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European Housing Markets at a Turning Point

Risks, Household and Bank Vulnerabilities, and Policy Options

Laura Valderrama, Patrik Gorse, Marina Marinkov, and
Petia Topalova

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WORKING PAPER

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European Housing Markets at a Turning Point – Risks, Household and Bank Vulnerabilities, and Policy Options

Prepared by **Laura Valderrama, Patrik Gorse, Marina Marinkov, and Petia Topalova**

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ABSTRACT: European housing markets are at a turning point as the cost-of-living crisis has eroded real incomes and the surge in interest rates has made borrowers more vulnerable to financial distress. This paper aims to (i) shed light on the risks in European housing markets, (ii) quantify household vulnerabilities, (iii) assess banking sector implications and (iv) examine policies' effectiveness using simulations based on microdata from the Household Finance and Consumption Survey (HFCS) and EU statistics on income and living conditions (EU-SILC). Under the baseline IMF macroeconomic forecast, the share of households that could struggle to meet basic expenses could rise by 10 pps reaching a third of all households by end 2023. Under an adverse scenario, 45 percent of households could be financially stretched, representing over 40 percent of mortgage debt and 45 percent of consumer debt. The impact on the banking sector seems contained under the baseline forecast, though there are pockets of vulnerability. A 20 percent house price correction could deplete CET1 capital by 100-300 basis points. Fiscal measures, such as subsidies to the bottom income tercile, could save 7 percent of households from financial distress at an estimated cost of 0.8 percent of GDP.

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WORKING PAPERS

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Prepared by Laura Valderrama, Patrik Gorse, Marina Marinkov, and Petia Topalova¹

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Glossary

BdP	Banco de Portugal
BBM	Borrower-based measure
BoE	Bank of England
CCyB	Countercyclical capital buffer
CESEE	Central, Eastern and Southeastern Europe
DSTI	Debt service to income ratio
DSECTI	Debt service and essential consumption to income ratio
DSTCTI	Debt service and total consumption to income ratio
DTI	Debt to income ratio
EA	Euro Area
EBA	European Banking Authority
EC	European Commission
ECB	European Central Bank
EE	Emerging Europe
EPG	Energy Price Guarantee
ESRB	European Systemic Risk Board
EE	Emerging Europe
EU	European Union
EU-SILC	EU Statistics on Income and Living Conditions
HBS	Household Budget Survey
HFCS	Household Finance and Consumption Survey
HIPC	Harmonized index of consumer prices
IRB	Internal ratings-based
LGD	Loss given default
LTI	Loan to income ratio
LTV	Loan to value ratio
NFCs	Non-financial corporations
OECD	Organization for Economic Co-operation and Development
PD	Probability of default
PTI	Price to income ratio
PTR	Price to rent ratio
RRE	Residential real estate
WEO	World Economic Outlook

I. Introduction

Housing markets across Europe show growing signs of over-valuation, raising risks of a downturn with broader financial stability implications. These risks are amplified by the confluence of shocks that have hit households and reduced housing affordability over the past couple of years. Surging inflation in 2021-22, fueled by the energy crisis, has forced central banks to sharply raise interest rates and, as a result, financial conditions have tightened. Mortgage rates have at least doubled in most European countries in 2022, and have tripled in Finland, Slovakia, Switzerland, and the United Kingdom. High inflation has also reduced households' real disposable incomes, further eroding housing affordability. Many buyers stretched their budgets to get on to the property market during the COVID-19 pandemic real estate boom and now have to refinance their mortgages at much higher rates. For prospective buyers, still high property values, surging mortgage rates and lower real incomes pose a growing barrier to homeownership.

The cost-of-living crisis and the tightening of financial conditions have raised broader household solvency concerns, with potential spillovers to the banking sector and the real economy. With budgets stretched by higher food and energy expenditures and higher debt service, the risk that indebted households default on loans or sharply reduce their spending has increased. Stretched households may be unable to service their loans, particularly those with adjustable rates, causing defaults, and eroding banks' capital position, which could potentially curtail credit supply, and create adverse macrofinancial feedback loops. And while some housing market adjustment could bring relief to new buyers, a sharp house price correction would raise the loan-to-value ratios of existing mortgages and increase banks' provisioning needs. Borrowers with negative home equity could also be more likely to default in the face of liquidity pressures in some countries (Bhutta et al, 2010).¹ Beyond default risks, households may also need to adjust their spending as essential items and debt service take up a larger share of their income, reducing aggregate consumption, and amplifying the macroeconomic downturn.

European governments are under pressure to address higher living costs, and housing affordability concerns, but achieving these goals simultaneously and cost-effectively is challenging. Since 2021, European countries have earmarked around EUR 770 billion to shield consumers from soaring energy prices (Sgaravatti et al, 2023). Some countries have also taken measures to help borrowers with rising mortgage payments by introducing temporary interest rate caps on floating loans (e.g., Hungary), issuing moratoria on mortgage payments (e.g., Poland, Romania), encouraging the restructuring of adjustable-rate mortgages (Portugal, Spain), or making aid to cover mortgage interest payments more accessible (United Kingdom). To strengthen bank balance sheets in the face of a potential housing downturn, many authorities have tightened macroprudential policy since 2021 (ESRB, 2023; Valderrama, 2023). Some countries, such as the Netherlands, have also lowered taxes on housing transactions for young borrowers and set binding targets to speed up the construction of social housing in order to support housing affordability and real estate market stability.

Against this backdrop, this paper aims to (i) shed light on the risks of potential house price reversal in a large set of European countries, (ii) quantify the ability of European households to continue servicing their debt obligations and maintain consumption under the baseline macroeconomic forecast and in adverse scenarios, (iii) assess the banking sector implications of a potential increase in default rates and (iv) examine policies'

¹ This is likely to differ across countries depending on their legal and institutional frameworks, as well as on housing finance structures.

effectiveness in reducing household vulnerabilities and preserving financial stability. We address the following questions:

- What is the potential for house price reversals across Europe, and how does it vary across countries? Could housing markets cool off further in the coming quarters as interest rates surge?
- What is the incidence of financially and economically overburdened households in Europe? How would it evolve under the baseline IMF macroeconomic forecast and under adverse assumptions about interest rates, food and energy prices, and wage growth? Which types of households are most likely to be negatively affected?
- What is the likely ‘mortgage debt at risk’ and ‘consumer debt at risk’? How large would be the risks to aggregate private consumption under various scenarios?
- What would be the financial sector implications of a potential rise in household defaults?
- What could be cost-effective policies to provide temporary relief to struggling households? Is there scope to improve the effectiveness of the fiscal measures announced in some countries?
- How should macroprudential policies respond if the housing market downturn deepens and household balance sheet stress rises further?

To answer these questions, this paper combines a variety of databases and relies on empirical and simulation techniques. First, we use country-level data to empirically estimate the extent to which housing prices deviate from model-predicted values in recent quarters. We then combine microdata from two major European surveys, the 2020 EU Statistics on Income and Living Conditions (EU-SILC), and the latest (2017) Household Finance and Consumption Survey (HFCS),² to quantify the share of financially and economically overburdened households under the baseline IMF macroeconomic forecast and adverse scenarios. We also use data from the European Banking Authority (EBA) Risk Dashboard and macro data from Eurostat, and national data sources to compute the likely impact of a potential rise in default rates on the banking sector. Finally, detailed policy announcements underpin the evaluation of select policy support measures.

The main findings from this paper are as follows:

- **There are growing signs of over-valuation in housing markets across Europe, in the order of 15 to 20 percent in most countries.** Risks of a downturn are amplified by rising household balance sheet pressures stemming from higher mortgage rates and lower real incomes (due to high energy/food/broader inflation), which have reduced housing affordability.
- **Rising living costs and interest rates are stretching household finances.** The share of households who could struggle to afford basic expenses is likely to increase by 10 percentage points under the baseline projections for 2023, reaching one-third of all households for the average European

² The HFCS survey is aged forward in time to 2021 to create a timely dataset that incorporates the evolution of household balance sheets during the pandemic.

country. One out of four consumers could pull back on spending amid real income losses in the baseline.

- **Further shocks could weaken households' financial health even more.** Under the worst-case scenario, 45 percent of households could be financially stretched on average, holding over 40 percent of mortgage debt and 45 percent of consumer debt. One third of consumers may be forced to cut back on consumption of non-essential goods to afford basic expenses, accounting for 30 percent of aggregate consumption.
- **Lower-income households are particularly vulnerable** as they spend a higher share of their income on essential goods and housing costs. The share of overburdened households among the bottom income tercile could reach between 70 and 80 percent, compared to just 7 and 13 percent of the top income tercile. Higher mortgage rates would make it harder for median-income households to afford mortgage repayments, as they tend to hold larger loans relative to their income. Vulnerabilities vary significantly across countries reflecting the extent of household leverage, ability to cut non-essential consumption, and prevalence of floating mortgage rates.
- **Impacts on bank balance sheets would generally be contained, though there are pockets of vulnerability.** In the absence of a major house price correction and assuming banks have built adequate provisions for existing risks, capital depletion would likely not exceed 100 basis points in most countries. A 20 percent house price correction would push up losses into the 100-300 basis points range, with Southern and Eastern European countries most severely affected.
- **Policies can ease the impact of higher living costs and rising mortgage payments on households but targeting greatly enhances their cost effectiveness.** A subsidy that shields the bottom income tercile from the food and energy price surge in 2022-23 can save about 7 percent of households from financial distress at an estimated cost of 0.8 percent of GDP under baseline projections. From a financial stability perspective (i.e. reducing mortgage debt at risk), policies with broader reach could be more cost effective since richer households are more likely to have mortgages. However, because they weaken monetary policy transmission and create moral hazard, such policies should be well-designed, at least partially targeted, and with clear sunset clauses.
- **Macroprudential authorities should closely monitor developments and adjust policy settings as needed.** Under baseline conditions, countries with elevated vulnerabilities should consider tightening sectoral capital buffers to enhance banking system resilience to future shocks. Excessive mortgage debt growth combined with house price overvaluation may warrant tightening of borrower-based measures (BBMs) to mitigate the build-up of systemic risk. A sharp downturn, however, may require the swift release of capital-based measures to enable banks absorb losses and support lending activity and a potential BBM easing to reduce the likelihood of adverse macro-financial feedback loops.

This paper contributes to several strands of literature.³ First, it provides new estimates of house price gaps in selected countries in Europe. House price gaps have been examined in multi-country (Cerutti et al, 2017), and single-country (Turk, 2015) contexts. More recently, Igan et al (2022) argue that shifting demand patterns explain some of the house price increases during the pandemic, however, there are signs of overheating that pose downside risk.

Second, the paper quantifies the vulnerability of European households to adverse macroeconomic conditions and a housing market correction and the implications for the financial sector and aggregate consumption. Risks in the residential real estate sector and associated financial stability concerns have been increasingly scrutinized by policy institutions across Europe, including the ESRB (2022a). Numerous central banks have flagged the risk that indebted households could default on their loans or cut back on consumption as rising living costs and higher interest rates erode their budgets. While several recent papers simulate the share of financially-stretched households using single-country (BoE, 2022; BdP, 2022; Latvijas Banka, 2022) or cross-country (ECB, 2022) perspectives, this paper explicitly models the interaction between household finances and default and estimates the possible adjustment in consumption as households struggle to pay housing costs and basic expenditures.⁴ More broadly, contrary to existing studies, this paper builds a joint framework to assess household stress, default risk, and consumption risk that addresses the interrelations between them for a broad set of countries in Europe under a range of macrofinancial scenarios. The paper leverages this framework to quantify the costs and benefits of recent policy interventions aimed at shielding vulnerable households from rising costs of living and financial distress.⁵

The rest of the paper is organized as follows. Section II looks at a range of indicators of systemic risk in the European housing market and presents new estimates of deviations of house prices from model-predicted values across select markets in Europe. Section III documents housing affordability and introduces a cost-of-living adjusted measure of household *vulnerability*. Using a simulation approach, Section IV estimates the share of financially and economically vulnerable households under a range of macrofinancial scenarios and tracks the evolution of stressed households grouped by characteristics including income, tenure status, and financial position. It then projects the amount of mortgage-debt-at-risk, retail loans-at-risk, and consumption-at-risk. Section V quantifies the impact of households' weaker debt servicing capacity on the banking sector. Section VI presents a cost-benefit analysis of fiscal support measures deployed by governments during the energy crisis to alleviate households' financial burdens. Section VII discusses the policy implications of the analysis and concludes.

³ The importance of the housing market for financial stability and the macroeconomy is reflected in a vast theoretical and empirical literature. Duca et al (2021) provide an overview of recent efforts to incorporate housing into macroeconomic models. The implications of real estate booms and busts for monetary and macroprudential policy in Europe have been examined by Muellbauer (2022), for example. OECD (2021) provides insights for the design of housing policies to support sustainable housing and housing affordability.

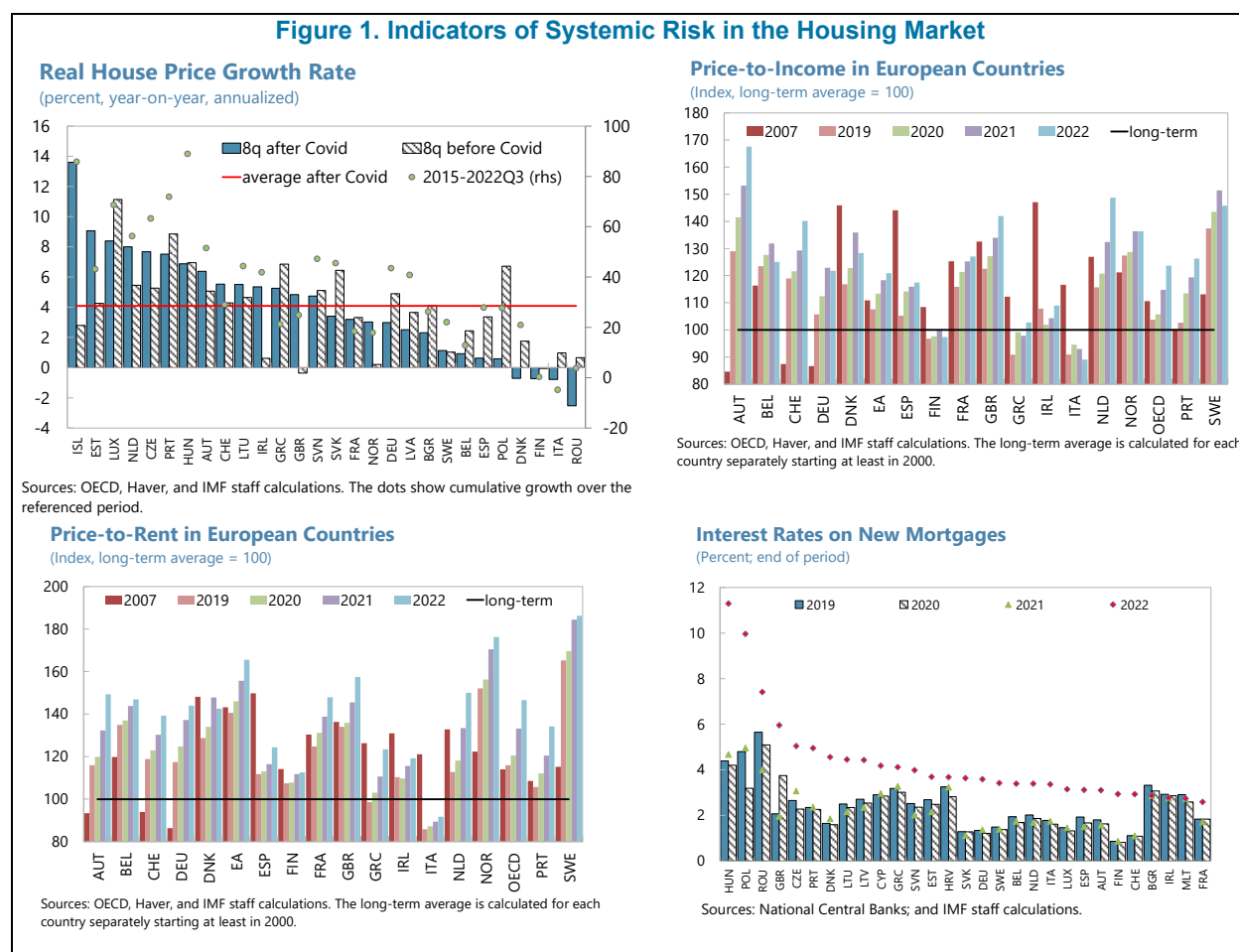
⁴ The ECB (2022) considers that households default when they exhaust their liquid buffers.

⁵ While Arregui et al (2022) find that most fiscal policies aimed at cushioning the impact of the energy crisis on households and firms are untargeted, they do not measure the benefits of government support in terms of avoided household balance sheet stress and financial sector stability.

II. Indicators of Systemic Risk in the Housing Market

Recent Trends

Many indicators point to a build-up of systemic risk in the European housing market. Since 2015, real house prices grew by 40 percent across Europe, and almost doubled in Hungary, Iceland, and Portugal (Figure 1). Because incomes have grown much more slowly, the difference between the price-to-income ratio and its long-term trend has widened significantly since 2019 in most countries, reaching about 25 percent on average in 2022Q3. Likewise, price-to-rent ratios are roughly 40 percent above their historical averages.



While several factors have supported prices, including low interest rates, a resilient labor market, and shifting demand for ownership, risks of a correction have risen. Price-to-rent ratios have increased significantly since 2018 (Figure 2). At the same time, real house prices are already falling in several markets. It is not surprising that authorities across Europe have assessed the systemic risk in the residential real estate sector to be elevated and have expressed concern about possible price reversals with implications for financial stability (ESRB, 2022b).

