

# Cross-Country Differences in Household Financial Decisions: A Structural Approach with Survey-Based Expectations

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# Motivation

- ▶ Role of expectations about future macro vars for HHs decisions
- ▶ Policy effectiveness depends on the link between expectations and HHs decisions
  - Forward guidance
  - Monetary policy  
Roth, Wiederholt and Wohlfart 2023
  - Unconventional fiscal policy  
Bachmann, Born, Goldfayn-Frank, Kocharkov, Luetticke and Weber 2024
- Important in times of high inflation  
Weber et al. 2024

# Stock of Previous Work

## Theory

- ▶ Financial decisions today depend on HHs expectations about
  - future income:  $Ey \uparrow \Rightarrow s \downarrow$  (income effect)
  - future prices:  $Er \downarrow \Rightarrow s \downarrow$  (substitution effect)
  - other future institutional arrangements

## Empirical Findings

- ▶ Heterogeneous expectations  
Weber, D'Acunto, Gorodnichenko and Coibion 2022
- ▶ Mixed evidence on the effect of expectations on HHs decisions  
Bachmann et al. 2015, D'Acunto et al. 2021, Coibion et al. 2022
- ▶ Difficult to isolate the role of
  - Liquidity constraints
  - Household income risk
  - Preferences

## What We Do

- ▶ Use a structural model of saving and consumption under subjective expectations
- ▶ Build empirical survey-based expectations as an input to the model
  - Use novel dataset with monthly measurement of expectations and decisions for households across Europe
  - Document empirical patterns for expectations and saving rates over time and along the income distribution in different European countries
- ▶ Calibrate preference and income parameters to match empirical patterns
- ▶ Study the role of expectations for saving decisions across income groups and countries

# Data I

## **ECB Consumer Expectation Survey (CES)**

- ▶ Launched in January 2020
- ▶ Initially covers six largest countries in the euro area: Belgium, Germany, Spain, France, Italy and the Netherlands (10,000 individuals in total)
- ▶ Data on household expectations, consumption, income, housing and other investment, borrowing choices and labor market conditions
- ▶ Panel data, expectations and consumption collected monthly, income quarterly

