



How Vulnerable are European Households? Evidence from Microdata

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UNIVERSITY OF MANNHEIM

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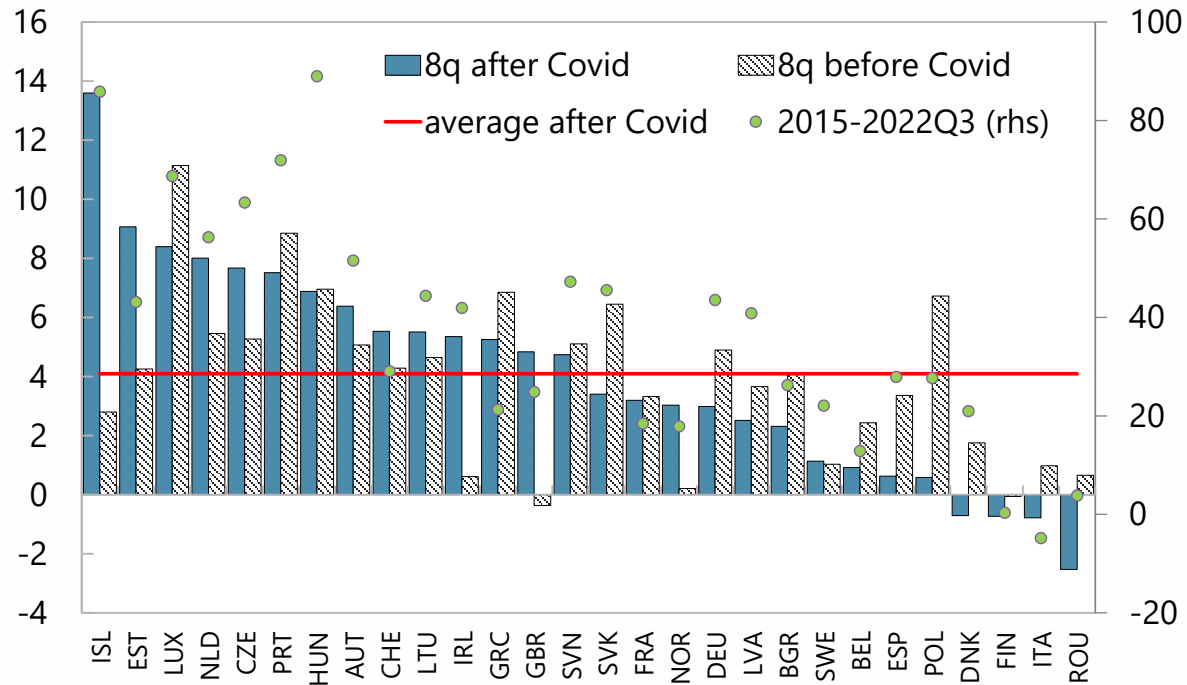
Context and Key Questions

- The *cost-of-living crisis*, *tightening financial conditions* and *deteriorating growth outlook* raise questions over household debt affordability after years of rising housing prices and increasing household indebtedness
- Growing policymakers' concern: ESRB's General warning of rising systemic risks to financial stability (Sep 22)
- Many measures to tackle the cost-of-living crisis are being implemented but limited information on their cost-effectiveness
- Key questions of this study:
 - **Vulnerability** How vulnerable are European households in the face of these shocks?
 - **Macro implications** To what extent, might affected consumers respond by cutting consumption?
 - **Financial stability implications** What would be the impact of rising default rates on banks?
 - **Distributional implications** What households are most likely to be adversely affected? Could it lead to rising inequality?
 - **Policies** What could be cost-efficient policies to mitigate the impact of potential shocks? How effective will announced policy measures likely be in addressing household vulnerabilities and preventing household defaults?

Despite the recent rise in mortgage rates, real house price growth has remained strong since the pandemic...

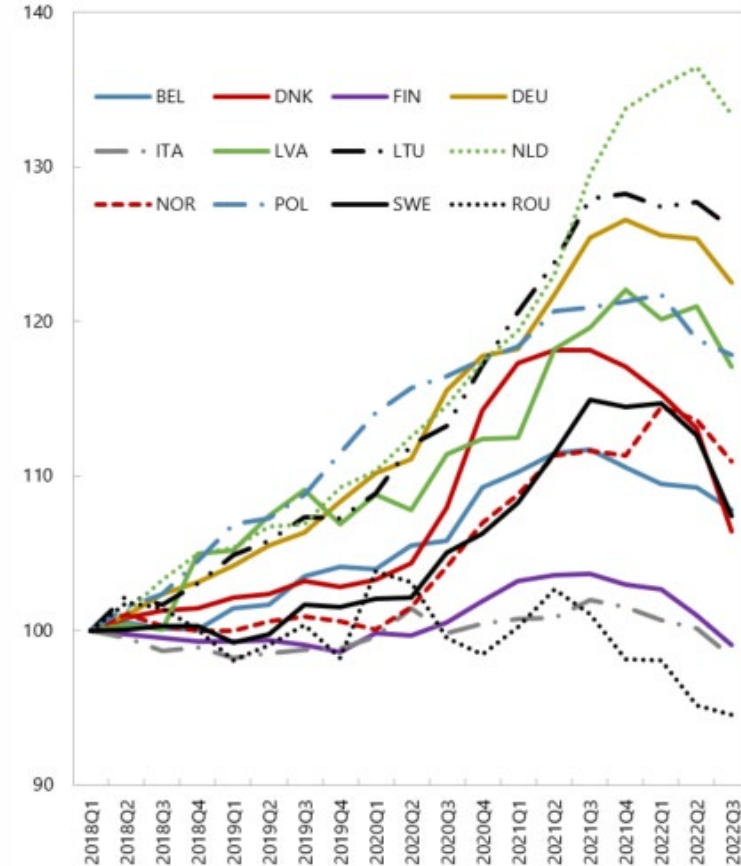
Real House Price Growth Rate

(percent, year-on-year, annualized)



Sources: OECD, Haver, and IMF staff calculations. The dots show cumulative growth over the referenced period.

Evolution of Real House Prices
(Selected countries, 2017Q4=100)



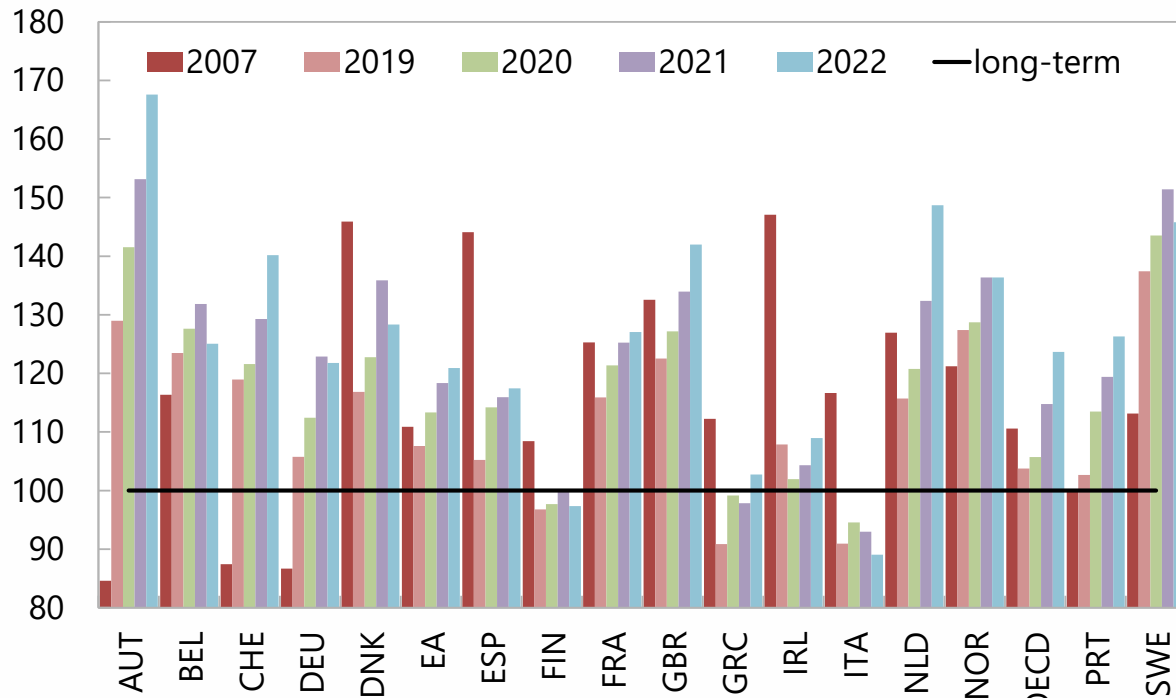
Sources: OECD, authors' calculations

- Since Covid-19, annual real house prices grew at 4.1 rate in Europe
- Despite the recent slowdown during 2022...
- ...brisk house price growth has led to an average cumulative 20 percent real growth since 2017

...increasingly outpacing fundamentals...

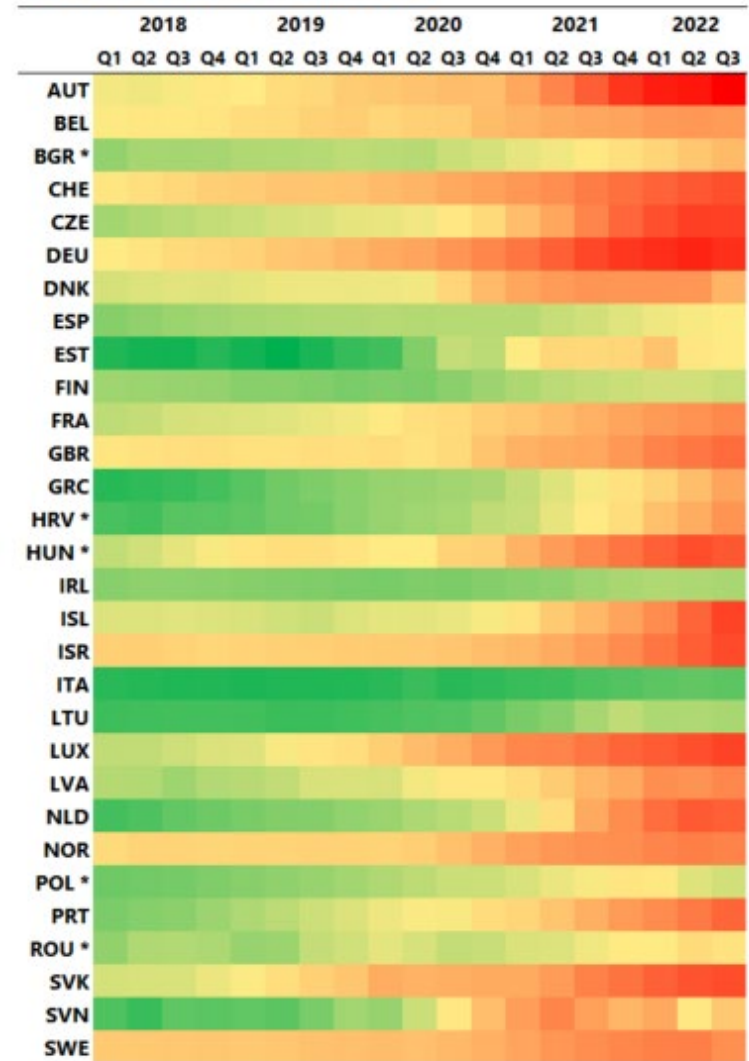
Price-to-Income in European Countries

(Index, long-term average = 100)



Sources: OECD, Haver, and IMF staff calculations. The long-term average is calculated for each country separately starting at least in 2000.