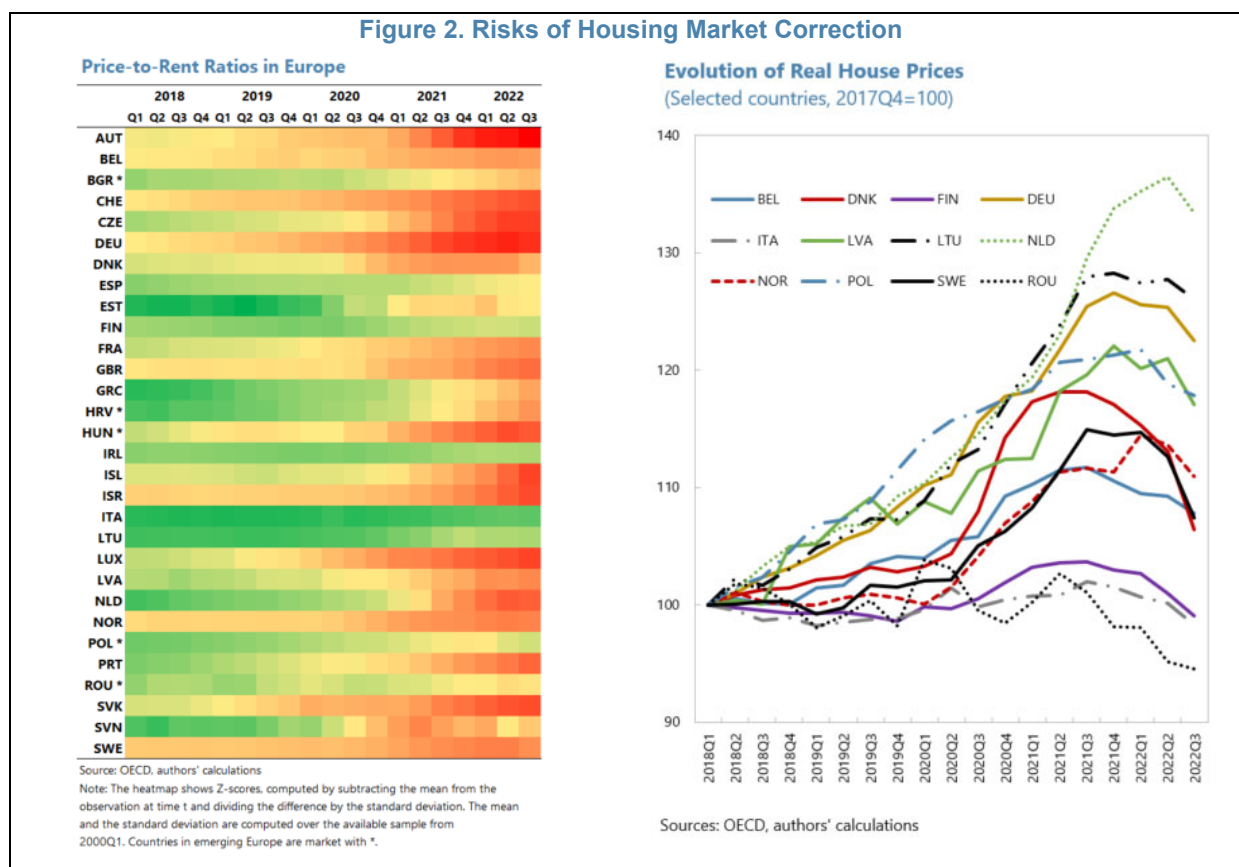
What is the Extent of Overvaluation?

To assess the extent of house price overvaluation, we use a cointegration approach that relates house prices to fundamentals. Following the literature, this approach estimates predicted equilibrium values for house prices derived from theoretical supply and demand determinants.⁶ As in Turk (2015), the observed real housing price (p) is expressed as a function of the long-run equilibrium real housing price (p^*) which is determined by supply (housing stock, hs) and demand factors (real household disposable income, di , and real mortgage interest rate, R):

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

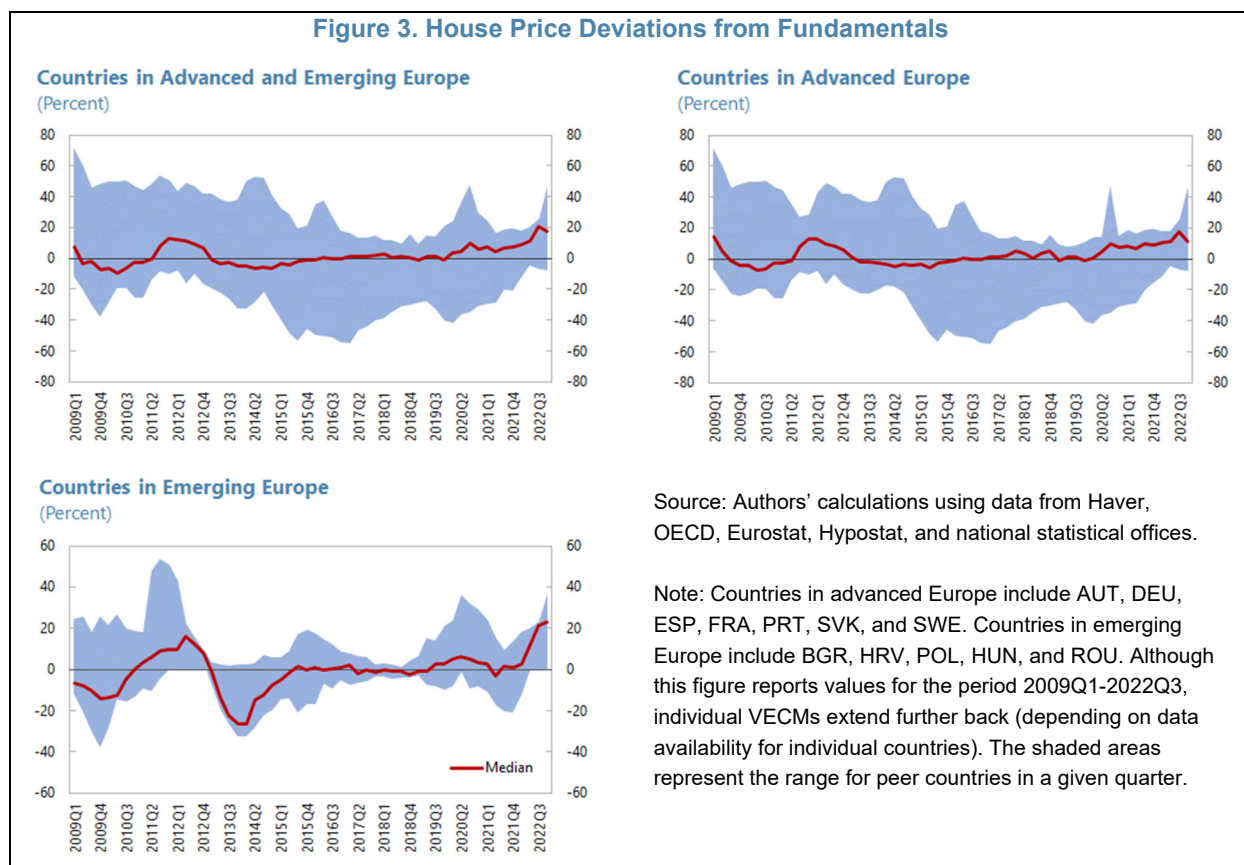
$$\Delta p_t = \alpha_2 + \varphi_1(p - p^*)_{t-1} + \sum_{i=0}^n \lambda_1 \Delta p_{t-1} + \sum_{i=0}^n \lambda_2 \Delta hs_{t-1} + \sum_{i=0}^n \lambda_3 \Delta di_{t-1} + \sum_{i=0}^n \lambda_4 \Delta R_{t-1} + \varepsilon_{2t} \tag{2}$$

Equation (1) is estimated as a vector error-correction model (VECM), where the term $(p - p^*)$ is the proxy for house price over-/ under-valuation and φ_1 measures the speed of adjustment of house prices to their equilibrium. Lags of supply and demand variables are included in equation (2) to reflect adjustment dynamics not fully captured by the error correction term $(\varphi_1(p - p^*)_{t-1})$. Equation (2) is then estimated individually for selected European countries.



⁶ See for example, Ott (2014), Turk (2015), and Geng (2018), among others.

There are growing signs of over-valuation in housing markets across Europe. The VECM estimates put over-valuation in 2022Q4 at around 15 to 20 percent in most countries (Figure 3).⁷ For advanced economies, the over-valuation trend began around the start of the pandemic, whereas for emerging economies house price over-valuation became more prominent towards the end of 2021.⁸ For both groups of countries, over-valuation seems to be slowing in 2022Q4. The speed of adjustment ranges from country to country, but on average points to a gradual adjustment in housing prices, with about 20 percent of disequilibria corrected over one year.



III. Measuring Household Vulnerability Using Microdata

Defining Household Vulnerability

Policymakers are warning of rising numbers of *vulnerable* households (BoE, 2022; ECB, 2022; ESRB, 2022a), but a common definition of vulnerability is lacking. There is no perfect measure of household vulnerability. A commonly used proxy is the housing cost overburden rate, calculated as the proportion of households who

⁷ Not reported in the paper, but available upon request.

⁸ In Lithuania, the estimated extent of misalignment during the pandemic is significantly less pronounced than the overvaluation prior to the global financial crisis (Cevik and Naik, 2023).

spend more than 40 percent of their disposable income on housing costs, including mortgage interest, rent, insurance, regular maintenance and repairs, and utilities (OECD, Eurostat). However, while housing expenditure-to-income ratios capture the financial burden of housing costs, the 40 percent threshold may not be consistently meaningful across the income distribution (low-income households may have little money left for key consumption items) or across countries (the threshold should depend on the cost of living in different places). Another common measure of vulnerability is household income. Low-income households are more likely to cross the poverty line if they experience a sudden loss of income. However, they may be less financially vulnerable, as they are less likely to have bank loans than households towards the median of the income distribution. An alternative indicator of vulnerability is household leverage. This measure tends to exclude lower income households, which are less likely to be indebted despite being disproportionately affected by a surge in consumer prices.⁹

We construct a cost-of-living-adjusted measure of vulnerability tailored to the current macrofinancial environment. The measure aims to capture the budget pressure that European households are experiencing due to the 2022 cost-of-living crisis and the tightening of financial conditions. We first define essential payments as the amount a household needs to spend on housing costs (e.g., mortgage repayment and/or rent), basic expenses (food, and utilities) and other debt repayments (e.g., consumer loans). A household is considered vulnerable - more likely to default on debt or cut back consumption - if essential payments consume more than 70 percent of income. The 70 percent affordability threshold is derived based on (i) the level of mortgage costs as a share of income at which households become more likely to default on their mortgage loans, estimated to be around 40 percent in most countries (Section V), and (ii) the share of income spent on non-housing essential payments, estimated to be 30 percent of income.¹⁰

Combining Microdata Sources to Assess Vulnerability

Understanding the impact of housing market developments and the energy crisis on household finances requires using microdata. To track and then simulate the evolution of household balance sheets under various scenarios, we need to account for the heterogeneity in household finances across household characteristics such as housing tenure, income distribution, and financial position. This allows us to identify vulnerable households who may be at risk of default and stretched consumers who may adjust their spending to make ends meet.

We combine two micro datasets—HFCS and EU-SILC—to create a granular dataset of household-level financials. The HFCS survey collects household-level data on finances and consumption in the euro area through a harmonized survey. HFCS provides rich data on balance sheets, payments, income, consumption but is available only every three years (the most recent being from 2017) and lacks loan default data. We use the HFCS to predict household financial stress and consumption patterns using a simulation approach. The EU-SILC survey collects timely and comparable cross-sectional and longitudinal data on income, housing,

⁹ Also, households with debt tend to have higher income on average than the rest of the households within the same income quantile. For instance, in Portugal, the average income of indebted households is 20 percent higher than that of all households in the first quantile (Banco de Portugal, 2022).

¹⁰ In section V, we provide evidence that the likelihood of being in arrears on outstanding loans is significantly higher for households whose essential expenses exceed 70 percent of income. The Bank of England also uses a 70 percent cost-of-living adjusted mortgage debt-servicing threshold to assess vulnerable households (BoE, 2022). The ECB uses a cost-adjusted disposable income ratio and assumes that a household becomes illiquid (and defaults) if his or her liquid assets cover less than one month of non-essential consumption.

labor, and well-being in Europe. The survey is conducted annually and contains information on loan arrears and material deprivation of households in the EU and 11 non-EU countries. This allows documenting current housing conditions across Europe. It also enables the estimation of delinquency rates on outstanding loans conditional on the financial position of each household. To estimate the increase in default rates from changes in the share of distressed households we combine results from the two exercises. We rely on HFCS survey to measure the share of consumers that could sharply reduce their spending to meet debt service obligations and essential consumption.

Aging HFCS Data Forward Through Time

To create a timely dataset, we bring forward households' balance sheets, income and consumption from the 2017 HFCS wave to end-2021. The most recent HFCS survey is from 2017.¹¹ Given the changes in households' liabilities and consumption patterns during the pandemic and subsequent recovery, we age the 2017 HFCS data to have updated information of households' balance sheets in 2021, the starting point of the simulations, following an approach similar to Krimmel et al (2013) and Ampudia et al (2016). The aging process involves updating the 2017 levels of incomes, household debt, interest payments, consumption, and prices using the growth rates of proxies for these variables in aggregate statistics over 2018-21.

- **Income.** We extrapolate each household's income using the cumulative growth in the country's gross disposable income per capita provided by Eurostat.¹²
- **Debt.** Updating household debt is more challenging as some households may offset principal repayment since 2017 with new borrowing, while others may fully amortize debt and be replaced by new borrowers. Moreover, as house prices outpaced income during 2018-21 (Figure 1), new borrowers likely entered the loan market at higher leverage ratios than previous vintages. At the same time, some households may have de-risked their balance sheets by pre-paying their debt with savings accumulated during the pandemic. To take these behavioral patterns into account, we project the change in nominal debt for each household by matching the aggregate path in gross debt-to-income ratios at the country level.
- **Interest payments.** We assume that interest payments on adjustable-rate loans track the evolution of lending rates as reported by central banks.
- **Consumption.** While we assume no change to the structure of the real consumption basket, we allow for adjustments in the amount of total consumption to match changes in real consumption per capita by country.
- **Prices.** Changes in the price of food and energy follow global wholesale prices sourced from IMF's WEO while the value of non-essential goods and services is adjusted by core inflation.
- **Durable consumption.** We estimate durable consumption by mapping the sub-components included in the HFCS survey to the consumption basket in the harmonized index of consumer prices (HICP). The HFCS survey shows the amount spent on goods and services and some sub-items of consumption (e.g., food, utilities, trips) but excludes consumer durables (e.g., cars), rents, regular maintenance of dwellings, and insurance policies. Using the composition of the HICP by country, we impute a level of consumption of excluded items at the household level by matching the sub-categories covered in both the HFCS and the HICP and scaling the amount spent on non-essential

¹¹ The release of the 2020 HFCS wave is expected by June 2023 within the Eurosystem and by June 2024 for external users.

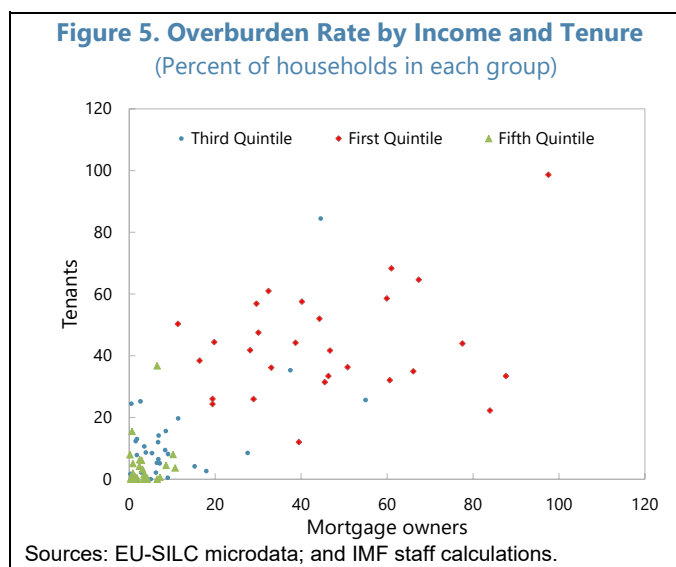
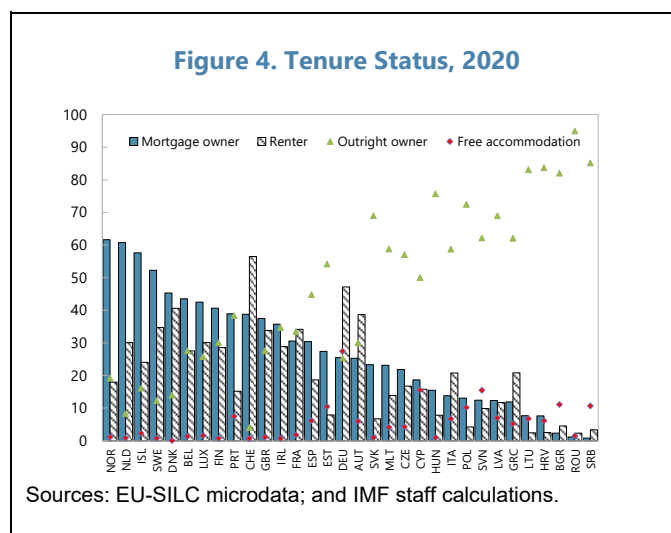
¹² This process keeps the relative income across households unchanged.

consumption (excluding rents) at the household level. This procedure allows taking into account key characteristics of households, such as their income level or the share of income spent on essential goods (food, utilities, rents).¹³

Housing Affordability across Europe

Base on the 2020 EU-SILC survey to document housing affordability – using the *wider definition* of housing costs that also include regular maintenance and repairs, taxes and utilities as a share of income, three key patterns emerge.¹⁴ First, housing affordability varies significantly based on a household tenure status (namely, whether the household has a mortgage, rents, owns their housing or receives free accommodations). Second, the burden of housing costs is significantly higher for lower-income households. Third, even accounting for tenure status and income distribution, there are wide differences across European countries in the overburden rate, namely the share of households for whom housing costs take up more than 40 percent of income.

