Household Behavior and the Dynamics of Inequality

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  - Taxes, welfare and social insurance (earnings→ net income)
  - Saving and borrowing (income→ consumption→ wealth) – *don't forget nonseparabilities*!
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- To explore the distributional dynamics from wages through to consumption.....

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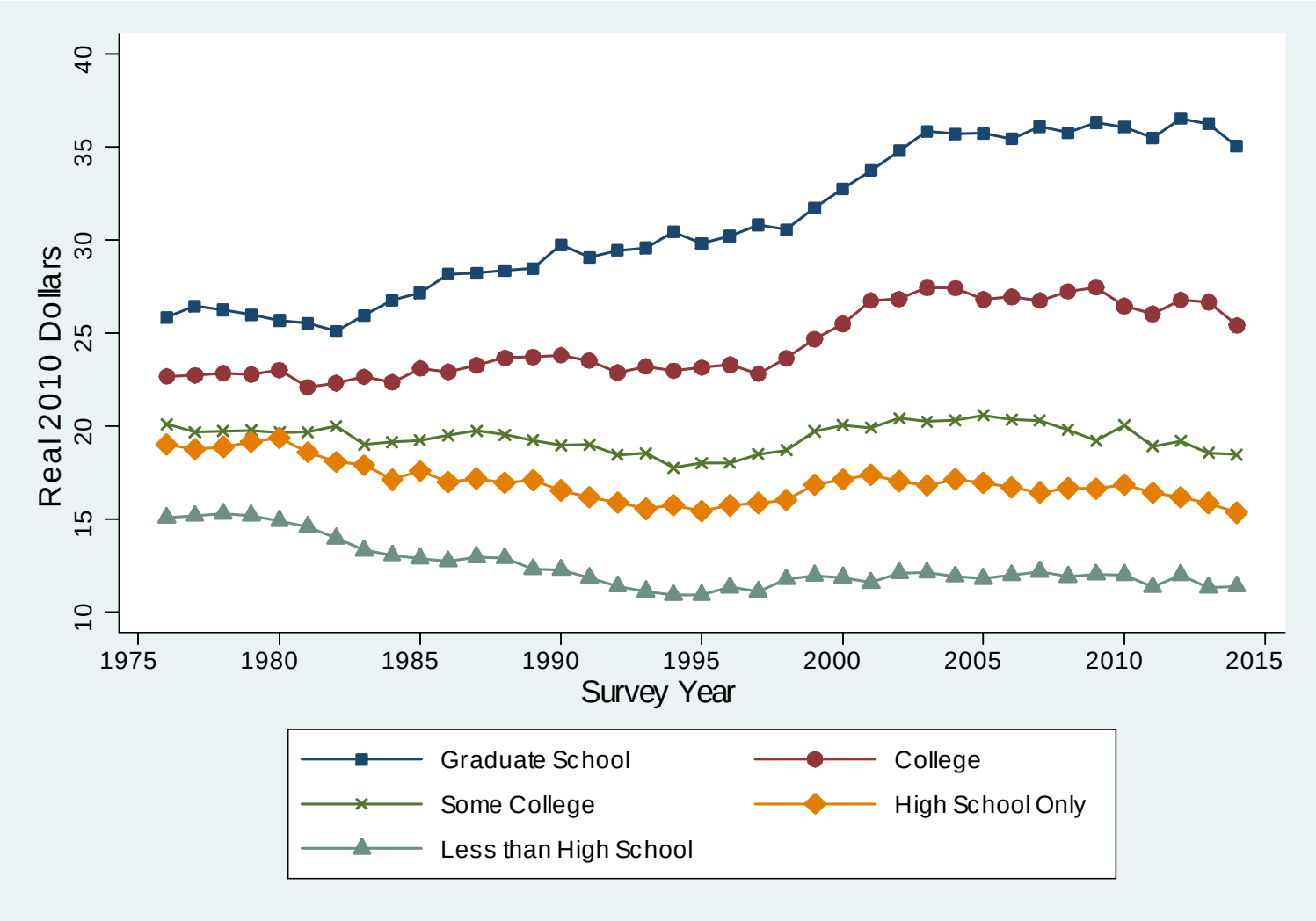
- **Two key motivating issues:**
  - falling real earnings for low skilled, especially men,
  - growing earnings inequality.
- These, in turn, place increasing pressure on government revenues (UK and US examples).
- Requiring the design of appropriate policy responses.

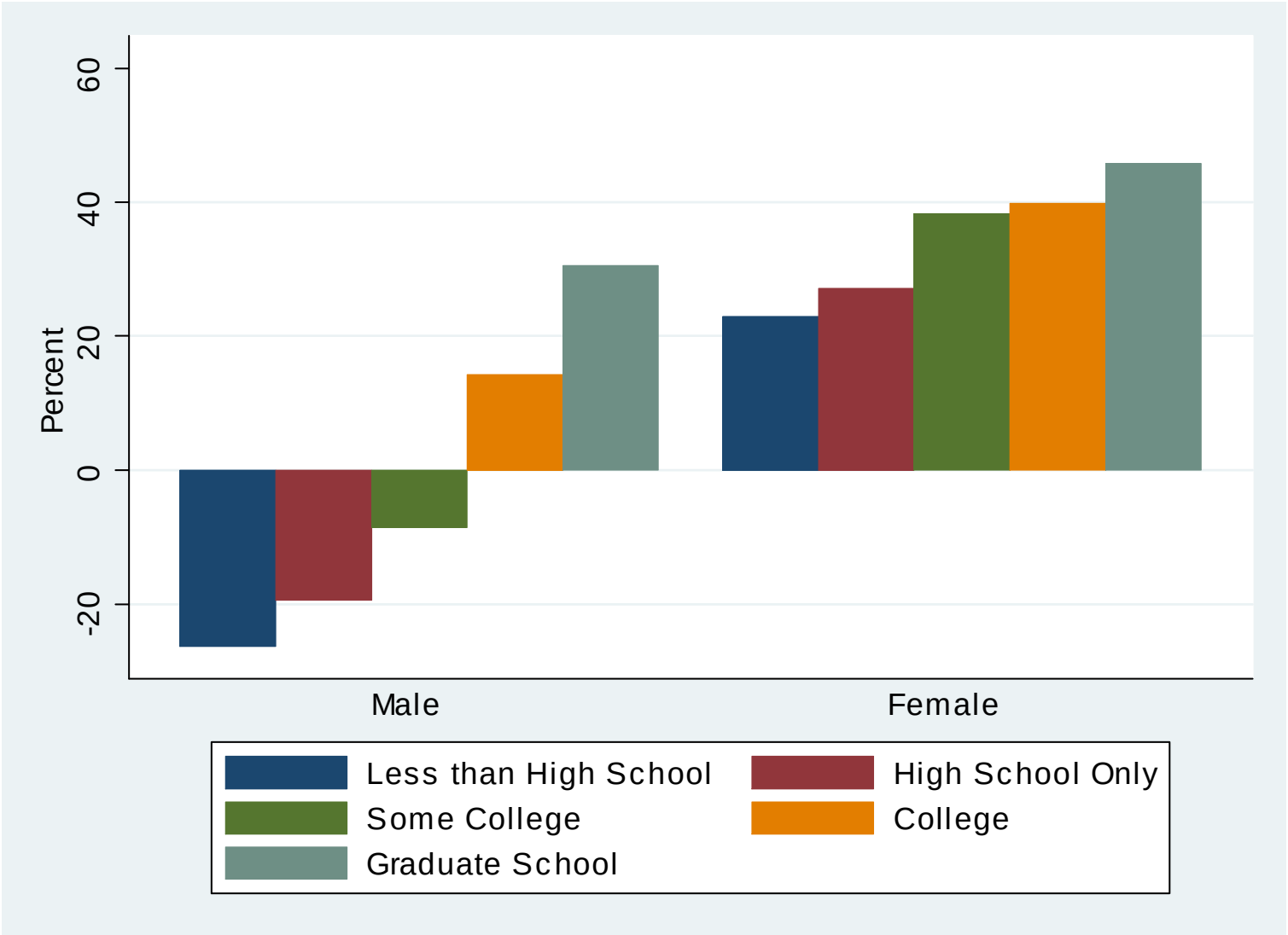
Some background figures.....

Male Median Real Wages by Education in the US



Notes: CPS, Ages 25-55; Source: Blundell, Norris-Keiller and Ziliak (2017)

Earnings Change by Education and Gender, US



Notes: CPS, real median earnings 1976-2014, Ages 25-55.
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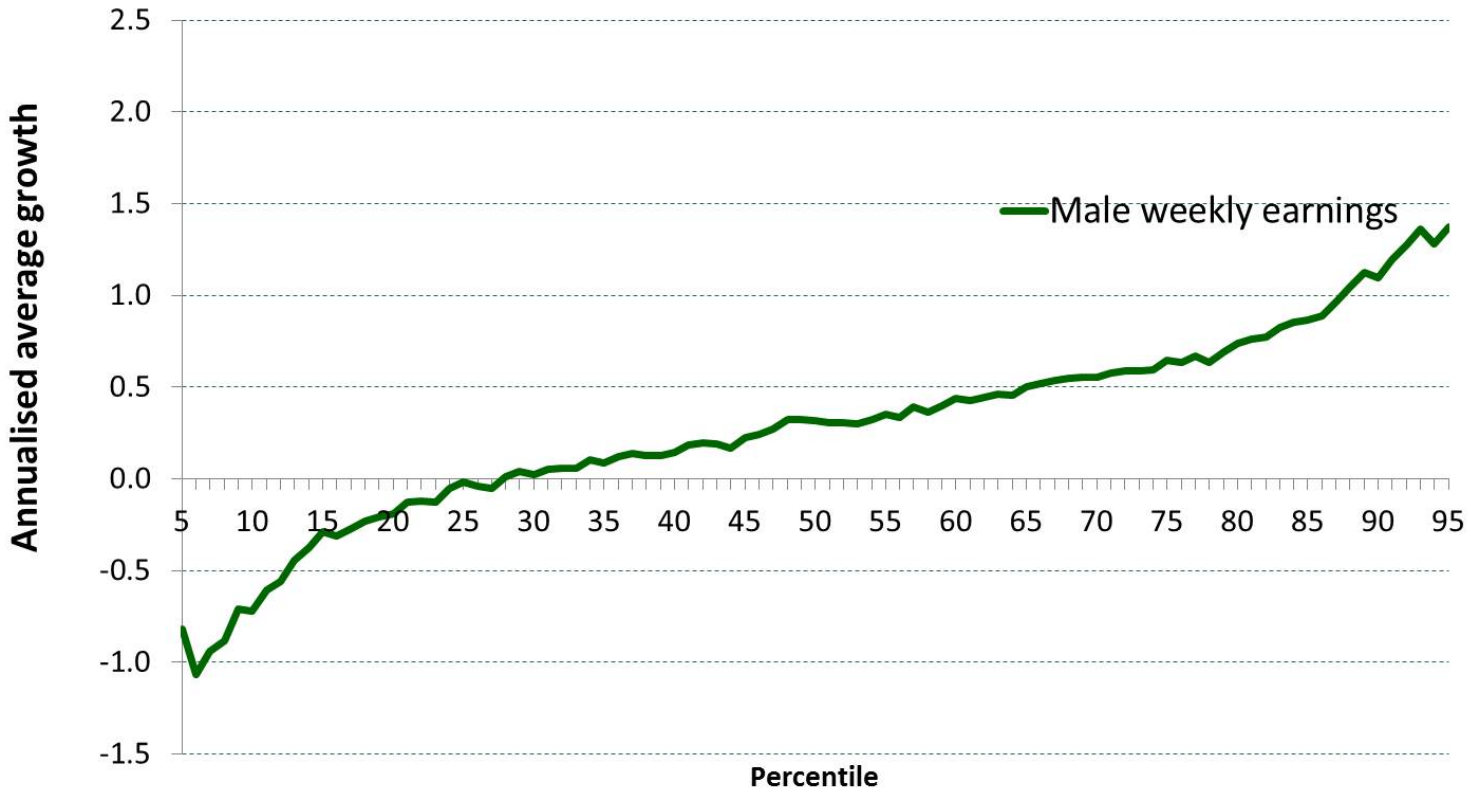
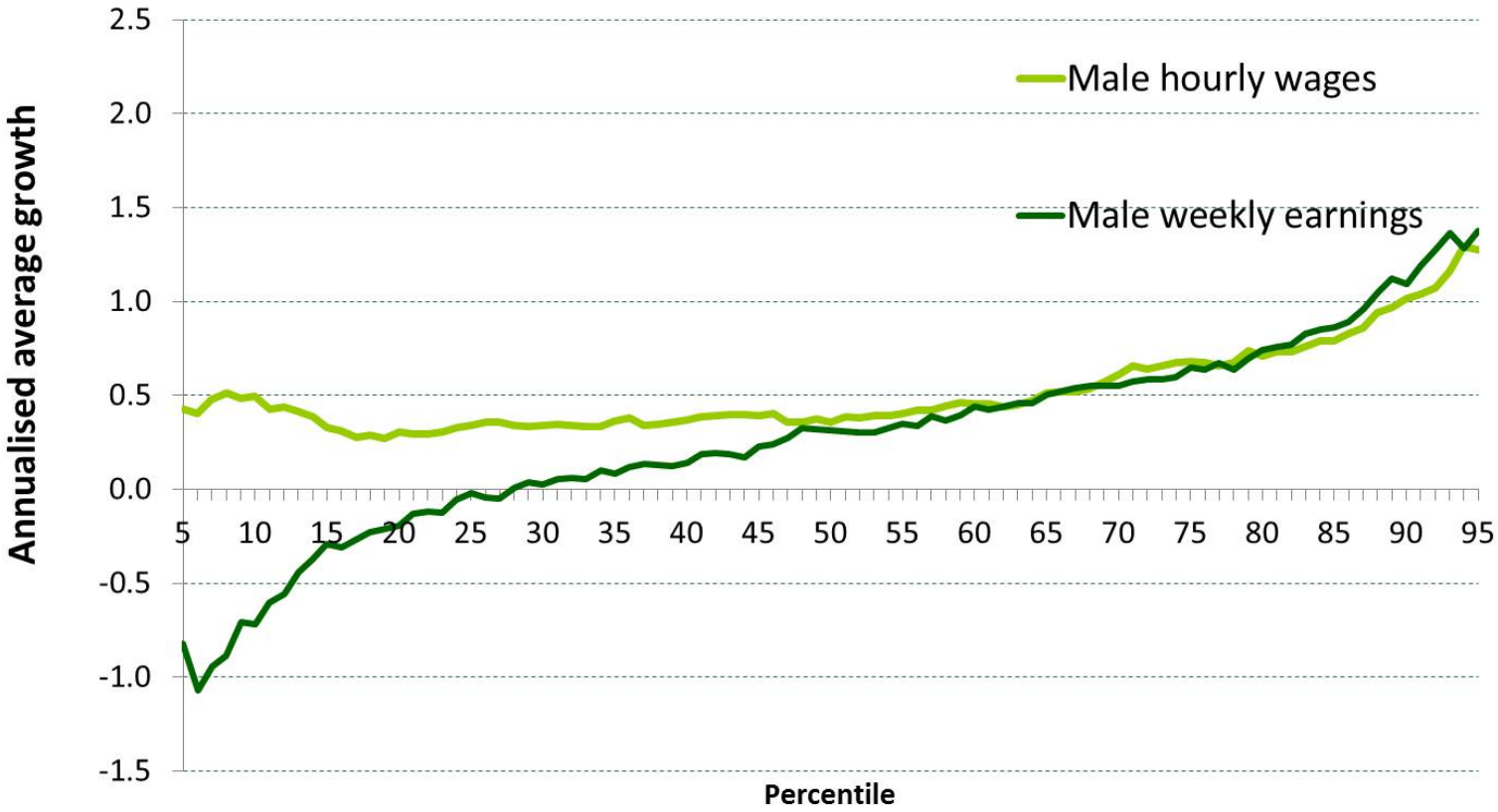
Growth in UK male weekly earnings: 1994/95 – 2015/16



Source: Blundell, Joyce, Norris Keiller and Ziliak (2018)
Data used is UK FRS 1994-95 and 2015-16.

Growth in UK male hourly wages: 1994/95 – 2015/16



Source: Blundell, Joyce, Norris Keiller and Ziliak (2018)
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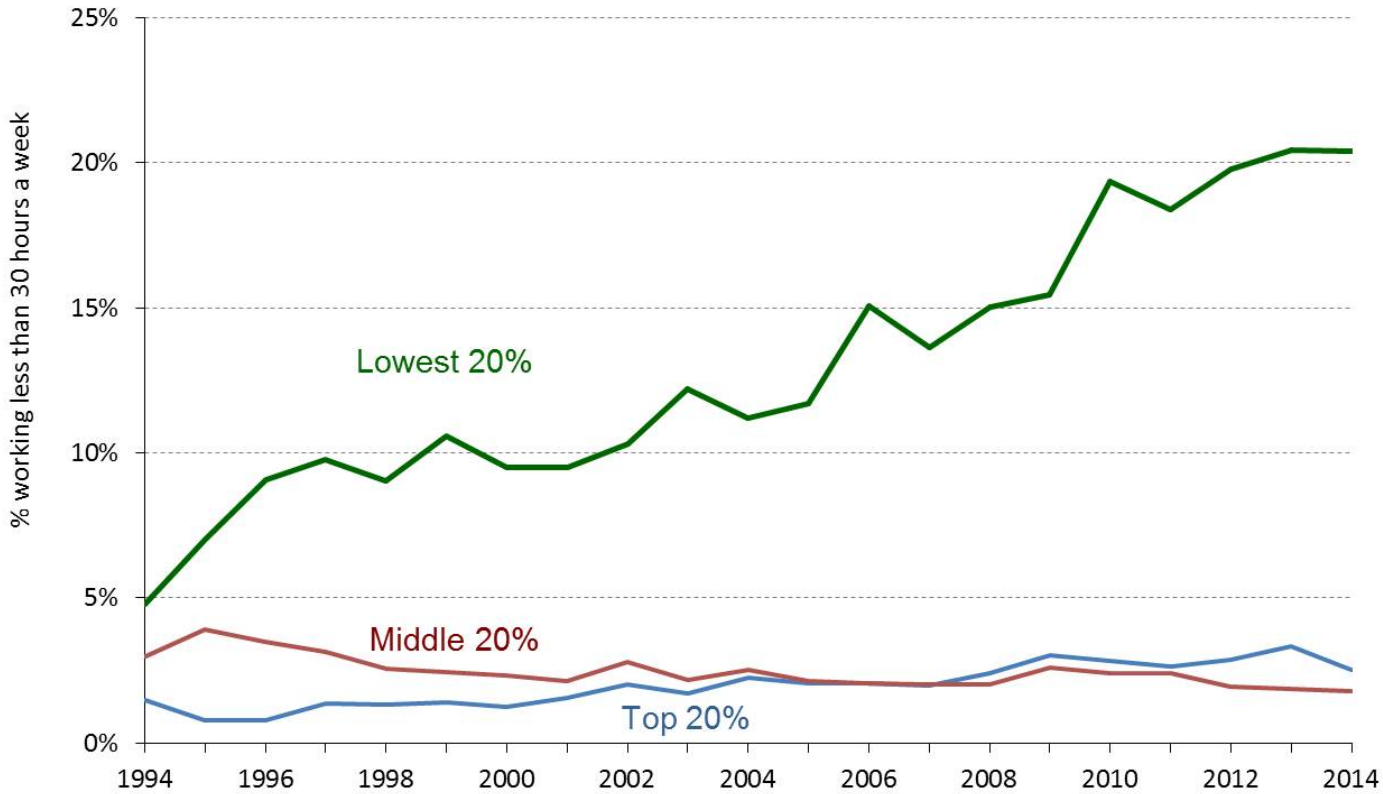
Male hours of work in the UK by wage quintile: 1994/95 – 2015/16



Source: Blundell, Joyce, Norris Keiller and Ziliak (2018)
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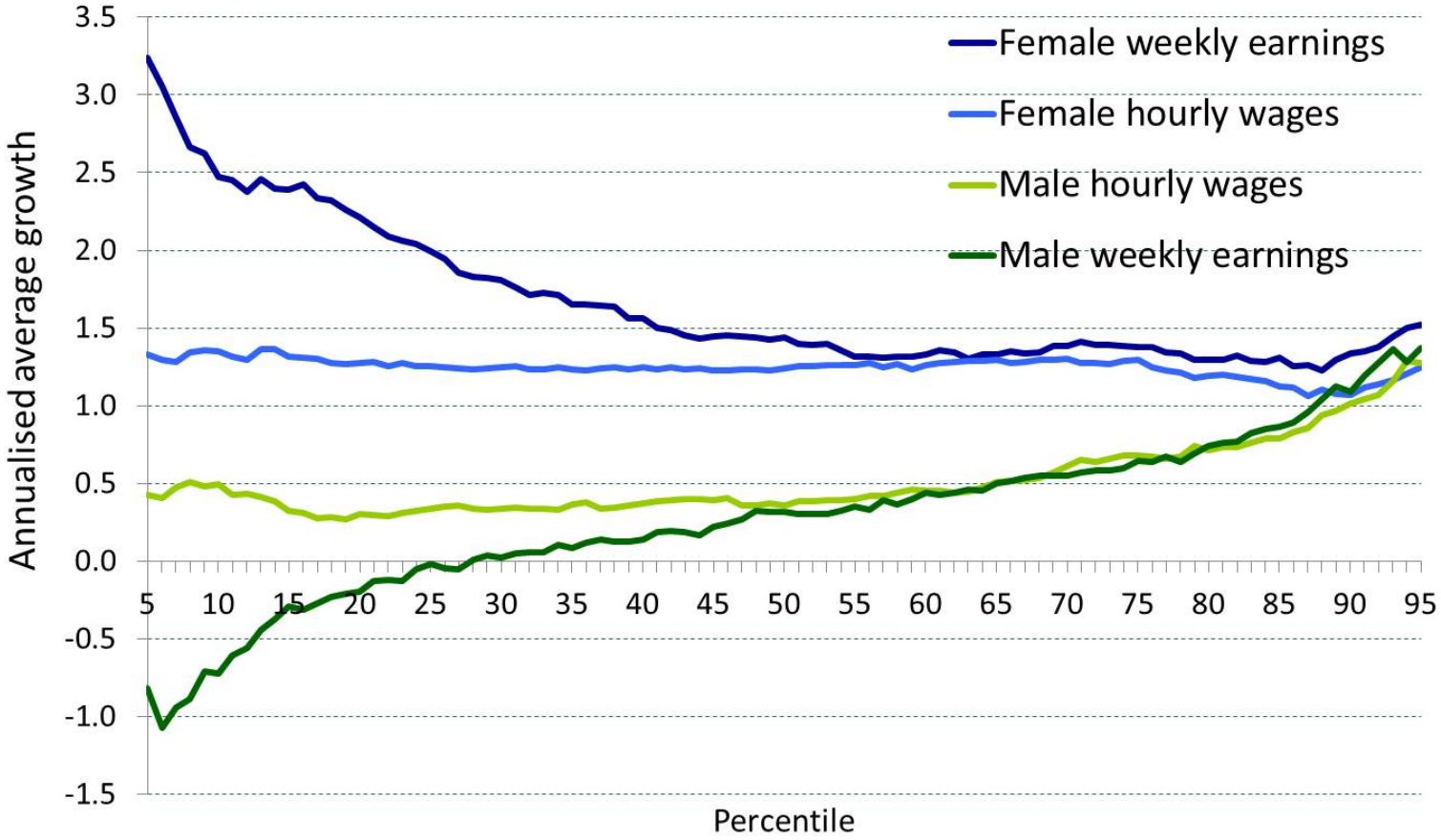
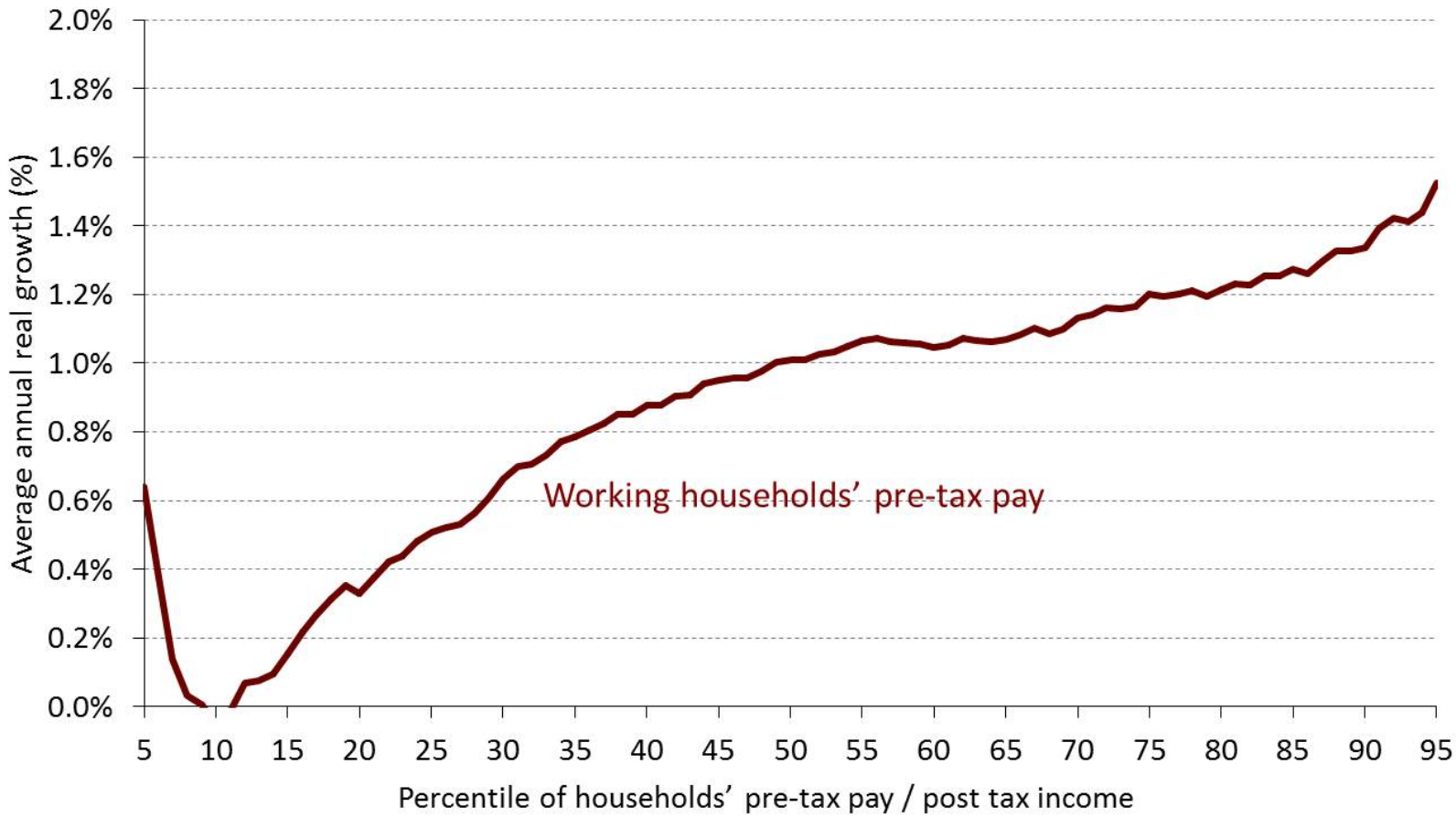
Growth in UK male and female earnings: 1994/95 – 2015/16



