INTERNATIONAL MONETARY FUND

Household Vulnerabilities, Financial Stability, and the Role of Policies in Portugal

Laura Valderrama

SIP/2023/046

***IMF Selected Issues Papers* are prepared by IMF staff as background documentation for periodic consultations with member countries.** It is based on the information available at the time it was completed on June 1, 2023. This paper is also published separately as IMF Country Report No 23/219.

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Household Vulnerabilities, Financial Stability, and the Role of Policies in Portugal
Prepared by Laura Valderrama

Authorized for distribution by Rupa Duttagupta
July 2023

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ABSTRACT: Since the pandemic, developments in the real estate market in Portugal suggest that housing vulnerabilities have increased. Rising living costs and interest rates are stretching household finances which could cause an increase in defaults or force households to cut back on consumption. Simulation results suggest that, under adverse conditions, almost half of all households could be financially stretched with a disproportionate effect on lower income households. In addition, one third of consumers may need to adjust spending although the estimated reduction in aggregate consumption is limited. The impact on the banking system is manageable but a sharp house price correction could have a material impact on capital buffers. Policy support aimed at tacking the cost of living crisis could help mitigate some of these risks.

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SELECTED ISSUES PAPERS

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PORTUGAL

SELECTED ISSUES

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Approved By
Rupa Duttagupta

Prepared By Laura Valderrama

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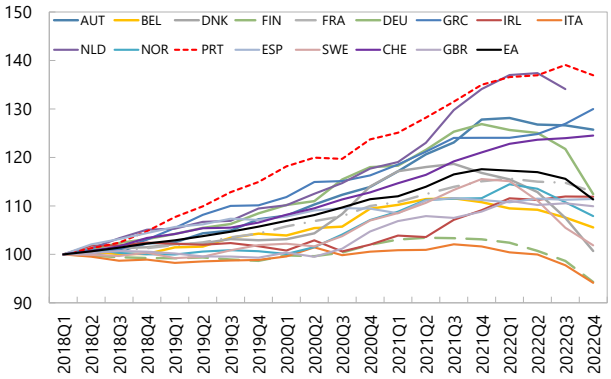
HOUSEHOLD VULNERABILITIES, FINANCIAL STABILITY, AND THE ROLE OF POLICIES IN PORTUGAL[1]

A. Introduction

1. As elsewhere in Europe, financial stability risks related to higher interest rates and strong housing market dynamics have risen in Portugal:

Evolution of Real House Prices in Europe
(2018Q1=100)



Sources: OECD; Haver; author's calculations. Note: The latest date for house prices in NLD is 2022Q3.

- *House prices*: Since 2018Q1 real house prices have increased by 40 percent (the highest appreciation rate in Europe), driven by the rapid post-Covid-19 economic recovery, negative real interest rates, rising construction costs, and structural supply constraints. The real estate market started cooling down in 2022 somewhat amid soaring interest rates with real house price growth decelerating to around 2 percent y/y in 2022Q4 (versus 9.1 percent y/y one year earlier), though remaining at the high end of the house price growth distribution in Europe (Figure 1).

- *New home buyers*: In Portugal, mortgage rates on new issuances reached 3.2 percent at end 2022, representing a 240-bps increase from end-2021. As a result, the monthly bill of buyers purchasing property in the main cities in 2022 rose by almost half relative to 2021. If interest rates were to increase by a further 300 basis points, mortgage bills would double relative to 2021 (Figure 2).[2]

- *Existing mortgage borrowers* (Figure 3)*:* As of 2022, the median household spends one third of its gross income on food and energy, while the bottom tercile of the income distribution spends 56 percent. In addition, 14 percent of households in the bottom tercile of the income distribution, 28 percent in the second tercile, and 25 percent in the top tercile have non-mortgage loans (such as consumer loans, credit lines, overdrafts, etc.).[3] The estimated average debt service among households with debt payments is around 10.4 percent at end-2021.

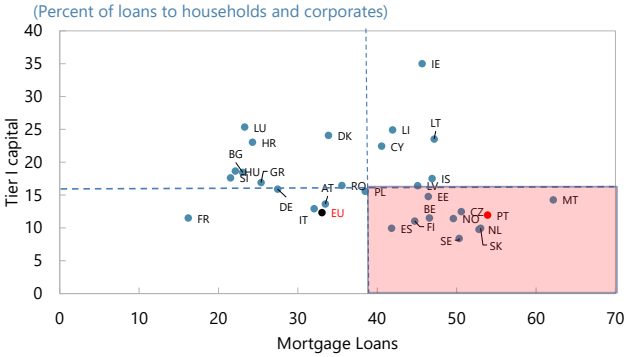
[1] Prepared by Laura Valderrama. This paper draws on Valderrama et al (2023).

[2] To quantify the impact, we calculate the price of a 100m2 dwelling as the average transaction price of new and existing homes in the most important cities in Portugal drawing on Statista. Then, we use information on the typical LTV ratio (Hypostat 2022) to back out the size of the average mortgage loan. Using data on average maturity, lending rate, and median income (using EU-SILC microdata), we compute the debt service to income ratio (DSTI) in 2021. We update the DSTI ratio using information on the mortgage rate on new originations as of December 2022, keeping housing prices and borrower's income constant, and simulate it under various interest rate scenarios.

[3] The partition of the income distribution is based on total gross annual household income, equalized using the modified OECD equivalence scale.

2. Mortgage loans are still sizable in bank portfolios. Household loans collateralized by residential real estate (RRE) account for over half of total loans to the nonfinancial private sector, and amount to over 40 percent of 2022 GDP. Other non-collateralized household loans represent 10 percent of total loans or 6 percent of GDP. Portuguese banks' exposure to RRE combined with relatively weaker CET1 capital buffers (compared to EA) also induces higher risks to financial stability stemming from a sharp fall in house prices.

Exposure to Residential Real Estate Sector, Dec 2022
(Percent of loans to households and corporates)



Source: EBA Risk Dashboard; and IMF staff calculations. The chart shows Tier 1 capital as a share of total loans, rather than risk-weighted assets (y-axis) and mortgage loans as a share of total loans (x-axis). The cut-off points of the dashed lines represent the average. The data is based on a sample of banks representing the largest EBA reporting institutions in each country.

3. Since the start of the cost-of-living crisis, the government is estimated to have spent about 1 percent of GDP on average during 2022-23 to shield households from rising food, energy, and housing costs. Most of the measures are in the form of income support to vulnerable households (e.g., low-income families). Other measures seek to provide VAT and excise tax relief. To protect vulnerable mortgage borrowers from higher interest rates, the government approved two sets of relief measures: (i) a measure to encourage banks to restructure loans for borrowers that could struggle to service their mortgage repayments (November 2022); and (ii) an interest rate subsidy to absorb part of the rise in interest rates for financially stretched borrowers (March 2023).

4. Against this backdrop, this paper examines the impact of RRE vulnerabilities, the cost-of-living crisis, and the tightening of financial conditions on households and banks in Portugal. It first assesses the ability of households to continue servicing their debt and maintain consumption under a range of scenarios. It then quantifies the impact on banks from the ensuing change in asset quality. Finally, it examines the effectiveness of policy measures to reduce household vulnerabilities and preserve financial stability.

