FINANCIAL STABILITY REPORT

NOV. 2022

BANCO DE PORTUGAL
EUROSYSTEM

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The data underlying the charts and tables presented in this Report can be found at the Banco de Portugal website, with some exceptions for private sources data .

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Content

Executive summary

The economic environment has been characterised by high and more persistent inflation, an abrupt increase in interest rates and a deterioration in the outlook for economic activity. These factors interact with pre-existing vulnerabilities, despite the financial adjustment of households, firms and the general government in the period following the sovereign debt crisis. As such, risks to financial stability have increased since the last issue of this Report, but financial sector resilience will help to preserve financial stability.

Inflationary pressures have consolidated, spreading from energy and food prices to the entire range of goods and services. This has led major central banks to raise official interest rates, a process that is expected to continue in the near future. While interest rates are still at contained levels, the abrupt nature of the monetary policy normalisation process, with no recent historical parallel, is especially relevant, in particular as it coincides with a deterioration in the outlook for economic activity.

The external environment is conditioned by developments in energy markets, which initially penalise more energy-intensive sectors of activity but will tend to exert a spillover effect on the other sectors. Expectations of a technical recession are looming in both the euro area and other major advanced economies.

The more unfavourable external and financial environment, with an adverse effect on real disposable income, will tend to curb economic developments in Portugal in the coming quarters.

These developments are set against a background in which vulnerabilities still persist, despite the strong adjustment observed in the resident sectors in the period following the sovereign debt crisis. These include: (i) debt levels; (ii) the sensitivity of debt service to rising official interest rates, especially as regards firms and households, given the prevalence of credit with variable interest rates; and (iii) in the case of the banking sector, exposure to certain asset classes, such as fixed-rate debt securities, namely sovereign debt, and real estate assets, most notably residential property.

Given this environment and such vulnerabilities, the main risks to financial stability are:

- a further reassessment of risk premia, leading to a devaluation of asset portfolios and increasing market financing costs for new issuances;
- a decline in residential real estate prices, which could also affect the value of asset portfolios, for households or financial entities, either directly or via collateral in credit transactions;
- greater difficulty in ensuring the expected reduction in the public sector debt ratio in view of the real and nominal slowdown of the economy and a potentially more significant increase in interest expenditure;
- the deterioration in the financial situation of households in a context of low saving rates, particularly among those already most vulnerable, and the preponderance of borrowing at variable interest rates;
- the deterioration in the financial situation of non-financial corporations, in particular those most exposed to the effects of the pandemic and/or rising energy and commodity costs, characterised by lower market power and a weaker balance sheet structure;
- in the banking sector, further materialisation of market and credit risks. This will depend to a large extent on developments in the economy and the unemployment rate, the pace of increase in interest rates and the support measures taken. This environment brings to light the importance for the sector: (i) to take a proactive approach in assessing its customers' ability to pay and to adjust loan conditions to their possible difficulties, and (ii) to follow appropriate provisioning and capital conservation practices, thereby promoting the ability to absorb potential losses and finance the economy.

Alongside these risks, more structural, albeit topical challenges should also be considered and increasingly internalised in the assessment and decision-making processes of financial and non-financial institutions. Given their implications for economic and financial flows and production costs, it is worth highlighting: (i) the climate transition, (ii) digital transformation, including operational resilience and cyber risk mitigation, and (iii) the change in the economic and financial globalisation process.

The complexity of the current situation and the materiality of the associated risks were enough to warrant a warning from the European Systemic Risk Board (ESRB) in September, calling for the need to preserve or strengthen the resilience of the financial system – a message echoed by the European Central Bank in early November. The Banco de Portugal will continue to monitor the resilience of the financial system and borrowers in view of the deterioration in real and nominal conditions in the economy, including monetary and financial conditions resulting from monetary policy normalisation.

I Financial Stability outlook

1 Vulnerabilities, risks and macroprudential policy

1.1 Main vulnerabilities and risks

The invasion of Ukraine and economic developments in China, whilst having an impact on economic activity and inflation, have created uncertainty with consequences on the conduct of monetary policies worldwide. The intensification of geopolitical tensions has materialised in a strengthening of inflationary pressures, in particular through higher energy and food costs feeding through to the prices of other goods and services. Faster normalisation of monetary policy in response to a more significant and persistent rise in inflation has accelerated the increase in financing costs of the different institutional sectors, constraining their ability to service debt, in particular the most vulnerable sectors. The low confidence of the various economic agents affects economic growth prospects. Together, these factors attest to the substantial volatility observed in international financial markets, where any sign of an economic slowdown or acceleration is absorbed and reflected in major stock indices as well as sovereign debt yields.

With high uncertainty surrounding economic projections and an abrupt normalisation of monetary policy, the main vulnerabilities and risks to financial stability are:

- **The risk of a further reassessment of risk premia.** Despite the corrections already observed, international financial markets remain vulnerable, notably as central banks continue to normalise monetary policy. In a highly volatile environment, additional shocks could lead to heightened risk aversion, resulting in a devaluation of asset portfolios and increasing market financing costs for new issues.
- **The downward path of public indebtedness may be challenged by rising interest expenditure and a real and nominal slowdown of the economy.** Public indebtedness as a percentage of GDP has been declining and is projected to continue on this path despite the gradual increase in the cost of financing. The pass-through has taken place gradually, given the high amount of public debt issued at a lower cost and its long average maturity. In addition, a sizeable part of public debt is in the Eurosystem's portfolio. The ECB has strengthened its commitment to a backstop in providing liquidity in the sovereign debt market and, in July 2022, created the Transmission Protection Instrument (TPI), seeking to ensure an effective transmission of monetary policy to all jurisdictions.
- **The economic downturn and the rise in inflation, coupled with additional increases in market interest rates, may worsen households' financial situation, especially those already more vulnerable and in an environment of low saving rates, thereby increasing their default risk.** However, some factors mitigate this, such as: (i) a reduction in the household indebtedness ratio, in particular for lower-income households, to a level below the euro area average; (ii) a concentration of credit for house purchase in higher-income households; (iii) an improvement in the risk profile of new borrowers as a result of the macroprudential Recommendation, which foresees a 3.3 p.p. increase in the reference rate when calculating the debt service to income ratio of loans with a floating or mixed rate and a maturity of more than ten years. In addition, the amendment to the Recommendation, made this year, envisages a reduction in the maximum maturity of credit agreements for house purchase for borrowers aged over 30, leading to a more active restriction of income on creditworthiness; (iv) labour market shortages, which will tend to limit the increase in unemployment in the event of a sharper slowdown in

economic activity; (v) an accumulation of deposits during the pandemic period, partly explained by credit moratoria as well as by precautionary reasons; and (vi) the adoption of government measures to support households.

- The materialisation of credit risk associated with the banking sector's exposure to firms most affected by the pandemic and/or a rise in energy and commodity costs, with less market power and a weaker balance sheet structure. Given expectations of a further increase in market interest rates and the large share of debt with a floating rate or short maturities issued by non-financial corporations (NFCs), the financing expenses coverage ratio is expected to deteriorate, and the number of financially vulnerable firms is estimated to rise by the end of 2023 (Special issue "The impact of rising interest rates on corporate debt service"). However, these indicators have remained more favourable than during the sovereign debt crisis. The improvement in financial indicators, such as the capital ratio and the financing expenses coverage ratio, has promoted the current resilience of firms. The possible use of accumulated deposits to repay debt and the support measures taken by the government have also mitigated this risk.
- Risk of a fall in residential real estate prices. Current uncertainty, a potential loss of real household income and further increases in interest rates may dampen demand for real estate assets. However, considering housing supply constraints, excess supply is expected to be absorbed by the market in a short time. In addition, the share of transactions financed by domestic bank credit, around 50% in 2022, is well below that observed in the period before the sovereign debt crisis, approximately 75% in 2010. In addition, the macroprudential Recommendation on new credit to households promotes the resilience of lenders and borrowers in credit-financed transactions.
- High and persistent inflation, an abrupt increase in interest rates and a strong slowdown in economic activity are the main risk factors for the banking sector via credit risk and market risk. The impact of each of these risk factors will depend to a large extent on developments in the economy and the unemployment rate, the pace of increase in interest rates and support measures adopted. Looking ahead, structurally higher interest rates, consistent with the ECB's inflation target, are expected to have a favourable effect on net interest income and will promote further diversification of the sovereign debt portfolio by discouraging search-for-yield strategies in the financial system's portfolio. However, the additional pressure on net interest income that higher interest rates may put on banks' market financing costs, in particular when complying with the minimum requirement for own funds and eligible liabilities (MREL), should not be overlooked. Accordingly, compliance with these requirements exposes Portuguese banks to changes in the perception of risk in international financial markets. To mitigate the risks identified, institutions should (i) adopt a proactive approach when assessing customers' ability to service their debt and adjust loan conditions to possible difficulties and (ii) follow appropriate provisioning and capital conservation practices, thereby promoting the ability to absorb potential losses and finance the economy.

Parallel to these risks, more structural challenges should also be considered. With implications for economic and financial flows and production costs, it is worth highlighting: (i) the climate transition, (ii) digital transformation, including operational resilience and cyber risk minimisation, and (iii) changes in the economic and financial globalisation process.

1.2 Macroeconomic and market environment

High uncertainty, which has an impact on economic activity and inflation, has influenced the conduct of monetary policy worldwide. The intensification of geopolitical tensions has been materialising in rising costs of energy and other commodities, especially food. The rise in the cost of these goods has passed through to the prices of other goods and services, reinforced in the

second case by the effects of the reopening of the economy and a strong recovery in tourism. Faster normalisation of monetary policy in response to a significant and persistent rise in inflation is increasing financing costs of the various institutional sectors. This is reflected in the confidence of economic agents, constrains the ability to service debt, in particular for those most vulnerable, and affects prospects for economic growth. Despite some lag, these effects are also materialising in Portugal. The possibility of more adverse economic impacts associated with the invasion of Ukraine and the economic slowdown in China are the main sources of uncertainty.

After developments in economic activity were above expectations in the first half of 2022, European economies are decelerating as a result of supply shocks, exacerbated by the continued conflict in Ukraine. In the euro area, the reopening of the economy and the recovery in tourism boosted economic growth in the first half of the year. Portugal experienced strong growth in the first quarter, reaching pre-pandemic levels, followed by a slowdown. The external and financial environment has deteriorated through terms-of-trade losses and rising interest rates. The adverse effects of these shocks have been dampened by a good labour market performance, savings accumulated during the pandemic crisis and government support measures.

The impact of the adverse shocks of 2022 will be more noticeable in 2023, with economic activity expected to slow down (Table I.1.1). The IMF projects global growth will slow from 6.0% in 2021 to 3.2% in 2022 and 2.6% in 2023. For the euro area, the ECB's projections point to a strong deceleration in 2023 (0.9%) and a small rebound in 2024 (1.9%). For Portugal, the projections in the October 2022 issue of the *Economic Bulletin* indicate that the Portuguese economy is expected to grow by 6.7% in 2022, continuing to benefit from a recovery in tourism and private consumption. The profile of economic growth over the course of 2022 implies a spillover effect of only 0.5 p.p. for 2023, compared with 3.9 p.p. in 2022. For 2023, the IMF and the European Commission project a slowdown in economic growth to 0.7% for Portugal, while the draft State Budget estimates a growth rate of 1.3%.

Table I.1.1 • GDP and inflation projections for 2022-24 | Annual rate of change, per cent

	Autumn 2022				Summer 2022			
	2021	2022(p)	2023(p)	2024(p)	2021	2022(p)	2023(p)	2024(p)
Gross Domestic Product								
Portugal	5.5	6.7			4.9	6.3	2.6	2
Euro area	5.2	3.1	0.9	1.9	5.4	2.8	2.1	2.1
Inflation (HICP)								
Portugal	0.9	7.8			0.9	5.9	2.7	2
Euro area	2.6	8.1	5.5	2.3	2.6	6.8	3.5	2.1

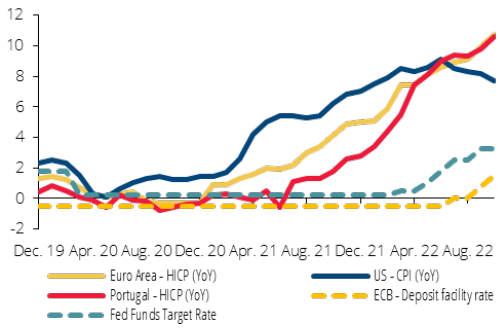
Sources: Banco de Portugal and ECB. | Notes: The Banco de Portugal's projections (p) were published in the June 2022 and October 2022 issues of the *Economic Bulletin* respectively . The ECB's Summer and Autumn projections (p) were published in June 2022 and September 2022 respectively.

The uncertainty surrounding economic projections is high. The possibility of more adverse economic impacts associated with the invasion of Ukraine is the main source of uncertainty. The risk of more production cuts and an increased need to ration energy used, particularly by European trading partners, could translate into weaker developments in economic activity in Portugal. China's economic slowdown is also a risk factor. The zero-COVID policy has constrained the Chinese economy, and the real estate sector, which accounts for approximately a fifth of economic activity, is rapidly weakening. China's size and importance in international supply chains may have significant effects on international trade and global economic activity.

