Consumption, Wealth and Monetary Policy

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Household Consumption: The Role of Heterogeneity and Policies

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The views presented here are those of the author, and do not necessarily reflect those of the European Central Bank.

- **Motivation**

- Effects of monetary policy on income and wealth

- Effects of monetary policy on consumption

- Summary

Motivation:

Recent public debate on impact of monetary policy on inequality

- ▶ ECB has since 2014 undertaken quantitative easing (QE)
  ("Asset Purchase Programmes")

- ▶ Various perspectives on why QE affects inequality:
  - ▶ Younger households, net borrowers benefited as interest rates fell,
    older households with interest-bearing assets lost (eg McKinsey, 2013)

  - ▶ QE boosted asset prices and financial wealth, it "made the rich richer"
    (eg FT, Oct 21, 2014)

- ▶ ECB (various speeches)
  - ▶ Expansionary monetary policy reduces unemployment, benefits poorer households most

  - ▶ QE also boosted house prices: these gains are more widely spread, as homeowners more
    evenly distributed than stock-holders

This presentation

How does monetary policy affect wealth, income and consumption at household level?

Effects of monetary policy easing:

1. Interest rate cut $R \downarrow$ $\Rightarrow$ Direct effect on $C \uparrow$
2. Interest rate cut $R \downarrow$ $\Rightarrow$ $W \uparrow$ and Effect ($\uparrow$?) on Y $\Rightarrow$ Indirect effect on C

Based on two papers:

- Effects of MP on income and wealth (Y and W)
  Lenza and Slacalek: "How does monetary policy affect income and wealth inequality? Evidence from quantitative easing in the euro area"

- Effects of MP on consumption C (via income and wealth and directly)
  Ampudia, Georgarakos, Slacalek, Tristani, Vermeulen and Violante: "Monetary policy and household inequality"

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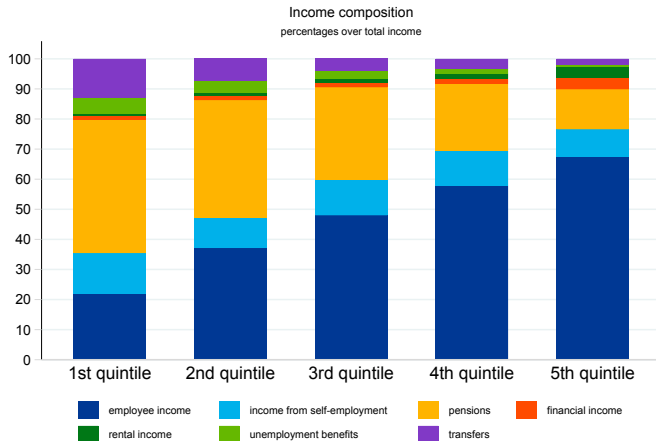 Ampudia, Georgarakos, Slacalek, Tristani, Vermeulen and Violante: "Monetary policy and household inequality"

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Substantial heterogeneity across income

- Increasing share of **employment income** and **rental** / **financial income**
- Decreasing share of **transfers, pensions, unemployment benefits**

Composition of income

Income composition
percentages over total income

Legend:
- employee income
- income from self-employment
- pensions
- financial income
- rental income
- unemployment benefits
- transfers

Substantial heterogeneity across wealth

- High share of **main residence** and **other real estate**
- Increasing (though moderate) share of **self-empl business, stocks, bonds**

Composition of total assets
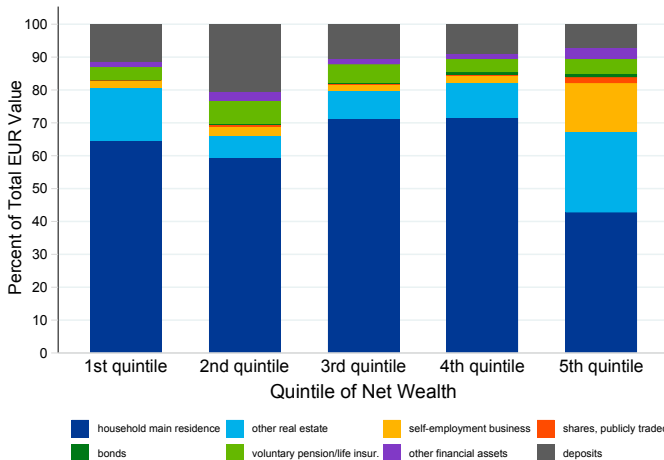
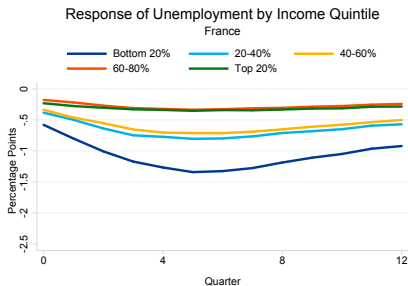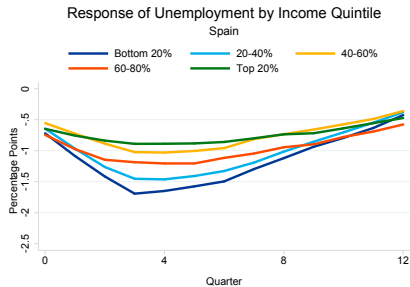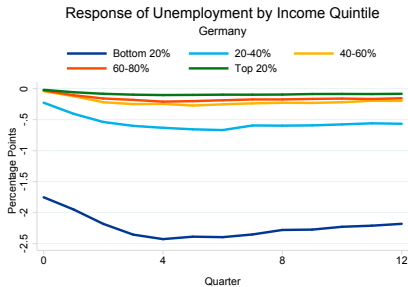# Effects of MP on income and wealth components
Lenza and Slacalek (2018)

Step 1: Aggregate data — Separate effects of MP from other factors

  a. Estimate **VAR** with aggregate unempl & asset prices
  b. Quantify **impulse responses** of asset prices / unemployment to MP

Step 2: Household-level data — Investigate heterogeneity across households

  c. Transpose IRFs over **household-level HFCS data** on wealth, income and their components
  d. For employment, use simulation based on probit for employment status
 e. Estimate effects of QE on wealth **and income** inequality (Gini . . .)