The burden of housing costs depends on households' tenure status, which varies widely across Europe. In all countries, except for Switzerland, homeowners are more common than tenants (Figure 4). In the Nordic countries and the Netherlands, owners with mortgages are the most common tenure type. By contrast, in Central Eastern and Southeastern European Economies (CESEE), outright owners dominate, as many tenants exercised the option to purchase their dwelling at low prices after the fall of communism (OECD, 2021). In most countries, tenants are more likely to be overburdened by housing costs (Figure 5). Across Europe, 1/4 of tenants face a substantial financial burden from housing costs, compared with 1/5 of mortgage owners, with significant cross-country variation. In Greece and Serbia more than half of tenants are overburdened. Latvia and Malta show the lowest rate of overburdened tenants, with an overburden rate below 10 percent (Figure 6).

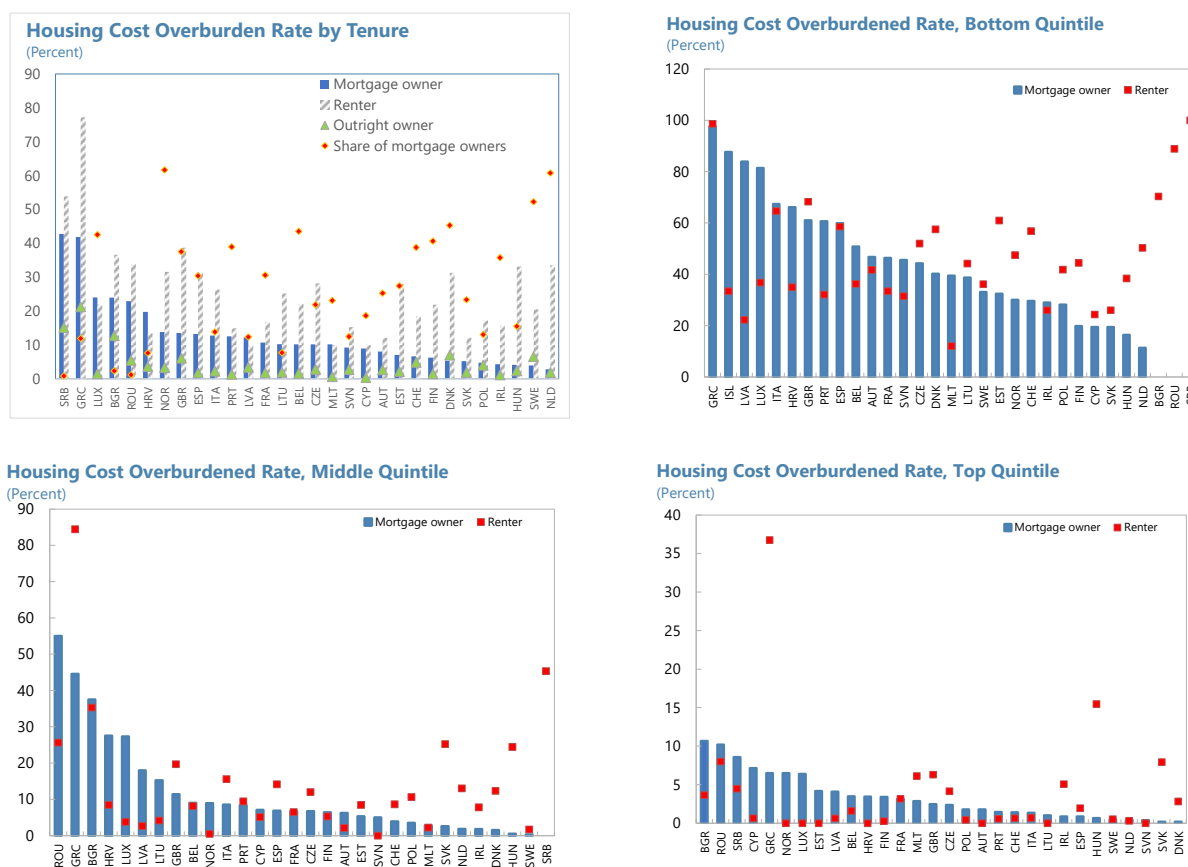


¹³ Another approach is to perform statistical matching to assess links between different consumption items that do not co-exist in the same survey, e.g., HFCS and the Household Budget Survey (HBS). See Lamarche (2017). We estimate that households' spending on durables, renovations, and insurance represents between 8 and 20 percent of their expenditure on non-essential items, with a smaller share in Central Eastern and Southeastern European (CESEE) countries.

¹⁴ This definition includes house renovations which are typically correlated with house prices, and therefore, could push up housing costs in countries with house price overvaluation.

However, this largely conceals a composition effect as lower-income households are more likely to be renters. Housing costs as a share of income are highest for households in the bottom quintile of the income distribution and lowest among the highest quintiles. On average, almost half of the poorest households are overburdened by housing costs irrespective of their tenure status, underlining the dominant role played by income compared to home ownership status in determining the likelihood that a household is overburdened. Among the better-off households, those with a mortgage are twice more likely to be overburdened than tenants (Figure 6).

**Figure 6. Share of Households Overburdened by Housing Costs
(Housing Cost Overburden Rate by Tenure Status and Income Distribution)**



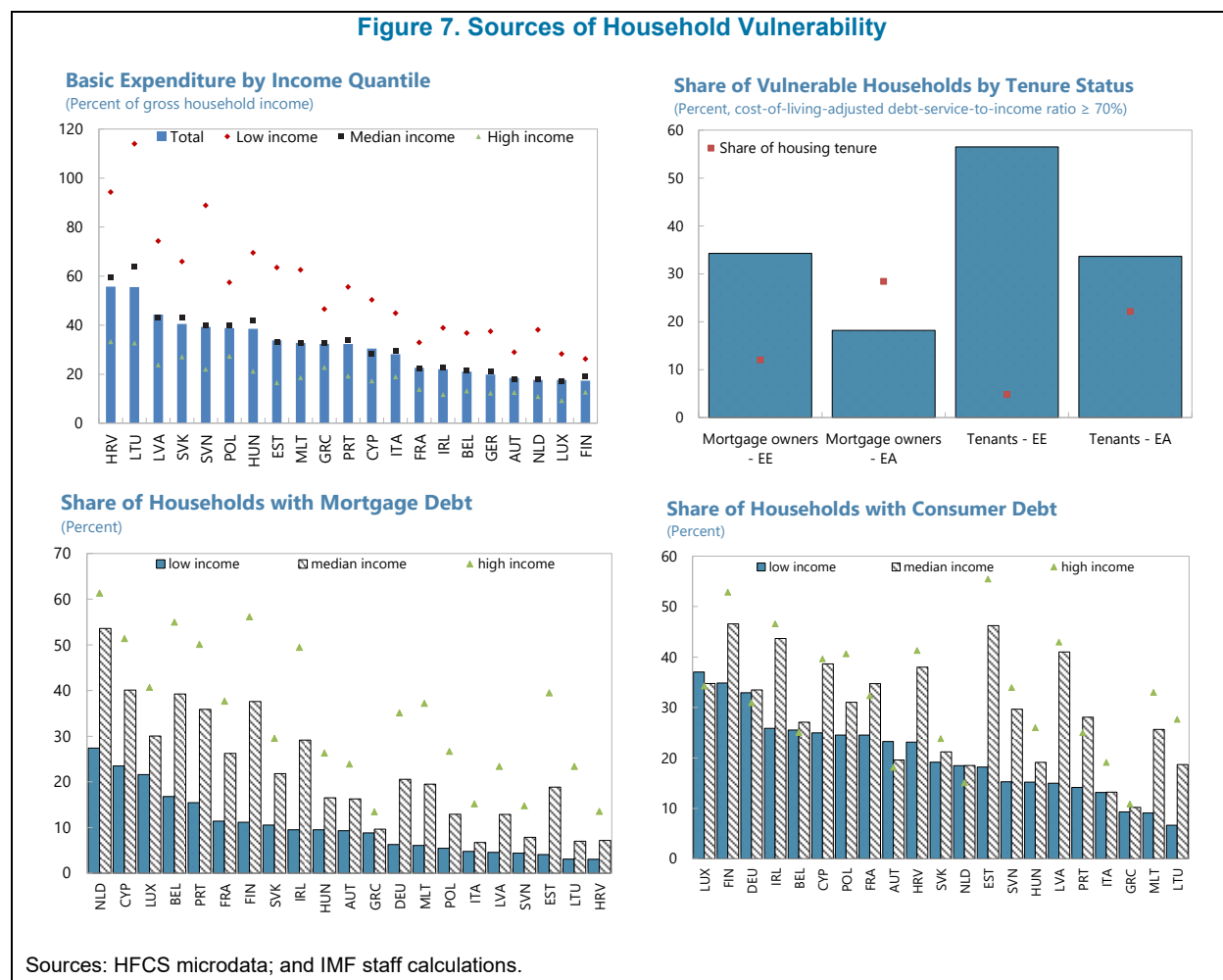
Sources: EU-SILC microdata; national authorities (Luxembourg); and IMF staff calculations.

Note: The housing cost overburden rate measures the proportion of households that spend more than 40 percent of their disposable income on housing costs (Eurostat methodology). Housing costs refer to the wider definition that includes mortgage costs (principal repayment and mortgage interest), rent, the costs of mandatory services and charges, regular maintenance and repairs, taxes, and utilities. The charts show household overburden rates by equivalized disposable income which is the total income net of tax and other deductions, divided by the number of household members converted into equalized adults.

What is the Share of Vulnerable Households in Europe?

Going beyond the financial burden of housing, analysis of the aged HFCS reveals that in many European countries, low- and even middle-income households spend a large share of their income on basic consumption,

making them vulnerable to increases in the cost of living (Figure 7). The median middle-income household spends about 1/3 of their gross income on food and utilities, with the share being significantly higher, at almost 1/2, for lower-income families. The burden is highest in Lithuania and Croatia, where middle-income households spend around 60 percent of their income on basic needs, and is lowest in Luxembourg, Austria, the Netherlands, and Finland, at about 20 percent.

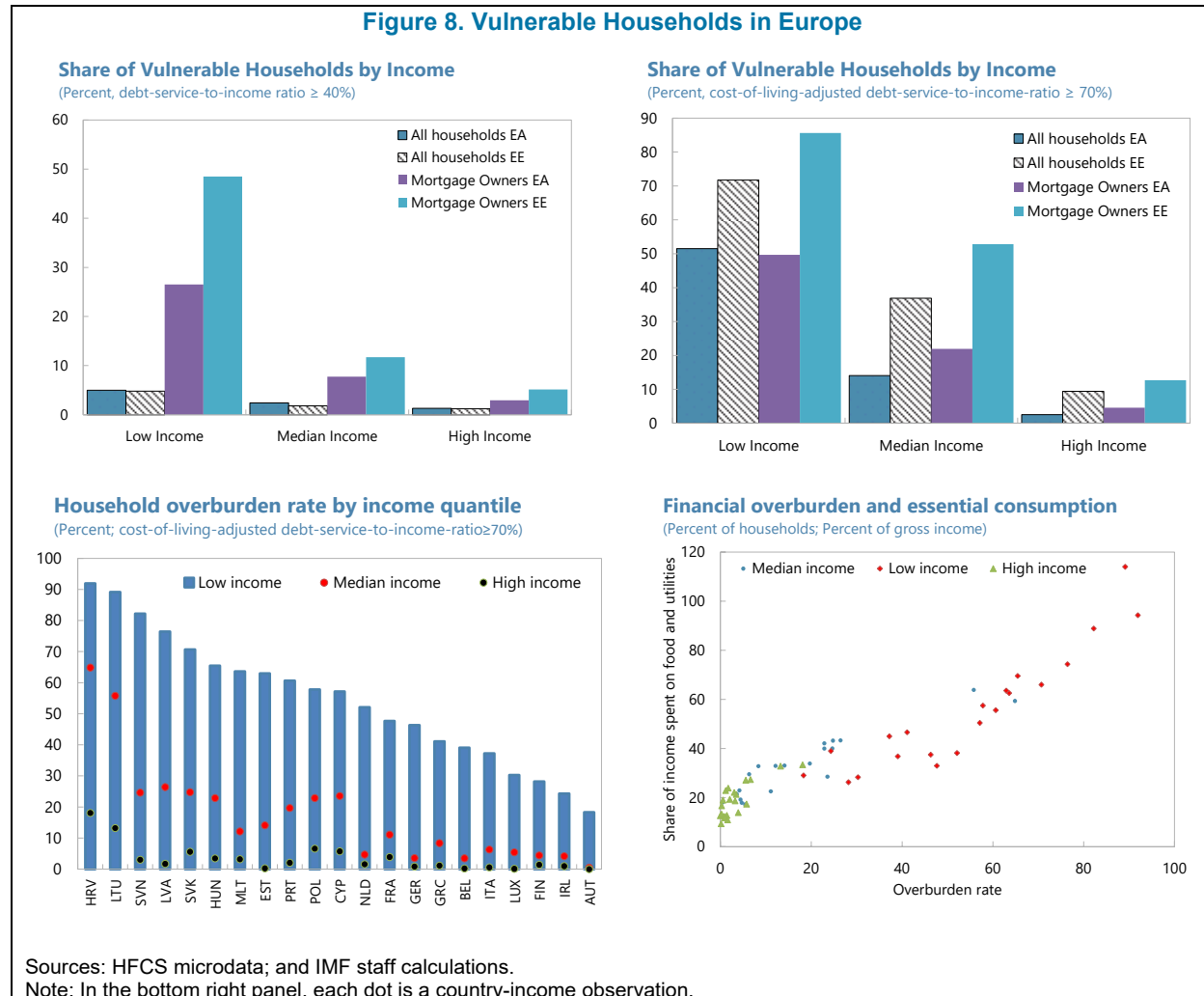


Even though most low-income families do not have mortgages, they tend to have consumer debt (Figure 7). Households in the lower-income quintile are three times less likely to have a mortgage than high-income households in both the euro area (EA) and emerging Europe (EE).¹⁵ Yet, when we look at consumer debt, one out of five low-income households have credit card debt, overdraft, and/or other non-mortgage loans.¹⁶ This exposes low-income households to higher debt service costs as interest rates, and cost of goods and services rise (Figure 8).

¹⁵ The euro area grouping includes all the euro area countries, except Spain, which is not included in the HFCS microdata. Emerging Europe includes Croatia, Hungary, and Poland.

¹⁶ This is consistent with recent empirical findings showing that, as the cost-of-living rose, so did credit card debt (NerdWallet, 2022).

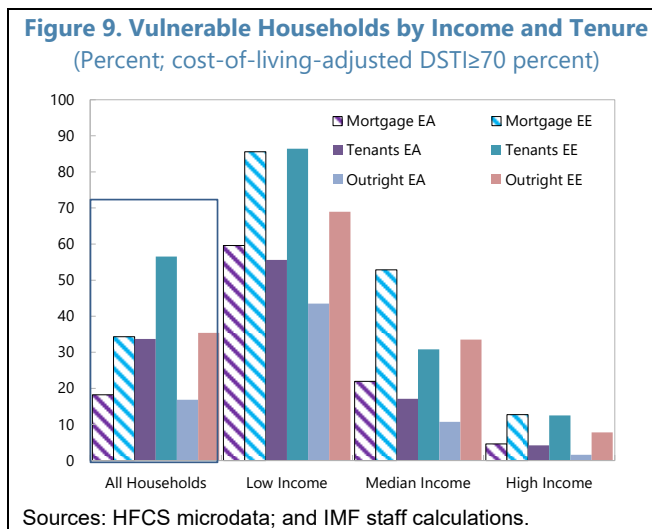
Figure 8. Vulnerable Households in Europe



Overall, we find that one out of five households in the EA and over one third of households in EE are vulnerable, with essential payments (including housing costs, basic expenses and other debt repayments) comprising more than 70 percent of income. There is a large dispersion in household vulnerability rates across countries. Households in EE are twice as likely to be vulnerable than households in the EA, with the lowest rates in Austria, Finland, and Ireland, and the highest in Croatia and Lithuania. Low-income families are most vulnerable (Figure 9).

The share of vulnerable households among those in the bottom tercile of the income distribution is almost half in the EA and three fourths in EE. Within the income-based sub-groups, there is little difference in the incidence of vulnerable households across mortgage owners and tenants.

Various factors are associated with vulnerability across income levels. The proportion spent on food and utilities is the main driver of financial overstretch among low-income households. However, as one moves up the income distribution, debt servicing costs (particularly mortgage repayments) represent an increasing share of household income (Figure 8).



IV. How Much More Vulnerable Could Households Get by end 2023?

Households' financial positions and housing affordability could deteriorate quickly amid rising interest rates, sluggish growth, and persistently high inflation. Before discussing our simulations of the evolution of household vulnerability under various macroeconomic scenarios, we briefly lay out some considerations for housing affordability at the current juncture.

