Imperial College Business School

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

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Motivation

What role do expectations about future macroeconomic outcomes play in household decisions?

- Effectiveness of policy measures, such as forward guidance, depends on the link between expectations and households' decisions
  - Especially important in times of high inflation

- **Theory**: Financial decisions today depend on household expectations for future prices, income

- **Empirical Findings**: Mixed evidence on the effect of expectations on households' decisions
  - Channel is not clear: mechanism of expectation formation as well as the effect on decisions
  - Heterogeneous intra-personal and inter-personal belief formation
  - Difficult to isolate:
    - Liquidity constraints
    - Household income risk
    - Preferences

This Paper

- Uses a structural model of saving and consumption under subjective expectations
- **Approach**: We use the survey-based expectations and calibrated preference and income parameters to study empirical patterns of savings
  - ▶ 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 the model to match empirical patterns
- Decompose:
  1. Effect of subjective expectations on household savings differences
     - Between countries
     - By income level
  2. Effect of subjective expectations compared to perfect foresight
  3. Relative effect subjective expectations, preferences, income risk on saving decisions

Related literature

- **Models of expectation formation**: Roth *et al.* (2021), Adam & Nagel (2022), Maćkowiak *et al.* (2021), Woodford (2019), Farhi & Werning (2019), Angeletos *et al.* (2021), Andre *et al.* (2019), Rozsypal & Schlafmann (2017)

- **Household financial decisions and macroeconomic expectations**: Weber *et al.* (2021), Coibion *et al.* (2022), D'Acunto *et al.* (2021), Vellekoop & Wiederholt (2019), Bachmann *et al.* (2015), D'Acunto *et al.* (2022)

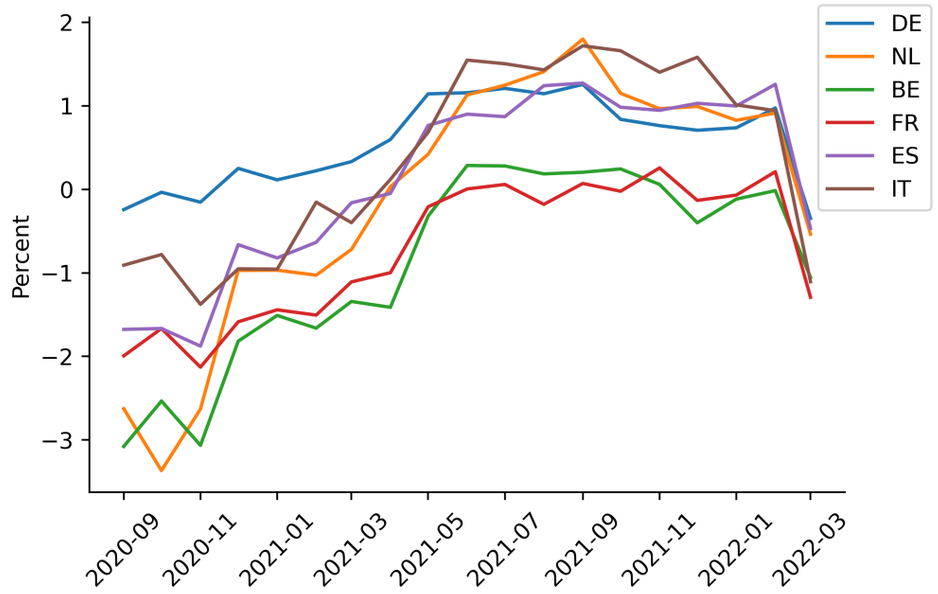
- **Sources of differential effect of expectations**:
  - Liquidity constraints: Christelis *et al.* (2020), McKay *et al.* (2016)
  - Uncertainty about the state of the economy: Coibion *et al.* (2021)
  - Risk aversion: Bommier & Grand (2019), Bucciol *et al.* (2017)

- **Models of consumption and savings**: Carroll & Samwick (1997), Carroll *et al.* (2020), Carroll *et al.* (2014), Kaplan & Violante (2014), Kaplan *et al.* (2018)