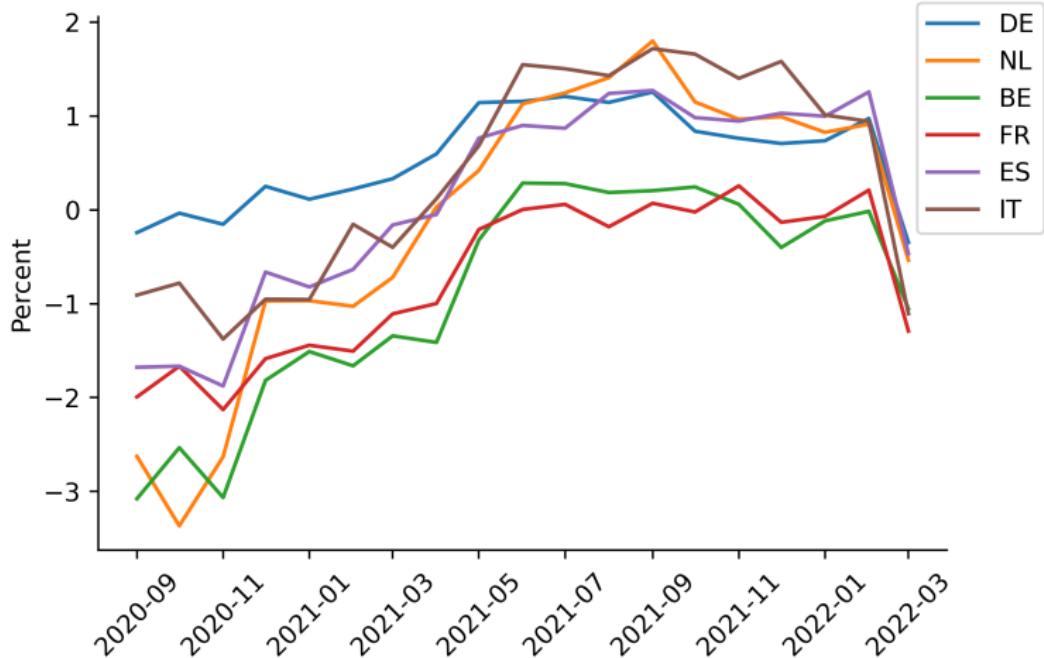
## Data II

### **ECB Household Finance and Consumption Survey (HFCS)**

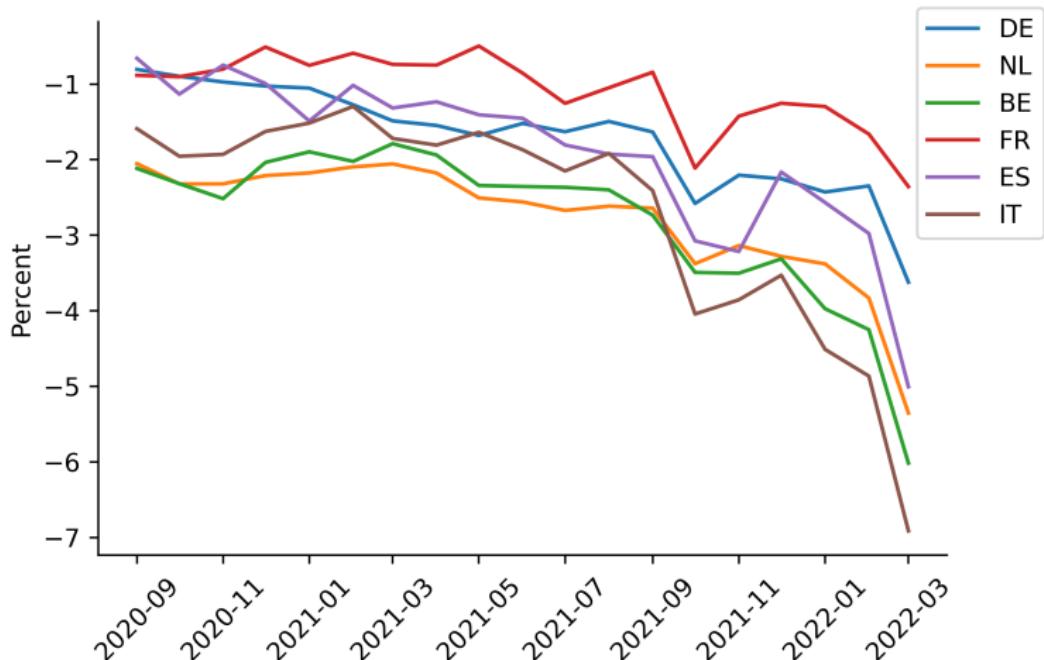
- ▶ Survey covering the demographics, wealth, income and consumption of European households
- ▶ Complement the CES data with the HFCS: use synthetic matching to estimate the wealth of households in the CES
- ▶ Households are synthetically matched on:
  - Age, gender, education level of the head of the household
  - Household size
  - Whether household owns or rents their residence
  - Whether household has a mortgage
  - Annual net household income

# Facts

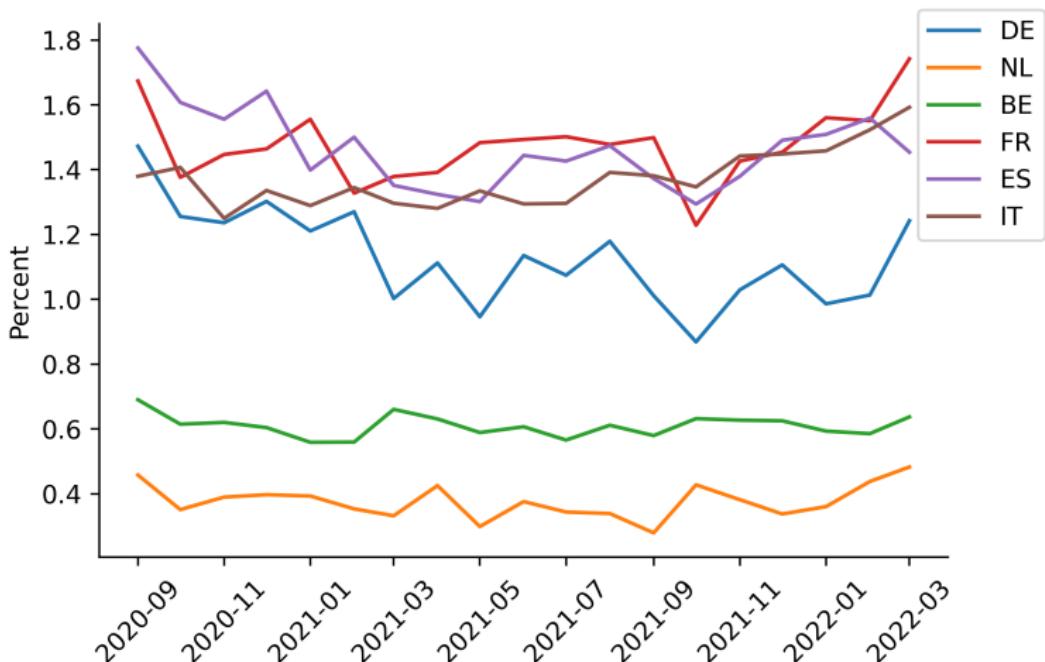
# Expectations about Economic Growth Over Time