Housing Affordability

As discussed in Box 1, housing affordability for new home buyers could be impaired by rising interest rates and sluggish income growth. To keep the buying power at 2021 levels, new borrowers that entered the market at end 2022 would see their mortgage bills increase by one fourth on average across our sample of European economies. Affordability would be further impaired if interest rate continued rising, or house prices continued growing at a brisk pace in the coming months

The rise in house prices over the past several years and macroprudential policy interventions are also adding to housing affordability concerns. Changes in affordability can be measured by the capacity of households to: (1) cover the down payment; and (2) service the monthly payments of their mortgage. Two corresponding indicators of affordability can be defined as:

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

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

Sustained increases in price-to-income (PTI) ratios lead to higher down payment and monthly installments, thus reducing both measures of affordability. Tighter macroprudential policy in the form of upper limits for the maturity of loans also raises monthly expenses, all else equal. Lower loan-to-value (LTV) ratios have two

Box 1. Higher Mortgage Rates are Hitting Housing Affordability

The dramatic increase of average lending rates on new loans for house purchases in Europe is eroding new entrants' buying power. To measure the deterioration in affordability, we calculate two metrics. In the first approach, we calculate by how much the DSTI ratio would increase to keep the buying power at end-2021. In the second approach, we assess how much mortgage can be afforded to anchor monthly repayments at end-2021 levels.

We use the following steps. First, we calculate the price of a 100m² dwelling as the average transaction price of new and existing homes in the most important cities in each country based on data from Statista. Then, we use information on the typical LTV ratio on residential mortgage loans drawing on data provided by the European Mortgage Federation (Hypostat 2022) to back out the size of the average loan. Using data on the average maturity for a typical mortgage loan as of 2021 from Hypostat¹⁷, the lending rate on new mortgage loans sourced from national central banks, and the median income of current mortgage owners using EU-SILC microdata, we compute the debt service to income ratio (DSTI) at time t as:

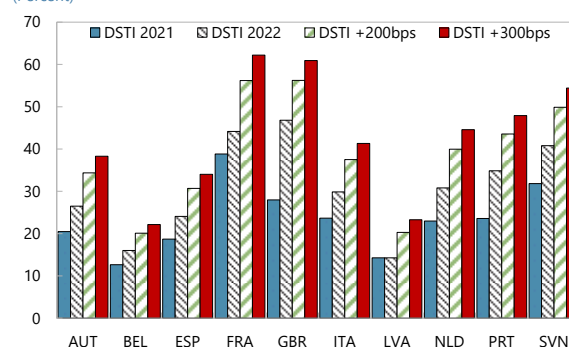
$$DSTI_t = \frac{\left(\frac{1}{maturity} + i_t \right) \cdot L_t}{I_t} \quad (1.1)$$

In the first approach, we update the DSTI ratio using the mortgage rate as of December 2022 and simulate it under various interest rate scenarios. In the second approach, we calculate the size of the loan that would keep the debt repayment ratio at its 2021 level conditional on the mortgage rate i as:

$$L_i = \frac{DSTI_{2021} \cdot I_{2021}}{\left(\frac{1}{maturity} + i \right)} \quad (1.2)$$

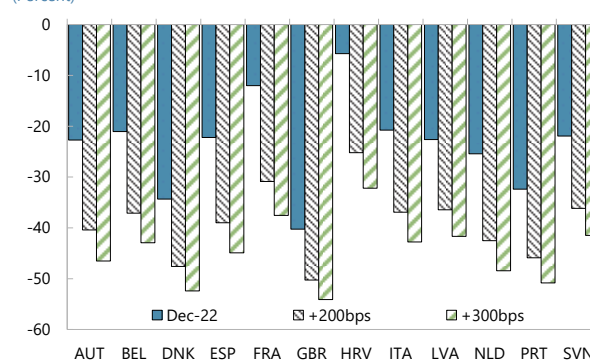
Results show that prospective buyers who are buying property at end 2022 are facing significantly higher bills than their 2021 peers. Debt service repayments have increased by one third on average, and up to 70 percent in the United Kingdom. If interest rates were to increase by 300 basis points, bills would more than double in the United Kingdom and Portugal. To keep monthly payments at 2021 levels, borrowers' buying power would be reduced by 40 percent in the United Kingdom, and by over 20 percent in the average country. In over 40 percent of the countries, housing buying power would be eroded by over 40 percent under a 200-basis points further interest rate increase.

Box 1.1. DSTI to Keep Buying Power in Main Cities at 2021 Levels (Percent)



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

Box 1.2. Reduction in Buying Power under Different Scenarios (Percent)



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

¹⁷ The 2021 country-specific average maturity of mortgage loans is kept constant in the calculation. Extending mortgage loan maturity could improve buying power by lowering monthly repayments as shown in equations (1.1) and (1.2). For instance, in Belgium, banks have recently extended mortgage loan maturities, especially for first time buyers.

offsetting effects on affordability. On the one hand, they push up the size of the down payment required to purchase the property, affecting disproportionately cash-constrained households. On the other hand, they reduce mortgage payments, decreasing the borrower's vulnerability to future income shocks.

Household Vulnerability: Key Elements of the Macrofinancial Scenarios

	Interest Rate (percent)	Household Income (percent)	Food Price (percent)	Energy Price (percent)	Core Inflation (percent)
Baseline (2022 October WEO)					
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
Adverse (200bps; -10% 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

Source: October 2022 WEO; and IMF staff calculations.
Note: The table shows cumulative shocks over the 2-year stress test horizon for the average country in the euro area and emerging Europe. The simulations are based on country-level shocks.

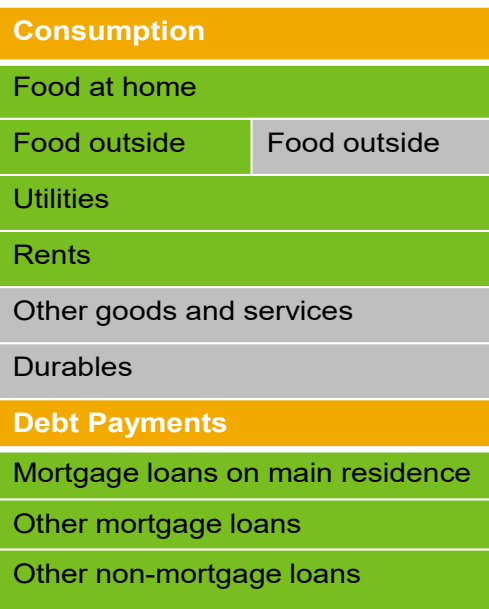
To assess how the share of vulnerable households might evolve by the end of 2023, we simulate the paths of household income, housing cost, other basic expenses, and repayments of other loans using the IMF October 2022 WEO forecast.¹⁸ In the baseline scenario, higher energy prices, tighter financial conditions, and a slowdown in global growth lead to weak growth and high inflation across Europe. Lending rates are assumed to rise by 240 basis points by end 2023 in EA and by 410 basis points in EE, on average. Notwithstanding strong household nominal income growth (at 14 percent in the EA and 20 percent in EE), headline inflation exceeds income growth by about 3-5 percentage points, eroding households' purchasing power. Higher food and energy prices rise at a cumulative 7 and 42 percent growth rate, respectively, imposing a heavier burden on low-income households as they spend a larger share of income on essential goods. It is important to emphasize that the baseline scenario assumes a full pass-through of global commodity price shocks to retail prices by the

¹⁸ In the analysis, household gross income is proxied by employee wages, and commodity prices follow global market prices.

end of 2023.¹⁹ Section VI relaxes this assumption by incorporating the effect of announced government policies on retail consumer prices.

Heightened uncertainty related to the continuing war in Ukraine, renewed commodity price shocks or the onset of stagflation imply risks to these baseline projections. To assess the resilience of households to deteriorating macrofinancial conditions, we test households' finances against a set of additional shocks applied to the baseline scenario including: (i) a 200 basis points further increase in the lending rate; (ii) a 10 percent decline in gross nominal household disposable income over baseline projections²⁰; (iii) a 20 percent increase in food and energy prices; (iv) a WEO downside scenario considering a worsening of geopolitical developments, accompanied by an increase in commodity prices, a sharper slowdown in the property sector in China, and lower potential output; (v) an 'adverse' scenario, combining the interest rate shock in (i) and the household income shock in (ii); and, (vi) a 'cost of living' scenario featuring the materialization of both the interest rate shock in (i) and the food and energy price shock in (iii). These scenarios should be seen as illustrative. For example, while three fourths of the shocks in (i) have already materialized due to the increase in interest rates relative to the October 2022 WEO assumptions, the likelihood of shocks (iii) has declined since October 2022 with the decline in oil prices in recent months. Table 1 shows the country-level cumulative shocks assumed for core macrofinancial variables aggregated for EA and EE.

Figure 10. Essential Payments



Note: Items in green represent essential payments, while items in grey show non-essential payments.

Defining and Assessing Vulnerability

We discuss two measures of household vulnerability. Under the standard measure of creditworthiness used by banks and macroprudential authorities (which includes only outstanding borrowers), a household is financially overburdened, in other words, at an increased risk of default, if the debt service to income ratio (DSTI) exceeds 40 percent.²¹ Alternatively, using the cost-of-living-adjusted measure of vulnerability introduced in Section III (which includes both outstanding borrowers as well as households with no debt), a household is identified as economically vulnerable if the debt service and essential payments (DESCTI) consume more than 70 percent of gross income. Section V tests the performance of this threshold in identifying risky borrowers. Essential consumption includes food at home, half of the food consumed in restaurants, utility bills, and rents. Non-essential consumption includes other goods and services (transportation, education, health, renovation, financial services), durables (cars, appliances) which can be adjusted to afford basic payments and avoid default.

¹⁹ While the speed of adjustment to market rates varies across countries depending on the re-setting practices of retail prices as documented in Arregui et al (2022), after two years the pass-through is generally complete.

²⁰ This implies that the average cumulative household income over 2022-23 would grow by 2.3 percent in the euro area, and 7.8 percent in Emerging Europe, respectively.

²¹ This definition of vulnerability refers to debt servicing costs rather than to the *wider* definition of housing costs used in Section III.

To identify vulnerable households, measure the transmission of shocks, and tailor the policy response, we need a granular representation of households' consumption patterns and debt repayments. In particular, we need to distinguish between essential (inelastic) consumption and other discretionary spending. Liabilities need to be segmented by type of loan and repricing schedule. Figure 10 shows a schematic representation of households' flows of payments with items in green showing essential payments, and items in grey non-essential goods. Table 2 shows the financial burden faced by households according to their tenure status.

Table 2. Housing Costs and Other Debt Payments According to Tenure Status

Tenure Status	Housing Costs	(Potential) Other Debt Payments
Outright owners	N/A	Mortgage (other purposes) Consumer loans
Mortgage owners	Mortgage (to buy the property)	Mortgage (other purposes) Consumer loans
Tenants	Rent	Consumer loans
Free accommodation	N/A	Consumer loans

Note: N/A: not applicable. The last column shows potential debt payments depending on the household's financial liabilities.

The impact of shocks on household finances is highly non-linear. Equations (3) and (4) show the channels through which macrofinancial shocks (denoted in red) affect households' ability to fulfil their debt service obligations and afford essential consumption:

$$DSTI_{T,j}^h = \frac{\sum_{k=1}^N (P_{t,k}^h + O_{t,k}^h \cdot i_{t,k}^h) + \sum_{s=1}^M (O_{t,s}^h \cdot \Delta i_{T-t,j} | s = \text{floating})}{I_t^h \cdot (1 + \Delta inc_{T-t,j}^h)} \dots\dots\dots(3)$$

$$DSECTI_{T,j}^h = DSTI_{T,j}^h + \frac{food_t^h \cdot (1 + \Delta food_{T-t,j}^h) + utilities_t^h \cdot (1 + \Delta energy_{T-t,j}^h) + rent_t^h \cdot (1 + \Delta inf_{T-t,j})}{I_t^h \cdot (1 + \Delta inc_{T-t,j}^h)} \dots(4)$$

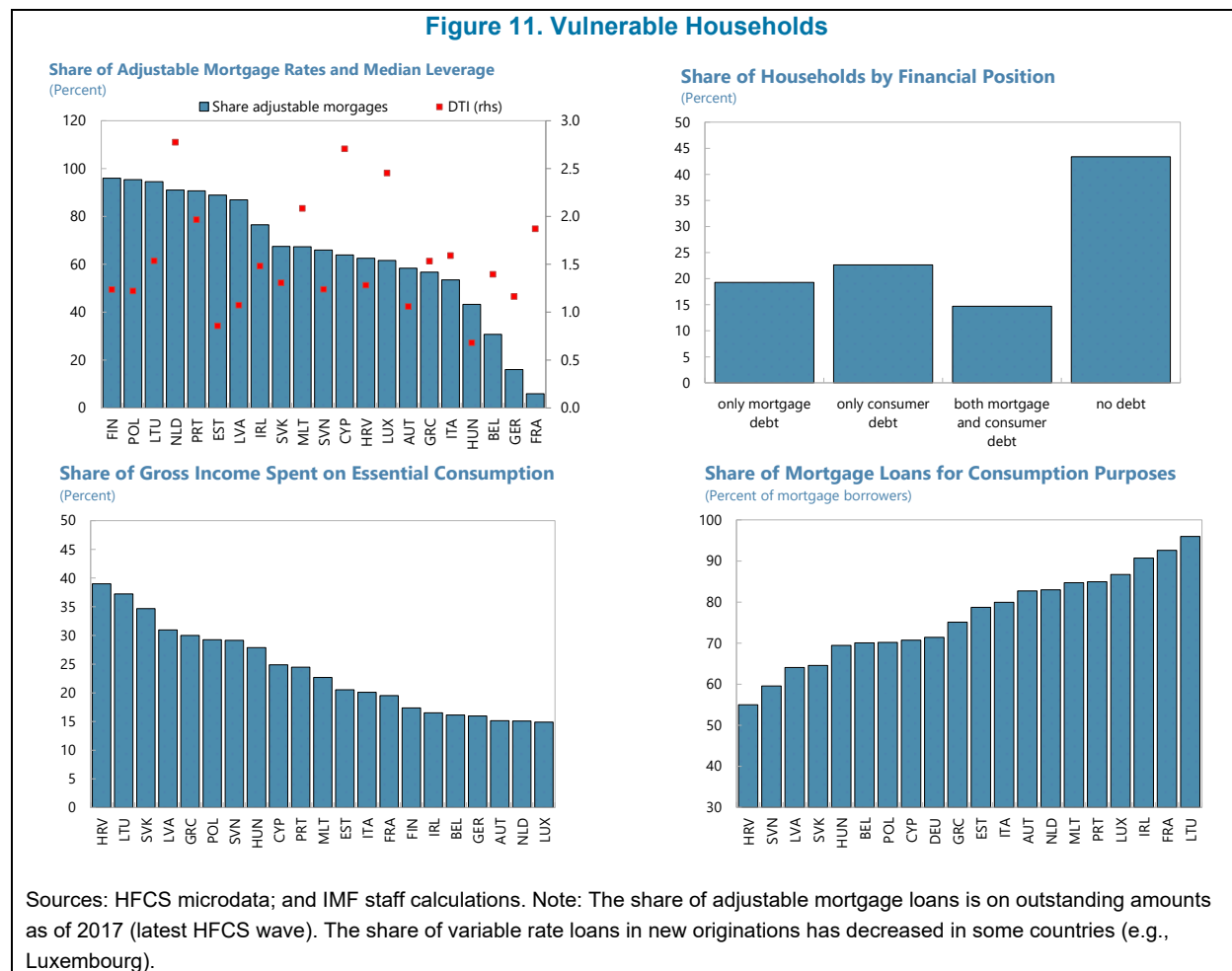
where I stands for household h gross household income, P is the principal repayment of outstanding loans, O is the amount of outstanding debt, i is the lending rate, N is the total number of loans, and M is the number of loans with interest rates to be re-set over the next two years. Rents are indexed to inflation. Projections are contingent on scenario $j \in \{1, \dots, 7\}$.

The analysis rests on several important assumptions. Household spending on food and utilities is assumed to rise according to the growth in the energy and food component of consumer prices, respectively. Households keep the structure of consumption unchanged, but the quantities they consume grow at the pace of real private consumption growth projected in the scenario. This is a conservative assumption as households in the EU have been encouraged, with some success, to reduce energy consumption²². Also, struggling households may

²² According to the Energy efficiency directive, countries must achieve savings of 0.8 percent of final energy consumption, increasing to 1.5 percent from 2024 to 2030.

change their eating habits and energy use as inflation erodes their purchasing power. The analysis is also conservative as it ignores possible behavioral responses that could dampen the impacts of shocks such as, for example, a rise in labor supply through higher working hours or labor force participation of second earners.

