small/Large
  - …

- Economic theory has different predictions regarding these changes
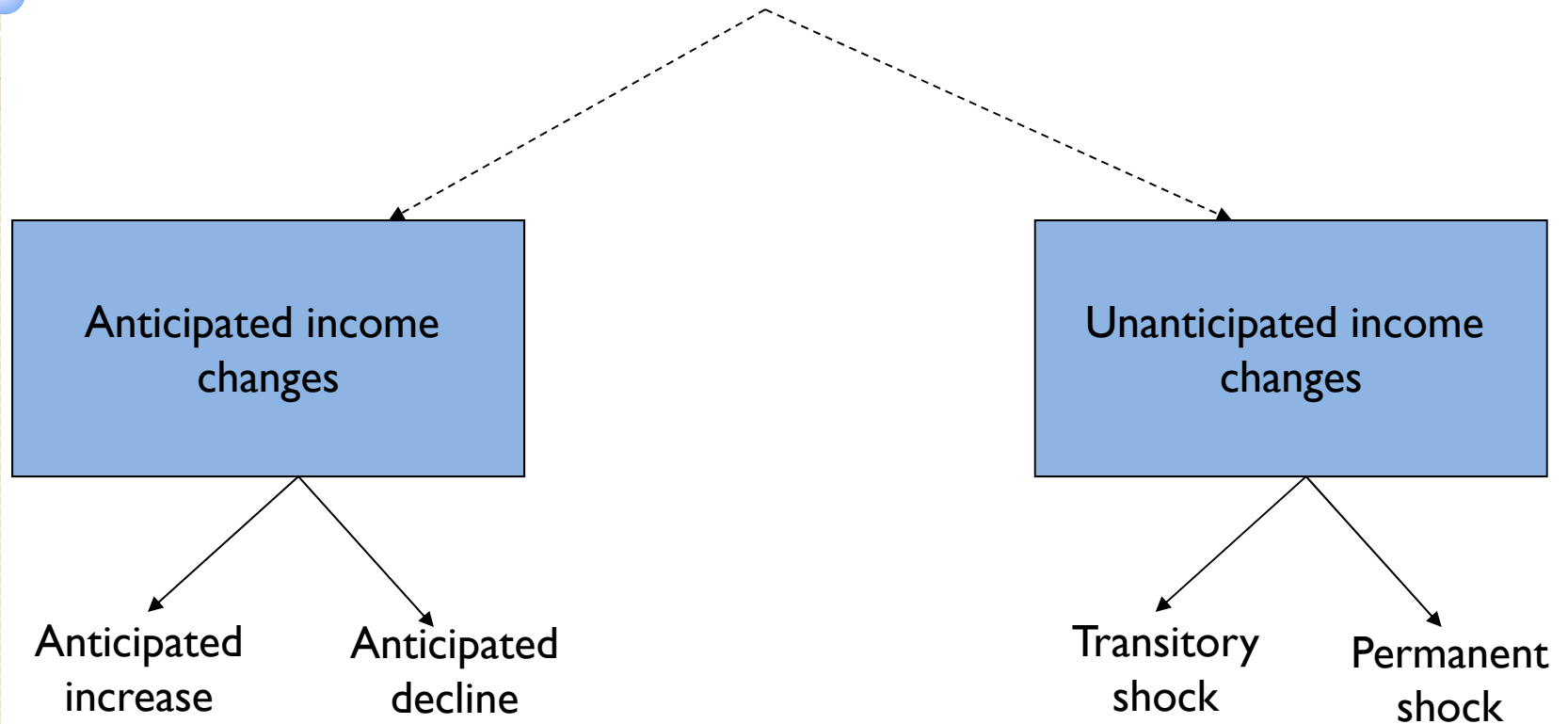
The response of consumption to income changes

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                    ┌─────────────────────┐        ┌─────────────────────┐
                    │  Anticipated income  │        │ Unanticipated income │
                    │       changes        │        │       changes        │
                    └─────────────────────┘        └─────────────────────┘
```

Anticipated income changes

Unanticipated income changes

The response of consumption to income changes

Anticipated income changes

Unanticipated income changes

Anticipated increase

Anticipated decline

The response of consumption to income changes

Anticipated income changes

Unanticipated income changes

Anticipated increase

Anticipated decline

Transitory shock

Permanent shock

The response of consumption to income changes

```
                    Anticipated income          Unanticipated income
                        changes                      changes

            Anticipated      Anticipated     Transitory      Permanent
             increase          decline         shock           shock

                                            Positive      Negative
```

The response of consumption to income changes

```
                                    ┌──────────────────────────┐
                                    │                          │
              ┌─────────────────────┴──────┐      ┌────────────┴──────────────┐
              │   Anticipated income        │- - - │   Unanticipated income     │
              │   changes                   │      │   changes                  │
              └──────────────┬──────────────┘      └─────────────┬──────────────┘
                     │              │         Size                │          │
              Anticipated      Anticipated   Small   Large   Transitory   Permanent
              increase         decline                       shock        shock
                                                                │       │
                                                            Positive   Negative
```

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The response of consumption to income changes

Anticipated income changes

Unanticipated income changes

Coupons
Payroll
Check in the mail
Medium

Size

Small

Large

Anticipated increase

Anticipated decline

Transitory shock

Permanent shock

Positive

Negative

The response of consumption to income changes

Coupons
Payroll
Check in the mail
Medium

Recession
Age
Asset liquidity
Debt
Context

Anticipated income changes

Unanticipated income changes

Size

Small

Large

Anticipated increase

Anticipated decline

Transitory shock

Permanent shock

Positive

Negative

Estimation methods for MPC

- To estimate response of consumption to income shocks
    1. Look at consumption responses by "permanent income" groups
        - Dynan, Skinner and Zeldes (2004)
    2. Write income process (say transitory/permanent decomposition) and then estimate MPCs using restrictions that theory imposes on the var-cov matrix of consumption and income growth residuals.
        - Hall and Mishkin (1982), Blundell, Pistaferri & Preston (2008)
    3. Use natural experiments
        - Gruber (1997), Browning & Crossley (2001), Paxson (1993)
    4. Use subjective expectations
        - Hayashi (1985), Pistaferri (2000), Kaufmann and Pistaferri (2008)

- To estimate response of consumption to anticipated changes
    - Can use 3. and 4. both to look at announcement effects (should reproduce response to shocks) and to test theory ("excess sensitivity")
        - Johnson, Parker & Souleles (2006), Parker et al. (2012)

- Can allow for heterogeneous responses, but sample sizes are typically too small to detect meaningful differences between groups

- Note: Need to have good consumption data to start with…

Direct survey questions

- Alternatively, one can ask direct questions about what people intend to do (or have done) with a windfall income, as in Shapiro and Slemrod (various years)
  - First describe what to expect from the 20xx tax rebate/stimulus policy, then ask: "*Thinking about your (family's) financial situation this year, will the tax rebate lead you mostly to increase spending, mostly to increase saving, or mostly to pay off debt?*"

- Don't need data on consumption

- Problem: Qualitative vs. Quantitative answers

Jappelli and Pistaferri (2012)

- 2010 SHIW
  - *Imagine you unexpectedly receive a disbursement equal to the amount your household earns in a month. How much of it would you save and how much would you spend? Please give the percentage you would save and the percentage you would spend.*
  - So – it's a shock, and it's transitory

- Pros:
  - Question is quantitative, hence aggregation is easy
  - Consumers' responses to income changes does not depend on the (abs.) size of the change
  - Robust to Ricardian neutrality criticism if people's responses fully internalize expectations of future taxes needed to pay for the "disbursement" received
  - Allows to pin down MPC heterogeneity

- Cons:
  - Question is hypothetical and it may be hard to understand for some consumers
  - It was asked in the Spring of 2011 in the middle of a recession
  - MPC(onsume) vs MPS(pend)
  - No period of reference / horizon provided (spend in a month? In a year?)