Unemployment: Disproportionate decrease for low income

Response of Unemployment by Income Quintile
Germany

Response of Unemployment by Income Quintile
Spain

Response of Unemployment by Income Quintile
France

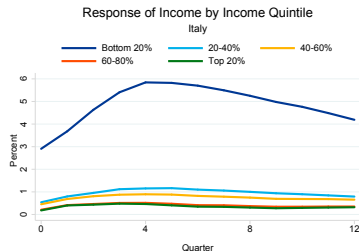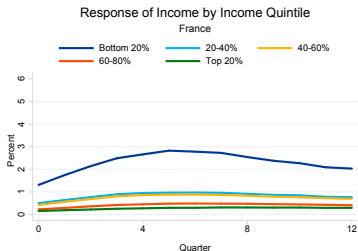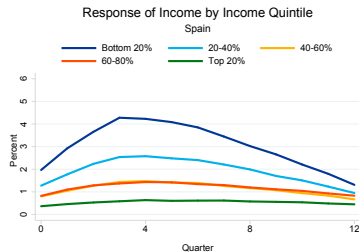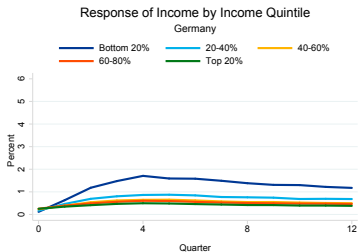Response of Unemployment by Income Quintile
Italy
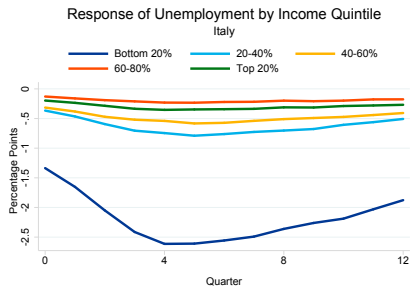
Unemployment

ES: Unemployed affected in all quintiles b/c distributed more evenly

DE: UR strongly skewed toward lowest income quintile

Unemployment Rate by Income Quintile
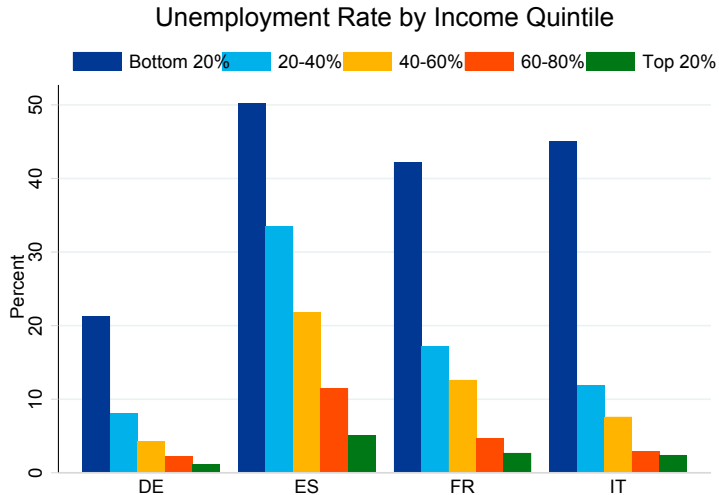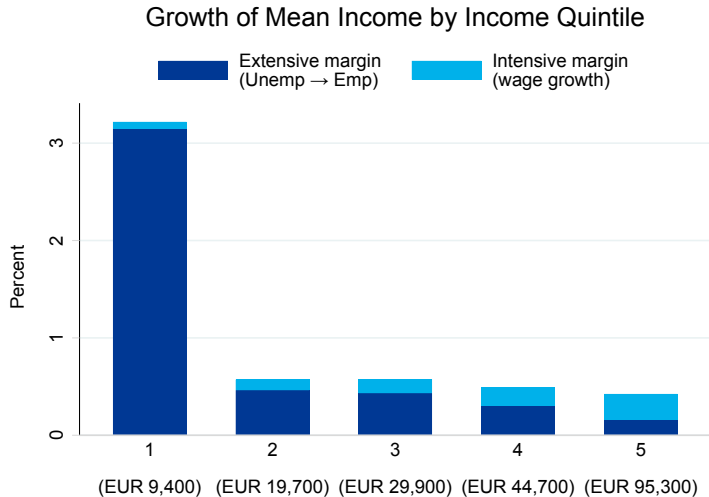
Income: Larger increases at lower levels

Unemployment benefits more generous in DE, FR than in ES and **IT**

Reduction of income inequality

Lower inequality: Gini for EA goes down from 43.1 to 42.8

Key importance of extensive margin (Unemp → Emp)

Growth of Mean Income by Income Quintile

Legend:
- Extensive margin (Unemp → Emp)
- Intensive margin (wage growth)

Y-axis: Percent (0 to 3)