The increase in inflation has been higher and more persistent than expected. Inflation has continued to rise on a global scale (Chart I.1.1). In the euro area, inflation reached 10.7% in October, mostly reflecting an increase in energy and food prices, due to a rise in commodity prices (Chart I.1.2) in the post-pandemic period as a result of recovery in global demand and, more recently, exacerbated by the invasion of Ukraine. Price pressures have been spreading across other goods and services. In Portugal, excluding the energy component, there is a positive gap vis-à-vis the euro area in terms of a greater momentum of food prices in Portugal (with a higher share in the domestic consumption basket), as well as a more pronounced recovery in services prices, in particular those related to tourism.

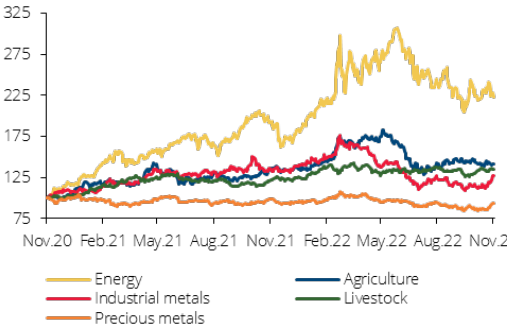
In 2022 the inflation rate should reach 9.0% and 7.8% in the euro area and Portugal respectively. The September 2022 ECB projections for the euro area point to inflation above 9% until the end of 2022, implying an upward revision of 1.3 p.p. from the June projections and reaching 8.1% as an annual average. In Portugal, inflation is expected to increase to 7.8% in 2022, reflecting increasing price pressures and strong demand for goods and services, the consumption of which was constrained in the first phase of the pandemic. Inflation in the euro area and Portugal is projected to ease in 2023 (Table I.1.1).

Chart I.1.1 • Inflation and central bank interest rates | Per cent



Sources: ECB, Eurostat, Fed, Statistics Portugal and U.S. Bureau of Labor Statistics.| Note: Last observation: October 2022.

Chart I.1.2 • Commodity prices | Index



Source: Refinitiv. | Notes: S&P Commodity Index. Base value of 100 on 13 November 2021. Last observation: 14 November 2022.

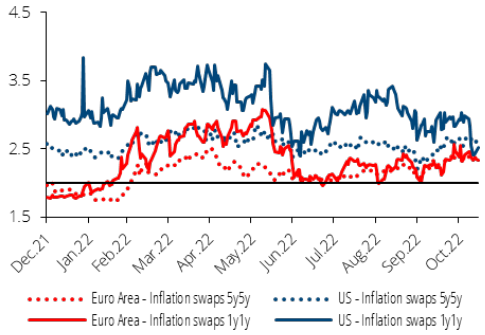
Continued broad-based and persistent inflationary pressures have led to a normalisation of monetary policy worldwide. Despite the different paces across geographies, there is a high degree of synchronisation in interest rate increases to tackle inflation and inflation expectations (Charts I.1.1 and I.1.3). Most central banks have also ended their net asset purchase programmes, in some cases initiating a process of gradual reduction of their securities portfolios. The Federal Reserve (Fed) and the Bank of England had increased their policy rates by more than 2 p.p. by September to a range from 3.75% to 4.0% and to 3.0% respectively. In some eastern European countries, such as Hungary and Poland, where the rise in inflation has been higher, policy rates are already at 13.0% and 6.75% respectively, having simultaneously triggered government moratorium measures for bank customers (through the extension of measures or new measures).

The ECB has raised the interest rate on the main refinancing operations to 2.0%, following successive upward revisions projecting inflation to be above target. Since June, in addition to the three consecutive increases of 50 b.p., 75 b.p. and 75 b.p., respectively, at the July, September and October meetings (leading to an increase in the interest rate on the main refinancing operations and the interest rates on the marginal lending facility and the deposit facility to 2.0%, 2.25% and 1.5% respectively) the ECB has continued to adjust its purchase programmes. At its October meeting, it decided to change the terms and conditions of the third series of targeted longer-term refinancing operations (TLTRO III). Despite having ended its net asset purchases at the end of June,

the ECB has remained committed to reinvesting the maturing securities under the pandemic emergency purchase programme (PEPP) and the asset purchase programme (APP) in full and to continue applying flexibility in PEPP reinvestments. In July the ECB also announced the creation of a new transmission protection instrument (TPI). The Eurosystem will be able to make secondary market purchases of government debt securities issued in jurisdictions that might be experiencing a deterioration in financing conditions not warranted by economic fundamentals if criteria are in place to ensure the pursuit of sustainable fiscal and macroeconomic policies in these jurisdictions. This instrument underlines the ECB's commitment to a backstop in providing liquidity in the sovereign debt market.

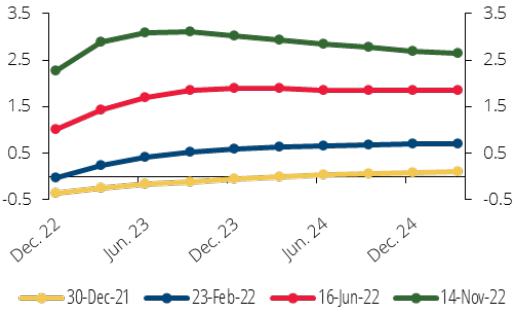
The normalisation of the ECB's monetary policy has translated into worsening monetary and financial conditions. The increase in the key ECB interest rates has been passed through to yields on public and private debt and index rates for bank loans (Charts I.1.6 and I.1.10). In 2022 the interest rates on the main refinancing operations and the deposit facility increased by 200 b.p. to 2.0% and 1.5% respectively, until the cut-off date of this Report, while the three-month Euribor increased by 236 b.p. to 1.8%. Market expectations for three-month Euribor futures show that investors expect the rate hike to continue for a few more months (Chart I.1.4). These expectations constitute additional increases of around 130 b.p. until June 2023 and a slight decrease thereafter. The total magnitude of both the observed and expected increase has a parallel in previous periods of rising interest rates but implies a faster pace of adjustment associated with the also more intense increase in the inflation rate.

Chart I.1.3 • 5y5y and 1y1y inflation-linked swaps in the euro area and the United States | Per cent



Source: Refinitiv. | Notes: Inflation expectations implied in the 5-year, 5-year and 1-year, 1-year inflation-linked swap contracts. Closing prices. Last observation: 14 November 2022.

Chart I.1.4 • Interest rate implied in three-month EURIBOR futures contracts | Per cent



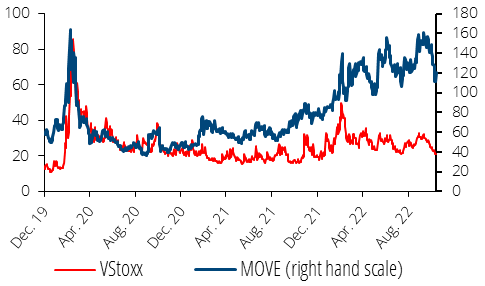
Source: Refinitiv (Banco de Portugal calculations). | Notes: A 30-day moving average of the interest rates implied in three-month Euribor futures contracts is calculated for each date. Last observation: 14 November 2022.

The risk of a further reassessment of risk premia remains, despite the rises that have already taken place. The political and economic effects of Russia's aggression against Ukraine have affected monetary policy and the risk appetite of international financial market participants. Volatility in these markets has increased (Chart I.1.5), with sovereign yields and credit spreads rising (Charts I.1.6 and I.1.7) and stock prices falling (Chart I.1.11), while the price of various commodities, most notably energy, has remained extremely high (Chart I.1.2).

Since June there have been two phases in international financial markets. In mid-June, after the Fed raised policy rates more than expected, investors expected some control of inflation and that the pace of monetary policy normalisation would slow, leading to an easing of financial conditions, a recovery in equity markets and, more generally, a compression of risk premia. In the case of euro area sovereign debt, this compression has also been influenced by the ECB's announcement of

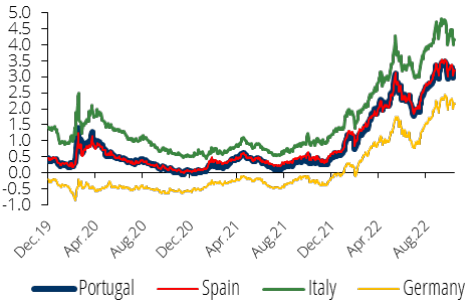
the TPI in July. From mid-August, there was a further reversal with signs of a more vigorous monetary policy response to tackle persistent inflation and the deepening energy crisis in Europe. Financial conditions have tightened, the value of risky assets has declined and debt yields have increased.

Chart I.1.5 • Equity and debt market volatility | Points



Source: Refinitiv. | Last observation: 14 November 2022.

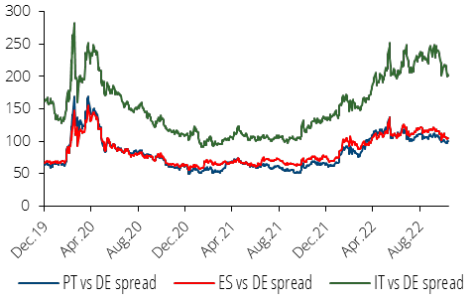
Chart I.1.6 • 10-year sovereign yields | Per cent



Source: Refinitiv. | Notes: The series correspond to the closing price of 10-year sovereign bond yields. Last observation: 14 November 2022.

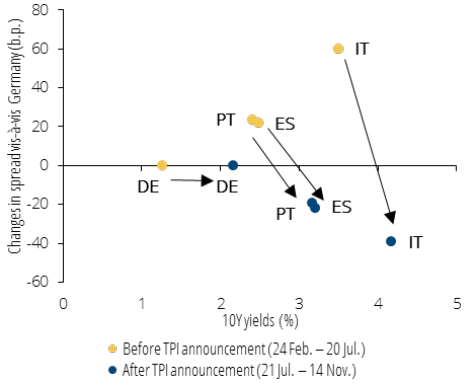
Increases in sovereign debt yields have accompanied the normalisation of monetary policy (Chart I.1.6). The upward trend has been accompanied by some increase in volatility, as the signals provided by monetary authorities to tackle inflation have led investors to adjust their expectations. In the euro area, the announcement of the TPI has helped developments in yield spreads vis-à-vis Germany for the most indebted countries, including Portugal (Chart I.1.8). In the case of Portuguese sovereign debt, there was a 267 b.p. increase in ten-year yields from the beginning of 2022 until the cut-off date. However, developments in yield spreads vis-à-vis Germany have been more benign than in other countries, also benefiting from improvements in the Republic's rating (increasing by 34 b.p. from the beginning of 2022 until the cut-off date to stand at 100 b.p.) (Chart I.1.7).

Chart I.1.7 • Ten-year sovereign yield spreads vis-à-vis Germany | Basis points



Source: Refinitiv. | Notes: The data series correspond to the spread in relation to the 10-year German benchmark at closing price. Last observation: 14 November 2022.

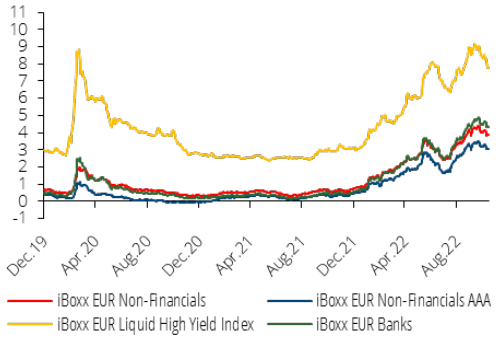
Chart I.1.8 • Ten-year sovereign yields and changes in spreads vis-à-vis Germany



Source: Refinitiv. | Notes: Changes in spreads calculated for each period; end-of-period yields. Last observation: 14 November 2022.

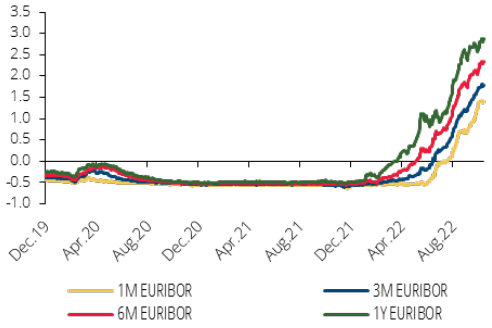
The rise in policy rates has also been reflected in private sector financing costs. Financing costs increased in the euro area, in particular for NFCs and banks issuing high-yield debt (Chart I.1.9). In the case of banks, the rise has been noticeable in subordinated debt, although there has been no market fragmentation across jurisdictions. Interbank interest rates have also seen significant upward developments with consequences for the financing conditions of the various sectors (Chart I.1.10).

Chart I.1.9 • NFC and bank bond yields in the euro area | Per cent



Source: Refinitiv. | Notes: Average yield of iBoxx indexes. Last observation: 14 November 2022.

