Household Balance Sheet Channels of Monetary Policy: A Back of the Envelope Calculation for the Euro Area

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Heterogeneous Agents or Heterogeneous Information

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HA + NK

- Aiyagari-Krusell-Smith meets Gali-Gertler-Woodford
- What is attractive about this approach?

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- What is attractive about this approach?
  - Conceptually, unified framework to study:
    - Short-run fluctuations and long-run dynamics of distribution
    - High MPC + precautionary saving $\Rightarrow$ AD channel salient
    - Stabilization, social insurance and redistributive policies
  - Empirically, unified approach to micro and macro data
  - Technically, now easier and faster to solve these models

Transmission mechanism of monetary policy

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- RA+NK: intertemporal substitution dominates transmission

Transmission mechanism of monetary policy

- RA+NK: intertemporal substitution dominates transmission
- HA+NK: no longer true
  - it mainly works through indirect GE effects on prices
  - impact differs across the income/wealth distribution
  - fiscal accommodation matters (Ricardian neutrality fails)
  - transmission mechanism is more complex

Transmission mechanism of monetary policy in HA+NK

- How can we quantify all these channels at work?
- Two methodologies in the literature:
  1. Rich DSGE models: e.g., *KMV, Bayer et al., Hagedorn et al.*
     - Pros: quantitatively plausible + policy counterfactuals
     - Cons: computational complexity + 'black box'
  2. Sufficient statistic approach: *Werning, Auclert, Bilbiie, Patterson*
- This paper applies this second approach to Euro Area

FRAMEWORK

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- One-time transitory unexpected shock to policy rate $r \rightarrow C$

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- Household problem w/o uncertainty:
  - CES utility (IES $= 1/\gamma$)
  - Inelastic labor supply / demand-determined hours
  - FOCs + budget constraints + differentiation
  - Closed form expression for each transmission channel

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- Separate analysis for non-, poor- and wealthy-hand to mouth hh
  - Different portfolios, MPC, exposure to aggregate fluctuations

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- Separate analysis for non-, poor- and wealthy-hand to mouth hh
  - Different portfolios, MPC, exposure to aggregate fluctuations
- Cross-sectional data + VAR to measure key objects

Direct effects of a change in r

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Intertemporal substitution (IES)

Net interest rate exposure (NIE)

$$dc^{DIR} = dc^{IES} + dc^{NIE}$$

$$\begin{aligned} dc^{IES} &= -\frac{1}{\gamma}(1-\mu)c\, dr \\ dc^{NIE} &= \mu\,(y - c + b)\, dr \end{aligned}$$

- y: earnings, c: consumption, b: liquid assets minus liabilities,
- μ: marginal propensity to consume out of transitory income

Indirect effects through inflation

- Fisher effect (NOM)

$$dc^{NOM} = -\mu\, m\, \frac{dp}{p}$$

- m: nominal net worth (e.g., cash + bank deposits - debt)
- dp/p: inflation induced by the monetary policy shock

Indirect effects through labor income y

- Aggregate Demand effects (INC)

$$\begin{aligned} dc^{INC} &= \mu\, dy \\ &= \mu\, \varepsilon_{y,Y} \left(\frac{y}{Y}\right) dY \end{aligned}$$

- dY: change in aggregate labor income induced by dr
- $\varepsilon_{y,Y}$: elasticity of individual income y to aggregate labor income Y
- Heterogeneous sensitivity to cycle (age, industry, occupation, etc)
- Large if sensitivity is positively correlated with MPC and y share

Indirect effects through capital gains on illiquid assets

- Capital gains (CAP) on real assets (e.g. housing, stocks)
- k: units of the asset, q: its price
- Linear transaction τ cost to deposit/withdraw (assume action)

$$dc^{CAP} = \mu(1-\tau)k\ dq.$$

- Let α be the fraction adjusting
- $\mu(1-\tau)\alpha < \mu$: effective MPC out of the illiquid capital gain

Summary of transmission to 'unconstrained' households

$$dc_n^{TOT} = dc_n^{IES} + dc_n^{NIE} + dc_n^{NOM} + dc_n^{INC} + dc_n^{CAP}$$

Poor hand-to-mouth households

- Small holdings of liquid assets (if positive) or close to the credit limit (if negative) and no holdings of illiquid assets
- Consumption is dictated by their budget constraint with unsecured debt limit $b = -\underline{b}$ binding

$$c = -r\underline{b} + y$$

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- Total effect of monetary policy shock for poor HtM:

$$dc_p^{TOT} = dc_p^{NIE} + dc_p^{NOM} + dc_p^{INC}$$

with $\mu = 1$

Wealthy hand-to-mouth households

- Small holdings of liquid assets (if positive) or close to the credit limit (if negative), but positive holdings of illiquid assets

- On their collateral constraint: $\Delta = \theta q k$

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- Small holdings of liquid assets (if positive) or close to the credit limit (if negative), but positive holdings of illiquid assets
- On their collateral constraint: $\Delta = \theta q k$
- Total effect of monetary policy shock at impact:

$$dc_w^{TOT} = dc_w^{NIE} + dc_w^{INC} + dc_w^{NOM} + dc_w^{CAP}$$

with:

$$dc_w^{CAP} = \theta\,(1-\tau) k\; dq$$

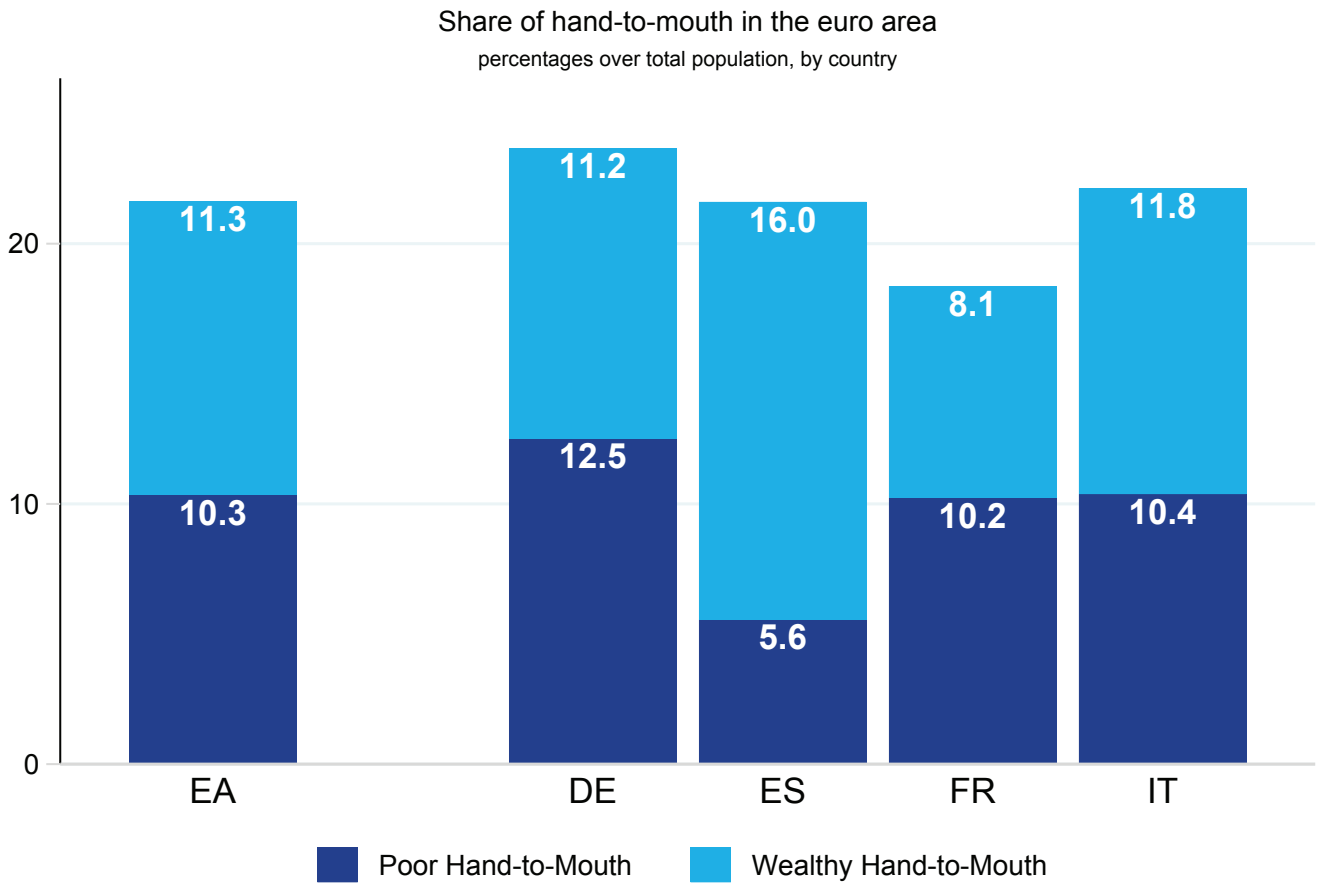
  - $1 \cdot \theta\,(1-\tau)$: effective MPC out of a capital gain