X-axis:
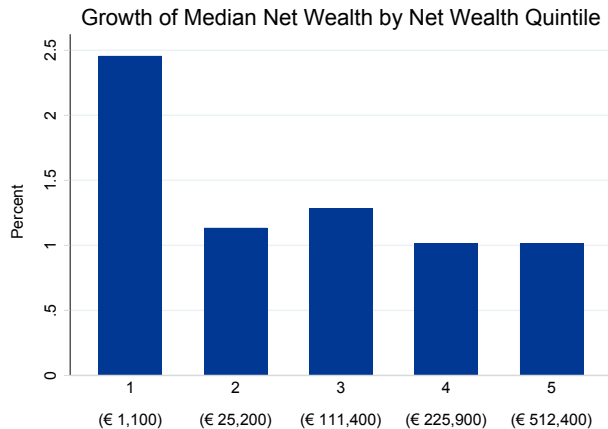1 (EUR 9,400) 2 (EUR 19,700) 3 (EUR 29,900) 4 (EUR 44,700) 5 (EUR 95,300)

Wealth inequality stable

Very small effect: Gini goes down from 68.09 to 68.07

Important to account for house prices ▸ Decomposition

[Assumes: no portfolio rebalancing; in line with literature on inertia in Hh portfolios (Ameriks, Zeldes, 2004; Bilias et al. (2010)]

Growth of Median Net Wealth by Net Wealth Quintile

- Motivation

- Effects of monetary policy on income and wealth

- **Effects of monetary policy on consumption**

- Summary

Implications for behavior of consumption   Ampudia et al. (2018)

- ▶ Consensus in recent literature on C [also HANK; Brinca & Krusell (2016); ...]: Many households (25–30%) are constrained

- ▶ Constrained households have large MPCs: ≥ 0.3

- ▶ This presentation so far: **Employment of constrained Hhs responsive to MP**

- ▶ HANK decomposition à la Kaplan et al. (2018), Auclert (2019)
  Total effect on consumption = Direct effects + Indirect (GE) effect

$$\frac{\Delta C}{C} = \underbrace{MPC \cdot \underbrace{\frac{\text{Interest Exposure}}{C}}_{\text{(Net) Interest Rate-Sensitive Assets}} \cdot \Delta R - \underbrace{\sigma \cdot (1 - MPC) \cdot \Delta R}_{\text{Intertemporal Substitution}}}_{\text{Direct Effects}} + \underbrace{MPC \cdot \frac{Y}{C} \cdot \underbrace{\frac{\Delta Y}{Y}}_{\text{Reaction of Income to } \Delta R}}_{\text{Indirect Effect}}$$

- ▶ $MPC \times \frac{\Delta Y}{Y}$ matters for strength of **indirect channel of monetary transmission** (GE/aggregate demand)

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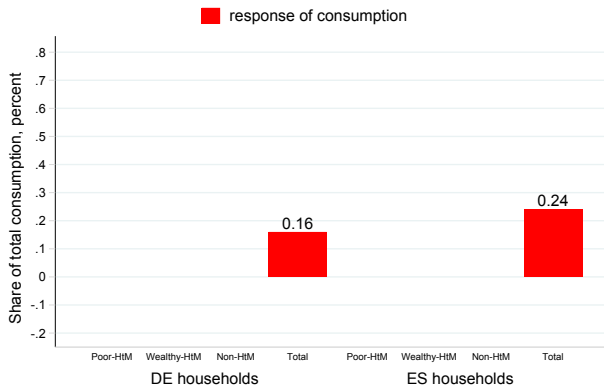 Total effect on consumption = Direct effects + Indirect (GE) effect

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Effects of 100 bp cut in R on C, by hand-to-mouth status (Ampudia et al., 2018)

Share on total population: Poor-HtM: 12.8% (DE), 6.1% (ES); Wealthy-HtM: 11.8% (DE), 18.6% (ES); Non-HtM: 75.4% (DE), 75.3% (ES).

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Direct Effects   Indirect Effect

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Summary

Monetary policy:

- ▶ Reduces income inequality

- ▶ Has substantial impact on employment / income in bottom tail

- ▶ Effect on wealth inequality small

- ▶ Consumption:
  Indirect (GE) effect important, especially for constrained households

Background slides

Existing literature

▶ **Macro effects of nonstandard MP—VARs:**
Baumeister and Benati (IJCB, 2013); Altavilla et al. (IJCB, 2016); . . .

▶ **VARs with income / consumption Ginis:**
Coibion et al. (JME, 2017); Mumtaz and Theophilopoulou (EER, 2017)
  ▶ No wealth inequality, don't estimate effects of nonstandard MP

▶ **Household wealth portfolios, inflation and asset prices:**
Doepke and Schneider (JPE, 2006); Adam and Zhu (JEEA, 2016); Adam and Tzamourani (EER, 2016); Doepke et al. (2016)
  ▶ Assume hypothetical scenarios, eg "10% increase in price level"

▶ **Model-based simulations:**
Casiraghi et al. (2018) [BdI]; Bunn et al. (2018) [BoE]
  ▶ More calibrated than estimated

▶ **So far little quantitative, estimated work on effects of nonstandard MP on inequality**

Gaps in existing work

Not much work with micro data on:

- House prices / housing wealth
- Employment effects / income inequality
- Little estimated quantitative evidence in general
- Even less on non-standard MP

Step 1: Multi-country VAR to estimate aggr effects of QE

$$y_t = C + B_1 y_{t-1} + \cdots + B_p y_{t-p} + \epsilon_t$$
$$\epsilon_t = N(0, \Sigma)$$

▶ Mix of EA and country-level variables; 4 countries: DE, FR, IT, ES

▶ ⇒ **Common MP + country heterogeneity in responses**

▶ Variables y_t:
  ▶ Country-specific: real GDP, GDP defl, **wages, unempl, house prices**
  ▶ EA: short- and long-term interest rates, **stock prices**
  ▶ US: GDP, short-term interest rates

▶ Large dimension ⇒ **Bayesian estimation** (Litterman, 1979; Giannone, Lenza and Primiceri, 2015)

▶ Quarterly data: 1999Q1–2016Q4, $p = 5$ lags

VAR: Identification à la Baumeister and Benati (2013)