B. Stress Testing Household Balance Sheets

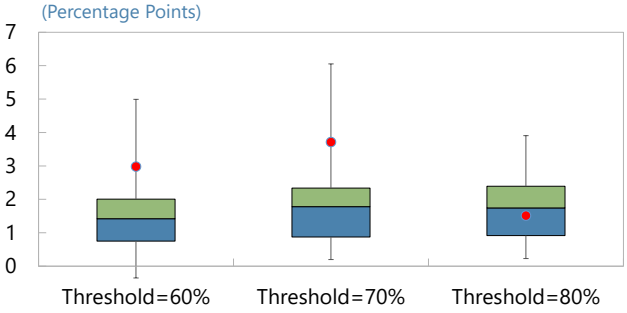
5. We assess affordability risk by quantifying the share of households that may be unable to service their debt. A household is identified as *financially vulnerable* (at a non-negligible risk of default) if debt service and basic living expenditures represent more than 70 percent of gross income.[4] Basic living expenditures include essential consumption (food and utilities), and housing costs. We also show results using the more standard measure of financial vulnerability, i.e., when debt service exceeds 40 percent of gross income. 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 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

[4] Country-level logit regressions identify 70 percent as the most significant threshold for a sharp increase in mortgage default risk across countries.

financially vulnerable households as a share of total consumer loans. The analysis relies on granular household level data, which allows identifying vulnerable households across the income distribution and tenure status and analyzing effectiveness of targeted policies. The data and the methodology are further described in Annex II.

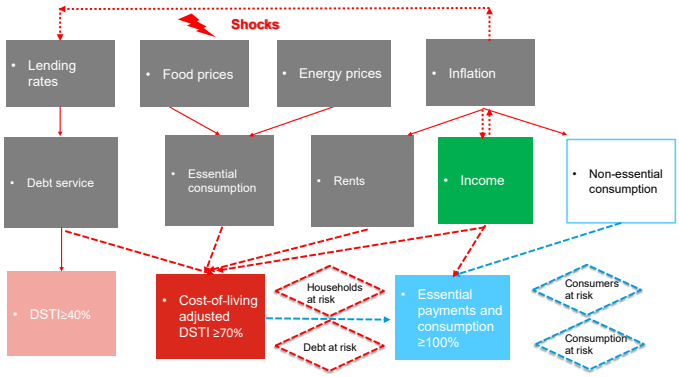
6. Financially vulnerable households are estimated to be significantly more likely to be in arrears on their debt payments. A logit regression controlling for macroeconomic drivers (e.g., unemployment rate, growth rate), and the household position in the income distribution suggests that the probability of being in arrears on their mortgage payments in Portugal increases by 70 percent (from 3.1 to 5.3 percent on average during the estimation period 2004-2020) when households are overburdened by basic expenditures and debt repayments.[5] Based on country-level regressions, the average probability of being in arrears jumps from 4.5 to 6.8 percent for vulnerable households across EA (Figure 4). Similarly, the probability of being in arrears on other retail loans rises by 60 percent (from 3.6 to 5.8 percent) when households are overburdened in Portugal, relative to a surge from 7.3 to 10.3 percent in EA.

Estimated Difference in the Probability of Default Above and Below Various Thresholds
(Percentage Points)



Source: EU-SILC microdata; IMF staff calculations. The box plots show the country distributions for the estimated difference in the probability of default of mortgage loans above and below varoius thresholds, based on country-level logit regressions controlling for household level income and macroeconomic factors.

7. To evaluate the risk that households cut consumption sharply, we consider an alternative definition of vulnerability. A household is identified as *economically vulnerable* (at a risk of sharply cutting consumption) if the sum of debt service and total consumption exceed gross income. While consumers may cut back on spending to avoid breaching their budget constraints regardless of their level of indebtedness, this risk is higher for leveraged households to avoid default. *Consumption-at-risk* is defined as the consumption of households classified as economically vulnerable as a share of aggregate consumption. Figure illustrates the transmission of shocks.



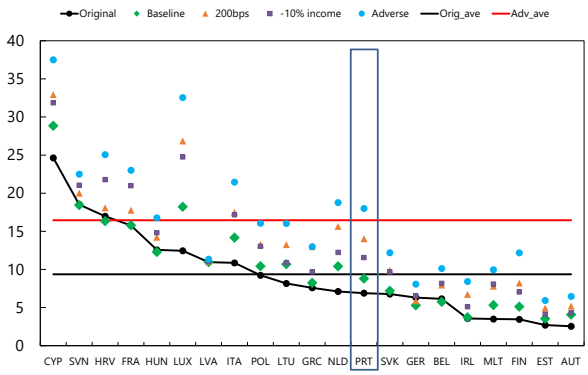
8. We simulate the paths of household income, housing cost, other basic expenses, and repayments of other loans using a range of scenarios over a 2-year horizon. These scenarios are illustrative. The baseline scenario follows the IMF October 2022 WEO forecast. To assess the resilience of households to deteriorating macrofinancial conditions, we stress test households' finances against a set of adverse scenarios. For instance, the 'cost of living' scenario features the

[5] In 2022, the share of households in arrears is 1.8 percent according to Bank of Portugal statistics.

materialization of both an interest rate shock (200 bps) and a food and energy price shock (20 percent) relative to the baseline. Annex II Table 2 shows the cumulative shocks by end-2023 for Portugal and EA. Some of these scenarios can be regarded as tail risk events.

9. Using the standard measure of financial vulnerability, the change in the share of vulnerable households would be moderate in all scenarios. The share of mortgage borrowers with a DSTI ratio (including all debt payments) exceeding 40 percent is estimated to rise to 8.8 percent under the baseline (and 14.0 percent in the 'tightening' scenario) in Portugal. This is in part because in the current inflationary environment, the rise in gross income absorbs most of the increase in interest payments. Because stressed households hold a good part of the outstanding debt, the share of *mortgage debt at risk* could double to reach a quarter of outstanding mortgage debt under the worst-case scenario.

Mortgage Borrowers at Risk (DSTI≥40%; all debt payments)
(Percent)



10. But once basic living expenditure is accounted for, a more significant share of households could be financially vulnerable. In the adverse scenario(s), almost half of households could struggle to afford basic expenditures in Portugal (twice as many as before the energy crisis), with sharper effects on low-income households. The share of financially vulnerable low-income families could increase to 78 percent under the baseline (from 60 percent) and reach around 90 percent under the 'cost of living' scenario. By contrast, only between 5 and 13 percent of high-income households would be financially vulnerable depending on the severity of the scenario. In the worst-case scenario[6], one third of consumers could be economically vulnerable and be forced to cut back on consumption on non-essential goods to afford basic expenditures, accounting for over one fourth of consumption (Figure 5). The estimated reduction in aggregate consumption would range between 2 and 5 percent.[7]

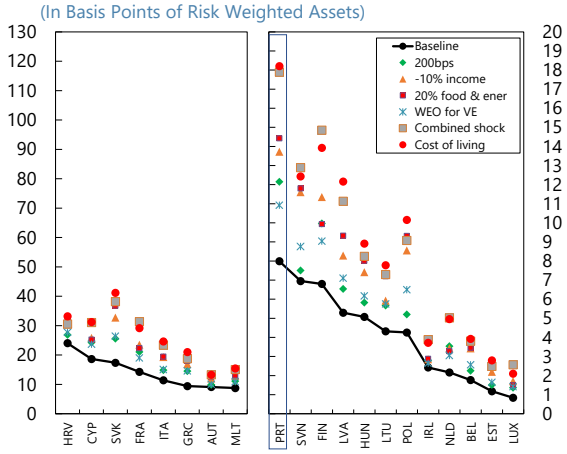
[6] The worst-case of scenario is characterized by an intensification of the cost-of-living crisis whereby interest rates increase by a further 200 bps relative to the baseline, and food and energy prices rise 20 percent above baseline projections.