Price-to-Rent Ratios in Europe

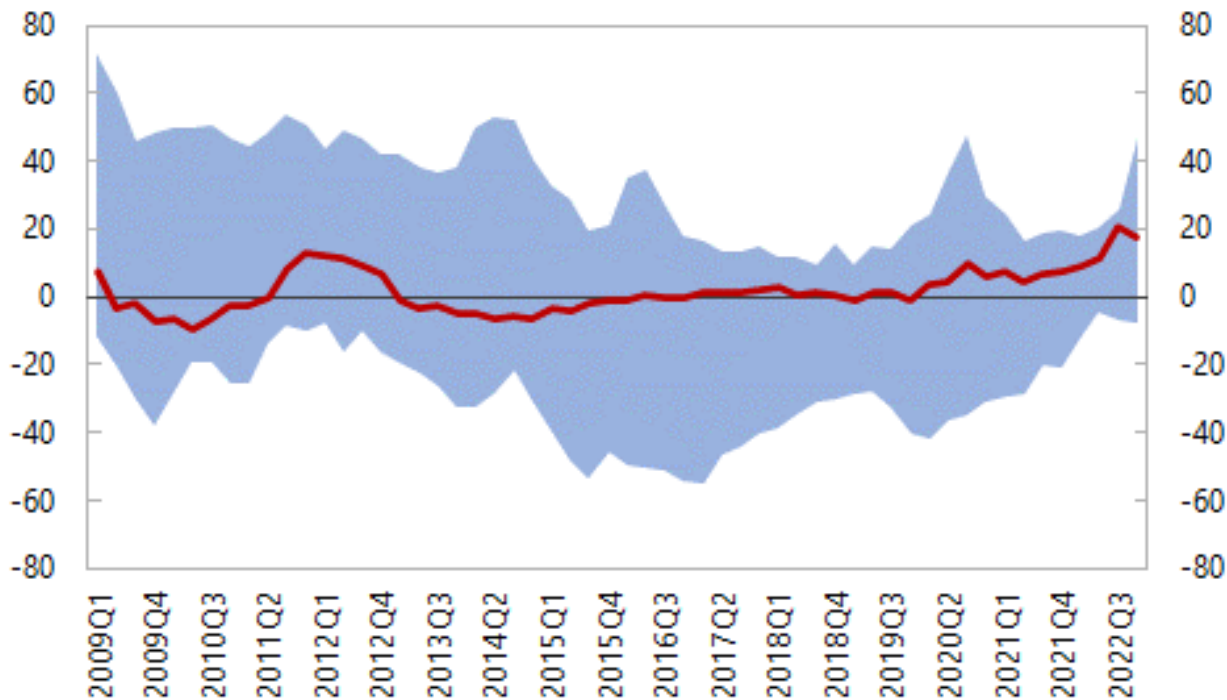


Source: OECD, authors' calculations

Note: The heatmap shows Z-scores, computed by subtracting the mean from the observation at time t and dividing the difference by the standard deviation. The mean and the standard deviation are computed over the available sample from 2000Q1. Countries in emerging Europe are marked with *.

...with signs of overvaluation at about 20 percent across Europe

Countries in Advanced and Emerging Europe
(Percent)



Source: Authors' calculations using data from Haver, OECD, Eurostat, Hypostat, and national statistical offices.

- ❖ We use a cointegration approach that relates house prices to fundamentals:

$$p_t = \alpha_1 + \beta_1 hs_t + \beta_2 di_t + \beta_3 R_t + \varepsilon_{1t} = p^* + \varepsilon_{1t}$$

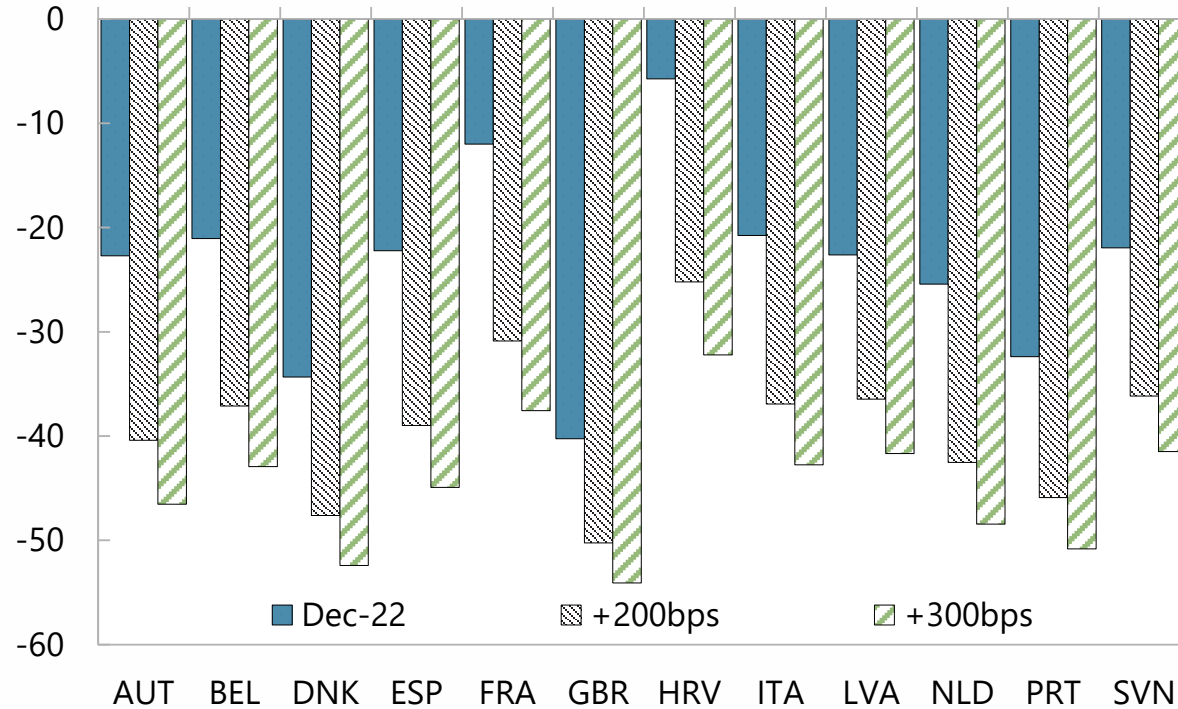
$$\Delta p_t = \alpha_2 + \varphi_1 (p - p^*)_{t-1} + \sum_{i=0}^n \lambda_1 \Delta p_{t-1} + \sum_{i=0}^n \lambda_2 \Delta hs_{t-1} + \sum_{i=0}^n \lambda_3 \Delta di_{t-1} + \sum_{i=0}^n \lambda_4 \Delta R_{t-1} + \varepsilon_{2t}$$

- ❖ The speed of adjustment is about 20 percent of disequilibria corrected over one year for most countries

Rising interest rates are hurting affordability

Reduction in Buying Power under Different Scenarios

(Percent)



Sources: Statista, National Central Banks, and IMF staff calculations.

Note: The analysis computes the average mortgage loan given LTV ratios and price in apartments in most important cities in each country at end 2021. Using the average mortgage rate and maturity in 2021, it computes the average DSTI ratio. Then it calculates the size of the loan in Dec 2022 to keep the debt servicing ratio constant under current mortgage rates and under stylized shocks.

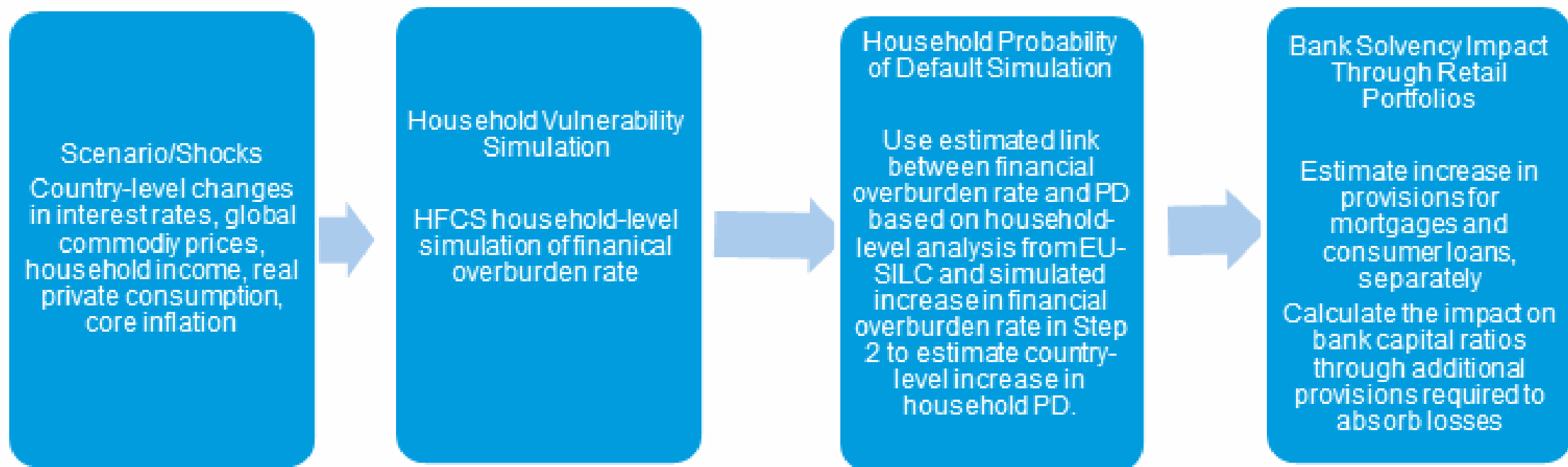
- Affordability is measured by the size of the downpayment and monthly installments
- Sustained increases in PTI are denting both indicators
- Tighter LTVs have offsetting effects, favoring borrowers with higher cash balances

$$\frac{\text{Cash}}{\text{Income}} = PTI \cdot (1 - LTV)$$

$$DSTI = PTI \cdot LTV \cdot \left(\frac{1}{\text{maturity}} + i \right)$$

Household Vulnerabilities and Scenario Analysis

Procedure to Assess Household Vulnerability and Bank Impact



To assess the resilience of households, we conduct scenario analysis using simulation techniques

Cumulative Shocks over 2022-23

	Interest Rate (percent)	HH Income (percent)	Food Price (percent)	Energy Price (percent)	Core Inflation (percent)
Baseline					
AE	2.42	13.68	7.56	84.72	10.50
EE	4.13	19.78	7.56	84.72	20.07
Tightening (200bps)					
AE	4.42	13.68	7.56	84.72	10.50
EE	6.13	19.78	7.56	84.72	20.07
Income (-10%)					
AE	2.42	2.32	7.56	84.72	10.50
EE	4.13	7.80	7.56	84.72	20.07
Food & energy (20%)					
AE	2.42	13.68	29.07	121.67	10.50
EE	4.13	19.78	29.07	121.67	20.07
WEO Downside					
AE	3.07	11.98	6.24	97.98	10.81
EE	4.77	18.05	6.24	97.98	20.37
Combined (tightening; income)					
AE	4.42	2.32	7.56	84.72	10.50
EE	6.13	7.80	7.56	84.72	20.07
Cost of living (tightening; food & energy)					
AE	4.42	13.68	29.07	121.67	10.50
EE	6.13	19.78	29.07	121.67	20.07

- Country specific shocks
 - The table shows country average shocks for AE and EE
- Baseline assumes
 - October 2022 WEO forecast
 - Full pass-through of global commodity price shocks to domestic prices by end 2023
 - No policy measures (assumption relaxed in the last part of the analysis)

Data & Analytical approach

Two Sets of Micro Data:

- *ECB's Household Finance and Consumption Survey*
 - 21 European countries; granular information on households' assets, liabilities, income and consumption
 - We use a matching procedure to 'age forward' the (latest) 2017 vintage to 2021 and estimate "Durable" consumption
- *EU-SILC Survey of Income and Living Conditions*
 - 31 EU countries; granular information on households' housing costs and mortgage arrears for around 10 million households; time series: 2004-2020