1. Identify exogenous asset purchase shock with **zero and sign restrictions** (Arias et al., 2017)

   Sign restrictions—Expansionary **QE (APP) shock** on impact:
   - Decreases term IR spread
   - Increases real GDP

2. **Offset response of EA policy rate** via series of standard MP shocks
   - ...because standard MP did not react to offset effects of asset purchases (policy rate remained at lower bound)

3. Standard MP shock identified via standard zero (Choleski) restrictions

Impulse responses—QE shock

- Size of QE shock to term spread scaled to **30 bp** on impact
  In line with Altavilla et al. (2015) and Andrade et al. (2016)

Impulse Responses of Financial Variables (Euro Area)
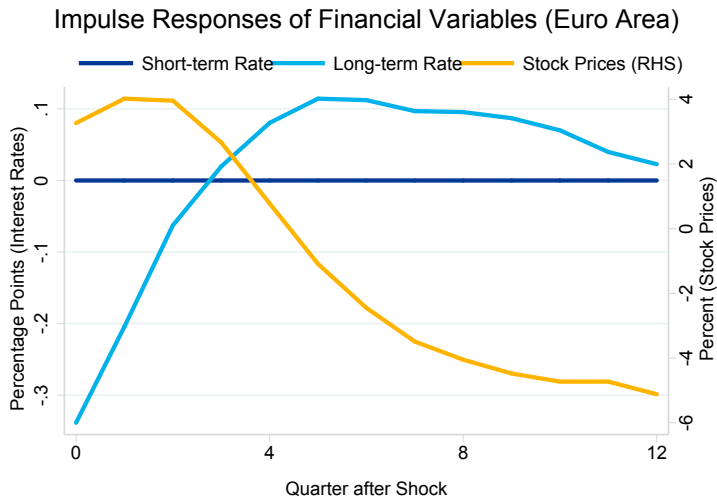
Impulse responses of key aggregate variables

- ▶ UR, HP responses stronger in ES, milder in DE
- ▶ Link to ARM, mortgage / labor market institutions?

Impulse Response of Unemployment — Germany, Spain, France, Italy

Impulse Response of House Prices — Germany, Spain, France, Italy
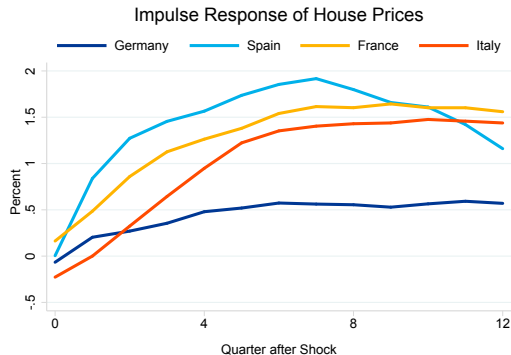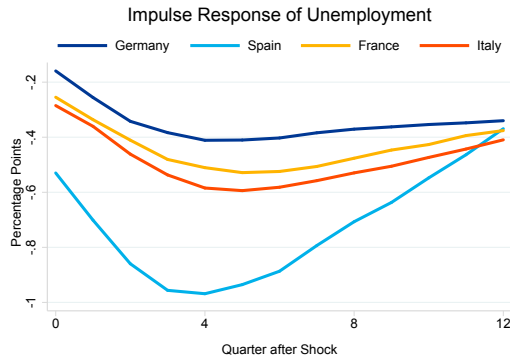
- ▶ Stock prices included at EA level

Unemployment simulation—Extensive margin [Ampudia et al. (2016)]

Some unemployed become employed and receive wage given by Heckman

1. Probit for employment status

- Country (c)-specific at individual level (not Hh):

$$\Pr(Y = 1|X = x) = \Phi(x'_{c,i}\hat{\beta}_c)$$

  Y empl status, X demographics (gender, edctn, age, mar status, chldrn)

- Collect fitted values $\hat{Y}_{c,i}$; draw uniformly distributed shock $\epsilon_{c,i}$
- If $\epsilon_{c,i}$ sufficiently below $\hat{Y}_{c,i}$ ⇒ unempl individual i becomes employed
- $\sum$ newly employed people $=$ aggregate decline in unempl implied by VAR
- Repeat many times for different draws of $\epsilon_{c,i}$, average across sims

2. Heckman selection model to estimate unobserved wages

- Income of the newly employed **increases** as implied by Heckman:
  They receive wage instead of (lower) unempl benefits

Robustness

- Local linear projections (Jordà, 2005):
  How do other variables respond to QE shock?
  - Holdings of wealth components (flow of funds) ▶
  - ES local house prices ▶
  - ES local house prices: IRF vs level ▶
  - Profits / financial income ▶
- Uniform employment probability ▶
- Same VAR response in all countries ▶
- Financial income ↑ by 5% ▶
- Portfolio rebalancing—some trading in stocks:
  Buy 15% of your stock holdings ▶

Modelling response of wealth and income components to QE

Wealth / income component	Modeling procedure
Real Assets	
Household's main residence	Multiplied with response of house prices
Other real estate property	Multiplied with response of house prices
Self-employment businesses	Multiplied with response of stock prices
Financial Assets	
Shares, publicly traded	Multiplied with response of stock prices (in the baseline; robustness: some trading)
Bonds	Multiplied with response of bond prices (based on long-term rate)
Voluntary pension/whole life insurance	No adjustment
Deposits	No adjustment
Other financial assets	No adjustment
Debt	
Total liabilities	No adjustment
Gross Income	
Employee income	Multiplied with response of wages (compensation per employee)
Self-employment income	Multiplied with response of wages (compensation per employee)
Income from pensions	No adjustment
Rental income from real estate property	No adjustment
Income from financial investments	No adjustment (in the baseline; robustness: grows by 5%)
Unemployment benefits and transfers	If becomes employed, replace with wage (otherwise no adjustment)