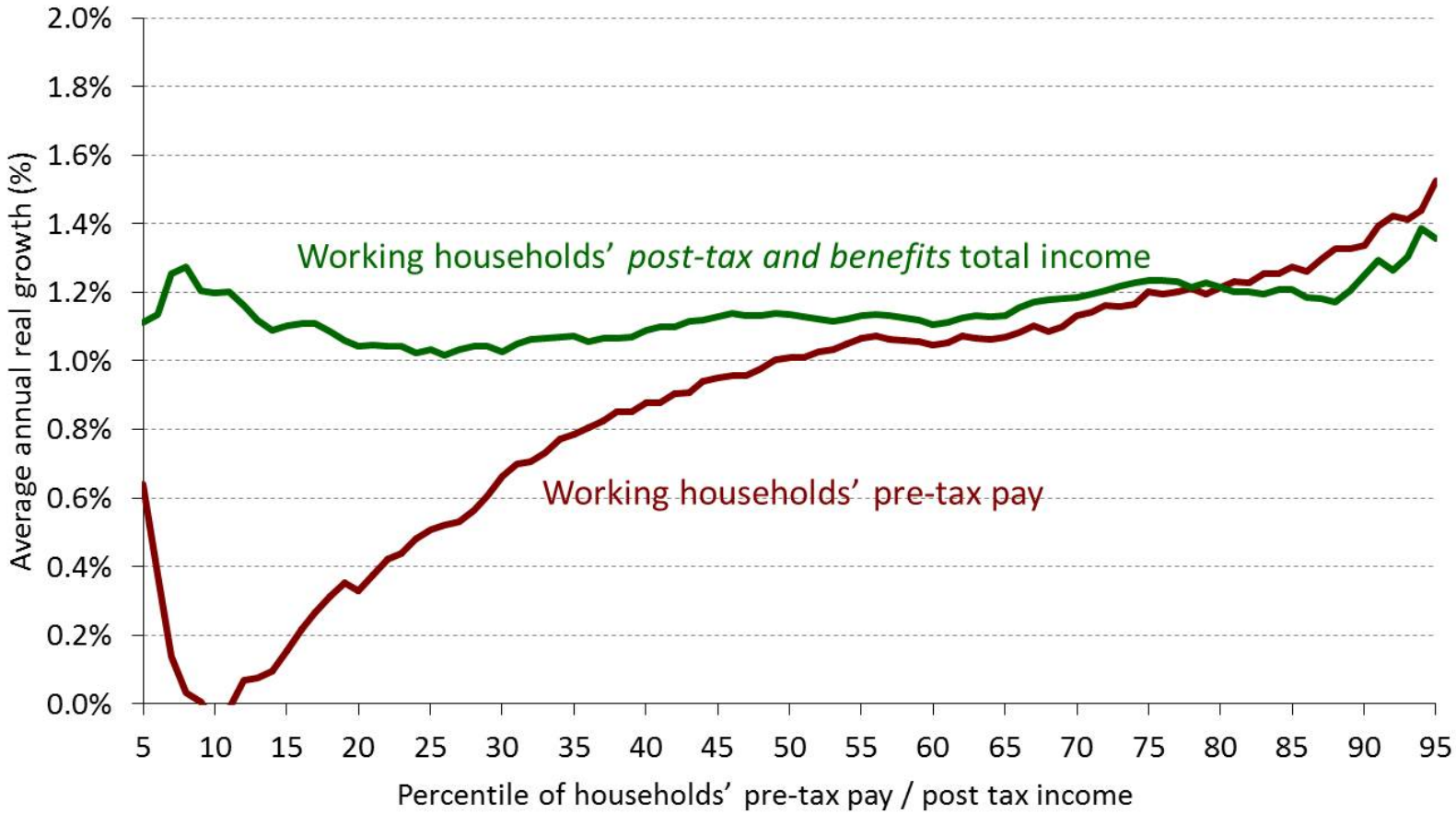
Source: Blundell, Joyce, Norris Keiller and Ziliak (2018)
Data used is UK FRS 1994-95 and 2015-16.

Growth in UK household earnings: 1994/95 – 2015/16



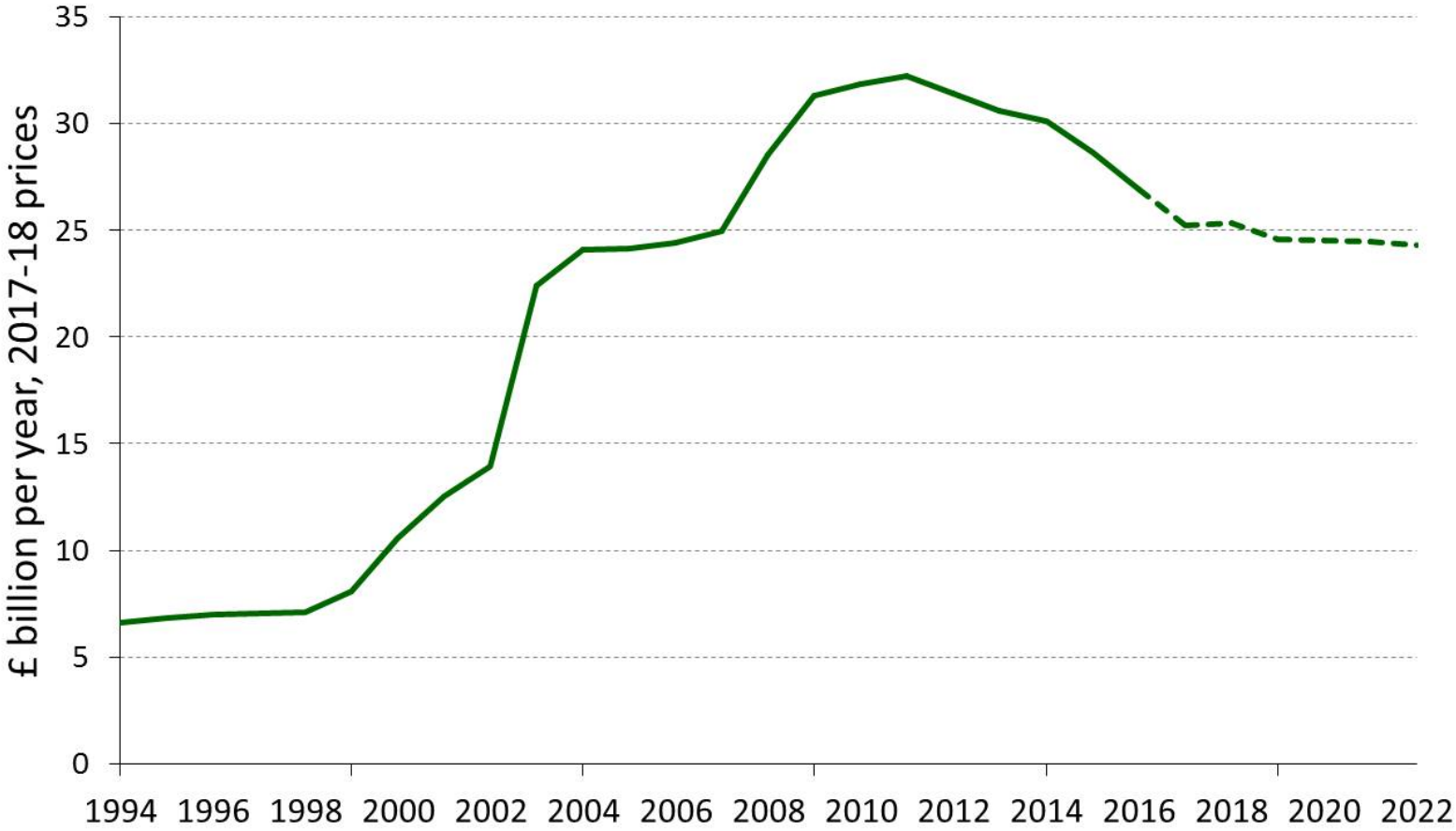
Source: Blundell, Joyce, Norris Keiller and Ziliak (2018)
Data used is UK FRS 1994-95 and 2015-16.

Growth in UK household post-tax income: 1994/95 – 2015/16



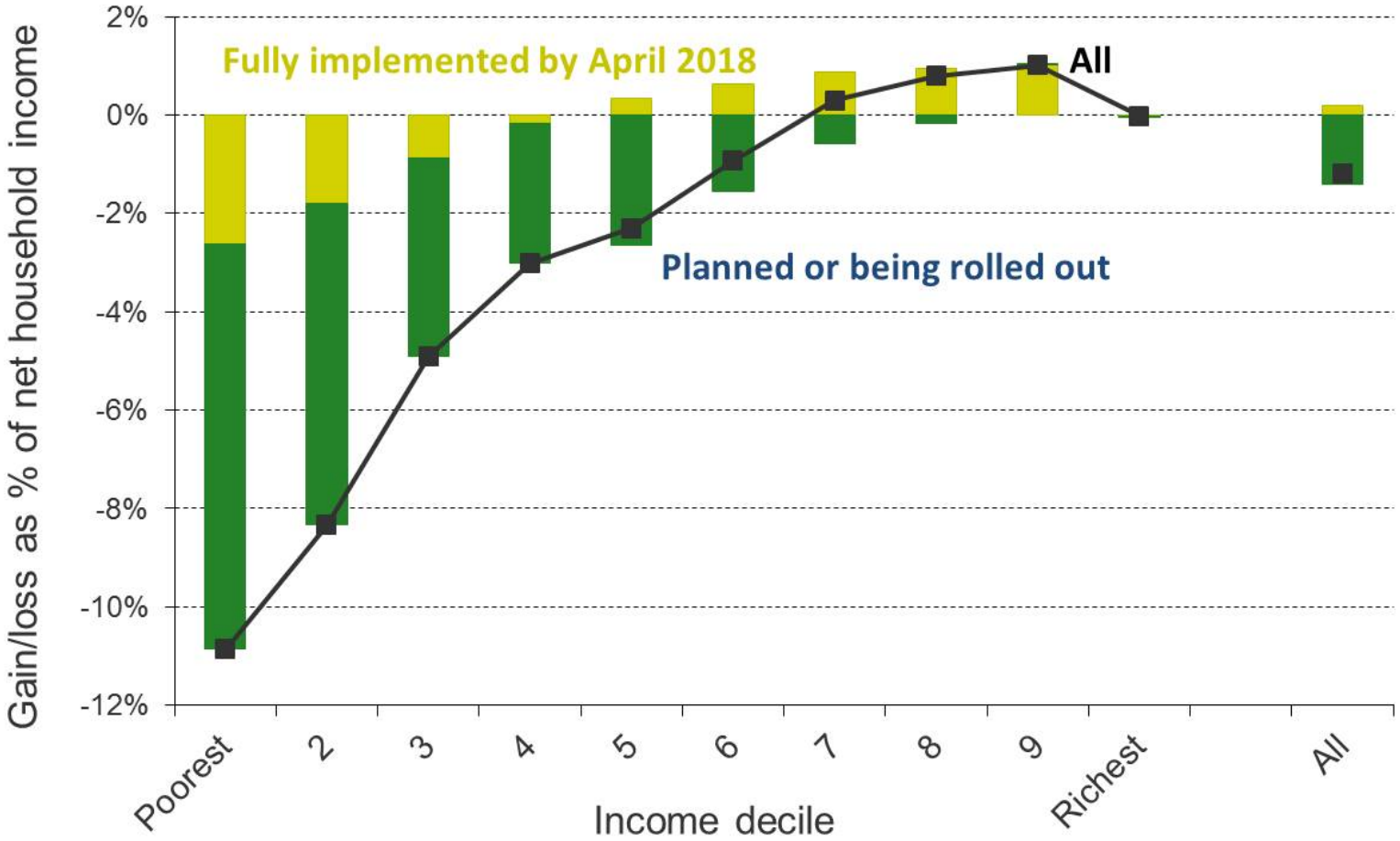
Source: Blundell, Joyce, Norris Keiller and Ziliak (2018)
Data used is UK FRS 1994-95 and 2015-16.

Growth in UK tax and welfare expenditure: 1994/95 –>



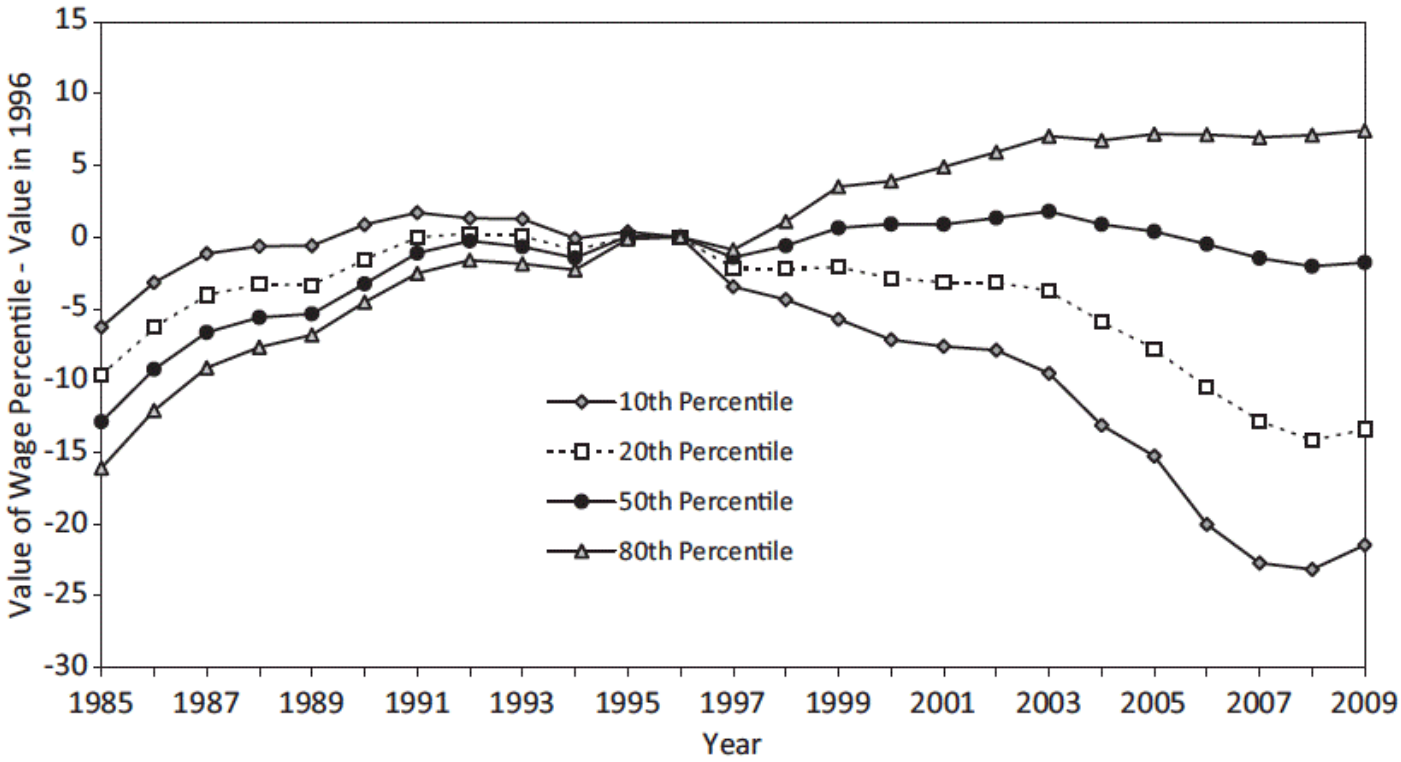
Source: Blundell, Joyce, Norris Keiller and Ziliak (2018).
DWP calculations plus IFS.

UK tax and welfare policy responses



Source: Blundell, Joyce, Norris Keiller and Ziliak (2018).
IFS calculations.

Trends in Percentiles of Real Log Daily Wages for West German Men



Notes: Percentiles of log real daily wage for full-time male workers on their main job, deviated from value of same percentile in 1996 and multiplied by 100.
Source: Card, Heining and Kline (2013).

Household behaviour and the dynamics of inequality

$\star$ => The aim of this work here is to explore the mechanisms families and households use to accommodate (adverse) labour market shocks, and to assess the effectiveness of the tax and welfare system.

- Much of the material here is coauthored and draws from work on developing the 'partial insurance' approach to linking across multiple dimensions of economic inequality.
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- Driven by a data revolution in empirical microeconomics.....

New data on consumption, assets and income

I. Administrative linked data: e.g. Norwegian population register.

- Linked registry databases with unique individual identifiers.
  - Containing records for **every Norwegian from 1967 to 2014.**
  - Detailed socioeconomic information (market income, cash transfers). Recent links to financial transactions data on real estate and assets; and to hours of work⇒ new consumption measurements.
- Family identifiers allow to match spouses and children.
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II. Newly designed panel surveys: e.g. PSID 1999 - 2015.

- Collection of consumption and assets had a major revision in 1999
  - ~70% of consumption expenditures. Around 90% from 2005.
  - Food at home, food away from home, gasoline, health, transportation, utilities, clothing, etc with choice of purchase frequency.
- Earnings and hours for all earners; Assets measured in each wave.
  - see Blundell, Pistaferri and Saporta-Eksten (2016).

The partial insurance approach

- Begin with modelling the dynamics of income as two latent components:
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- There is also good economic reasoning behind this decomposition:
  - persistent shocks to income are more difficult to insure,
  - especially the young with low assets.
- How families cope with persistent shocks and the implications for inequality is the main focus.
  1. First, look at some baseline partial insurance results,
  2. Second, examine the importance of nonlinear persistence,
  3. Third, unpack the role of family labour supply and time use.

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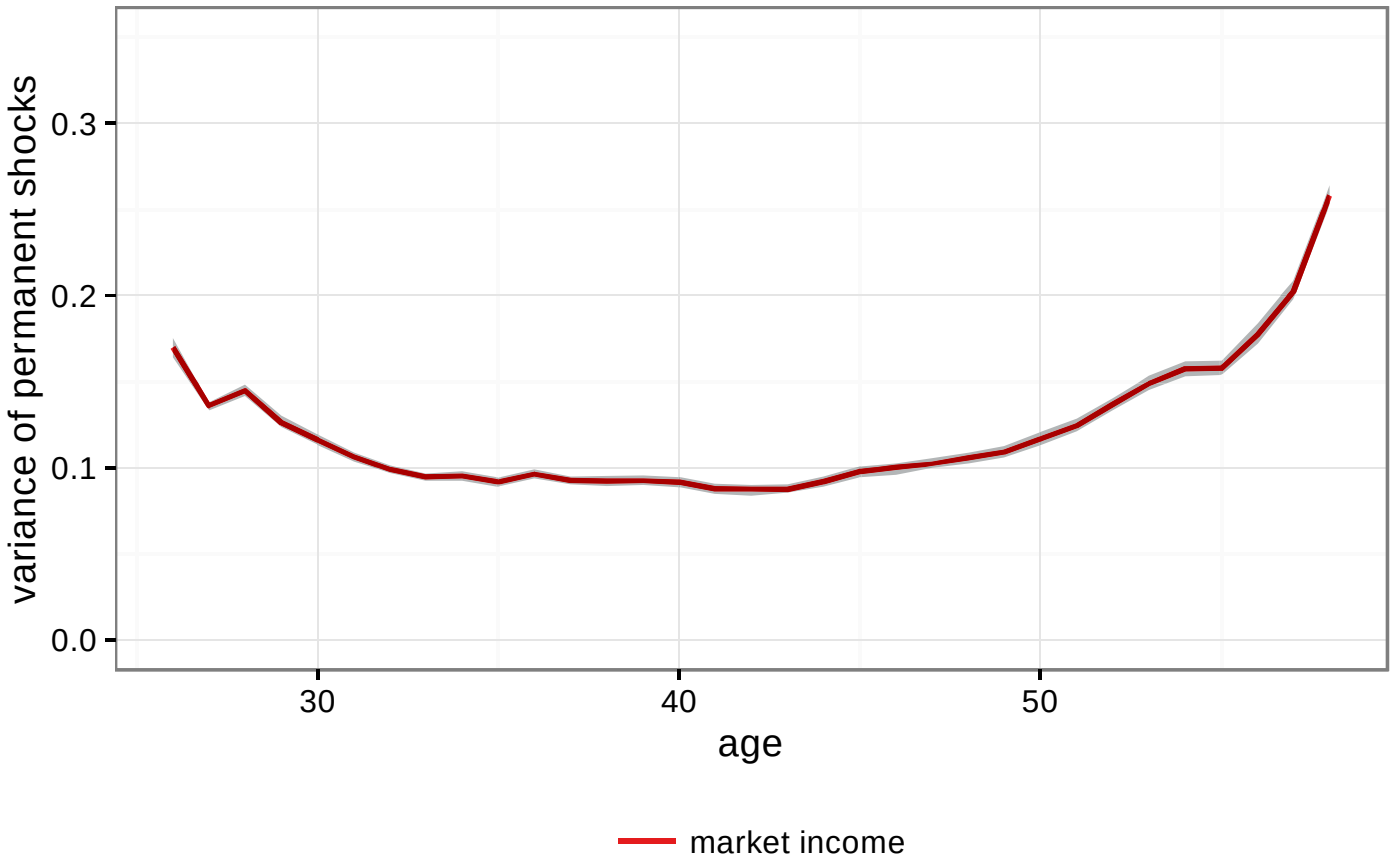
- Simple but can be very revealing - detailed work on Norwegian population register panel data....

Variance of permanent shocks to income



Source: Blundell, Graber and Mogstad (2015).

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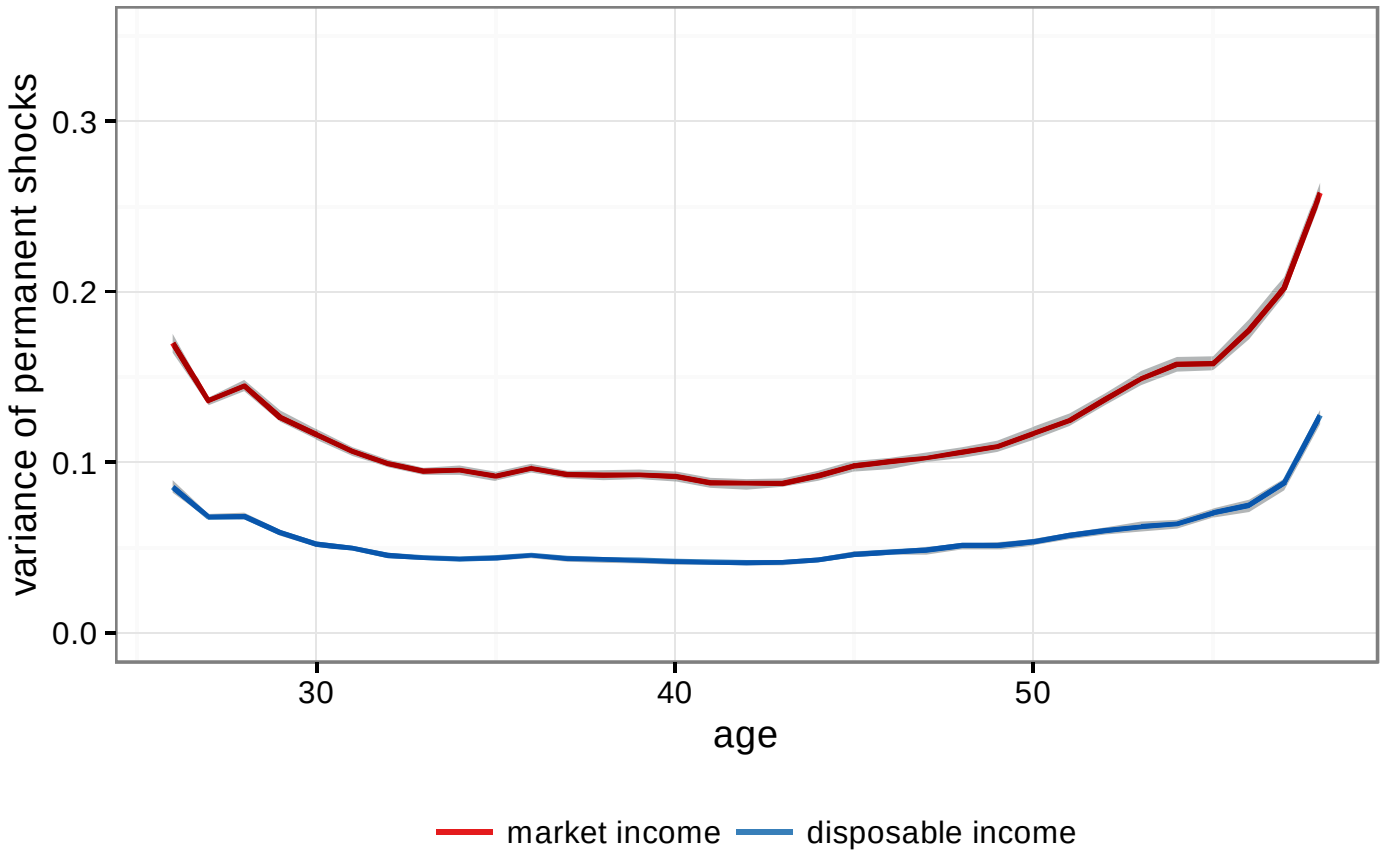