Figure 11. Vulnerable Households



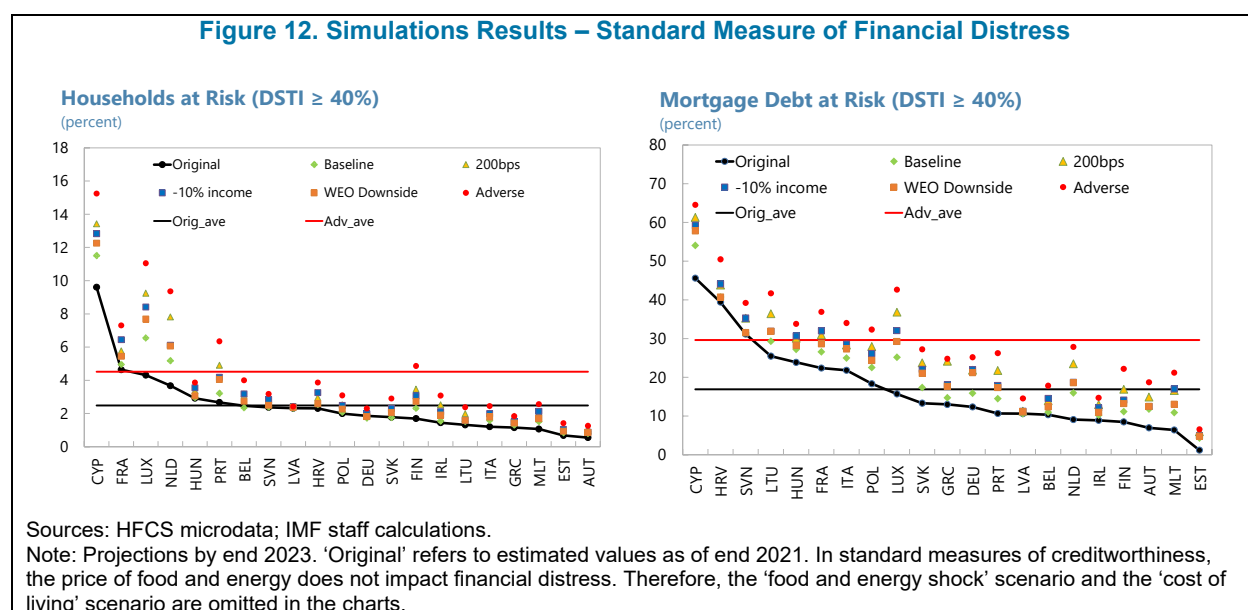
A household is classified as 'vulnerable' (financially overburdened or at an increased risk of default) if debt service and basic living costs consume more than 70 percent of gross income. That is, if $DSECTI_{T,j}^h \geq 70\%$ (under the cost-of-living adjusted measure). To allow benchmarking against estimates found in other studies, we also show results using the standard measure of default risk, i.e., $DSTI_{T,j}^h \geq 40\%$. Based on the proposed definition of vulnerability, *mortgage debt-at-risk* is defined as the amount of outstanding mortgages of households identified as financially vulnerable under equation (4) as a share of the total volume of mortgages outstanding. Similarly, *consumer debt-at-risk* is defined as the amount of outstanding non-mortgage debt held by financially vulnerable households under equation (4) as a share of total consumer loans.

While inflation affects the cost of living of all households, rising rates impact predominantly borrowers with loans at adjustable rates. Households that spend a higher share of their income on essential goods, hold (mortgage and/or consumer) loans at floating rates and are highly leveraged are disproportionately exposed to the cost-of-living crisis and the tightening of financial conditions. The prevalence of floating rate mortgages

varies widely across Europe, with variable-rate mortgage most prevalent in the Nordic countries, the Baltics, the Netherlands, and Portugal (Figure 11). Median household leverage is the highest in the Netherlands at almost three times gross income, while essential consumption comprises the highest share (almost 40 percent) of income in Croatia (Figure 11).

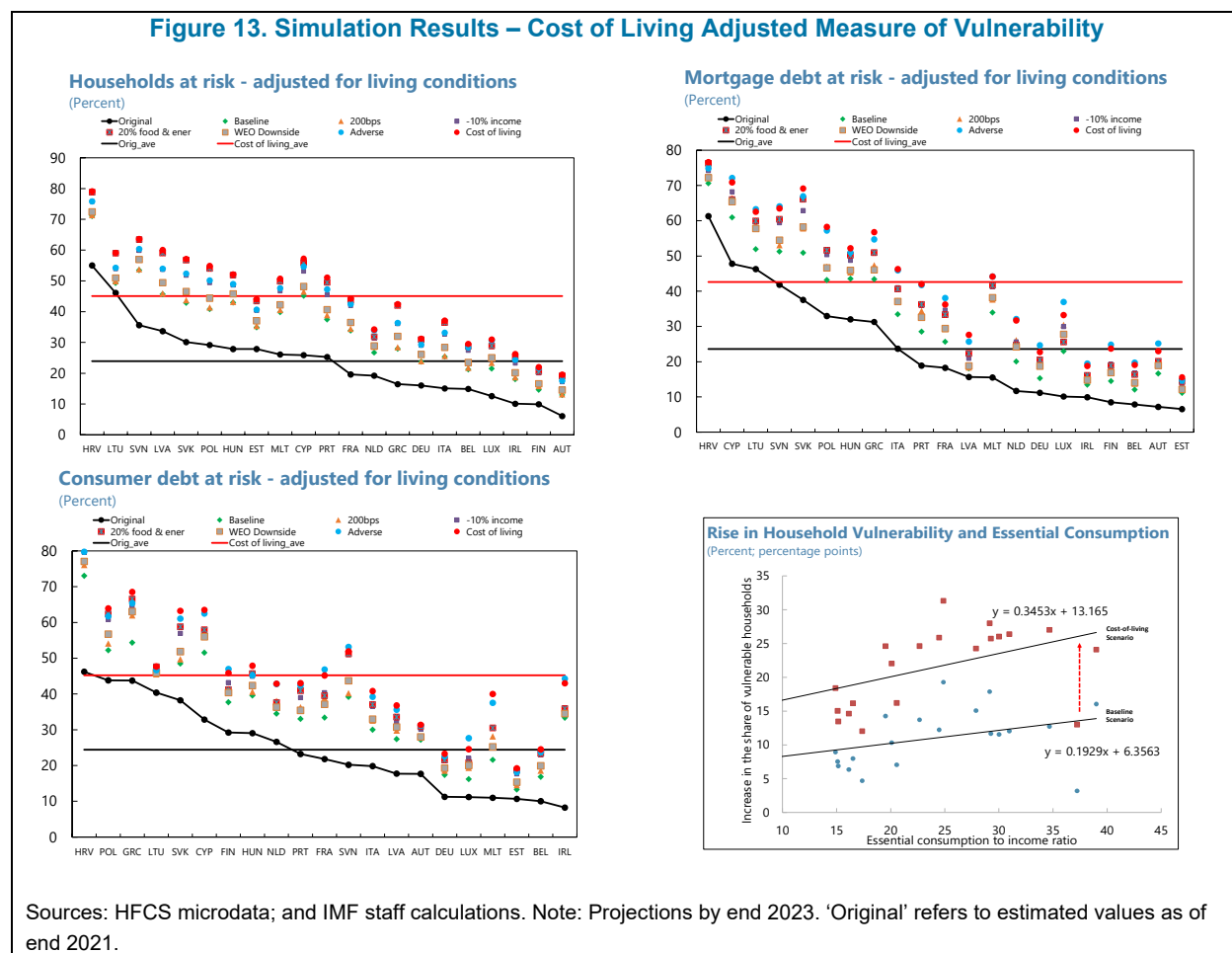
What is the Capacity of European Households to Service their Debt?

Using the standard measure of creditworthiness, i.e. leaving aside essential consumption, the change in the share of vulnerable households would be moderate even under adverse scenarios in most cases. Using the standard debt service coverage ratio, the simulations suggest that most households would be able to pay their debt obligations. This is in good part because in the current inflationary environment, the rise in gross income absorbs most of the increase in interest payments. For the average country, the share of financially distressed households could double from 2.5 percent to nearly 5 percent under the average adverse scenario, with higher increases in countries with a high share of floating mortgages and household leverage.²³ Because stressed households hold most of the outstanding debt, the share of *mortgage debt at risk* could rise by over 10 percentage points to reach thirty percent of the total mortgage portfolio under adverse conditions (Figure 12).



However, once hard-to-compress essential consumption is factored in, the combination of rising living costs and interest rates could significantly stretch household finances, with a third of households being vulnerable across Europe even under baseline projections—up 10 percentage points from 2021. Under the worst-case scenario represented by the 'cost of living' shock, 45 percent of households could be financially stretched, holding over 40 percent of mortgage debt and 45 percent of consumer debt. There is substantial heterogeneity across countries, however. While the transmission of shocks through leverage, exposure to floating rates, and a high share of basic consumption interact non-linearly, the sensitivity of households to shocks increases with the severity of the scenario (Figure 13). The impact is similar across households' tenure status (Figure 14).

²³ The definition of financially distressed households is a flow measure. It does not consider net household wealth.



The results also show great vulnerability among lower-income households. As of 2021, over half of all low-income households are estimated to be vulnerable. This share could increase to 70 percent under baseline projections and reach 80 percent under adverse conditions. By contrast, only between 7 and 13 percent of high-income households would be vulnerable depending on the severity of the scenario. Still, most of the increase in mortgage debt at risk would come from these households as they hold larger loans (Figure 15).

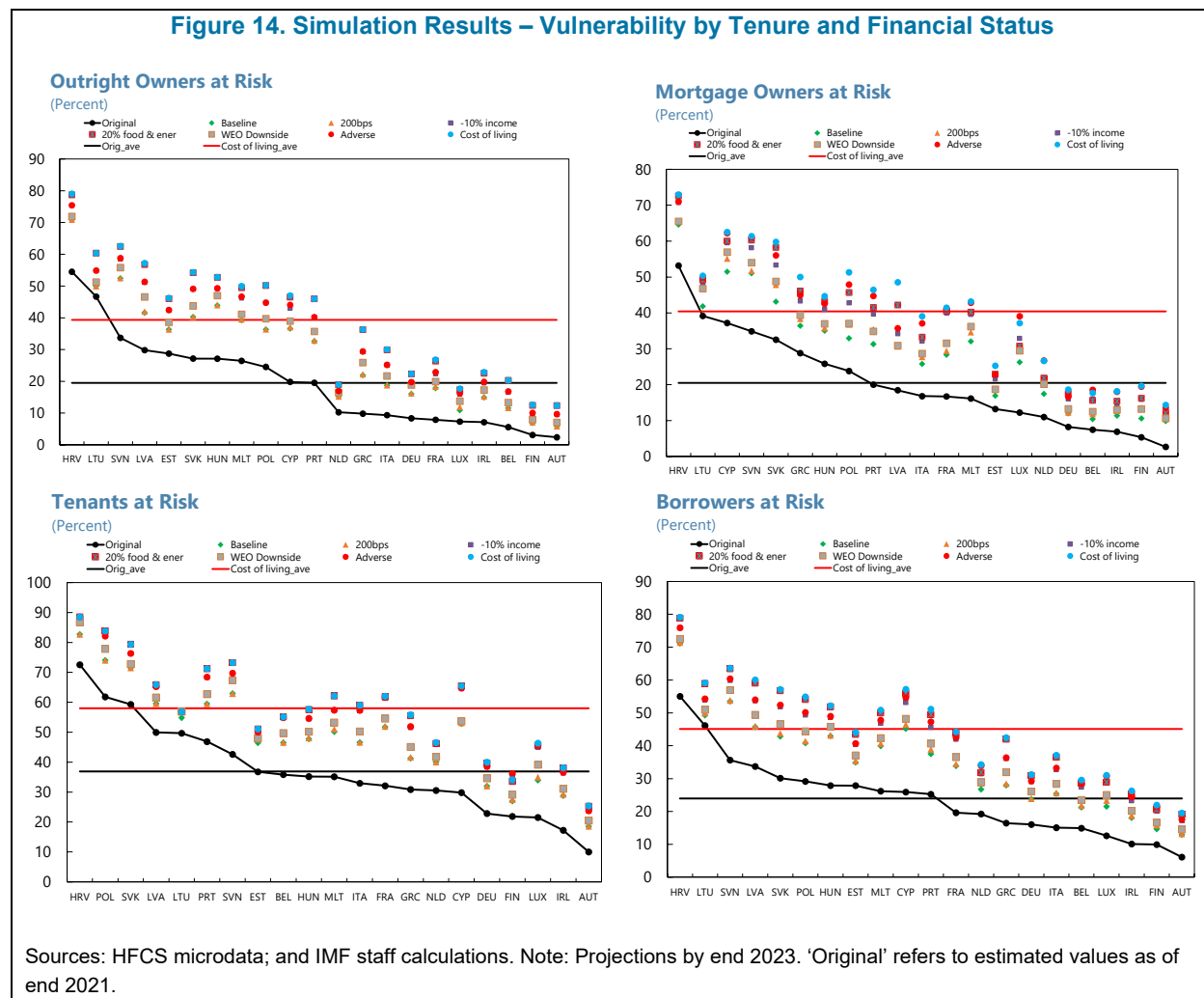
Vulnerable households may reduce their spending, however, in which case they would be more likely to keep on servicing their debts. To assess the macroeconomic implications of the squeeze in households' real incomes, we consider an alternative definition of vulnerability. A household is classified as *economically overburdened*, i.e., at an increased risk of cutting consumption, if debt service and total consumption exceed gross income ($DSTCTI > 1$). Regardless of their level of indebtedness, consumers may cut back spending, while leveraged households may retrench further to avoid default.

$$DSTCTI_{T,j}^h = DSECTI_{T,j}^h + \frac{\text{other consumption}_t^h \cdot (1 + \Delta \text{other consumption}_{T-t,j}^h)}{I_t^h \cdot (1 + \Delta inc_{T-t,j}^h)} \dots \dots \dots (5)$$

The assumption that a household is economically overburdened when $DSTCTI_{T,j}^h \geq 100\%$ may be pessimistic since consumers may alternatively rely on transfers, use credit lines, or draw down on their savings to keep

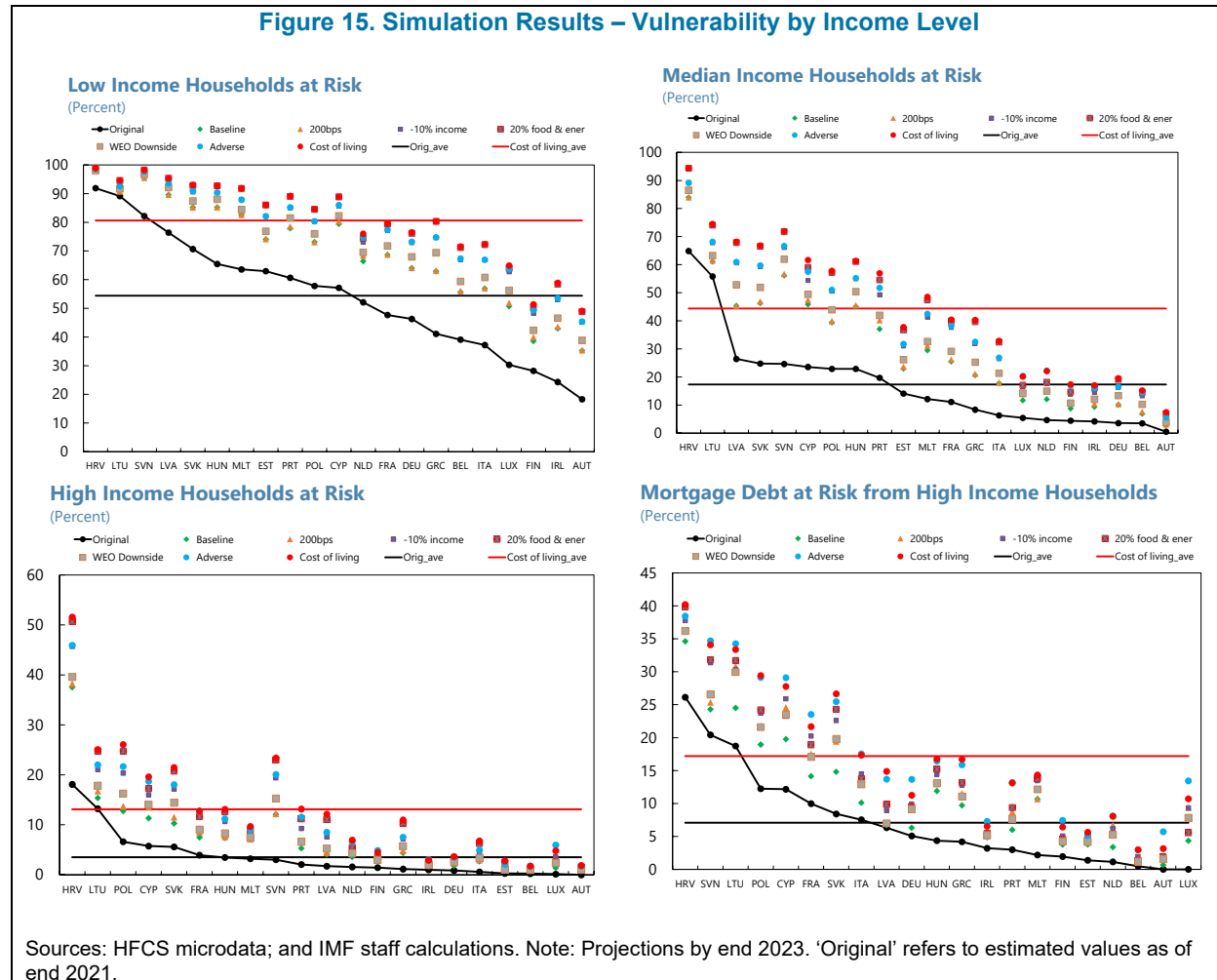
their consumption habits. At the same time, some consumers may start adjusting their consumption levels well before they hit the budget constraint. Given this definition, consumption-at-risk is defined as the consumption of households classified as economically overburdened under equation (5) as a share of the consumption of all households in the sample.