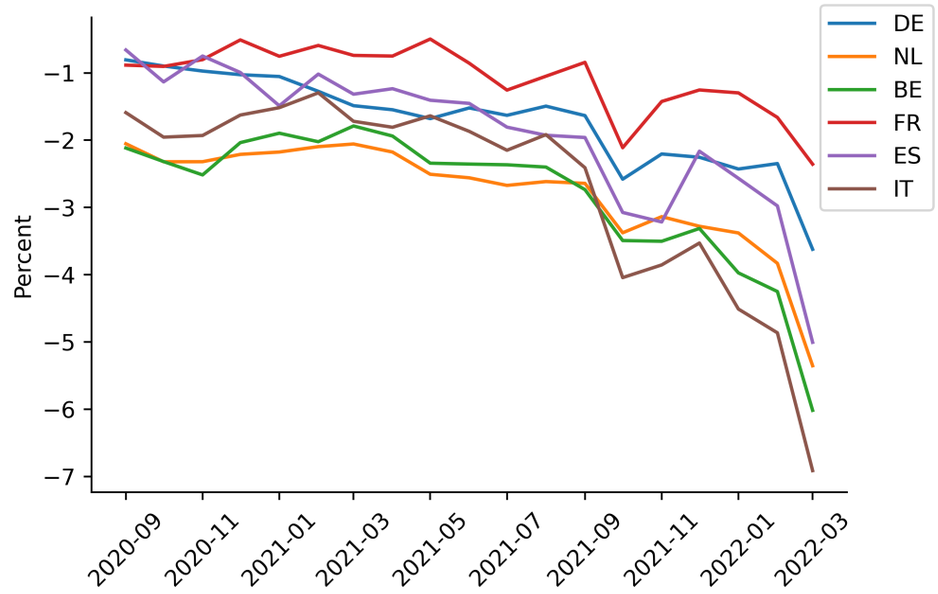
Data

- ECB Consumer Expectation Survey (CES)
  - Launched by the ECB in January 2020, covers the 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 labour market conditions
  - Panel data, expectations and consumption collected monthly, income quarterly
- ECB Household Finance and Consumption Survey (HFCS)
  - Survey covering the demographics, wealth, income and consumption of European households
  - We 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