[7] This is calculated by multiplying the share of stretched consumers (weighted by their contribution to total consumption) by their excess consumption over their budget constraint. This is a conservative assumption since consumers could draw down on their savings, rely on transfers, or use credit lines to keep their consumption habits. At the same time, some consumers may start adjusting their consumption levels well before they hit their budget constraint for precautionary motives.

C. Impact on Bank Capital

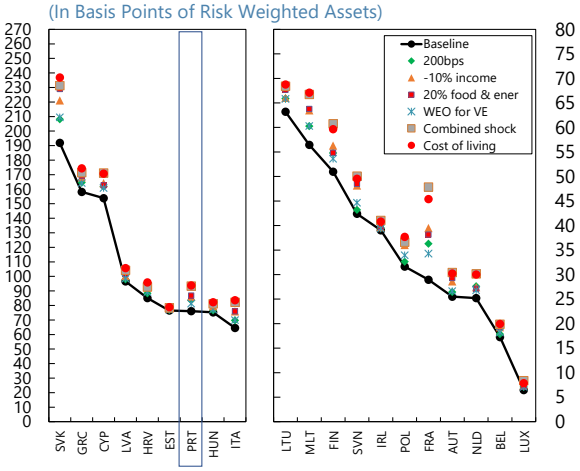
11. To quantify the impact of household financial stretch on banks' capital, we follow a four-step procedure. First, we estimate a range of scenarios to account for uncertainty around the outlook by end-2023. Second, we estimate the link between being financially vulnerable and the likelihood of default at the individual household level. In a third step, we simulate the increase in the share of financially vulnerable households to estimate the increase in probability of default. In a fourth step, we use data from EBA Risk Dashboard to project the impact of higher credit risk on banks' capital position. We use estimates of house price overvaluation in Portugal to compute bank impact under a house price correction.

CET1 Capital Depletion -No House Price Correction
(In Basis Points of Risk Weighted Assets)



12. In the absence of a sharp house price correction, the impact of household stress on Portuguese banks is relatively contained. Capital depletion would not exceed 20 basis points in Portugal (versus 15 basis points in the EA). However, an abrupt decline in house prices in Portugal (eliminating the 20 percent estimated overvaluation; see Annex I) combined with the increase in default rates projected in the analysis, could challenge some banks.[8] On aggregate, it would shed up to 100 basis points of capital in Portugal (versus 85 basis points in the EA). While this is a severe scenario, the estimates don't consider that some households could see their credit quality deteriorate and require additional provisions even if their DSTI falls below the estimated threshold where the default rate jumps.

CET1 Capital Depletion - House Price Correction
(In Basis Points of Risk Weighted Assets)



D. The Effect of Policies

Policies to Mitigate the Impact of Soaring Food and Energy Prices in Portugal

[8] It is assumed that the 20 percent estimated house price overvaluation is corrected by end 2023 (Annex I). This impacts the loss given default (LGD) of defaulted exposures which increases by 20 percent over the weighted average LGD on retail loans secured on real estate property reported by Portuguese IRB banks on non-defaulted exposures (i.e., 20.1 percent as of 2022Q4). The stressed LGD (i.e., 40 percent) is in line with estimates found in the literature (An and Cordell, 2019).

13. The sharp increase in food and energy prices, prompted the Portuguese government to put in place measures to shield households from the direct impact of rising prices. In 2022, the government reduced the tax burden on fuel, put a hold on the planned carbon tax increase, reduced the VAT rate on electricity, and provided exceptional income support to households, among fiscal policy responses. We conduct a cost-benefit analysis of specific policy measures[9] that we label as 'selected shock mitigation policies'.[10] For simplicity, we assume that the reduction in the price of energy and the exceptional income support applies to all the households. We compute the estimated fiscal outlay (cost) of the 'selected shock mitigation policies' under the baseline and 'cost of living' scenario. Then, we calculate the share of households and mortgage debt at risk protected (from default) under each scenario (benefit). [11]

14. The analysis suggests a moderate cost-effectiveness of the 'selected shock mitigation policies' in Portugal (Figure 6). Under baseline conditions, around 3.5 percent of households would be saved from distress at a cost of 0.6 percent of GDP. The financial stability impact would be smaller with a 1.7 percent reduction of risky debt. Under the 'cost of living' scenario, the share of households shielded from financial stretch would reach 3.8 percent at a cost of 0.7 percent of GDP. The reduction of the share of mortgage debt at risk is estimated at 2.5 percent.

15. We also quantify the cost effectiveness of three hypothetical interventions. We estimate the impact of three hypothetical policies which would shield consumers from the entire (100 percent) increase in food and energy prices during 2022-23, with different targeting schemes: (i) a *broad* policy whereby all households are shielded; (ii) a *partially targeted* policy according to which the poorest two thirds of households are shielded; and (iii) a *narrowly targeted* policy through which only the bottom tercile is shielded. Simulation results suggest that, in the baseline, a hypothetical *narrowly targeted* policy would save 7.9 percent of households (0.8 percent of mortgage debt at risk) at a cost of 0.8 percent GDP. Under the 'cost of living' scenario, a *narrowly targeted* policy would save 12 percent of distressed households (2.5 percent of risky debt) at an estimated cost of 1.5 percent of GDP.[12]

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[9] We include the following policy measures in the simulation: (i) a reduction of the price on gasoline and diesel and the temporary suspension of the carbon tax available at https://ps.pt/wp-content/uploads/2022/04/OE2022.pdf; (ii) a EUR 60 extraordinary support transfer for households in the context of the armed conflict in Ukraine available at https://dre.pt/dre/en/detail/decree-law/30-d-2022-182213909; (iii) a reduction of VAT on electricity from 13 to 6 percent ("Familias Primeiro") available at https://www.portugal.gov.pt/pt/gc23/comunicacao/noticia?i=familias-primeiro-perguntas-e-respostas#1.; and (iv) a EUR 240 extraordinary transfer to households ("Familias Primeiro"). A summary of policies is available at the Bruegel database of national fiscal policy responses to the energy crisis at https://www.bruegel.org/dataset/national-policies-shield-consumers-rising-energy-prices.

[10] The simulation exercised does not include additional revenue and expenditure measures provided in the broader 'Geopolitical shock mitigation measures' fiscal package. For details see the Staff Report.

[11] In addition to Portugal, we quantify the estimated cost of the support programs announced by the government in Greece, Cyprus, and Croatia, taking into account the conditionality of the schemes. See Valderrama et al (2023) for details.

[12] The cost of the policy depends on the evolution of wholesale market prices during 2022-23, which in the analysis, are in line with the October 2022 WEO forecast. Under current projections for energy prices, the cost would be more contained.

Policies to Mitigate the Impact of Higher Rates on Mortgage Borrowers in Portugal

16. Considering the surge in interest rates, the government published the Decree-Law No. 80-A/2022 on November 25, 2022. The objective is early detection of debtors and exposures in distress. Under the Decree-Law, borrowers with first residence floating-rate loans of up to EUR 300,000 at acquisition are eligible to renegotiate their loans if the DSTI is 50 percent or higher, or if it exceeds 36 percent with an increase in DSTI of at least 5 percentage points in 2023. We conduct a cost-benefit analysis of this measure by assuming that banks restructure the loans of eligible borrowers by reducing their monthly installments through a reduction of interest payments (half of the increase by end-2023). Results suggest that around 0.5 to 3.2 percentage points of mortgage-debt-at-risk (and between 0.3 and 2.3 percent of mortgage borrowers) would be protected from distress depending on the scenario.[13] Restructuring would be applied to 7-18 percent of outstanding mortgage debt. The benefit for banks (lower provisions) would be around 5 basis points of common equity Tier 1 (CET1), while the cost (lower NII) would reach between 10 and 20 basis points of CET1.