  - No "negative MPC" allowed (pay-off debt)

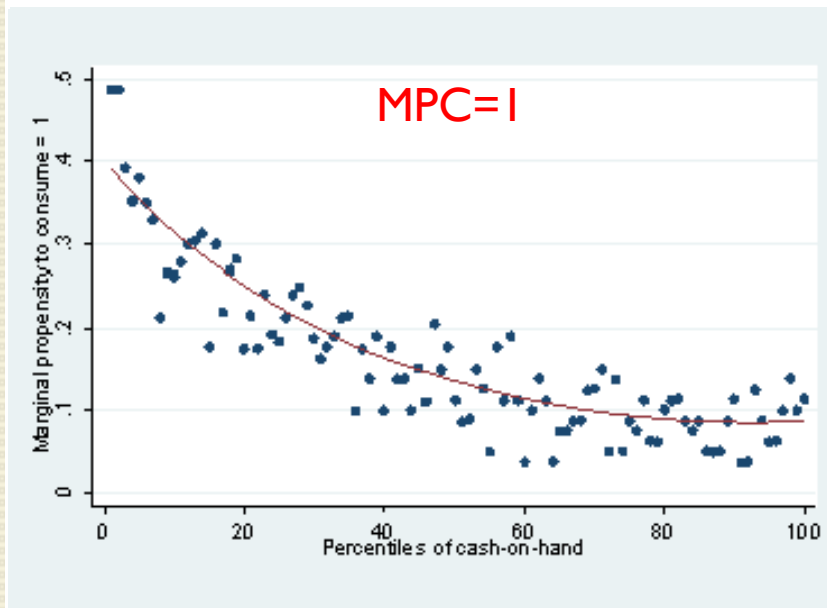# Self-reported MPC from transitory income shock
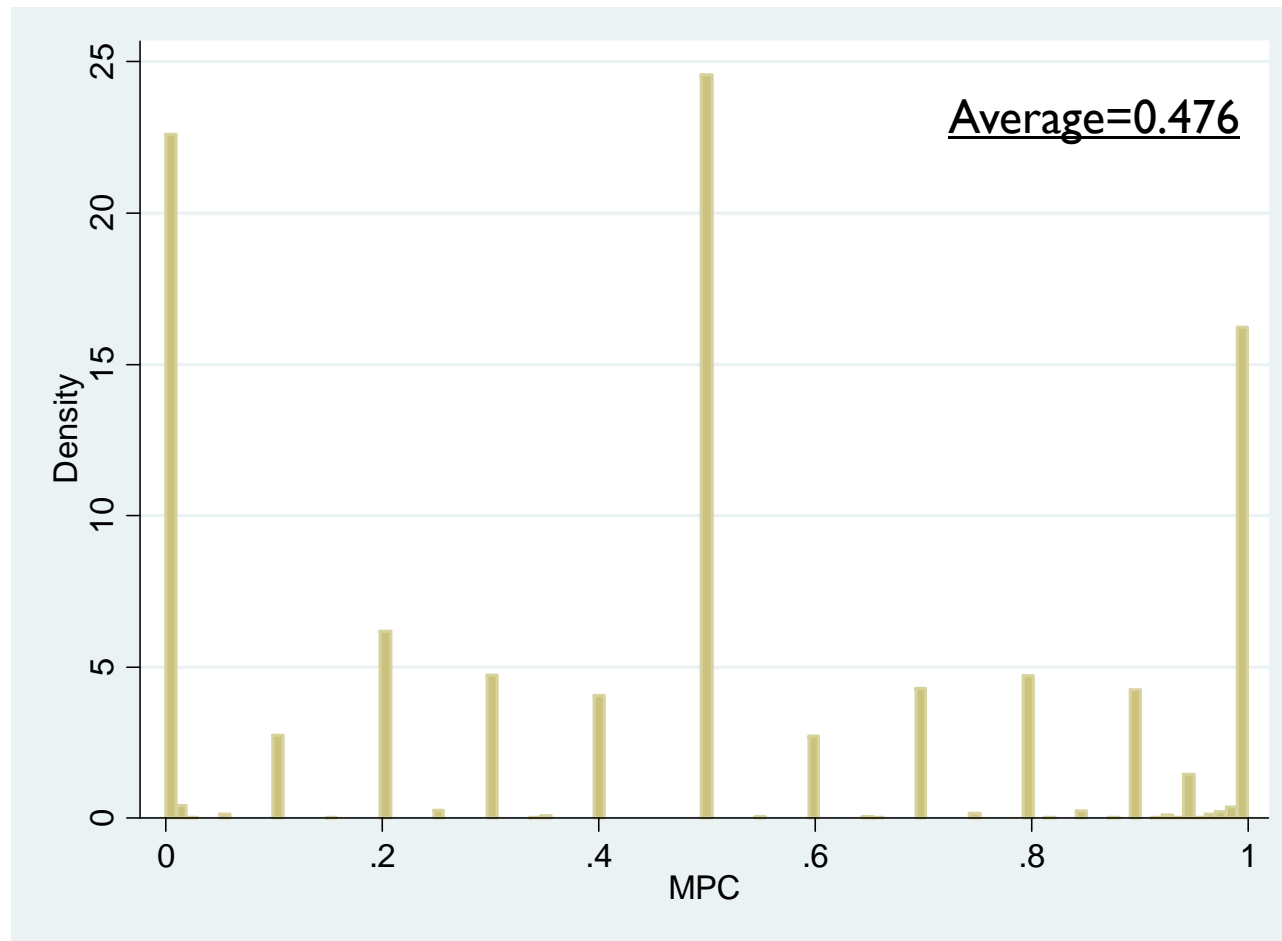
Source: Jappelli and Pistaferri (2012)

MPC by cash on hand
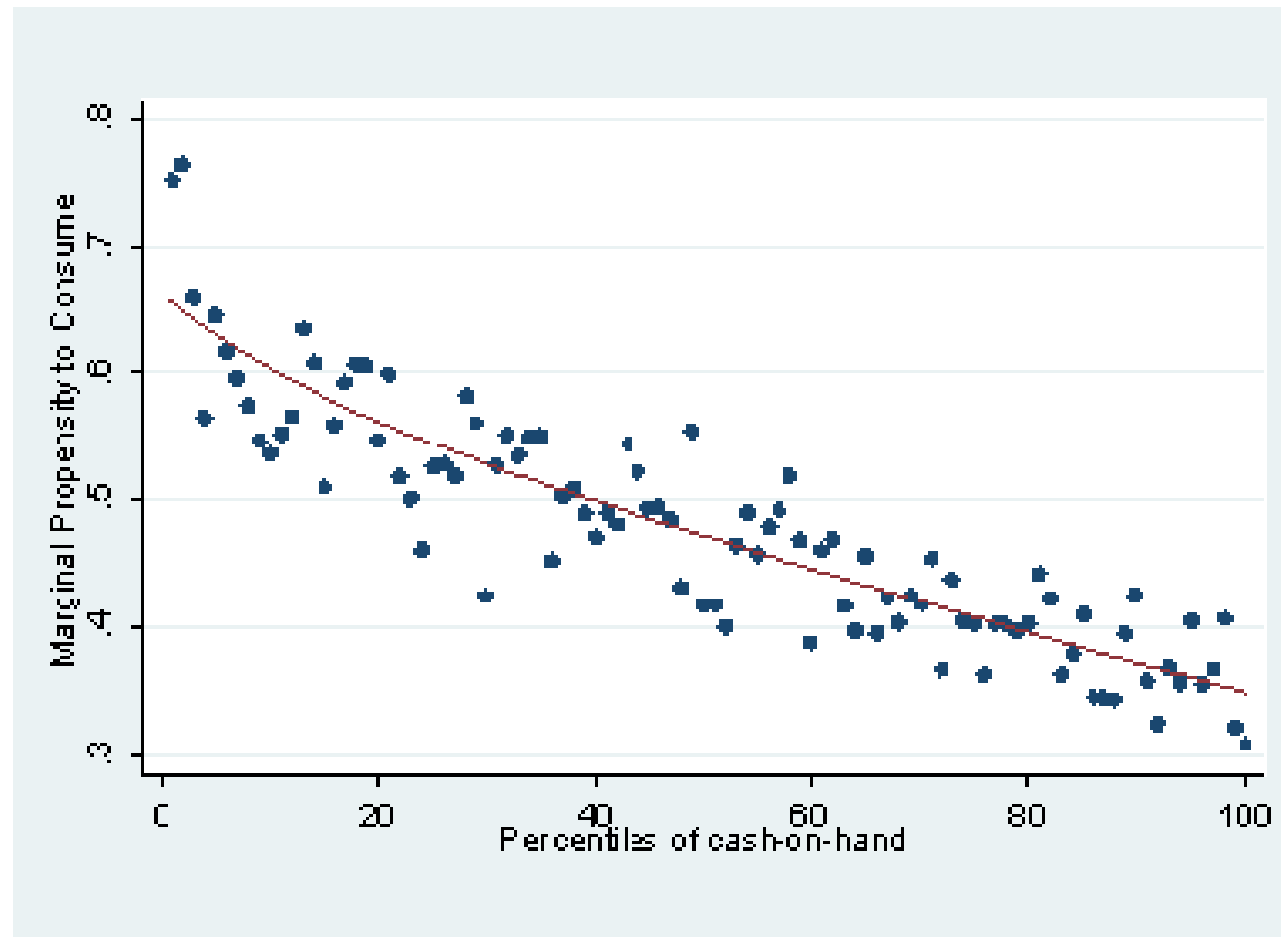
Source: Jappelli and Pistaferri (2012)

Who is more likely to report MPC=1 and MPC=0?
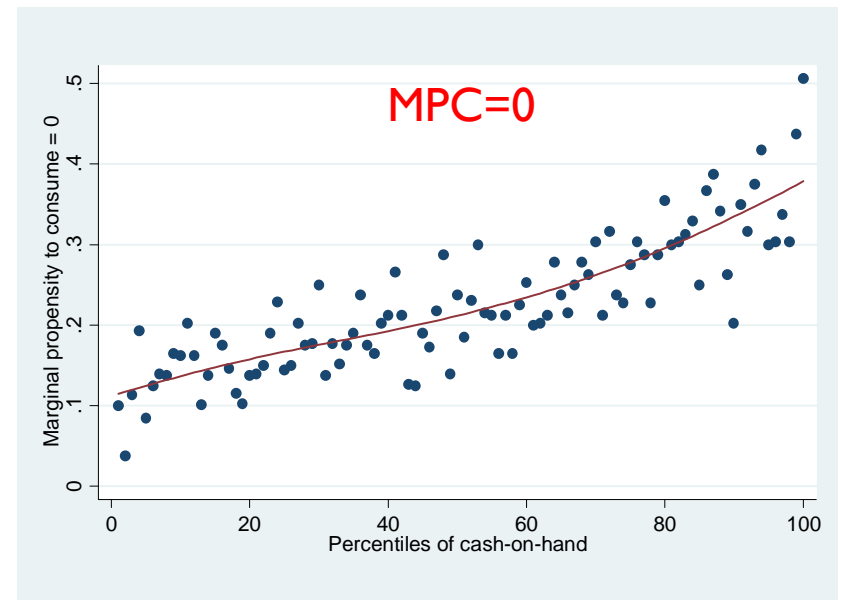
Source: Jappelli and Pistaferri (2012)

What explains MPC heterogeneity?