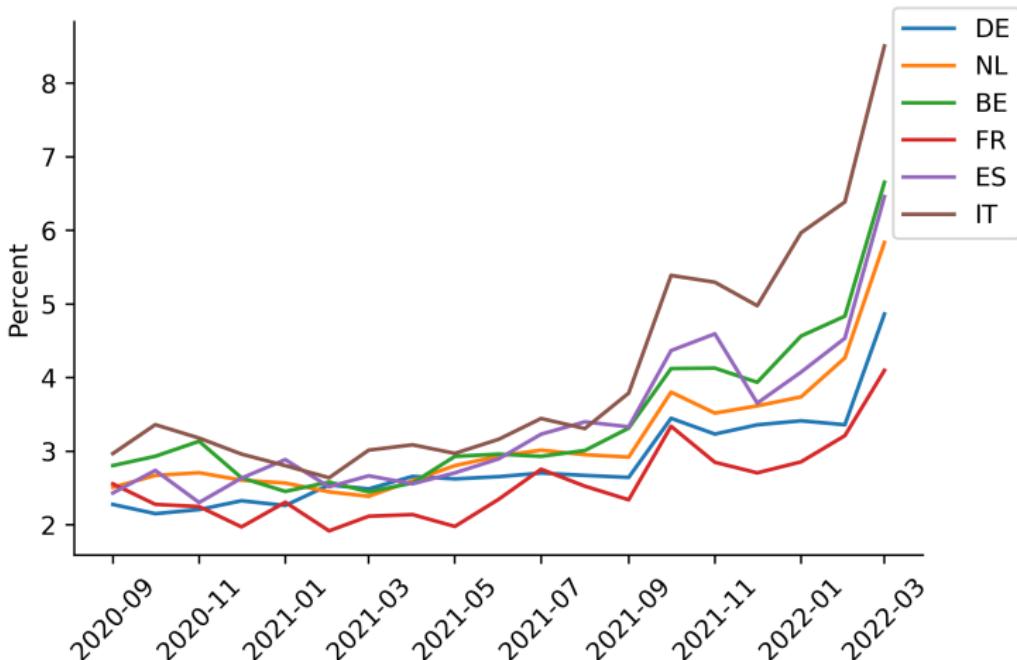
# Expectations about Real Rates on Savings Over Time



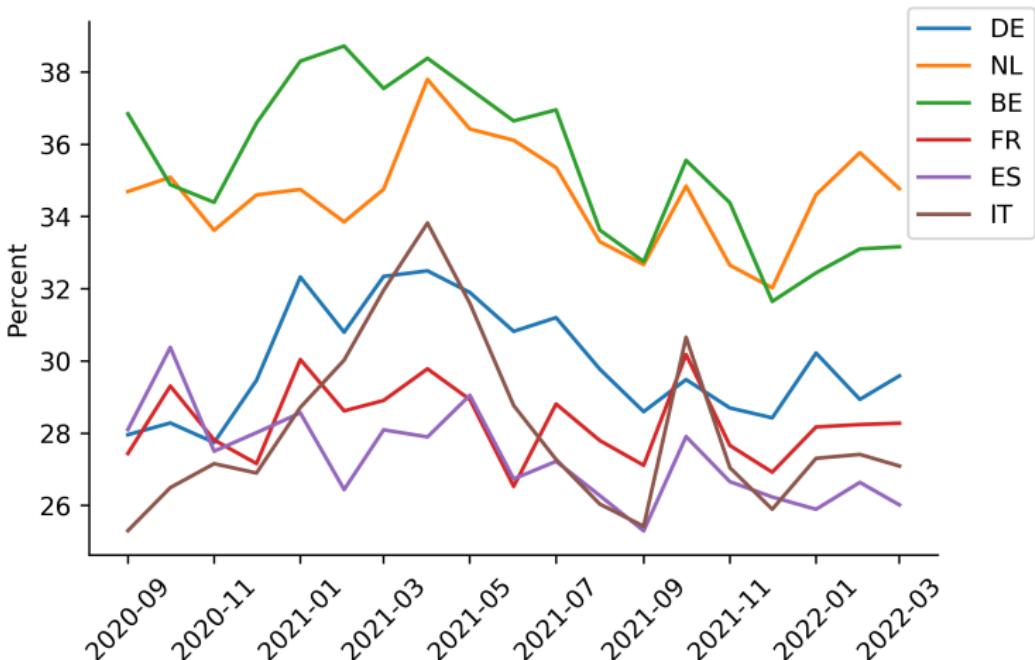
# Expectations about Nom Rates on Savings Over Time