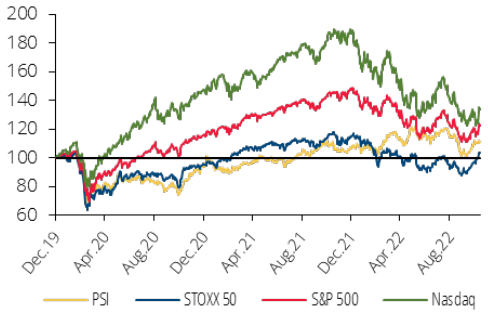
Chart I.1.10 • Euro interbank interest rates: 1-month, 3-month, 6-month and 1-year Euribor | Per cent



Source: Refinitiv. | Note: Last observation: 14 November 2022.

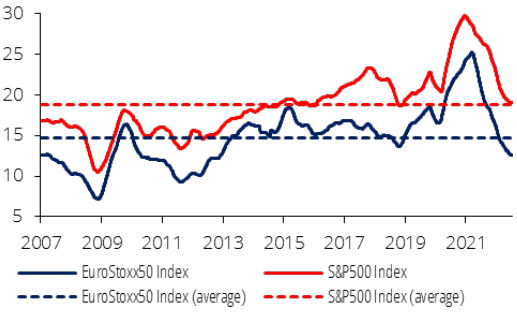
The stock market has continued its downward path. After some recovery from mid-June, stock prices decreased again from August onwards, as a result of pressures related to energy supply disruptions in Europe and the strengthening of central banks' messages to tackle inflation (Chart I.1.11). This correction has occurred following an extended period of appreciation, during which signs of overvaluation emerged (Chart I.1.12). The domestic stock market showed more favourable developments until September, subsequently changing as the impact of geopolitical tensions accentuated the rise in interest rates.

Chart I.1.11 • Stock indices | Points



Source: Refinitiv. | Notes: Stock indices with a base value of 100 on 31 December 2019. Closing prices. Last observation: 14 November 2022.

Chart I.1.12 • Price-to-earnings ratio | 3-month moving average



Source: Refinitiv. | Notes: The dashed lines represent the average price-to-earnings ratio since January 2007. Closing prices. Last observation: 14 November 2022.

Commodity prices have fallen from previous peaks. In energy derivatives markets, prices remain extremely high and volatile (Chart I.1.2). The intense volatility and rise in energy market prices since March 2022 have resulted in margin call increases for energy derivatives contracts, causing liquidity risks for a number of large investors in these markets, notably NFCs using these instruments to hedge production cost risks.

Over a longer horizon, other challenges are likely to affect the various sectors of the economy in a broad and structural manner, with implications for economic growth and inflation. These include changes emerging in:

- **Commodity markets**: in addition to the slowdown in the globalisation of production processes, with possible production cost increases, the pressures on energy markets (including derivatives markets) reveal the need for adjustments not only in the production but also storage and trading of critical commodities;
- **Firms' business models:** there is an acceleration in the supply of online services, but also changes in labour models and commodity supply sources;
- **New sources of risk:** critical infrastructure security risks are increased by digitalisation and the need for energy transition but have also been exacerbated by geopolitical tensions.

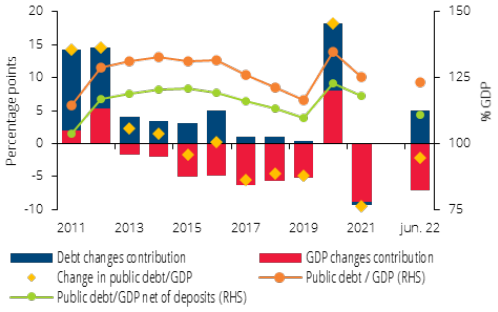
1.3 Sectoral risk analysis

1.3.1 General government

Real and nominal developments in GDP in 2022 foster the improvement in the budget balance and public debt as a percentage of GDP. During the first half of 2022, the strong recovery in economic activity and the acceleration in prices contributed to tax revenue growth, while a significant share of primary expenditure grew mutedly, without immediately incorporating the effect of inflation. The Portuguese public debt ratio remained on a downward path, reaching 123.4% of GDP. This decline stemmed from the denominator effect, as the stock of debt increased. At the same time, there was an accumulation of government deposits, which exceeded gross debt growth, resulting in a further decrease in the stock of debt net of deposits as a percentage of GDP (Chart I.1.13).

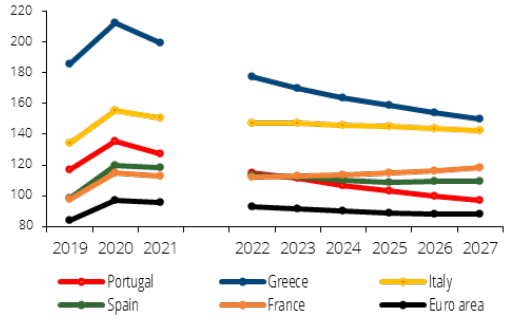
The public debt ratio is expected to continue to decline in the coming years, and Portugal will be one of the European countries where this reduction will be most pronounced. The draft State Budget for 2023 points to a debt ratio of 115% for 2022, down to 110.8% in 2023 (the lowest since 2010, when it hit 100.2%).[1] In its October projections, the IMF anticipates a reduction in the public debt ratio and a convergence towards the euro area average in the coming years (Chart I.1.14).

Chart I.1.13 • Portuguese public debt ratio



Sources: Banco de Portugal and Statistics Portugal. | Note: Changes in June 2022 are calculated against December 2021.

Chart I.1.14 • IMF projections for public debt developments | As a percentage of GDP

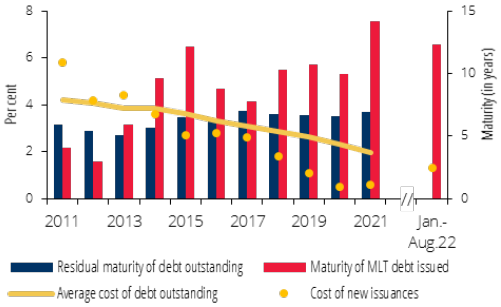


Source: IMF. | Notes: October 2022 projections. Estimates from 2022 onwards.

[1] The draft State Budget for 2023 points to a 1.9% deficit in 2022, which will drop to 0.9% in 2023. In its October projections, the IMF indicates a deficit of 1.9% for 2022 and 1.4% in 2023, pointing to a continued downward path of the indicator up to 2025, when it will reach 1% of GDP, up to 1.2% in 2026 and 2027. These figures are always below the 3% benchmark set by the Stability Pact, whose rules have been suspended until 2024.

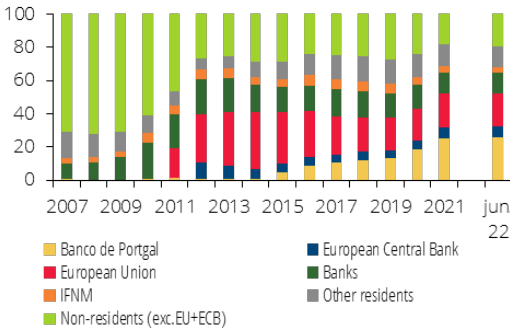
In parallel with the global increase in interest rates and in line with the trend in the euro area, yields in the secondary market and the costs of new public debt issuances have been on the rise (Chart I.1.15). However, the widening spread vis-à-vis Germany was smaller for Portugal than for other countries (Chart I.1.7). There was also an increase in financing costs for new issuances. Turning to short-term debt, the average interest rate on Treasury bills up to June stood at -0.1%, but the two one-year issuances carried out in October reached rates of around 2%. In longer maturities, the average rate at which Treasury bonds were placed in the market was 1.7%, compared to values close to zero in the previous year. The most recent issuance of a Treasury bond maturing in 2031 was placed at a 3.2% rate. However, the pass-through of the increase in interest rates on new issuances to interest expenditure is gradual, given the large amount of stock issued at lower fixed rates.

Chart I.1.15 • Cost and maturity of Portuguese public debt



Sources: Banco de Portugal, ECB, Portuguese Treasury and Debt Management Agency and Statistics Portugal. | Notes: The implicit average cost of the stock of debt corresponds to the ratio of interest expenditure to the average stock of debt. The cost of debt issued in each period is weighted by amount and maturity and includes Treasury bills, Treasury bonds, variable rate Treasury bonds and medium-term notes issued in the relevant year. The average maturity of medium and long-term debt includes Treasury bonds and medium-term notes issued in the relevant year.

Chart I.1.16 • Structure of Portuguese public debt holders | Per cent



Sources: Banco de Portugal, ECB and Portuguese Treasury and Debt Management Agency (Banco de Portugal calculations). | Note: End-of-period data.

In the medium term, rising interest expenditure and the real and nominal slowdown of the economy will make it more difficult to bring down the deficit and debt ratio. The impact on government spending of measures to mitigate the impact of the energy crisis and inflation is expected to amount to 1.5% of GDP in 2022, which should almost fully offset the effect of the reduction in support associated with the pandemic shock, adding to the rise in financing costs. Despite the current challenges associated with increased need for support to households and firms, the pursuit of a sustained fiscal consolidation plan is key. Given the current uncertainty, it is crucial that the public debt ratio proceeds on its downward path to prevent adverse shocks to the financing costs of domestic issuers (sovereign, corporate and financial institutions) in international financing markets. Measures to support households and firms should therefore be temporary and specific to the most vulnerable segments.

Table I.1.2 • Annual schedule of Portuguese public debt redemptions | EUR billions

	2022	2023	2024	2025	after 2025
Stock of debt maturing	10.7	18.6	14.6	16.8	177.9
Treasury bills	0.7	6.5	0.0	0.0	0.0
Official loans	0.0	1.5	1.8	1.5	51.2
Other medium- and long-term debt	10.0	10.6	12.8	15.3	126.7
Weight in total stock of debt (%)	4.5	7.8	6.1	7.0	74.5

Source: Portuguese Treasury and Debt Management Agency. | Notes: Official loans include: EFAP (EFSF and EFSM), SURE and RRF. The maturity of loans under the EFSM will be extended by seven years on average. Each loan will be effectively extended close to its maturity.

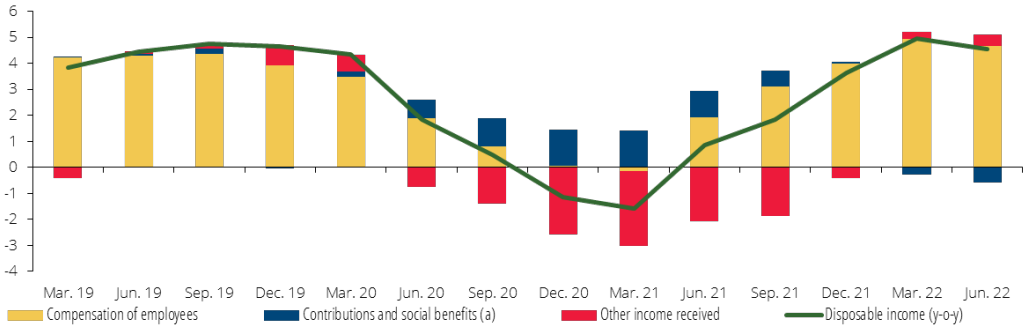
The effects of rising interest rates and the economic downturn on public finances and financing costs are mitigated by:

- the progress in reducing high debt, which is expected to continue in the coming years. The improvement in the country's creditworthiness has also been recognised in the form of recent credit rating upgrades. In August and September, Portugal benefited from rating upgrades from DBRS (BBB-high to A-low, with a stable outlook), S&P (from BBB to BBB+, with a stable outlook) and Fitch (from BBB to BBB+, with a stable outlook).
- the high stock of debt with low fixed interest rates. This ensures a gradual pass-through of interest rate increases on new issuances to interest expenditure. Despite the increase in the costs of the most recent issuances, the implicit interest rate on debt is still 2% (Chart I.1.15).
- contained refinancing risk in the short term. The average residual maturity of debt is around seven and a half years (Chart I.1.15). Active debt management during the period of low interest rates, through the issuance of debt securities with longer maturities and bond swap operations, facilitated an increase in the average maturity and a smoothing of the time profile of redemptions (Table I.1.2). Large government deposits (of over 12% of GDP) provide additional room in the event of short-term market turmoil (Chart I.1.13).
- the stock of debt in the Eurosystem's portfolio (Chart I.1.16). The ECB will continue to reinvest, in full, the principal payments from maturing securities under the APP (for as long as necessary) and the PEPP until the end of 2024. In addition, the geographical origin of the remaining holders has also been diversified in recent years.
- the ECB's commitment to safeguarding an effective transmission of monetary policy to all jurisdictions, particularly in view of the possibility of unwarranted, disorderly sovereign yield disruptions, not based on country-specific fundamentals. Following the ECB's announcement in July 2022 of the establishment of the Transmission Protection Instrument (TPI), the sovereign yield spread narrowed, following a previous increase (Chart I.1.8).