Impact of QE on long-term IR—Literature review

Table 1 Empirical Estimates of the Effects of Nonstandard Monetary Policy Using Event Studies

Authors	Country	Type of Event	Typical Impact on 10-Year Rate (p.p.)	Notes
Altavilla et al. (2016)	DE, ES, FR, IT	OMT	0.2 to 1	
Altavilla et al. (2015)	EA, DE, ES, FR, IT	APP	0.3 to 0.5	
Andrade et al. (2016)	EA	APP	0.45	
Joyce and Tong (2012)	UK	APF1	1	
Christensen and Rudebusch (2012)	UK, US	APF1	0.43 to 0.89	
Lam (2011)	JP	CME+	0.24 to 0.27	
Fukunaga et al. (2015)	JP	QQE	0.33 to 0.47	
Gagnon et al. (2011)	US	LSAP1	0.55 to 1.05	
Krishnamurthy and Vissing-Jorgensen (2013)	US	LSAP1, LSAP2, MEP	0.07 to 1.07	
Bauer and Rudebusch (2014)	US	LSAP1	0.89	
Krishnamurthy and Vissing-Jorgensen (2011)	US	LSAP1, LSAP2	0.3 to 1.07	
Cahill et al. (2013)	US	LSAP1, LSAP2, MEP	0.089 to 0.131	for $100bn purchases

Notes: See also Andrade et al. (2016), Appendix B for other studies and details.

Impulse responses of aggregate variables

Impulse Responses of Financial Variables (Euro Area)
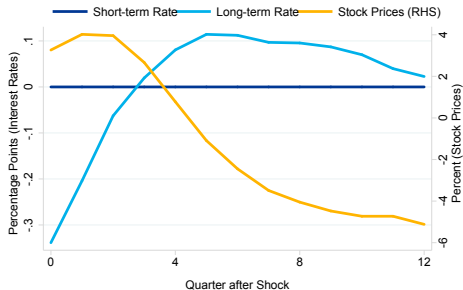
Impulse Response of House Prices
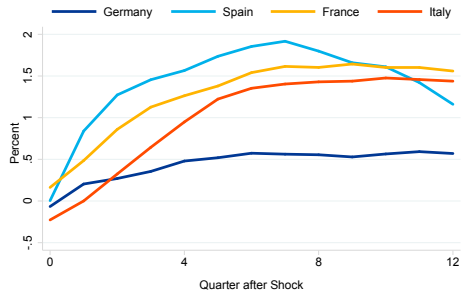
Impulse Response of Unemployment
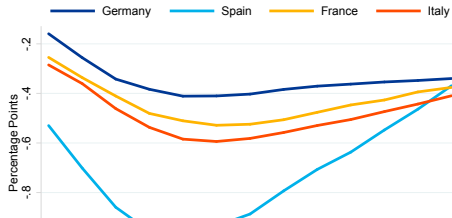
Impulse Response of Wages

EA unemployment

Disproportionate decrease for low income
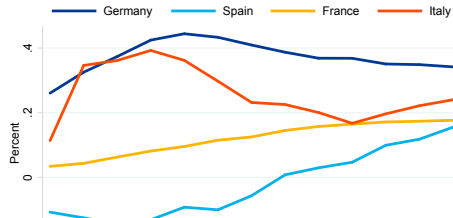
Decline in Unemployment Rate by Income Quintile
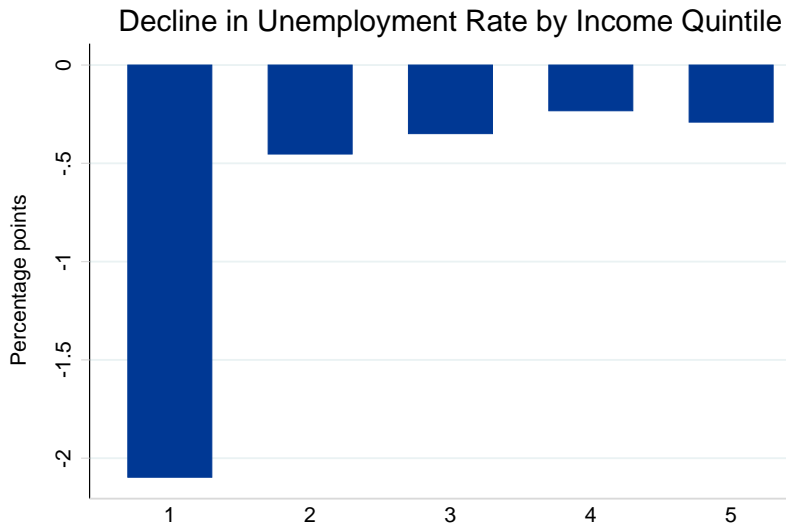
Decomposition of changes in net wealth

Key role of housing

Growth of Net Wealth and Its Components
by Net Wealth Quantile (Mean)
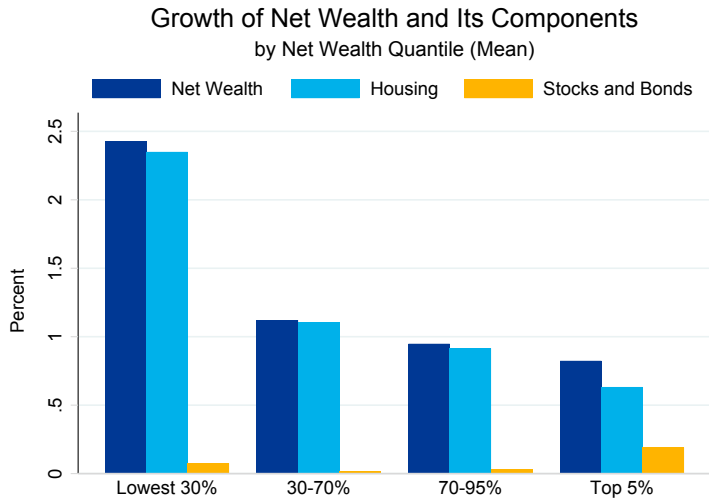
Net wealth