EMPIRICAL IMPLEMENTATION

Ingredients of the decomposition

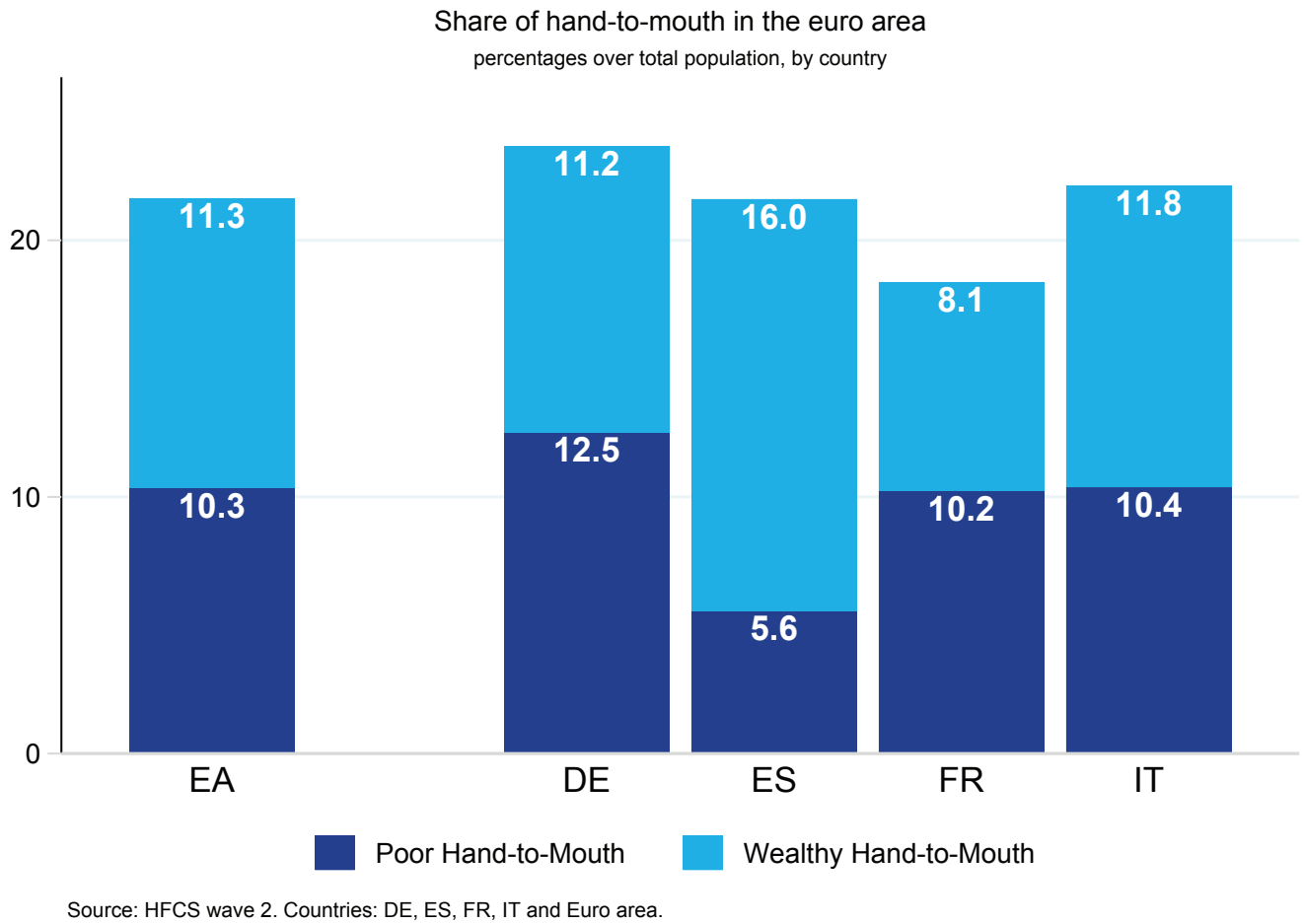
1. Shares of three types of households
2. Their balance sheet composition $(b, m, k, ...)$
3. Their MPCs (μ)
4. Their earnings' exposure to the cycle $(\varepsilon_{y,Y})$
5. The aggregate response of prices to the monetary shock

Shares of hand-to-mouth households



Source: HFCS wave 2. Countries: DE, ES, FR, IT and Euro area.

Shares of hand-to-mouth households



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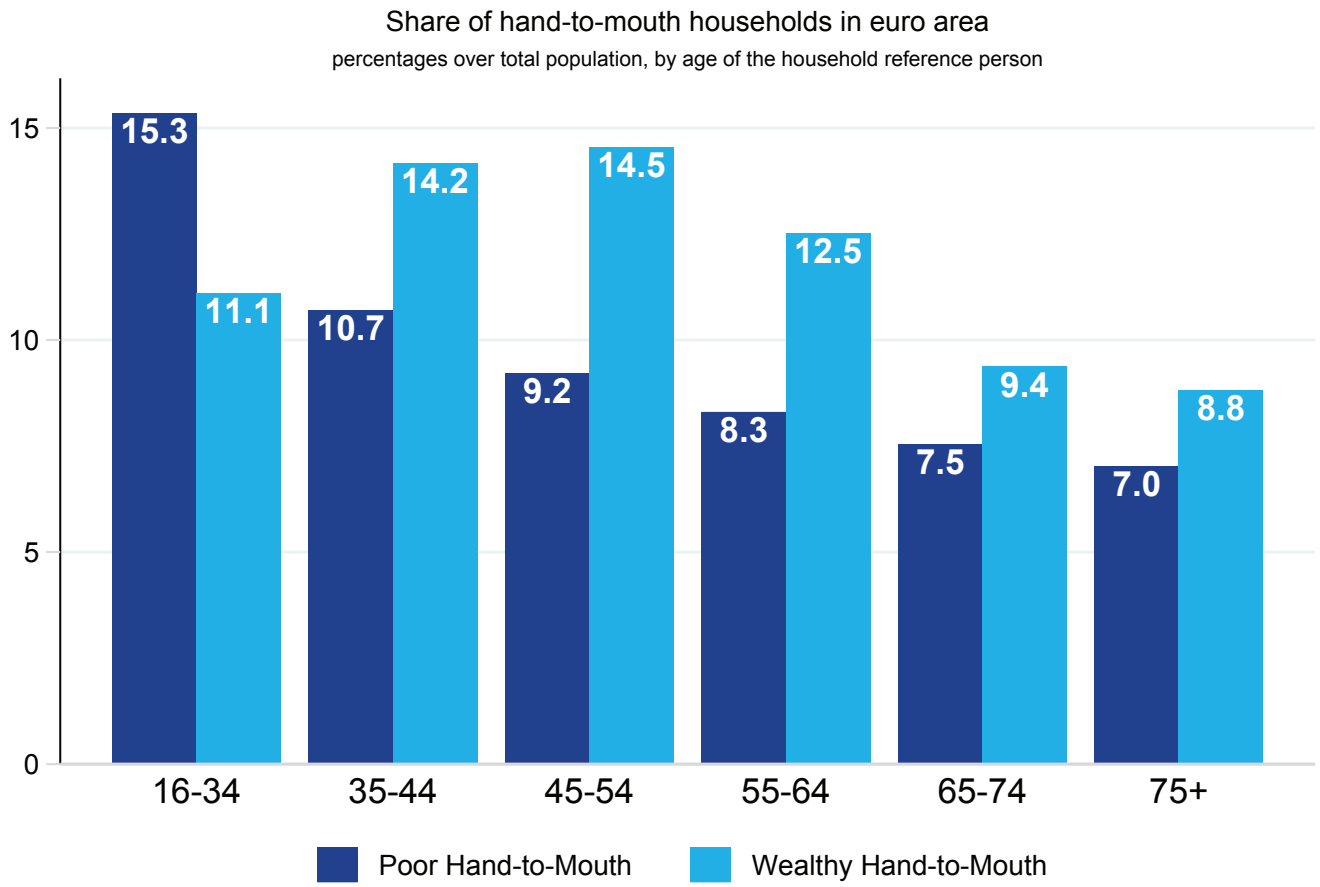
- US: Poor HtM: 10% and Wealthy HtM: 20%