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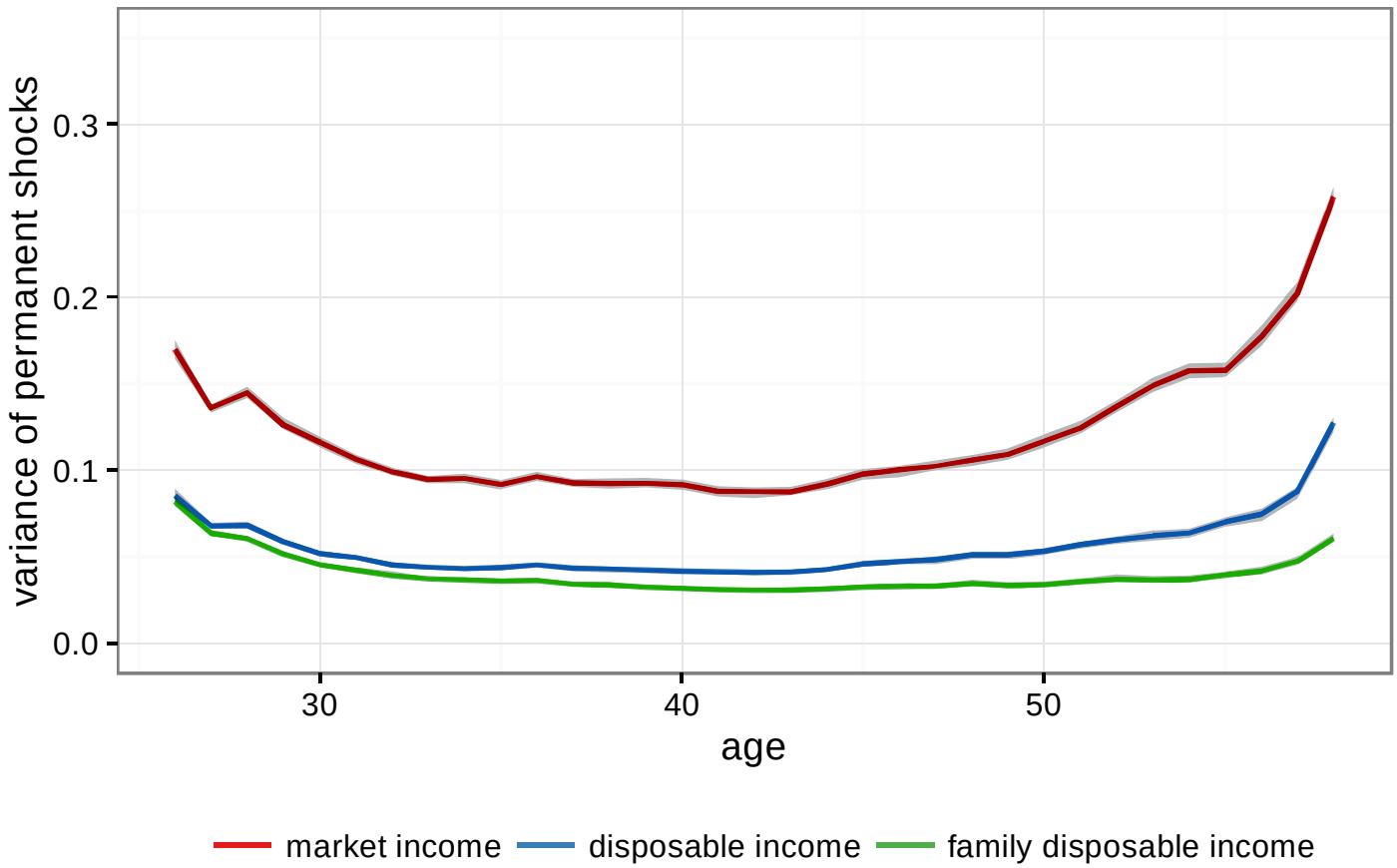
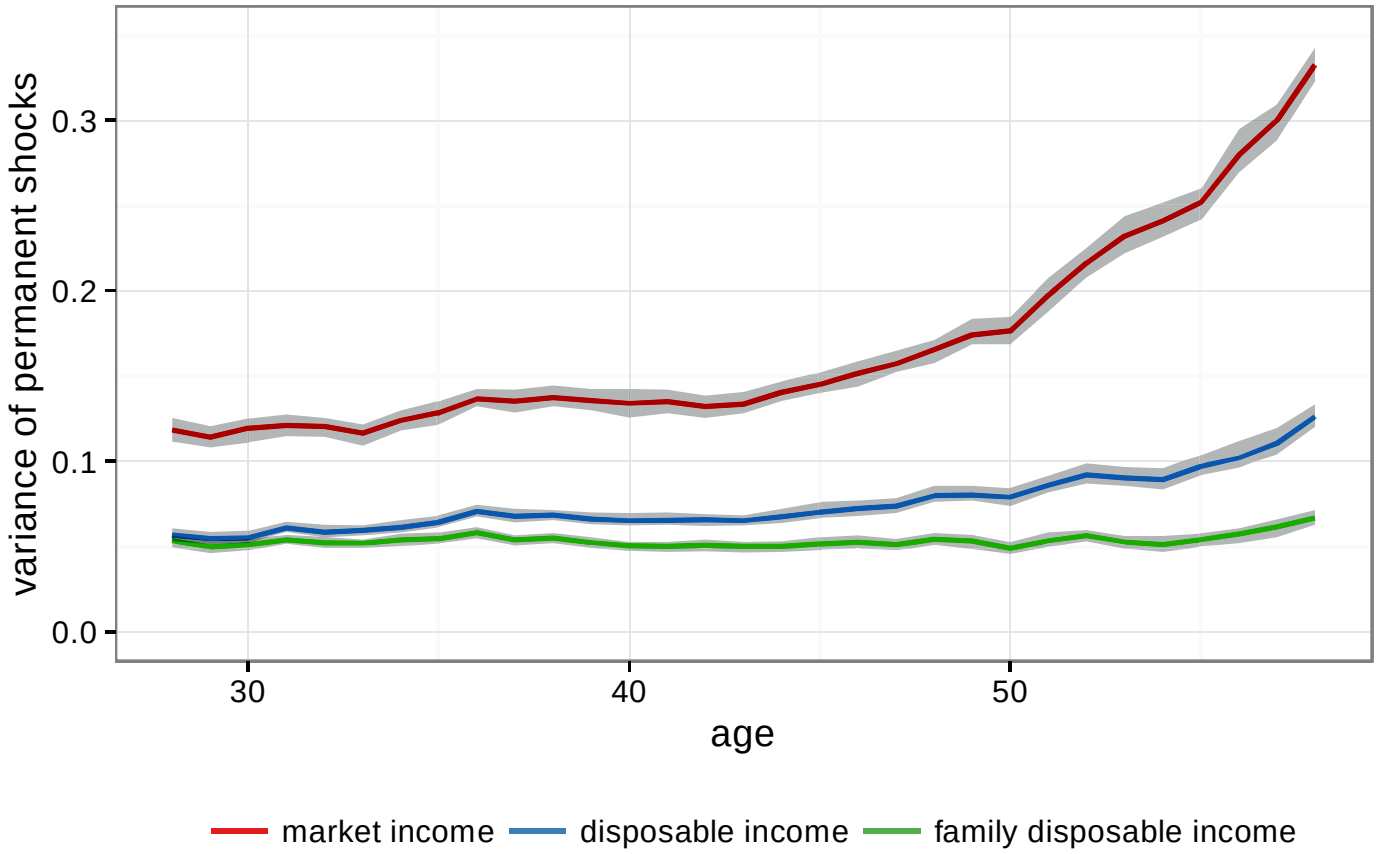


Source: Blundell, Graber and Mogstad (2015).

Variance of permanent shocks to income (low skilled)



Source: Blundell, Graber and Mogstad (2015).

Partial Insurance:

Linking Income and Consumption Inequality

Introduce *transmission* or *partial insurance* parameters, writing consumption growth as:

$$\Delta \ln C_{it} \cong \gamma_{it} + \Delta Z'_{it}\varphi + \phi_t v_{it} + \psi_t \varepsilon_{it} + \xi_{it}$$

where ϕ_t and ψ_t can be individual specific and provide the link between the consumption and income distributions - v_{it} the persistent and ε_{it} the transitory shock to income.

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- For example, in a simple benchmark intertemporal consumption model for consumer of age t

$$\phi_t = (1 - \pi_{it}) \text{ and } \psi_t = (1 - \pi_{it})\gamma_{Lt}$$

where

$$\pi_{it} \approx \frac{\text{Assets}_{it}}{\text{Assets}_{it} + \text{Human Wealth}_{it}}.$$

- We generalise this framework: taxes, welfare benefits, and other mechanisms to examine US and Norwegian data.

Consumption in the Norwegian Register Data

The analysis combines several data sources for the period 1994-2014

- Tax records on income and wealth
- Real estate transactions from Norwegian Land Register
- Transactions in listed and unlisted stocks from Norwegian Registry of Securities.

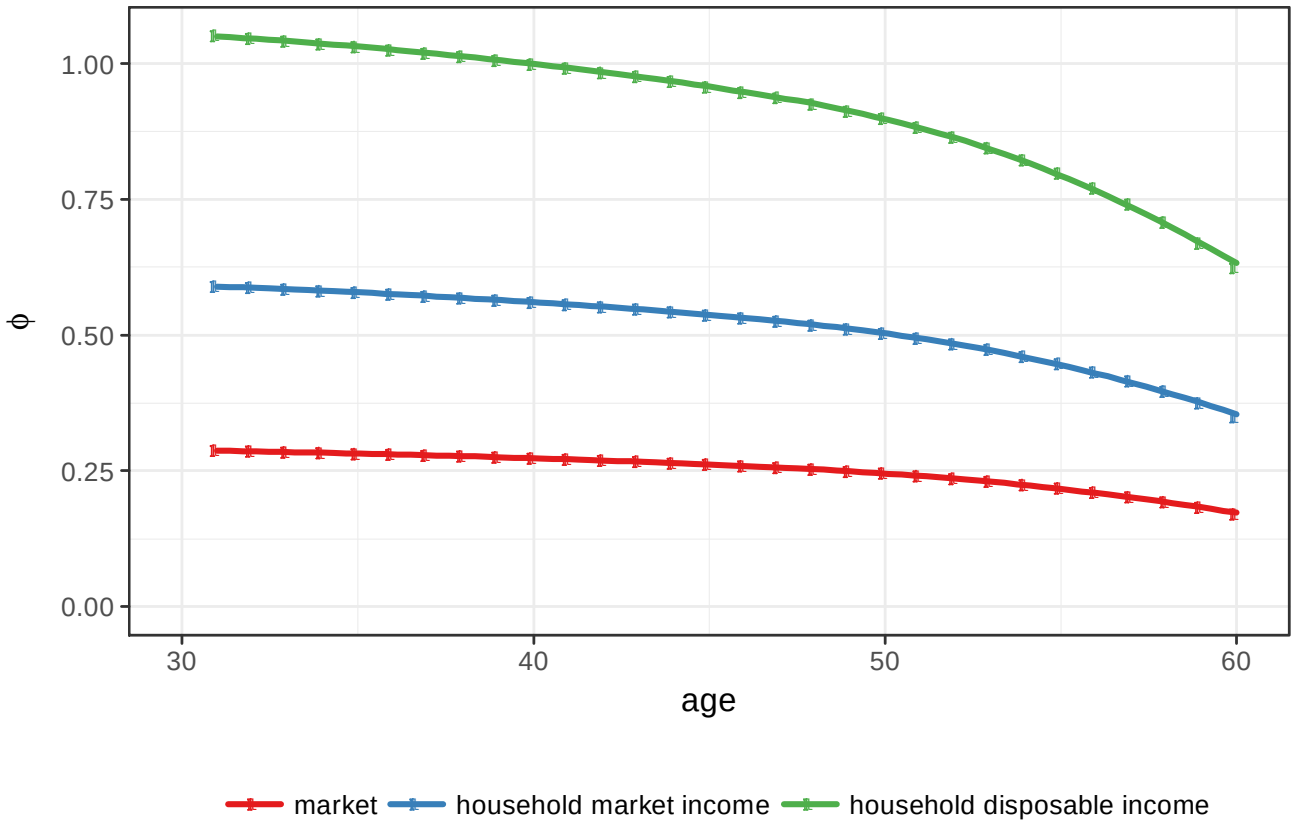
The initial sample covers all households where the household's oldest is at least 18 years old, everyone above 17 years has filed a tax return

- The number of household-year observations in the initial panel is 44,302,000.
- In each year, we keep only households with a male head, age 30 - 60, cohort 1945 - 1975, with non-missing information on schooling and location.

Detailed description of the dataset and consumption measurement in Eika, Mogstad and Vestad (2018).

Partial Insurance and the Transmission of Permanent Income Shocks

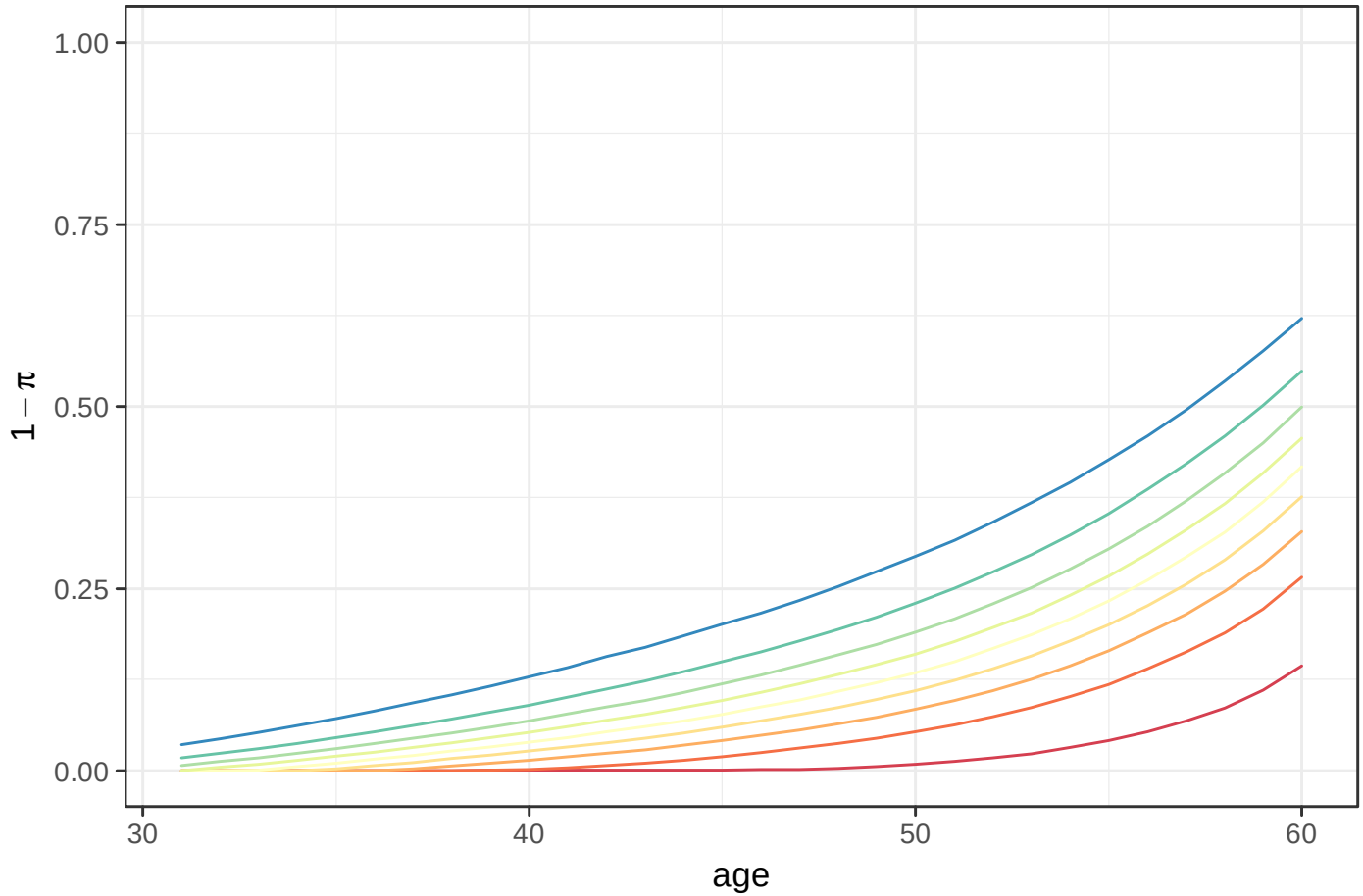
Norway 1994-2014, High Skill



Source: Blundell, Graber and Mogstad (2018).

Asset Shares out of Asset and Human Wealth:

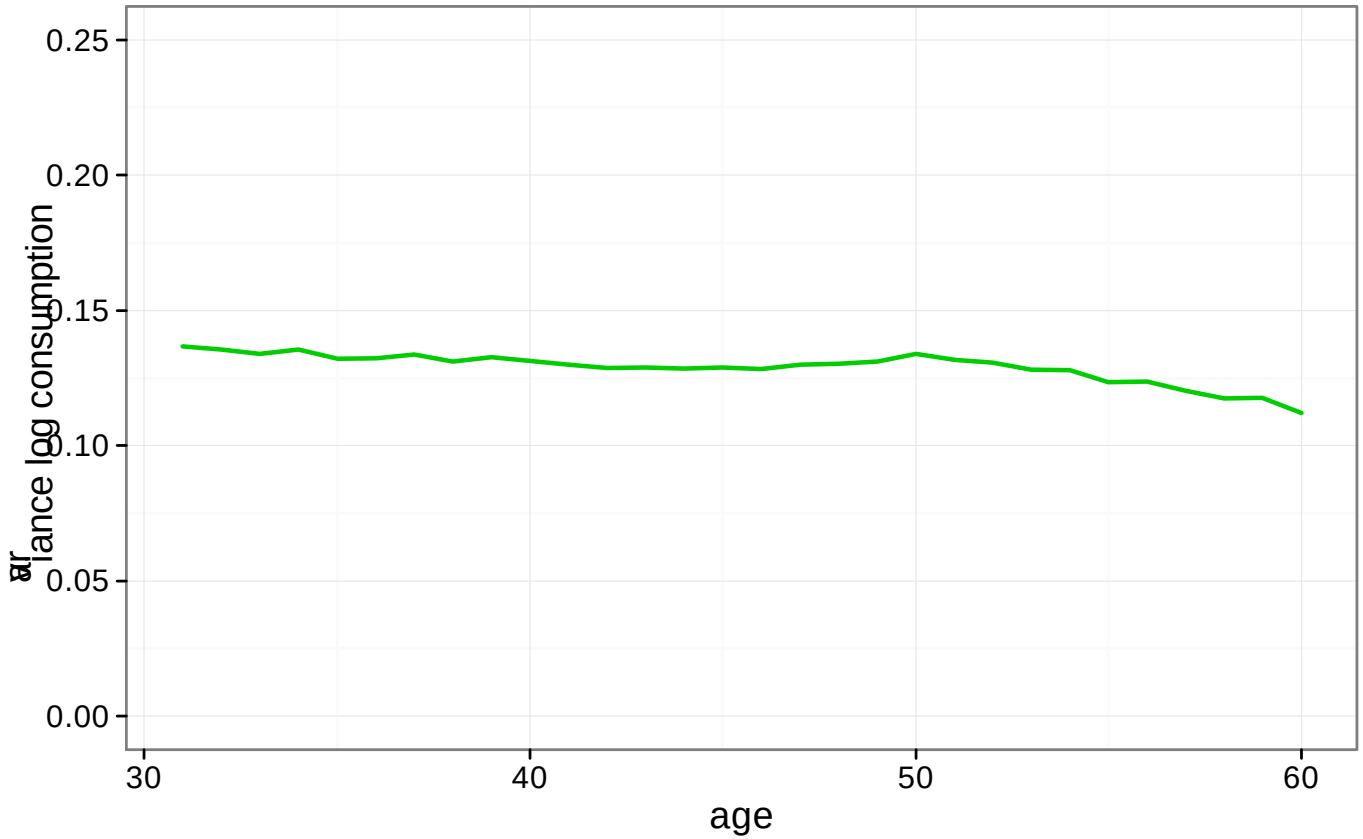
Norway 1994-2014, High Skill, $\pi_{i,t} \approx \frac{\text{Assets}_{i,t}}{\text{Assets}_{i,t}+\text{Human Wealth}_{i,t}}$



Source: Blundell, Graber and Mogstad (2018).

Consumption inequality in Norway by age, low skilled.

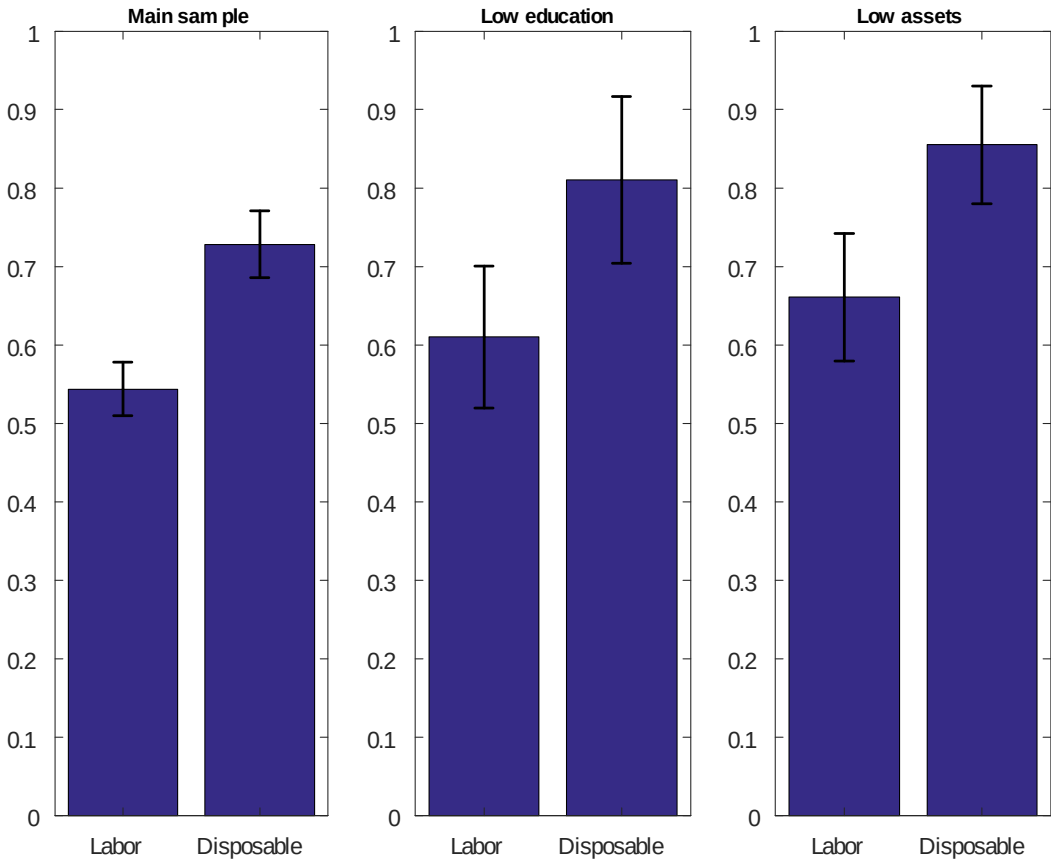
Social insurance takes most of the strain in insuring consumption fluctuations. Little role for self-insurance or other channels.



Notes: Variance log consumption. Consumption measured using income sources, taxes paid, bank balances, real estate and asset transactions.
Source: Blundell, Graber and Mogstad (2018).

Partial Insurance to Permanent Shocks

PSID: 1999-2009, average transmission coefficients.



Source: Arellano, Blundell, Bonhomme and Light (2018).

Transmission Parameters and Partial Insurance

The parameters ϕ_t and ψ_t link the evolution of consumption inequality to income inequality.

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- Typically $(1 - \pi_{it})$ averages at around .82 in US data. This would be the transmission parameter with self-insurance alone.

Using the US PSID data, BPP estimates of *partial insurance*, $\widehat{\phi}_t$:

0.6423 (.09) overall,
0.9439 (.13) for the sample without college education, and
0.7928 (.18) for those born in the 1940s.

- The estimate falls by more than 30% if we exclude taxes, EITC and food stamps for the no college group.
- For a low wealth sample $\widehat{\phi}_t$ is .8489 and there are significant impacts of transitory fluctuations in income too.

Digging deeper....

- These have proven to be useful results, linking the distributional dynamics of income and consumption. With key results on the value of self-insurance and welfare transfers.
- Perhaps a little too much insurance, especially in the PSID.
- I want to briefly highlight two important directions/issues to explore:

1. The income process: usual shocks and nonlinear persistence.
2. Other mechanisms: family labor supply and time use with children, and separate out the role of assets and of taxation and welfare benefits.

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1. The income process: usual shocks and nonlinear persistence.
2. Other mechanisms: family labor supply and time use with children, and separate out the role of assets and of taxation and welfare benefits.

- Advance information could be a key issue too.

1. Nonlinear persistence and partial insurance

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- We develop a new framework that allows unusual shocks to wipe out the memory of past shocks, and future persistence of a current shock to depend on the future shocks.

Show this has important implications for income inequality and partial insurance.