1.3.2 Households

Households' nominal disposable income grew by 4.9% and 4.5% in the year ending in the first and second quarters of 2022 respectively. The main contribution to developments in disposable income was made by labour compensation and increased further, while the contribution of net social benefits was negative (Chart I.1.17). Government measures to support households announced in September are expected to contribute 1.4 p.p. to changes in disposable income during the year. Real disposable income is expected to nearly stagnate in 2022, with 0.2% growth (2.2% in 2021). Despite inflation developments, rising labour compensation, together with growth in employment and compensation per employee, helped to prevent a reduction in real disposable income during the first half of the year.

Chart I.1.17 • Households' nominal disposable income | Per cent and percentage points



Sources: Banco de Portugal and Statistics Portugal. | Note: (a) Net of transfers in kind.

The household saving rate fell to 5.9% of disposable income in the first half of the year (7.2% in 2019), after a strong increase during the pandemic (11.9% and 9.7% in 2020 and 2021 respectively). In terms of investment of household savings, investment in real assets – largely in housing – continued to stand out, rising to 5.7% of disposable income (5.6% in 2021 (Table I.1.3)). The purchase of financial assets decreased to 5% of disposable income, with a reallocation of investment in shares and other equity and, to a lesser extent, investment fund units, for the collection of deposits, which increased to 9.5% of disposable income (7% in 2021).

Table I.1.3 • Sources and uses of funds by households | As a percentage of disposable income

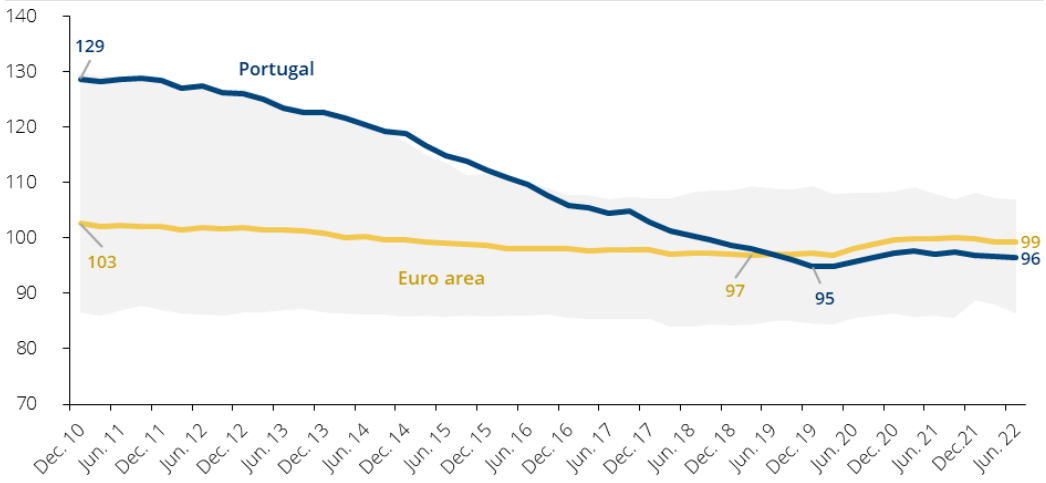
	2020	2021	2021 H1	2022 H1
Current savings in Portugal	11.9	9.7	11.1	5.9
Assets	14.6	12.8	14.3	10.4
Investment in real assets [a]	5.1	5.6	5.5	5.7
Balance of capital transfers	-0.4	-0.3	-0.4	-0.3
Net acquisition of financial assets	9.9	7.5	9.2	5.0
o.w. Currency and deposits with resident banks	8.3	7.0	8.6	9.5
Liabilities	2.8	3.0	3.2	4.5
Financial debt [b]	1.5	2.5	2.3	3.4
Other financial liabilities [c]	1.2	0.5	1.0	1.1

Sources: Banco de Portugal and Statistics Portugal. | Notes: Consolidated figures in nominal terms. (a) Corresponds to the sum of gross fixed capital formation, changes in inventories, acquisitions net of disposals of valuables and acquisitions net of disposals of non-produced non-financial assets. (b) Corresponds to the sum of loans and debt securities. (c) Other financial liabilities include liabilities associated with all financial instruments, as defined in national financial accounts, except loans and debt securities (financial debt). It also includes the statistical discrepancy between the balances of net lending/net borrowing in the capital account and in the financial account.

The growth of the stock of loans for house purchase stabilised during the first nine months of 2022, with the adjusted annual rate of change standing at 3.8% in September. New loans for house purchase grew during the first half of the year but contracted in the third quarter. In the case of loans for consumption and other purposes, there has been a recent acceleration (3.4% in September) stemming from the dynamics in consumer credit (Section 2.2).

The household indebtedness ratio as a percentage of disposable income decreased by 1 p.p. to 96% in the first half of 2022, to stand slightly above the value observed in the last quarter of 2019 (95%) and below the euro area average (99%) (Chart I.1.18).

Chart I.1.18 • Developments in the indebtedness ratio of households in the euro area and in Portugal | As a percentage of disposable income



Sources: Banco de Portugal and Eurostat (Banco de Portugal calculations). | Notes: Non-consolidated figures for total debt. The grey area corresponds to the range between the third and the first quartiles of the distribution for a set of euro area countries (Belgium, Germany, Ireland, Greece, Spain, France, Italy, Netherlands, Austria, Portugal, Slovenia and Finland).

The deceleration in economic activity and the rise in inflation, coupled with rising market interest rates, heighten the risk of households defaulting. In Portugal, the share of loans for house purchase with a variable rate is around 90%, meaning that the increase in market interest rates results in an increase in debt service in the short run. It is estimated that, in December 2023, 11% of credit agreements for house purchase will have a loan service-to-income ratio (LSTI) of over 40% (5% in June 2022; see Box 1). In addition, rising inflation could lead to a stagnation in real disposable income in 2022 and 2023, which coupled with higher debt burden may affect the level of real consumption.

However, some factors mitigate the risk of households defaulting, by which the current situation compares favourably with that seen in the sovereign debt crisis. These include:

- The reduction in the indebtedness ratio to below the euro area average. This adjustment was broadly based across all income brackets, but in particular for lower-income households.
- Loans for house purchase are concentrated in higher-income households, while the stock of consumer credit, which is more concentrated in lower-income households, is dominated by fixed-rate contracts.
- Labour market shortages will tend to limit the increase in the unemployment rate in the event of a sharper slowdown in economic activity.
- The improved new borrowers' risk profile as a result of the macroprudential Recommendation, which strengthened the significance of a suitable risk assessment of consumer credit addressed by EU and national legal initiatives. More specifically, in the case of a credit agreement for house purchase at a variable or mixed interest rate, credit institutions should simulate a 3 p.p. increase in the index applicable to consumers' creditworthiness in credit agreements with a maturity of over 10 years. Note also that the macroprudential Recommendation sets limits to the DSTI on the basis of the same potential interest rate increases. A credit agreement should only be concluded when the creditworthiness assessment shows that the obligations of the credit agreement can be complied with. The amendment to the macroprudential Recommendation, which includes the reduction of the maximum maturity of loan agreements for house purchase, results in a more active constraint of income on creditworthiness.

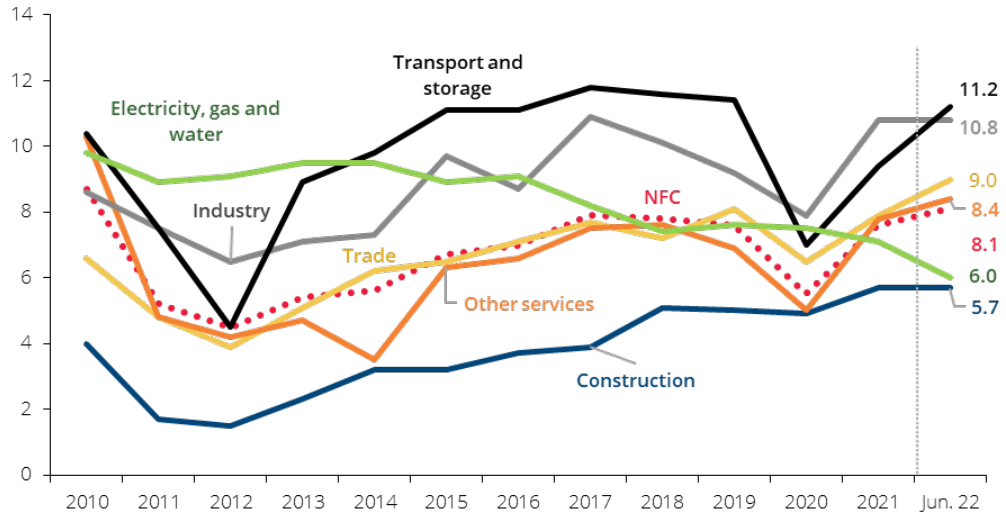
- Finally, the implementation of government measures supporting households helps to mitigate the risk of households defaulting.

1.3.3 Non-financial corporations

By the end of 2021, NFCs had restored the average return on assets observed in December 2019 (7.6%), despite sectoral heterogeneity. In the accommodation and food services sector, profitability remained below 2019 (3.3%, compared with 7.1%), although it recovered from the negative EBITDA posted in 2020 (Chart I.1.19).

The improvement in NFC profitability proceeded in 2022, reaching 8.1% in the year ending in the second quarter (0.5 p.p. above the end of 2019). This was broadly based across the various sectors of activity. Since the third quarter of 2021 the services sector has been more profitable than the NFC average. The transport and storage sector continued to restore its profitability and nearly brought it back to its 2019 level. In the electricity, gas and water sector, the downward trend in return on assets continued, which intensified in the first half of the year, reflecting the energy market turmoil.

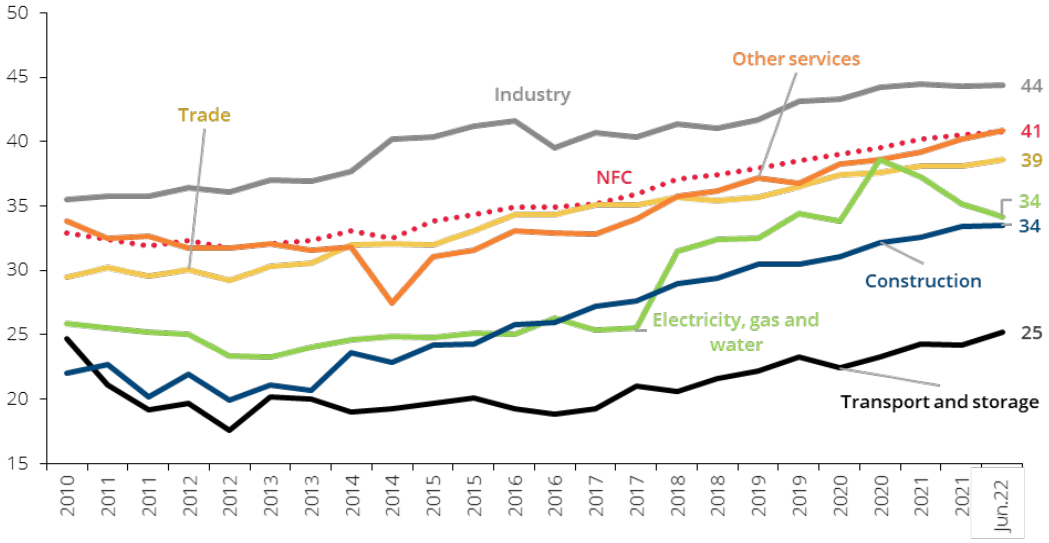
Chart I.1.19 • Profitability ratio (EBITDA/total assets), by sector of activity | Per cent



Sources: Banco de Portugal and Statistics Portugal. | Notes: (a) Other services include services except trade and transport and storage (identified in the chart); industry includes mining and quarrying. EBITDA stands for earnings before interest, taxes, depreciation and amortisation.

The NFCs' capital ratio remained on the upward path that started in 2013. Developments were broadly based across sectors, with only a deterioration in the electricity, gas and water sector from 2021 onwards, in line with profitability (Chart I.1.20).

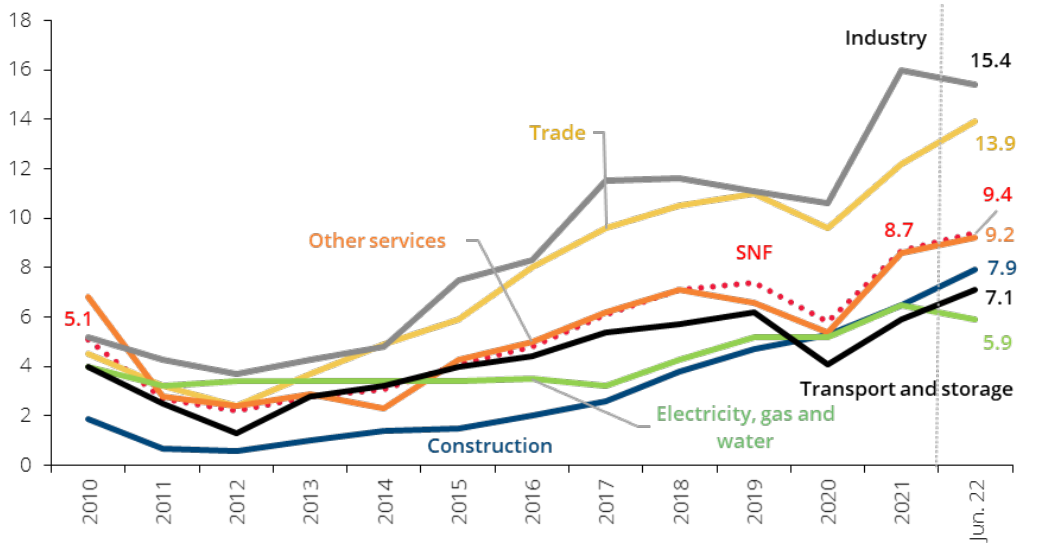
Chart I.1.20 • NFCS' capital ratio, by sector of activity | Per cent



Source: Banco de Portugal. | Notes: The capital ratio is the ratio of equity to assets. Other services include services except trade and transport and storage (identified in the chart); industry includes mining and quarrying. In June 2022, head offices had a capital ratio of 61.8% (not shown in the chart).