Procedure: Simulate overburden rate for each household under scenario j

$$DSTI_{T,j}^h = \frac{\sum_{k=1}^N (P_{t,k}^h + O_{t,k}^h \cdot i_{t,k}^h) + \sum_{s=1}^M (O_{t,s}^h \cdot \Delta i_{T-t,j} | s = floating)}{I_t^h \cdot (1 + \Delta inc_{T-t,j}^h)}$$

$$DSECTI_{T,j}^h = DSTI_{T,j}^h + \frac{food_t^h \cdot (1 + \Delta food_{T-t,j}^h) + utilities_t^h \cdot (1 + \Delta energy_{T-t,j}^h) + rent_t^h \cdot (1 + \Delta inf_{T-t,j})}{I_t^h \cdot (1 + \Delta inc_{T-t,j}^h)}$$

$$DSTCTI_j^i = DSECTI_{T,j}^j + \frac{Other\ Cons_t^i \cdot (1 + \Delta core_{T-t,j})}{I_t^i \cdot (1 + \Delta inc_{T-t,j}^h)}$$

- P = principal repayment
- O = outstanding debt
- j = scenario
- i = interest rate
- s = loans with adjustable interest rates
- Food = amount spent on food
- Utilities = amount spent on utilities
- Other cons = amount spent on other goods and services
- Energy = wholesale energy prices
- Inf = headline inflation
- Core = core inflation

We define two thresholds of household vulnerability

- We identify a 'vulnerable' household (at an increased risk of default) if debt service and basic living costs consume more than 70 percent of gross income

$$DSECTI_{T,j}^h \geq 70\%$$

- Country-level logistic regressions identify the 70 percent limit as the most significant threshold for mortgage default risk and default on consumer loans

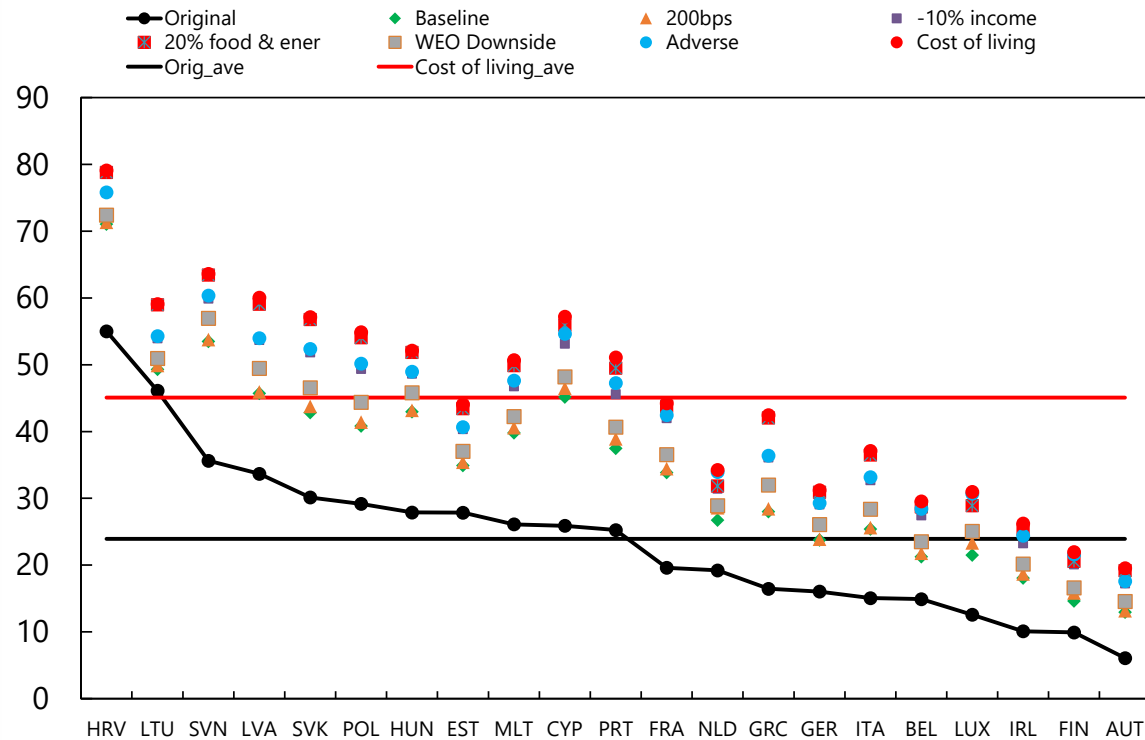
- We identify a household 'at risk to cut back on consumption' if essential payments and other consumption exceed 100 percent of gross income

$$DSTCTI_{T,j}^h \geq 100\%$$

The share of vulnerable households could reach over 45 percent of household under the worst-case scenario...

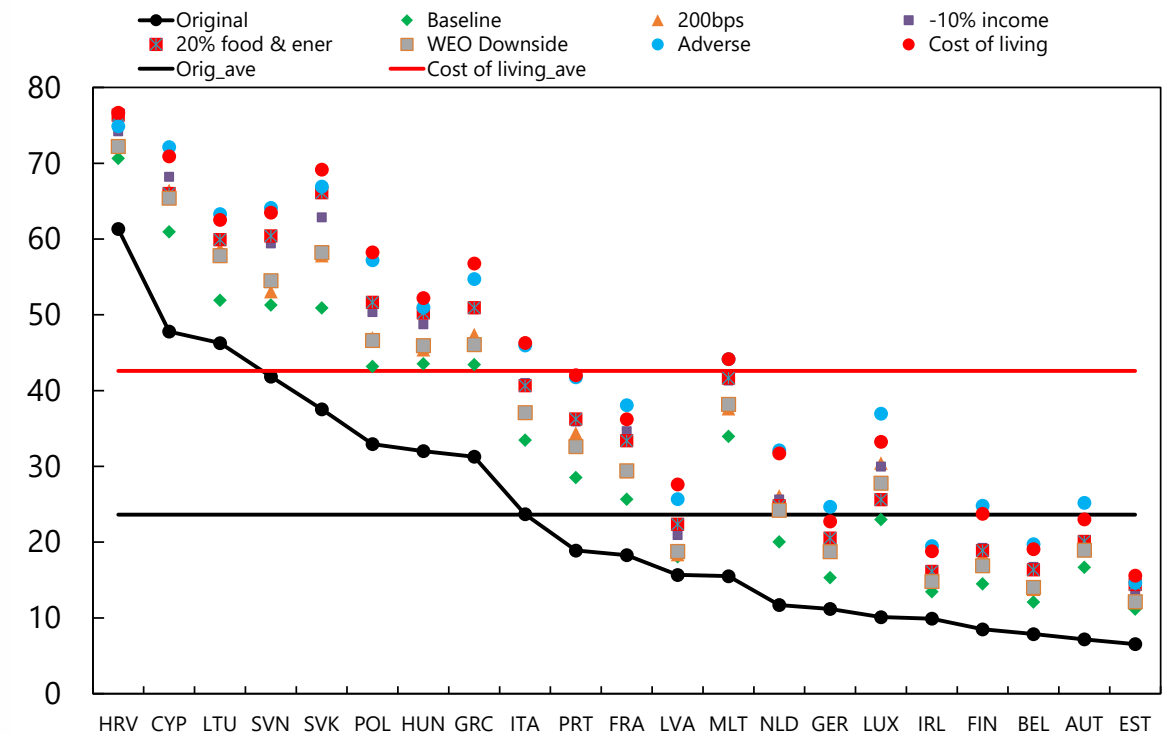
Households at risk - adjusted for living conditions

(Percent)



Mortgage debt at risk - adjusted for living conditions

(Percent)

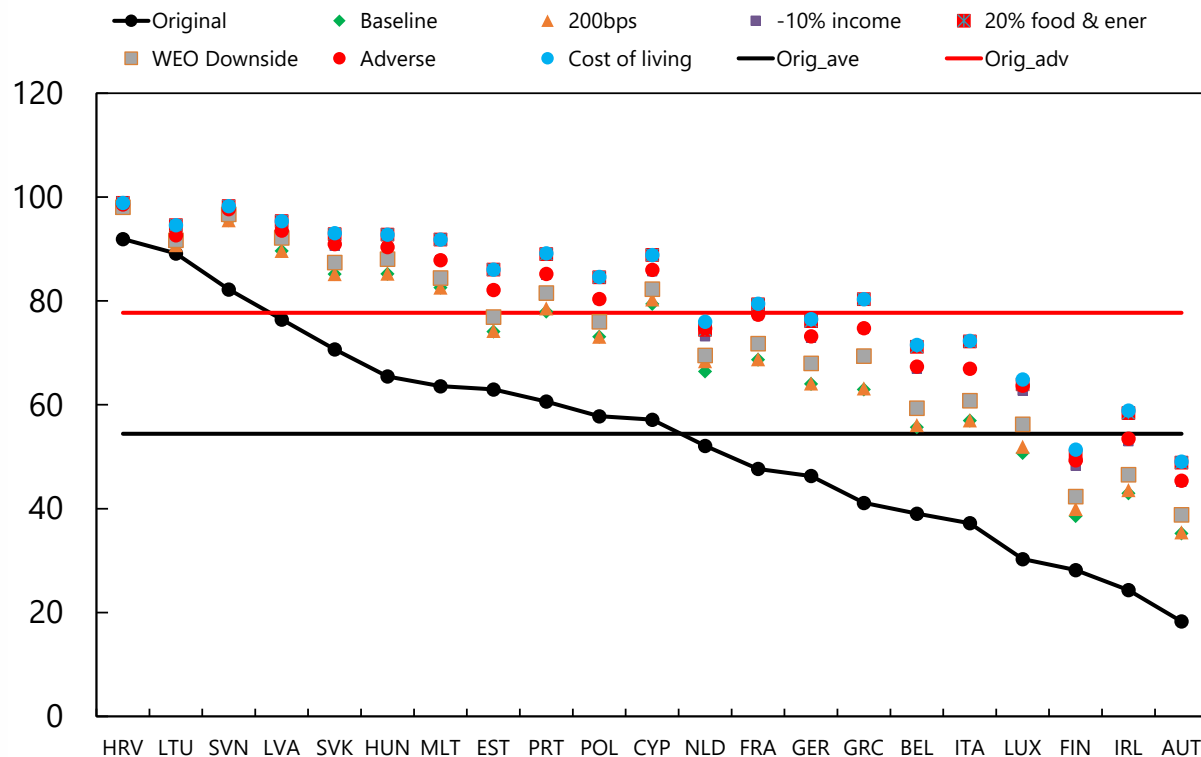


- Under the baseline, the share of vulnerable households could increase by 10 pps on average, to reach over one third of households...
- Under the worst-case scenario, 45 percent of all households could be stretched, holding 40 percent of mortgage debt, and 45 percent of consumer debt

...and 80 percent in the lowest income tercile group...