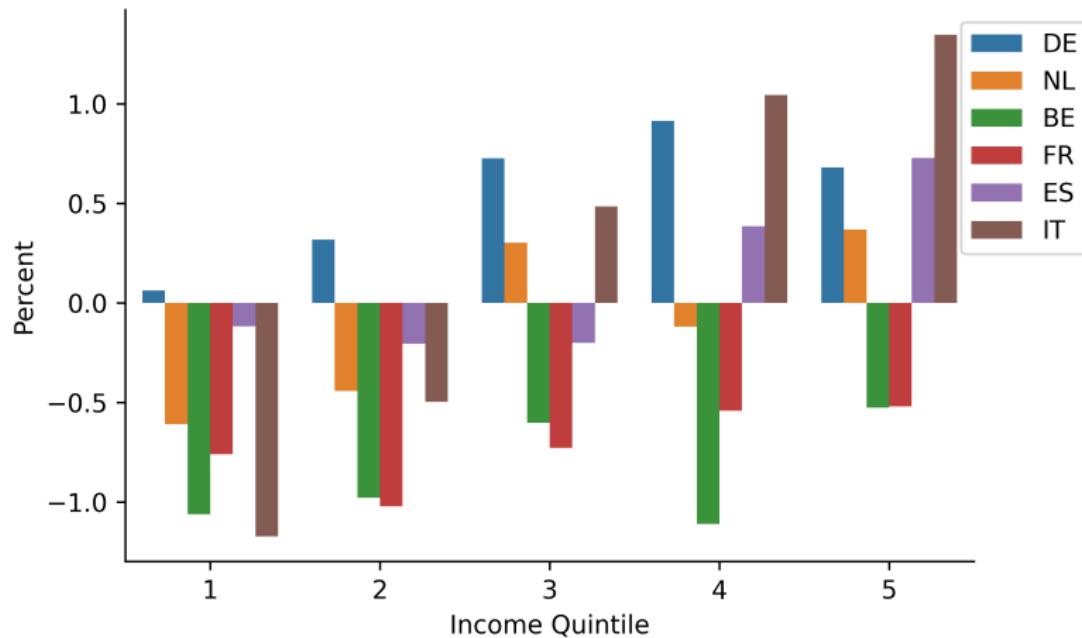
# Expectations about Inflation Over Time