17. A law granting an interest subsidy to stressed borrowers came into force on March 23, 2023 (Decree-Law No. 20-B/2023).[14] Support takes form of a temporary subsidy in 2023 for half of the increase in current and past benchmark rates at origination augmented by a 3-percentage point increase. The outstanding amount at origination should be lower than EUR 250,000, the family's income up to the 6th income bracket (EUR 38,632 annual income), and the DSTI greater than or equal to 35 percent.[15] We re-run the simulations for eligible mortgage borrowers and find that that under the 'interest rate shock' or 'cost of living' scenario mortgage debt at risk would be lower by up to one percentage point under the policy. Debt relief, at an estimated subsidy of 0.46 percent on eligible debt (around 15 percent of outstanding mortgages) would cost around EUR 60 million (3 basis points of GDP). The benefit for banks (lower provisions) is estimated at 1 basis point of CET1. These are lower bound projections as the reference rate at the time when the loan was signed is biased upwards (and the amount of support downwards) as outstanding loans do not include mortgage originations granted after the 2017 (latest) Household Finance and Consumption Survey (HFCS).

E. Concluding Remarks and Policy Implications

18. Since the onset of the Covid-19 pandemic, house prices in Portugal have risen faster than fundamental factors can account for, pointing to overvaluation of around 20 percent. This implies an elevated risk of price correction. Given the materiality of the mortgage portfolio for

[13] For this analysis, we use the standard metric of financial distress whereby debt service to income ratio exceeds 40 percent of household income.

[14] At the time of drafting this note, a broader program to support the housing market "Mais Habitação" had been approved by the Council of Ministers in March 2023 and was in Parliament to be discussed in the following weeks.

[15] In the simulations, the eligibility criteria follow the conditionality of the February 2023 proposal including an outstanding amount of less than EUR 20,000, and no conditionality on the maximum amount of financial assets (less than 62 times the social support index up to EUR 29,787).

Portuguese banks, an abrupt decline in house prices combined with an increase in default rates amid the cost-of-living crisis and soaring interest rates could become a challenge for some banks.

19. Using a cost-of-living measure of financial vulnerability, our simulations suggest that, under adverse conditions, almost half of all households could become financially stretched in Portugal. They represent over 40 percent of mortgage debt and 45 percent of consumer debt. The share of vulnerable low-income families could range between 78 and 90 percent, while only 5 to 13 percent of high-income households would struggle depending on the severity of the scenario. In the worst-case scenario, one third of consumers could be forced to cut back on consumption with an estimated reduction in aggregate consumption of 7 percent. Considering that banks have adequately provisioned existing risks, capital depletion would not exceed 100 basis points under a market price correction that would bring back house prices to fundamental values in Portugal.

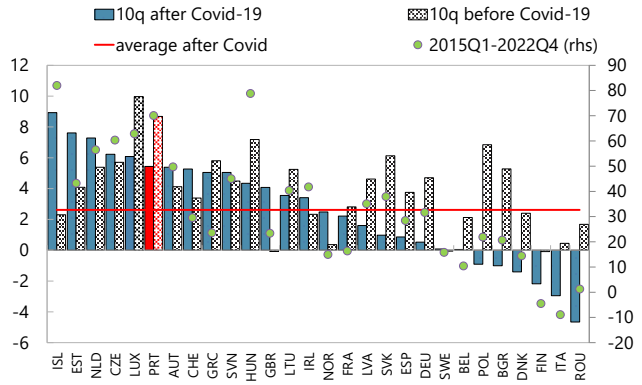
20. Government support measures could help maintain borrower repayment capacity. We measure the benefit of intervention by the share of household/debt that could be spared from financial distress. Results suggest that, under the baseline, the 'selected shock mitigation policies' in terms of VAT reductions and extraordinary income support could shield around 3.5 percent of households from financial distress (and 1.7 percent of mortgage debt at risk) at a cost of 0.6 percent of GDP. Targeting a similar budget envelope to the bottom tercile of the income distribution would be more cost effective to reduce the share of financially stretched households. A policy package that also includes the middle tercile would increase the financial stability support as these households are more likely to hold mortgage debt.

Figure 1. Vulnerability Indicators in the Residential Real Estate Market

Real house prices rose by 6 percent after Covid-19…

Real House Price Growth Before and After Covid-19

(Percent, year-on-year, annualized; cumulative rhs)

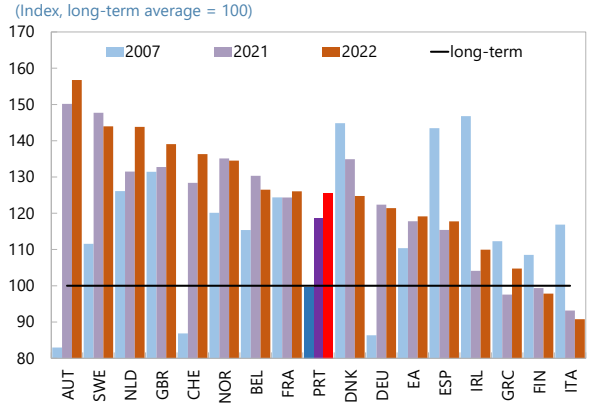


Sources: OECD, Haver, and IMF staff calculations. The dots show cumulative growth over the referenced period. Note: For EST and NLD, data is up to 2022Q3.

…with price-to-income ratios reaching levels above 25 percent their historical averages…

Price-to-Income in European Countries

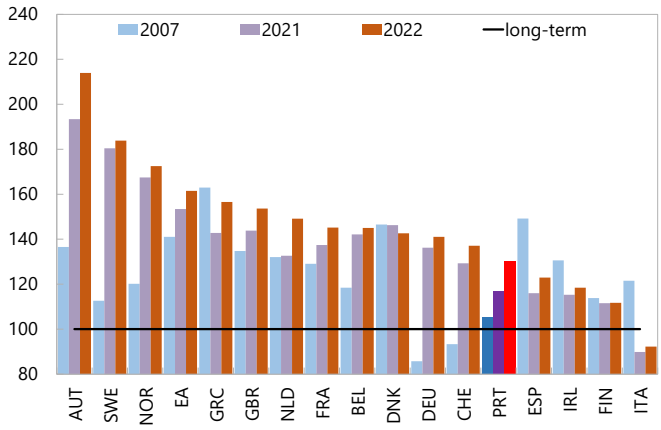
(Index, long-term average = 100)



…and price-to-rent ratios exceeding long-term values by 30 percent.

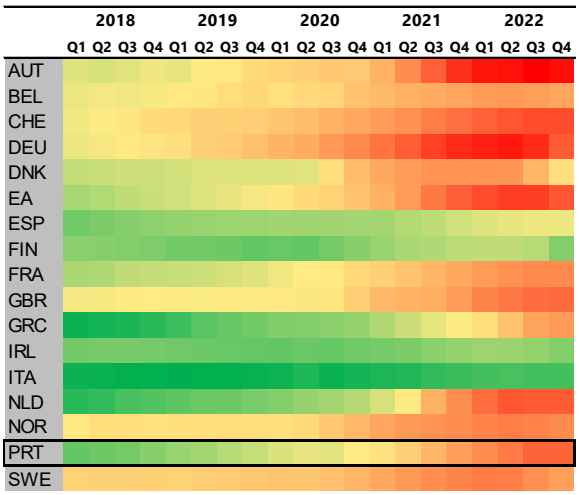
Price-to-Rent in European Countries

(Index, long-term average = 100)



This trend has intensified over the last five years.