Age 18-30	0.023	0.024
	(0.035)	(0.035)
Age 31-45	0.047	0.048
	(0.019)**	(0.019)**
Age 46-60	0.052	0.053
	(0.016)***	(0.016)***
Male	-0.015	-0.015
	(0.013)	(0.013)
Married	-0.014	-0.014
	(0.016)	(0.016)
Years of education	0.005	0.005
	(0.002)***	(0.002)***
Family size	0.022	0.022
	(0.007)***	(0.007)***
I cash-on-hand quintile	0.293	0.292
	(0.024)***	(0.025)***
II cash-on-hand quintile	0.185	0.184
	(0.021)***	(0.022)***
III cash-on-hand quintile	0.133	0.132
	(0.020)***	(0.021)***
IV cash-on-hand quintile	0.062	0.062
	(0.019)***	(0.019)***
Unemployed	0.075	0.075
	(0.034)**	(0.034)**
Turned down for credit ordiscouraged	-0.125	-0.126
	(0.029)***	(0.029)***
Overdraft		0.013
		(0.014)
Credit card		-0.011
		(0.015)
N	7,950	7,950

- MPC decline with cash on hand is robust feature

- MPC slightly increases with age

- MPC higher for the unemployed

- But MPC lower for people who report to be turned down for credit or discouraged from borrowing

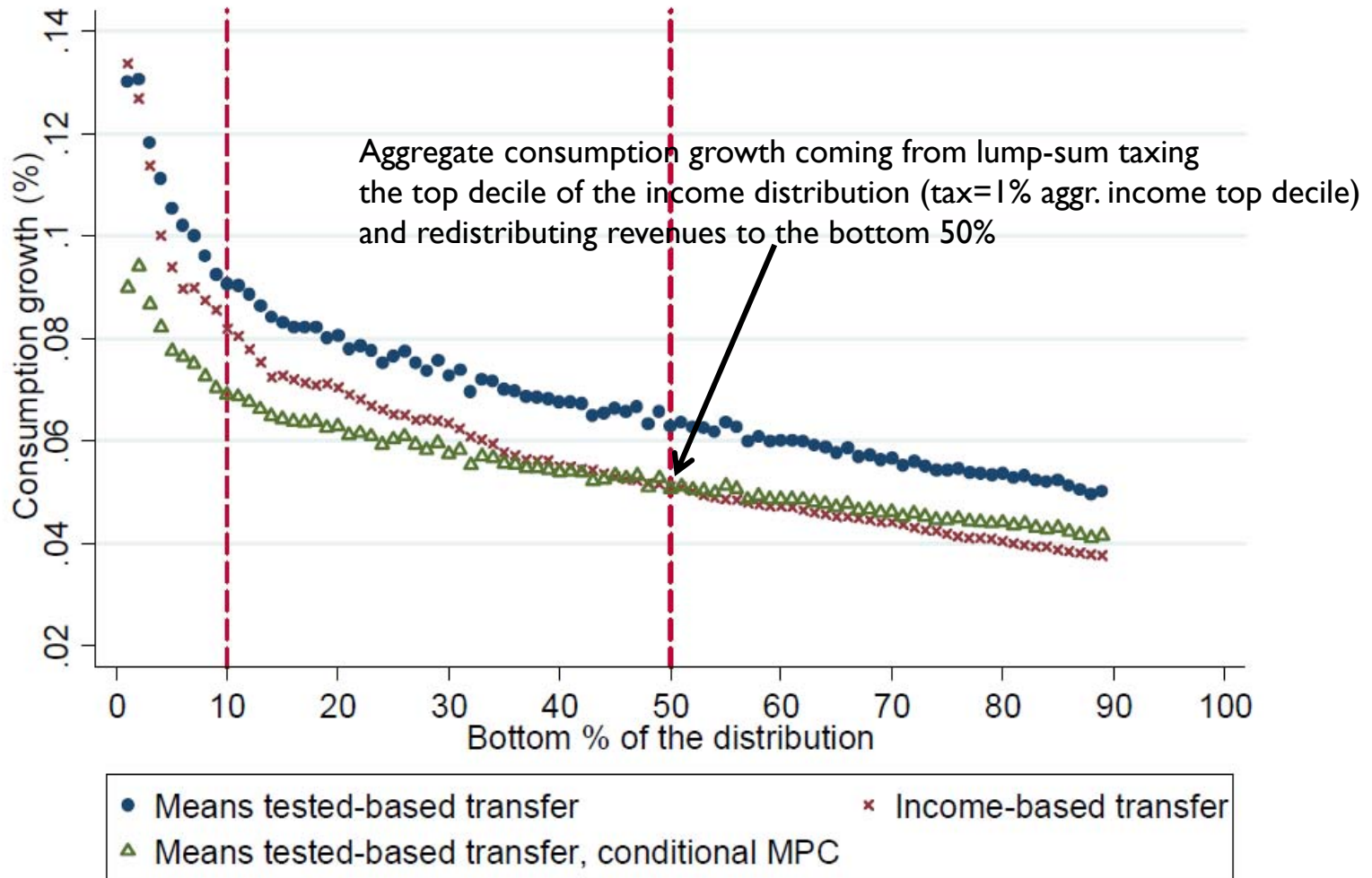Source: Jappelli and Pistaferri (2012)

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Puzzling result?

- Note:
  - Control for cash-on-hand & unemployment, so perhaps capturing some nonlinear effect
  - Other (more objective) measures of borrowing constraint are statistically insignificant
  - May capture precautionary savings: People who face constraint today may be expecting constraints in the future, which raises the conditional variance of consumption growth. This should reduce MPC
    - Using panel component of SHIW: Being turned down for credit in year t increases the likelihood of being turned down in year $t+2$ by about 10 percentage points (s.s.)

The effect of a redistributive policy

Aggregate consumption growth coming from lump-sum taxing the top decile of the income distribution (tax=1% aggr. income top decile) and redistributing revenues to the bottom decile
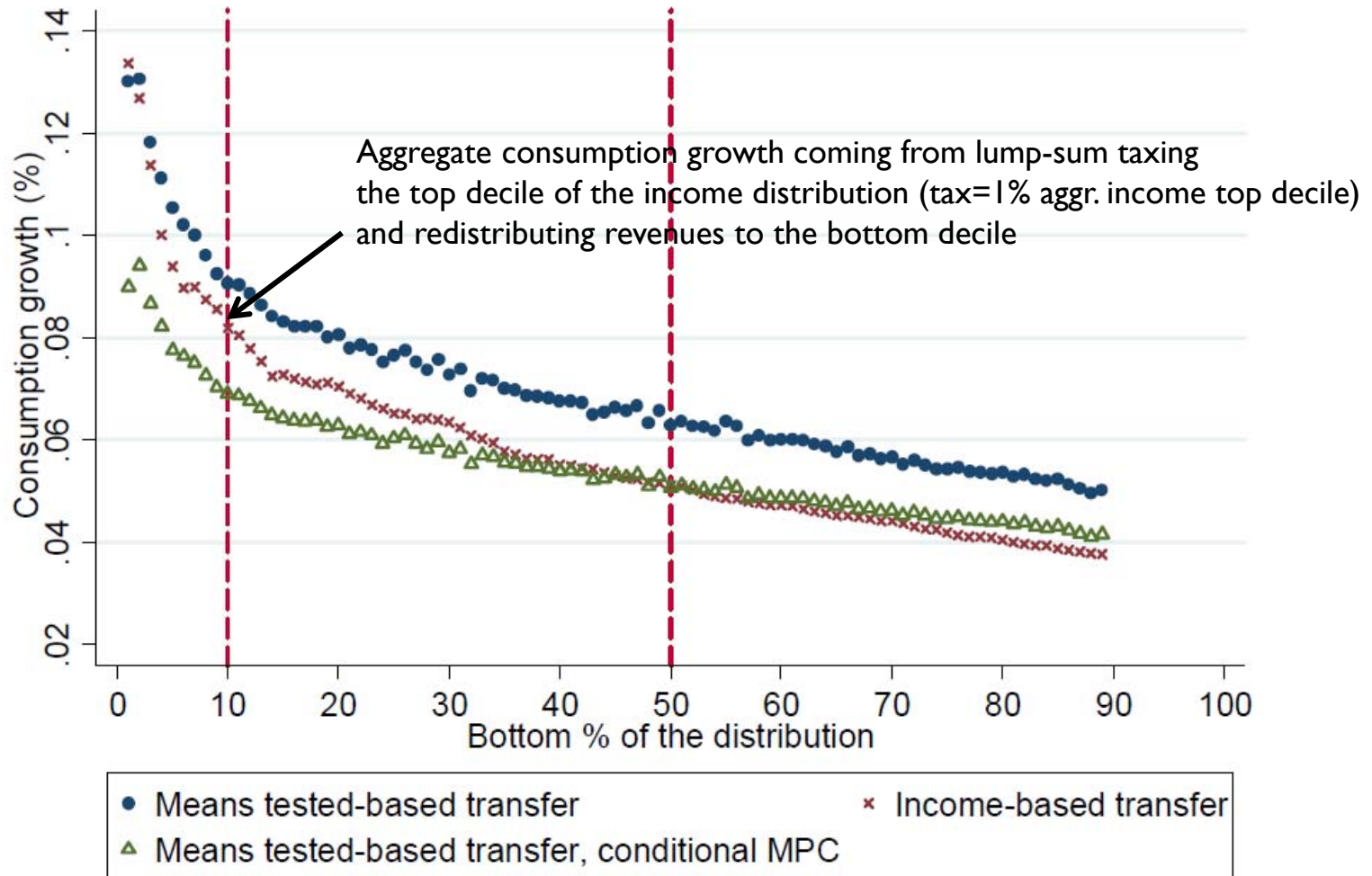
Source: Jappelli and Pistaferri (2012)

The effect of a redistributive policy

Aggregate consumption growth coming from lump-sum taxing the top decile of the income distribution (tax=1% aggr. income top decile) and redistributing revenues to the bottom 50%

- Means tested-based transfer
- Means tested-based transfer, conditional MPC
- Income-based transfer

Source: Jappelli and Pistaferri (2012)

MPC – May "targeting" percolate?

- **Consumption social interactions**
  - In De Giorgi, Frederikssen and Pistaferri (2012), we use Danish administrative tax records to test whether household consumption is affected by the consumption of "peers"
    - Peer=co-worker
  - Distinguish between husband and wife peers
    - Use network structure to identify effect of interest (robust to reflection effects á la Manski)
  - Find evidence that peers' consumption affects household consumption (0.17 (s.e. 0.03))
    - Bertrand and Morse (2013) – "Trickle-down" consumption

Policy implications of social interactions

- A tax/transfer imposed on a group may reverberate through the entire distribution, depending on the degree of "connectedness"
- We consider transferring the equivalent of a 1% of aggregate consumption equally among:
  - households in the top 10% of the consumption distribution
  - a 10% random sample of households
  - households in the bottom 10%, financed by "tax" on top 10%
- Here abstract from MPC heterogeneity, i.e. tax/transfer is in consumption terms

Results

Transfer recipients	Aggregate cons. growth		With network effects
	No network effects		
	Population	Our sample	
Top 10%	1.00%	0.90%	1.05%
Random 10%	1.00%	0.93%	1.33%
Balanced budget	0%	-0.52%	0.90%

Source: De Giorgi, Frederikssen and Pistaferri (2012)

- A transfer to the bottom is expansionary even with MPC homogeneity because people at the bottom are "endogenously" more connected than people at the top
- With MPC heterogeneity effect might be even stronger

Inequality: Transitory or Permanent?

- Suppose income can be written as

$$Y_{it} = X'_{it}\beta + g_i t + P_{it} + T_{it}$$

- With

$$P_{it} = P_{it-1} + u_{it}$$

- $P \rightarrow$ "wage structure" shifts: SBTC, quantity, quality, price of skills etc.
- $T \rightarrow$ "wage instability": turnover, firm effects, unemployment spells, etc.
