How Vulnerable are European Households? Evidence from Microdata

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8TH EUROPEAN USER CONFERENCE FOR EU-MICRODATA

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...

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

Sources: OECD, Haver, and IMF staff calculations. The dots show cumulative growth over the referenced period.
...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.
...with signs of overvaluation at about 20 percent across Europe

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

\[ p_t = \alpha_1 + \beta_1 h_s + \beta_2 d_i + \beta_3 R_t + \varepsilon_{1t} = p^* + \varepsilon_{1t} \]

\[ \Delta p_t = \alpha_2 + \varphi_1 (p - p^*)_{t-1} + \sum_{i=0}^{n} \lambda_1 \Delta p_{t-1} + \sum_{i=0}^{n} \lambda_2 \Delta h_s_{t-1} + \sum_{i=0}^{n} \lambda_3 \Delta d_i_{t-1} + \sum_{i=0}^{n} \lambda_4 \Delta R_t_{t-1} + \varepsilon_{2t} \]

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

Source: Authors’ calculations using data from Haver, OECD, Eurostat, Hypostat, and national statistical offices.
Rising interest rates are hurting affordability

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.

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

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

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.

Sources: Statista, National Central Banks, and IMF staff calculations.
Household Vulnerabilities and Scenario Analysis
Procedure to Assess Household Vulnerability and Bank Impact

1. Scenario/Shocks
   - Country-level changes in interest rates, global commodity prices, household income, real private consumption, core inflation

2. Household Vulnerability Simulation
   - HFCS household-level simulation of financial overburden rate

3. Household Probability of Default Simulation
   - Use estimated link between financial overburden rate and PD based on household-level analysis from EU-SILC and simulated increase in financial overburden rate in Step 2 to estimate country-level increase in household PD.

4. Bank Solvency Impact Through Retail Portfolios
   - Estimate increase in provisions for mortgages and consumer loans, separately
   - Calculate the impact on bank capital ratios through additional provisions required to absorb losses
To assess the resilience of households, we conduct scenario analysis using simulation techniques.

- 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)

### Cumulative Shocks over 2022-23

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

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

\[
I_t^h \cdot (1 + \Delta inc_{T-t,j}^h)
\]

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

\[
I_t^h \cdot (1 + \Delta inc_{T-t,j}^h)
\]

\[
DSTCTI_{T,j}^i = DSECTI_{T,j}^j + Other Cons_t^i \cdot (1 + \Delta core_{T-t,j}) \]

\[
I_t^i \cdot (1 + \Delta inc_{T-t,j}^h)
\]

- \( P \) = 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...

- 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...

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.

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.

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)

Banking sectors with lower capital and higher share of mortgage loans are disproportionally 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.

- 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.

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

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

<table>
<thead>
<tr>
<th>Policy</th>
<th>Coverage</th>
<th>Energy and Food</th>
</tr>
</thead>
<tbody>
<tr>
<td>Broad</td>
<td>All households</td>
<td>Cash transfers equivalent to 100% of the increase in food and energy prices</td>
</tr>
<tr>
<td>Targeted L&amp;M</td>
<td>Low- and Median-income households</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(bottom two thirds in the income distribution)</td>
<td></td>
</tr>
<tr>
<td>Targeted L</td>
<td>Low-income households</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(bottom one third in the income distribution)</td>
<td></td>
</tr>
</tbody>
</table>
### Policy measures announced to shield consumers from rising prices

#### …and actual policies deployed by three countries

<table>
<thead>
<tr>
<th>Country</th>
<th>Coverage</th>
<th>Energy</th>
<th>Food</th>
<th>Other measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Croatia</td>
<td>Households affected by rising prices</td>
<td>Price growth cap Max 9.6% for electricity; 20% for gas</td>
<td>Lower current prices by 30%</td>
<td>Energy VAT reduction from 25% to 13% for gas and heat; temporarily to 5% for heat from April 2022 to March 2023; Lump sums for unemployed and farmers</td>
</tr>
<tr>
<td>Greece</td>
<td>Households with annual income of up to €45,000</td>
<td>Ceiling on wholesale electricity prices and refund up to 60% of all surcharges</td>
<td>N/A</td>
<td>One-off grant of €200 for low-income pensioners</td>
</tr>
</tbody>
</table>
| Cyprus  | Staggered subsidy based on household vulnerability and energy consumption | Subsidy to cover up to the following increase in energy bills:  
- 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 |

Note: Average electricity consumption per dwelling is 400kw/m.
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)

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.

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.

Thank You
Additional Slides
### Number of Households in the Last Year of the Analysis

<table>
<thead>
<tr>
<th>ISO-Code</th>
<th>Country Name</th>
<th>EU-SILC</th>
<th>HFCS</th>
</tr>
</thead>
<tbody>
<tr>
<td>AUT</td>
<td>Austria</td>
<td>12,264</td>
<td>3,072</td>
</tr>
<tr>
<td>BEL</td>
<td>Belgium</td>
<td>16,074</td>
<td>2,329</td>
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<tr>
<td>BGR</td>
<td>Bulgaria</td>
<td>16,622</td>
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<tr>
<td>HRV</td>
<td>Croatia</td>
<td>18,731</td>
<td>1,262</td>
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<tr>
<td>CYP</td>
<td>Cyprus</td>
<td>10,945</td>
<td>1,292</td>
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<td>CZE</td>
<td>Czech Republic</td>
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<td>DNK</td>
<td>Denmark</td>
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<td>EST</td>
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<td>Finland</td>
<td>22,692</td>
<td>10,210</td>
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<tr>
<td>FRA</td>
<td>France</td>
<td>21,926</td>
<td>13,635</td>
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<td>DEU</td>
<td>Germany</td>
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<td>4,912</td>
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<tr>
<td>GRC</td>
<td>Greece</td>
<td>32,757</td>
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<td>HUN</td>
<td>Hungary</td>
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<tr>
<td>GBR</td>
<td>United Kingdom</td>
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</tbody>
</table>

- 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.