Heatmap of Price-to-Rent in European Countries

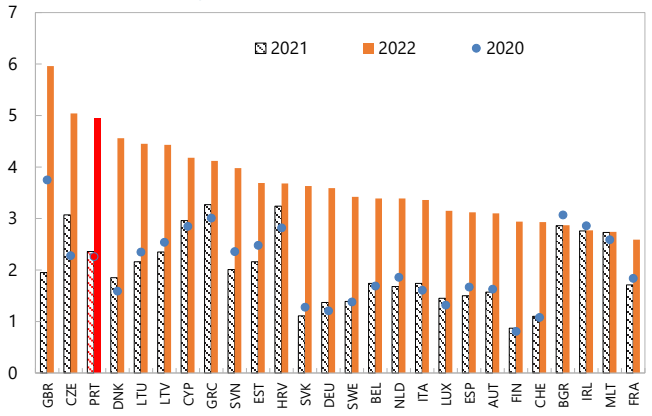


Sources: OECD, and IMF staff calculations. Note: The latest data is 2022Q4, except for Estonia, Netherlands (top left chart), and for Estonia, Netherlands, and Portugal data (remaining three charts) (2022Q3). In top left chart, ten quarters (10q) after Covid includes 2020Q2-2022Q4, while 10q before Covid covers 2017Q4-2020Q2. The dots show cumulative real house price growth over 2015Q2-2022Q4. In top right and bottom left charts, the long-term average is calculated for each country separately starting at least in 2000. In bottom right chart, the heatmap shows Z-scores, computed by subtracting the mean from the observation at time t and dividing the difference by the standard deviation. The mean and the standard deviation are computed over the available sample, starting in 1970Q1 through 2022Q4.

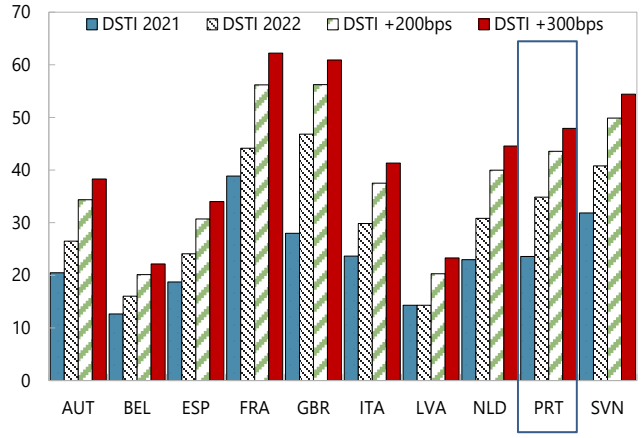
Figure 2. Rising Interest Rates are Hurting Affordability

Mortgage rates in Portugal raise by 260bps in 2022… *…pushing DSTI ratios by 50 percent.*

Interest Rates on New Mortgages
(Percent; APRC; end of period)



DSTI to Keep Buying Power in Main Cities at 2021 Levels
(Percent of Household Gross Income)

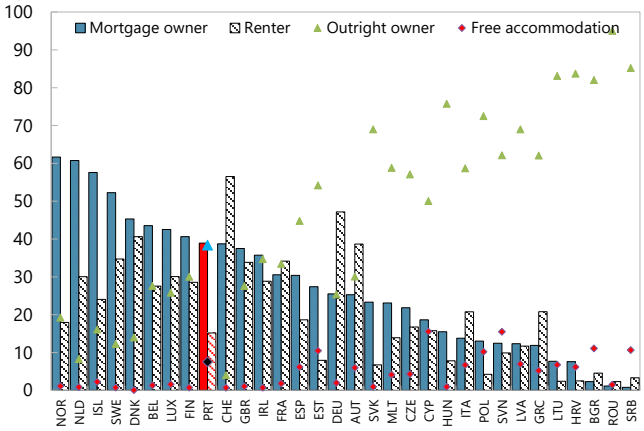


Sources: Statista, Hypostat, Haver Analytics, and IMF staff calculations. Note: DSTI denotes debt service to income ratio. To quantify the increase in DSTI due to higher mortgage rates, we calculate the price of a 100m2 dwelling as the average transaction price of new and existing homes in the most important cities drawing on Statista. Then, we use information on the typical LTV ratio (Hypostat 2022) to back out the size of the average mortgage loan. Using data on average maturity, lending rate, and median income (using EU-SILC microdata), we compute the debt service to income ratio (DSTI) in 2021. We update the DSTI ratio using the mortgage rate as of December 2022 and simulate it under various interest rate scenarios

Figure 3. Tenure Status and Borrowers' Vulnerability

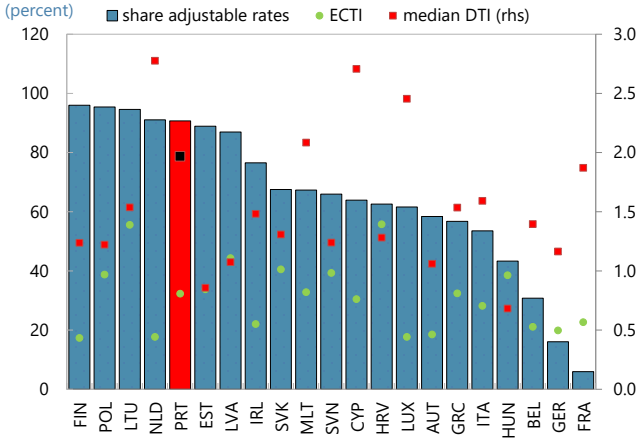
Around 40 percent of households in Portugal have mortgages…

Tenure Status, 2020
(percent)



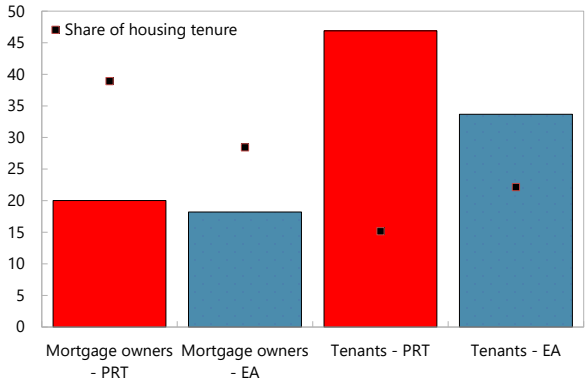
…of which 90 percent have floating rate loans with median DTI ratio of 2…

Adjustable Mortgage Rates, Essential Consumption, and Leverage
(percent)



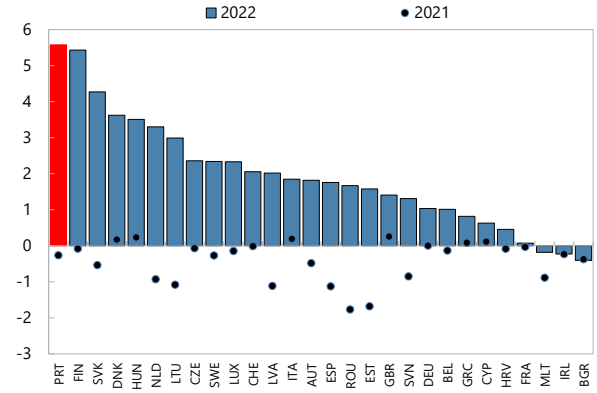
The share of vulnerable households is higher than in the EA, particularly for renters…

Share of Vulnerable Households by Tenure Status
(Percent, cost-of-living-adjusted debt-service-to-income ratio ≥ 70%)



…even borrowers with a DSTI of 30 percent in 2018 would see debt service increase by over 5 pps in 2022…

Estimated change in DSTI ratio for outstanding borrower
(Indexed: DSTI=30 in 2018)