Shares of hand-to-mouth households by age



Source: HFCS wave 2. Countries: Euro Area countries.

Poor HtM: young

Wealthy HtM: middle age

MPCs out of income and wealth

- Calibrated from existing literature

	Marginal Propensity to Consume (annual)		
Household Type	Income	Housing	Stocks
Poor HtM	0.50	$--$	$--$
Wealthy HtM	0.50	0.07	0.07
Non HtM	0.05	0.01	0.01

- Aggregate MPC out of transitory income $\simeq$ 0.20 (low end)
- Aggregate MPC out of housing/stocks $\simeq$ 0.025

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- Aggregate MPC out of transitory income $\simeq$ 0.20 (low end)
- Aggregate MPC out of housing/stocks $\simeq$ 0.025
- IES = 0.5

Systematic exposure to aggregate fluctuations

- From HFCS, estimate $Prob(HtM\ type)$ as function of observables
- Impute $Prob$ to each individual in monthly EU Labor Force Survey
- Estimate, for each group g:

$$e_t(g) = \alpha(g) + \beta(g) \cdot t + \varepsilon(g) \cdot E_t + \nu_t(g)$$

	Germany	Spain	France	Italy
Poor HtM	1.7	2.9	1.3	2.1
Wealthy HtM	0.3	1.6	1.6	1.7
Non HtM	1.0	0.7	0.8	0.8

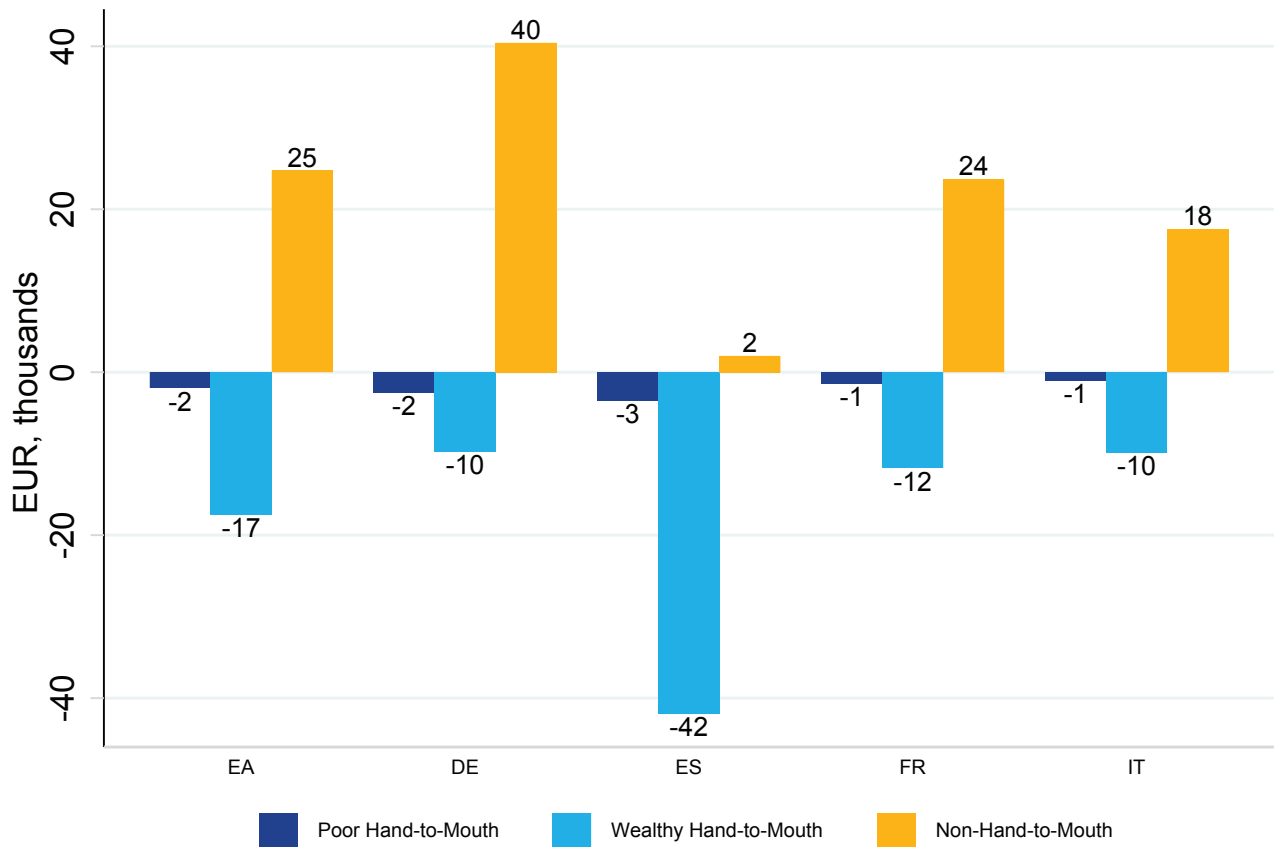
VAR responses of aggregates to monetary shock

- High-frequency identification *(Gertler-Karadi, Altavilla et al.)*
- Responses to 100BP (60BP averaged over first year)

	Germany	Spain	France	Italy
Earnings (%)	0.5	1.6	0.7	1.8
Inflation Rate (p.p.)	0.1	0.6	0.3	0.1
House Prices (%)	0.0	5.0	0.3	1.4
Stock Prices (%)	27	21	24	26

- Spanish macroeconomy much more 'sensitive' than German one
- Huge response of stock prices (common)