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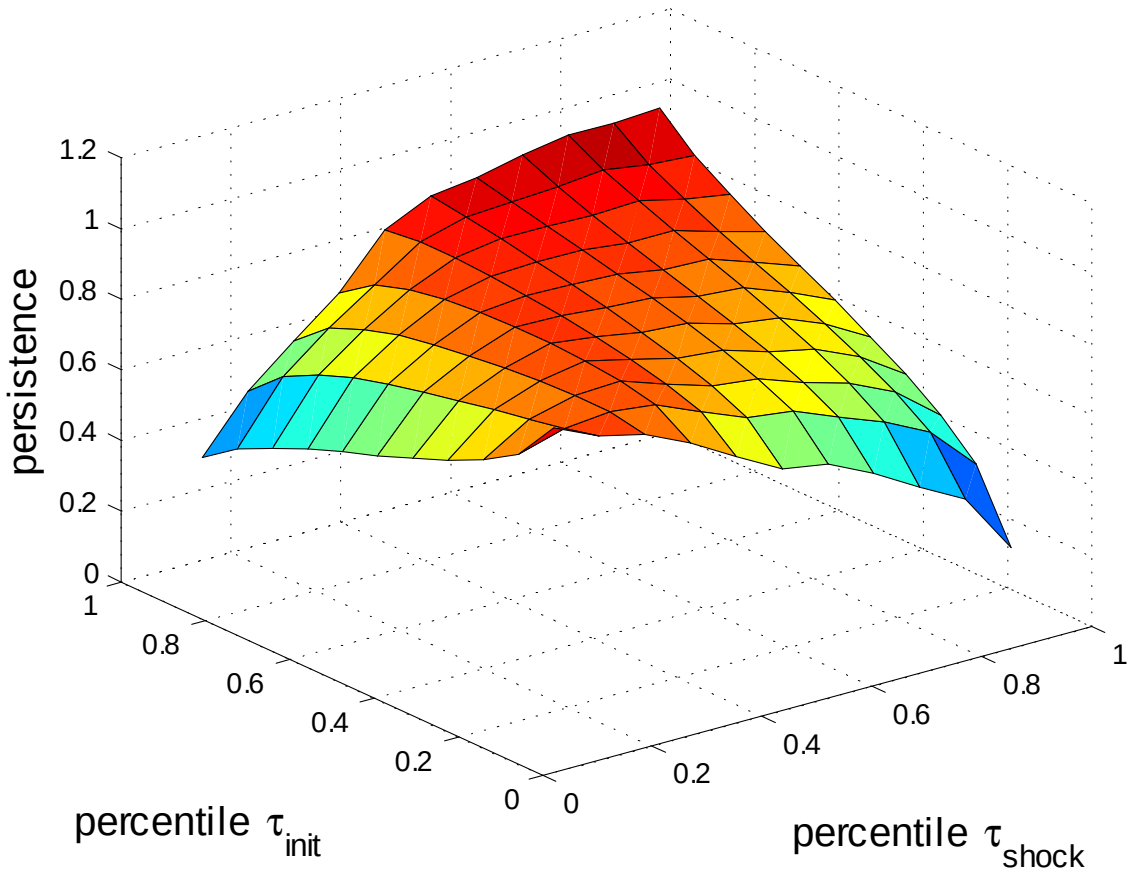
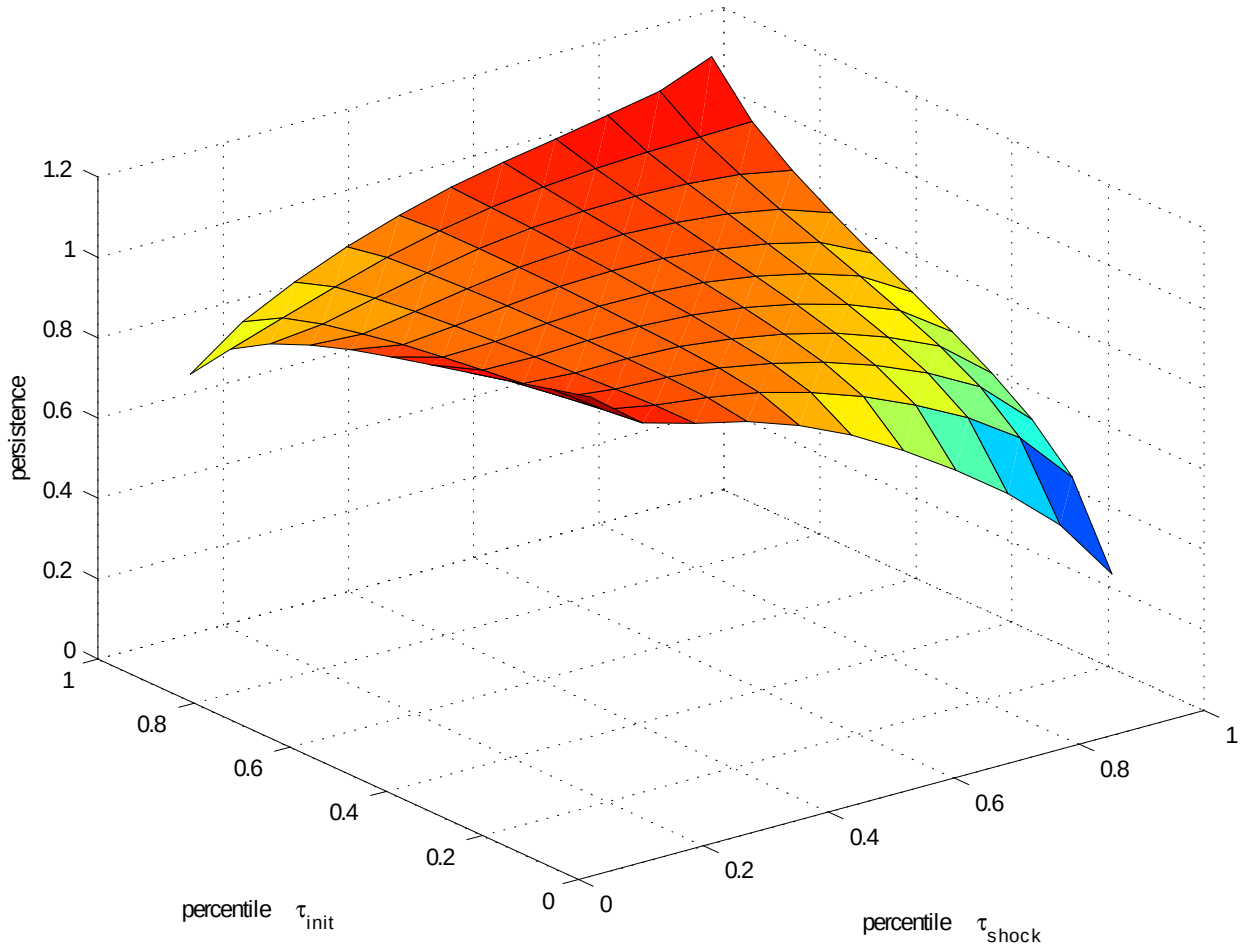
- **Evidence of such nonlinearity?**

Nonlinear Persistence in the PSID



Notes: Household labor earnings, Age 30-60 1999-2009 (US).
Estimates of the average derivative of the conditional quantile function.
Source: Arellano, Blundell and Bonhomme (2017).

Nonlinear Persistence in the Norwegian Register Data



Notes: Norwegian Population Register, Family Labour Income.
Estimates of the average derivative of the conditional quantile function.
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Income Shocks and Nonlinear Persistence

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- And delivering a new measure of nonlinear persistence:

$$\rho_t(\eta_{it-1}, \tau) = \frac{\partial Q_t(\eta_{it-1}, \tau)}{\partial \eta}$$

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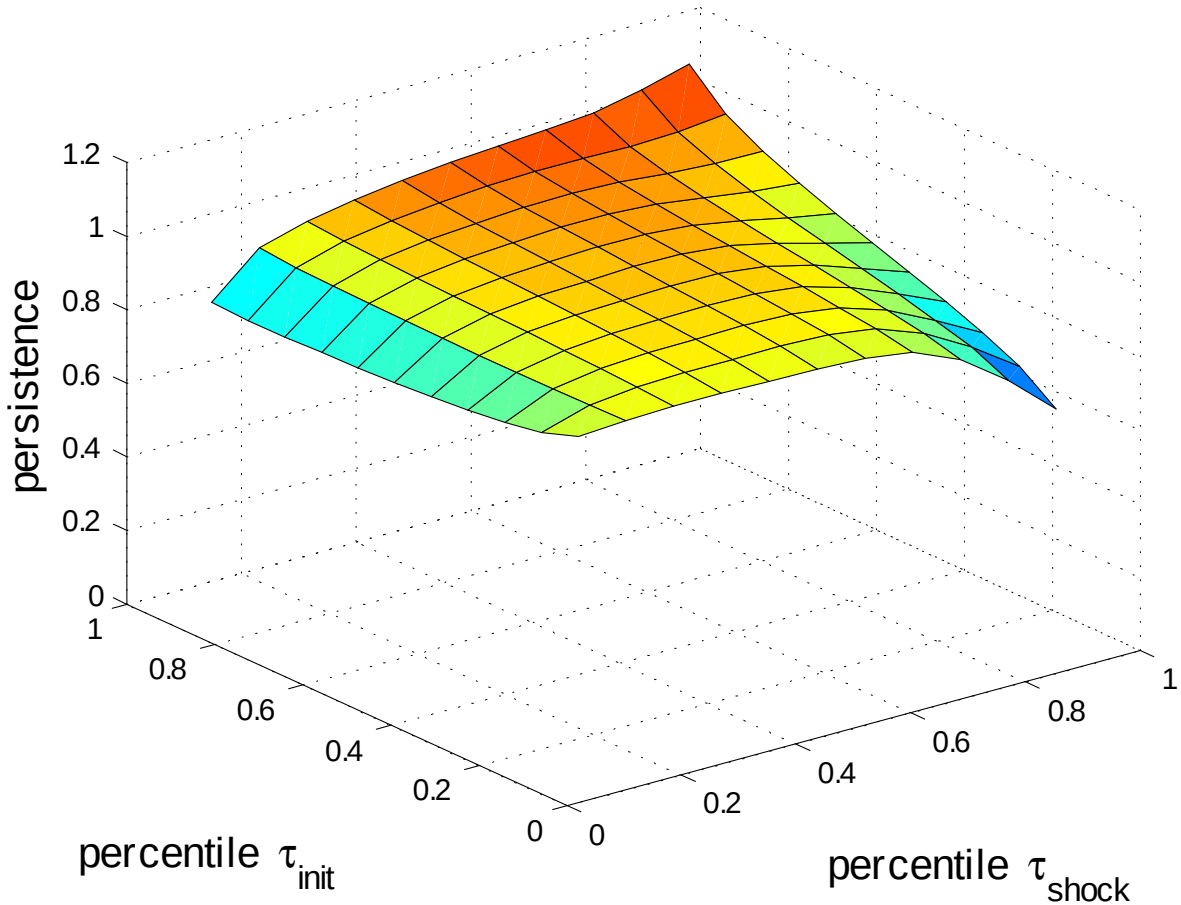
- quantile functions are specified as flexible Hermite polynomials.

- And delivering a new measure of nonlinear persistence:

$$\rho_t(\eta_{it-1}, \tau) = \frac{\partial Q_t(\eta_{it-1}, \tau)}{\partial \eta}$$

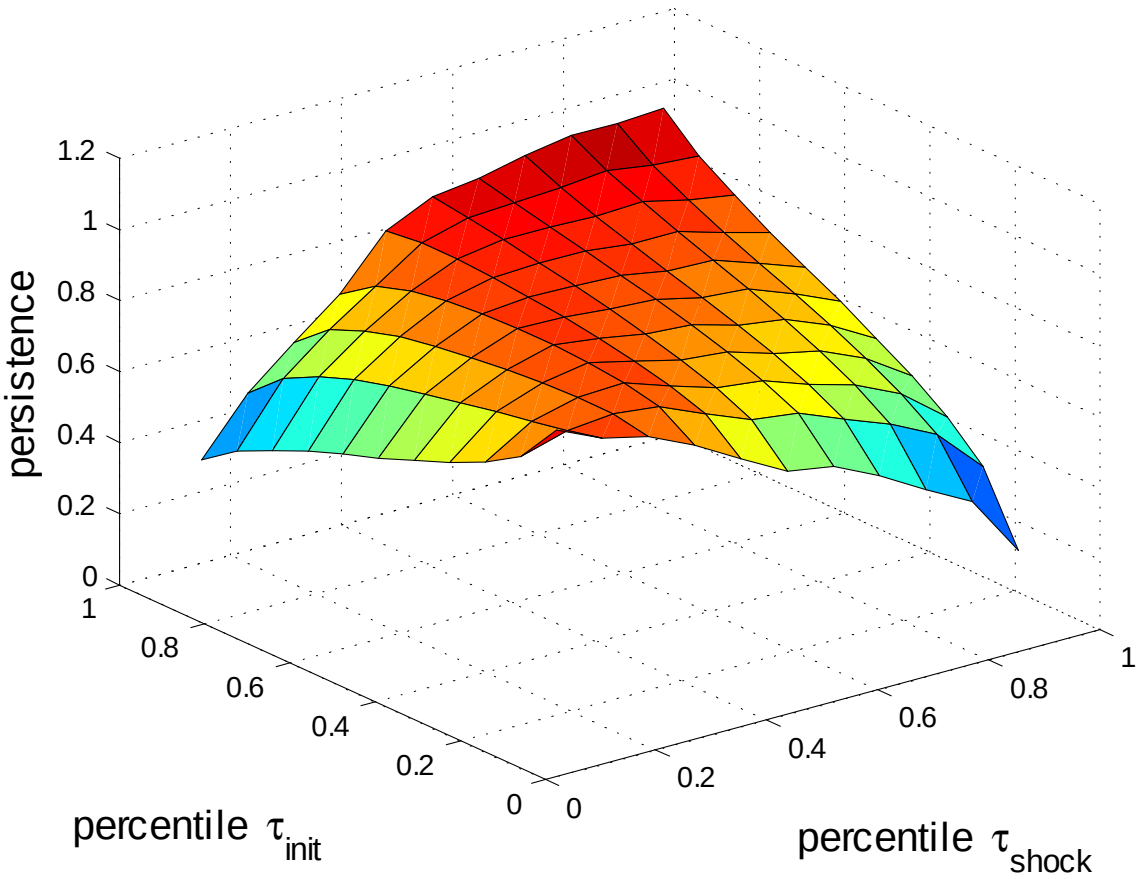
- Use this nonlinear framework to explore the complete distributional dynamics of income over the life-cycle,
- and then the implications for consumption and savings decisions....

Persistence in η_{it}



Notes: PSID Household labor earnings, Age 30-60 1999-2009 (US).
Source: Arellano, Blundell and Bonhomme (2017).

Implied Model Simulation of Persistence in Income



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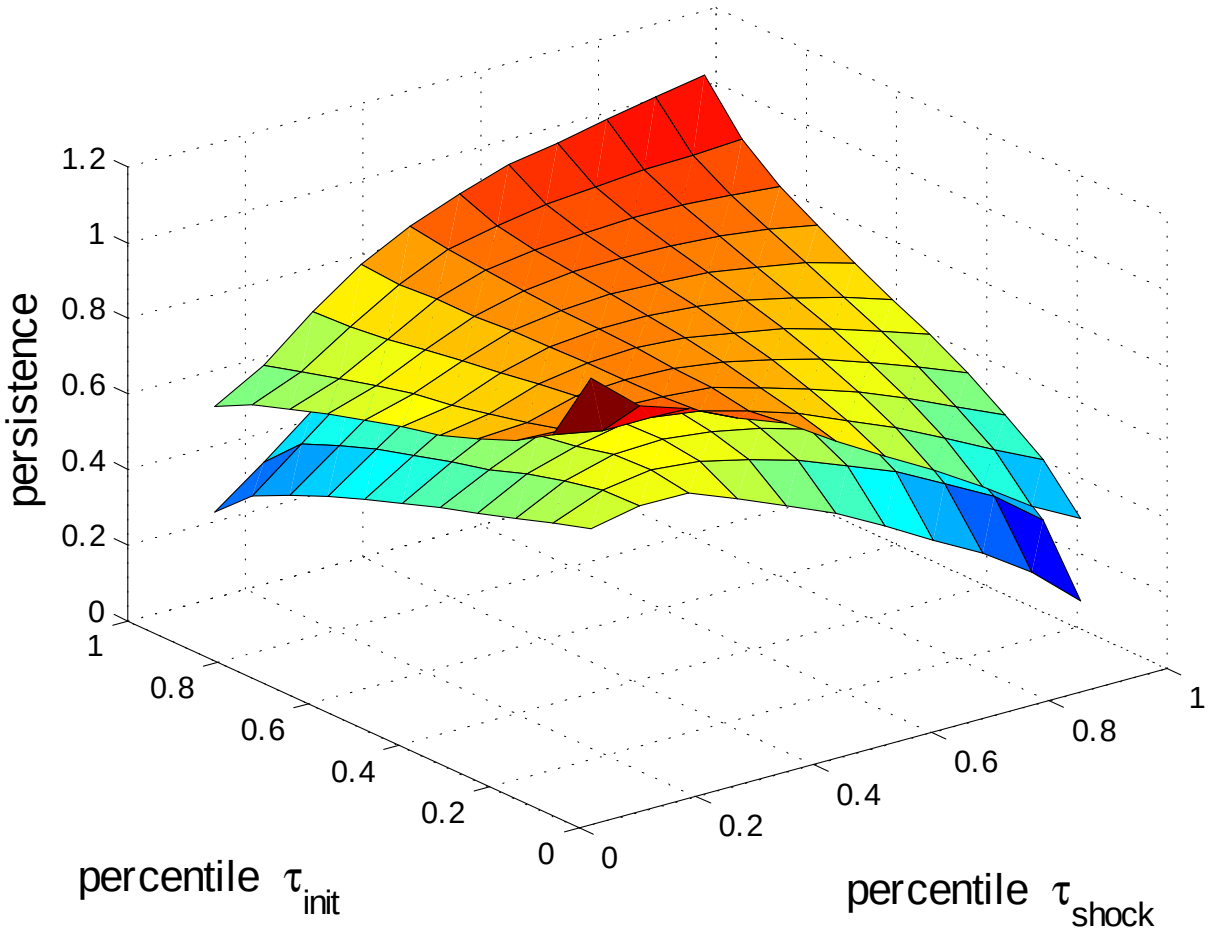
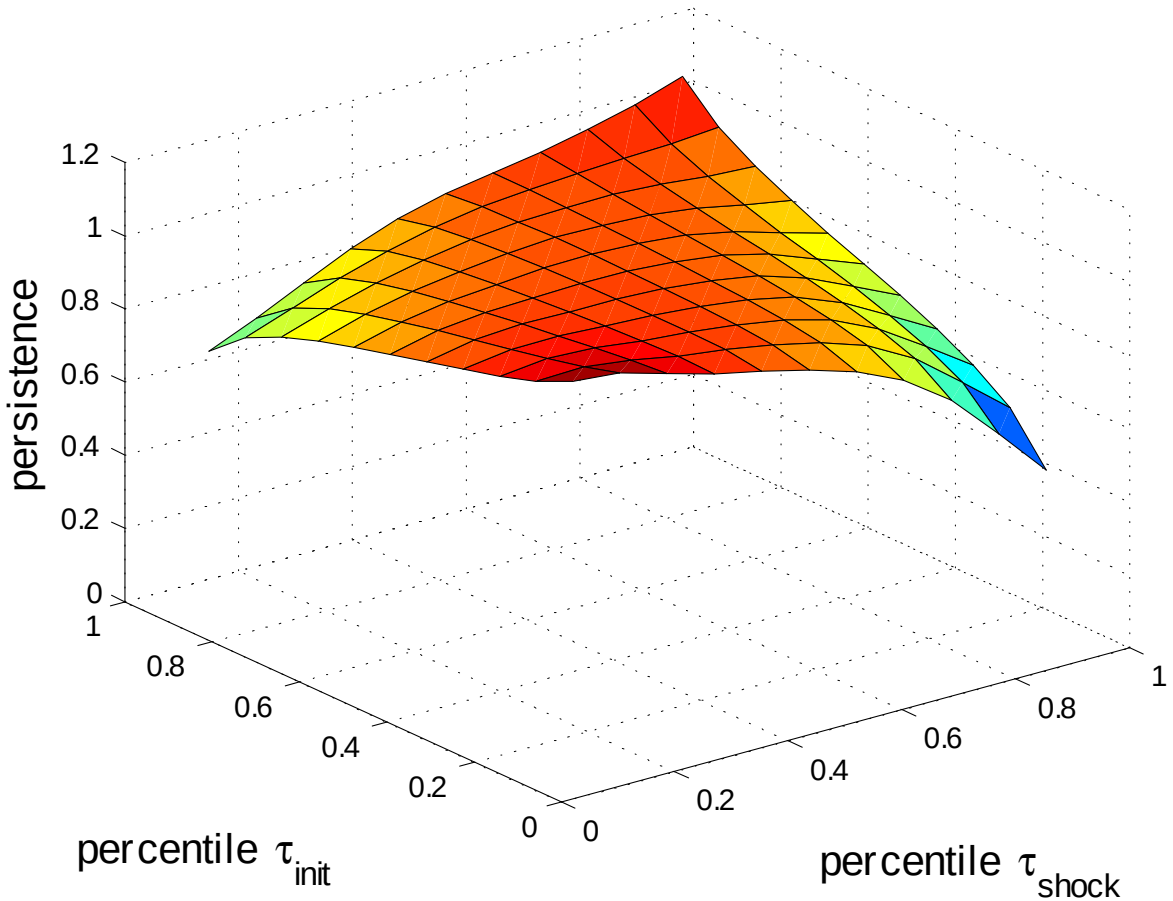
Confidence Intervals for Estimated Nonlinear Persistence



Notes: PSID; 95% CI for estimated average derivative of the conditional quantile function see source paper; parametric bootstrap.
Source: Arellano, Blundell and Bonhomme (2017).

Implied Model Simulation of Persistence in Norwegian Income



Notes: Norwegian Population Register, Family Labour Income.
Source: Arellano, Blundell and Bonhomme (2017).

IMPLICATIONS FOR THE CONSUMPTION DISTRIBUTION

- Allow the permanent and transitory income components to interact with assets, age and individual heterogeneity:

$$c_{it} = g_t(A_{it-1}, \eta_{it}, \varepsilon_{it}, \nu_{it}, \xi_i)$$

-> assets A_{it-1}, permanent income η_{it}, transitory shocks ε_{it}, taste differences ν_{it}, ξ_i.

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$$\phi_t(A, \eta, \varepsilon) = E\left[\frac{\partial g_t(A, \eta, \varepsilon, v)}{\partial \eta}\right],$$

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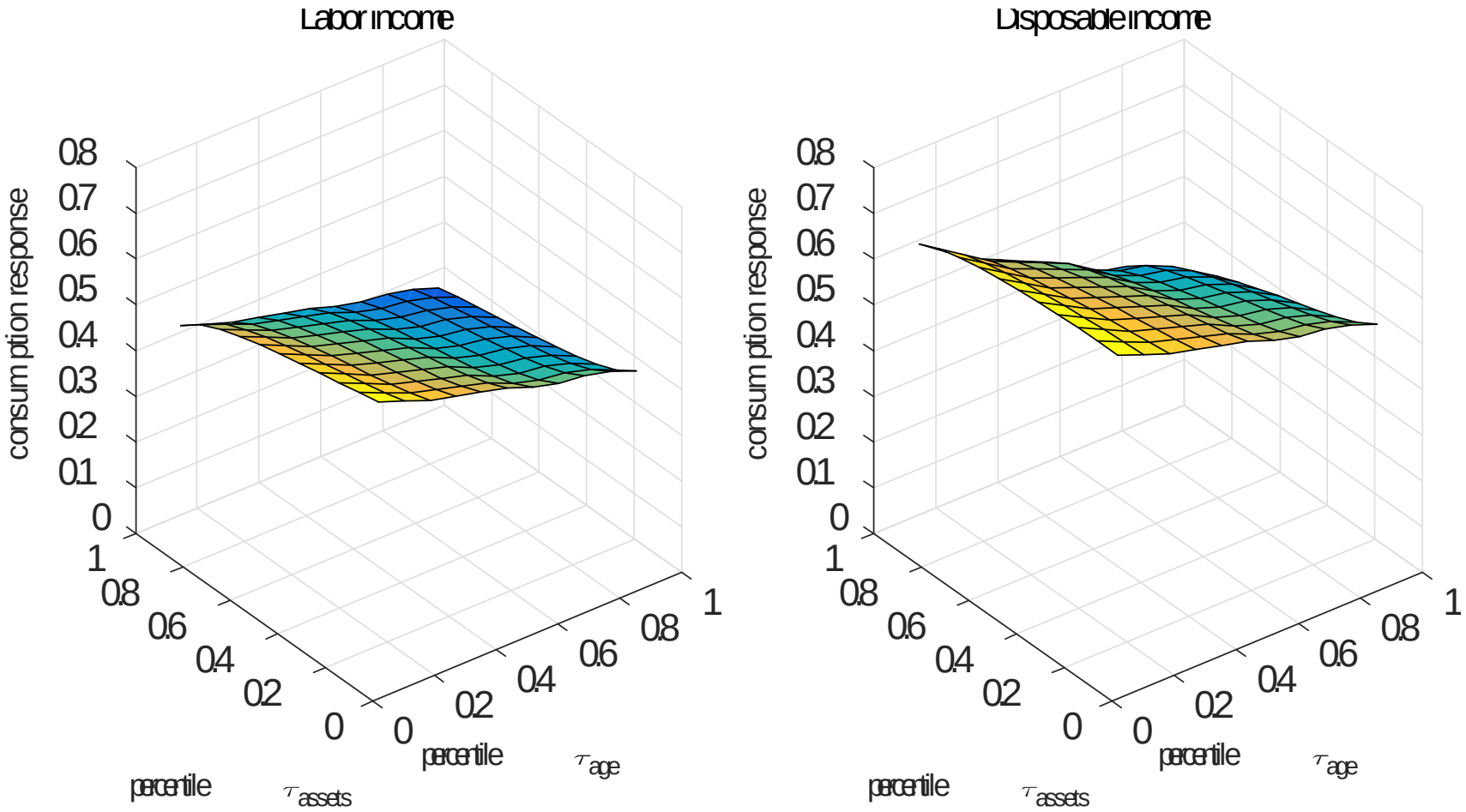
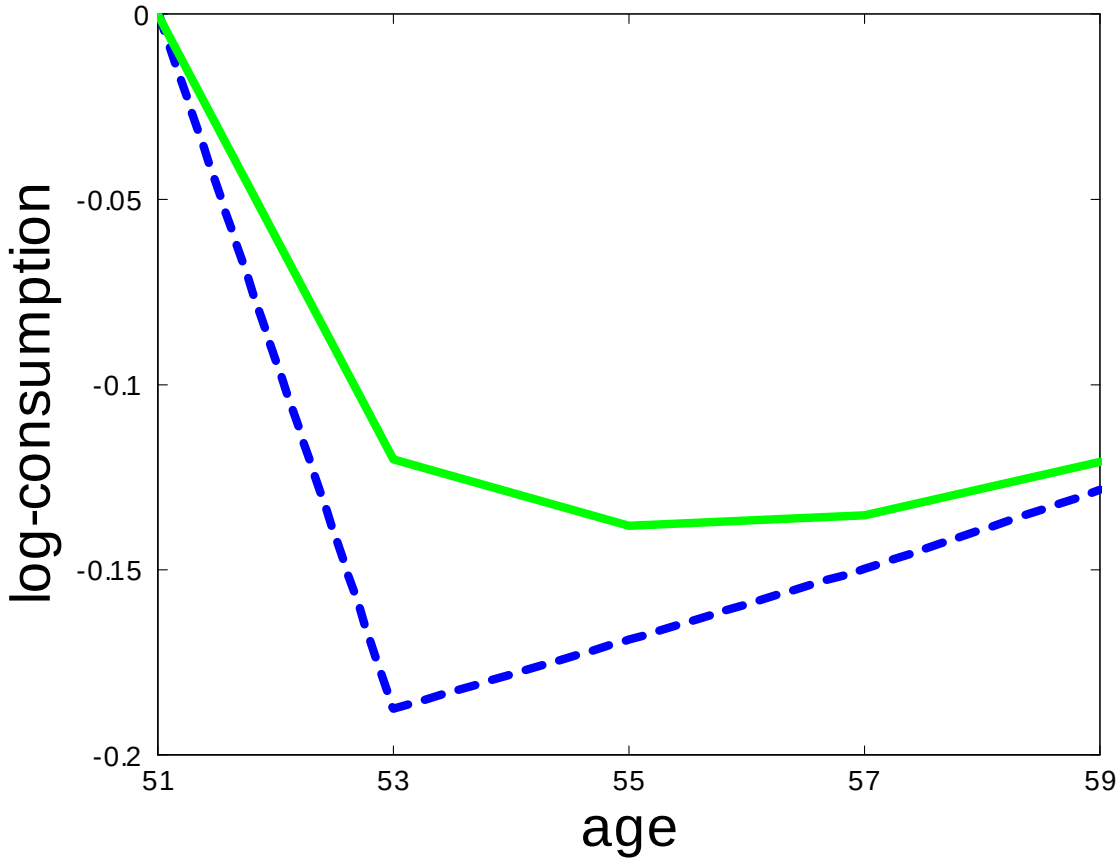
- Tracking the impact of a change in permanent income on consumption for different levels of assets and for different ages.....