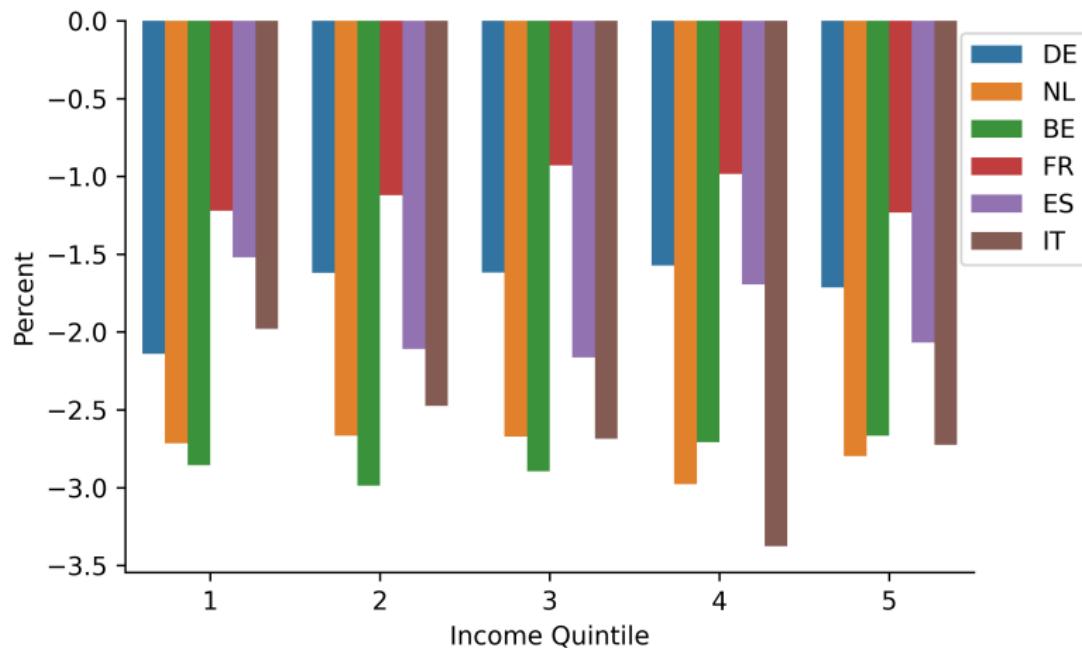
# Savings/Income Over Time



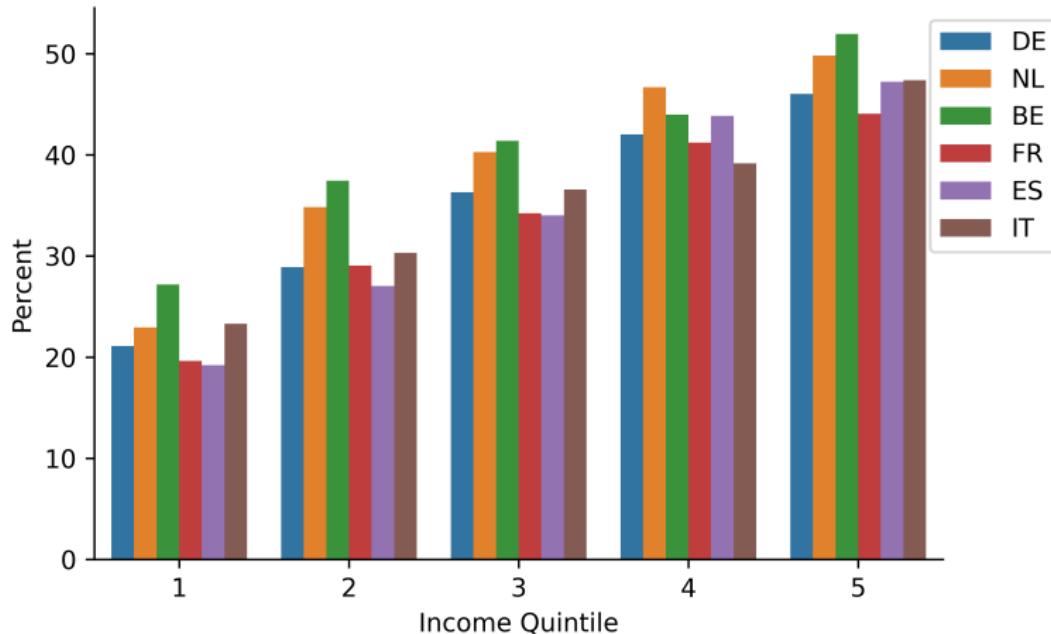
# Expectations about Economic Growth by Income



# Expectations about Real Rates on Savings by Income



# Savings/Income by Income



Model

# Model Overview I

## HHs

- ▶ Infinitely lived
- ▶ CRRA preferences over consumption,  $u(c) = \frac{c^{1-\rho}}{1-\rho}$
- ▶ Decisions on consumption and savings in each period  $t$
- ▶ Income subject to idiosyncratic and aggregate permanent and transitory productivity shocks (Carroll et al. 2020)