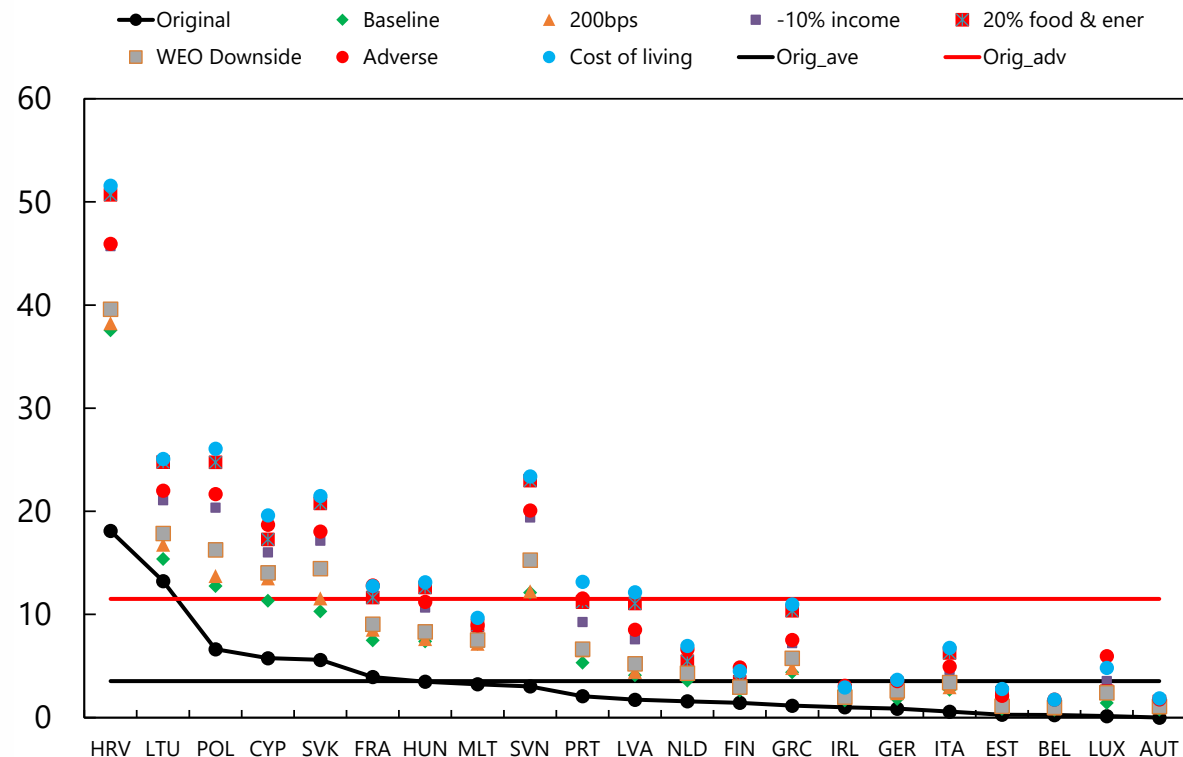
Low Income Households at risk

(Percent)



High Income Households at risk

(Percent)

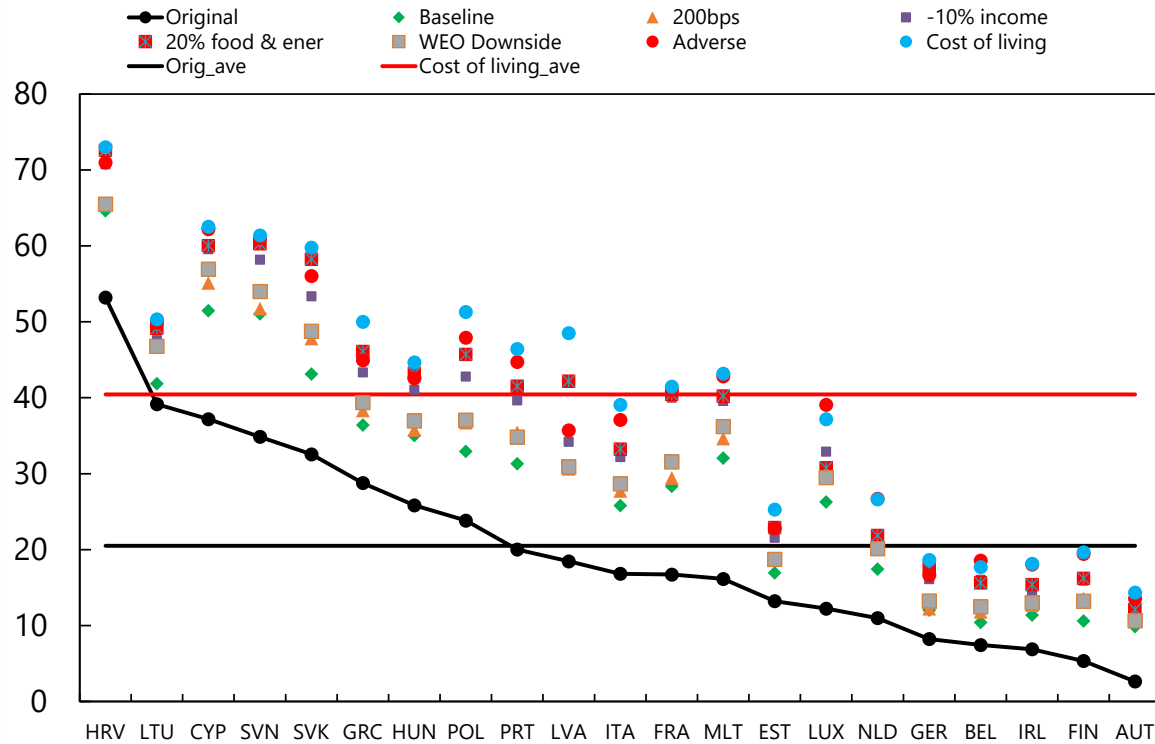


- Lower income households spend more income in basic expenses (55 percent vs 20 percent for higher income) and around 10 (20) percent have mortgage (consumer) debt

The impact of the crisis is similar across tenure groups, but the share of vulnerable households is higher amid renters

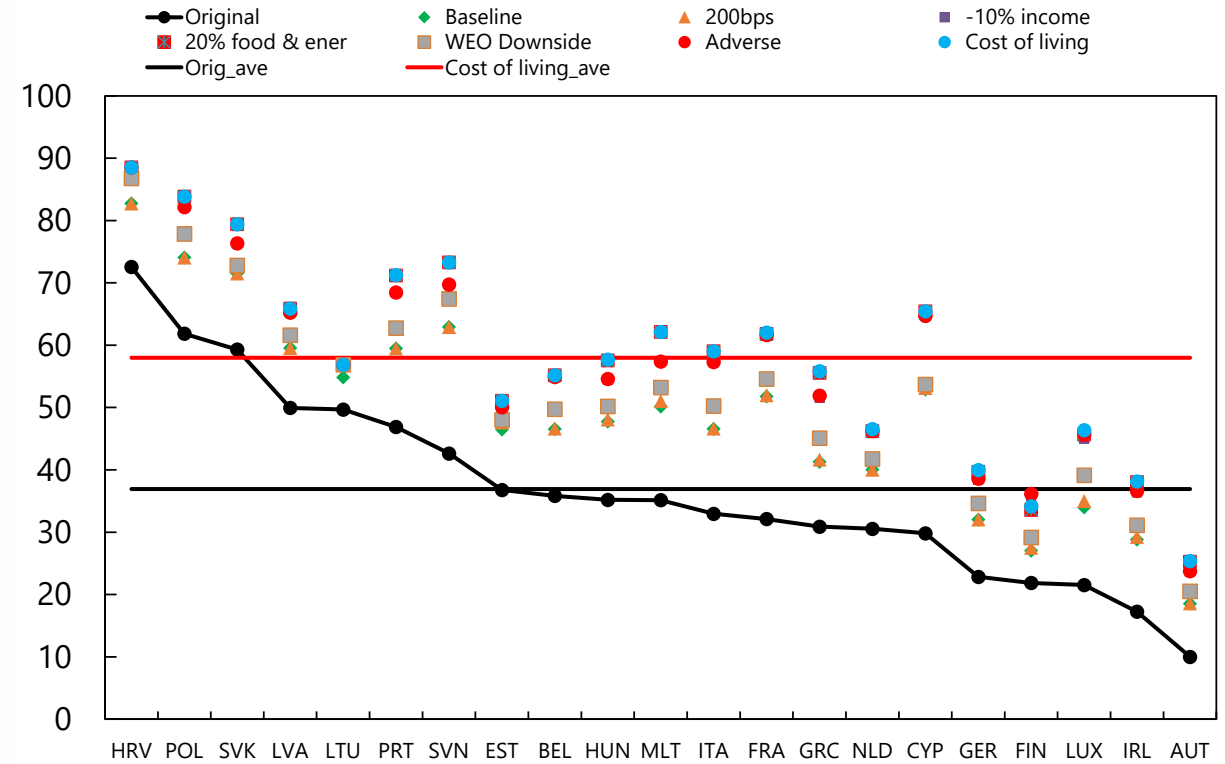
Mortgage Owners at Risk

(Percent)



Renters at Risk

(Percent)

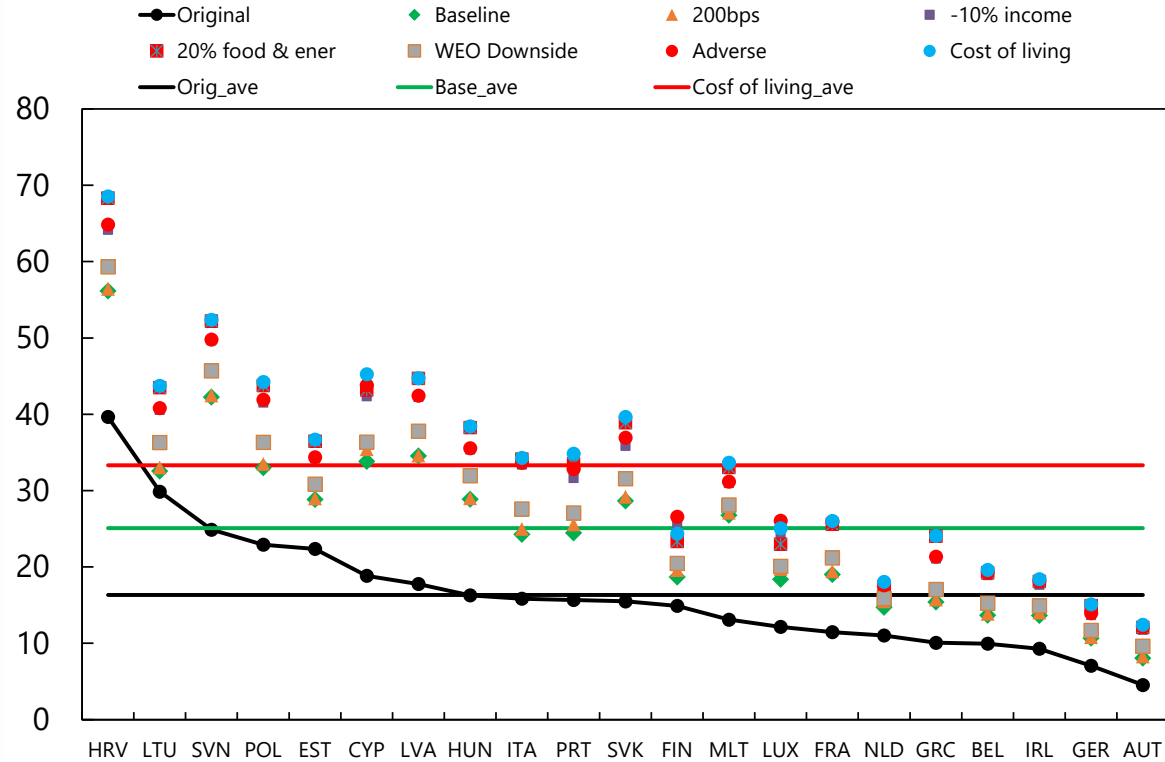


➤ Lower income households are more likely to be renters

One out of four consumers could be forced to cut back on spending accounting for one fourth percent of consumption under the baseline