In June 2022, the NFCs' financing expenses coverage ratio was above its 2019 value (+1.7 p.p.). On average, the EBITDA of an NFC covered nine times its financing expenses in June 2022. Developments in this ratio were consistent with the improvement in EBITDA, with sectoral heterogeneity particularly reflecting the mixed performance of profitability. Only the electricity, gas and water sector and industry posted decreases. Nevertheless, industry profitability continued to be well above average (Chart I.1.21).

Chart I.1.21 • Developments in the financing expenses coverage ratio, by sector of activity | In number of times



Source: Banco de Portugal. | Notes: The interest coverage ratio corresponds to the number of times the EBITDA generated by firms exceeds financing expenses. A higher ratio corresponds to lower financial pressure. Other services include services except trade and transport and storage (identified in the chart); industry includes mining and quarrying.

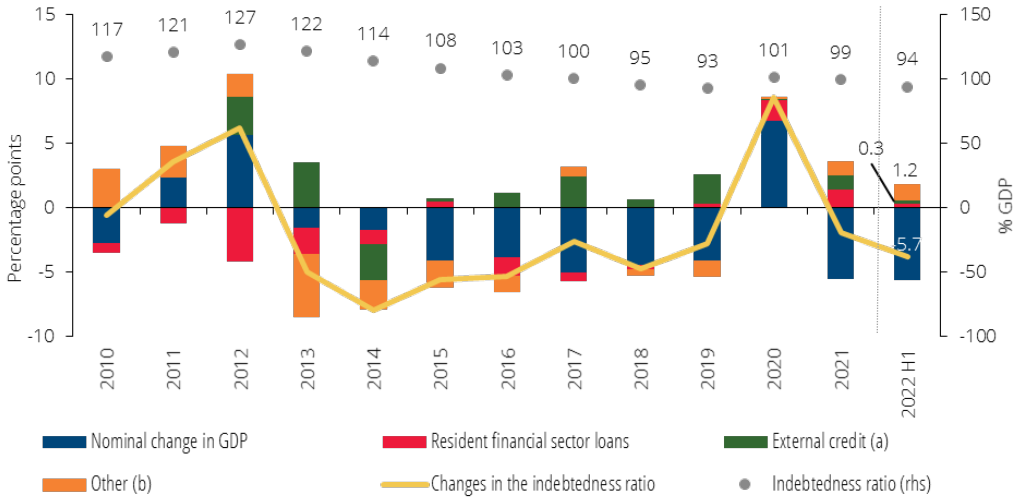
The improvement in NFCs' financial indicators, such as the capital and the financing expenses coverage ratios, boosts the resilience of firms to the challenges posed by the economic environment. The reduction in the degree of financial vulnerability is a mitigating factor for default, which may result from rising funding costs and deteriorating margins.

Rising market interest rates already affect financing costs for NFCs. By September, the average interest rate on new loans had risen by 1 p.p. from December 2021, to stand at 3%. The average rate of the outstanding amount of loans has increased by 0.4 p.p. since the beginning of the year, standing at 2.5%.

Expectations of market interest rate hikes and the large share of NFC debt at a variable rate (around 70% in August 2022) or with a short residual maturity (15%) will result in a strong increase in interest expenditure and a deterioration in the financing expenses coverage ratio by the end of 2023. However, the results of a simulation exercise suggest that this ratio remains clearly above that seen during the sovereign debt crisis, reflecting a much more favourable starting point. For the subset of firms with positive equity considered in the exercise, the financing expenses coverage ratio narrows from 11 in 2021 to six in 2023 (seven, considering that part of each firm's deposits is used to repay debt), compared to a minimum of four in 2012. This scenario could worsen if economic developments are more unfavourable (Special issue "The impact of rising interest rates on corporate debt service").

In the first half of the year, the NFCs' debt-to-GDP ratio continued on the downward path that started in the third quarter of 2021, standing only 1 p.p. higher than at the end of 2019. This recovery is in line with the upturn in nominal GDP, which reached its pre-pandemic value in the fourth quarter of 2021. The contribution of credit granted by the resident financial sector was very slight from the second quarter of 2021 onwards. Conversely, the issuance of debt securities, purchased mainly by non-residents and resident banks, made a positive contribution (Chart I.1.22).

Chart I.1.22 • Contributions to changes in the NFC indebtedness ratio



Sources: Banco de Portugal and Statistics Portugal. | Notes: (a) External credit includes liabilities on account of loans and debt securities held by non-residents. (b) Includes debt securities held by residents, credit written off from assets in the balance sheet of resident monetary financial institutions, loans from households, trade credits and advances and other changes in volume and value.

NFCs have been affected by rising energy and commodity prices, as well as disruptions to global supply chains. Firms whose production process is more reliant on these inputs have experienced an increase in their production costs, which could reduce profit margins. This could curtail their financial capacity and increase the risk of losses for the banking sector, in particular in the case of

firms simultaneously affected by pandemic and energy shocks. Among the more energy and commodity-intensive sectors as a share of total production costs are electricity and manufacturing. Despite the high exposure of the banking system to the manufacturing sector (21%), the latter is only slightly leveraged (37%, compared to a median value of 45%). In terms of risk category, sectors that may be doubly affected are more concentrated in the higher risk class than the NFC average (Box 4, *Financial Stability Report*, June 2022).

In June, more than half of the stock of loans granted to NFCs had as a counterpart a firm operating in a sector more heavily hit by the pandemic, more affected by the increase in commodity and energy costs or both (Table I.1.4). However, in terms of financial stability, the risk associated with these exposures also stems from firms' financial vulnerability and those firms' specific impact on their activity. There is greater credit risk, assessed through firms' economic and financial ratios, in the sectors more affected by the rise in energy and/or commodity costs which also fall within the sectors more heavily hit by the pandemic crisis. In turn, the stock of loans to NFCs in sectors more affected only by the rise in energy and/or commodity costs is less concentrated in more leveraged and indebted firms. In September 2022 firms in sectors that were only potentially more affected by rising energy and/or commodity costs had lower credit risk than total NFCs (53% and 43%, respectively, in the lower risk class). Nevertheless, for situations where NFCs also belong to sectors more affected by the pandemic, the share of intermediate and higher risk classes is larger.

Table I.1.4 • Stock of loans to NFCs (June 2022) – domestic activity | Per cent

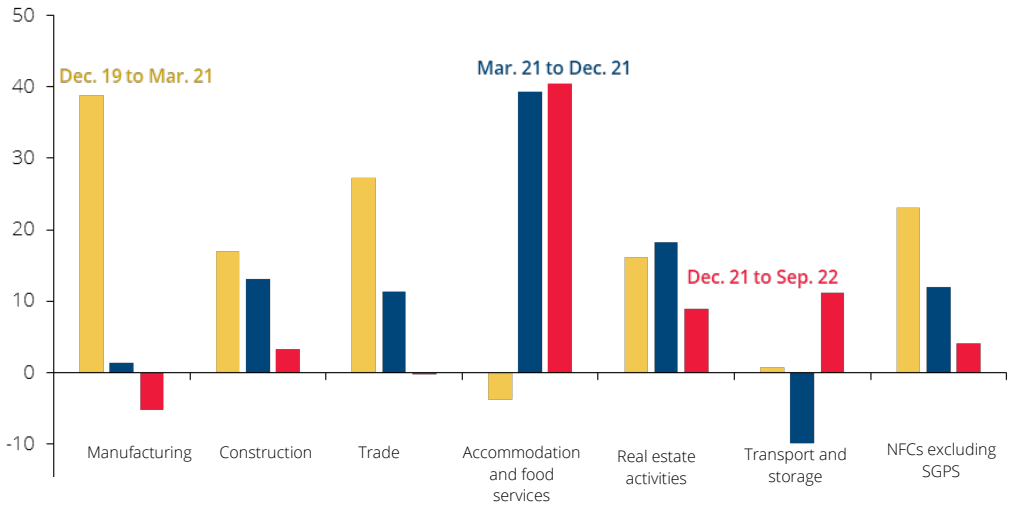
	%
Sectors more affected by:	
The increase in energy and/or commodity costs and the pandemic	12.5
Only the increase in energy and/or commodity costs	24.2
Only the pandemic	15.7
Least affected sectors	47.7

Source: Banco de Portugal. | Notes: Sectors more affected by a rise in energy and/or commodity costs are considered to be those with a value above the 75th percentile (unweighted figures) in at least one of the following aggregate ratios (by CAE subclass): energy costs over total production costs or expenditure on commodities over total production costs (according to the definition of the note to Chart B4.1). Excluding firms belonging to classes in sections K, O, T and U of the Portuguese Classification of Economic Activities (CAE) Rev.3. Sectors more affected by the pandemic include those set out in Decree-Law No 22-C/2021 and/or those eligible for the support line for economic recovery – Retomar programme.

The rise in indebtedness during the pandemic period was accompanied, in aggregate terms, by more significant growth in firms' deposits. In June 2022, NFCs' net borrowing as a percentage of GDP decreased to 63% (-9.4 p.p. from December 2020 and -6.3 p.p. from the end of 2019).

Deposits also increased for NFCs operating in the sectors more affected by the pandemic and/or rising energy and commodity costs. However, for some sub-groups of particularly affected firms, there may have been no reduction in debt net of deposits. During the most critical periods, deposits declined in the sectors more affected by the exogenous shocks that the Portuguese economy has withstood in recent years (Chart I.1.23). For instance, the accommodation and food services sector, which was particularly affected in the pandemic crisis, posted a decline in deposits from December 2019 to March 2021, followed by a recovery in tandem with activity. Deposits from transport and storage decreased from March 2021 to March 2022, when fuel prices started to rise, with some subsequent recovery in the wake of support measures and the transfer of part of these costs to customers. Manufacturing, which was particularly affected by rising energy and commodity costs, posted lower deposits from March to September 2022, following stagnation between March 2021 and March 2022 and a build-up in deposits during 2020. Overall, firms maintain large deposits as an important liquidity buffer in the event of additional shocks.

Chart I.1.23 • Change in NFC deposits, by sector of activity | Per cent

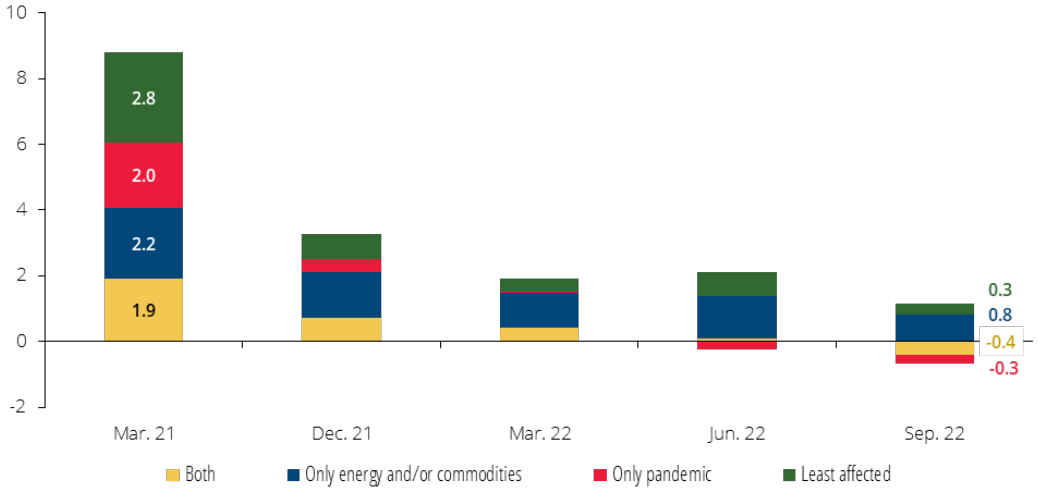


Source: Banco de Portugal. | Notes: Deposits with the eight most significant institutions (G8) account for around 90% of OMFI deposits. Given the availability of information, the rate of change for 2020 corresponds to changes between December 2019 and March 2021, the rate of change for 2021 corresponds to changes in deposits between March 2021 and March 2022 and the rate of change for 2022 corresponds to the period between March and September.