Figure 14. Simulation Results – Vulnerability by Tenure and Financial Status

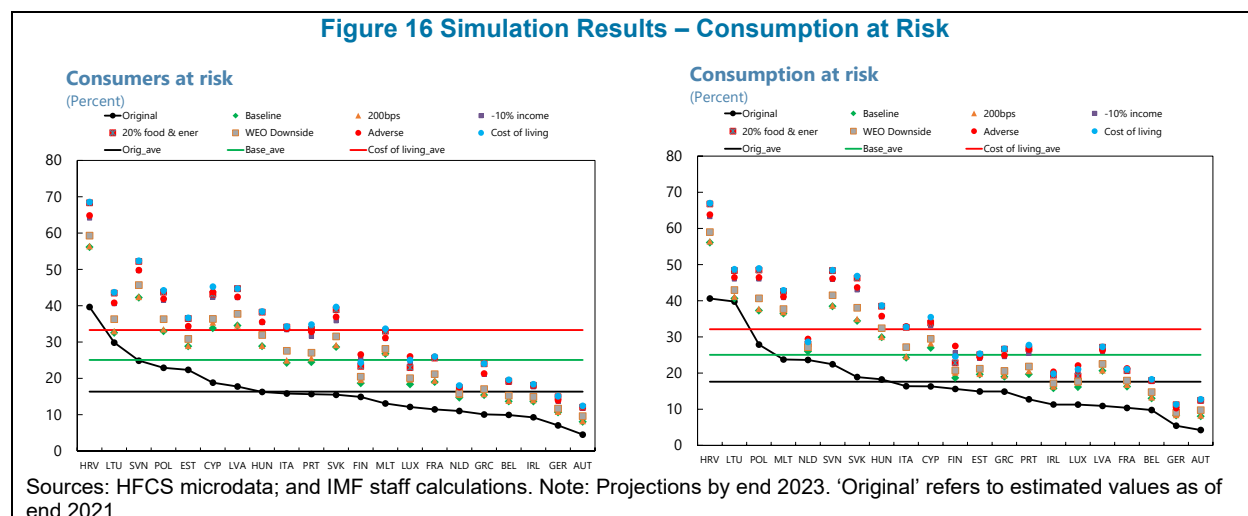


Sources: HFCS microdata; and IMF staff calculations. Note: Projections by end 2023. 'Original' refers to estimated values as of end 2021.

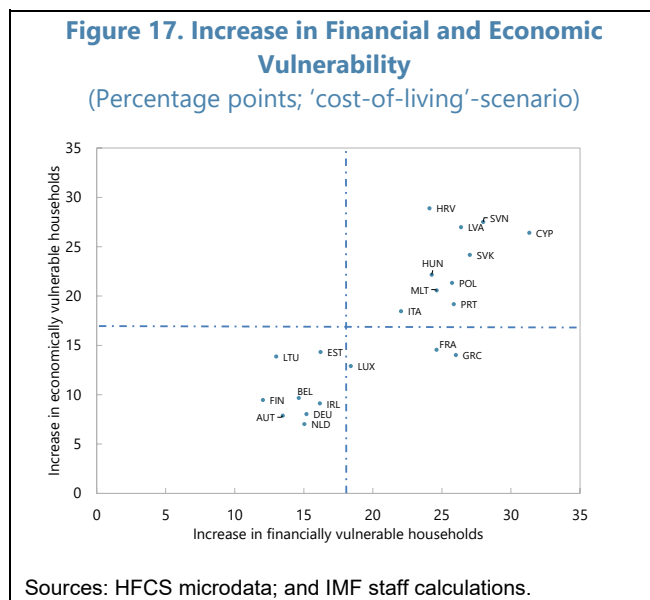
Figure 15. Simulation Results – Vulnerability by Income Level



One out of four consumers could pull back on spending amid real income losses in the baseline. Under the cost-of-living scenario, this share could rise to one-third of consumers, representing a twofold increase relative to estimated 2021 values, and accounting for over 30 percent of aggregate consumption (Figure 16). There is a strong correlation between financial and economic vulnerability; financially stretched consumers are not only more likely to default but also to adjust their spending behavior to avoid default (Figure 17).



Households in CESEE are more exposed than their Northern counterparts. Under baseline conditions, consumers could be more likely to cut back on spending in CESEE. By contrast, the share of consumers that may face liquidity shortfalls to finance their current level of spending is lowest in Austria and Germany. The current crisis affects all consumers, but there are various factors that contribute to higher ability to afford consumption. For instance, countries where consumers have already limited ability to meet essential payments are the worst affected. In countries where households spend a lower share of income on discretionary spending, consumers are more able to navigate the crisis. Households facing higher price inflation relative to income growth are less likely to make ends meet.



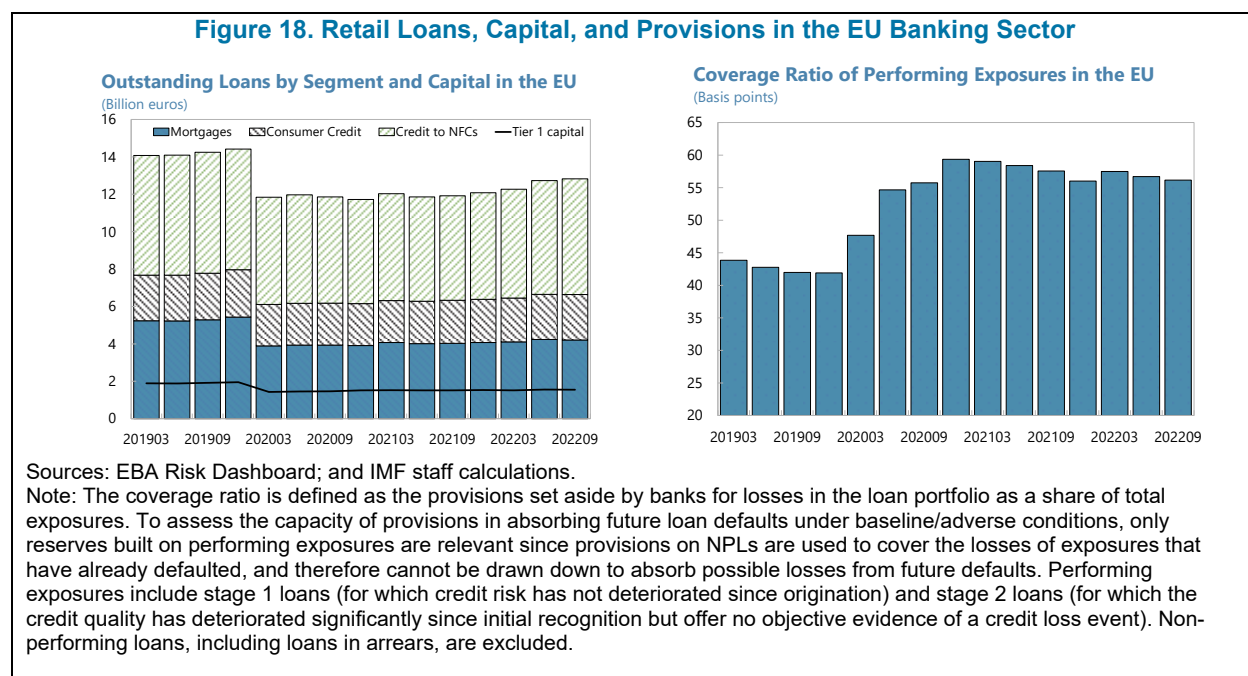
Some caveats require due consideration. First, simulations are conducted over the 'aged' HFCS survey to 2021, which imputes household level variables based on macrofinancial aggregates. This could introduce measurement error to the extent that the strong growth in mortgage lending and house prices prior to and during the COVID-19 crisis, had a differential impact across households. Second, the simulations in this paper assume full passthrough of global commodity prices into domestic retail prices by 2023. The effect of governments' measures to shield consumers is quantified in Section VI. Third, the analysis abstracts from potentially important behavioral responses of households to changes in prices. This concern is somewhat mitigated as we focus on essential consumption – food eaten at home and the use of heating and electricity are likely pretty inelastic as there may not be much scope for quantity adjustments to offset higher prices, without significant quality of life changes.

V. Can Banks Absorb Higher Credit Risk in their Retail Portfolio?

European Banks' Exposure to Household Loans

Household mortgages and consumer loans account for a sizeable part—half in the EU—of European banks' loans. As of 2022Q3, EU banks reported EUR 4.2 trillion of outstanding mortgages to households, and 2.4 trillion of other household loans (e.g., credit card debt, overdraft, etc.). These loans ('the retail portfolio') represent over half of total loans to the real economy, and more than four times the aggregate Tier 1 capital of the EU banking system. Since the onset of the pandemic, the retail portfolio has risen at a faster pace than credit to non-financial corporations (NFCs), at 9 percent cumulative growth. While provisions for non-defaulted exposures increased since the start of the pandemic (from 48 to 55 basis points), they reached their peak at the end of 2020. Since then, most banks have released provisions despite other Covid waves and the energy crisis, exposing them to increased household default risk (Figure 18).

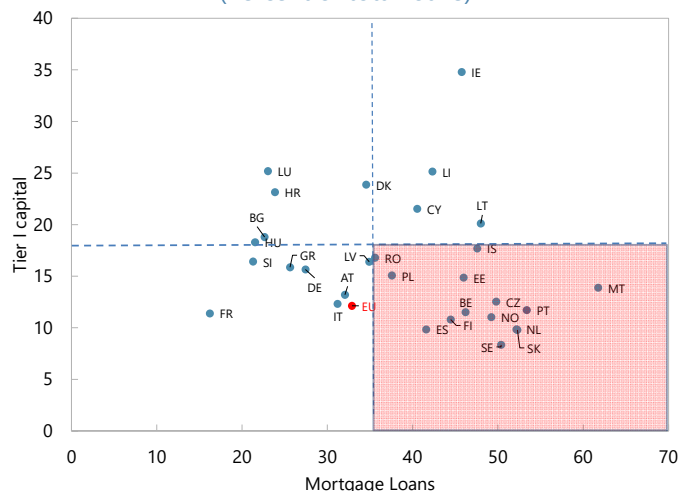
Figure 18. Retail Loans, Capital, and Provisions in the EU Banking Sector



Banking systems with a higher share of mortgages and lower capital are disproportionately exposed to imbalances in housing markets. The importance of the mortgage portfolio varies substantially across countries. French banks report a share of mortgage loans of 16 percent of total loans while in Malta this share reaches two-thirds. In addition, several countries, particularly in CESEE, are exposed to household non-mortgage credit. They account for around one third of loans to the non-financial sector in Croatia, and over 20 percent in Hungary and Poland, whereas in the Netherlands they account for only 5 percent of exposures. Household non-mortgage loans are also exposed to the performance of the housing market, as households who struggle to service their mortgage could default on their non-collateralized loans to avoid foreclosure. Bank capital

buffers also vary notably across countries, with Irish banks posting the highest share of Tier 1 capital relative to loans (34 percent); by contrast, in the Netherlands and Slovakia Tier 1 capital represents less than 10 percent of total loans. This is in part due to the higher share of mortgage loans in these countries, carrying a lower risk weight than unsecured loans and requiring lower regulatory capital. Nevertheless, countries with a higher share of mortgage loans and lower capital are more vulnerable to a systemic event in the housing market (Figure 19). To address systemic risk from adverse developments in the residential real estate market, the macroprudential authorities have recently tightened borrower-based measures on housing loans in these countries (e.g., Netherlands increased risk weights on real estate exposures, whereas Malta, Portugal, and Slovakia have limited the maturity of mortgage loans, conditional on the age of the borrower).

Figure 19. Banking System Exposure to Residential Real Estate Sector, Sep 2022
(Percent of total loans)

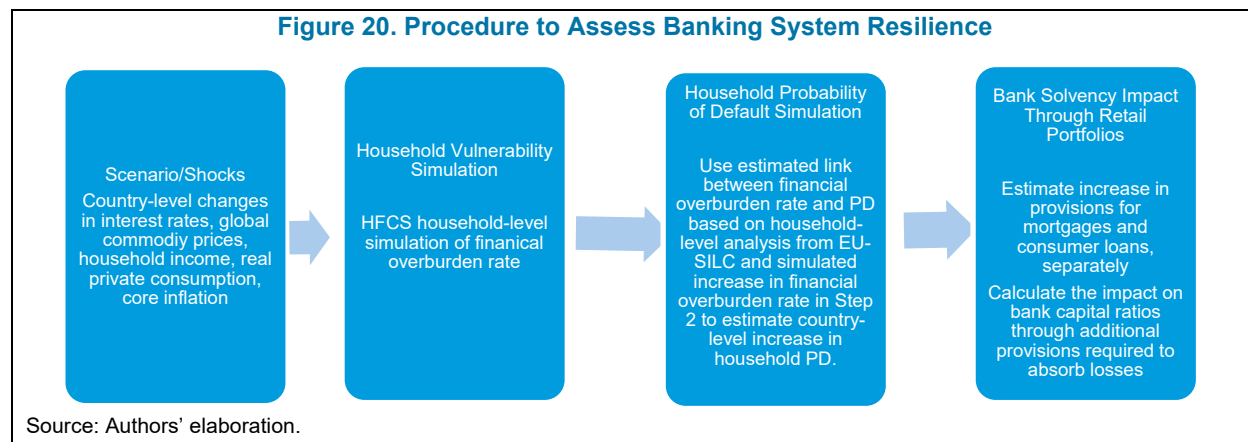


Source: EBA Risk Dashboard; and IMF staff calculations.

Note: For Latvia, sub-consolidation of subsidiaries in Estonia and Lithuania of a major bank is excluded. Countries with a higher share of mortgage loans and lower Tier 1 capital are more exposed to adverse developments in the residential real estate sector (countries located in the southeastern quadrant of the chart, highlighted in red).

Analytical Approach to Assess the Impact of Household Stress on Bank Capital

To quantify the potential impact of deteriorating household finances on banks' capital, we follow a three-step procedure (Figure 20). We first estimate the link between being financially overburdened and the likelihood of default at the individual household level. For this purpose, we rely on the EU-SILC micro data, which contains information on housing costs (including mortgage principal and interest repayments), households' ability to make ends meet (namely, the income needed to pay for essential expenses), and households' debt obligation status (i.e., whether in arrears on mortgage loans and other loan obligations). In a second step, we use the simulated increase in the share of financially overburdened households in the HFCS under the various scenarios examined in the paper to estimate the increase in the average probability of default. Finally, in a third step, we use data from EBA Risk Dashboard on the amount of household mortgages, the volume of other household loans, banks' risk weights, and loss given default (LGD) reported by Internal ratings-based (IRB) banks on loans, to project the impact of higher credit risk on banks' capital position. We assume that banks have built sufficient provisions to cover potential losses under current conditions—but not necessarily under the baseline or adverse scenarios.



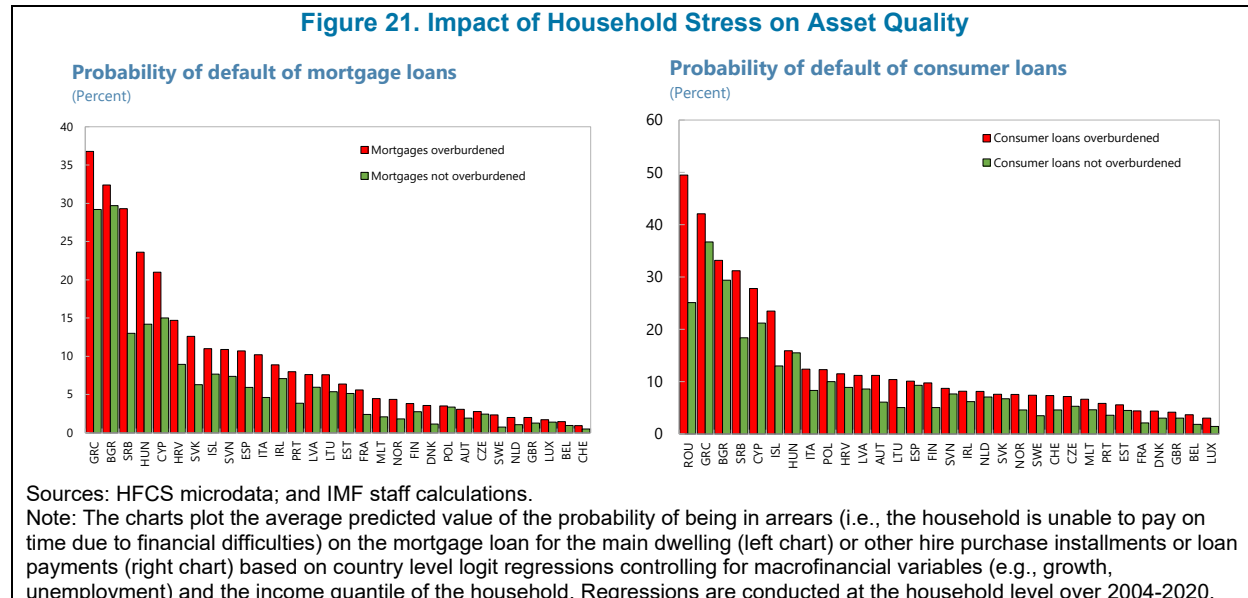
In contrast with recent studies aimed at assessing financial risks from the cost-of-living crisis, we take an econometric approach to measure default risk. Our analysis is distinct from other approaches in the literature (see, for example, ECB, 2022; Gross et al; 2022) that assume a household defaults with a probability of 1 if net financial assets (approximated by gross income less debt service) turn negative. By combining the estimated increase in the likelihood of default from being financially overburdened at the country level and the simulated change in the share of overburdened households, we aim to provide a more realistic picture of the potential impact on bank's asset quality and capital ratios.