## Incomplete markets

- ▶ Household can save using of a non-contingent bond

## Partial equilibrium

- ▶ Exogenously determined bond price (interest rate) and wage rate

# Model Overview II

## Expectations

- ▶ Expectations about macro vars matter for consumption-savings choice
- ▶ Do not impose structure on belief formation about macro vars
- ▶ HHs hold survey-based expectations about macro vars
  - Real Rates on Savings = Nominal Rates on Savings - Inflation
  - Economic Growth
- ▶ HHs hold rational expectations over other shocks to their income

# Survey-based Expectations I

- ▶ HH  $i$  in period  $t$  has subjective distribution of expectations for  $t + 1$
- ▶ Relevant survey questions
  - Quantitative expectations on Nominal Rate on Savings
  - Probabilistic expectations on Inflation
  - Quantitative expectations on Economic Growth
- ▶ **Mean:** household-time specific
- ▶ **Standard deviation:** household type specific (see next slide)
- ▶ **Grids and distributions:** Assume normality and use Tauchen-like procedure for discrete distribution for each type and each country with 10 grid points

## Survey-based Expectations II

### Types based on

- ▶ Whether standard deviation of inflation expectations for  $[i, t]$  is above the median in a quarter
- ▶ Whether economic growth expectations for  $[i, t]$  is multiple of 5 (Binder 2017) + inflation expectations are above median in a quarter
- ▶ **Uncertain households**
- ▶ **Certain households**

# Income Process

- ▶ Household's labor income

$$\begin{aligned}y_{i,t} &= w l_{i,t} \\l_{i,t} &= \theta_{i,t} p_{i,t} \Theta_t P_t\end{aligned}\tag{1}$$

$l_{i,t}$ : household effective labor

$w$ : constant wage rate

$\theta_{i,t}, \Theta_t$ : idiosyncratic and aggregate transitory unity-mean log-normal shocks

- ▶ Idiosyncratic and aggregate productivity levels  $p_{i,t}, P_t$  evolve according to

$$p_{i,t+1} = p_{i,t} \psi_{i,t+1}\tag{2}$$

$$P_{t+1} = \Phi_{t+1} P_t \Psi_{t+1}\tag{3}$$

$\Phi_{t+1}$ : aggregate productivity growth

$\psi_{i,t}, \Psi_t$ : idiosyncratic and aggregate permanent unity-mean log-normal shocks

## Household Problem

The recursive formulation of the HH problem is

$$v(m_{i,t}, p_{i,t}, P_t) = \max_{c_{i,t}} \{ u(c_{i,t})$$

$$+ \beta \mathbb{E}_t \left[ \mathbb{E}_{i|t}^S [v(m_{i,t+1}, p_{i,t+1}, P_{i,t+1} | \Phi_{i,t+1}^S, R_{i,t+1}^S)] | \psi_{i,t+1}, \Psi_{t+1}, \theta_{i,t+1}, \Theta_{t+1} \right] \}$$

subject to (1)-(3) and

$$a_{i,t} = m_{i,t} - c_{i,t}, \quad a_{i,t} \geq \lambda m_{i,t}$$

$$m_{i,t+1} = w l_{i,t+1} + R_{t+1} a_{i,t}$$

$$R_{t+1} = \begin{cases} R_{t+1}^{bopo} & \text{if } a_{i,t} < 0 \\ R_{t+1}^{save} & \text{if } a_{i,t} \geq 0 \end{cases}$$

Survey-based expectations about macro vars:

- ▶  $\Phi_{i,t+1}^S$ : Survey-based expectation distribution of  $[i, t]$  for  $\Phi_{t+1}$
- ▶  $R_{i,t+1}^S$ : Survey-based expectation distribution of  $[i, t]$  for  $R_{t+1}$

## Calibration and Model Fit

# Calibration I

## Expectations parameters

- ▶ By country, for  $h$  (high uncertainty) and  $l$  (low uncertainty) HHs

Household Type	BE		FR		DE		IT		ES		NL	
	$h$	$l$										
Inflation SD	0.71	0.16	0.64	0.13	0.69	0.13	0.82	0.15	0.81	0.15	0.65	0.17
Econ. Gr. SD	2.25	1.07	2.50	0.91	2.36	1.00	3.02	1.19	2.83	1.24	2.33	1.01

## Income parameters

- ▶ **Idiosyncratic Income:** Country-specific, calibrated using survey income data (Li et al. 2016)
- ▶ **Aggregate Income:** Country-specific, calibrated using aggregate income data (Carroll et al. 2014)