In a context of low growth in credit to NFCs, those firms most affected by rising energy and/or commodity costs and those least affected by the two shocks increased their contribution to the growth of the stock of loans granted by resident banks. According to the October Bank Lending Survey, institutions point to increased financing needs for working capital as one of the drivers behind loan increases, which may account for the contribution of firms most affected by the increase in production costs. The contribution to credit growth for firms simultaneously affected by the pandemic and the increase in production costs was negative in the third quarter of 2022 (Chart I.1.24). During the first half of the year, the accommodation and food services sector posted a decline in the amount of loans, while industry and trade had the highest growth rates (Section 2). These developments reflect the lifting of pandemic-related restrictions and the current environment.

In terms of funding to firms affected by the pandemic crisis, the contribution of Portuguese government-guaranteed credit lines became negative as of the first quarter of 2021, while the outstanding balance of loans guaranteed by the Pan-European Guarantee Fund (EGF) increased in 2022. In the first case, the amount of new loans has decreased markedly, as the grace periods associated with most of these claims have already expired (Section 2). In the second case, Portuguese credit institutions that concluded protocols with the European Investment Fund under the EGF in order to intermediate this lending, from the end of 2021 granted loans with an outstanding amount as of June 2022 (€6.890 billion) similar to the outstanding balance of loans guaranteed by the Portuguese State in the context of the pandemic crisis (€8.179 billion). The collateral received by banks in this context is not a contingent liability of the Portuguese State, which has contributed to the fund ex-ante.

Chart I.1.24 • Contributions to the year-on-year rate of change in the stock of loans to NFCs, according to the impact of the pandemic crisis and the rising energy and commodity costs | Percentage points



Source: Banco de Portugal. | Notes: Sectors more affected by a rise in energy and/or commodity costs are considered to be those with a value above the 75th percentile (unweighted figures) in at least one of the following aggregate ratios (by CAE subclass): energy costs over total production costs or expenditure on commodities over total production costs (according to the definition of the note to Chart B4.1). Excluding firms belonging to classes in sections K, O, T and U of the Portuguese Classification of Economic Activities (CAE) Rev.3. Sectors more affected by the pandemic include those set out in Decree-Law No 22-C/2021 and/or those eligible for the support line for economic recovery – Retomar programme.

In the first half of the year, insolvency proceedings initiated continued to be clearly below those observed prior to the pandemic crisis, on a downward path from the fourth quarter of 2021. This is also the case for firms in the accommodation and food services sector, after a few quarters when they exceeded insolvencies observed in the pre-pandemic period. These developments may be influenced by the suspension of the obligation to file for insolvency by debtors unable to meet their credit obligations or with assets clearly below their liabilities. This measure was adopted in the context of the pandemic crisis and has not yet been repealed. Nevertheless, an exercise to estimate the expected exposure from potential firms' insolvency, based on the financial situation of firms until 2021, concluded that non-materialised risk may not be significant (Box 2).

Given the expected rise in the interest rate, the number of financially vulnerable firms is estimated to increase by the end of 2023. However, this worsening may be mitigated by the use of deposits to repay debt. Furthermore, NFCs' starting financial position is better than that observed during the sovereign debt crisis, namely in terms of leverage. Thus, the simulation points to a lower share of firms in this situation than throughout the sovereign debt crisis. Between 2021 and 2023, the share of vulnerable firms is estimated to increase from 18% to 26% (24% if deposits are used to repay debt), but less than during the sovereign debt crisis (29% in 2013) (Special issue "The impact of rising interest rates on corporate debt service").

The government has been adopting measures to support firms in order to limit the impact on their business. Changes to the final energy pricing process have been announced, reducing network access costs and thereby costs to firms.

Overall, the impact on financial stability hinges on the banking sector's exposure to the most affected firms, with lower market power and a more fragile balance sheet structure. Policies to encourage and support firms' capitalisation will play a major role. The implementation of projects approved by the Capitalisation and Resilience Fund (with an envelope of €1.3 billion) and the Consolidar programme (€752 million) can contribute to the financial soundness of firms. Similarly,

the tax incentives to capitalisation planned in the State Budget for 2023 may make an additional contribution.

1.3.4 Residential and commercial real estate market

Until June, house prices rose further, growing by 13.2% year on year in the second quarter. The average rate of change for the year ending in the quarter was 12.3%, with a 2.9 p.p. increase from 2021, to reach a new peak. The median value of bank appraisals on housing continued to increase, with a 15.8% year-on-year nominal growth rate in August.

In the first half of the year, the amount of transactions rose by 31% year on year and by 5% half year on half year. The number of transactions increased by 14% year on year but fell by 2% compared with the second half of 2021. In June, for the first time since February 2021, the number of transactions decreased compared with the same month one year before (-7.6%), although the associated amount rose by 6.3%.

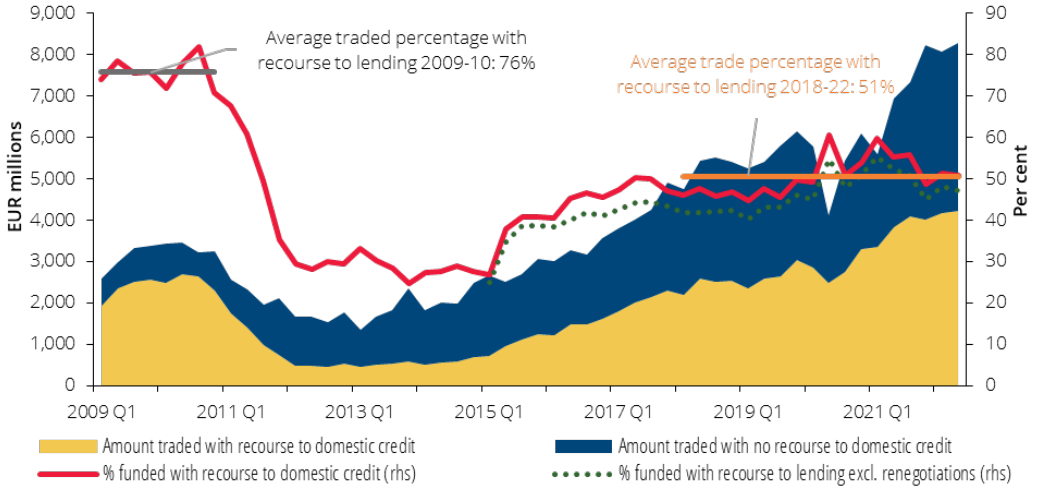
Non-residents' participation in the Portuguese real estate market continued to increase in 2022, accounting for 11.2% of the total sales value in the first half of the year (6.1% of the number of transactions). Over this period, the number and amount of residential real estate transactions by non-residents grew respectively by 24% and 58%, compared with the same period in 2019.

In 2022, growth in house prices was accompanied by an increase in loans for house purchase. The annual rate of change in the stock of loans for house purchase, adjusted for securitisation and loan transfers, stood at 3.8% in September. However, after peaking in March, the monthly average amount of new loans for house purchase posted negative year-on-year rates of change between July and September (Section 2).

The share of transactions financed through credit (around 50% in 2022) is still lower than before the sovereign debt crisis (Chart I.1.25). There is, however, considerable geographical heterogeneity. In 2021 the Algarve continued to have the lowest share of transactions financed by loans for house purchase (around 20%), followed by the Lisbon and Porto metropolitan areas (around 60% and 70% of the value of transactions respectively), while in the rest of the country this share was around 80%. This pattern reflects the degree of non-residents' participation in transactions in each region.

Domestic bank credit to foreign citizens accounts for a small share of the total, although it has increased more recently. This credit has a higher concentration of lower LTVs than that granted to domestic borrowers. In terms of original maturity, it has a lower weight in the range of over 30 years (Box 3).

Chart I.1.25 • Transactions in dwellings vs. new loans for house purchase

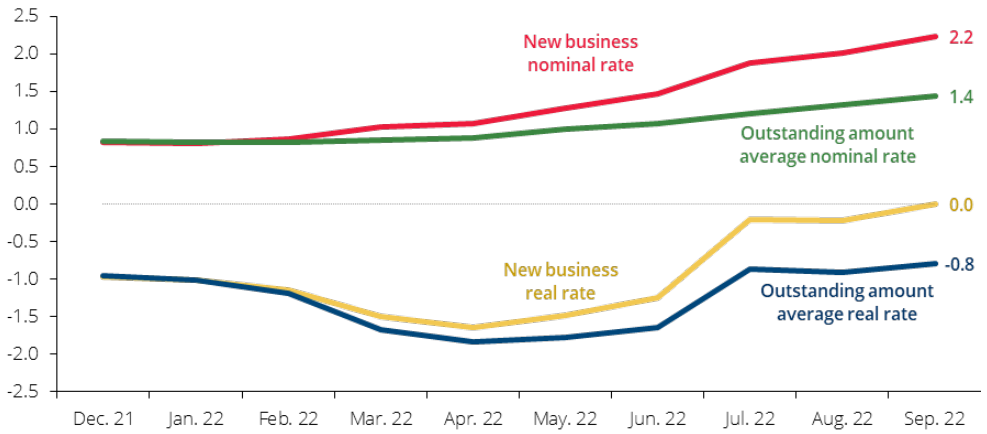


Sources: Banco de Portugal and Statistics Portugal. | Notes: The way information on transactions of dwellings is calculated has been revised by Statistics Portugal. Transactions of dwellings in which the buyer is part of the institutional sector of Households are now reported on a quarterly basis. For more details, see the note on the "House Price Index" of Statistics Portugal. Latest observation: 2022 Q2.

The potential loss in real household income and the expectation of a continued increase in interest rates will tend to lead to lower demand for housing by residents. Interest rates on loans for house purchase have been increasing in 2022. In terms of new business, the rate reached 2.2% in September, 1.4 p.p. more than at the end of 2021, and the average cost of the stock moved up to 1.4% in August, 0.6 p.p. more than in December 2021. However, the average real interest rate on the outstanding amount of loans for house purchase remains in negative territory (Chart I.1.26). For economic agents with liquidity constraints, increasing debt service can dictate their default and be pivotal for securing new loans.

The October *Bank Lending Survey* shows that demand for loans for house purchase by households declined somewhat in the third quarter. This is probably due to lower consumer confidence, the housing market outlook and, to a lesser extent, interest rates. In the fourth quarter, institutions expect a further reduction in demand for this type of credit. In the euro area, demand for loans for house purchase by households declined considerably, in tandem with tighter credit standards and an increase in rejection rates for loan applications.

Chart I.1.26 • Developments in nominal and real interest rates on loans for house purchase in 2022 | Per cent



Sources: Banco de Portugal and Refinitiv. | Notes: The real interest rate is obtained by deducting from interest rates on loans for house purchase the inflation expectations implied by the euro area one-year-ahead one-year inflation swaps (monthly averages). Closing market quotes.

The macroeconomic and geopolitical environment constrains developments in demand by non-residents. The same factors holding back demand by residents may contribute to a decline in demand by non-residents. However, Portugal's geographical location, far from the conflict, and the security and stability conditions that have made it a desirable destination will tend to further support this demand. Also notable were, inter alia, the continuation of the Golden Visa regime (despite limitations in terms of investment location) and tax benefits for non-regular residents, as well as the recent establishment of the 'digital nomads' regime.

Residential real estate is expected to remain attractive for portfolio diversification, in particular amid international financial market turmoil. Moreover, higher expected inflation than that observed in recent years may foster demand for residential real estate for hedging reasons to store value.

Housing supply has yet to meet demand. In the first half of the year, 3.1% fewer building permits were issued than in the same period of 2021, but 6.3% more than in the first half of 2019. Gross fixed capital formation in housing (adjusted for seasonal and calendar effects) has decelerated (1% quarter-on-quarter rate of change in volume and 16% in current prices in the second quarter).

Difficulties in obtaining permits are compounded by disruptions in raw material supply chains, labour shortages and an increase in input costs. Rising construction costs, including labour costs, may reinforce the upward trend in house prices.

Housing supply constraints also mean that, when demand wanes, oversupply of housing that can only be absorbed by the market after a protracted period is not to be expected. The economy is now less dependent on the construction sector (its contribution to GVA fell from 5.9% in the fourth quarter of 2009 to 4.3% in the second quarter of 2022) and the banking sector's exposure to this sector is also lower than during the sovereign debt crisis. In particular, loans account for 9% of the total granted to NFCs in September 2022, down from 23% in December 2009.

The number of real estate properties put on the market for sale has been on a declining trend during 2022; however, the number of dwellings sold has remained constant (Chart I.1.27). In 2022, the average period it took for real estate to be sold in the market continued to be on a downward curve, which intensified in the third quarter, while prices rose (Chart I.1.28).