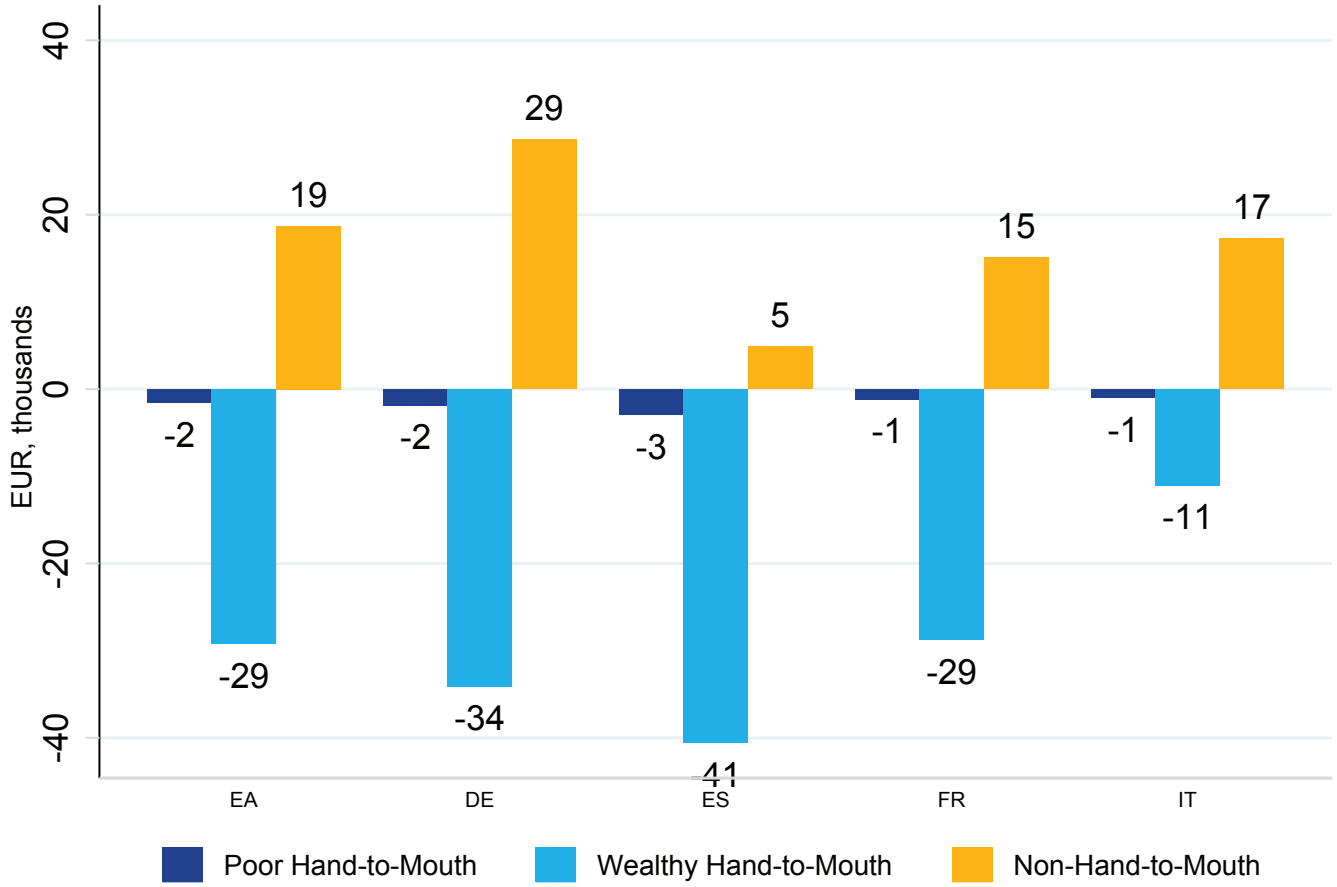
Net interest rate exposure



Source: HFCS 2nd wave. Countries: Euro Area countries.

- Germany (DE): large liquid savings + FRMs
- Spain (ES): many homeowners + large ARMs

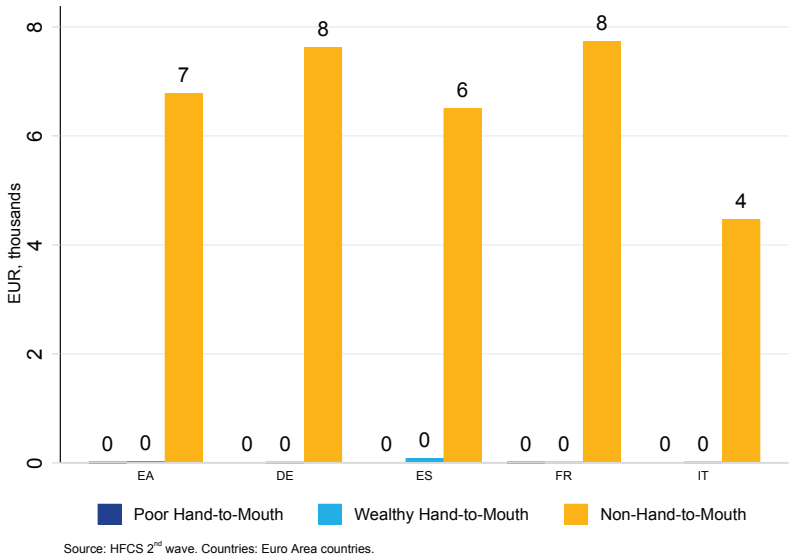
Net nominal positions



Source: HFCS 2nd wave. Countries: Euro Area countries.

- In Italy, most households are outright homeowners

Stockmarket and housing wealth



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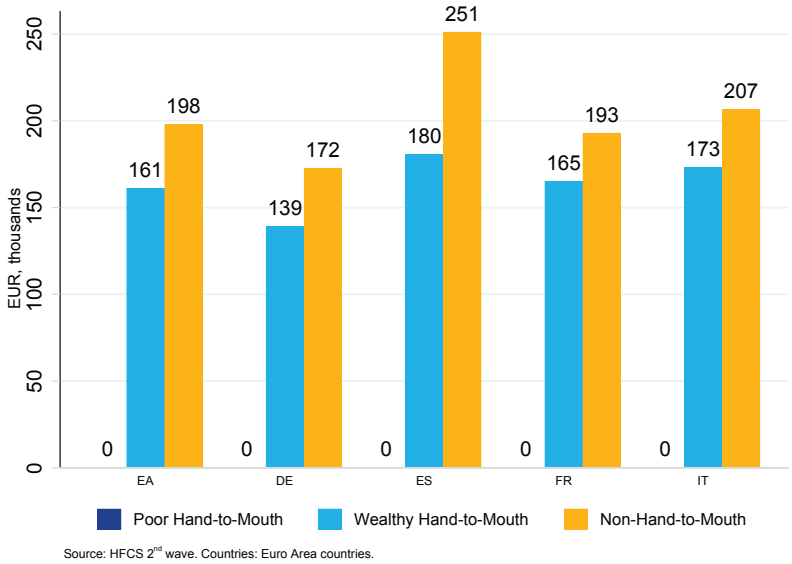
STOCKS