Caveat: Some increase in wealth above P90, but transitory (see IRF for stock prices)

Lower percentiles: Role of leverage

Response of Wealth by Wealth Quintile
Germany

Response of Wealth by Wealth Quintile
Spain

Response of Wealth by Wealth Quintile
France

Response of Wealth by Wealth Quintile
Italy
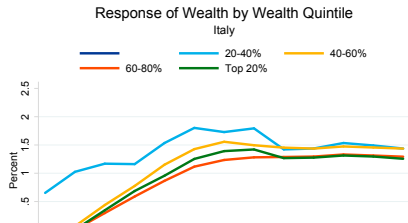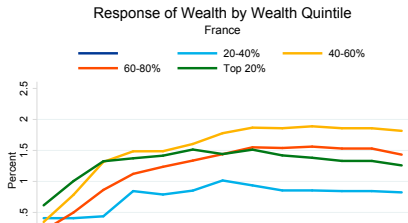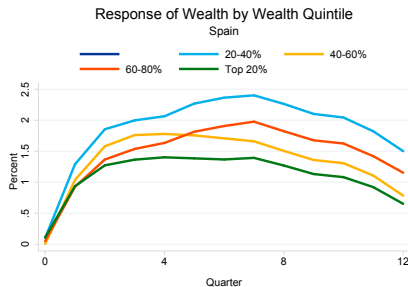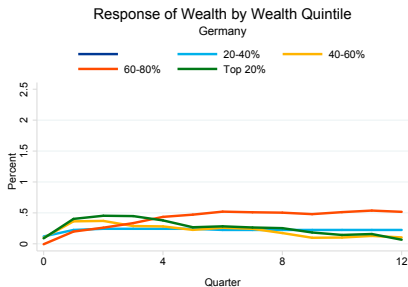
Local linear projection:

ES holdings of wealth components (flow of funds)

Total fin assets ↑≈ 5–10%; stocks ↑ by a lot (≈ 15%), debt ↓ a bit
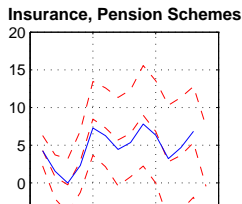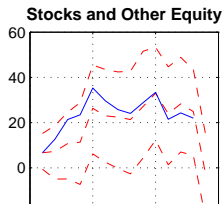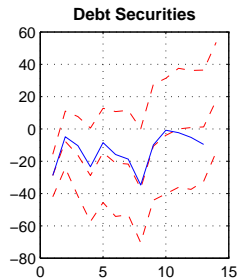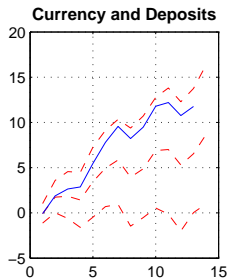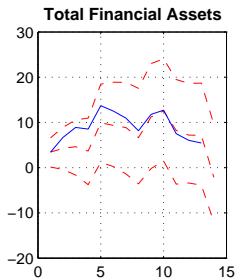
Local linear projection: ES regional house prices [▸ Back]

Some, but not overwhelming heterogeneity
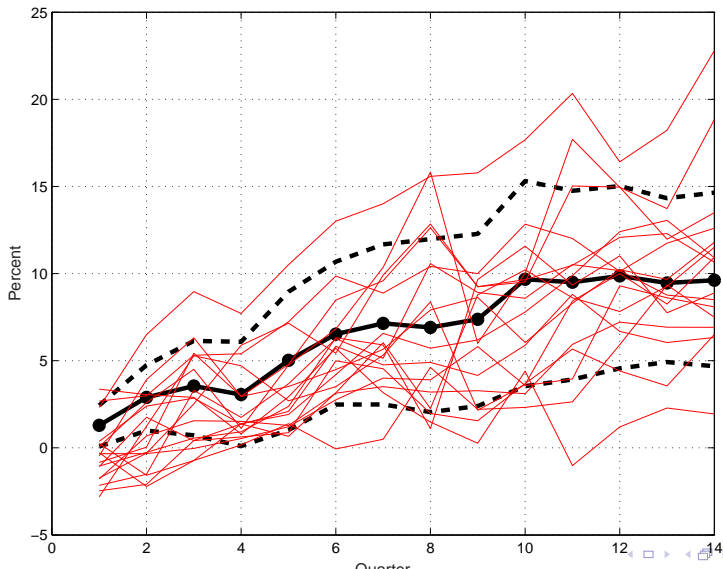
ES regional house prices: IRF vs level