Household Vulnerability and Default Risk

Households overburdened by higher borrowing costs are significantly more likely to be in arrears on their mortgage. Country-level logit regressions suggest that, on average, the probability of being in arrears on their mortgage payments increases by over 50 percent when households are overburdened by their mortgage debt service. Regressions control for macroeconomic drivers (e.g., unemployment rate, growth rate), and the household position in the income distribution. The probability of being in arrears varies widely across countries. In most countries, it stands at single digit levels. By contrast, in some Southern and Eastern countries, the probability of falling into arrears by overburdened households exceeds 20 percent. Low-income households are more likely to be in arrears on their housing loans in all countries, particularly when they become overburdened by mortgage expenses. Across the region, the average probability of being in arrears jumps from 6 to 10 percent when the household is overburdened (Figure 21). In the analysis we measure 'default' as being in arrears on debt payments in the past 12 months.²⁴

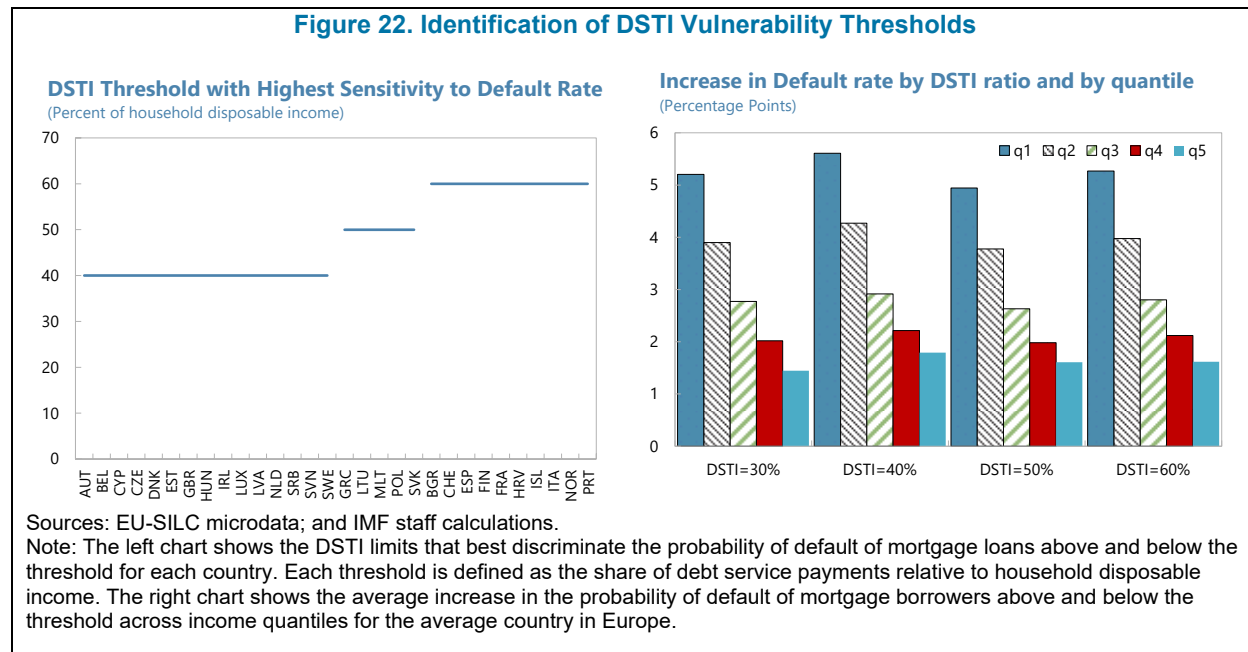
²⁴ According to European guidelines, an obligor past due more than 90 or 180 days is technically in default. We use "being in arrears in the past 12 months" as a proxy of default using EU-SILC data. This variable could overstate the default rate if the borrower has been on arrears less than 90 days.

Figure 21. Impact of Household Stress on Asset Quality



For most countries, a DSTI threshold of 40 percent relative to household disposable income shows the strongest link to the likelihood of default on mortgage debt. The relationship between a household’s DSTI ratio and the probability of default is non-linear. We run a horse race across thresholds and find that, for most countries, the relative increase in the probability of default is highest when the borrower’s debt servicing costs exceed 40 percent of disposable income. In a few countries, the best performing threshold (along this criterion) reaches 60 percent, namely Croatia, Iceland, Finland, France, Italy, Norway, Portugal, and Spain. The sensitivity of the probability of default to the DSTI ratio is similar across income quantiles (Figure 22).

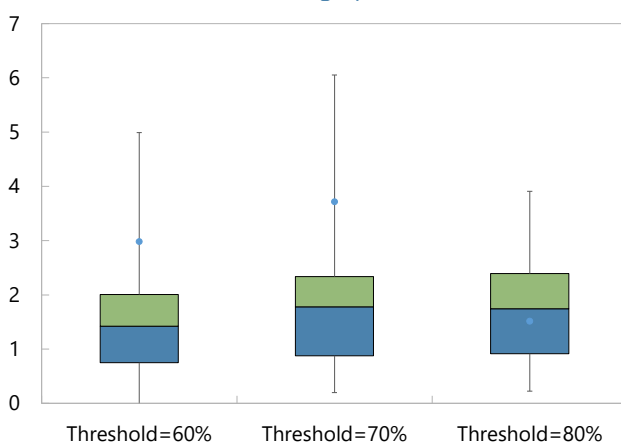
Figure 22. Identification of DSTI Vulnerability Thresholds



This can be partly explained by self-selection as mortgage owners in the lowest quantiles are relatively better off (OECD, 2022). This type of analysis can inform the calibration of DSTI limits on housing loans by macroprudential authorities.

Households overburdened by living expenses are also significantly more likely to default on their consumer loans. EU-SILC does not contain data on principal or interest repayments on non-mortgage loans. Instead, we use information on the minimum income needed by the household to pay for essential expenses. If this amount is above 70 percent of the gross household income projected in the scenario, the household is considered overburdened by living expenses. Country-level logit regressions identify the 70 percent limit as the most significant threshold for mortgage default risk across countries²⁵ (Figure 23). Similarly, econometric results suggest a 4-percentage point increase in the probability of default of consumer loans by overburdened households relative to their non-overburdened peers with the 70 percent limit as the most discriminatory threshold. Further, the average probability of default on consumer loans exceeds that on mortgages (13 versus 9.5 percent on average), as struggling households prioritize servicing their mortgage debt to avoid foreclosure. Finally, as with mortgage debt, low-income households are more likely to default on their consumer loans when they lack enough buffers to make ends meet.

Figure 23. Estimated Difference in the PD Above and Below Various Thresholds
(Percentage points)



Sources: EU-SILC data; and IMF staff calculations.
Note: The box plots show the country distributions for the estimated difference in the probability of default of mortgage loans above and below various thresholds, based on country-level logit regressions. The thresholds are defined as the share of basic expenditure relative to household gross income.

A Manageable Impact on Most Banking Systems under Most Scenarios, But Some Could Take a Significant Hit

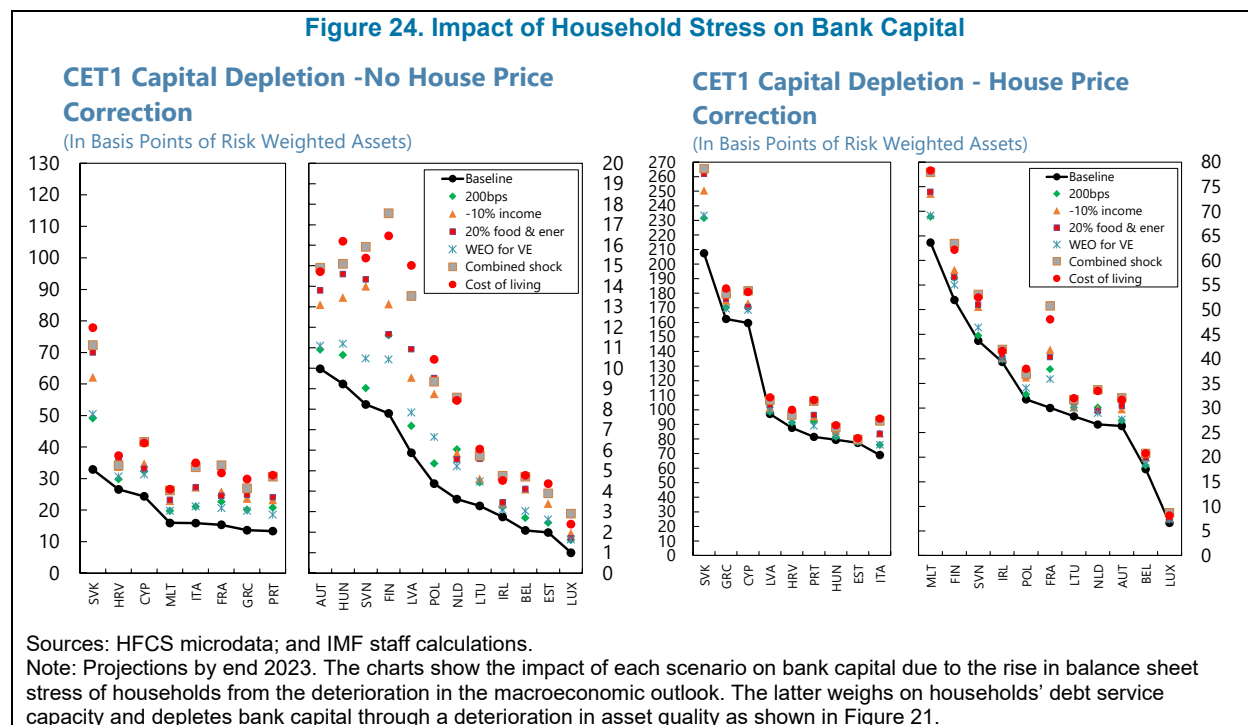
In the absence of any major house price correction, the impact of household stress on banks is manageable—capital depletion would not exceed 100 basis points in most countries and adverse scenarios considered here, although these estimates should be seen as providing a lower bound. Following the approach sketched in Figure 20 we compute the capacity of bank capital to absorb losses from the deterioration in credit quality of their mortgage book and other consumer household loans. We assume that the loss given default (LGD) of mortgage exposures hovers around 40 percent (in line with the average LGD reported by IRB banks in the EU for regulatory capital calculations), while the LGD of defaulted uncollateralized loans reaches 100 percent. In the analysis, banks need to build up provisions to cover the additional defaults by newly overburdened households. Results provide a lower bound for the capital impact, as some households will see their credit quality deteriorate and require additional provisions even if they lie below the estimated threshold that triggers technical default. A further reason why our estimates may provide a lower bound for the capital impact is that banks are assumed to have already built adequate provisions on potential losses under current conditions,

²⁵ We run a battery of econometric specifications using different threshold limits and compare their merits in maximizing the distance in the average default rate between borrowers below and above the threshold limit.

which may not hold true as provisioning levels differ markedly across countries and segments, with the mortgage portfolio being one of the least provisioned portfolios (EBA, 2022).²⁶

A house price correction could have a significant impact on European banking systems—pushing up losses into the 100-300 basis points range depending on the country and scenario considered, with CESEE banking systems being most exposed. Section II suggested that current house prices might be about 20 percent overvalued in most countries. A house price correction would reduce the value of mortgage debt collateral and increase LGD, amplifying banks’ losses. Therefore, we re-run the analysis assuming that banks need to increase their provisions for housing loans to cover the additional LGD. The new provisions need to cover the losses from lower recovery rates on all defaulted exposures (i.e., held by overburdened and non-overburdened households). The impact is significant for many countries (Figure 24).

However, the impact on bank losses could be mitigated by several factors. First, some borrowers could draw on their savings accumulated during the pandemic, although overburdened borrowers may not have sufficient liquid buffers to withstand higher cost-of-living expenses for several months (ECB, 2022). Second, borrowers may be able to adjust spending, although stressed low-income borrowers may be unable to cut back on essential expenditures. Finally, government support and mortgage relief measures could support household income. The effect of some policy support measures on household vulnerability is examined in Section VI.



²⁶ While mortgage portfolios generally present higher recovery rates (we assume a 60 percent recovery), they have longer recovery times than other loans, and may weigh down capital in countries with higher foreclosure times.

VI. What is the Likely Impact of Policies to Shield Households and Banks from Financial Distress?

Governments Have Deployed a Strong Policy Response but Most Schemes are Untargeted

To shield households and firms from soaring food and energy costs in 2022, governments have rolled out a broad range of fiscal policies. These policies aim to protect households and firms from temporary inflationary pressures and rising debt service costs. The measures, announced from September 2022 to February 2023, account for around 2 percent of GDP on average, of which 1.3 percent target households (Sgaravatti et al, 2023).²⁷ Most measures will remain in place through end 2023. Governments' efforts to shield households and firms from distress have varied significantly in size across Europe, with schemes to protect households accounting for the bulk of support. The main schemes have taken the form of caps on energy prices, and VAT cuts on gas and electricity bills. In some cases, support has been more targeted – such as cost-of-living payments going to low-income households or covering electricity consumption below a threshold. In Europe, only 30 percent of the schemes designed to households can be considered as having been targeted (Figure 25), as documented also by Arregui et al (2022).

Some countries have also implemented forbearance measures to protect banks against asset quality deterioration. In most schemes, banks have been encouraged to offer forbearance measures to struggling borrowers such as extension of maturities, payment holidays or deferrals. The stated purpose of these measures is to restore sustainable repayment by viable borrowers. For instance, Hungary has imposed a cap on mortgage rates for outstanding loans with variable interest rates of less than 1 year maturity. In Portugal, the government published a decree to allow borrowers with first residence floating-rate loans to renegotiate their loan if their DSTI is 50 percent (or higher) or has increased by more than five percentage points. The Spanish government approved a “Code of Good Practices” to standardize solutions offered to mortgage borrowers requesting debt restructuring, mainly by extending maturities. The aim is to align mortgage installments with borrowers' debt servicing categories.

Notwithstanding the wide implementation of policies to tackle the cost-of-living crisis, there is limited information on their cost effectiveness. The cost of energy price caps is uncertain, given the high uncertainty around future energy prices.²⁸ Even less is known about the effective capacity of policy measures to protect consumers, which would depend on the income share spent on basic consumption, balance sheet capacity, liquidity position, and debt service obligations of the household (Figure 25).

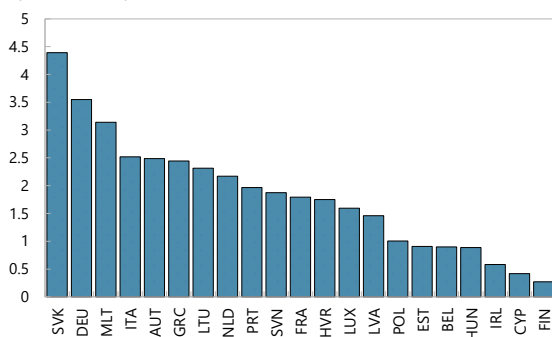
²⁷ This is consistent with Arregui et al (2022) who report an average fiscal cost of household support measures in 2022 and 2023 of 2.7 percent of annual GDP. Our numbers are quoted as a share of 2-year cumulative GDP over 2022 and 2023.

²⁸ For example, estimates of the costs of UK's 'Energy Price Guarantee' (EPG) introduced in September 2022 to cap the unit cost of energy for households range from GBP 52 billion to GBP 140 billion over two years (see estimates by the UK government, the Institute for Fiscal Studies and Cornwall consulting firm).

**Figure 25. Government Announced Policies
(Sep 2021-Feb 2023)**

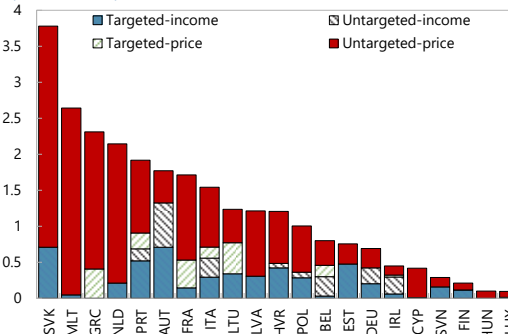
Policy Support to Households and Firms in Europe

(Percent of GDP)



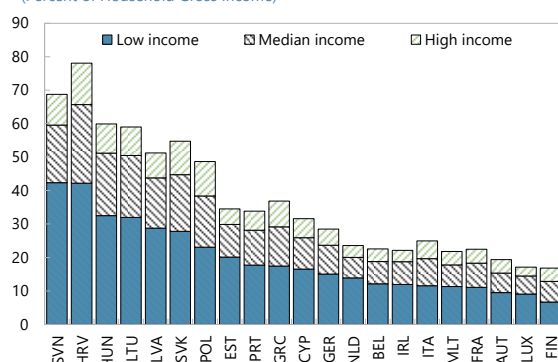
Policy Support to Households, by Type of Scheme

(Percent of GDP)



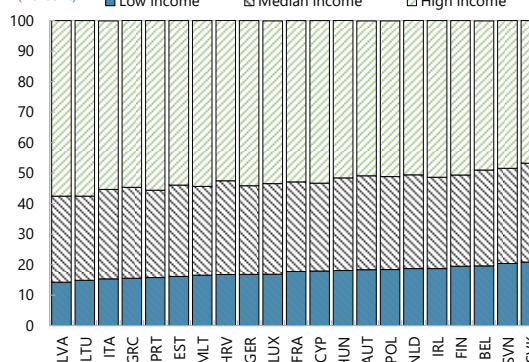
Income Spent on Utilities

(Percent of Household Gross Income)



Share of National Equivalized Income

(Percent)



Sources: HFCS microdata; Eurostat; Sgaravatti, G., S. Tagliapietra, C. Trasi and G. Zachmann (2023) 'National policies to shield consumers from rising energy prices', Bruegel Datasets, first published 4 November 2021, available at <https://www.bruegel.org/dataset/national-policies-shield-consumers-rising-energy-prices>; and IMF staff calculations.
 Note: The data should be interpreted with caution as it excludes measures at the sub-national and supra-national levels and may differ from national data sources. For instance, according to national government data, households have been the main beneficiaries of support in Luxembourg.

Because eligibility criteria can be complex and vary widely, we examine the cost effectiveness of both illustrative policy packages for all countries and actual policy packages for three of them—Croatia, Cyprus and Greece. In May 2022, the Greek government announced a ceiling on wholesale electricity prices and a refund of up to 60 percent of all the surcharges for consumers with annual incomes of up to EUR 45,000. In July 2022, the Cyprus government announced that the state would cover all additional energy costs of vulnerable households and introduced a staggered subsidy for other consumers covering between 50 and 85 percent of consumption to encourage users to save on energy use. By contrast, in Croatia, the government decided to limit the rise in electricity prices to 9.6 percent and gas prices to a maximum of 20 percent. It also announced measures to limit current food price increases to 30 percent.