- $g \rightarrow$ "Guvenen" component

Evidence on P/T Inequality: Early on

- ## The two components have both risen
- ## Moffitt and Gottschalk (2004):
  - *"…over [the] period [1974 to 1990], half of the increase in cross-sectional inequality was a result of an increase in transitory variance. After 1990, however, the total cross-sectional variance has continued to rise slowly while the transitory variance has not, resulting in a falling share for transitory variance over that period."*
- ## For family income, evidence of a continuous growth over the entire period

Consumption Inequality: Early on

- ## Greenspan (1996):

  - *"[…] there is a surprising difference between trends in the dispersion of holdings of claims to goods and services (that is, income and wealth) and trends in the dispersion of actual consumption. […] I do not wish to disparage in-come as a partial antidote to insecurity. Nevertheless, some aspects of economic well-being may be more accurately discerned by examining consumption."*

Perri and Krueger (2004)

- Only modest increase in consumption inequality
- The rise in transitory inequality generated a demand for more efficient credit markets

Legend:
- Disposable Earnings (Positive Wage Sample)
- Consumption (Positive Wage Sample)
- Consumption (Full Sample)
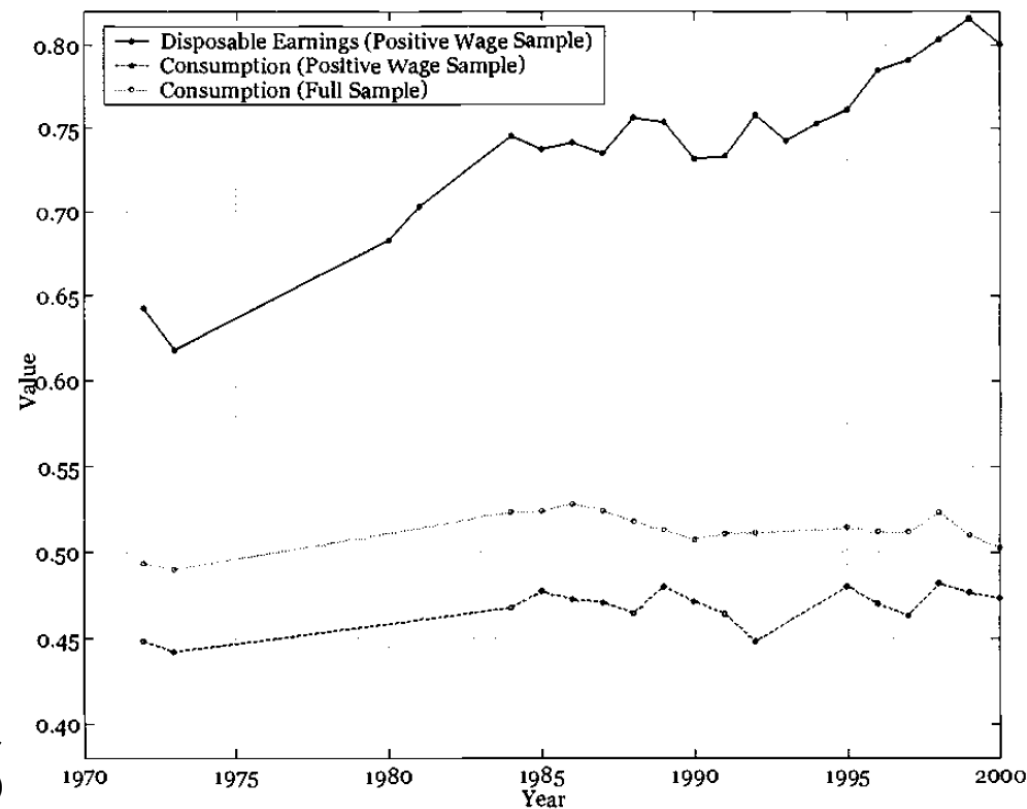
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Problem: Data

- Most of the evidence on permanent/transitory income inequality decomposition comes from survey panel data (PSID, SIPP, NLSY, etc.)
  - small samples, attrition, etc.

- Most of the evidence on consumption inequality comes from the CEX (the only US data set with complete info on consumption)