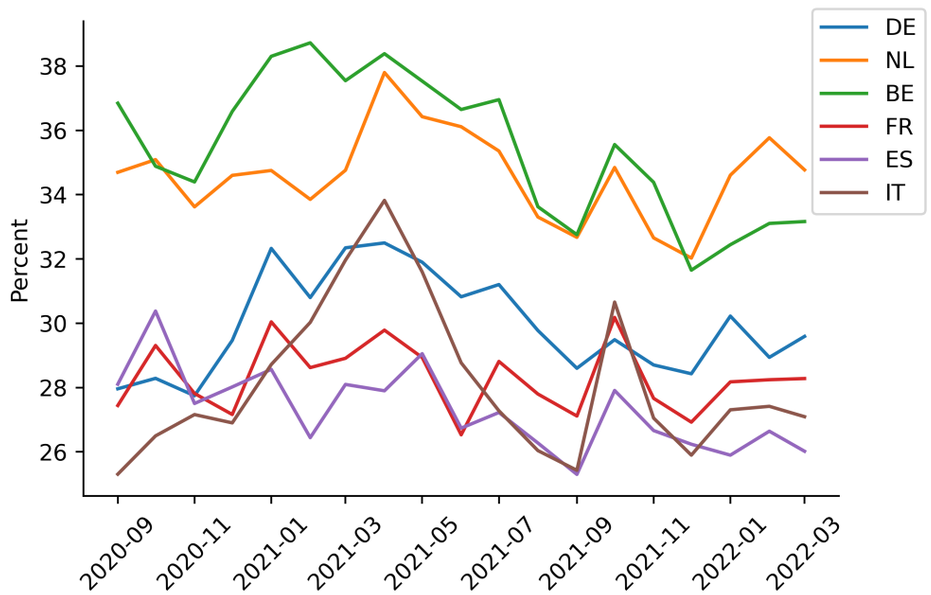
Time Series Facts



(a) Expectations about Economic Growth



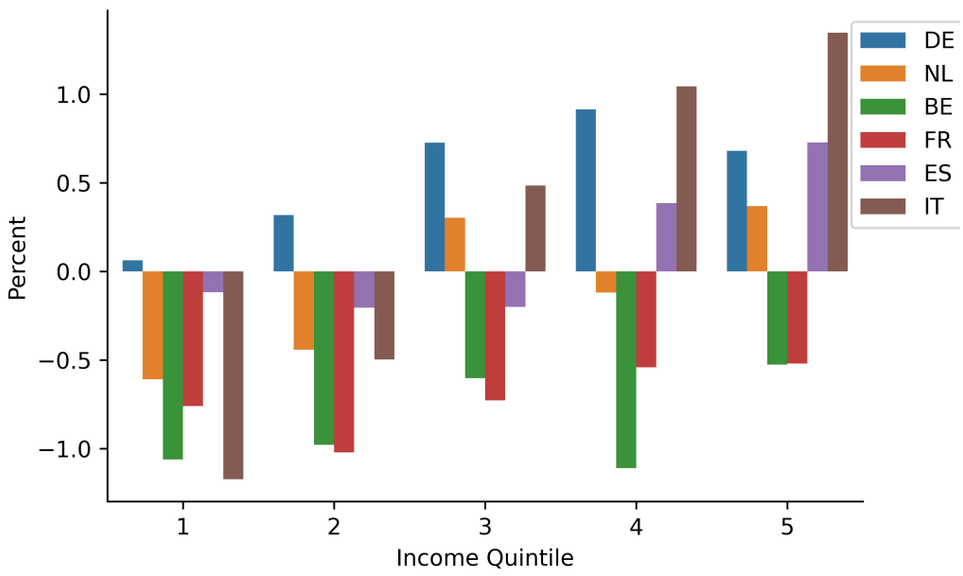
(b) Expectations about Real Rates on Savings