Partial Insurance by Age and Assets



Notes: Families with head aged 30-60, 1999-2009 (US).
Nonparametric estimates of the average partial insurance of persistent shocks.
Source: Arellano, Blundell, Bonhomme and Light (2018).

Consumption responses for older worker (high income [90th], bad shock [10th])



Notes: Impulse response of persistent shock; 90th percentile of permanent income, 10th percentile shock; 25th percentile (blue) and 75th percentile (green) of assets. Families with head aged 50-60, 1999-2009 (US).
Source: Arellano, Blundell and Bonhomme (2017).

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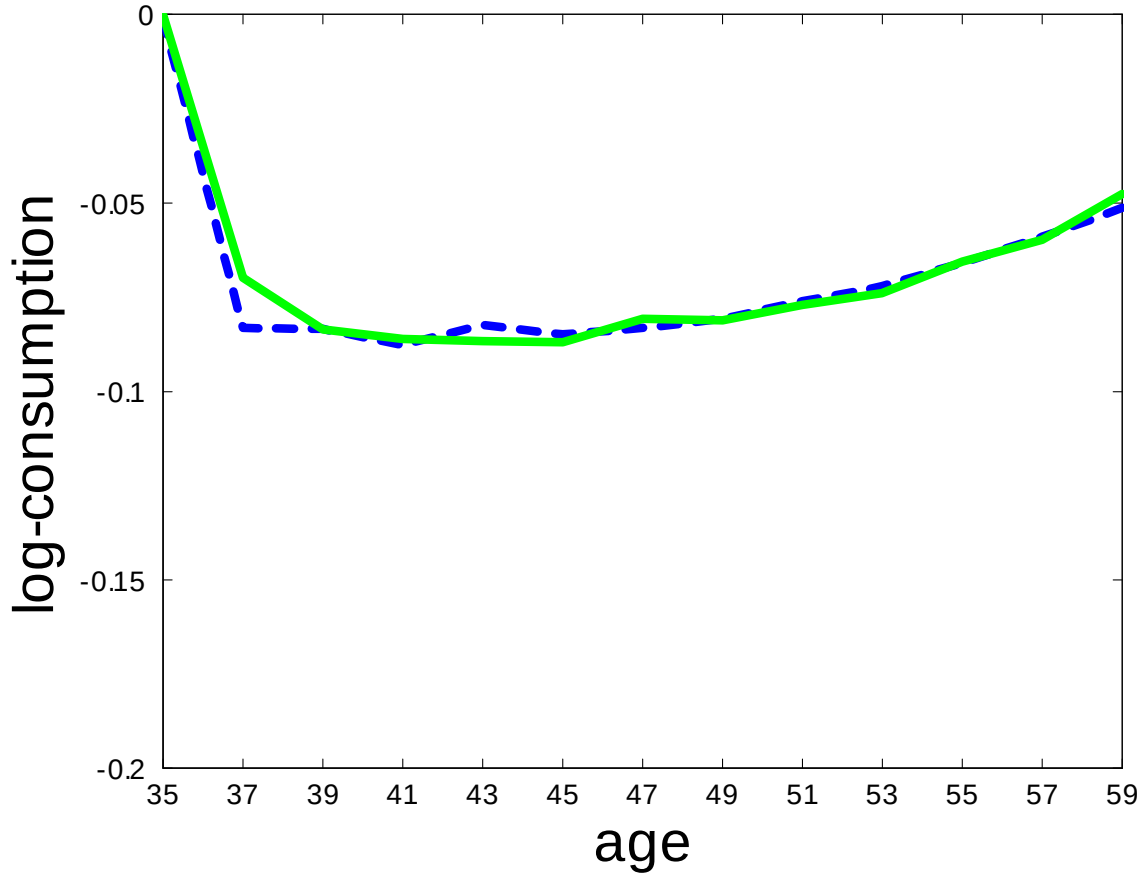

Notes: Impulse response of persistent shock; 90th percentile of permanent income, 10th percentile shock; 25th percentile (blue) and 75th percentile (green) of assets. Families with head aged 35-60, 1999-2009 (US).
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- Extend baseline partial insurance model to allow wage shocks to impact on consumption *and* on family labour supply,

- allowing for correlated wage shocks, nonseparabilities in family labor supply and for redistribution/insurance in tax and welfare system ->

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  - even with correlated wages and complementary preferences, find a **persistent** decline in one spouse earnings to induce an increase earnings of the other to maintain consumption.
- For example, a persistent shock to his wages will depend on preferences over labour supply and consumption, on net assets and on how important his earnings are in family earnings...

Consumption Smoothing Responses

Use nonlinear method of moments on extended partial insurance model, e.g.

Extent of consumption smoothing w.r.t. j's permanent wage shock:

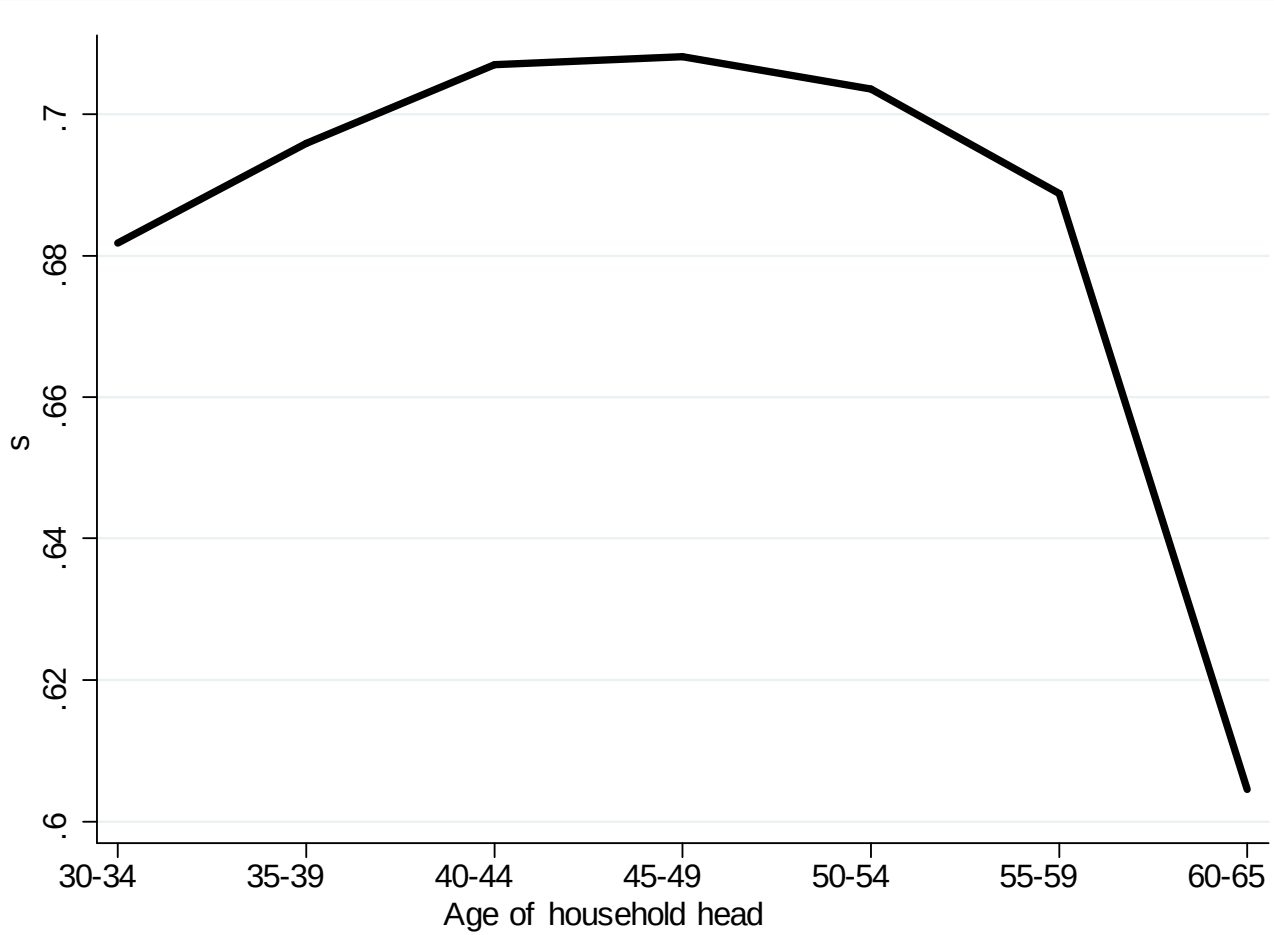
$$\phi_{c,\eta_j} = (1-\beta)(1-\pi_{i,t})\, s_{i,j,t} \frac{\varepsilon_{c,p}\left(1+\varepsilon_{h_j,w_j}\right)}{\varepsilon_{c,p} + (1-\beta)(1-\pi_{i,t})\,\overline{\varepsilon_{h,w}}}$$

- declines with $s_{i,j,t}$ (j's earnings play heavier weight)
- increases with $\pi_{i,t}$ (accumulated assets allow better insurance of shocks)
- increases with β (outside insurance allows more smoothing)
- declines with $\varepsilon_{c,p}$ (consumers more tolerant of intertemporal fluctuations in consumption)
- increases with $\varepsilon_{h_{-j},w_{-j}}$ ("added worker" effect).

Extend to allow for nonseparabilities and nonlinear taxation.

The share of his human wealth by age

$$s_{i,t} \approx \frac{\text{Human Wealth}_{male,i,t}}{\text{Human Wealth}_{i,t}}$$



Notes: PSID. Source: Blundell, Pistaferri and Saporta-Eksten (2016)

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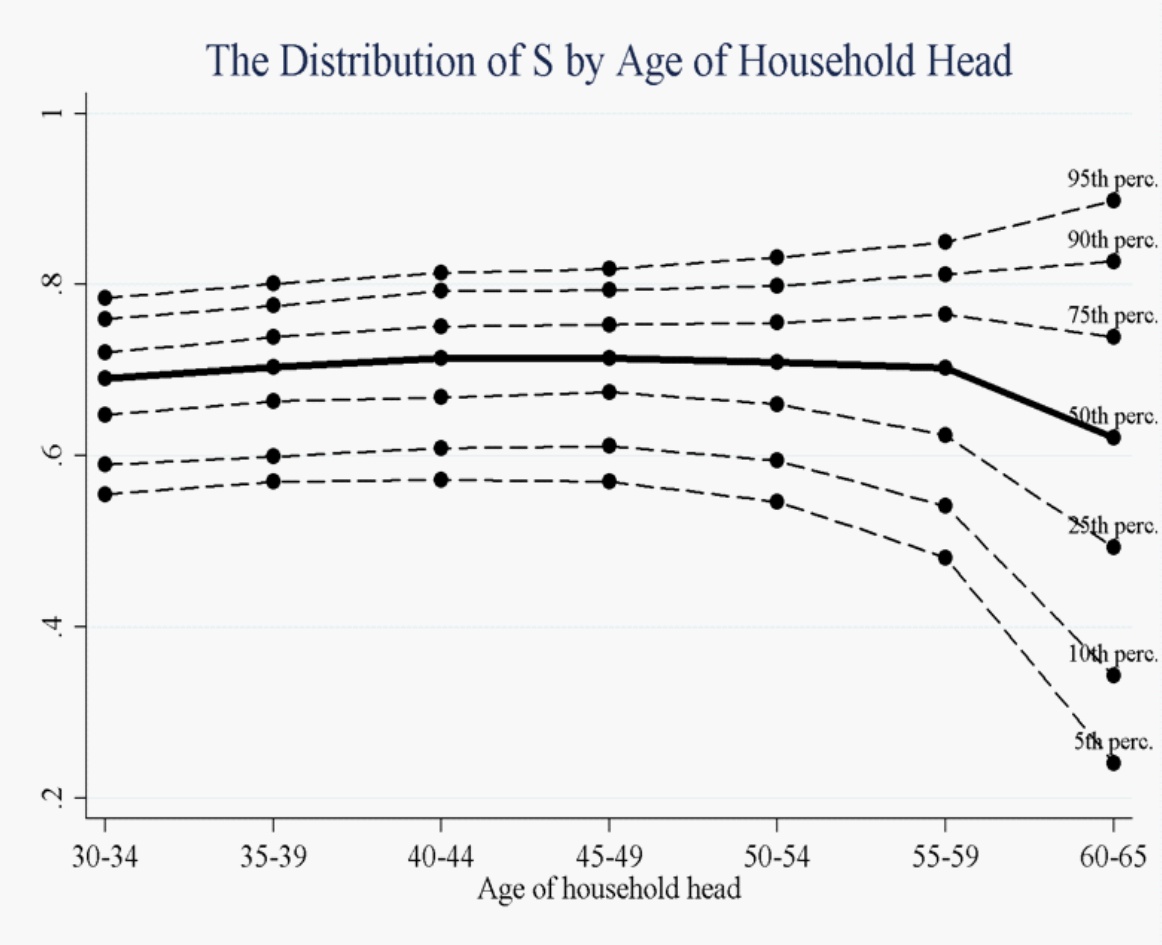
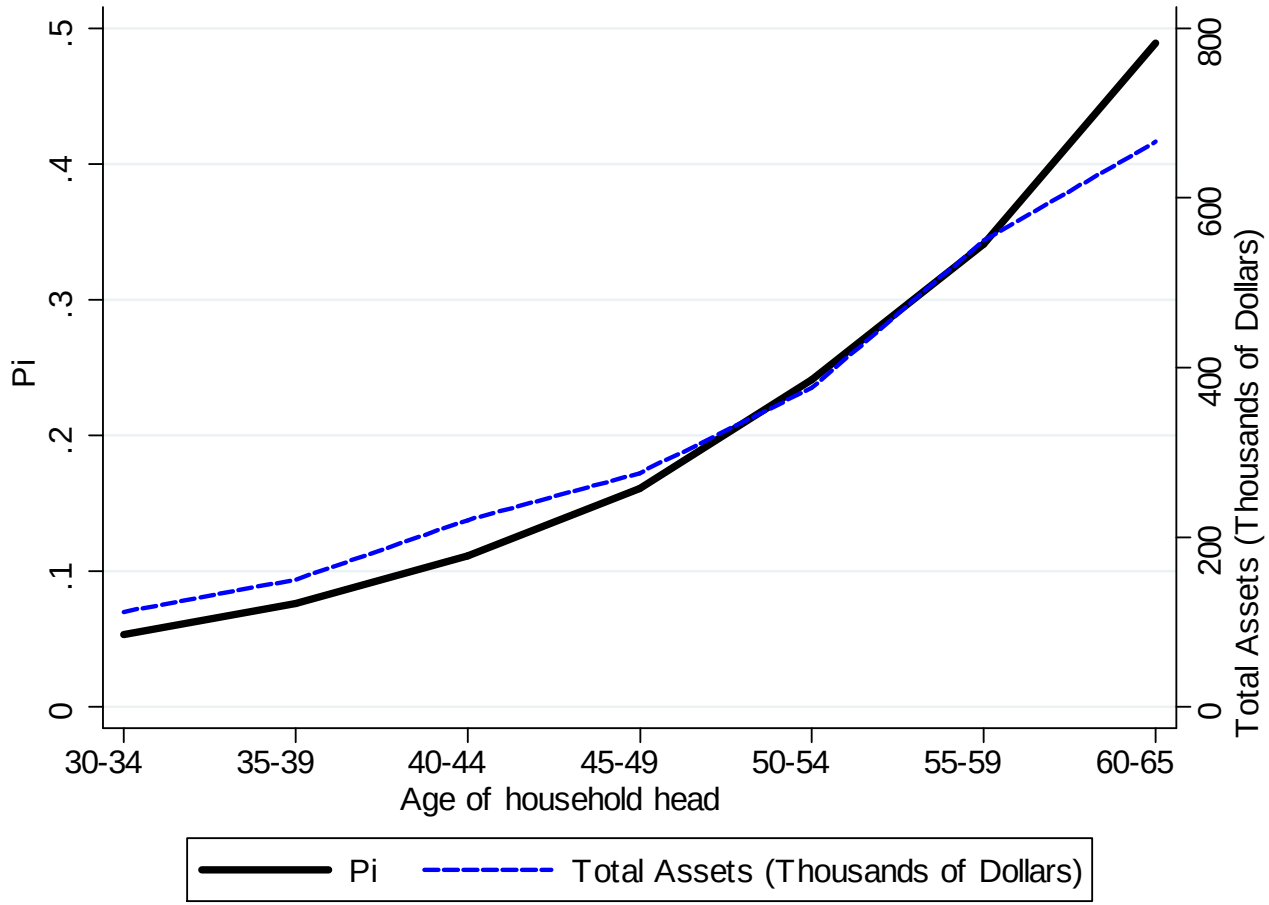


Source: Blundell, Pistaferri and Saporta-Eksten (2016)

The share of assets to human wealth by age

$$\pi_{i,t} \approx \frac{\text{Assets}_{i,t}}{\text{Assets}_{i,t} + \text{Human Wealth}_{i,t}}$$



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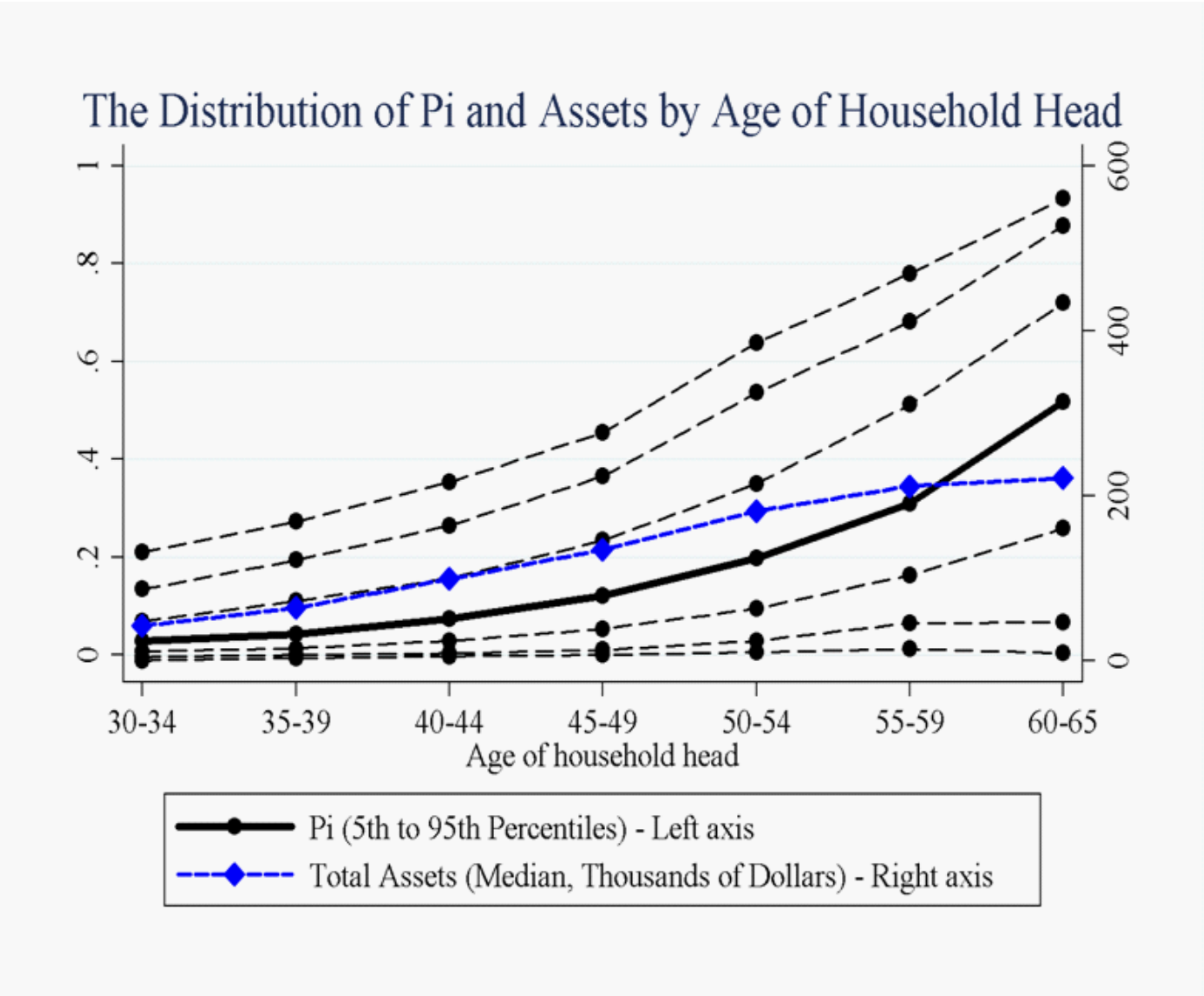
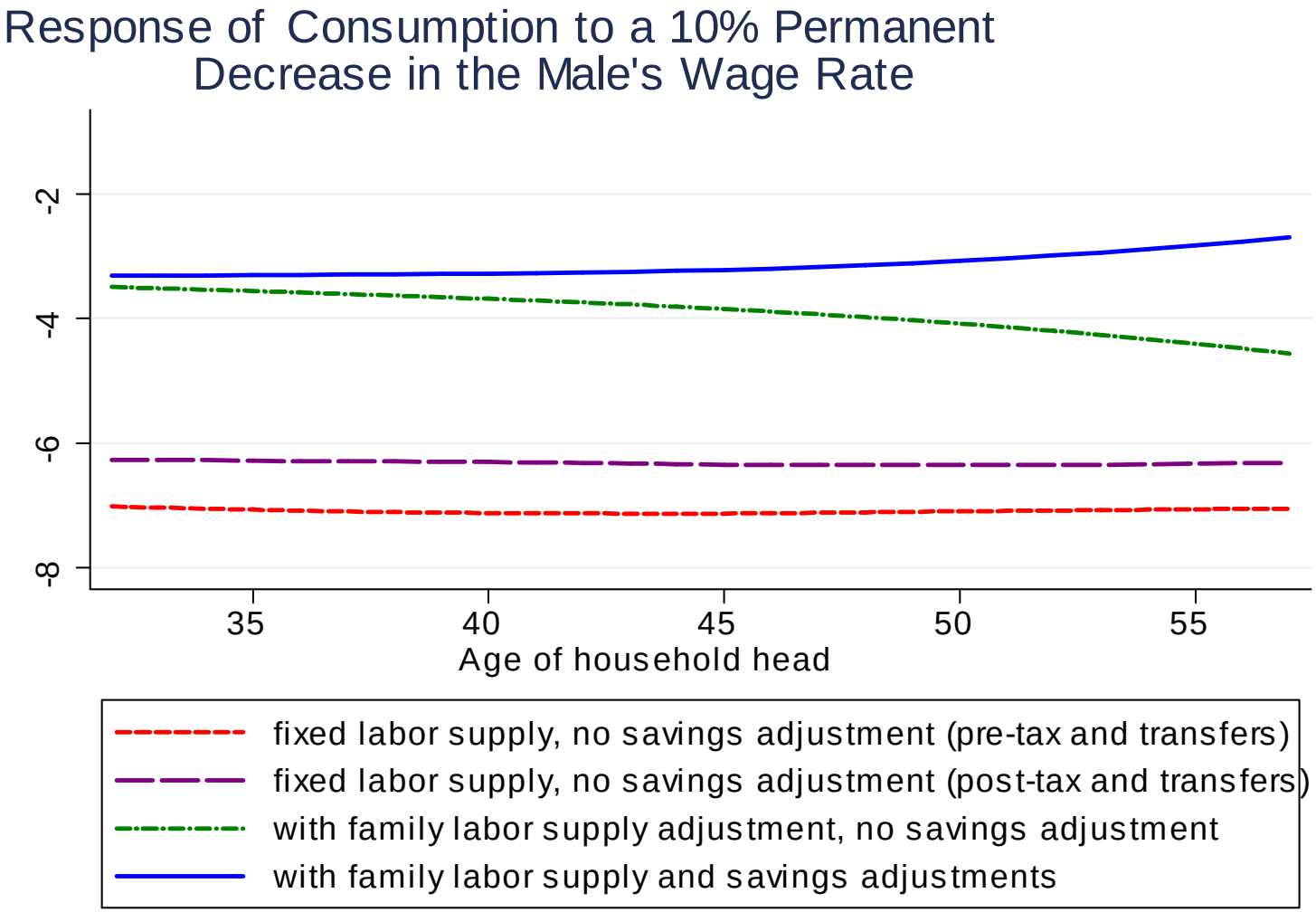
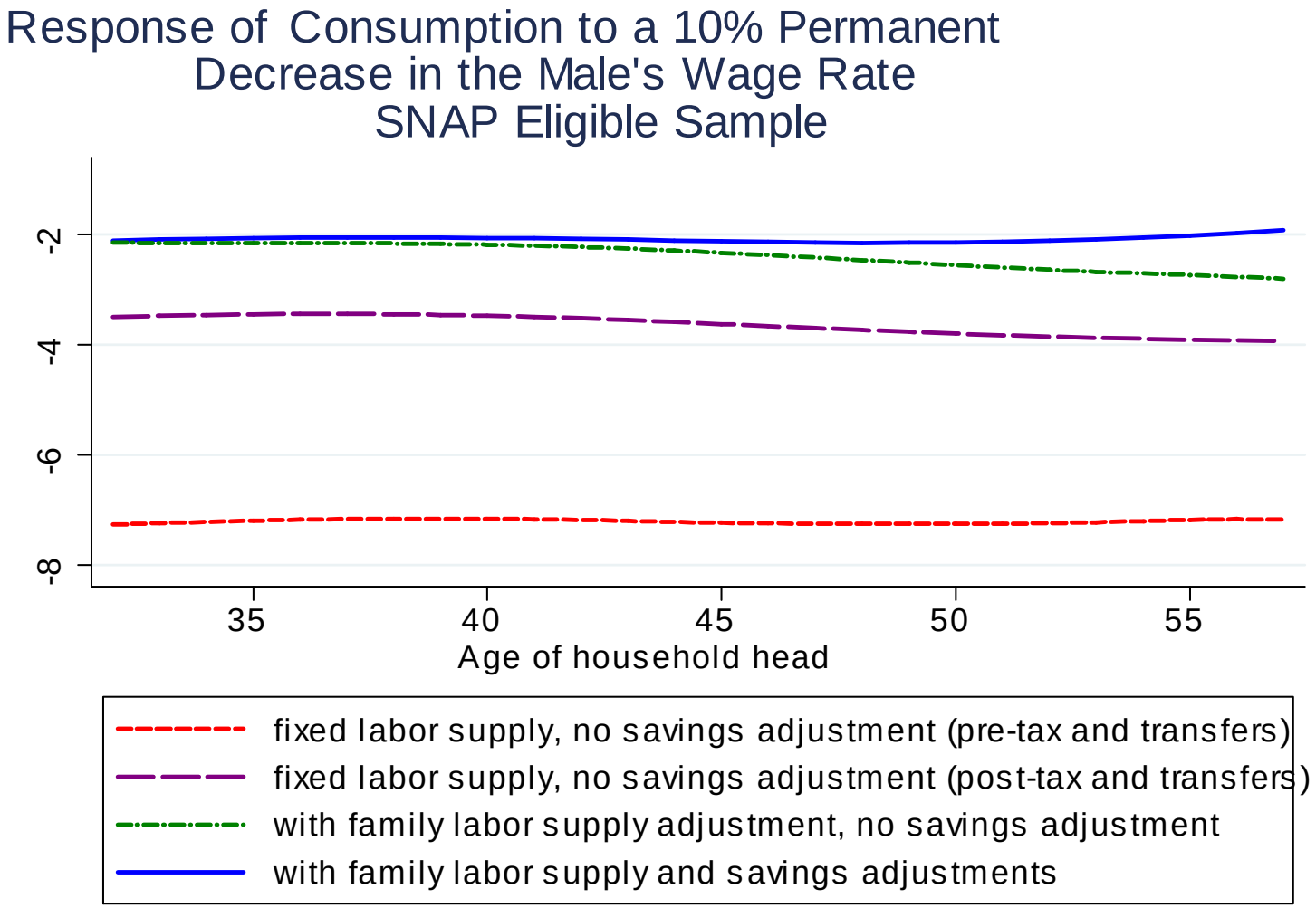


HOUSEHOLD CONSUMPTION RESPONSES



Average response. Source: Blundell, Pistaferri and Saporta-Eksten (2017)

CONSUMPTION INSURANCE FOR SNAP GROUP



Source: Blundell, Pistaferri and Saporta-Eksten (2017)

FINDINGS....