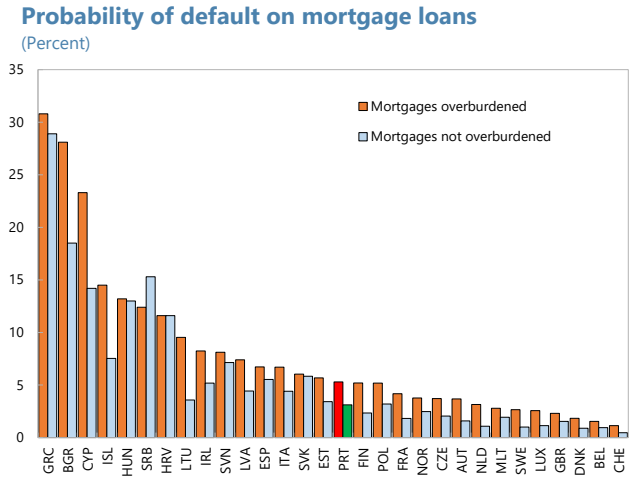


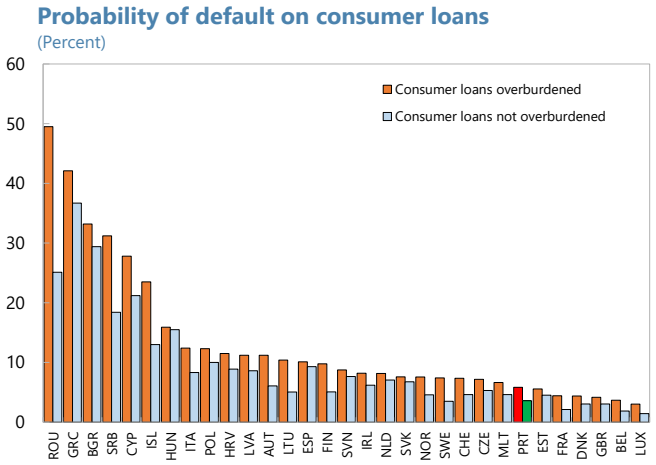
Sources: EU-SILC microdata; HFCS microdata; Hypostat; Haver Analytics; and IMF staff calculations. Note: In Panel 3, a vulnerable household consumes more than 70 percent of its gross income on essential payments (housing costs, food, utilities, and debt repayments). Panel 4 shows the increase in DSTI ratio of an outstanding borrower with a DSTI of 30 percent in 2018 in 2021 (dots) and 2022 (bars) as a result of shifts in benchmark curves.

Figure 4. Vulnerable Households Are at Default Risk

When a household is overburdened, the probability of default on mortgage loans rises from 3.1 percent to 5.3 percent …

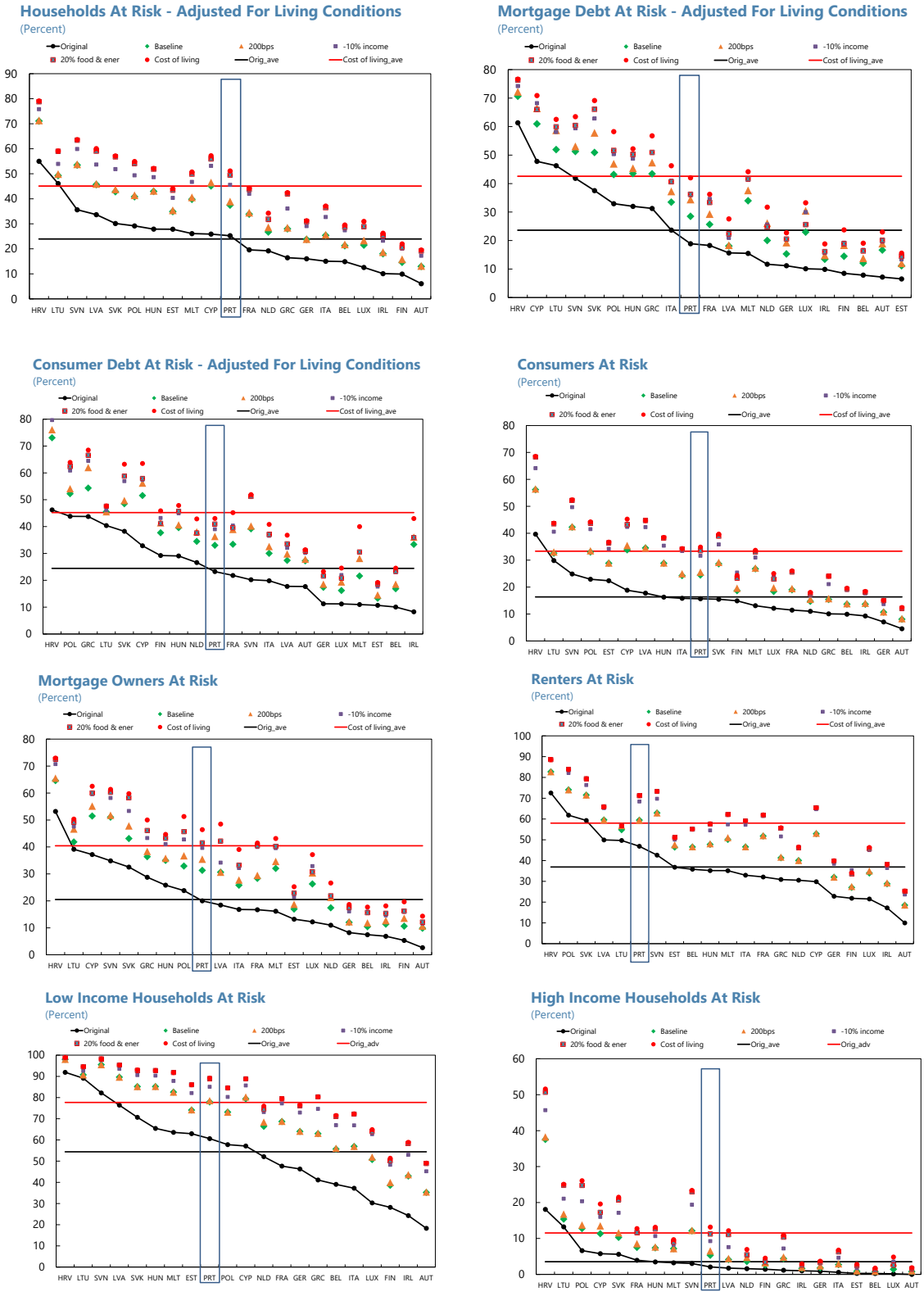
…and on consumer loans from 3.6 percent to 5.8 percent.





Sources: EU-SILC microdata; and IMF staff calculations. The figure plots the average predicted value of the probability of being in arrears (i.e., the household is unable to pay on time due to financial difficulties) on the mortgage loan for the main dwelling (left chart) or other hire purchase installments or loan payments (right chart) based on country level logit regressions controlling for macrofinancial variables (e.g., growth, unemployment) and the income quantile of the household, conditional on whether the household is overburdened or not. An overburdened household is defined as a household for which essential payments consume more than 70 percent of its gross income. Regressions are conducted at the household level over 2004-2020.