**Borrowing limit:**  $\lambda = -0.5$

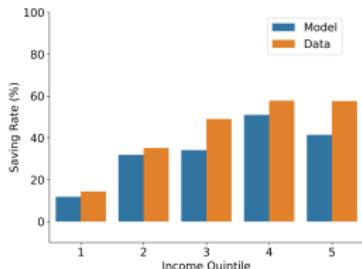
## Calibration II

**Preference parameters:** Country-specific, calibrated by matching mean saving rates by income level

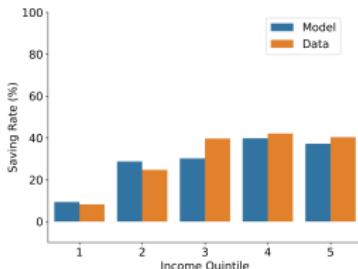
- ▶ Use the balanced panel of households between 2nd quarter 2020 to 1st quarter 2022
- ▶ Simulated households take their initial wealth and income from the data, and decide their consumption using their survey-based expectations

Preference Parameters	BE	FR	DE	IT	ES	NL
$\beta$	0.980	0.979	0.985	0.977	0.976	0.980
$\rho$	6.7	6.5	7.0	5.6	6.3	13.8

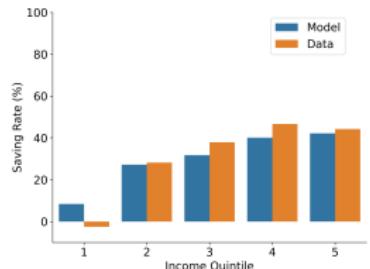
# Model Fit - Means



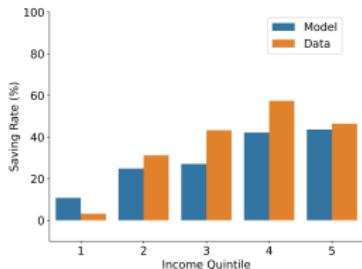
Belgium



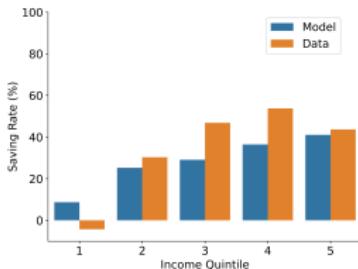
France



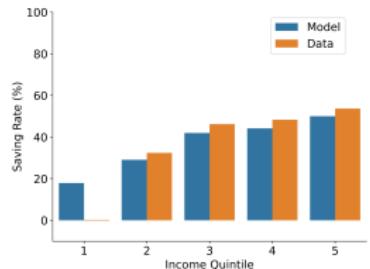
Germany



Italy

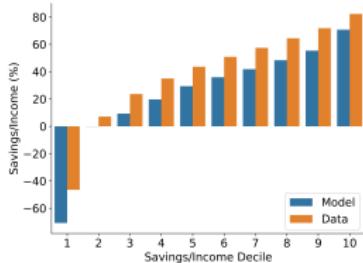


Spain

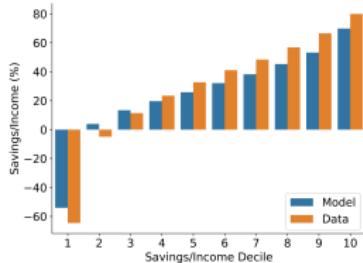


Netherlands

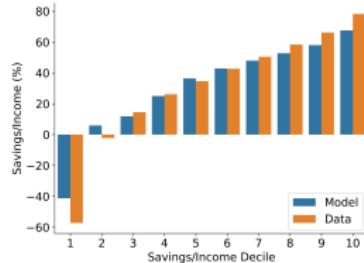
# Model Fit - Medians



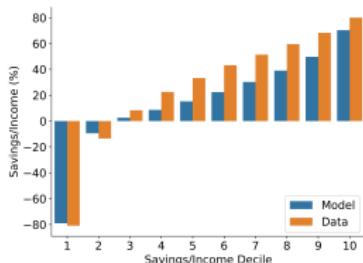
Belgium



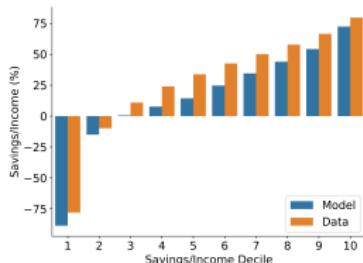
France



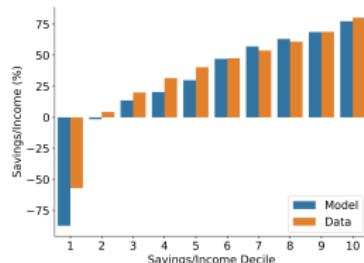
Germany



Italy



Spain



Netherlands

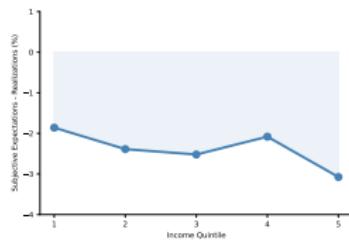
# Results

# The Effect of Subjective Expectations

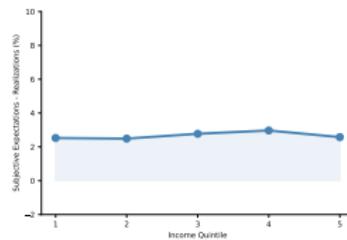
- ▶ How saving decisions would change if HHs held more accurate expectations about the macro vars?
- ▶ Keep all model parameters at baseline values but alter expectations