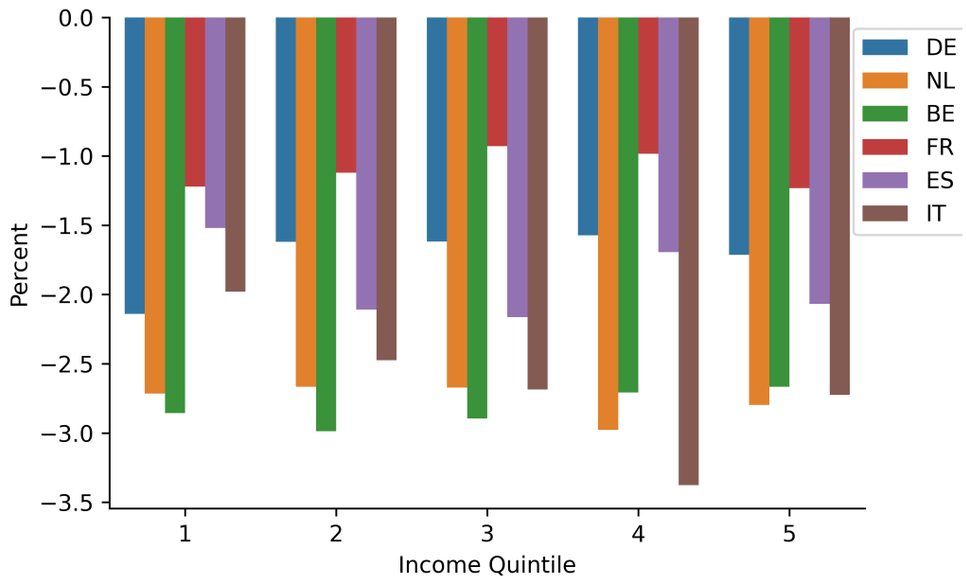
(c) Savings/Income

Averages by Country, Time Series

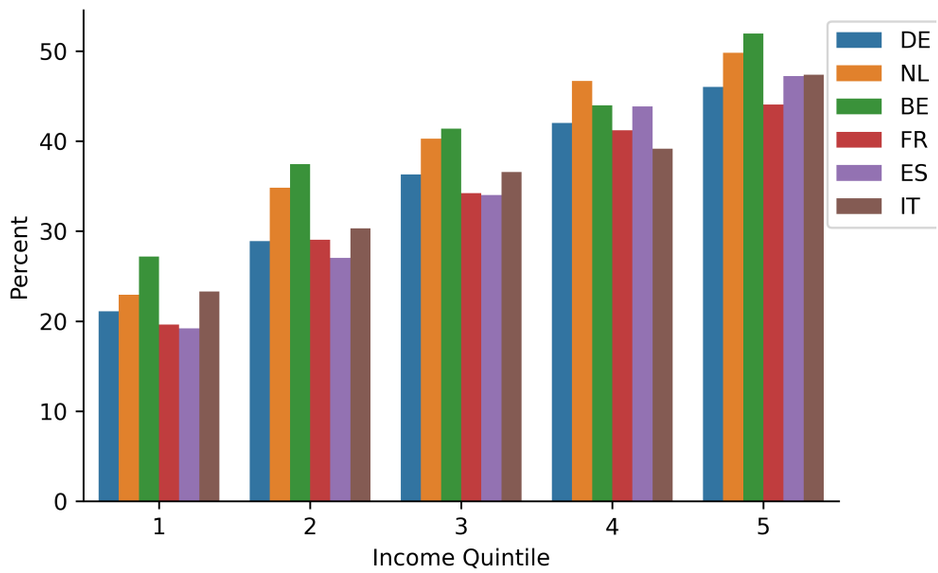
Cross-Sectional Facts



(a) Expectations about Economic Growth



(b) Expectations about Real Rates on Savings



(c) Savings/Income

Averages by Country, by Income Quantile

Model Overview

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

- **Incomplete markets**, partial equilibrium: exogenously determined interest rate on savings, wage rate

- **Expectations**:
  - Households hold survey-based, subjective expectations about macroeconomic variables, we do not impose structure on belief formation
  - Households hold rational expectations over shocks to their income

Income Process

- Household's labor income is:

$$y_{i,t} = wl_{i,t}$$

$$l_{i,t} = \theta_{i,t} p_{i,t} \Theta_t P_t$$

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

w: constant wage rate

$\theta_{i,t}$, Θ_t: idiosyncratic and aggregate transitory productivity shocks

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

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

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

Φ_{t+1}: aggregate productivity growth

$\psi_{i,t}$, Ψ_t: idiosyncratic and aggregate permanent productivity shocks

Model Solution

- The household's problem in Bellman form is as follows:

$$\mathrm{v}(m_{i,t}, p_{i,t}, P_t) = \max_{c_{i,t}} \left\{ u(c_{i,t}) + \beta \, \mathbb{E}_t \left[\mathrm{v}(m_{i,t+1}, p_{i,t+1}, P_{i,t+1}) | \psi_{i,t+1}, \Psi_{t+1}, \theta_{i,t+1}, \Theta_{t+1}; \Phi_{t+1} = \Phi^S_{i,t+1}, R_{t+1} = R^S_{i,t+1} \right] \right\}$$

subject to:

$$a_{i,t} = m_{i,t} - c_{i,t}$$

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

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

$$l_{i,t+1} = \theta_{i,t+1} p_{i,t+1} \Theta_{t+1} P_{t+1}$$

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

- Survey-based expectations for macroeconomic outcomes at time $t + 1$:
  - $\Phi^S_{i,t+1}$: survey-based expectation at time t of Φ_{t+1}
  - $R^S_{i,t+1}$: survey-based expectation at time t of R_{t+1}

Calibration

- *Preliminary results, planning to structurally estimate the model*

- **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))

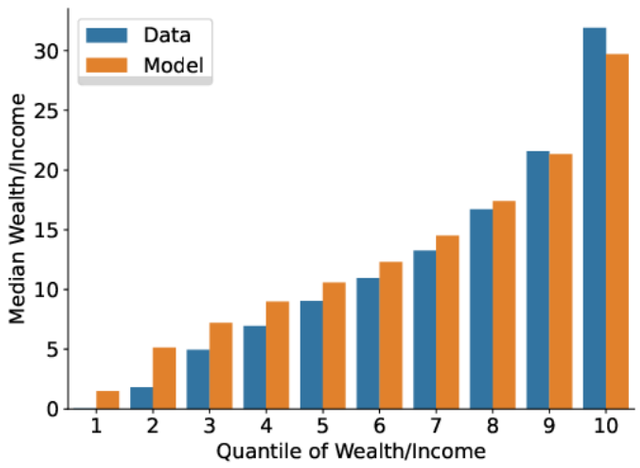
- **Preference parameters**: Country-specific, calibrated by matching median wealth/income