Chart I.1.27 • Year-on-year change in the price index and number of dwellings listed and sold

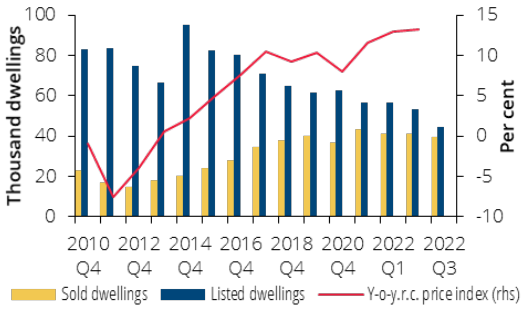
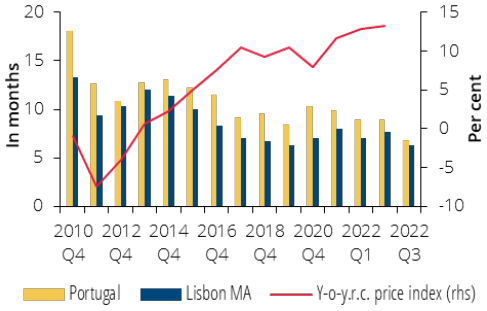


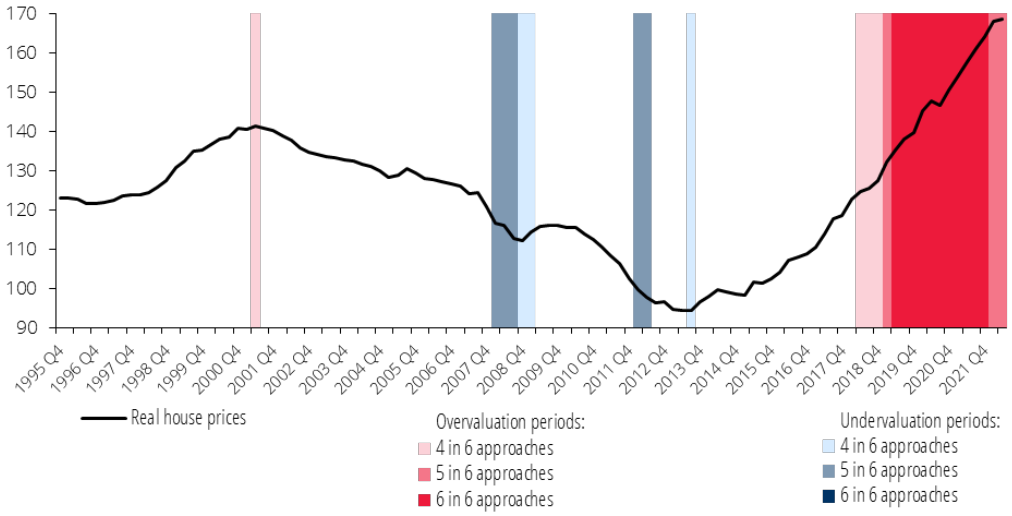
Chart I.1.28 • Year-on-year change in the price index and average number of months it takes for a listed property to be sold



Sources: Confidencial Imobiliário and Statistics Portugal.

These developments occurred amid ongoing signs of overvaluation of residential real estate in Portugal (Chart I.1.29). However, these estimates do not directly take into account factors such as demand by non-residents and for tourism activities, which have contributed to price developments in this market. The current environment, characterised by higher credit cost, may nevertheless lead to a moderation (or even some correction) in residential real estate price growth.

Chart I.1.29 • Valuation measures of house prices in Portugal | Index: 2015=100



Sources: ECB and OECD (Banco de Portugal calculations). | Notes: Overvaluation and undervaluation periods correspond to periods in which, from the six approaches considered, at least four identify an imbalance in house prices. For more details on this methodology, see the Special issue: "Housing price assessment methodologies applied to Portugal", Banco de Portugal, *Financial Stability Report*, December 2019. Latest observation: 2022 Q2.

Recourse to the rental market could reduce pressure on demand for real estate, moderating the growth dynamics of prices and loans for house purchase.

In the first half of the year, the median value of rent per square metre increased further, as did the number of rentals across all regions of the country. In the first half of the year, the highest year-on-year rate of change in rent per square metre was posted in the autonomous regions (around 11%) and the Porto Metropolitan Area (around 9%), following declines in the second half

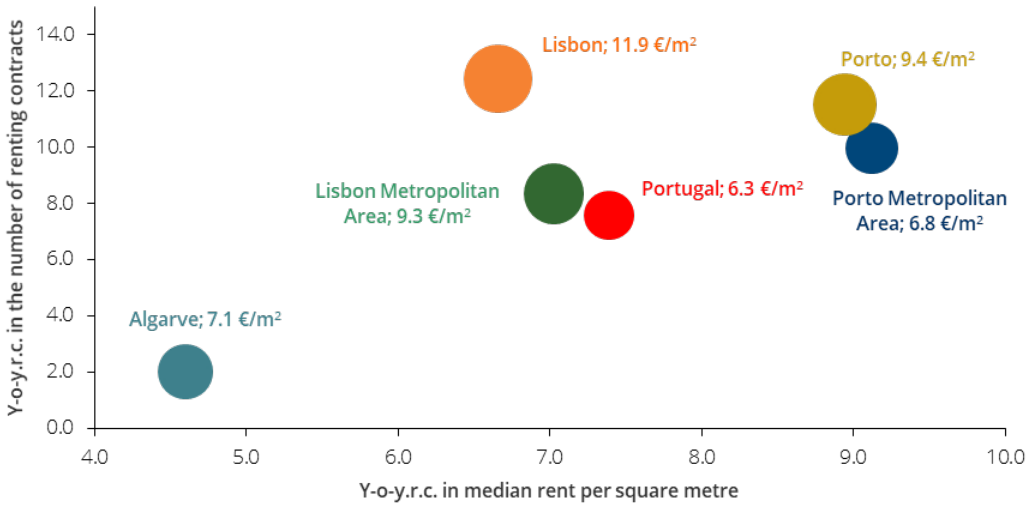
of 2020 and the first half of 2021. The highest year-on-year growth in the number of contracts concluded was seen in Lisbon (12%), which also has the highest median price per square metre (€12), despite a decrease in the second half of 2020 and during 2021 (Table I.1.5 and Chart I.1.30).

Table I.1.5 • Median rent per square metre, by region

	EUR/m²	Year-on-year rate of change						
	2022 H1	2019 H1	2019 H2	2020 H1	2020 H2	2021 H1	2021 H2	2022 H1
Portugal	**6.3**	**9.2**	**10.8**	**9.4**	**5.5**	**6.4**	**7.7**	**7.4**
North	5.4	10.1	11.6	8.3	5.0	5.9	7.6	8.2
Porto Metropolitan Area	6.8	12.7	13.4	10.3	6.4	4.5	6.4	9.1
Porto	9.4	15.5	12.5	7.2	-1.5	-3.6	1.7	8.9
Centre	4.4	6.2	6.6	6.1	3.3	3.5	5.2	5.6
Lisbon Metropolitan Area	9.3	16.0	15.3	11.7	6.2	3.1	3.9	7.0
Lisbon	11.9	12.7	7.2	1.8	-4.2	-6.7	-1.9	6.7
Alentejo	4.1	3.8	4.6	6.2	6.3	3.7	2.8	5.4
Algarve	7.1	12.5	12.0	10.3	6.1	3.1	3.3	4.6
Azores Autonomous Region	4.4	7.8	2.3	3.1	2.0	-0.5	1.5	10.6
Madeira Autonomous Region	6.8	12.8	2.6	-0.3	0.0	2.8	5.7	10.7

Source: Statistics Portugal.

Chart I.1.30 • Rental market in 2022 H1 – year-on-year rate of change in median rent per m² and in the number of contracts | Per cent and EUR



Source: Statistics Portugal. | Note: The size of the circles is proportional to the median rent per square metre, presented in the chart in euro per square meter.

The September round of the Portuguese Housing Market Survey points to a reduction in agreed sales, albeit with an ongoing increase in prices. Most reporting market agents expect short-term transactions to decrease and prices to remain on an upward path, despite slowing down somewhat over a three-month horizon. Similarly, during this period, potential customer enquiries and supply of new property are expected to decline further. The rental market is still resilient and rents are expected to increase in the short run, reflecting growth in demand coupled with limited supply.

The banking sector's exposure to commercial real estate is limited and considerably lower than that of residential real estate, so developments in this segment will tend to have a lower impact

on financial stability. Moreover, capital requirements for this type of credit are much higher than those for residential real estate. In June 2022 loans to NFCs secured by commercial real estate (€25 billion) accounted for around 27% of total loans to NFCs on a consolidated basis, compared with an exposure of approximately €114 billion in loans to households secured by real estate, mostly loans for house purchase (Section 2.2). This contrasts with that seen in the euro area.

The pandemic led to mixed developments in the residential and commercial real estate market in both Portugal and the euro area. The prices for some commercial real estate subsectors have been less resilient but recovered in 2021. According to the Morgan Stanley Capital International (MSCI) index, commercial real estate devalued by 3.8% in Portugal in 2020. The retail and accommodation sectors, more affected by restrictions on mobility, devalued by 6.3% and 7.0% respectively (Table I.1.6). In 2021, commercial real estate valuations recovered by 1.6% across all segments.

Table I.1.6 • Developments in commercial real estate valuations by segment, in Portugal and the euro area | Per cent

		Portugal	Euro area
Retail	2019	1.9	-0.6
	2020	-6.3	-5.6
	2021	2.5	-0.2
Offices	2019	6.0	6.5
	2020	0.3	1.6
	2021	1.8	4.4
Industrial	2019	1.5	9.5
	2020	-0.3	7.7
	2021	1.2	17.7
Accommodation	2019	0.8	4.4
	2020	-7.0	-5.3
	2021	0.5	1.9

Source: Morgan Stanley Capital International (MSCI).

Between January and September, there was an increase in turnover and prices in the various segments.[2] In the offices segment, the shortage of supply (particularly in the prime segment) contributed to price and rental resilience during the pandemic. In the first three quarters, in 'Greater Lisbon', the traded area hit a peak last seen in 2013, while in 'Greater Porto' activity remained at the average of the last three years, falling short of the figure recorded in 2018. The industrial and logistics real estate segment was also resilient to the pandemic shock. Prices fell by 0.3% in 2020 but increased by 1.2% in 2021 (1.5% in 2019). In 2021, driven by the expansion of e-commerce, the traded area peaked, while in 2022 activity levels were similar to those in 2020. The value of retail real estate assets increased by 2.5% in 2021 (1.9% in 2019). During the first half of the year, the retail sector tended to recover, although demand for retail space according to Cushman & Wakefield declined by 10% compared with the same period a year earlier. In

[2] Cushman & Wakefield MarketBeat report for Portugal; autumn 2022.

accommodation, the recovery in tourism activities supported the upturn in this activity and the opening of new units in the first half of the year.

In the second quarter, the share of market participants assessing prices in the commercial real estate market as appropriate in Portugal decreased, in contrast to an increase in perceived overvaluation. Portugal has moved closer to the perceptions of the euro area, with only around half of participants deeming prices as fair. In the euro area, the share of participants considering real estate as very expensive decreased slightly, while in Portugal it was negligible (Chart I.1.31).

The economic and financial environment, with forecast economic slowdown and interest rate increases, weighs on expectations from this market, with perceptions regarding the current stage of the commercial real estate cycle deteriorating in the second quarter in both Portugal and the euro area. Uncertainty may lead to the postponement of investment decisions, and available leading indicators suggest caution in view of possible changes in the cycle stage. In Portugal, more than two-thirds of the views point to a reversal of the commercial real estate cycle, with 42% believing that a peak has already been reached and 26% that the market will contract (Chart I.1.32).

Chart I.1.31 • Views from market participants as to commercial real estate prices | Per cent

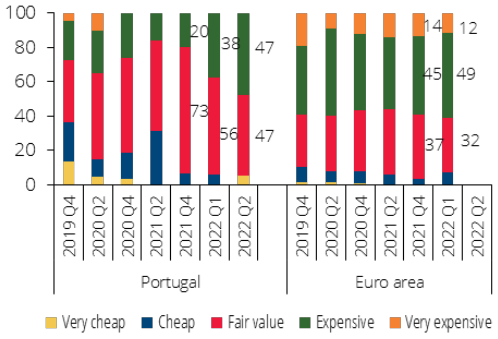
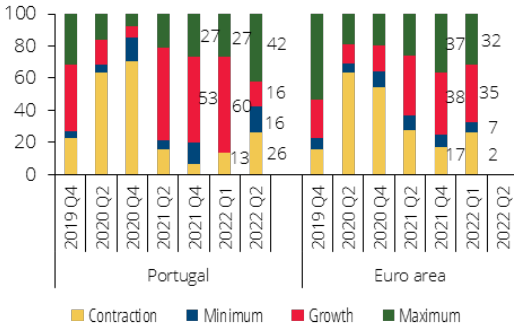


Chart I.1.32 • Perceptions on the stage of the commercial real estate cycle | Per cent



Source: Global Commercial Property Monitor, Royal Institution of Chartered Surveyors – RICS

1.3.5 Non-banking financial sector

The possibility of a reassessment of risk premia continues to be one of the main risks faced by the non-bank financial sector. Deteriorating financial market prospects in a challenging macroeconomic and financial environment, marked by uncertainty, higher inflation and rising interest rates, may continue to materialise in asset price corrections (e.g. equity and bonds), with an impact on the liquidity, profitability and equity of these institutions. The effect will also hinge on cumulated risk in search for yield amid the very low interest rate environment. In the euro area, the non-bank financial sector has a significant share in financing of economy, standing at 376% of GDP (Chart I.1.33).