- Unpack the role of assets, tax/benefits and family labor supply as mechanisms for 'insuring' unexpected persistent shocks,
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- For the food stamps eligible families: consumption declines on average by only 2.1% for a 10% fall in male earnings
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- But where do these hours adjustments come from?

Implications for family time-use allocations

- Recent work, Blundell, Pistaferri and Saporta-Eksten (2018), use time-use data (ATUS and CDS) to unpack what's going on.
- Develop a household production model where time, supply and consumption can be complements or substitutes,
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- Develop a household production model where time, supply and consumption can be complements or substitutes,
  - allowing explicitly for extensive margins and borrowing constraints.
- A tension between the desire of spouses to spend leisure time with each other, and the specialization in care of children,
  - complementarity in leisure but specialization in childcare.
- Find that family labour supply flips between being substitutes to complements as the child ages,
  - also show, especially for lower educated/low assets, it is mother's time with children that takes a hit following adverse shock to husbands earnings....

Mother's labor supply response to a persistent adverse shock (10%) to husband's earnings

Notes: ATUS and PSID; Source: Blundell, Pistaferri and Saporta-Eksten (2018)

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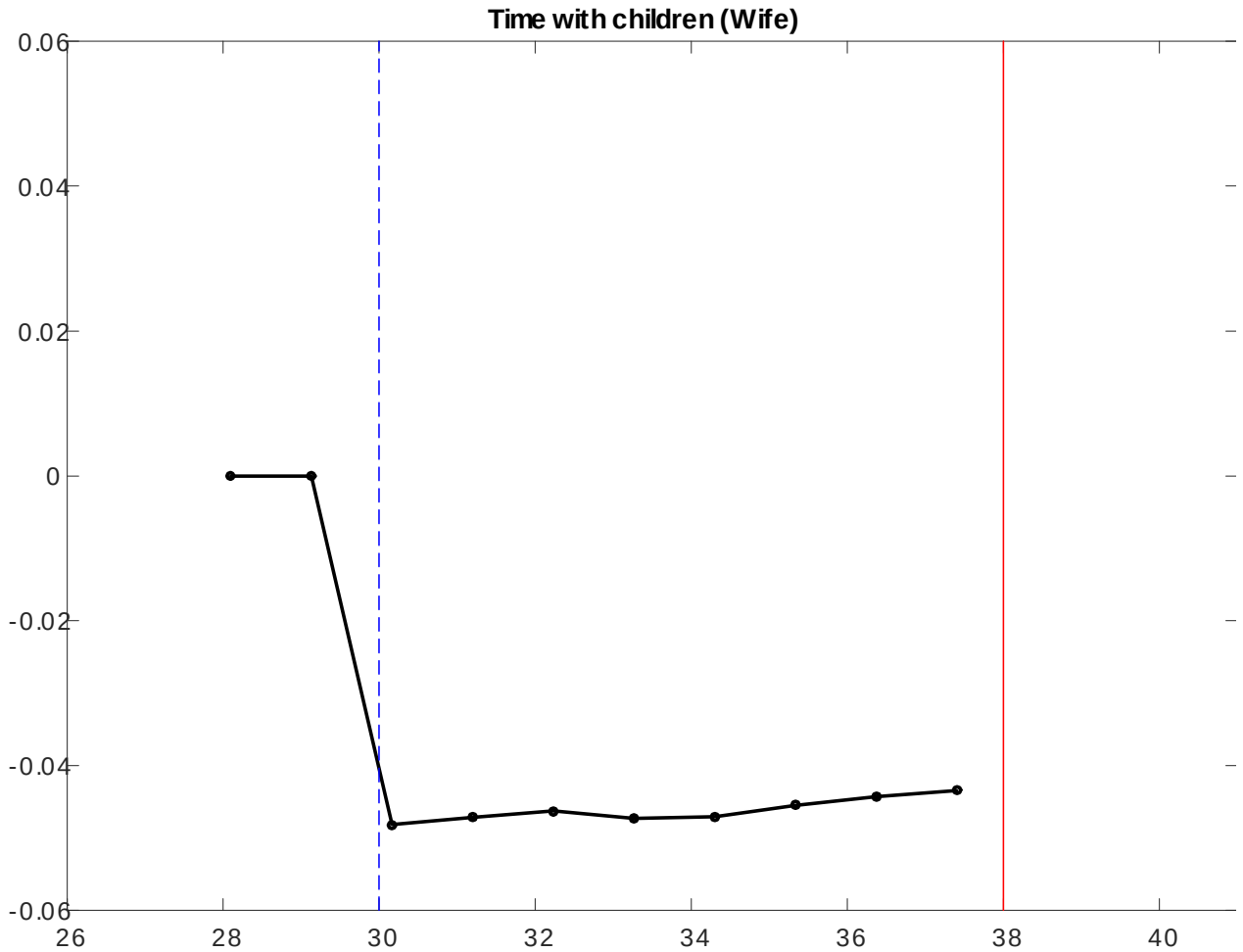

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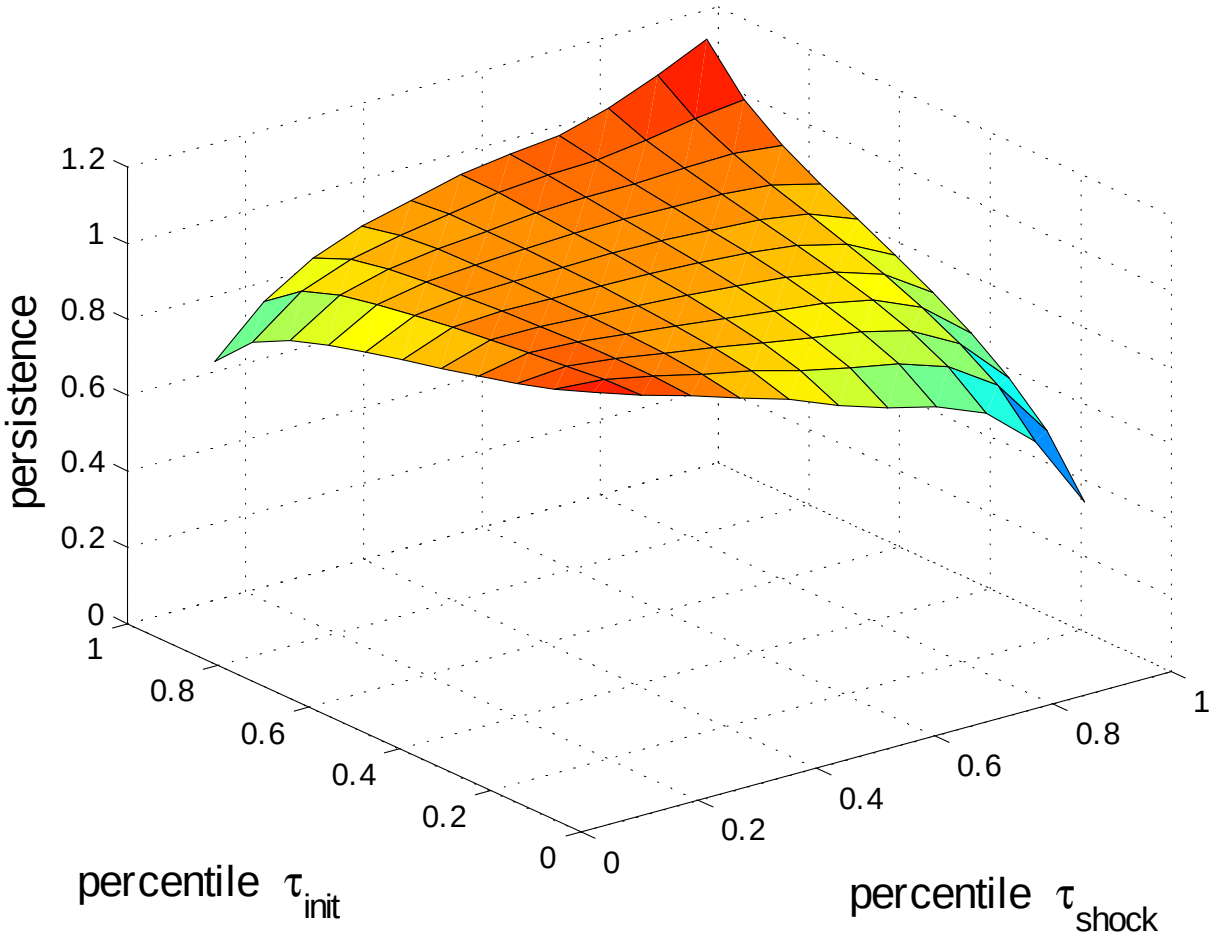
....Note, Nonlinear Persistence remains a key feature for male wages



Notes: Log male wages, Age 30-60 1999-2009 (US). Estimates of the average derivative of the conditional quantile function. Source: Arellano, Blundell and Bonhomme (2017b).

GATHERING UP THE RESULTS...

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- Showing the value, of high quality data on household earnings, hours, consumption and assets.
- Drawing from linked administrative population register data and carefully collected panel data surveys.

But more to be done!

- New work, post-recession. Interacting impact on housing asset values and local labour market shocks. Locally linked data in Norway and, hopefully, PSID.
- Human capital during working life - BCMS (2016) show little experience effects for lower skilled - new linkages to training data in UK data.
- Firms, technology and wage progression - firm linked data in Norway.
- Disability and persistent health shocks - linked to medical expenditures and health insurance.
- Family formation and extended family - relationship links.
- Durable goods and role as collateral - linked to car transaction data in Denmark.

References to papers

1. Blundell, Pistaferri and Preston [BPP] 'Consumption inequality and partial insurance' (*AER*, 2008)
2. Blundell, Low and Preston [BLP] 'Decomposing changes in income risk using consumption data' (*QE*, 2013)
3. Blundell, Graber and Mogstad [BGM] 'Labor income dynamics and insurance' (*JPubE*, 2015; 2018)
4. Arellano, Blundell and Bonhomme [ABB] 'Earnings and consumption dynamics: a nonlinear framework' (*Ecta*, 2017; 2018)
5. Blundell, Pistaferri and Saporta-Eksten [BPS1/2] 'Consumption inequality and family labor supply' (*AER*, 2016; *JPE*, 2018)
6. Blundell, Costa-Dias, Meghir and Shaw [BCMS] 'Female labour supply, human capital and welfare reform' (*Ecta*, 2016).

all on my webpage!

That's it for now!

Richard Blundell

UCL & IFS

EPoS CRC
October 2018

Measuring Consumption

Let $W_{ikt} = p_{kt}A_{ikt}$, total household consumption expenditure:

$$C_{it} = \underbrace{\left(E_{it} - \tau_{it} + \sum_k r_{kt}A_{ikt-1} \right)}_{\textit{disposable income}} - \underbrace{\underbrace{\sum_k (W_{ikt} - W_{ikt-1})}_{\textit{changes in wealth}} + \underbrace{\sum_k (p_{kt} - p_{kt-1})A_{ikt-1}}_{\textit{capital gains}}}_{-\textit{net savings}}$$

where

- Y_{it} : labour income and cash transfers
- τ_{it} : taxes
- A_{it-1} : assets held at the end of period $t-1$.

Combining the last two terms using financial and real estate transactions data has been a key insight.

Transmission Parameters and Partial Insurance

The parameters ϕ_t and ψ_t link the evolution of consumption inequality to income inequality.

- They indicate the degree of partial insurance.

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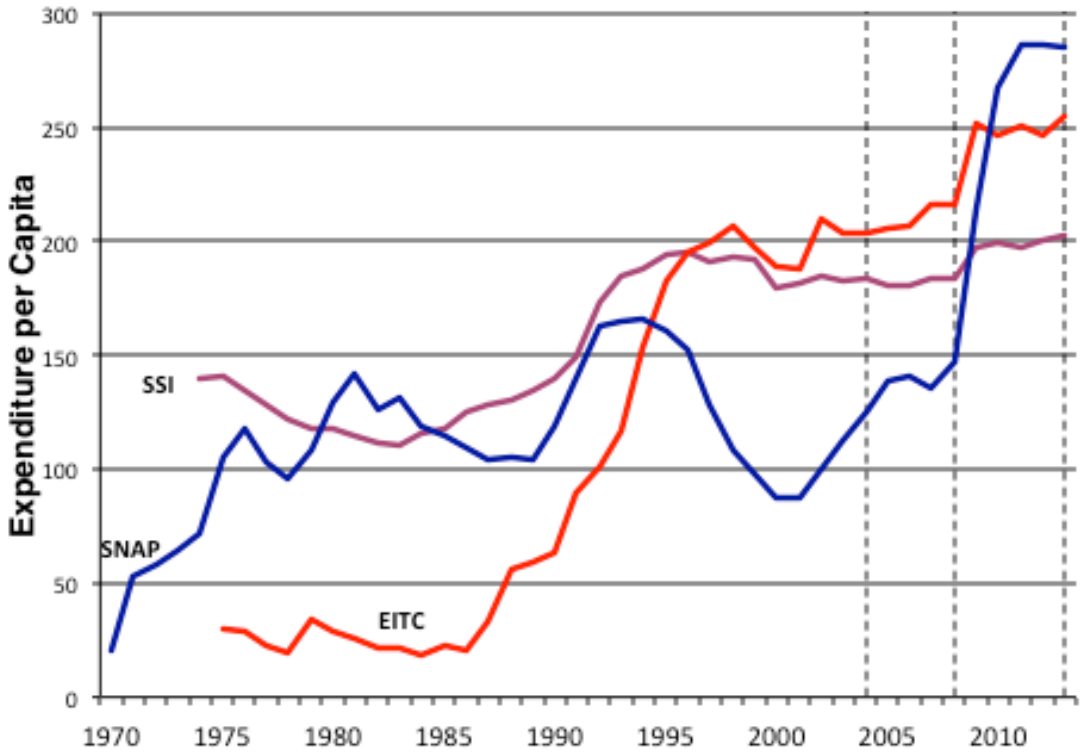
0.7928 (.18) for those born in the 1940s.

- The estimate falls by 50% if we exclude taxes, EITC and food stamps for the no college group.
- For a low wealth sample $\widehat{\phi}_t$ is .8489 and there are significant impacts of transitory fluctuations in income too.

Expenditure per Capita, Non-Medicaid Means Tested Programs, US.



Source: Moffitt (2016); SNAP, EITC and SSI, [note AFDC/TANF].

Partial Insurance Across the Atlantic

- Travelling back across the Atlantic..... to the PSID
- Our main sample consists of (stable) married / cohabiting households drawn from the non-SEO component of the PSID for the years 1999-2015 (approximately 2,500 households each year).
- The biennial nature of the PSID gives 9 waves from which we construct a non-balanced panel of household heads aged 25-60.
- Consumption data is a tribute to Bob Schoeni (Michigan).
- Local zip codes can also be used to add housing values and local labour markets as in our work on Norway.

Family response to a persistent adverse shock (10%) to husband's earnings

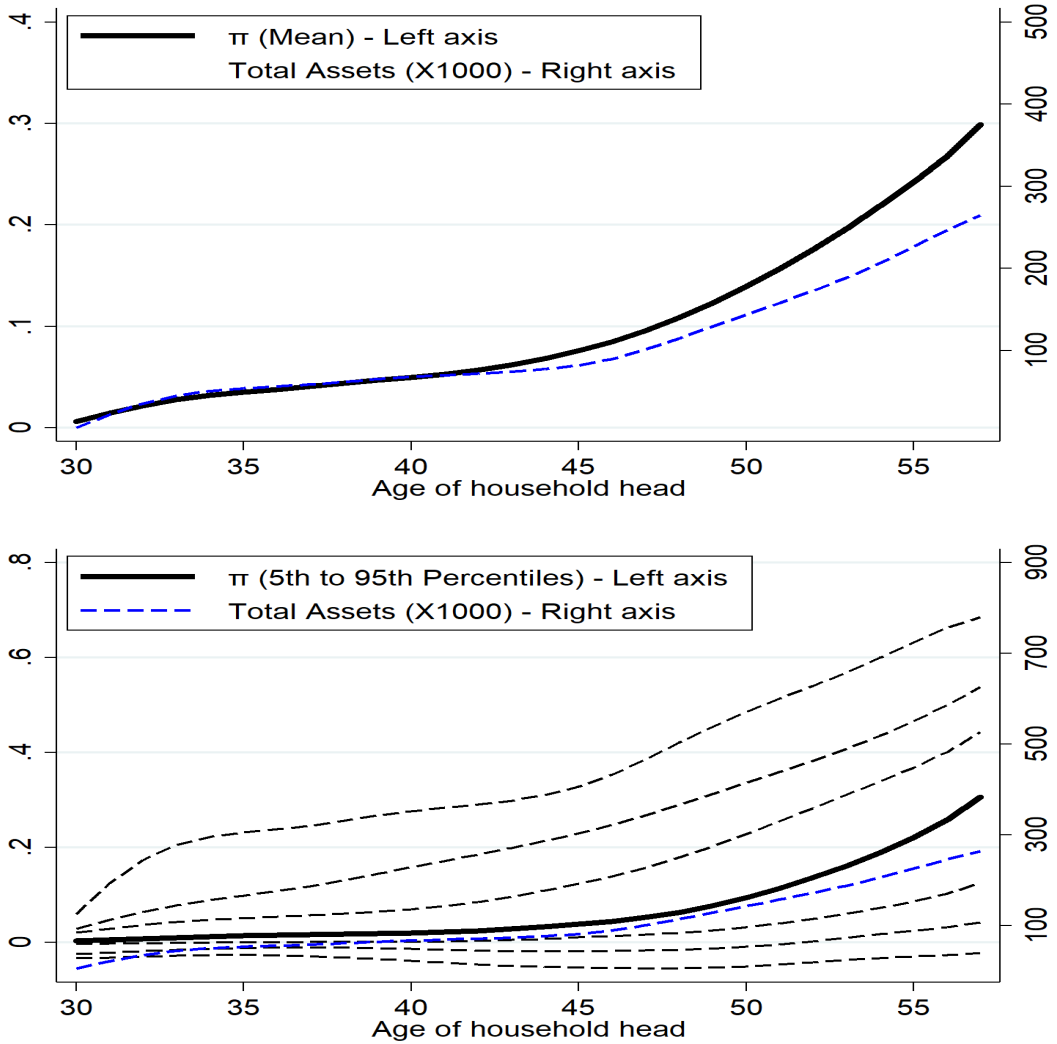
Families with low assets.

Families with Low Assets

Consumption	**-4.2%**	
After-tax household earnings:	**-4.9%**	
pre-tax (post-transfer) household:	**-5.5%**	
	Husband	**Wife**
Earner's average share of pre-tax earnings:	**0.65**	**0.34**
Earner's pre-tax earnings response:	**-10.6%**	**1.9%**
Hours	**-0.9%**	**3.0%**
Leisure	**1.2%**	**-0.9%**
Parental time	**0.7%**	**-2.9%**

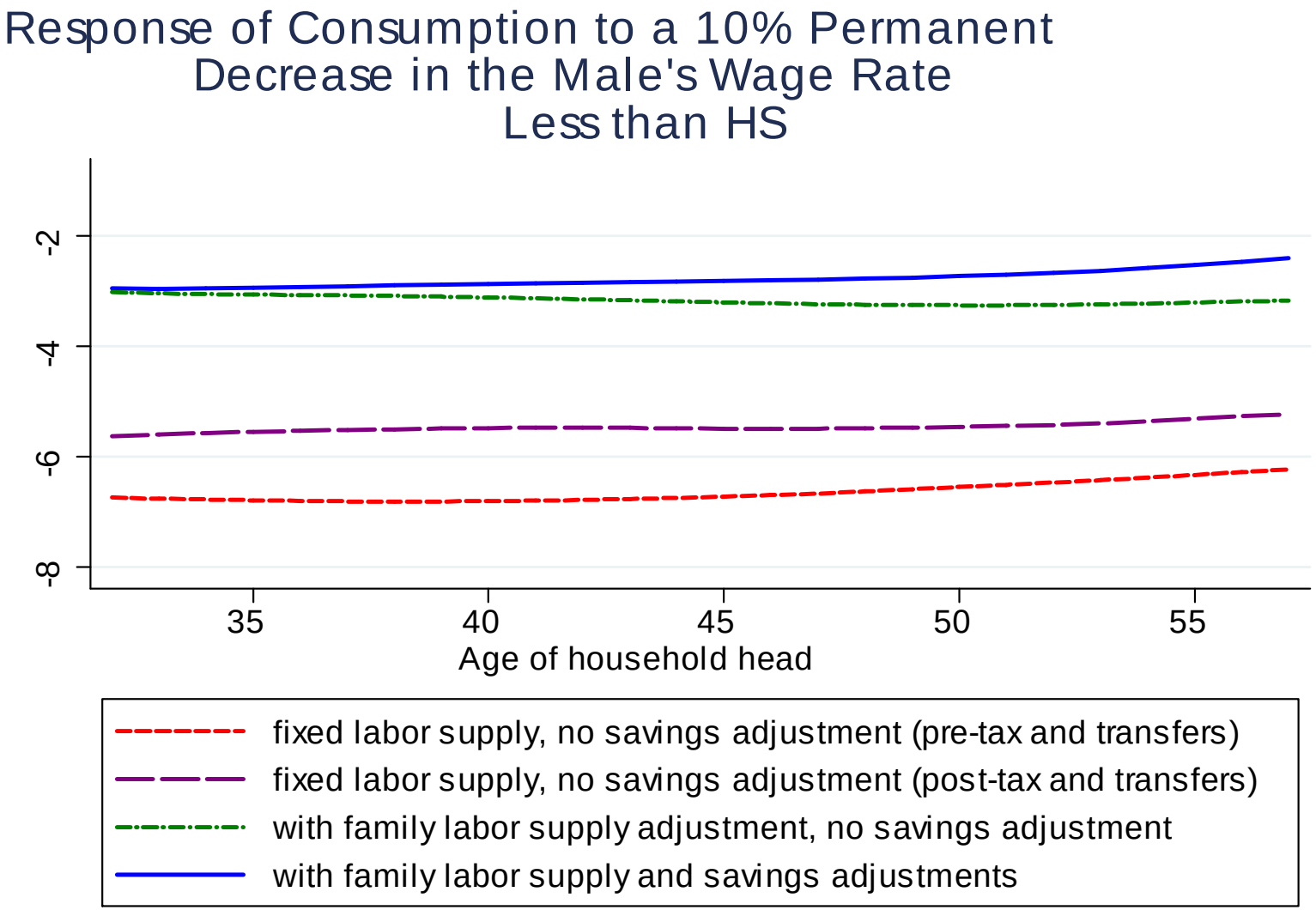
Notes: ATUS and PSID; Source: Blundell, Pistaferri and Saporta-Eksten (2017)