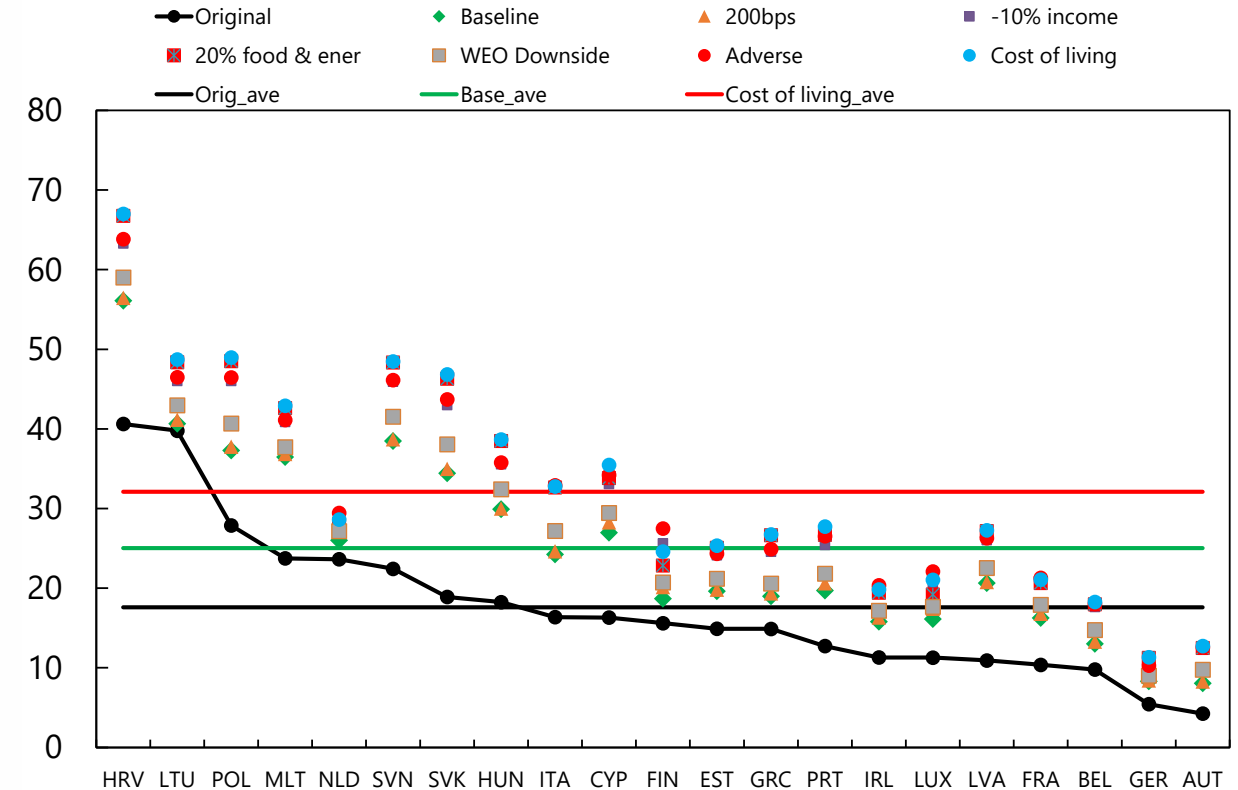
Consumers at risk

(Percent)



Consumption at risk

(Percent)



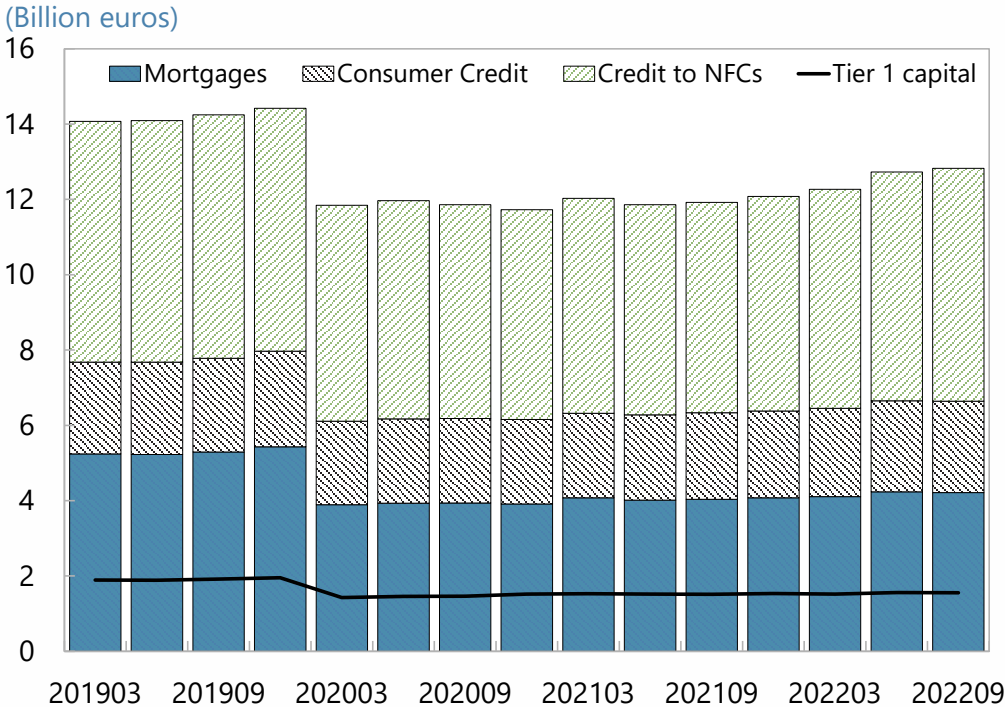
➤ Under the worst-case scenario, one out of three of consumers may need to adjust spending of non-essential goods to afford basic expenses, accounting for 30 percent of aggregate consumption

Implications for the Banking Sector

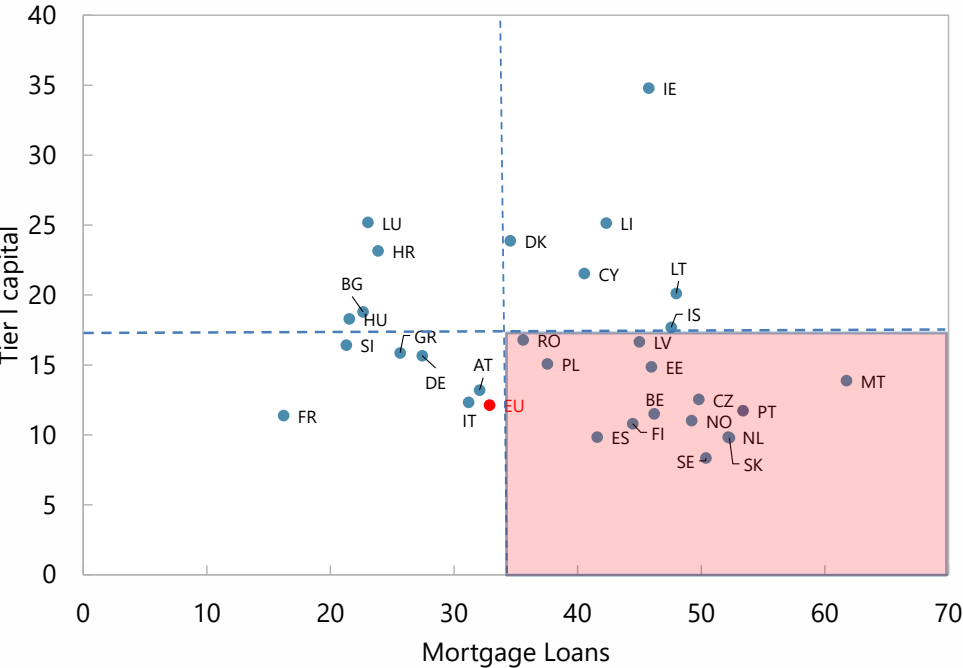
European banks are exposed to household loans

Household mortgages and consumer loans account for half of total loans to the real economy (EUR 6.6 trillion or 40 percent of GDP in EU)

Outstanding Loans by Segment and Capital in the EU



Banking System Exposure to Residential Real Estate Sector, Sep 2022
(Percentage Points)



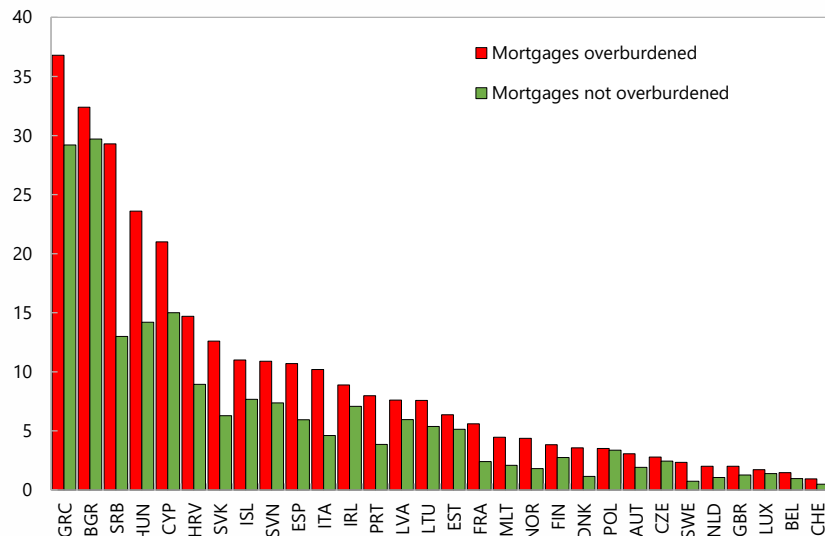
Banking sectors with lower capital and higher share of mortgage loans are disproportionately exposed to the residential real estate sector

The overburdened rate is strongly associated with default

- ❖ The probability of default for both mortgage and consumer loans is significantly higher for overburdened households

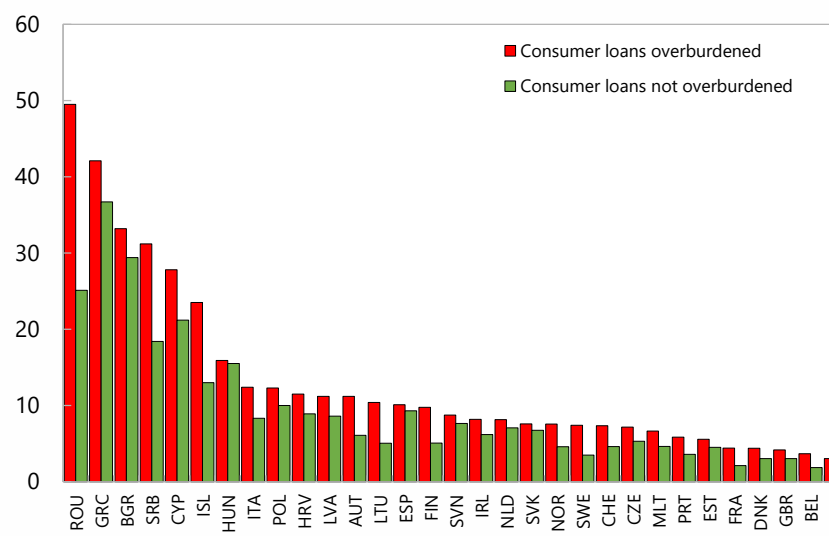
Probability of default of mortgage loans

(Percent)