  - detachment from NIPA trends, etc.

- Top tail of the distribution is typically missed in survey data

Evidence on P/T Inequality: Later on

- Work using administrative US data has found more nuanced evidence: Guvenen et al. (2012) – SSA data
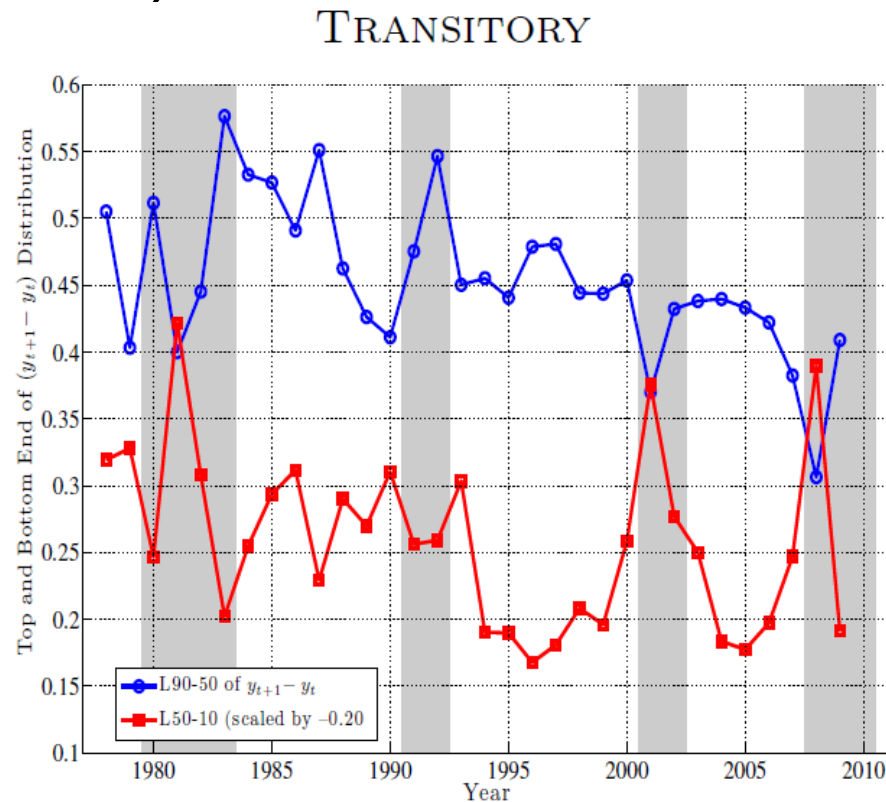
TRANSITORY

Source: Guvenen et al. (2012)

DeBacker et al. (2013) – IRS data

Figure VII
GM Decomposition of Cross-Sectional Variance
Pre-Tax Household Income on Male-Headed Households Sample
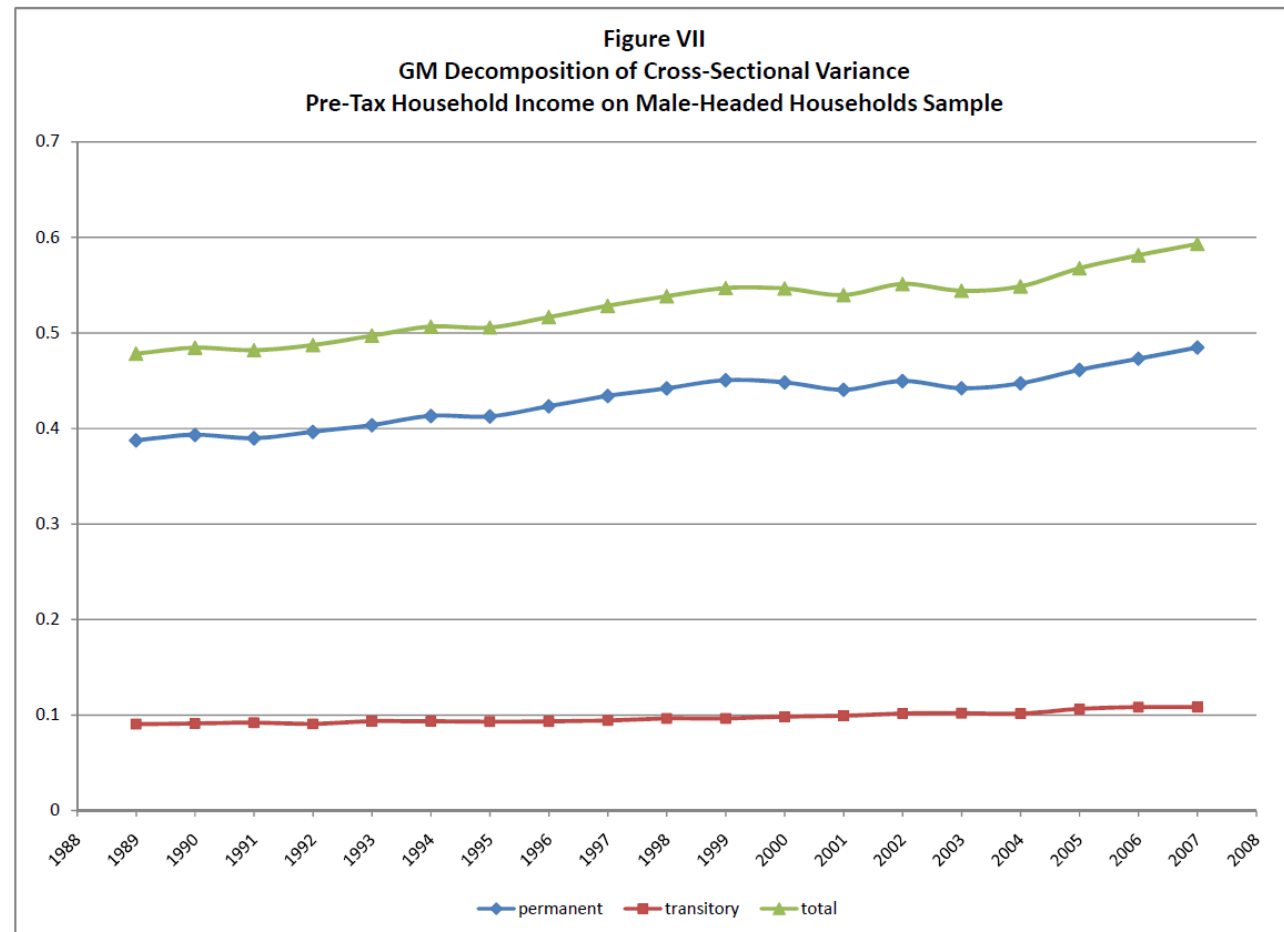
Source: DeBacker et al. (2013)

Kopczuk, Saez and Song (2010) – SSA data
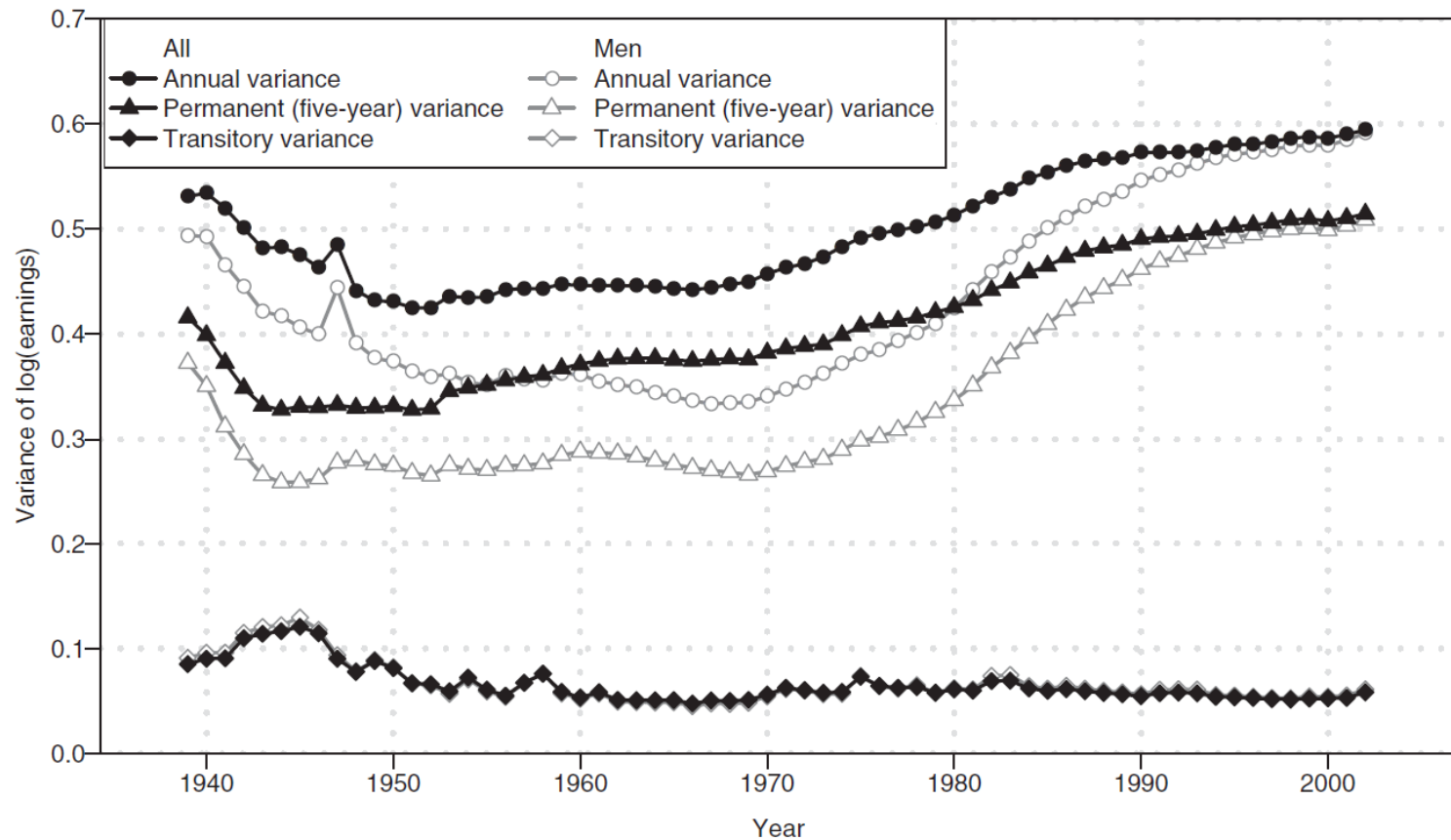
FIGURE V

Variance of Annual, Permanent, and Transitory (log) Earnings

Source: Kopczuk, Saez and Song (2010)
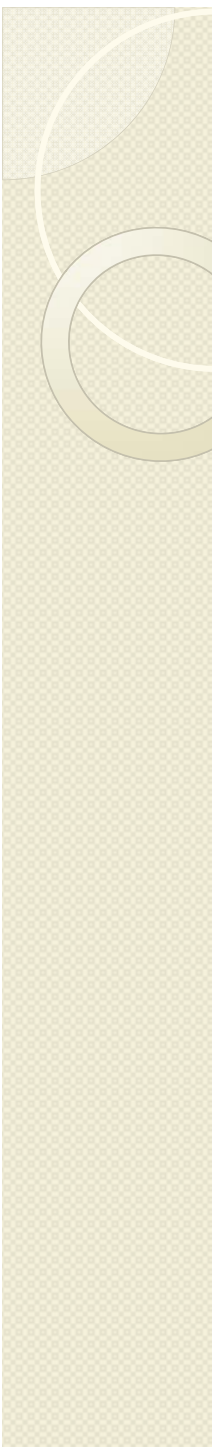
More recent evidence on consumption inequality

- In parallel, more recent papers find that consumption inequality has risen in parallel with income inequality once measurement error issues are taken into account:

  - Aguiar and Bils (2012): "*Our results show that consumption inequality has tracked income inequality much more closely than estimated by direct responses on expenditures.*"

  - Attanasio, Hurst and Pistaferri (2012): "We *find that consumption inequality in the U.S. between 1980 and 2010 has increased by nearly the same amount as income inequality.*"

Consumption inequality from PSID

- The re-designed PSID (1999-09) collects lots more information about consumption than its predecessor
- The consumption measure matches NIPA trends pretty well
- But it is only available since 1999