Positive relationship b/w level and response of HP
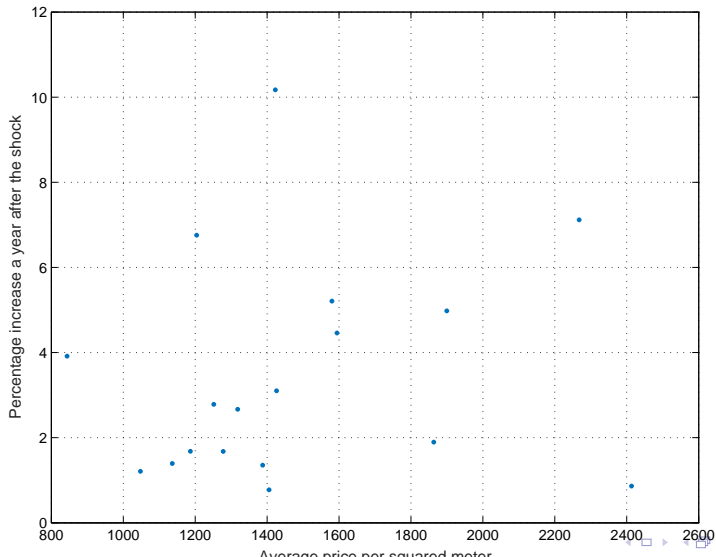
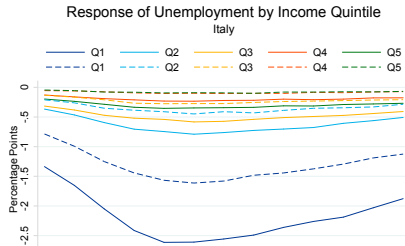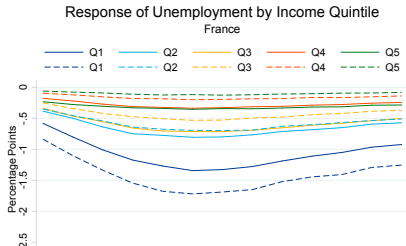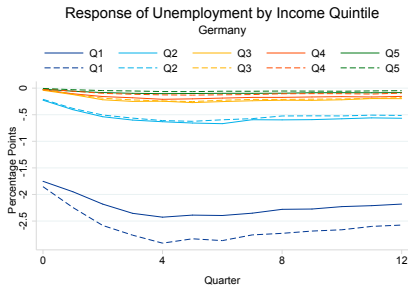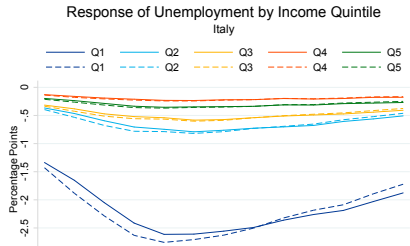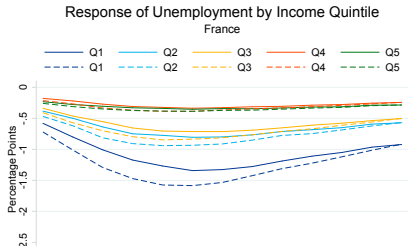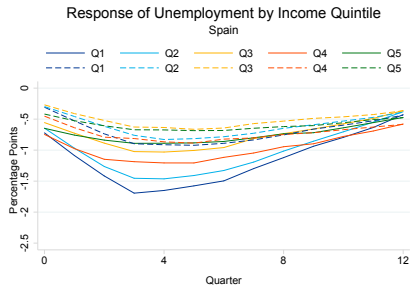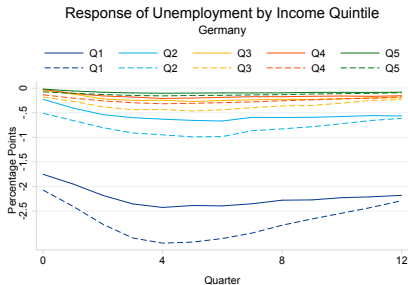# Local linear projection: Profits ↑ by 5% ▸ Back

Profits
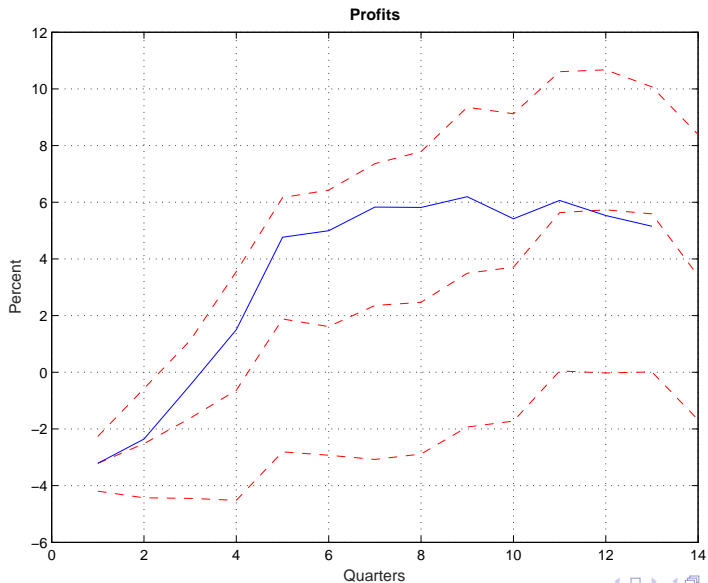
Robustness: Uniform employment probability

Baseline IRFs (Solid) vs IRFs under uniform probability of getting employed (Dashed) ▸ Back
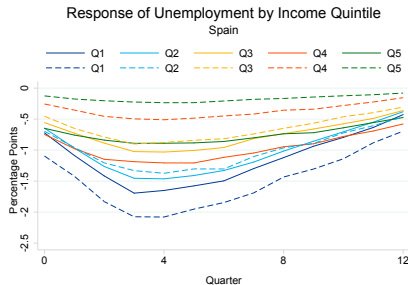
Robustness: Same VAR response in all countries

Baseline IRFs (Solid) vs IRFs restricted to be the same across countries (Dashed) ▶ Back

Response of Unemployment by Income Quintile — Germany

Response of Unemployment by Income Quintile — Spain

Response of Unemployment by Income Quintile — France

Response of Unemployment by Income Quintile — Italy

Robustness: Financial income ↑ by 5%

Financial income matters most in the upper tail ▶ Back

Growth of Mean Income by Income Quintile

Legend:
- Extensive margin (Unemp → Emp)
- Intensive margin (wage growth)
- Financial income