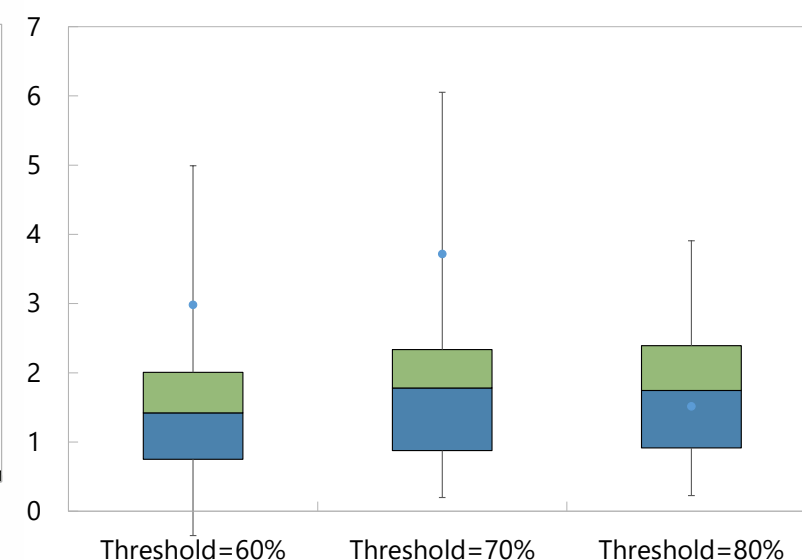


Probability of default of consumer loans

(Percent)



Estimated Difference in the PD of Mortgage Loans Above and Below Various Thresholds (Percentage Points)

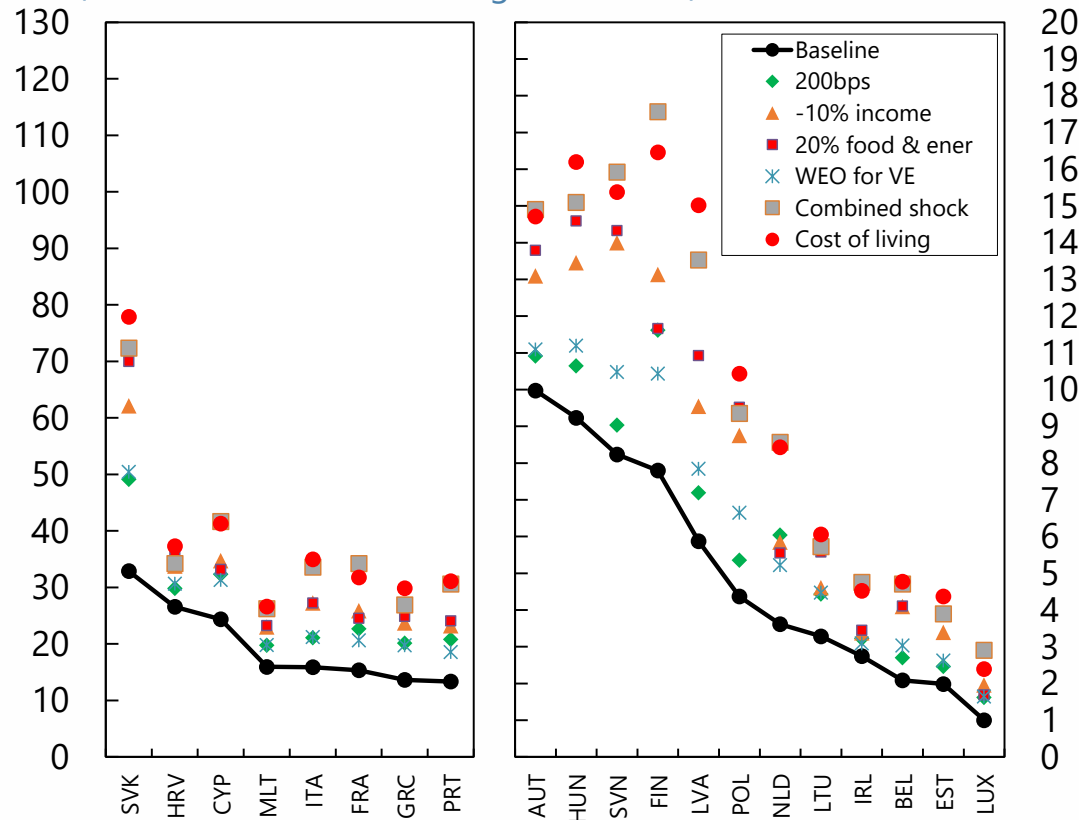


- ❑ Based on country-by-country logistic regressions controlling for income quantile and macroeconomic factors.
- ❑ If the minimum income needed by the household to pay for essential expenses exceeds 70 percent of gross income, the difference in the probability of default of mortgage loans between overburdened and non-overburdened households is the largest.

The impact on bank capital would not exceed 100 bps under the baseline but could reach 200 bps in a real estate crisis

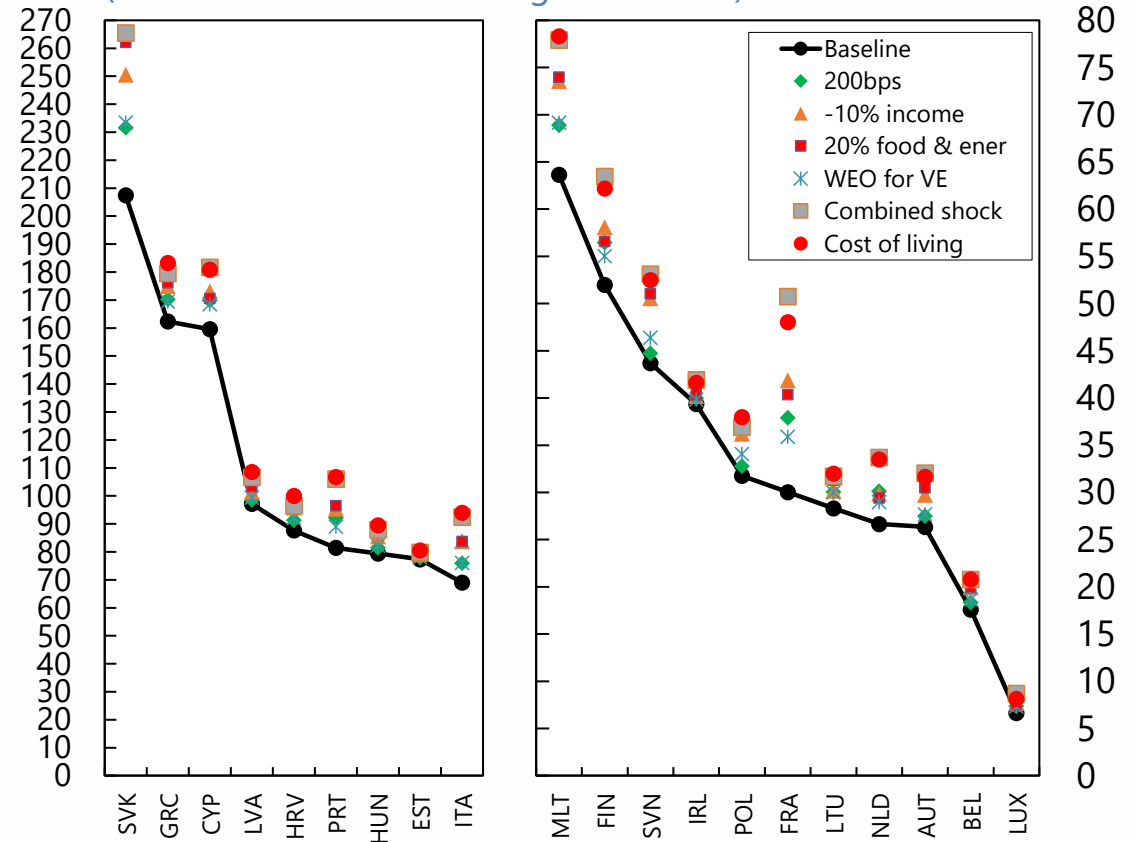
CET1 Capital Depletion - No House Price Correction

(In Basis Points of Risk Weighted Assets)



CET1 Capital Depletion - House Price Correction

(In Basis Points of Risk Weighted Assets)



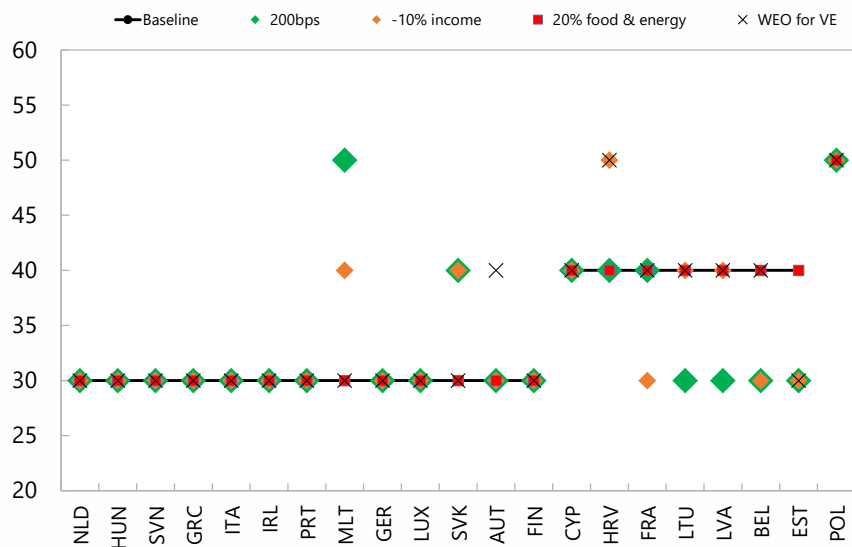
➤ The right chart assumes a house price correction of 20 percent, which is the estimated average overvaluation in housing prices in Europe.

Implications for Macprudential Policy Borrower-Based Tools

- A DSTI limit between 30 and 60 percent would decrease mortgage losses on new mortgage originations
- The risk of default is particularly elevated for lower income households

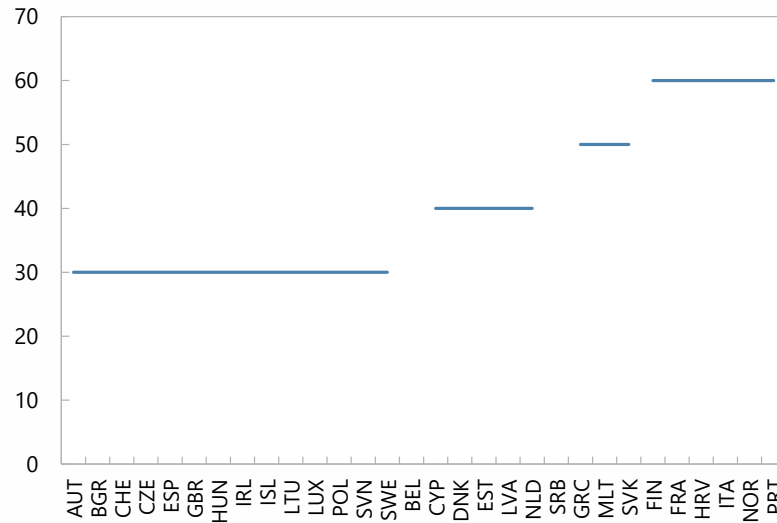
DSTI Threshold with Highest Sensitivity to Bank Losses

(Percent of household gross income)



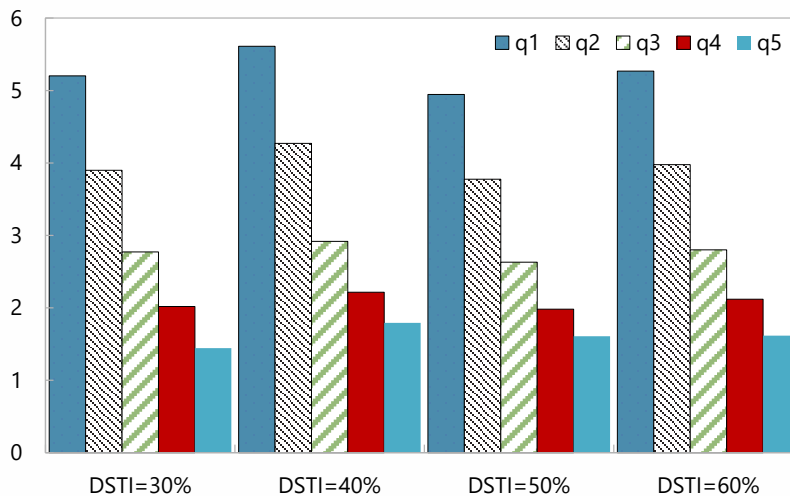
DSTI Threshold with Highest Sensitivity to Default Rate

(Percent of household disposable income)



Increase in Default rate by DSTI ratio and by quantile

(Percentage Points)



The left and middle charts are based on country-by-country logistic regressions controlling for income quantile and macroeconomic factors. The right chart is based on country-by-country and income –by-income quantile logistic regressions after controls. It shows the increase in the average PD for households above the threshold relative to those below the threshold for each quantile for the average European country.