  - While food information is available since inception

- Attanasio and Pistaferri (2012) propose a "backward imputation" procedure.
- Write an equation for net consumption (n, net of "ever-present" goods f)

$$\ln n_{it} = z_{it}'\theta + p_t'\delta + f_{it}'\rho_{jt} + u_{it}$$

- Estimate this equation for the years of *plenty* (1998-2008)
- Impute net consumption for the years of *scarcity* (1978-1996)
- Construct an imputed measure of consumption

$$\hat{C}_{it} = f_{it} + \exp\left\{ z_{it}'\hat{\theta} + p_t'\hat{\delta} + f_{it}'\hat{\rho} \right\}$$

- Advantage
  - Can verify goodness of imputation procedure by in-sample comparison of var(log C_{it}) and $var\left(log\hat{C}_{it}\right)$

In-sample comparison

Standard deviation log equivalized consumption

Source: Attanasio and Pistaferri (2012)

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Backward imputation

Standard deviation log equivalized consumption
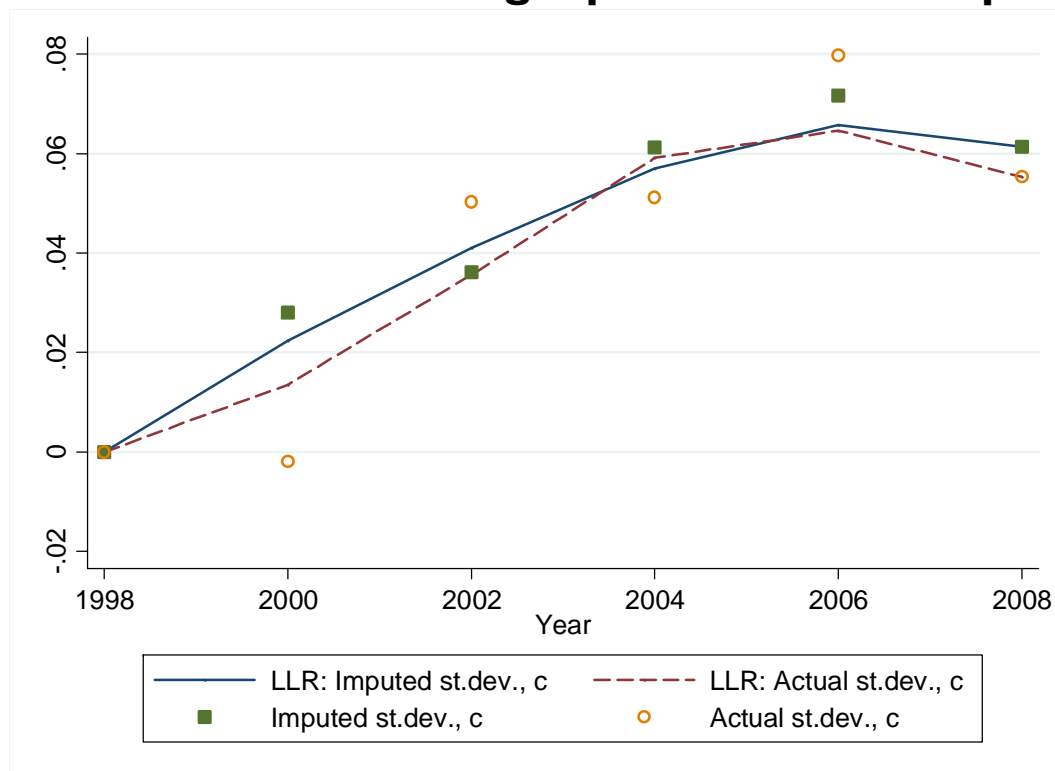
Source: Attanasio and Pistaferri (2012)

Backward imputation

Standard deviation log equivalized consumption

Source: Attanasio and Pistaferri (2012)

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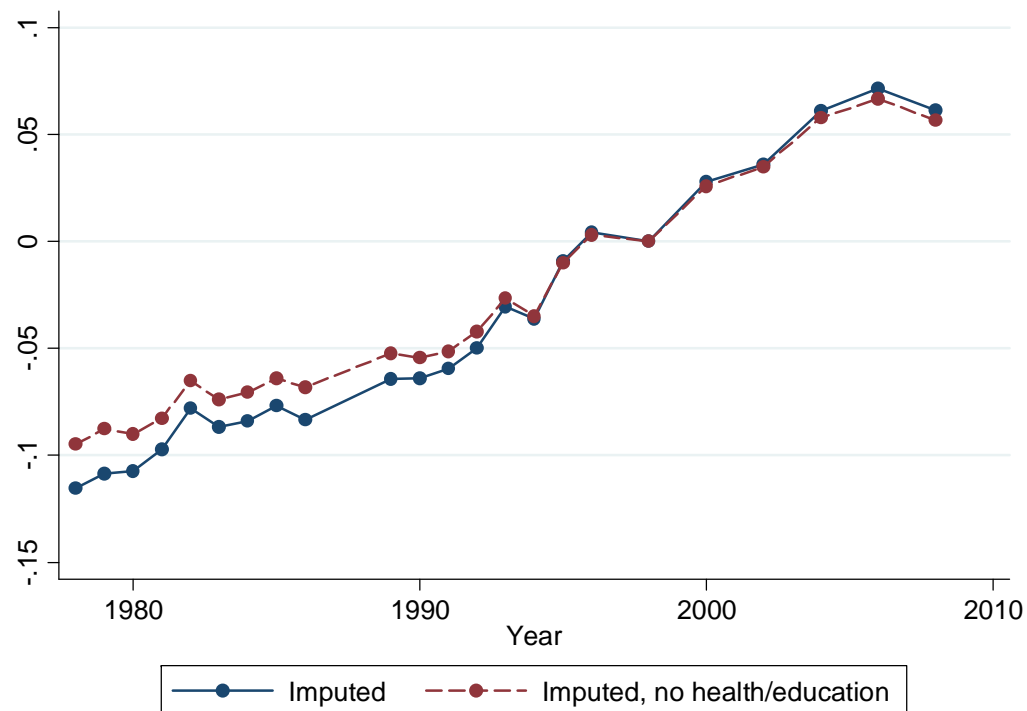
Consumption inequality vs. Income inequality

Period	Δ s.d. log(c/n)	Δ s.d. log(y/n)
1978-2008	0.175	0.22
1978-1989	0.05	0.12
1990-1998	0.06	0.06
1999-2008	0.065	0.04

Source: Attanasio and Pistaferri (2012)

Case Study:
The Great Recession in the US
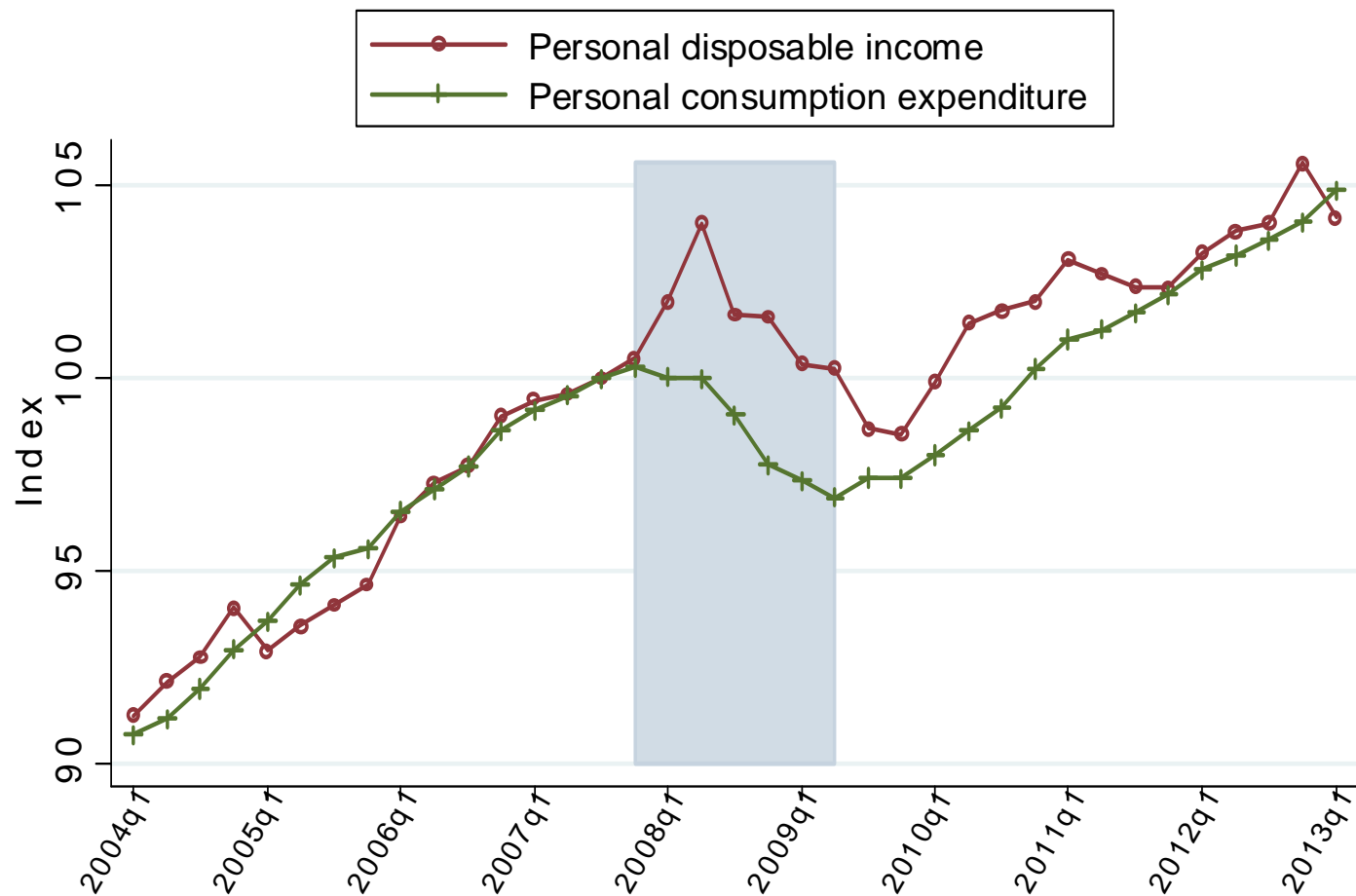
Source: Authors' calculations, based on BEA NIPA Tables 2.1, 2.3.4 and 2.3.5

Per-capita figures