Figure 5. Simulation Results – Household Vulnerability by Income and Tenure



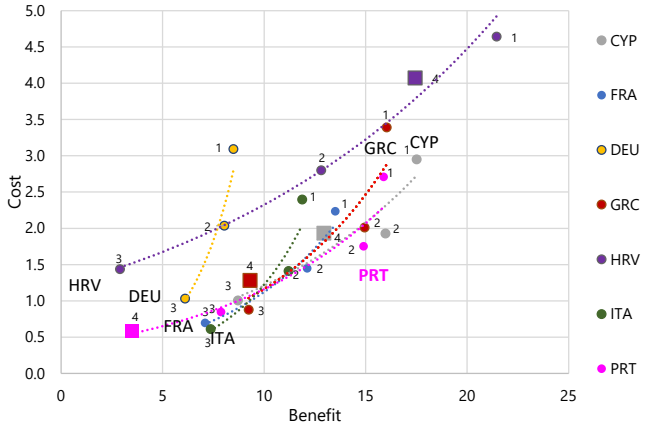
Source: HFCS micro data; and IMF staff calculations. To simplify the charts, selected scenarios are shown.

Figure 6. Simulation Results – The Effect of Policies

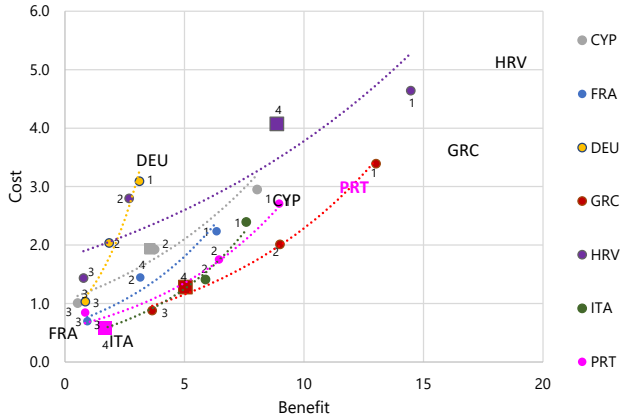
In the baseline, the shock mitigation policies in Portugal would save 3.5 percent of distressed households…

…and 1.7 percent of risky mortgage debt at a cost of 0.6 percent of GDP …

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



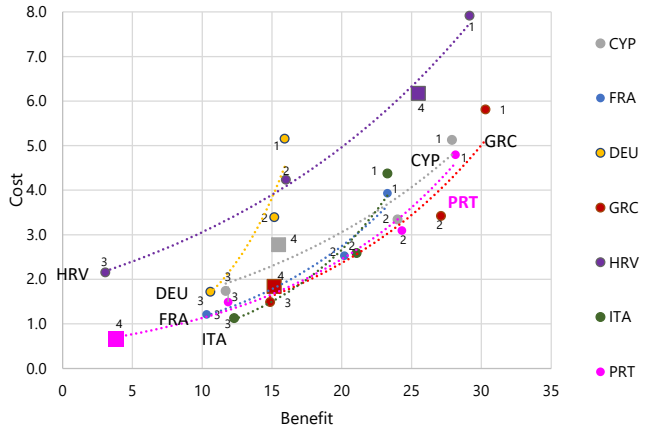
Mortgage Debt at Risk Saved vs Cost, Baseline
(Percent of Households; percent of GDP)



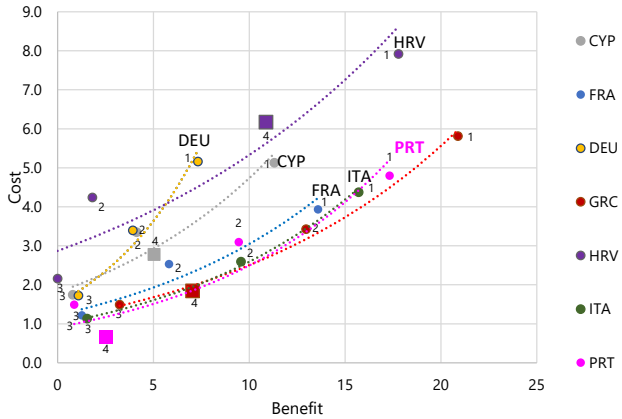
In the adverse, 3.8 percent of households would be saved…

…but only 2.5 percent of mortgage debt-at-risk at a cost of 0.7 percent of GDP.

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



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



Sources: HFCS microdata; Eurostat; and IMF staff calculations. The 'shock mitigation' policies in Portugal include the reduction in the tax burden for fuel and electricity. Projections are as of end 2023. The charts illustrate the benefit and cost of each policy intervention for Portugal against 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 the policy interventions announced by governments in Portugal (PRT), Croatia (HVR), Cyprus (CYP) and Greece (GRE), represented by subscript (4), shown in a square symbol. They also 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), shown in a circle symbol.

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Annex I. Assessing House Price Overvaluation

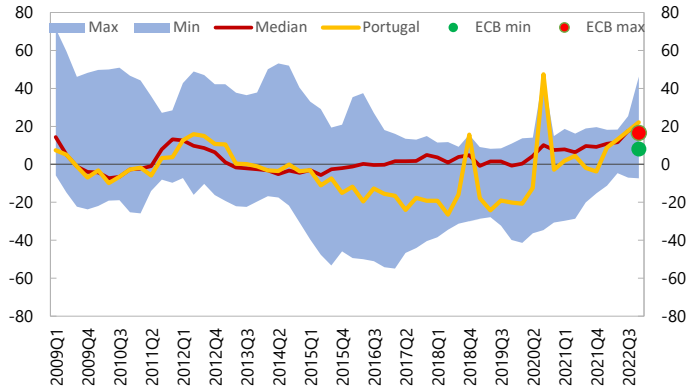
1. To measure house price overvaluation, we use a vector error correction model (VECM) that relates house prices to fundamentals. Following the literature (Turk, 2015), this approach estimates predicted equilibrium values for house prices derived from theoretical supply and demand determinants. The observed 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). In addition, we introduce a dummy to control for the intensity of macroprudential policy interventions[1] (MacroPru):

$$p_t = \alpha_1 + \beta_1 hs_t + \beta_2 di_t + \beta_3 R_t + \beta_4 RMacroPru_t + \varepsilon_{1t} = p^* + \varepsilon_{1t}$$

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

2. Results suggests sizeable house price overvaluation in Portugal. The VECM estimates put over-valuation in 2022Q3 at around 20 percent (and at the upper end of the 8-16 percent range estimated for 2021 by the European Central Bank. This lies just above the median of the distribution of estimates for European countries with dynamic housing markets.[2] House prices have risen faster than fundamental factors could explain since the end of 2021. The model estimates indicate that the speed of adjustment differs from country to country, but points to a gradual adjustment in housing prices, with about 20 percent of disequilibria over one year in Portugal.

House Price Overvaluation in Europe
(Percent)



[1] Macroprudential policy is proxied by a dummy which takes the value of +1 (-1) for each tool which is tightened (loosened) in a quarter. Typically, there are various tools that are tightened/loosened during the same quarter.

[2] Selected countries in Europe include Austria, Germany, France, Portugal, Slovakia, Spain, and Sweden. Although the text figure reports values for the period 2009Q1-2022Q4, individual VECMs extend further back (depending on data availability for individual countries).

Annex II. Technical Aspects of the Model

1. Identifying vulnerable households requires the use of microdata. To assess financial stability pressures and calibrate a targeted policy response, we need to account for the heterogeneity in household finances. We segment households across several characteristics such as housing tenure, income distribution, and financial position. This allows to identify vulnerable households who may be at the risk of default and stretched consumers that may be forced to adjust their consumption to avoid breaching their budget constraint.