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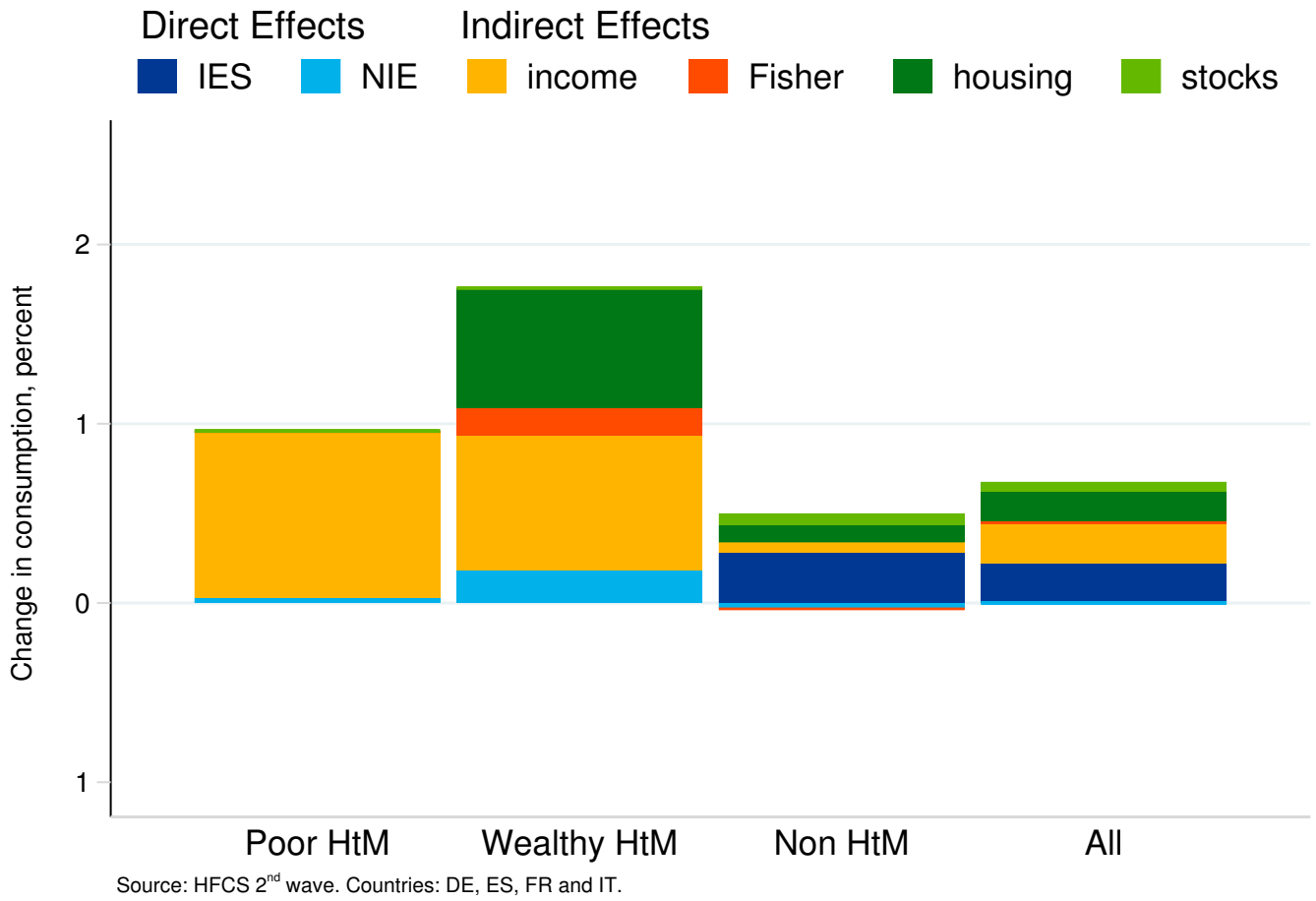
HOUSING

- Imputation of missing stock-market wealth
- Stocks are a smaller share of net worth in EA compared to US
- All illiquid household wealth in EA is in housing

DECOMPOSITION RESULTS

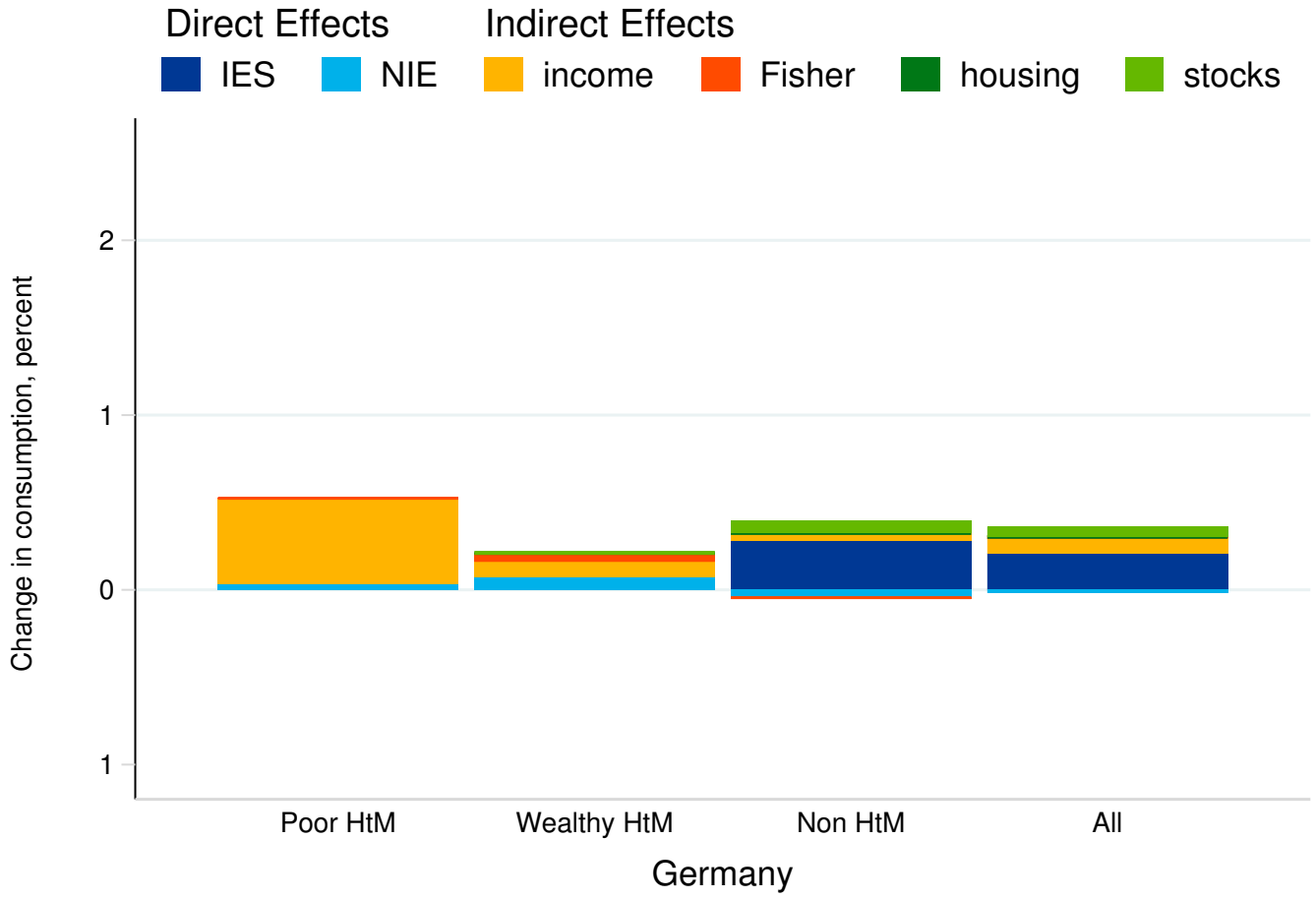
Decomposition for the Euro Area



Source: HFCS 2nd wave. Countries: DE, ES, FR and IT.