- We use the balanced panel of households between September 2020 and March 2022
- The simulated households inherit their initial wealth and income from the data, and decide their consumption using their subjective expectations from the survey

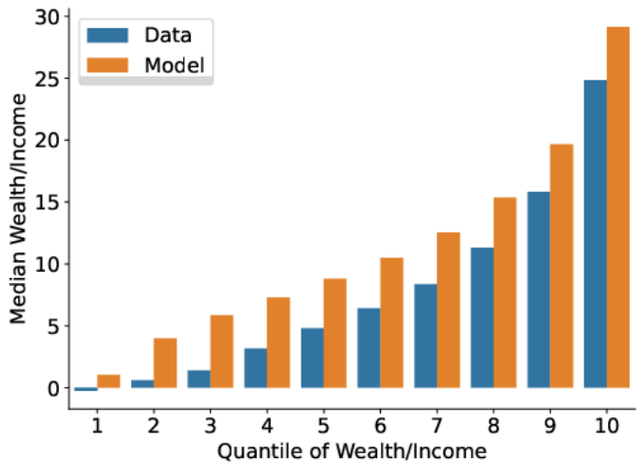
Preference Parameters	BE	FR	DE	IT	ES	NL
β	0.975	0.970	0.970	0.970	0.976	0.980
ρ	6.6	3.1	4.0	5.5	5.8	13.9

Notes: The values for the preference parameters, calibrated by targeting the wealth to income ratio by country in the data.