2. We combine two sources of micro data to create a rich dataset of households' financials. The 2020 EU Statistics on Income and Living Conditions (EU-SILC) micro data contains information on housing costs, households' financial stretch, and households' debt obligation status since 2004. The latest (2017) Household Finance and Consumption Survey (HFCS) provides granular data on households' balance sheets, payments, income, and consumption. We age forward the HFCS survey to end-2021 using a matching procedure targeting a range of aggregate statistics on household income, indebtedness, consumption, mortgage rates, and prices sourced from Eurostat and national central banks.[1] For Portugal, EU-SILC has around 30,000 households in 2020 (326,000 observations in 2004-20). The HFCS survey covers under 6,000 households. Annex 1 Table 1 shows data coverage for all countries included in the analysis.

3. To measure household vulnerability, we simulate the overburden rate of each household under each scenario.[2] Equations (1) and (2) show the channels through which macrofinancial shocks affect households' ability to fulfil their debt service obligations and afford essential consumption. DSTI stands for debt service to income ratio, and DSECTI for debt service and essential consumption to income ratio:

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

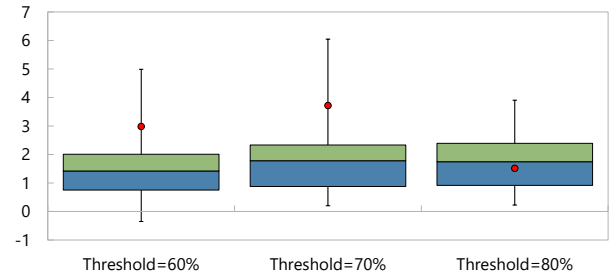
[1] We extrapolate household income using the cumulative growth of gross disposable income per capita. The change in nominal debt at the household level is projected to match the aggregate path for gross debt-to-income ratios. For each household, the consumption of goods and services is scaled up to include durables, renovation, and insurance expenses linked to the country weights of the HICP index. The amount of consumption grows with real private consumption per capita at the country level. Changes in food and energy prices follow wholesale price developments, and interest payments for floating rate lows are adjusted to moves in benchmark curves.

[2] The income projection is performed at the aggregate country level. It is worth noting that, in 2022, changes in income were heterogeneous across income classes with lower income households experiencing relatively higher income growth due to a pickup in employment (concentrated in this income class), the increases in the minimum wage (rising faster than average wage growth), and a concentration of extraordinary support on vulnerable households.

$$DSECTI^h_{T,j} = DSTI^h_{T,j} + \frac{food^h_t \cdot \left(1+\Delta food^h_{T-t,j}\right) + utilities^h_t \cdot \left(1+\Delta energy^h_{T-t,j}\right) + rent^h_t \cdot \left(1+\Delta \inf_{T-t,j}\right)}{I^h_t \cdot \left(1+\Delta inc^h_{T-t,j}\right)} \quad (2)$$

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 $j \in \{1,...7\}$. The impact of shocks to interest rates (Δi), household income (Δinc), food (Δfood), energy (Δenergy), and inflation (Δinf) on debt servicing capacity is highly non-linear.[3]

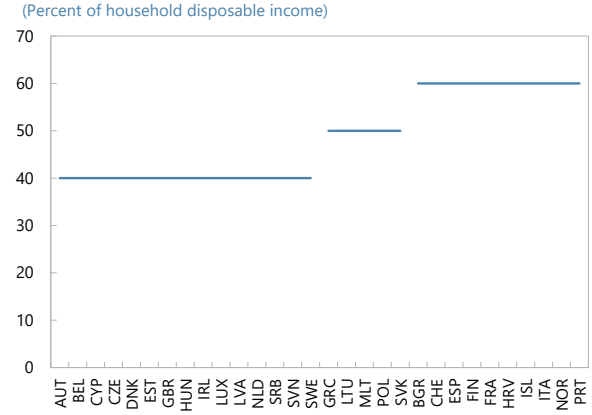
Est. Difference in Mortgage Loan PD by DSECTI Ratio Threshold
(Percent)



Sources: EU-SILC microdata and IMF staff calculations.
Note: The box plots show the country distributions for the estimated difference in the probability of mortgage loan default above and below various thresholds, based on country-level logit regressions controlling for household-level income and macroeconomic factors.

A household is *financially vulnerable* if $DSECTI^h_{T,j} \geq 70\%$. This is the most significant threshold of mortgage default across countries. To allow benchmarking against estimates found in other studies, we also show results using the standard measure of default risk, i.e., $DSTI^h_{T,j} \geq 40\%$. For macroprudential policy purposes, we find that a DSTI ratio of 60 percent (defined on total household disposable income, rather than on gross income) is the most discriminatory limit for mortgage default in Portugal.

DSTI Threshold with Highest Sensitivity to Default Rate
(Percent of household disposable income)



To assess the potential effect on consumption by stressed households, we identify a household as *economically vulnerable* if debt service and total consumption exceed gross income (DSTCTI>1):

$$DSTCTI^h_{T,j} = DSECTI^h_{T,j} + \frac{other\ consumption^h_t \cdot \left(1+\Delta other\ consumption^h_{T-t,j}\right)}{I^h_t \cdot \left(1+\Delta inc^h_{T-t,j}\right)} \quad \text{.....(3)}$$

[3] Household spending on food and utilities rises according to market prices; the quantity of food and energy remains constant over the forecasting horizon; and households do not adjust the composition of their consumption basket.

Annex II. Table 1. Portugal: Countries and Number of Households in Europe

ISO-Code	Country name	EU-SILC (latest year)
AUT	Austria	12,264
BEL	Belgium	16,074
BGR	Bulgaria	16,622
HRV	Croatia	18,731
CYP	Cyprus	10,945
CZE	Czech Republic	18,754
DNK	Denmark	13,467
EST	Estonia	15,108
FIN	Finland	22,692
FRA	France	21,926
DEU	Germany	
GRC	Greece	32,757
HUN	Hungary	13,035
ISL	Iceland	8,601
IRL	Ireland	10,683
ITA	Italy	43,099
LVA	Latvia	12,714
LTU	Lithuania	8,114
LUX	Luxembourg	7,218
MLT	Malta	9,552
NLD	Netherlands	28,516
NOR	Norway	14,306
POL	Poland	37,380
PRT	Portugal	27,695
ROU	Romania	16,861
SRB	Serbia	15,223

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 a matching procedure with aggregate statistics. Econometrics are conducted on the EU-SILC data over the period 2004-2020, including 9.4 million of observations.

Annex II. Table 2. Portugal: Cumulative Shocks in Europe by end 2023 (relative to 2021)

	Interest Rate (Percent)	Household Income[1/] (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
PRT	2.42	17.88	7.56	84.72	9.49
Tightening (200bps)					
AE	4.42	13.68	7.56	84.72	10.50
PRT	4.42	17.88	7.56	84.72	9.49
Income (-10%)					
AE	2.42	2.32	7.56	84.72	10.50
PRT	2.42	6.09	7.56	84.72	9.49
Food & energy (20%)					
AE	2.42	13.68	29.07	121.67	10.50
PRT	2.42	17.88	29.07	121.67	9.49
Adverse (200bps; -10% income)					
AE	4.42	2.32	7.56	84.72	10.50
PRT	4.42	6.09	7.56	84.72	9.49
Cost of living (tightening; food & energy)					
AE	4.42	13.68	29.07	121.67	10.50
PRT	4.42	17.88	29.07	121.67	9.49

Source: October 2022 WEO; and IMF staff calculations.
1/Note that the income shock is relative to the baseline, implying, for Portugal, an income growth of 6 percent relative to initial conditions under the adverse scenario compared to nearly 18 percent under the baseline.
AE denotes advanced Europe (Euro Area) and includes Austria, Belgium, Cyprus, Estonia, Finland, France, Germany, Greece, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Portugal, Slovenia, and Slovakia. The WEO downside scenario considers 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, relative to the WEO baseline.