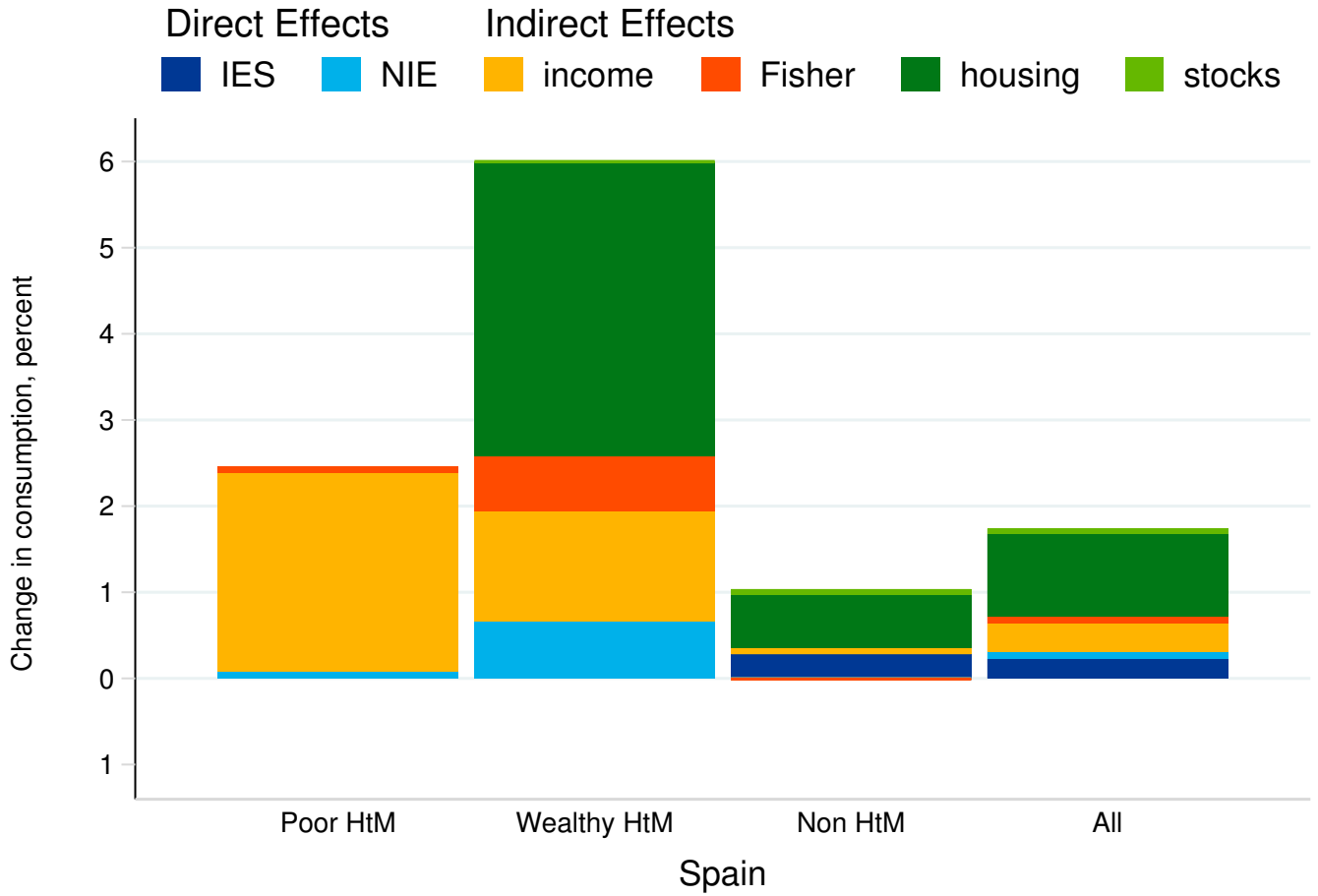
- Indirect GE channels account for 2/3 of the total
- Wealthy HtM benefit the most from easing via indirect channels

Decomposition: Germany



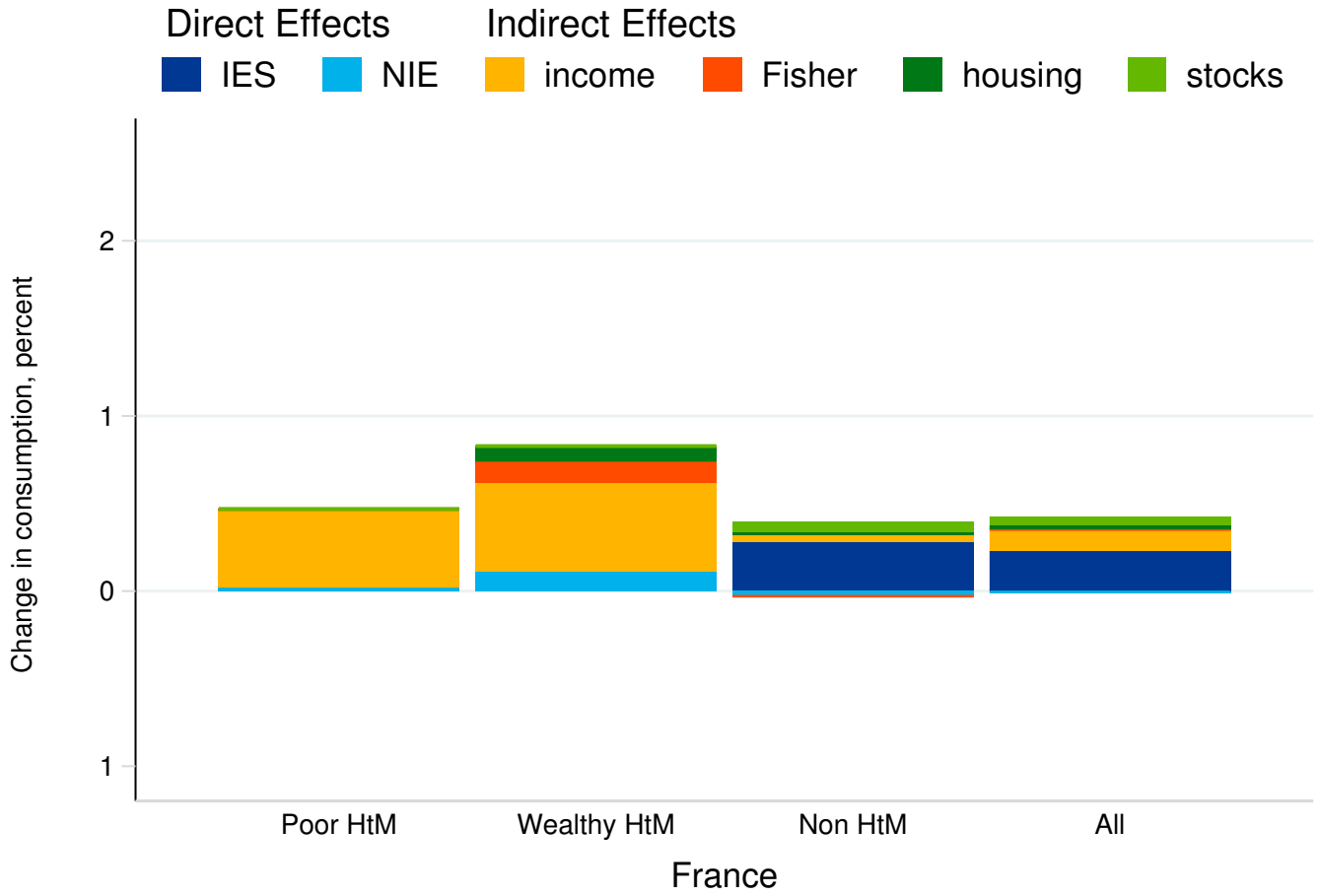
- Traditional transmission mechanism dominated by IES
- Roughly equal impact across all groups