Targeted Moments

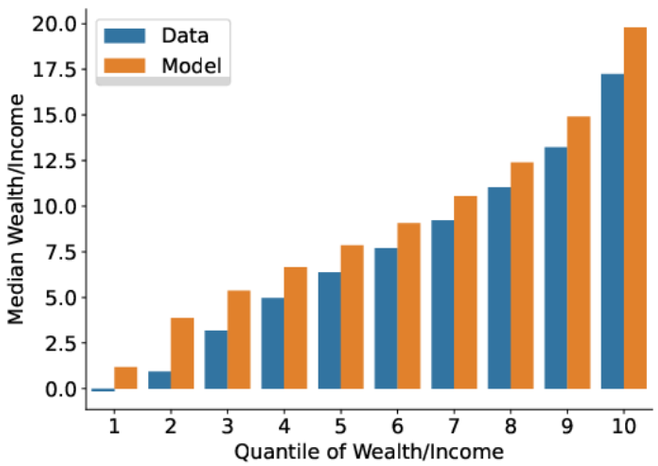


(a) Belgium

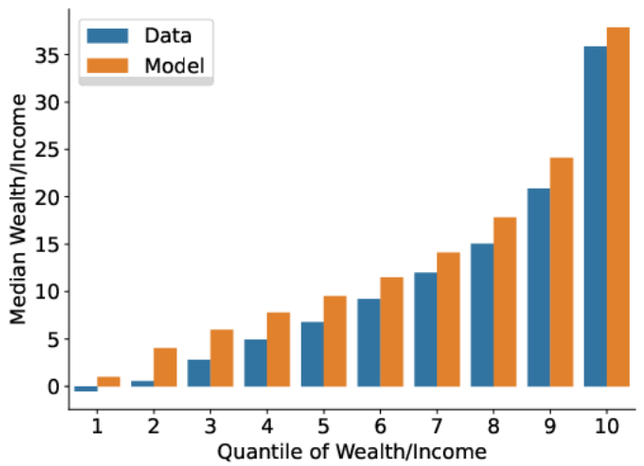


(b) France

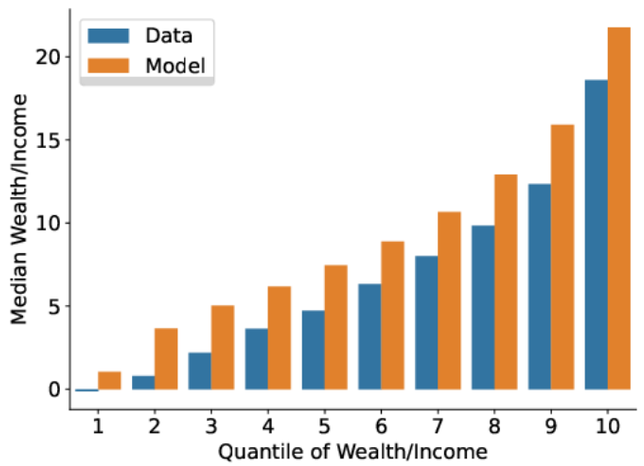
(c) Germany



(d) Italy



(e) Spain



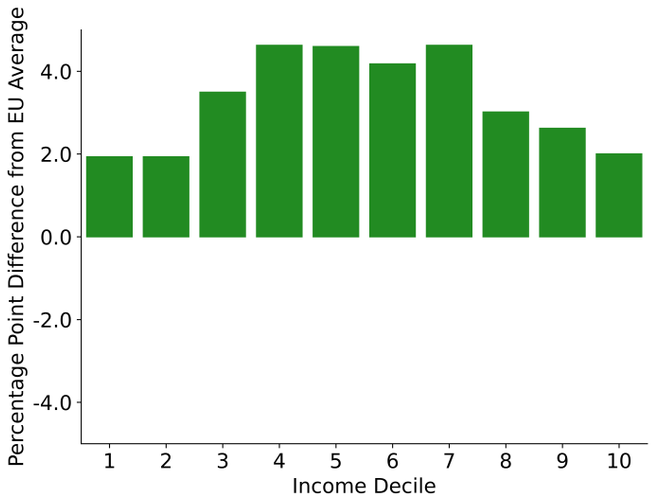
(f) Netherlands

Wealth/Annual Income by Country, by Wealth/Income Quantile

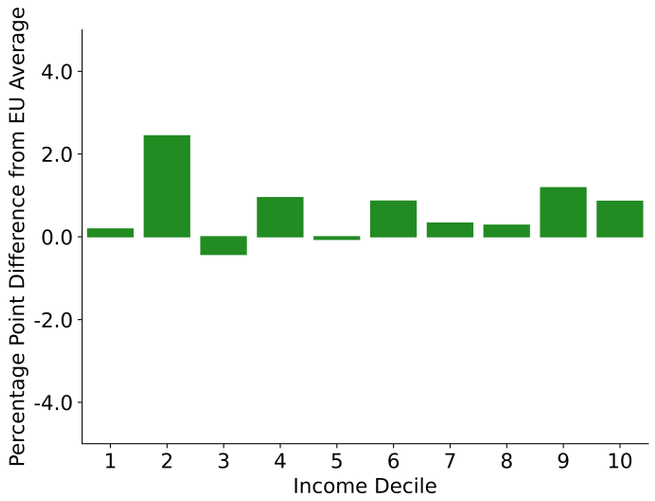
Effect of Subjective Expectations

- Do subjective expectations lead to differences in savings among households?
  1. Create benchmark: European average
     - Simulate saving decisions for households across Europe, using European averages for preferences and income risk
     - Calculate weighted mean of Savings/Income by income decile
  2. Subjective expectations
     - Simulate saving decisions, using subjective expectations of households in each country, but European averages for preferences and income risk
     - Calculate weighted mean of Savings/Income by country and income decile
  3. Decompose effect of subjective expectations
     - Difference (2) - (1) is the effect of subjective expectations by country and income decile

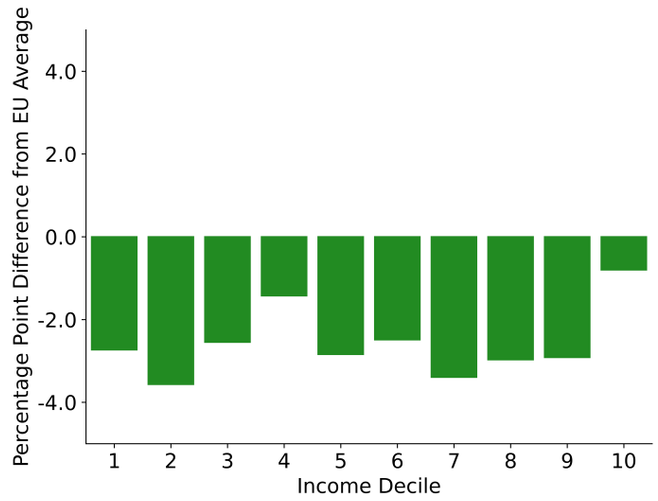
Saving Differences due to Subjective Expectations