Percent (y-axis): 0, 1, 2, 3, 4

Income Quintile (x-axis):
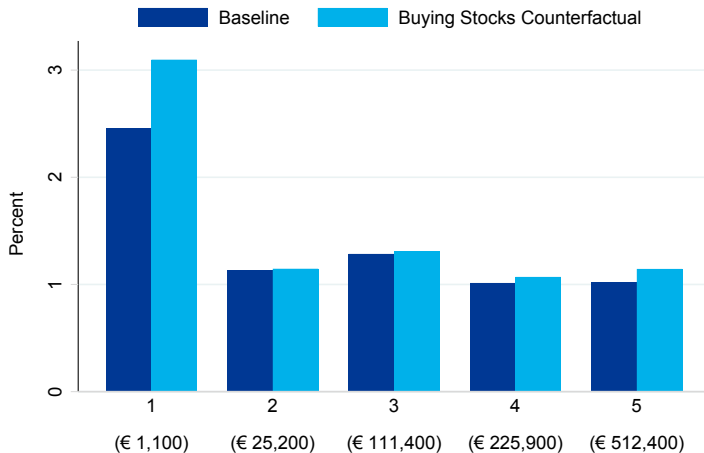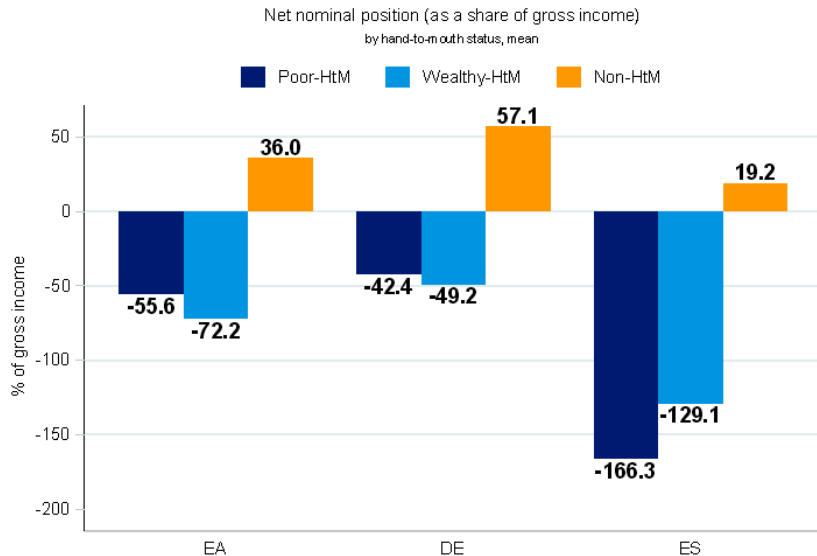| 1	2	3	4	5
(EUR 9,400)	(EUR 19,700)	(EUR 29,900)	(EUR 44,700)	(EUR 95,300)
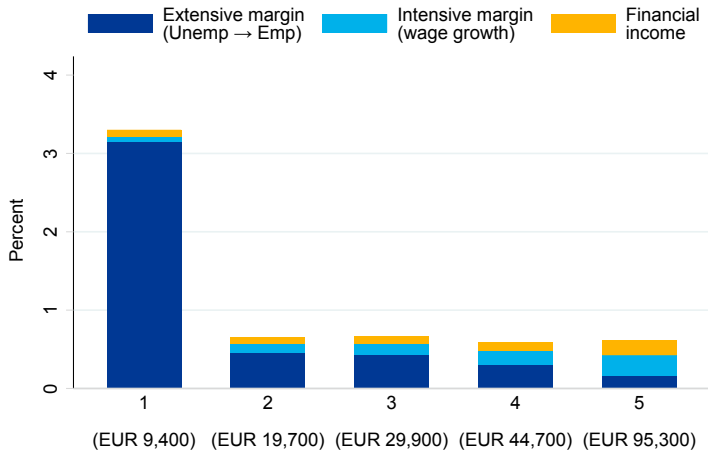
Robustness: Holdings of stocks ↑ by 15%

Similar overall results ▶ Back

High leverage at the bottom

Growth of Median Net Wealth by Net Wealth Quintile

# Net nominal positions

Net nominal position (as a share of gross income)
by hand-to-mouth status, mean

Poor-HtM Wealthy-HtM Non-HtM

HFCS 2nd wave. Countries: DE, ES and Euro area.

Net interest rate exposure—Auclert (2017)

- Net interest rate exposure = maturing assets - maturing liabilities
- Maturing assets = 25% of value of mutual funds, bonds, shares, managed accounts, money owed to households, other assets + 100% of deposits
- Maturing liabilities = 100% outstanding balance of adjustable-rate mortgages + 100% outstanding balance of other non-collateralized debt

Net interest rate exposure (as a share of gross income)
by hand-to-mouth status, mean
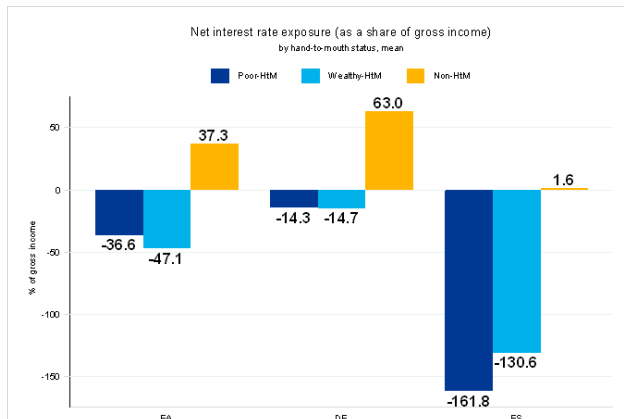
Nonstandard vs Standard MP

- Targeting the same peak GDP response, VAR gives:
  30 bp change in term spread $\approx$ 100 bp change in policy rate
- BUT also qualitative differences (ZLB, differential effects on prices of specific assets, . . .)