Decomposition: Spain



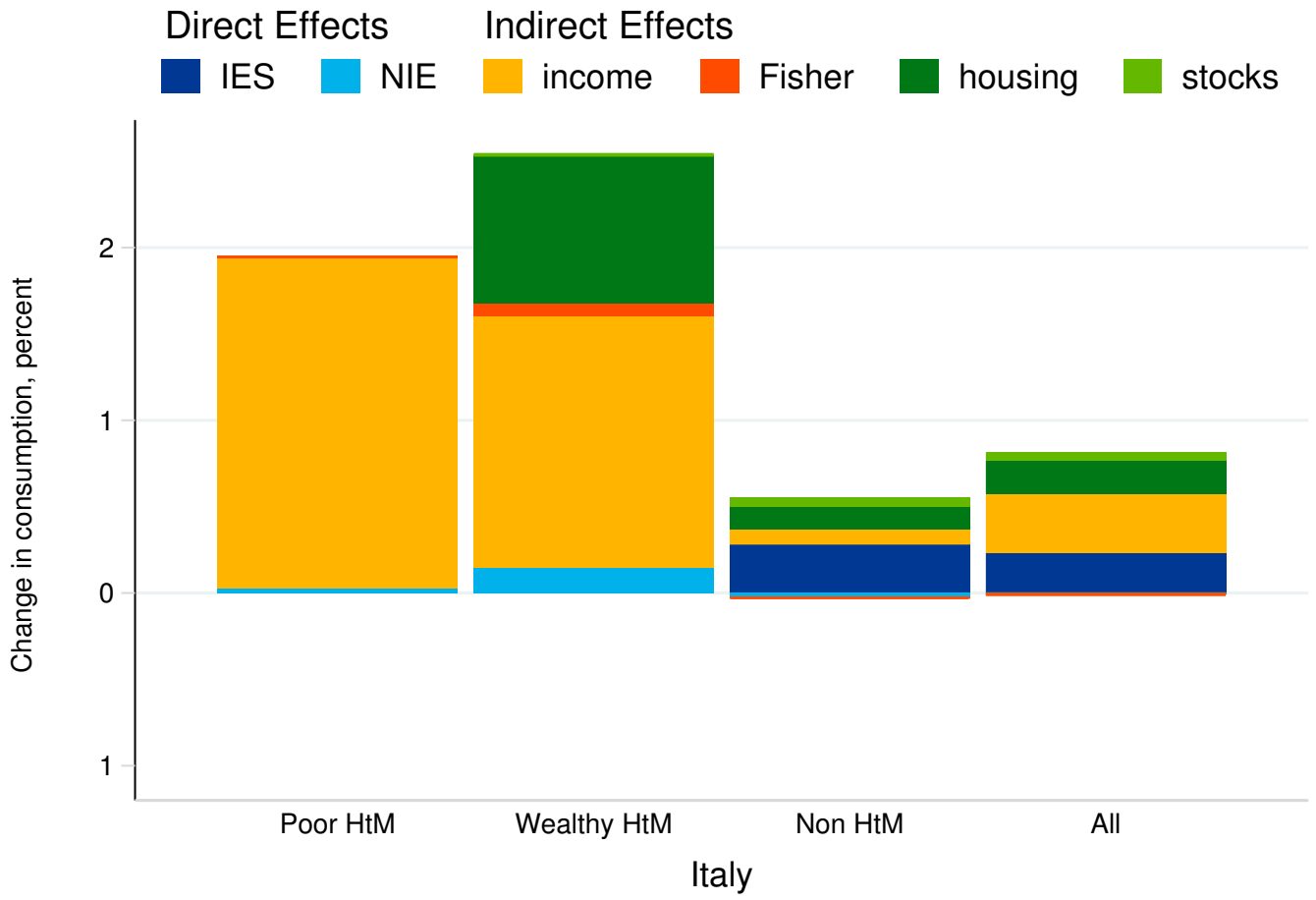
- Housing wealth and AD effects are dominant
- Very unequal impact across groups

Decomposition: France



- Similar to Germany

Decomposition: Italy



- Similar to Spain

VAR responses vs Model decomposition

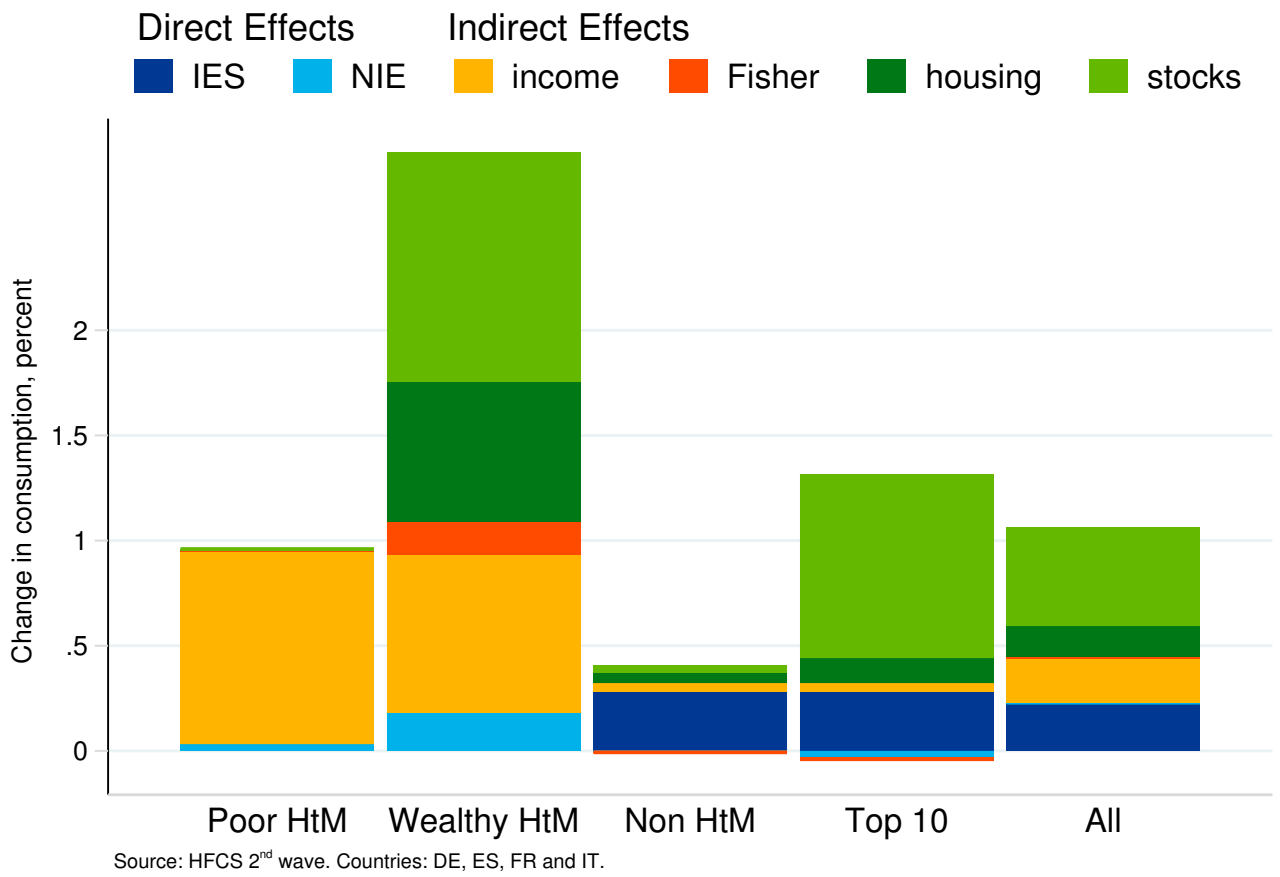
- Two 'independent' estimates of the impact on aggregate C
- Obtained with different methodologies

	Germany	Spain	France	Italy
VAR estimate (%)	0.24	1.8	0.03	1.5
HA Decomposition (%)	0.3	1.8	0.4	0.8
Repr. Agent - IES (%)	0.2	0.2	0.2	0.2

- VAR and HA line up, which offers some credibility to the exercise
- The HANK block amplifies the shock compared to the RA

TREATMENT OF BUSINESS WEALTH

Business wealth treated as stocks: EA decomposition



Source: HFCS 2nd wave. Countries: DE, ES, FR and IT.