Source: Authors' calculations, based on BEA NIPA Tables 2.1, 2.3.4 and 2.3.5

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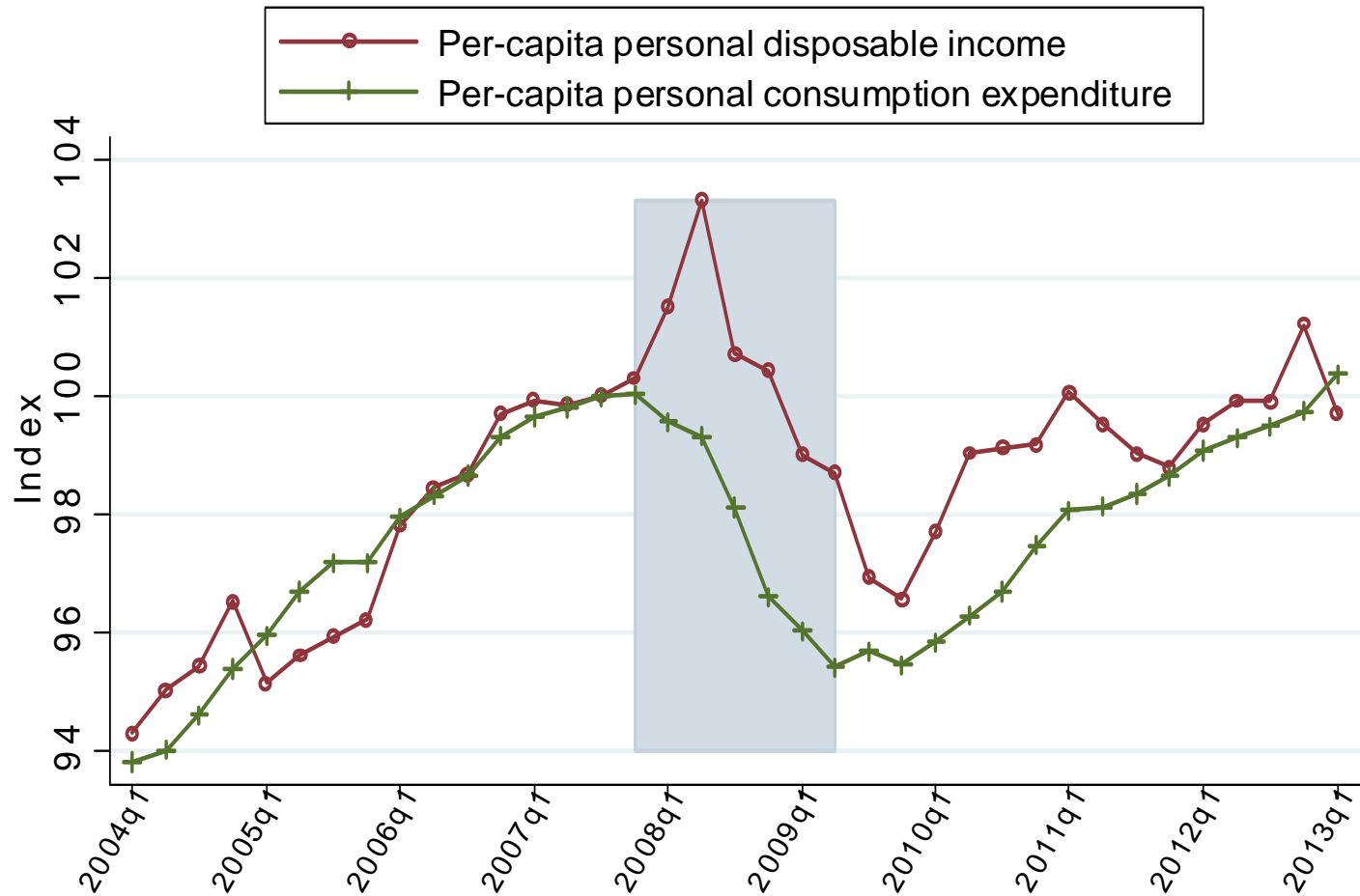
Relative to previous recessions
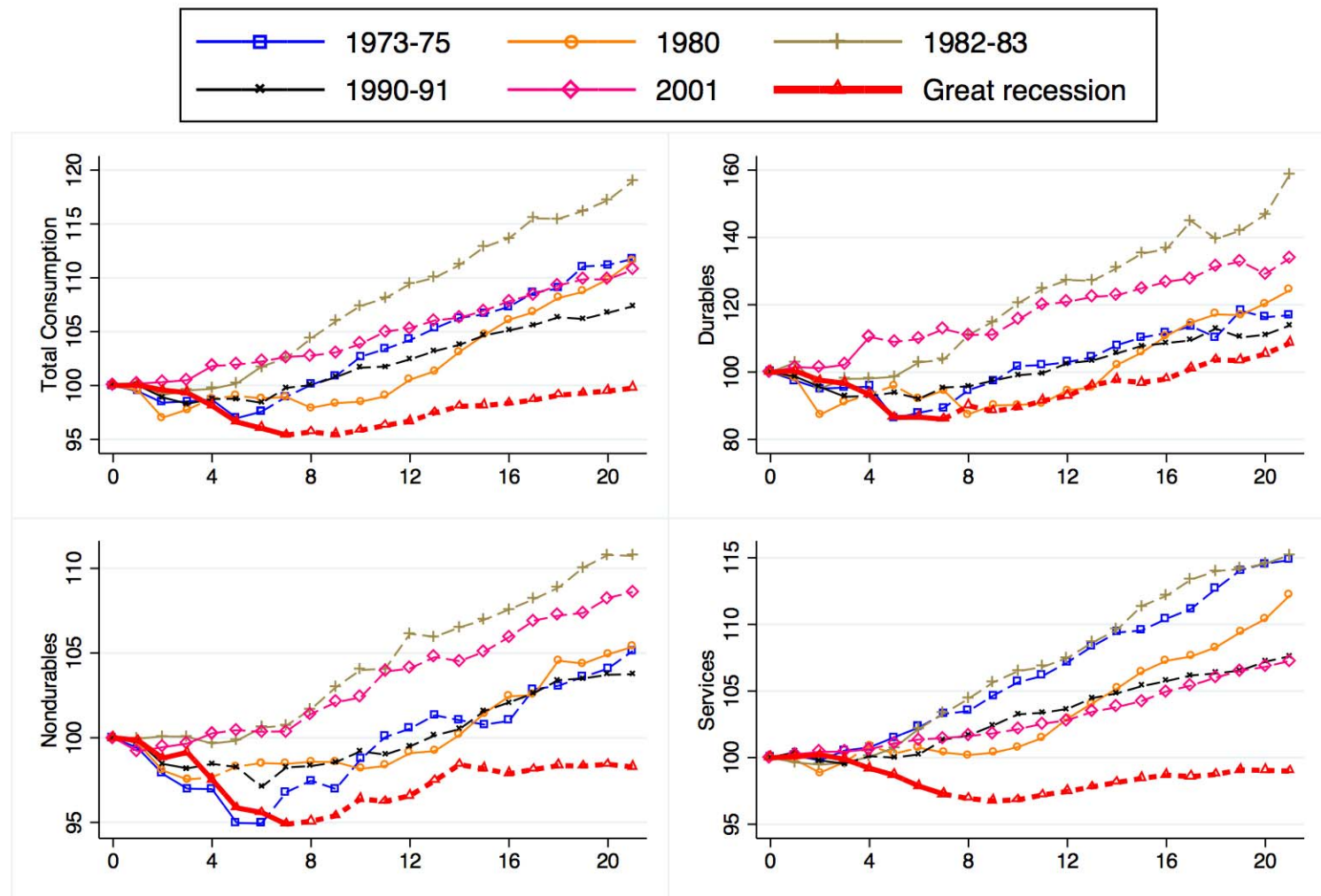
Source: Authors' calculations, based on BEA NIPA Tables 2.1, 2.3.4 and 2.3.5

Explanations

- **Impulse - Financial and housing market**:
  - Wealth destruction
    - Wealth effects may explain a good chunk of the decline in consumption (Petev, Pistaferri and Saporta, 2013)
  - Credit supply restrictions
    - Consumers unable to smooth transitory shocks
    - Consumers unable to purchase goods typically purchased by taking on debt (vehicles, white goods, etc.)
  - Household balance sheet effects (Mian, Rao and Sufi, 2011)
    - Consumption declined more strongly in counties with high leverage and large house price declines due to interaction of large housing wealth shocks with high levels of debt at the start of the recession

- **Propagation - Labor market**:
  - Downward revision in expectations, and perhaps very persistent ones
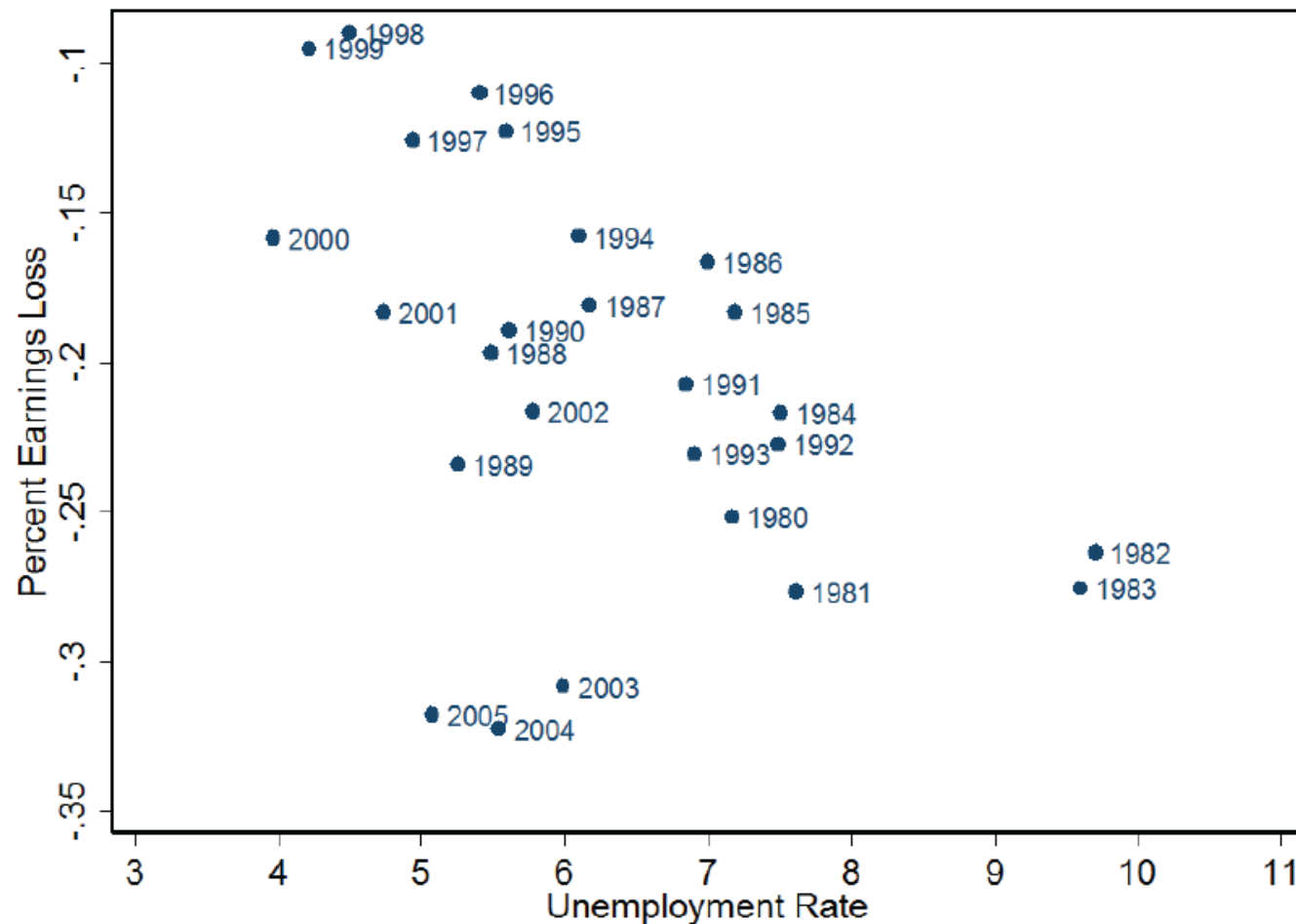 - Rise in uncertainty

Permanent shocks and the GR

1. Rise in unemployment concentrated among permanent job losers ("displaced workers")
   - Displacement associated with "scarring" effects on outcomes (future wages, employment, etc.)
   - Effects amplified during recessions
   - If reason for scarring is skill depreciation, the rise in long-term unemployment of the GR exacerbates this effect even further

Earnings losses after displacement
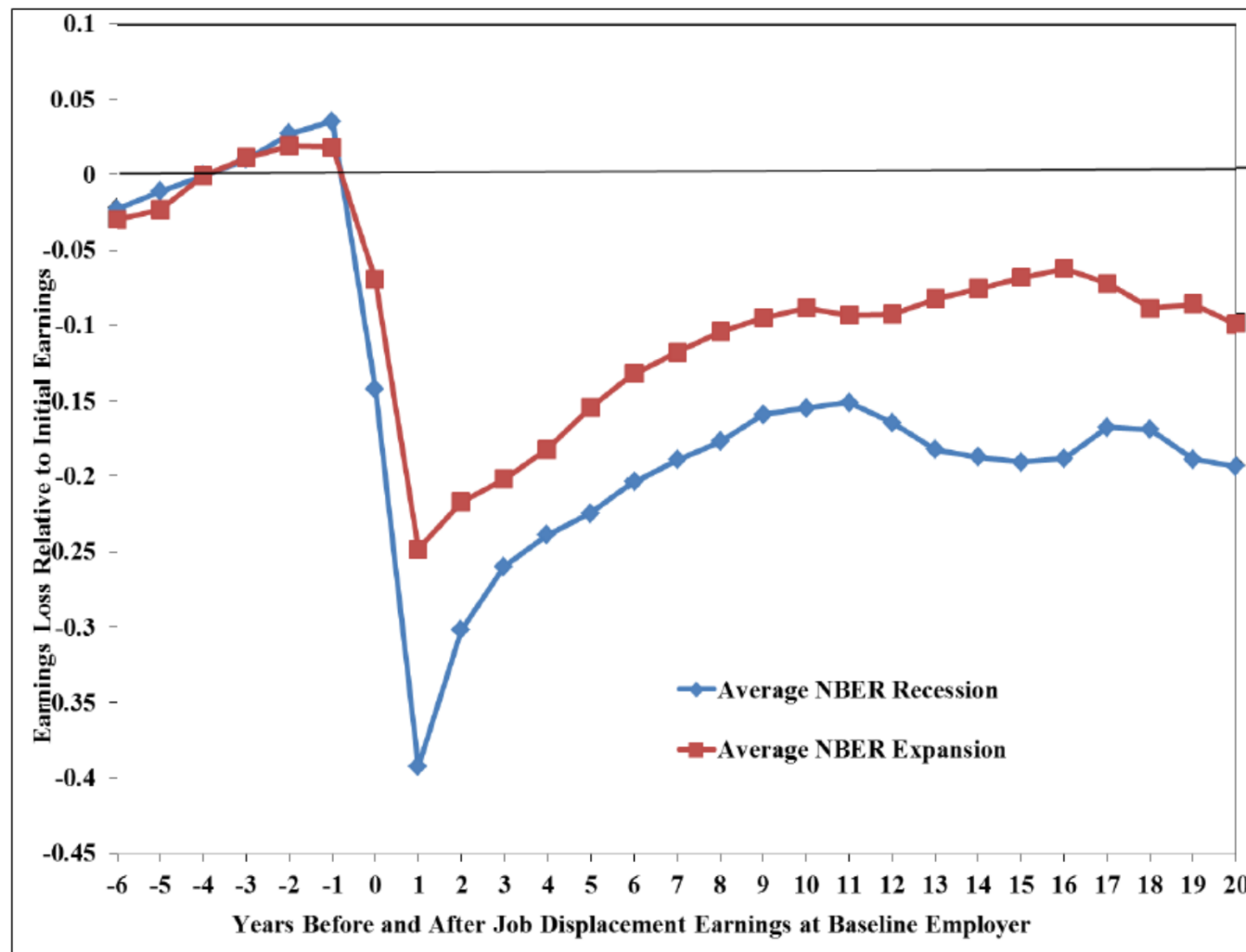
Source: Davis and von Wachter (2012), Figure 5c.