- ▶ **Perfect foresight (Pf):** simulate saving decisions using as mean of the expectations the actual macro realizations for next period
- ▶ Outline the effect of **Pf** on saving decisions relative to the **baseline** case
- ▶ Today we discuss France and Germany

# Perfect Foresight in France

## Forecast error

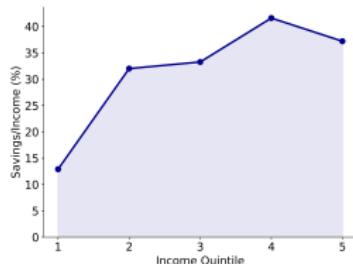


Economic growth

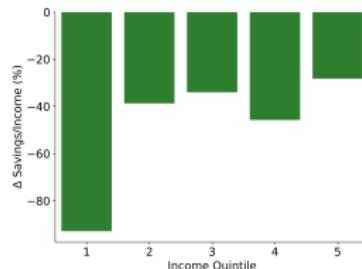


Real interest rate

## Results



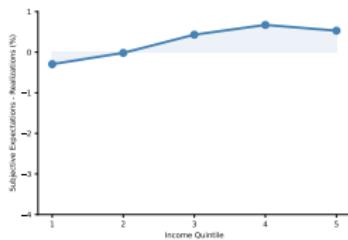
Saving rates,  $s$



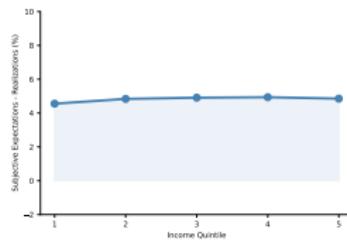
$\Delta s$ , Pf with uncertainty

# Perfect Foresight in Germany

## Forecast error

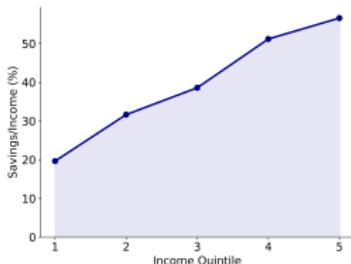


Economic growth

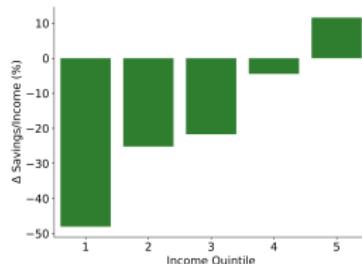


Real interest rate

## Results



Saving rates,  $s$



$\Delta s$ , Pf with uncertainty

## Taking Stock and Future Directions

- ▶ HHs expectations about macro vars and saving rates differ across Europe
- ▶ To understand how these two are linked
  - Incomplete markets model of household saving decisions with survey-based expectations
  - Model replicates savings heterogeneity across countries
- ▶ Differential effect of expectations on saving rates across countries and income groups
  - German households reduce their saving rates much less than French ones when forecast errors = 0
  - Low income HHs affected more by the forecast errors
- ▶ TODO
  - Welfare analysis
  - Survey of Professional Forecasters data
  - Decomposition: preferences, income risk, constraints
  - **Policy relevant:** explore marginal changes to expectations