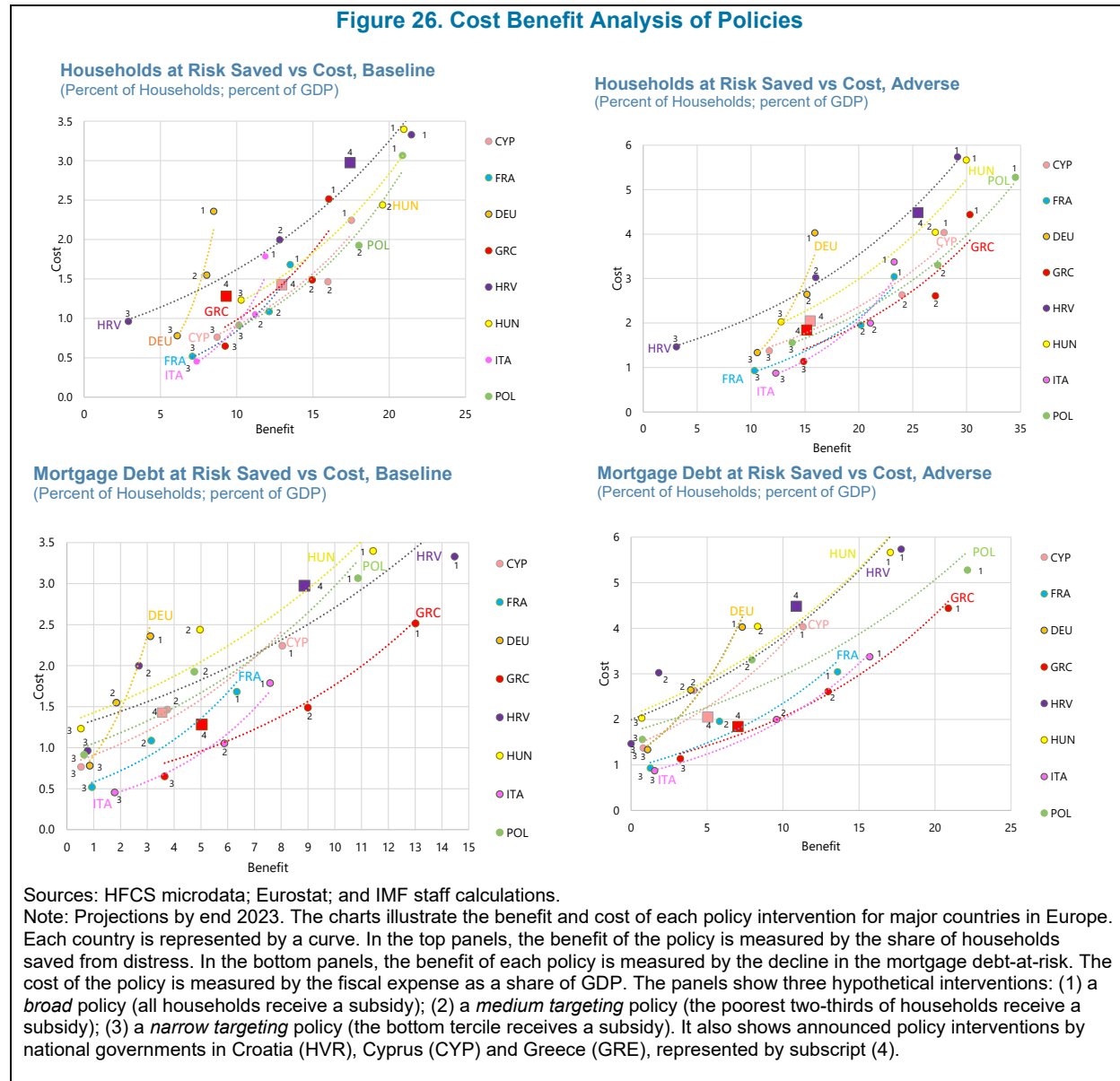
Targeted Policies Could Shield More Households from Financial Distress At A Lower Cost, particularly in Advanced Europe

To quantify the cost effectiveness of various illustrative policies, we follow a two-step procedure. First, we estimate the fiscal outlay of three hypothetical policies: (i) a *broad* policy whereby all households receive a subsidy; (ii) a *partially targeted* policy according to which the two thirds poorest households receive a subsidy; and (iii) a *narrowly targeted* policy through which only the bottom tercile receives a subsidy. We also quantify the estimated cost of the support programs announced in Greece, Cyprus, and Croatia, taking into account the conditionality of their beneficiaries. Second, we estimate the benefit of each policy along two dimensions; first, the share of households saved from financial distress (economic metric); second, the decline in mortgage debt-at-risk (financial stability metric). We assess the cost effectiveness of each policy under the baseline, and adverse scenario (the ‘cost of living scenario’), given the co-dependence between financial stress, debt at risk, wholesale prices, and macrofinancial aggregates.

The analysis suggests that the narrowly targeted policy support is more cost effective (Figure 27). It could save about 7 percent of households from financial distress at an estimated average cost of 0.8 percent of GDP under the baseline forecast. Under adverse conditions, the benefit could rise to 10 percent of households, while the cost of the policy would rise by half a percentage point of GDP. This yields a *cost-effectiveness ratio* of 10.4 percent of households saved per percentage point of GDP spent under the baseline, and 9.0 percent of households saved per percentage point of GDP spent under the adverse scenario. These ratios would decline to 6.3 and 6.1 for broad policies, under baseline and adverse conditions, respectively. From a financial stability perspective, policies that shield the bottom two thirds of households would yield the highest cost effectiveness. This is because median-income households are more likely to hold mortgage debt and bigger-sized loans than poorer ones. The cost-effectiveness ratio of partially targeted support would reach 3.6 and 3.1 under baseline and adverse conditions, respectively, relative to the 2.4 and 1.4 percent ratio achieved by narrowly targeted policies.

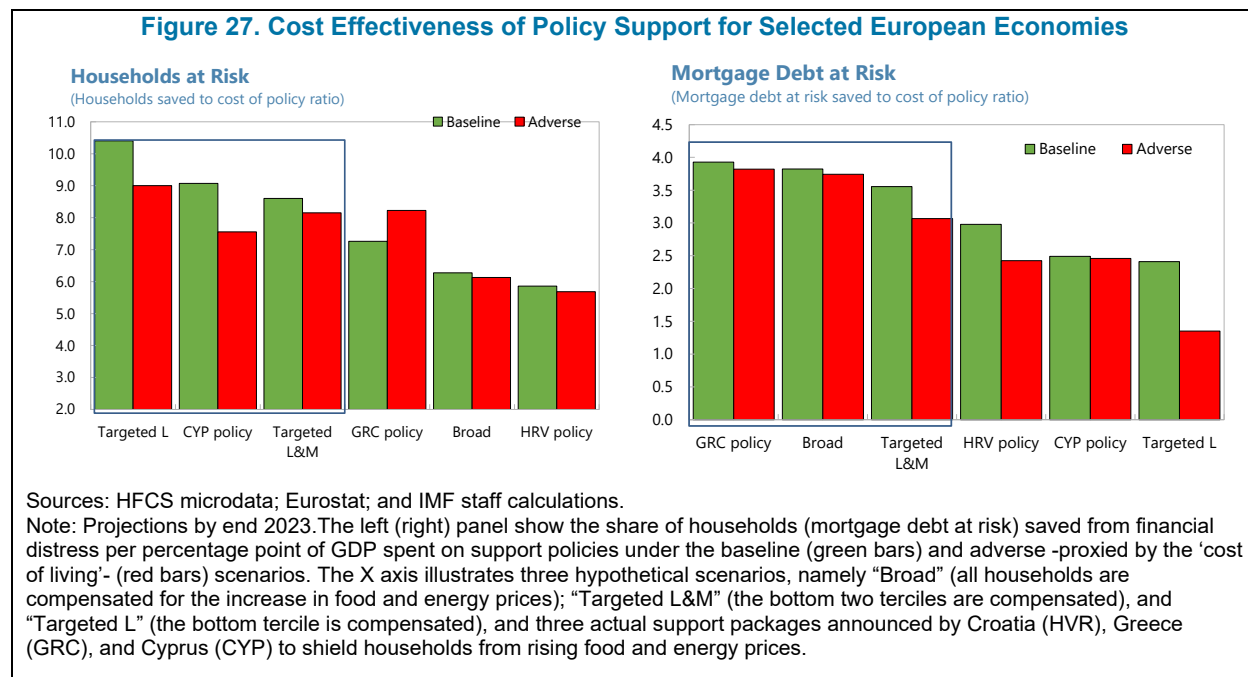
Actual packages also vary in cost effectiveness. Results suggest that the targeted policy announced in Cyprus could be comparatively more cost effective to shield households at risk, as the size of the subsidy is linked to energy consumption, and thus benefits lower-income households disproportionately. By contrast, the policy scheme deployed in Greece could be relatively more cost-effective to save ‘mortgage debt at risk’ as it also protects lower-median income households who are more likely to be burdened by mortgage payments. The impact of targeted policies could support the banking system by saving regulatory capital. The results suggest that a partially targeted policy could save between 50 and 90 basis points of CET1 capital in the countries most affected by a house price correction.

Figure 26. Cost Benefit Analysis of Policies



Sources: HFCS microdata; Eurostat; and IMF staff calculations.
 Note: Projections by end 2023. The charts illustrate the benefit and cost of each policy intervention for major countries in Europe. Each country is represented by a curve. In the top panels, the benefit of the policy is measured by the share of households saved from distress. In the bottom panels, the benefit of each policy is measured by the decline in the mortgage debt-at-risk. The cost of the policy is measured by the fiscal expense as a share of GDP. The panels show three hypothetical interventions: (1) a *broad* policy (all households receive a subsidy); (2) a *medium targeting* policy (the poorest two-thirds of households receive a subsidy); (3) a *narrow targeting* policy (the bottom tercile receives a subsidy). It also shows announced policy interventions by national governments in Croatia (HVR), Cyprus (CYP) and Greece (GRE), represented by subscript (4).

Advanced economies could benefit relatively more from narrow targeting than emerging economies. The cost-benefit curves presented in Figure 26 show a flatter slope for emerging countries, i. e., Croatia, Hungary, Poland, signaling a relatively higher benefit to cost ratio when policy support includes median income households. By contrast, Italy, France and Germany show very steep curves, implying that, as support broadens, costs rise sharply for limited benefits. This is because households in advanced countries tend to be less financially stretched than in emerging economies, as they spend a lower share of their income on basic goods and have relatively stronger balance sheets.



VII. Conclusion

Housing is a key sector in the economy, representing a major part of household wealth and collateral held by banks. Over the last decade, and particularly since the onset of the Covid-19 pandemic, house prices in Europe have risen faster than fundamental factors can account for, pointing to overvaluation of around 20 percent in most markets in 2022, and implying an elevated risk of price correction. The surge in the cost of credit since early 2022 as central banks tighten monetary policy may intensify the cooling of housing markets over the coming quarters.

European household finances are being stretched by increasing living costs and rising debt repayments. The risk that indebted households default on loans or sharply reduce their spending has increased. Using a novel metric of household *vulnerability*, which takes into account households' essential expenses (food, utilities, rent, debt repayments), debt, and income, and detailed data from HFCS and EU-SILC surveys, we find that the share of households that could struggle to afford basic expenses could increase by 10 percentage points by end 2023 under baseline conditions, reaching a third of all households for the average European country. However, there is substantial heterogeneity across countries depending on the amount of income consumed on essential expenses, household indebtedness, and the share of floating-rate mortgages, thus contributing to different shock elasticities across countries. The use of microdata is crucial to measure the non-linear effects in the left tail of the distribution. While income growth can absorb the rise in interest payments for the median household in some countries, the share of financially stretched households rises across all the scenarios in all countries.

Under the worst-case scenario, represented by an intensified cost-of-living crisis, our simulations suggest that 45 percent of households could become financially stretched, representing over 40 percent of mortgage debt and 45 percent of consumer debt. Lower income households could be disproportionately affected as they spend a higher share of their income on essential goods and housing costs. The share of overburdened households

among the bottom tercile of the income distribution could reach between 70 and 80 percent of households, compared to just 7 and 13 percent for their well-off peers. The cost-of-living crisis and the tightening of financial conditions could lead households to cut back on consumption to meet their budget constraint. We find that one out of four households could pull back on spending amid real income losses in the baseline. In the worst-case scenario, one third of consumers, accounting for 30 percent of aggregate consumption, may be forced to adjust their spending to make ends meet.

We use the newly constructed vulnerability indicator to stress test banks' retail portfolios across Europe by mapping the simulated increase in financially vulnerable households under the baseline and a range of adverse scenarios and the associated increase in default probability by overburdened households to the composition of banks' retail books, using EBA Risk Dashboard disclosures. We find that, overall, the risks posed by the household sector to the stability of the financial system appear to be contained, though pockets of vulnerability persist. Absent an abrupt house price correction and assuming banks are adequately provisioned for existing risks, capital depletion would likely not exceed 100 basis points in most countries. However, a sharp decline in house prices would impair banks' recovery rates from defaulted exposures. A 20 percent increase in the loss given default on mortgage loans could push up bank CET1 capital erosion into the 100-300 basis points with Southern and Eastern European countries most affected.

Government support measures could help maintain borrower repayment capacity. We measure the benefit of intervention by the share of household/debt that could be spared from financial distress. We quantify the cost effectiveness of policies depends on their targeting features. Results suggest that a price subsidy shielding the bottom tercile of the population from the surge in energy and food prices in 2022-23 could prevent about 7 percent of households from becoming financially distressed at an estimated cost of 0.8 percent of GDP under baseline projections. From a financial stability perspective, protecting both low and median-income households could be more cost efficient as median-income households are more likely to hold mortgage debt and have bigger sized loans.

Given the importance of housing sector to financial and macroeconomic stability, authorities may need to adjust macroprudential settings in countries where vulnerabilities continue to build, including by introducing a sectoral systemic risk buffer to increase resilience, as well as measures to improve the functioning of the rental market in some countries. Calibration and phase-in of macroprudential measures are crucial to avoid unintended consequences, and associated costs and benefits should be carefully evaluated. In the event of a downturn, however, authorities could swiftly relax capital-based measures to enable banks absorb credit losses and continue lending to the real economy.

Annex I. Survey Data Overview

Annex I. Table 1. Countries and Number of Households

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

Source: Household Finance and Consumption Survey (HFCS), wave (latest) 2017; EU survey on income and living conditions (EU-SILC), 2020, (except for Iceland and United Kingdom 2019; Italy 2019); and IMF staff calculations. Only households for which income is positive are included. Household income includes employee income, self-employment income, pension income, income from financial assets, and income from unemployment benefit, social transfers, and private transfers. Simulations are performed on the 2017 HFCS data aged to 2021 using the procedure described in Section III. Econometrics are conducted on the EU-SILC data over the period 2004-2020, including 9.4 million of observations.

Annex I. Table 2. Key Statistics in the HFCS Survey

Country name	DSTI (all borrowers)	Mortgage DSTI (mortgage owners)	DTI (all borrowers)	LTV main residence (mortgage owners)	Share of owners with debt	Share of non-owners with debt
Austria	3.2	8.4	34.0	24.0	41.4	25.4
Belgium	12.8	14.8	90.6	37.1	59.3	28.5
Croatia	0.0	19.9	26.6	21.9	39.9	45.5
Cyprus	19.5	26.1	208.6	39.7	69.5	29.4
Estonia	6.1	8.6	21.7	39.9	50.2	41.3
Estonia	14.7	14.7	112.9	46.9	56.4	40.9
Finland	10.0	10.5	77.1	47.2	62.3	49.5
France	16.3	19.7	64.5	46.2	56.0	31.1
Germany	7.1	12.2	45.1	35.7	54.5	38.3
Greece	8.4	14.1	72.9	56.6	21.3	15.7
Hungary	7.7	11.1	38.3	29.2	32.1	29.2
Ireland	10.9	12.9	61.3	45.3	57.4	38.0
Italy	9.0	14.1	47.2	40.0	23.8	16.0
Latvia	9.4	11.8	21.2	43.7	40.7	36.8
Lithuania	2.8	8.5	43.9	47.1	25.4	35.3
Luxembourg	13.1	17.8	95.5	39.0	59.1	40.1
Malta	11.0	14.5	110.6	42.1	38.7	14.9
Netherlands	11.5	13.6	243.0	68.4	84.0	22.3
Poland	8.9	13.2	16.7	32.4	41.3	37.4
Portugal	13.0	13.5	131.6	46.8	51.1	30.0
Slovakia	9.9	13.3	61.1	41.5	37.1	33.2
Slovenia	8.0	16.7	27.6	31.0	32.6	31.0
Euro area	11.0	14.6	70.3	44.6	48.5	31.9

Source: Household Finance and Consumption Survey (HFCS), wave (latest) 2017.

Note: Ratios are in percent. Only households for which income is positive are included. Household income includes employee income, self-employment income, pension income, income from financial assets, and income from unemployment benefit, social transfers, and private transfers. DSTI denotes debt service to gross income ratio; DTI denotes total debt to gross income ratio; LTV denotes loan to value ratio of main household residence point-in-time. Total debt includes mortgages collateralized on household's main residence, mortgages collateralized on other real estate property owned by the household, non-mortgage loans (consumer credit loans, private loans and other loans not collateralized on household's real estate property), credit lines/bank overdrafts debt and credit card debt (outstanding amount on which interest is paid at the end of the billing period). Owners include outright owners of the household main residence and owners of the household main residence with mortgage. Non-owners include non-owners of the household main residence (renters and free/other use category).

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