- Clearly an upper bound
- It doubles overall effects of the monetary shock

ZOOMING IN ON THE TOP 10%

Isolating the rich from the rest

- Separate the top 10% in net worth from the rest of the non HtM
- Same MPC as Non-HtM
- Impute to them the missing stock market wealth
- Recompute their earnings exposure to aggregate cycle

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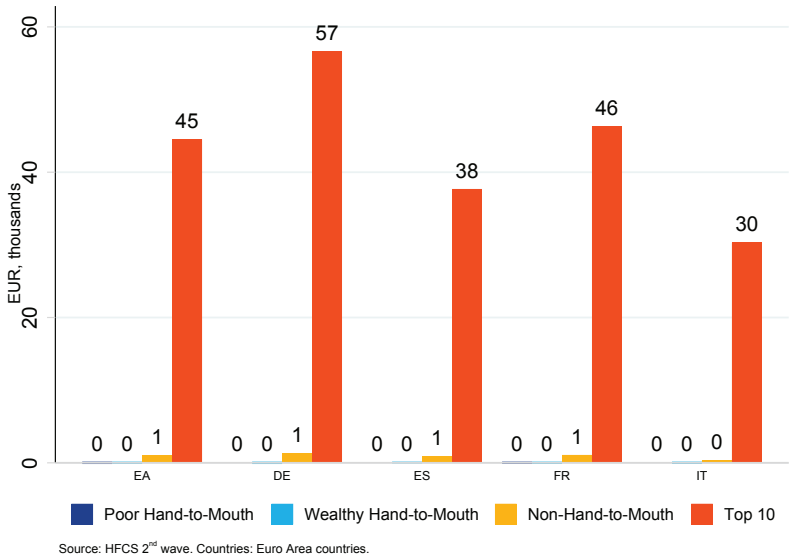
Wealthy HtM	0.3	1.6	1.6	1.7
Non HtM	0.9	1.0	0.7	0.7
Top 10%	1.4	0.4	1.5	1.2

Stockmarket and housing wealth



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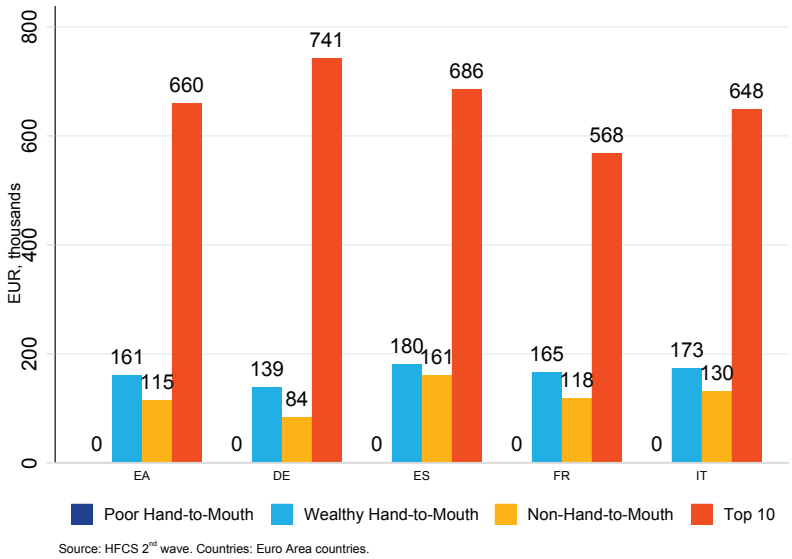
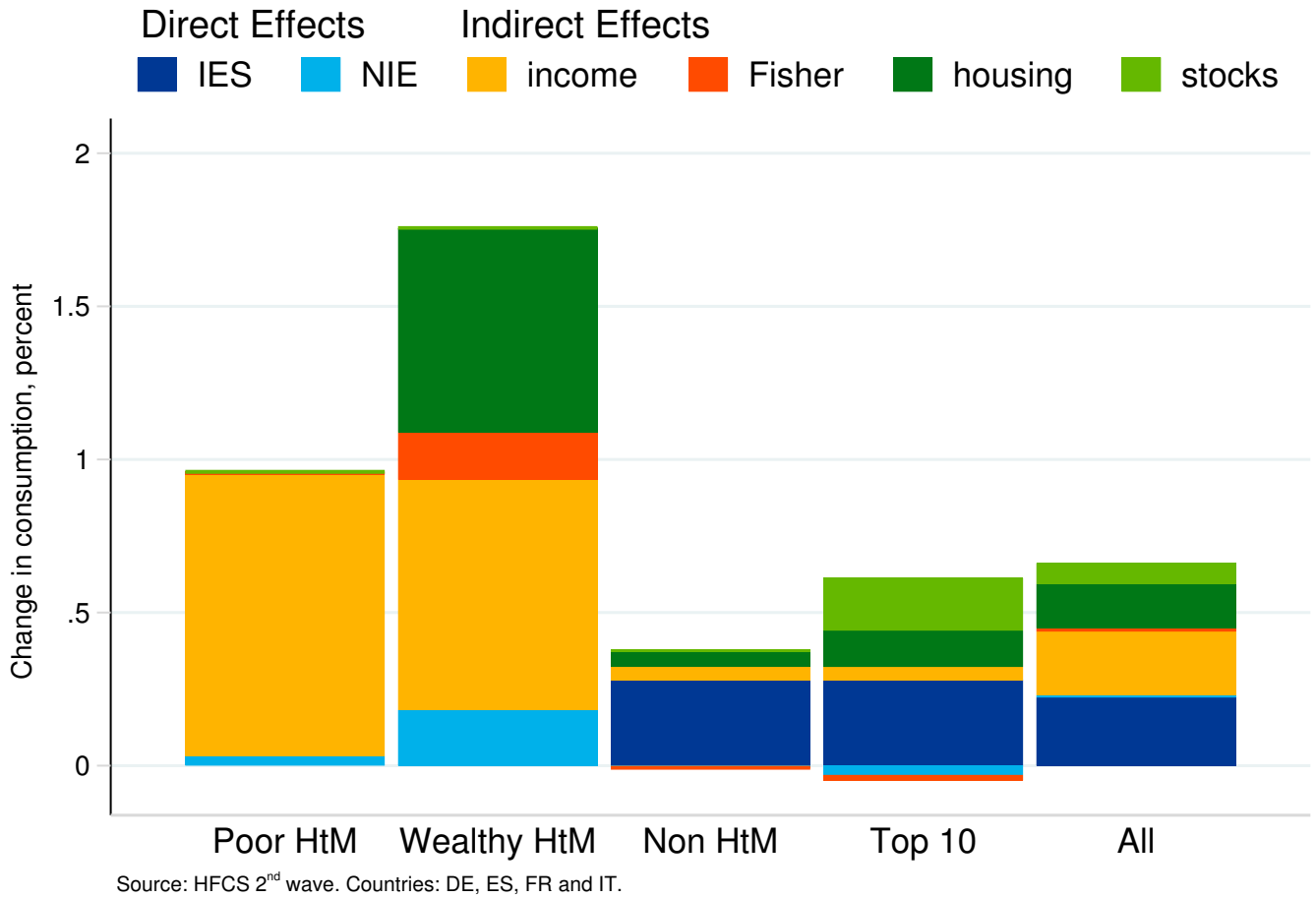


Source: HFCS 2nd wave. Countries: Euro Area countries.

HOUSING

- Stock-market wealth is small even for the richest in the EA
- The wealth of the richest in the EA is all in housing

Decomposition for the Euro Area



Source: HFCS 2nd wave. Countries: DE, ES, FR and IT.

- Richest lose somewhat from NIE + NOM
- They gain a lot through asset prices (but small MPC)

Conclusions

- Household balance sheet channels of monetary policy
- Simple back of the envelope calculation that offers guidance on:
  - relative size of various transmission mechanisms
  - heterogeneous impact across types of households
  - heterogeneous impact across countries hit by same shock
  - how total effect changes over time

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- Simple back of the envelope calculation that offers guidance on:
  - relative size of various transmission mechanisms
  - heterogeneous impact across types of households
  - heterogeneous impact across countries hit by same shock
  - how total effect changes over time
- Lesson for medium-scale DSGE models
  - Model both the top and bottom of distribution accurately
  - Enrich HANK with credible asset price dynamics

Thanks!