# Earnings losses are strongly counter-cyclical

Source: Davis and von Wachter (2012)

Permanent shocks and the GR

1. Rise in unemployment concentrated among permanent job losers ("displaced workers")
   - Displacement associated with "scarring" effects on outcomes (future wages, employment, etc.)
   - Effects amplified during recessions
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2. «Cycle becomes Trend»
   - Increased job polarization
     - Concentrated in recessions (Firm reorganization, restructuring, etc.)
   - Jobless recoveries
     - Concentrated among middle-skill "routine" occupations
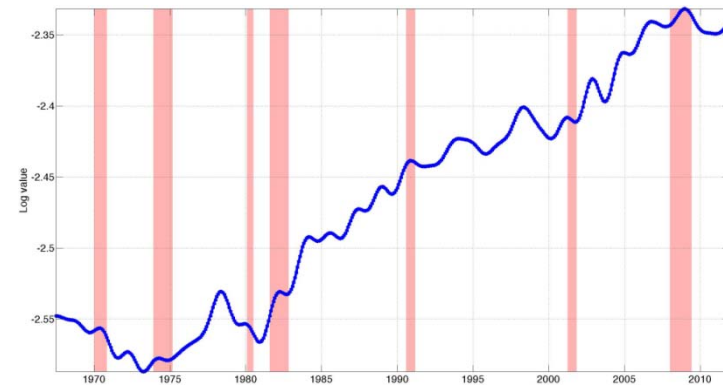
The disappearance of the «middle» class?
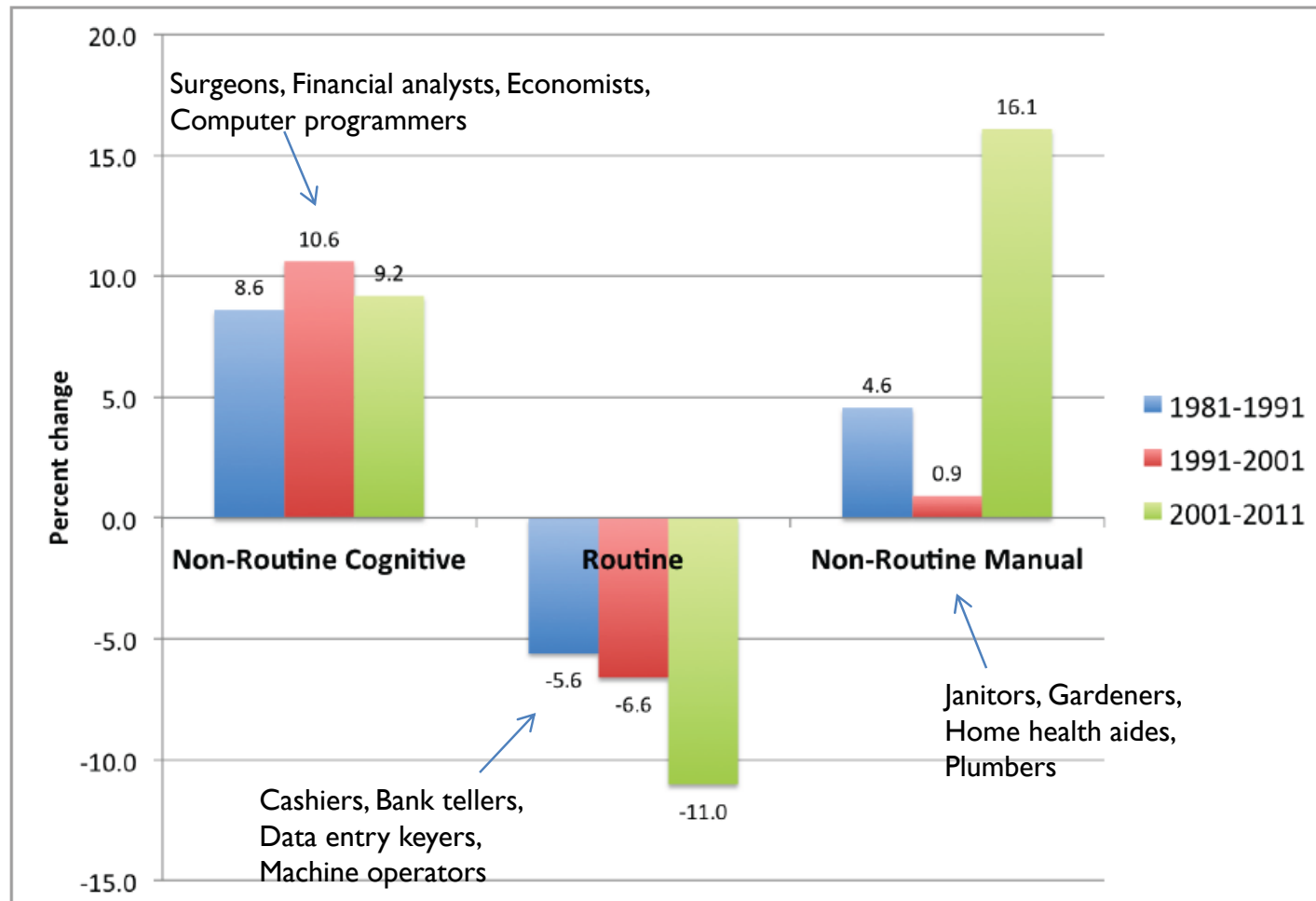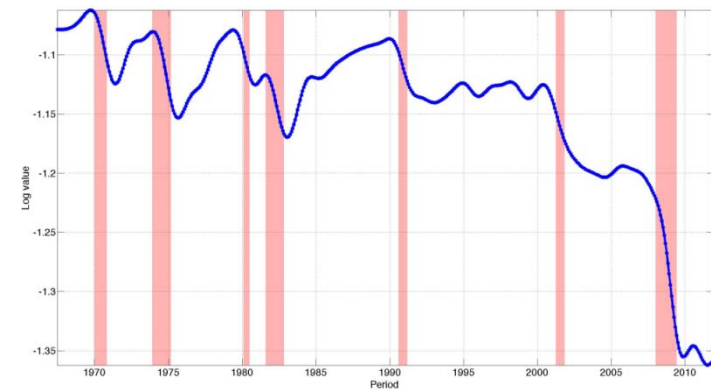

Source: Jaimovich and Siu (2012)

Employment Trends for the three groups
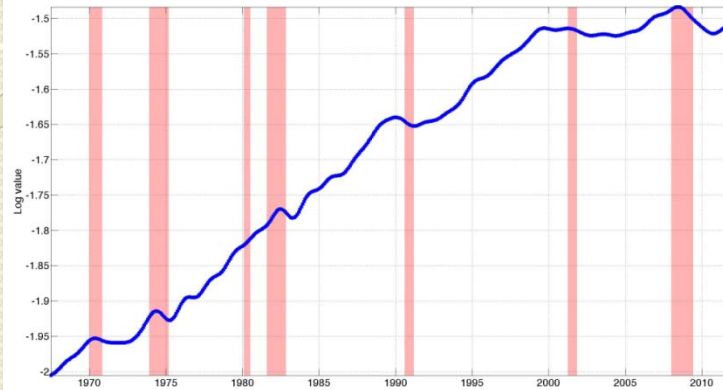
Non-routine cognitive

Non-routine manual

Routine

Source: Jaimovich and Siu (2012)

Conclusions

- Predicting the outcome of a policy intervention requires defining nature of change, context, and distribution of responses in population

- Heterogeneity is pervasive

- Measurement issues are paramount to inform policy and welfare debate

Some calculations of potential effects

- A redistribution experiment (Krueger, 2010; ERP, 2012):
  - Convert the extra share of income captured by the top 1% over the last 30 years in 2007$ income
  - Give it to the bottom 99%
  - Use estimates of heterogenous MPCs from the literature
  - This would induce a 5% aggregate consumption boost
    - Upper bound: neglect all sorts of behavioral (e.g., labor supply) disincentive effects

- Reassessing the effect of tax policies in the presence of MPC heterogeneity (Misra and Surico, 2012)
  - Study 2001 tax rebate
  - Predict a 5% effect on aggregate nondurable consumption assuming homogenous MPCs
  - Effect is only 3% when heterogeneity is allowed for
  - Similar qualitative results for 2008 tax stimulus

Issues

1. Does the distribution of MPC heterogeneity in the population varies over the business cycle?
   - The "direct question" approach can in principle be repeated for several waves. With panel data, it is possible to answer these questions

2. Study responses to tax rebate as well as response to tax hikes to test for asymmetry (due to borrowing constraints, etc.)

3. MPC - a "sufficient statistics" idea á la Chetty?
   - In fact, it is a function of multiple structural parameters
   - In Blundell, Pistaferri and Saporta-Eksten (2012), we show that the MPC wrt permanent shocks to wage of earner j can be written as

$$\kappa_{c,v_j} = \eta_{c,w_j} + \frac{\left(\eta_{c,p} - \left(\eta_{c,w_j} + \eta_{c,w_{-j}}\right)\right)\left[(1 - \pi_{i,t})\left(s_{i,j,t} + \overline{\eta_{h,w_j}}\right) - \eta_{c,w_j}\right]}{\left(\eta_{c,p} - \left(\eta_{c,w_j} + \eta_{c,w_{-j}}\right)\right) + (1 - \pi_{i,t})\left(\overline{\eta_{h,w_j}} + \overline{\eta_{h,w_{-j}}} + \overline{\eta_{h,p}}\right)}$$

   - Heterogeneity: $\pi_{i,t}$, $s_{i,j,t}$, etc.
   - Do we care about the structural parameters or the sufficient statistics?