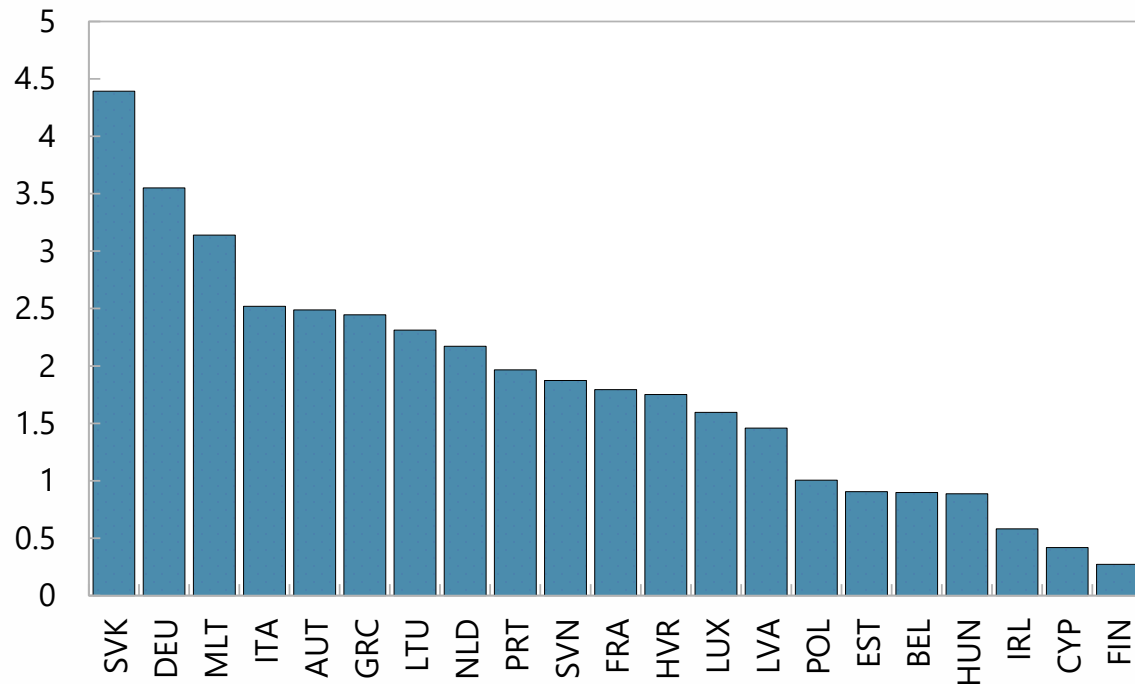
Cost Benefit Analysis of Policies

Governments have announced significant fiscal packages to support struggling households and firms

- Around EUR 770 billion have been earmarked across Europe (Bruegel, Feb 2023)
- Most of the support has been untargeted (in the form of energy caps)

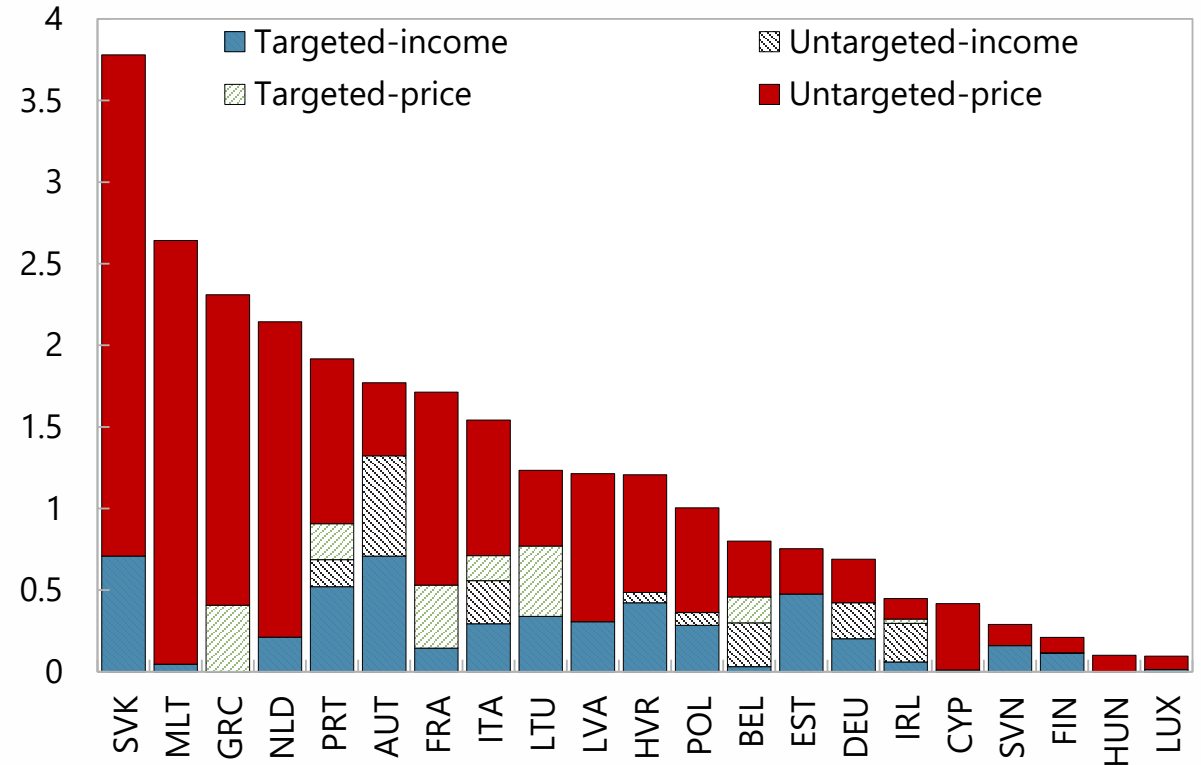
Policy Support to Households and Firms in Europe

(Percent of GDP)



Policy Support to Households, by Type of Scheme

(Percent of GDP)



Policy options to help consumers weather the crisis

- We conduct a cost-benefit analysis to assess the cost effectiveness of three hypothetical policies ...

Policy	Coverage	Energy and Food
Broad	All households	Cash transfers equivalent to 100% of the increase in food and energy prices
Targeted L&M	Low- and Median-income households (bottom two thirds in the income distribution)	
Targeted L	Low-income households (bottom one third in the income distribution)	

Policy measures announced to shield consumers from rising prices

➤ ...and actual policies deployed by three countries

Country	Coverage	Energy	Food	Other measures
Croatia	Households affected by rising prices	Price growth cap Max 9.6% for electricity; 20% for gas	Lower current prices by 30%	Energy VAT reduction from 25% to 13% for gas and heat; temporarily to 5% for heat from April22-March23 Lump sums for unemployed and farmers
Greece	Households with annual income of up to €45,000	Ceiling on wholesale electricity prices and refund up to 60% of all surcharges	N/A	One-off grant of €200 for low-income pensioners
Cyprus	Staggered subsidy based on household vulnerability and energy consumption	Subsidy to cover up to the following increase in energy bills: <ul style="list-style-type: none"> • Vulnerable HHs: up to 100% • 1-400kwh: up to 85% • 400-600kwh: up to 75% • 600-800kwh: up to 50% Note: average electricity consumption per dwelling 400kw/m	N/A	Temporary energy VAT reduction from 19% to 5% for gas for vulnerable groups for 6m (Nov 21); re-introduced in July 2022

Approach to Cost and Benefit Analysis

QUANTIFYING THE COST

- Scope of the measure (eligibility criteria for the targeted group)
- The amount of food & energy consumed by the targeted group
- The share of gross income by the targeted group in total income

MEASURING THE BENEFIT

- The share of households saved from financial distress
- The decrease in the share of mortgage debt at risk

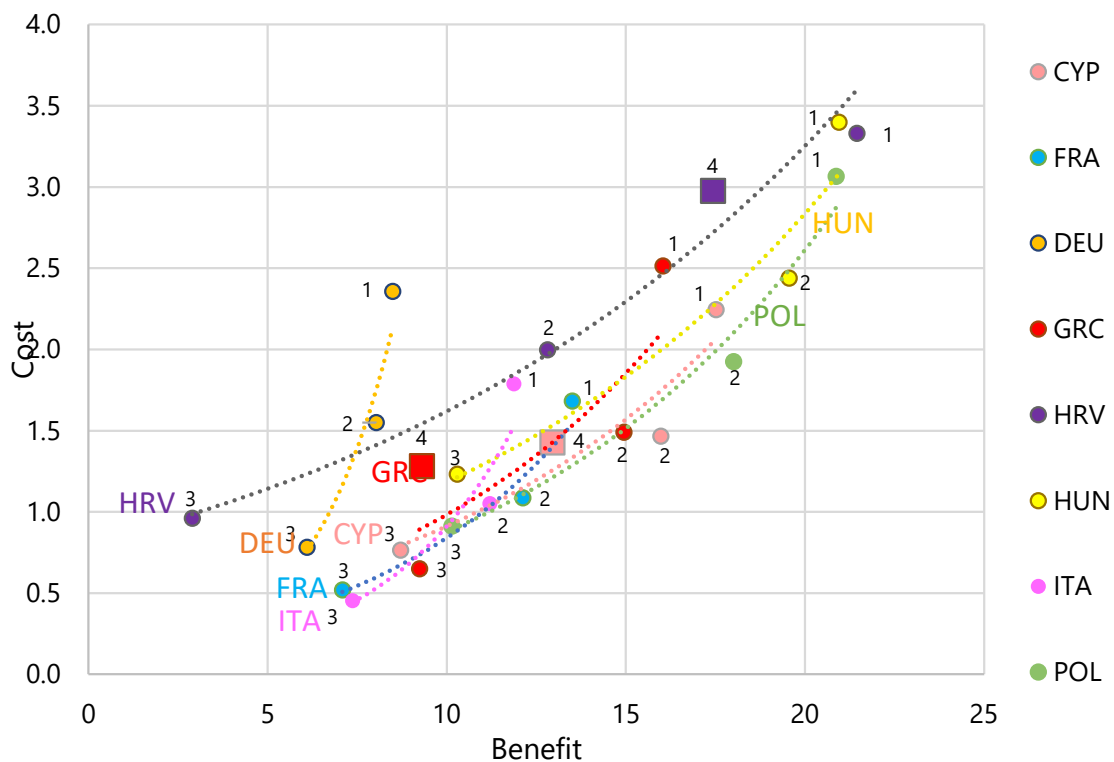
The ultimate choice of policy depends on the objective of the policy maker; for instance:

- Maximize benefit/cost ratio
- Cover all households below an income level
- Protect all households from a maximum price increase, other

A subsidy shielding the bottom tercile could prevent 7 percent of households to fall into distress at a 0.8 percent of GDP cost under the baseline