Distribution of assets for SNAP group



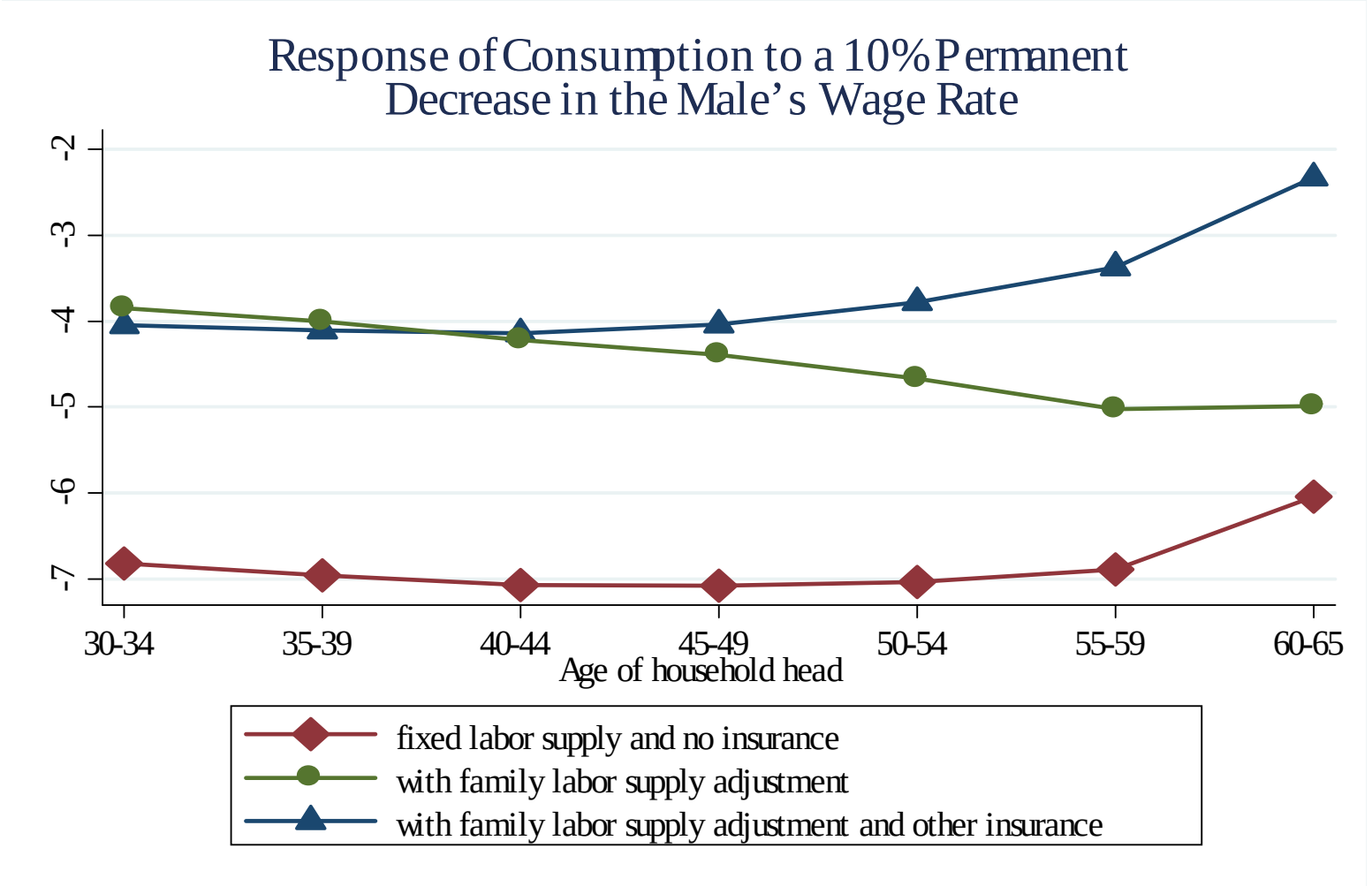
Source: Blundell, Pistaferri and Saporta-Eksten (2018)

Consumption Insurance for low educ group



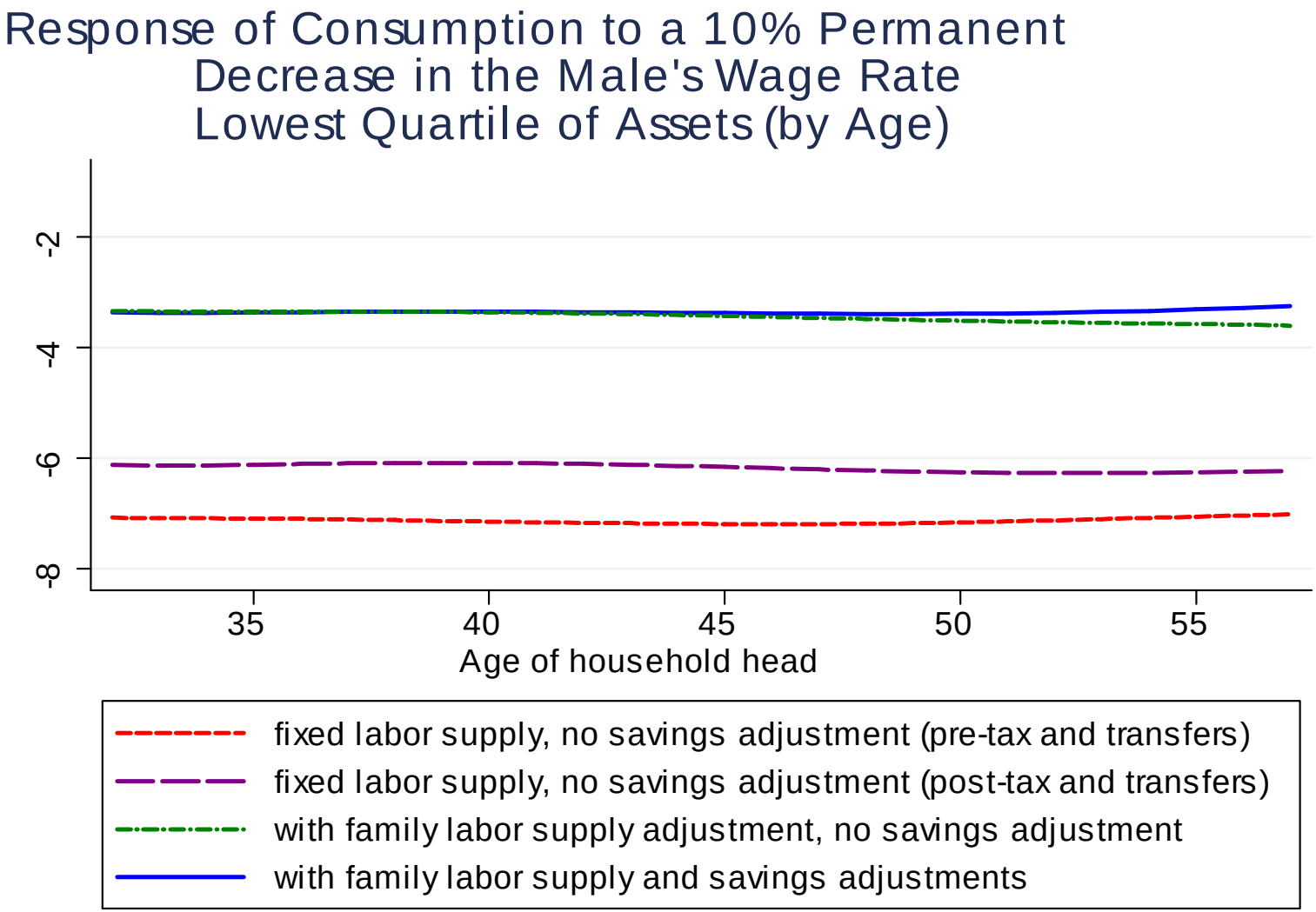
Source: Blundell, Pistaferri and Saporta-Eksten (2018)

Household consumption responses to an adverse persistent shock to husband's real wage.



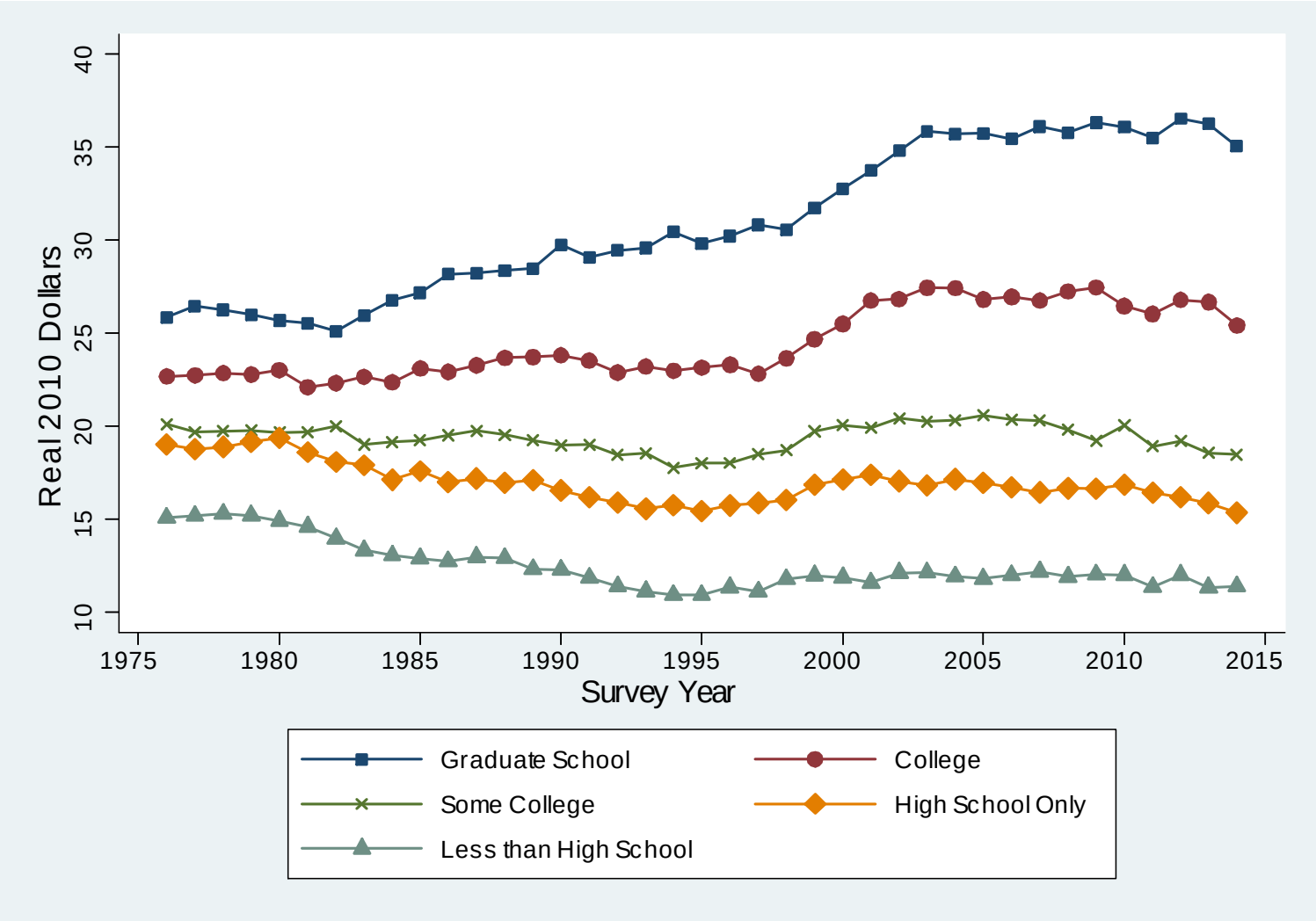
Notes: Average response. Source: Blundell, Pistaferri and Saporta-Eksten (2016)

Consumption Insurance for low assets group



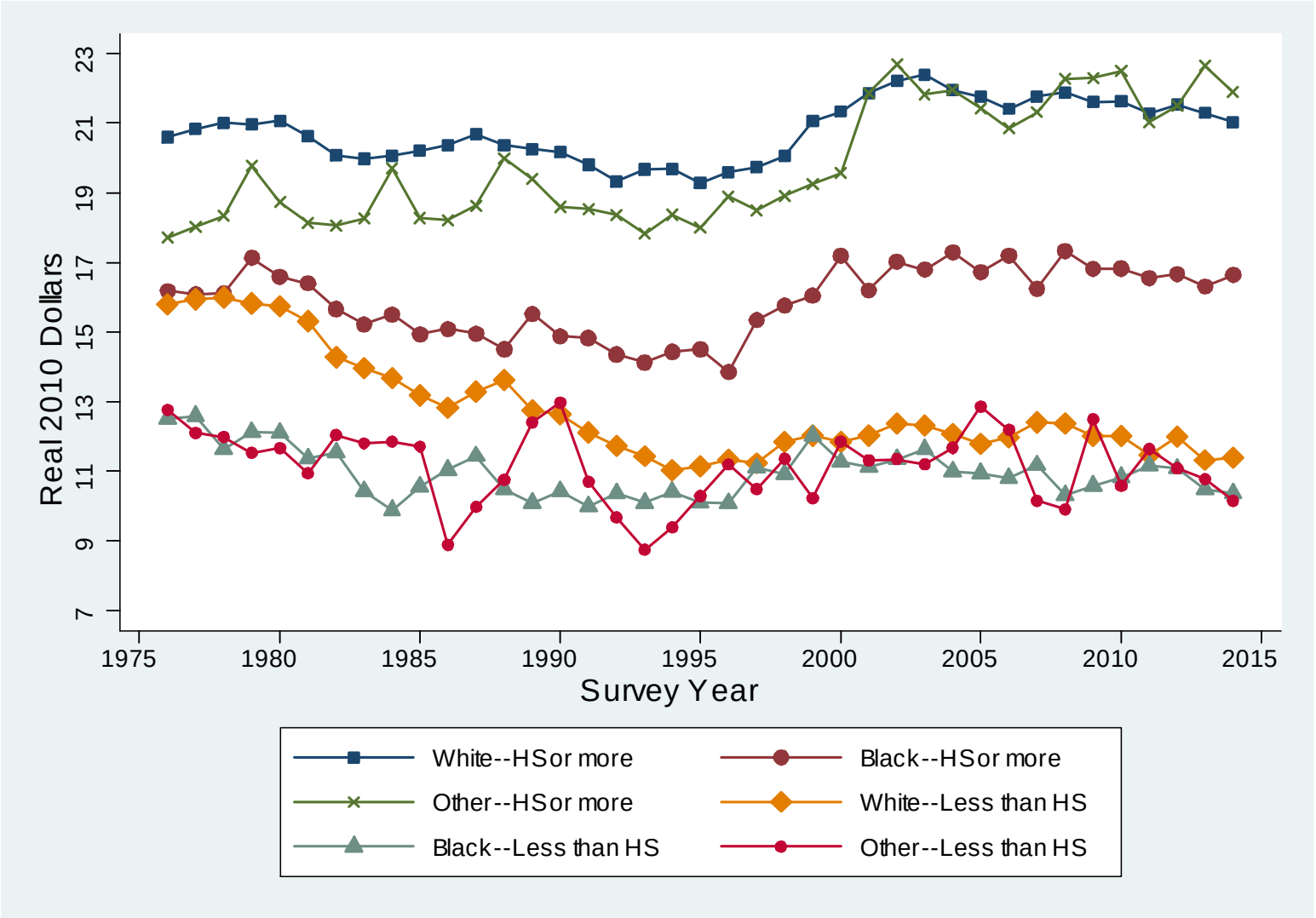
Average response. Source: Blundell, Pistaferri and Saporta-Eksten (2018)

Male Median Real Wages by Education in the US



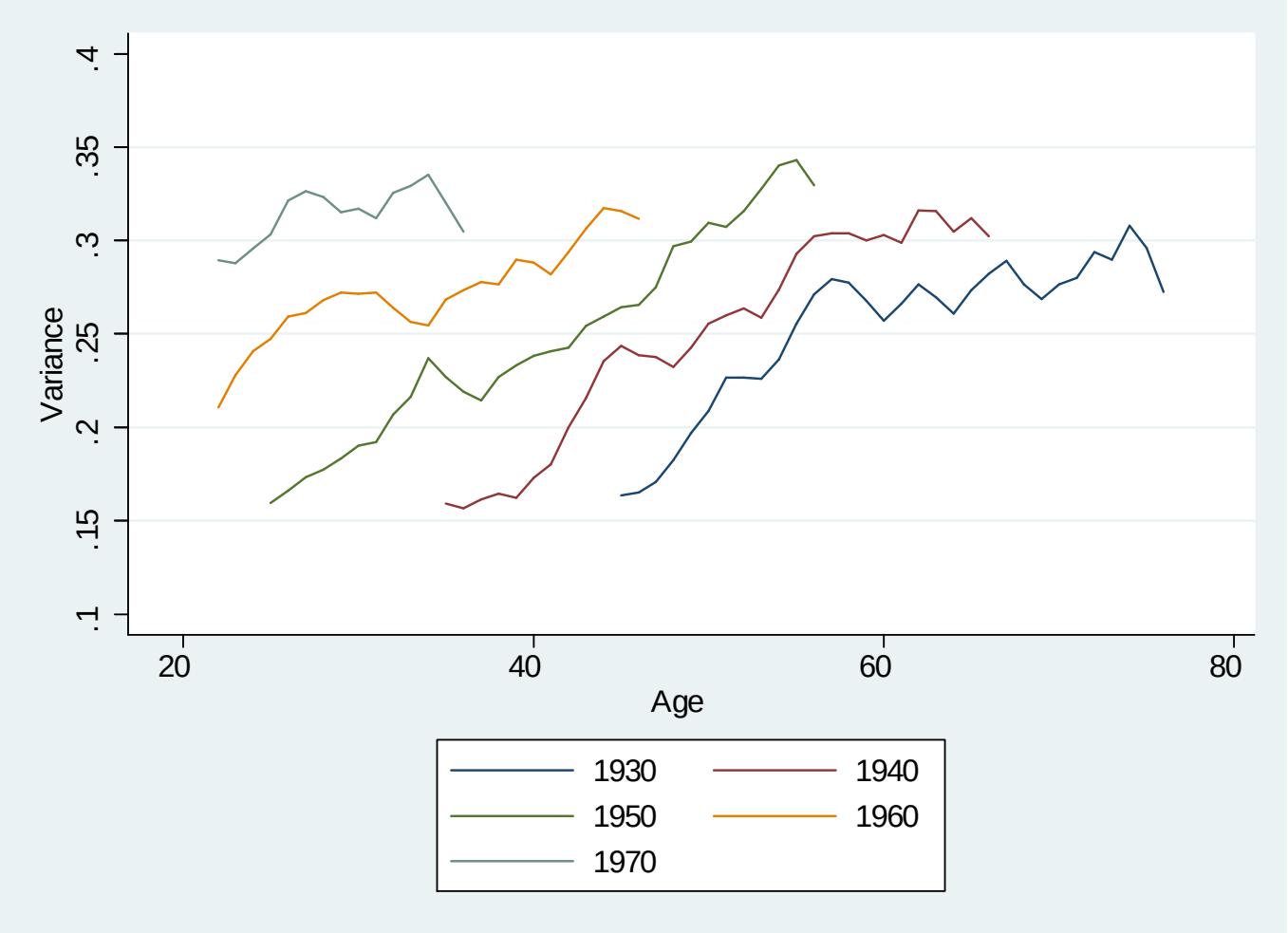
Notes: CPS, Ages 25-55; Source: Blundell, Norris-Keiller and Ziliak (2017)

Male Median Real Wages by Education and Race in the US



Notes: CPS, Men Ages 25-55; Source: Blundell, Norris-Keiller and Ziliak (2017)

Consumption inequality by age and birth cohort (UK)



Notes: Variance (log); Source: Blundell, O'Dea and Joyce (2016).

Descriptive Statistics for Consumption

	1998	2000	2002	2004	2006	2008	All years	All years
Sample	Only Working Males							All Married Males
Consumption								
Total	28,447	32,994	36,482	42,873	49,165	44,995	39,257	38,733
Non durable Cons.	6,907	7,870	7,906	8,929	10,002	9,392	8,552	8,490
Food at home	5,489	5,818	5,961	6,307	6,673	6,734	6,165	6,104
Gasoline	1,419	2,052	1,945	2,622	3,328	2,657	2,339	2,318
Services	21,540	25,124	28,576	33,944	39,163	35,603	30,705	30,243
Food out	2,034	2,270	2,377	2,582	5,040	2,601	2,816	2,737
Health ins.	1,011	1,257	1,450	1,720	1,882	2,110	1,572	1,550
Health serv.	894	1,044	1,138	1,433	1,610	1,765	1,317	1,308
Utilities	2,284	2,653	2,705	4,683	5,085	5,632	3,856	3,823
Transportation	3,204	3,786	4,681	3,893	4,026	3,783	3,896	3,826
Education	2,105	2,414	2,592	2,719	2,866	2,802	2,589	2,523
Child care	594	651	687	724	724	917	714	677
Home ins.	429	479	554	619	687	716	581	574
Rent (or rent eq.)	8,984	10,570	12,392	15,571	17,241	15,276	13,366	13,225
Observations	1,717	1,753	1,740	1,727	1,751	1,791	10,479	11,638

Notes: PSID data, 1999-2009 waves. Baseline sample is married couples with working male aged 30-57. SEO sample excluded.

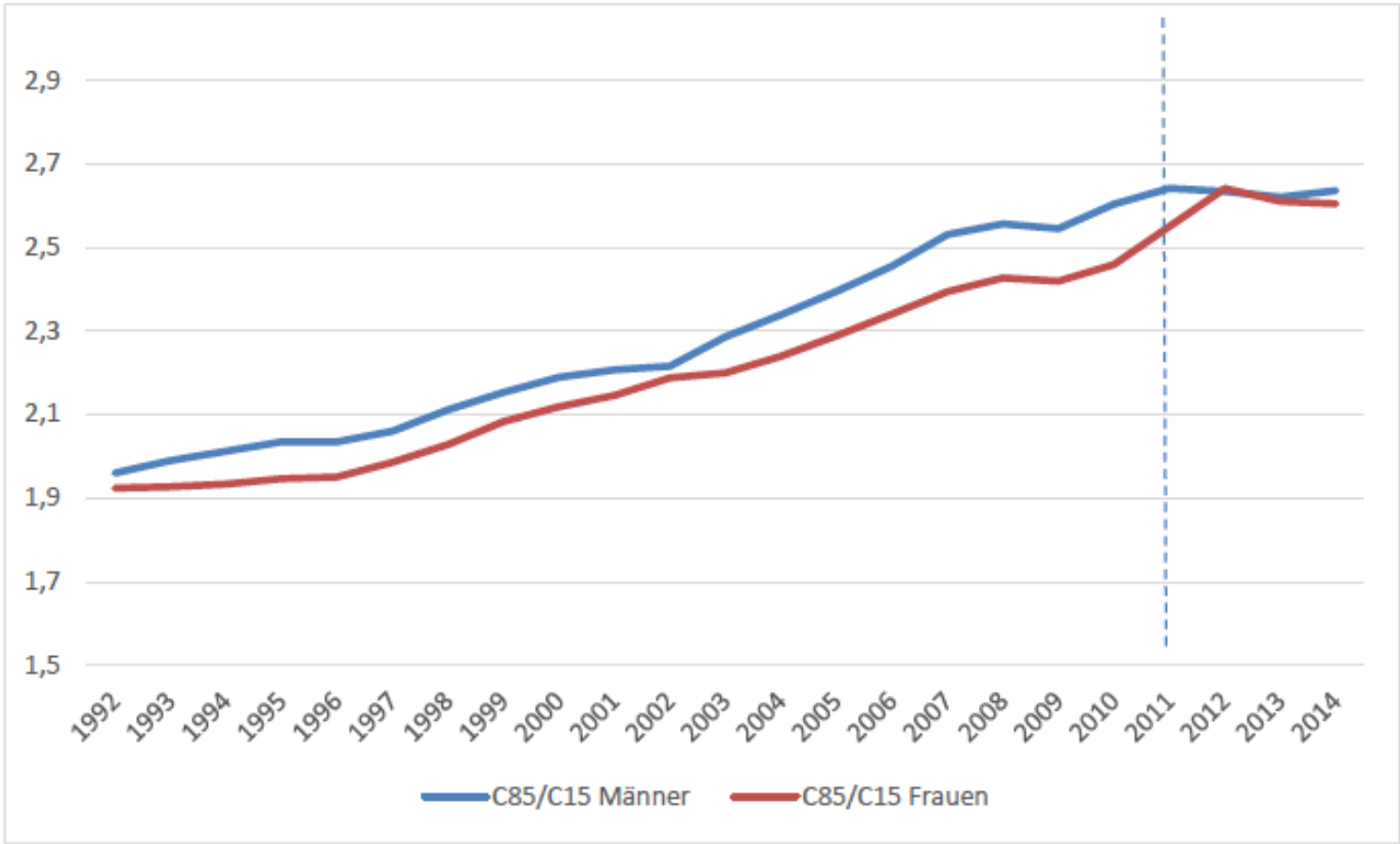
Missing values in consumption sub-categories treated as zeros. Match with NIPA

Descriptive Statistics for Assets and Earnings

	1998	2000	2002	2004	2006	2008	All years	All years
Sample	Only Working Males							All Married Males
Assets (Medians)								
Total	177,000 [179,100]	205,000	231,000	271,000 [262,100]	305,000	270,000	240,000	233,000
Housing and RE	120,000 [127,300]	140,000	165,000	200,000 [196,700]	225,000	200,000	170,000	165,000
Financial assets	38,000 [33,400]	40,000	41,000	41,000 [41,200]	45,300	40,000	40,300	40,000
Total debt	55,000 [51,600]	64,000	78,000	89,000 [84,400]	100,000	107,928	78,500	74,000
Mortgage	50,000	59,000	70,000	80,000	90,000	98,000	70,000	66,182
Total net worth	100,000	117,000	125,000	149,000	170,000	121,000	127,000	125,000
Primary earner								
Participation rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95
Earnings|Work	55,709	61,927	63,440	67,748	74,233	78,414	67,008	66,068
Hours|Work	2,371	2,326	2,322	2,313	2,309	2,176	2,302	2,293
Secondary earner								
Participation rate	0.79	0.80	0.80	0.79	0.80	0.79	0.80	0.79
Earnings|Work	26,017	28,447	31,661	34,203	36,723	40,517	32,988	33,485
Hours|Work	1,676	1,693	1,707	1,717	1,668	1,667	1,688	1,699
Observations	1,717	1,753	1,740	1,727	1,751	1,791	10,479	11,638

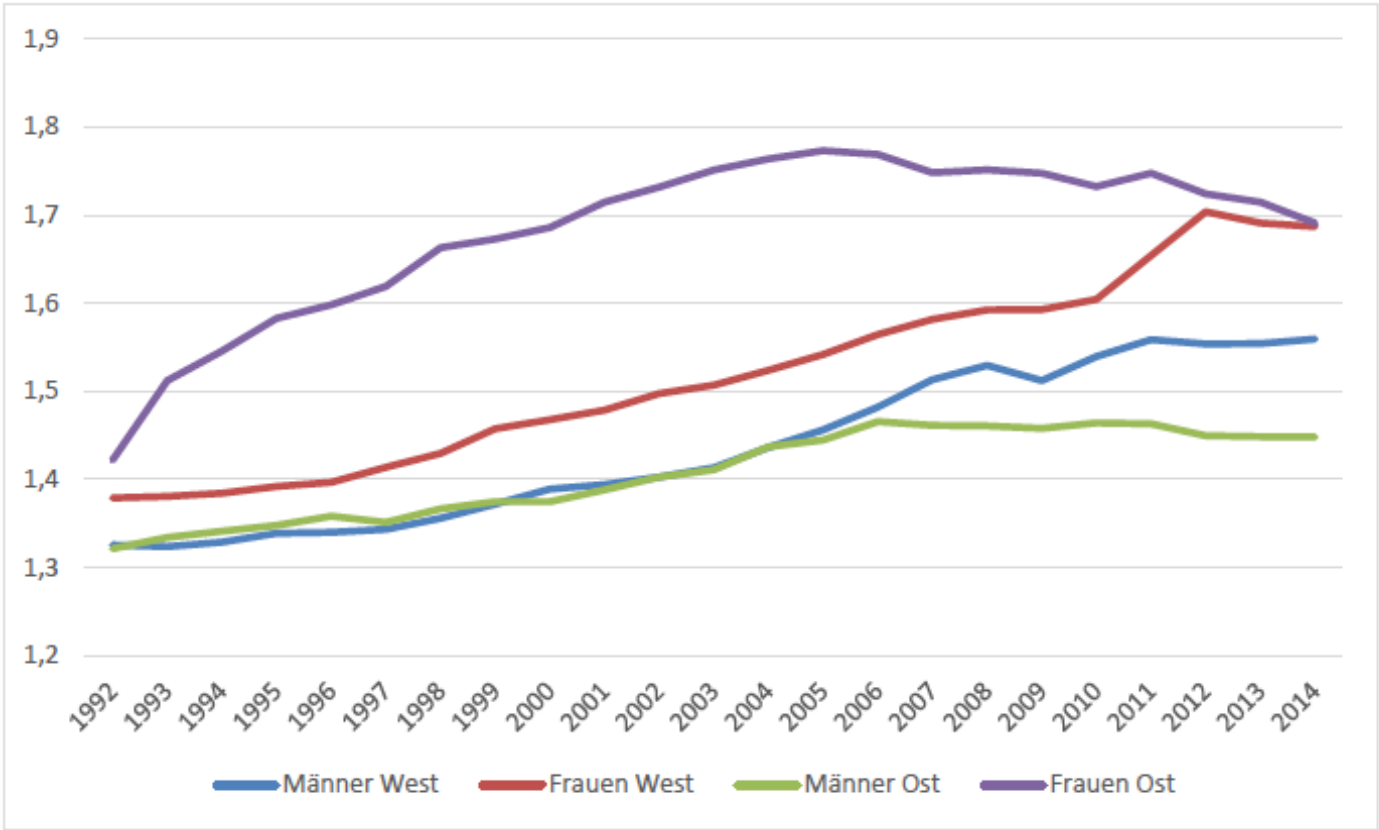
Notes: PSID data, 1999-2009 waves. Baseline sample: married couples with working male aged 30-57. SEO sample excluded. Missing values in assets sub-categories treated as zeros. Values in square brackets are from the SCF (couples sample). Asset statistics use sample weights.