(a) Belgium



(b) France



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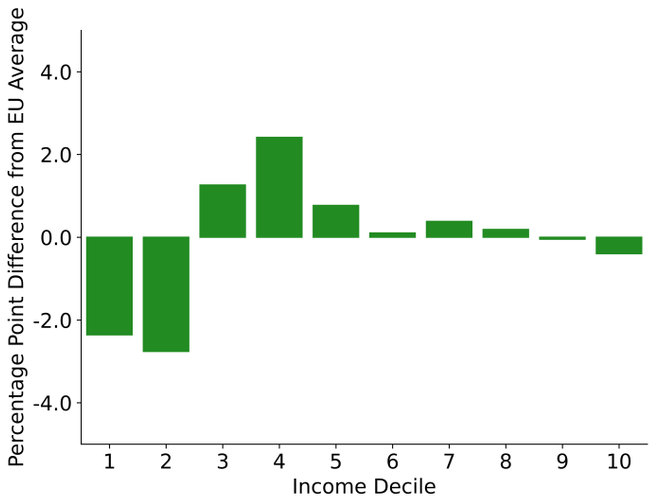

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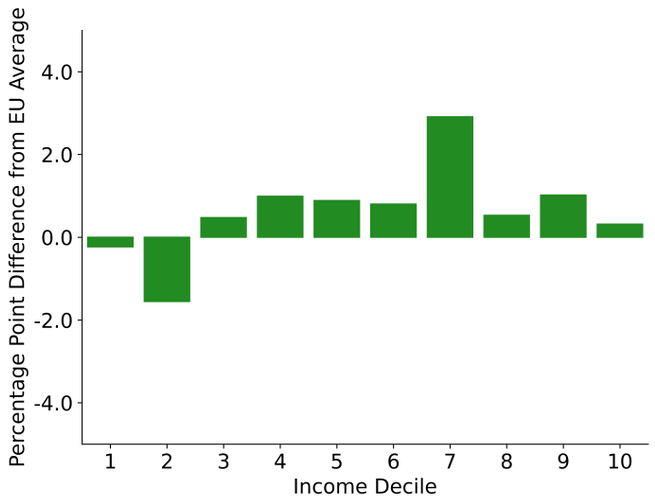
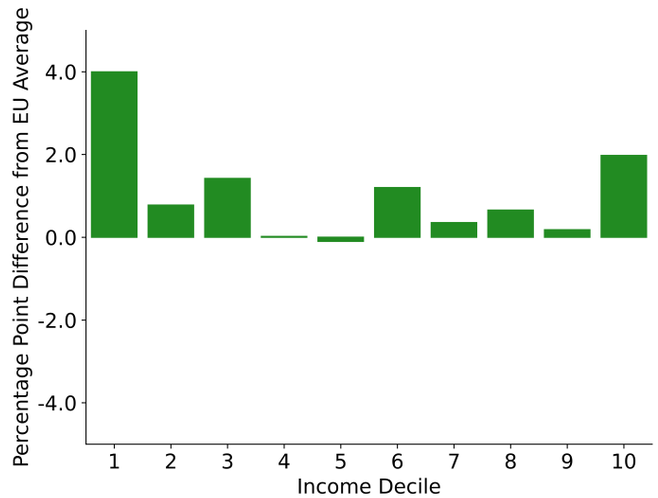


(e) Spain



(f) Netherlands

Conclusion

- We document that saving rates across European countries differ in the cross-section and across time
- To understand these patterns, we utilize an incomplete markets model of household saving decisions
  - Our model can replicate savings heterogeneity between countries
- Effects of subjective expectations on saving differences
  - Belgian households of all income levels save more than the average European household as driven by their expectations
  - German households of all income levels save less than their European counterparts due to their expectations
  - Households in Italy and Spain save less or more compared to the rest of Europe because of their expectations, depending on their income