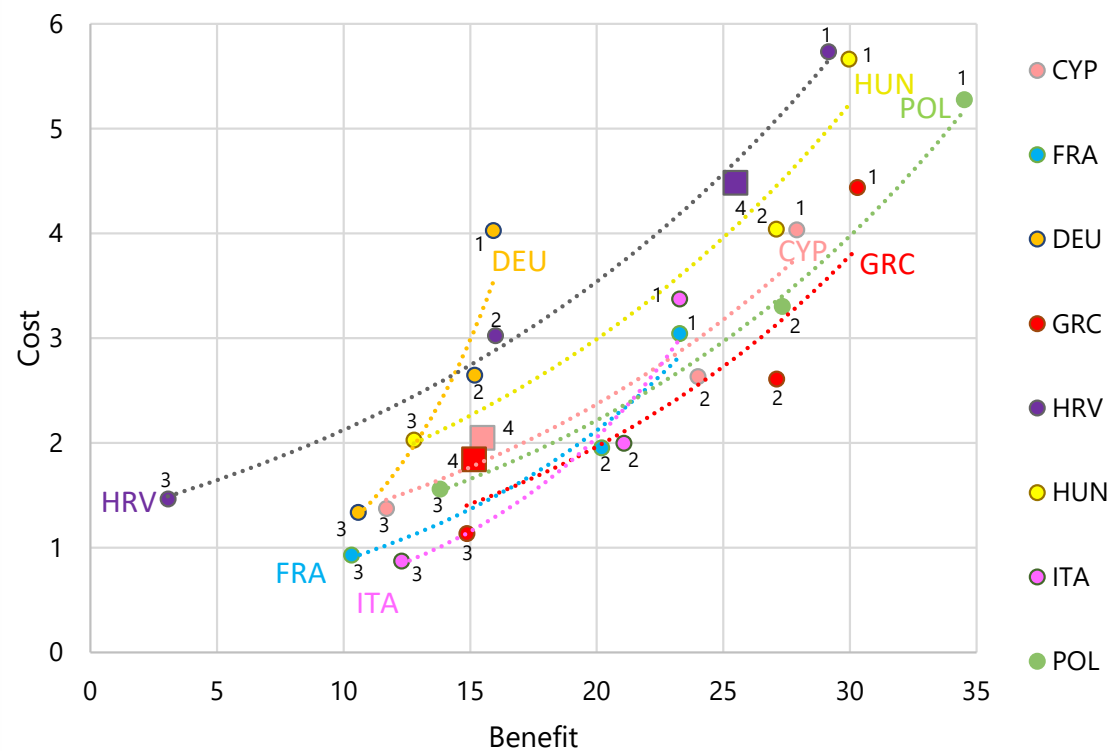
Households at Risk Saved vs Cost, Baseline

(Percent of Households; percent of GDP)



Households at Risk Saved vs Cost, Adverse

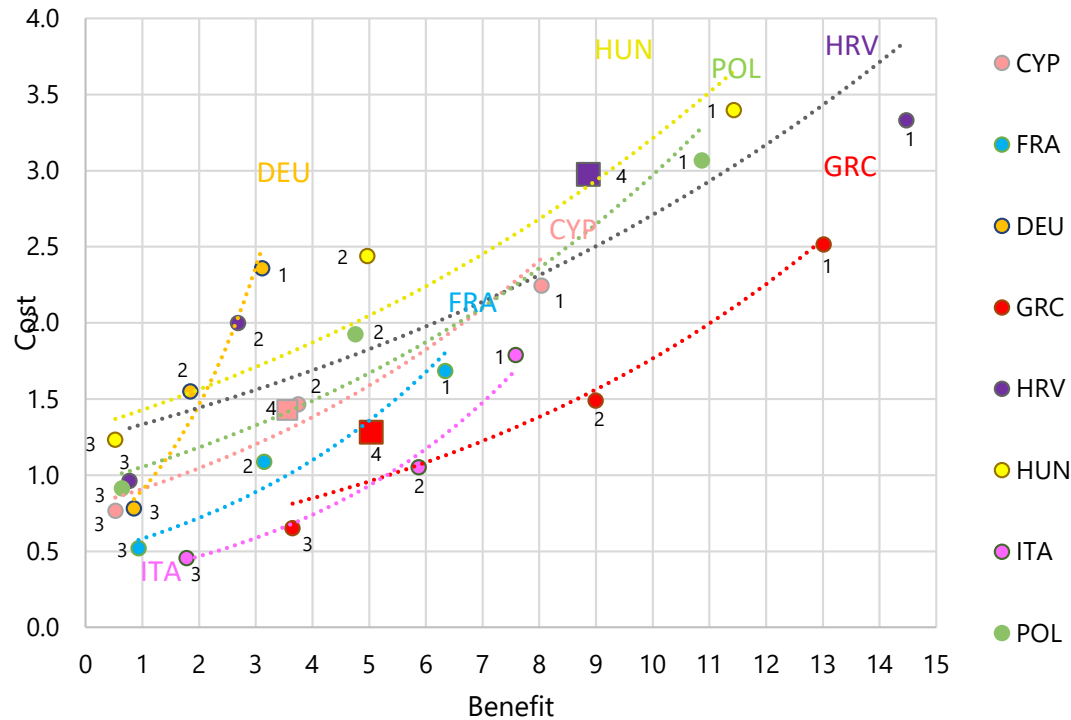
(Percent of Households; percent of GDP)



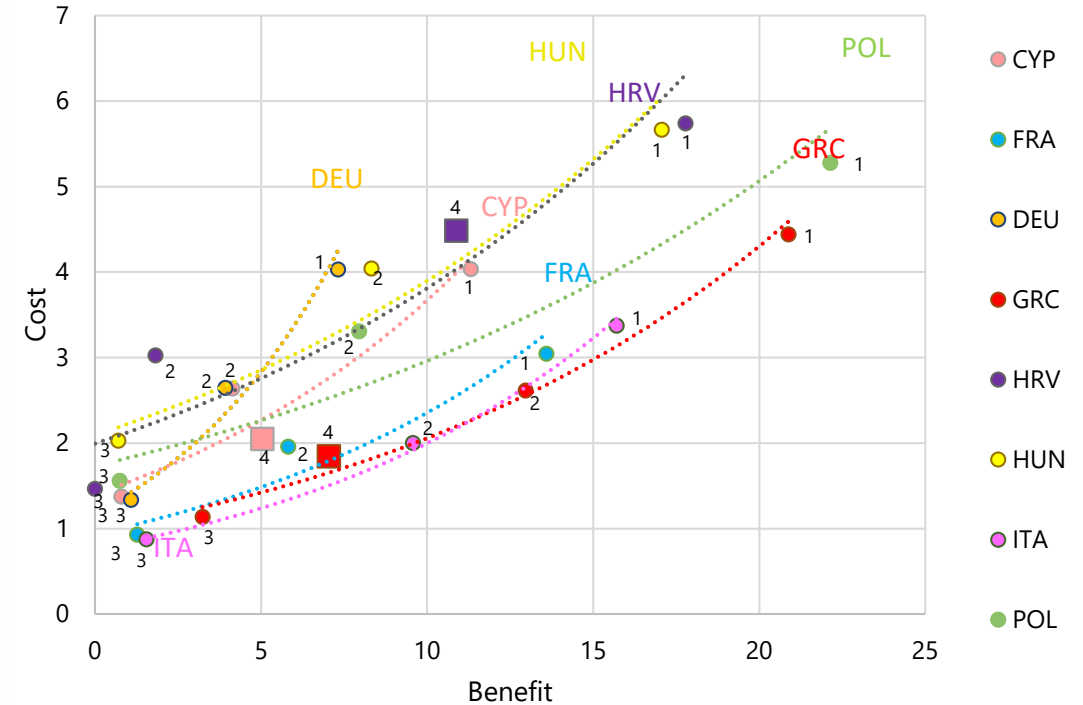
Each country is represented by a curve. The benefit of the policy is measured by the share of households saved from financial distress. The cost of the policy is measured by the estimated fiscal expenditure as a share of GDP. The chart shows four policy interventions denoted by subscript: (1) a broad targeting policy (all households are shielded from rising food and energy prices); (2) a medium targeting policy (the bottom two thirds of households are shielded from rising food and energy prices); (3) a narrow targeting policy (the bottom tercile of households are shielded from rising food and energy prices); and (4) the actual government policy. The slope of the cost-benefit curves is steeper for advanced economies (France, Germany) than for southern or emerging economies (Greece, Cyprus, Hungary, and Poland).

Protecting the lowest two thirds of households would be more cost effective to decrease the share of mortgage debt at risk

Mortgage Debt at Risk Saved vs Cost, Baseline
(Percent of Households; percent of GDP)



Mortgage Debt at Risk Saved vs Cost, Adverse
(Percent of Households; percent of GDP)



Each country is represented by a curve. The benefit of the policy is measured by the decrease in the share of mortgage debt at risk. The cost of the policy is measured by the estimated fiscal expenditure as a share of GDP. The chart shows four policy interventions denoted by subscript: (1) a broad targeting policy (all households are shielded from rising food and energy prices); (2) a medium targeting policy (the bottom two thirds of households are shielded from rising food and energy prices); (3) a narrow targeting policy (the bottom tercile of households are shielded from rising food and energy prices); and (4) the actual government policy. The slope of the cost-benefit curves is steeper for advanced economies (France, Germany) than for southern or emerging economies (Greece, Cyprus, Hungary, and Poland).

Takeaways

- There are signs of house price overvaluation of about 20 percent in most European countries
- The tightening financial conditions and rising living costs could have a significant impact on European households without policy support
- Under an intensification of the current ‘cost of living crisis’:
 - 45 percent of households could be financially stretched, holding over 40 percent of mortgage debt and 45 percent of consumer debt
 - About 80 percent of low-income households could be financially stretched
 - One third of consumers could be forced to cut back on spending accounting for 30 percent of aggregate consumption
- While the impact on the banking system is manageable, a house price correction (20 percent) could deplete up to 100-300 basis points of bank capital in some countries
- Policies protecting the bottom income tercile could be more cost efficient from an economic perspective but protecting the low- and median-income households could be more cost efficient from a financial stability perspective
- ❖ *Based on Valderrama, L, Gorse, P., Marinkov, M., and Topalova, P. (forthcoming) “European Housing Markets at a Turning Point – Risks, Households and Bank Vulnerabilities, and Policy Options, IMF Working Paper.*

Thank You

Additional Slides

Number of households in the last year of the analysis

ISO-Code	Country name	EU-SILC	HFCS
AUT	Austria	12,264	3,072
BEL	Belgium	16,074	2,329
BGR	Bulgaria	16,622	
HRV	Croatia	18,731	1,262
CYP	Cyprus	10,945	1,292
CZE	Czech Republic	18,754	
DNK	Denmark	13,467	
EST	Estonia	15,108	2,669
FIN	Finland	22,692	10,210
FRA	France	21,926	13,635
DEU	Germany		4,912
GRC	Greece	32,757	2,956
HUN	Hungary	13,035	5,962
ISL	Iceland	8,601	
IRL	Ireland	10,683	4,782
ITA	Italy	43,099	7,284
LVA	Latvia	12,714	1,246
LTU	Lithuania	8,114	1,472
LUX	Luxembourg	7,218	1,616
MLT	Malta	9,552	1,004
NLD	Netherlands	28,516	2,516
NOR	Norway	14,306	
POL	Poland	37,380	5,854
PRT	Portugal	27,695	5,886
ROU	Romania	16,861	
SRB	Serbia	15,223	
SVK	Slovakia	13,796	2,170
SVN	Slovenia	24,794	1,946
ESP	Spain	37,760	
SWE	Sweden	13,783	
CHE	Switzerland	18,191	
GBR	United Kingdom	36,703	
		597,364	84,075

- The EU-SILC dataset has information on housing living conditions for about 600,000 households in 2020 (10 million observations over 2004-2020)
- The 2017 HFCS dataset has granular information on assets, liabilities, income, and consumption for about 84,000 households.