Development of wage inequality in Germany (percentile ratio 85/15) for full-time employees men and women



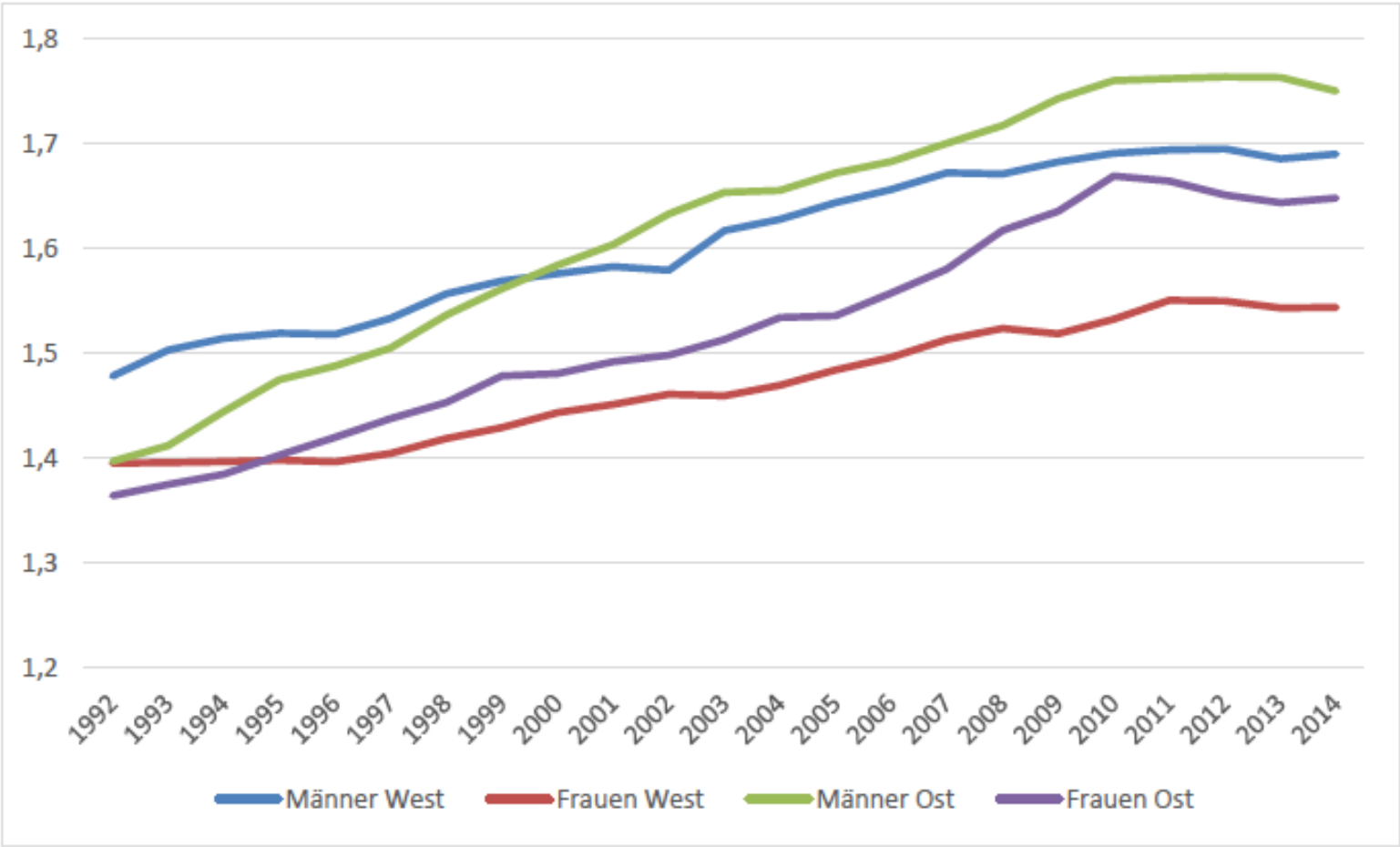
Notes: IEB data; persons aged 20 to 65, no apprentices; Cx is the xth percentile of the distribution of gross earnings per calendar day for all persons. Source: Moller (2016)

Development of German wage inequality in the lower range of the distribution by sex and part of the country (percentile ratio 50/15)



Notes: IEB data; persons aged 20 to 65, no apprentices.
Source: Moller (2016).

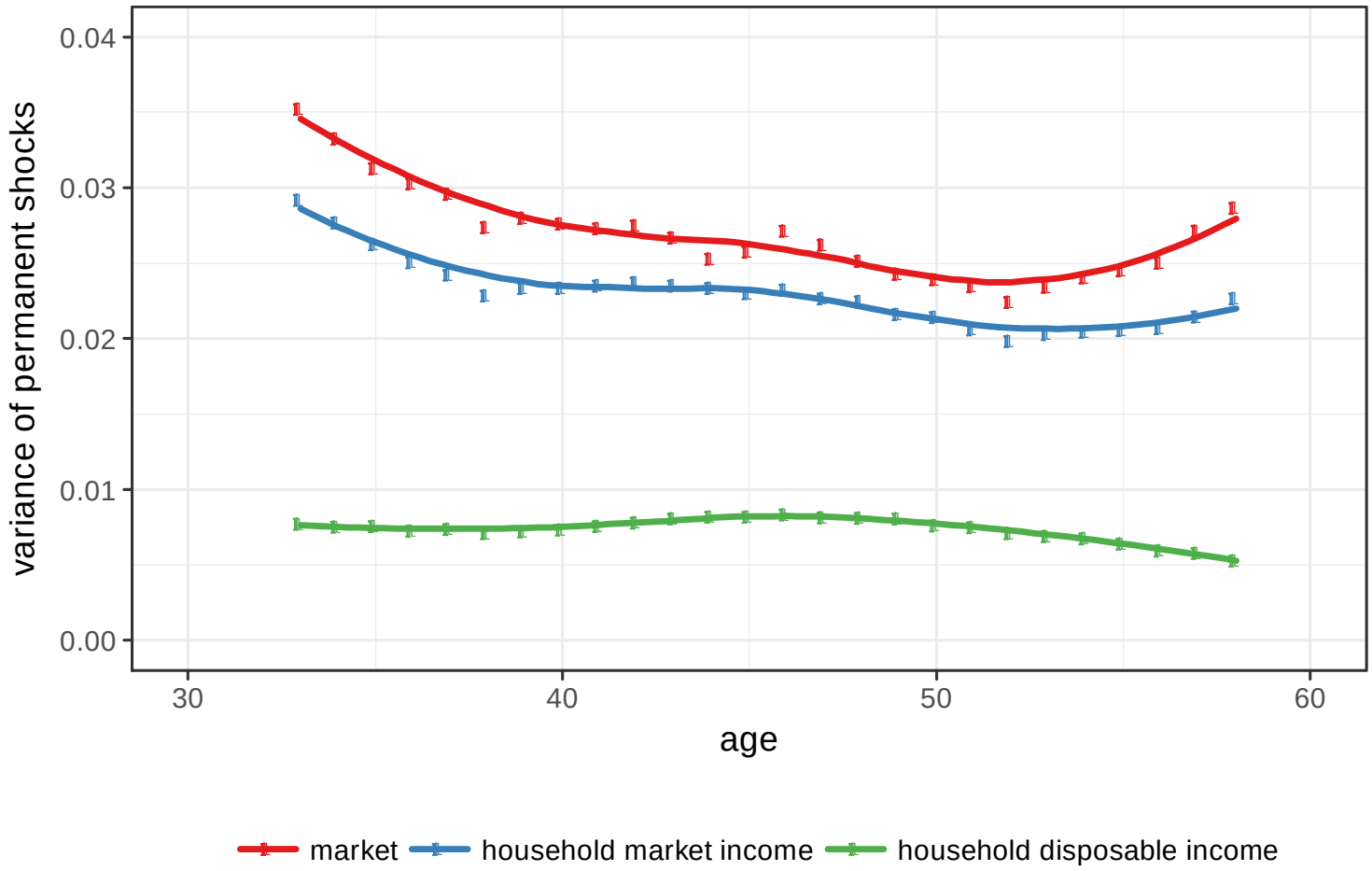
Development of German wage inequality in the lower range of the distribution by sex and part of the country (percentile ratio 85/50)



Notes: IEB data; persons aged 20 to 65, no apprentices.
Source: Moller (2016).

VARIANCES OF PERMANENT SHOCKS BY AGE:

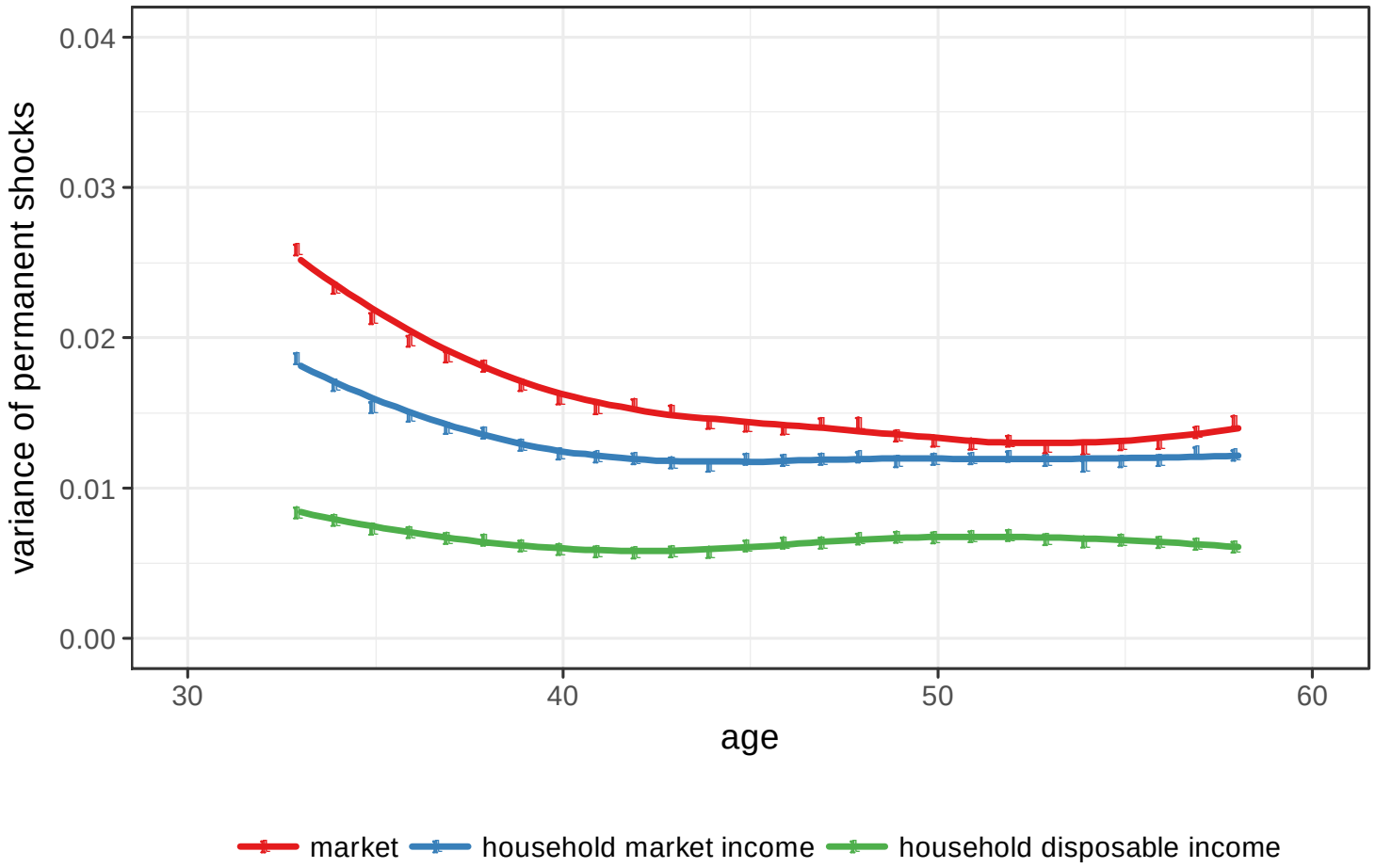
Norway 1994-2014, Low Skill



Source: Blundell, Graber and Mogstad (2018).

VARIANCES OF PERMANENT SHOCKS BY AGE:

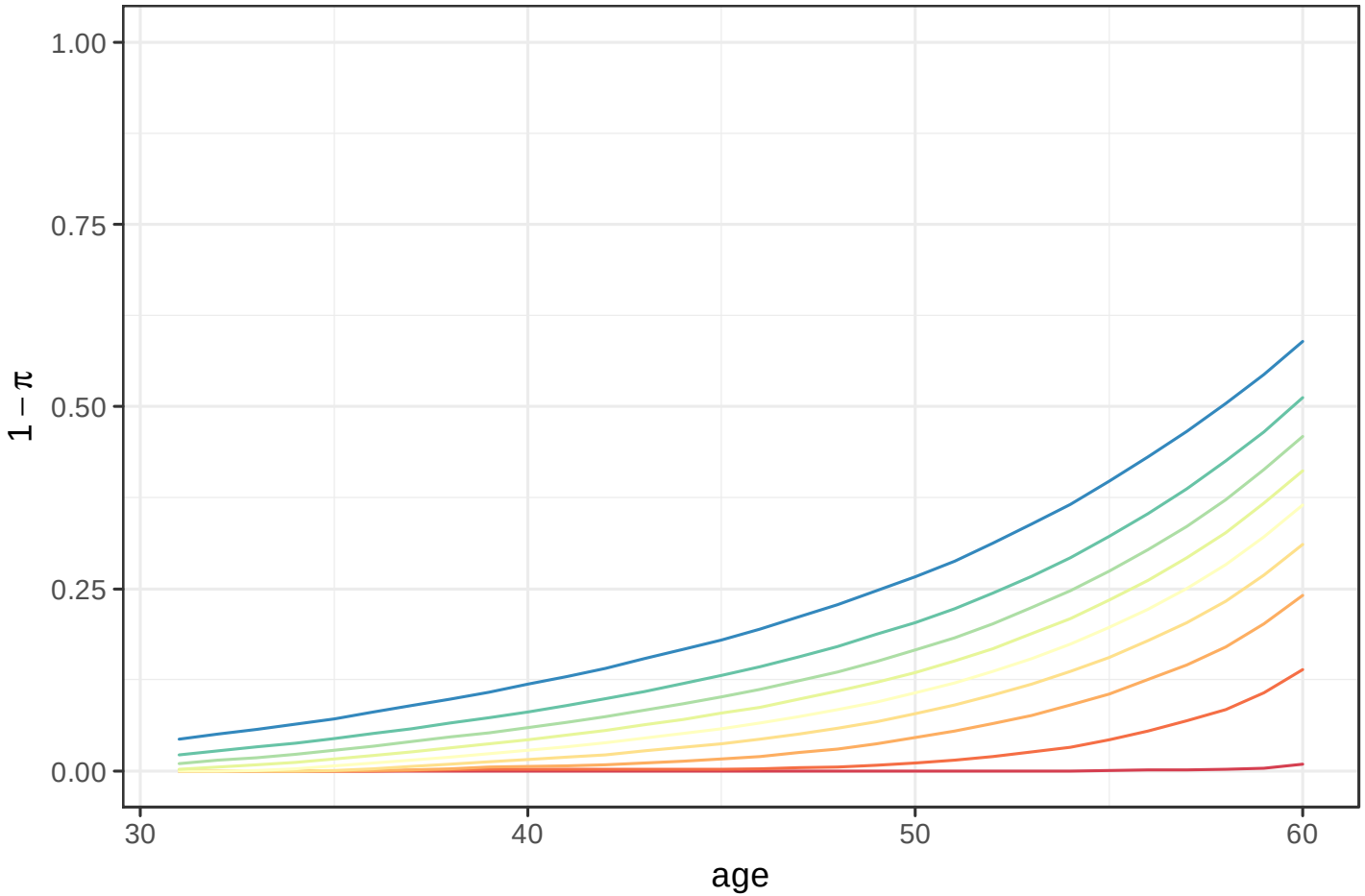
Norway 1994-2014, High Skill



Source: Blundell, Graber and Mogstad (2018).

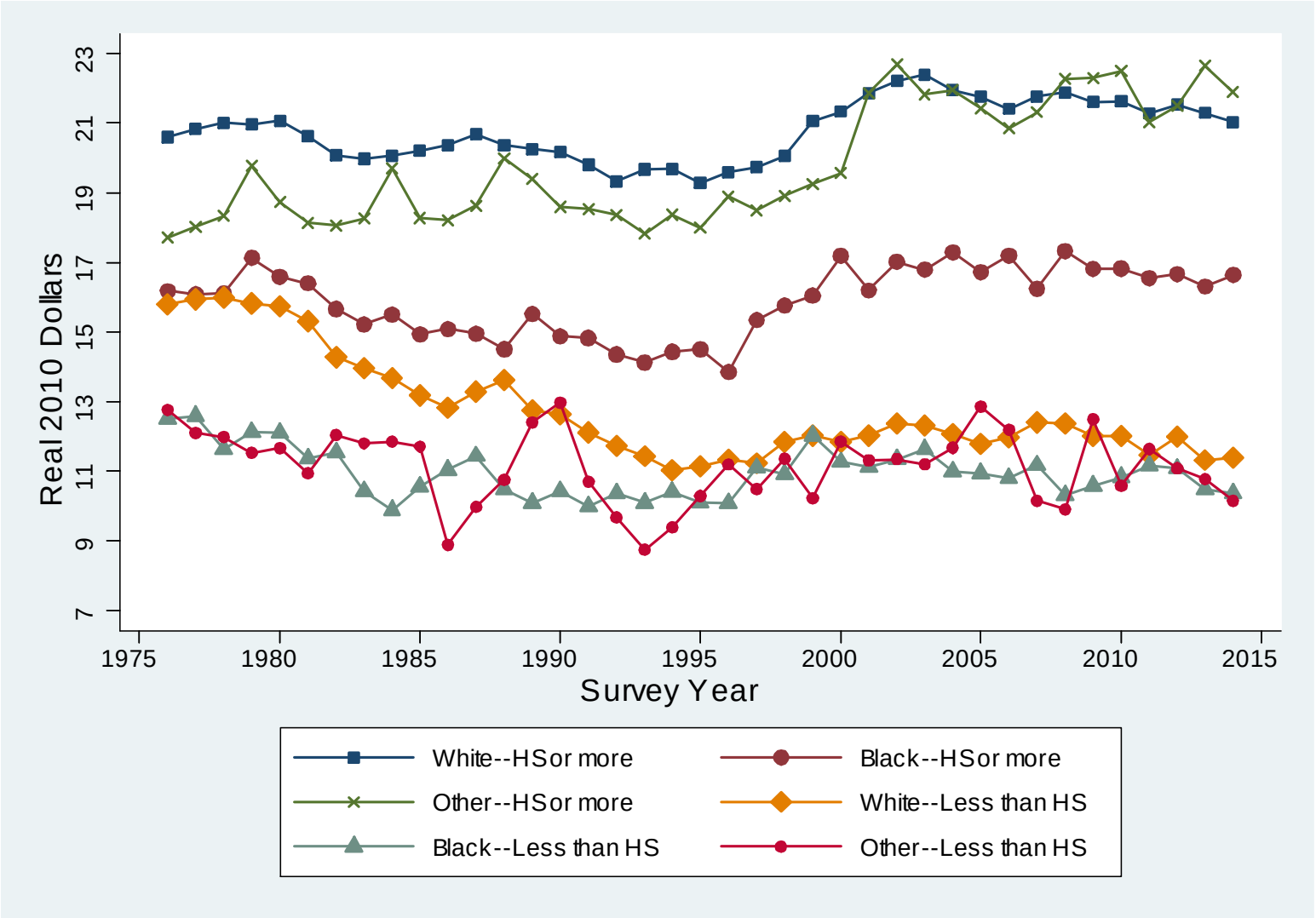
Asset Shares out of Asset and Human Wealth:

Norway 1994-2014, Low Skill, $\pi_{i,t} \approx \frac{\text{Assets}_{i,t}}{\text{Assets}_{i,t}+\text{Human Wealth}_{i,t}}$



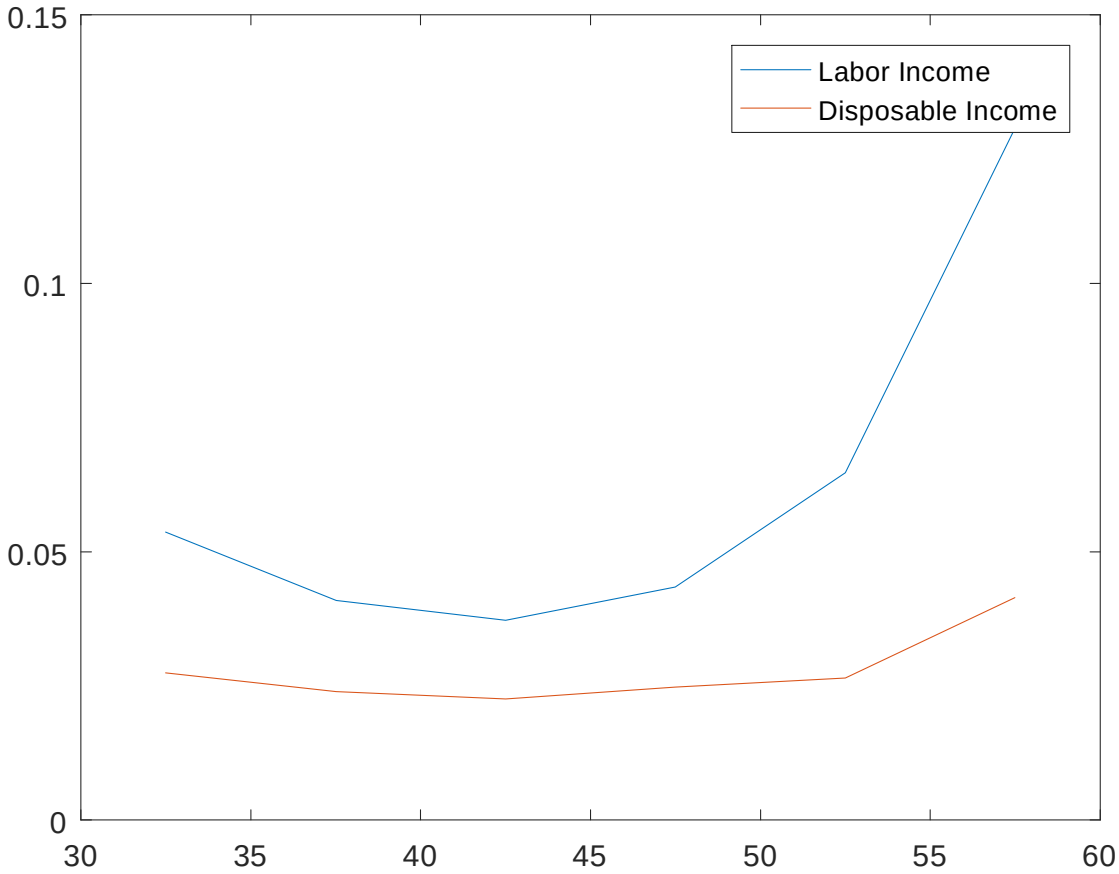
Source: Blundell, Graber and Mogstad (2018).

Male Median Real Wages by Education and Race in the US



Notes: CPS, Men Ages 25-55; Source: Blundell, Norris-Keiller and Ziliak (2017)

Variance of Permanent Shocks, PSID: 1999-2009



Notes: (Stable) married / cohabiting households drawn from the non-SEO component of the PSID for the years 1999-2015 (approximately 2,500 households each year).
Source: Arellano, Blundell, Bonhomme and Light (2018).