Increased volatility in international financial markets has contributed to liquidity stress situations with a potential systemic impact. In the United Kingdom, the sharp, substantial rise in government debt yields following the government's announcement of its Growth Plan forced defined-benefit pension funds to sell assets, in particular government debt, to cover additional margin needs on interest rate exposures. These institutions have implemented liability-driven investment (LDI) strategies (internally and through participation in LDI investment funds) in order to provide a better match between the value of their assets and liabilities, particularly in a context of very low interest rates. Some of these strategies were based on strong leverage through, for instance, repurchase

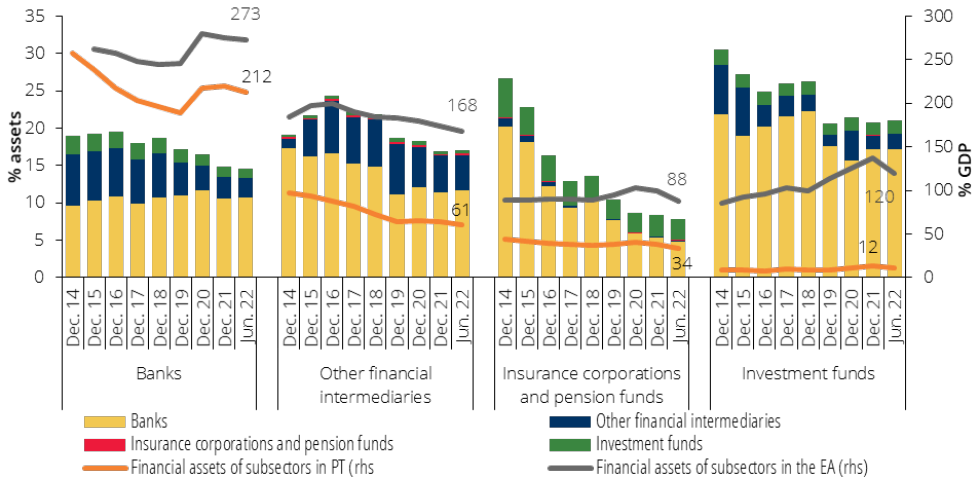
agreements involving government debt securities and interest rate derivatives, which originated considerable losses given the rising government bond yields in the United Kingdom. The need to sell government debt securities to cover such losses compounded the impact on underlying yields. The Bank of England's intervention through the announcement and purchase of these securities made it possible to stabilise the public debt market and pension funds.

Increases in energy and commodity prices have induced higher margin requirements for members of central counterparties in the EU, especially as regards energy contracts, originating liquidity stress situations in some participants, mainly non-financial counterparties. The European Commission, in its 18 October communication, adopted measures including new rules for market participants, temporarily expanding the list of eligible collateral to non-cash collateral, including government guarantees.

The maintenance of this challenging environment, coupled with a deterioration in the outlook for economic growth, could lead to losses for non-bank financial institutions. These are affected by the devaluation of assets on the balance sheet, the need to rebalance the portfolio in an environment of rising interest rates and high financial market volatility. High inflation penalises real profitability associated with their investments, particularly fixed-yield assets, dampening the relative attractiveness of their products. These situations may result in an increase in redemptions and may lead to liquidity stress episodes. Given the importance of this sector in the euro area, there is a potential to amplify and pass through these shocks to other financial system segments and international financial markets, with possible adverse consequences for the Portuguese financial sector.

In Portugal, the non-bank financial sector continued to account for a small share, of 106% of GDP, compared to 376% in the euro area (Chart I.1.33). Since 2019, this share has decreased by 5 p.p. in Portugal, compared with a 24 p.p. increase in the banking system's share (212%). The increasing importance of the banking system matched developments in the euro area, also reflecting policies to mitigate the pandemic crisis. The interconnectedness of non-bank financial subsectors with the banking system has continued to decrease in recent years, thereby mitigating the risk of direct contagion stemming from a potential adverse event impacting on any systemic entity or subsector of the financial system.

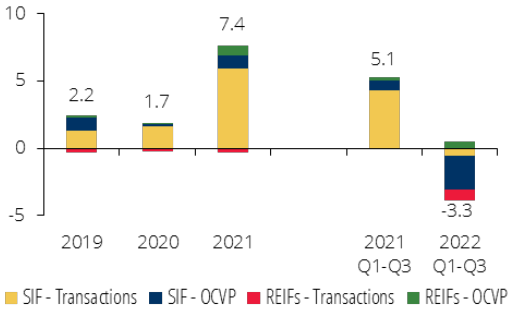
Chart I.1.33 • Relative size of financial system subsectors in Portugal and the euro area
| As a percentage of GDP and assets



Sources: ECB and Banco de Portugal. | Notes: Total non-consolidated assets of each sector were considered. The following financial assets were considered in the calculation of exposure: deposits, debt securities, loans, shares and other investment funds units and listed shares. For simplification purposes, other financial intermediaries refer to the sum of the following subsectors: S125 – Other financial intermediaries except ICPFs, S126 – Financial auxiliaries and S127 – Captive financial auxiliary institutions and lenders. In Portugal, this sector is mostly made up of captive financial institutions and lenders. For more details on this classification, see "Institutional sectors breakdown – ESA2010".

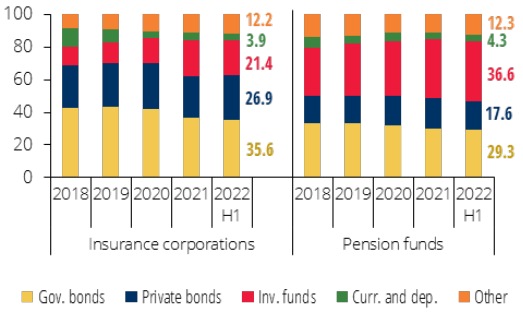
The first three quarters of 2022 saw a decrease in investment fund assets, mainly reflecting the decrease in the value of securities investment fund (SIF) units and, to a lesser extent, net redemptions (Chart I.1.34). The decreases in value were most pronounced in equity and bond funds, in line with developments in financial markets, while net redemptions were mainly in real estate investment funds (REIFs) and bond funds. In open-ended bond funds, the share of deposits has been on the decline (26 p.p. compared to early 2017, to 8% of total units in September). The current context will make equity risk-free alternative investment more attractive, which could lead to liquidity risk situations in some segments, given the possibility of additional redemptions. Households are the main holders of investment fund shares/units, in particular open-ended bond, equity and mixed securities investment funds and real estate investment funds.

Chart I.1.34 • Total shares/units issued by investment funds: transactions and other changes in value and price | EUR billions



Source: Banco de Portugal. | Note: SIFs – securities investment funds, REIFs – real estate investment funds, OCVP – other changes in value and price.

Chart I.1.35 • Composition of assets and technical provisions | As a percentage of the total insurance or pension fund portfolio



Source: Insurance and Pension Funds Supervisory Authority. | Notes: Gov. bonds - Government bonds; Private bonds – Private debt bonds; Inv. funds - Investment funds; Curr. and dep. – Currency and deposits. 'Other' also includes real estate, derivatives, mortgages and structured products.

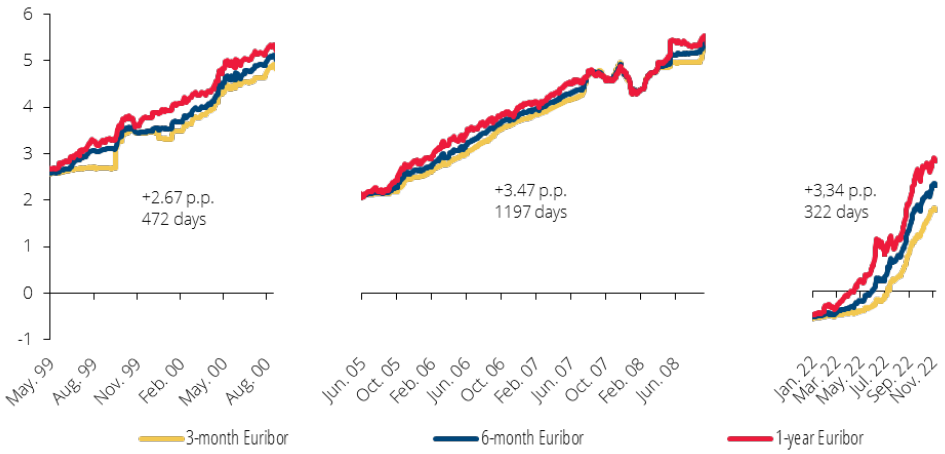
Rising interest rates have a twofold impact on insurers and pension funds. First, they tend to penalise the valuation of assets, which comprise exposure to (public and private) debt securities, 63% of total assets of insurance companies and 47% of total assets of pension funds in June (Chart I.1.35). In the insurance sector, debt securities are highly concentrated at the investment-grade threshold, although the duration of the portfolio is shorter than for pension funds. However, the debt securities portfolio of the pension fund sector has better credit quality, and its duration reflects the longer maturities of its liabilities. Second, the increase in interest rates and yields is reflected in higher discount rates for liabilities, resulting in a reduction in the latter, with a positive effect on the profitability and solvency of these sectors. The maintenance of higher interest rates also reduces the risk of reinvestment of their portfolios and is particularly crucial for institutions with liabilities on defined-benefit products.

Higher inflation translates into higher insurance costs in the non-life segment. Given the importance of the household sector for the non-bank financial sector, the reduction in households' real income and a deterioration in their financial situation may also lead to a decline in the output of the insurance sector and pension funds as well as in investment fund subscriptions and to a rise in redemptions, putting additional pressure on institutions' profitability, liquidity and capital.

1.3.6 Banking system

A period of high and persistent inflation, the abrupt rise in interest rates and the slowdown in economic activity are currently the key risk drivers for the banking sector. For this sector, rising interest rates (Chart I.1.36 – Periods of Euribor increases) are expected to result in an improvement in net interest income, but also in greater materialisation of credit and market risks. The impact and extent of each of these effects will largely depend on economic developments, the pace of increase in interest rates and the support measures taken. Going forward, structurally higher interest rates are expected to have a favourable effect on net interest income and to make it possible to diversify the public debt portfolio by discouraging search-for-yield strategies.

Chart I.1.36 • Periods of Euribor increases | Per cent



Source: Refinitv. | Notes: The three periods with the largest increases in interbank rates since 1997 have been selected. The reference values shown in the chart refer to developments in the one-year Euribor. Latest observation: 14 November 2022.

The rise in funding costs, amid deteriorating economic expectations, could result in an increase in credit risk for the banking system, which would result in higher impairments. However, the impact of expected developments in Euribor rates up to December 2023 is not likely to result in an abrupt increase in the materialisation of credit risk jeopardising financial system stability. Yet, the impact may be relevant for banks' exposure to more vulnerable firms and households. These effects should lead to a greater volume of non-performing loans and an increase in expected losses on loans to customers.

In the wake of the pandemic crisis, credit risk materialisation has been contained. Loans under moratoria during the pandemic crisis are still sending muted signs of deteriorating credit quality, with a slight widening of the NPL and forborne loan ratio. Credit risk materialisation was lower than anticipated at the onset of the pandemic crisis. In the first half of 2022, the NPL ratio of the total portfolio continued its downward trend (3.4% in June 2022).

The narrowing of corporate and household indebtedness ratios mitigates credit risk materialisation. Moreover, the share of loans with a longer interest rate fixation period has gradually increased since 2016.

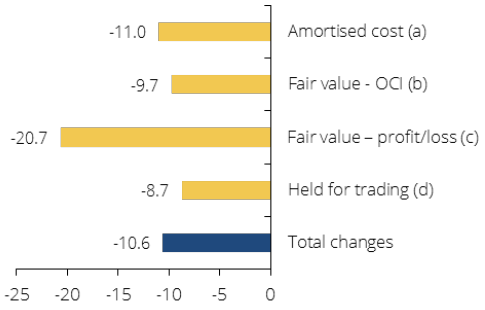
The potential materialisation of credit risk should continue to be monitored by institutions. The legal and regulatory framework for managing credit at default risk or past due (PARI and PERSI) was strengthened in 2021, by requiring credit institutions to take a more proactive approach to prevent arrears. Also, for loans to households, credit risk will tend to be mitigated by the adoption of the macroprudential Recommendation on new loans for house purchase and new consumer

credit, which explicitly envisages a scenario of rising interest rates within the limit set for the DSTI (3 p.p. shock for variable rate loans with a maturity of over 10 years). Accordingly, Portuguese banks should continue their efforts to identify and provide solutions (including the renegotiation and restructuring of credit agreements) that make it possible to tailor loan conditions to borrowers' debt servicing capacity and, consequently, to mitigate the materialisation of default. The law approved by the Council of Ministers in early November sets out measures to follow up on and mitigate the increase in the debt-service rate in loans for house purchase.

The risk associated with international activity may increase. In addition to the increase in the euro area, some Eastern and Central European countries have also raised their key interest rates, such as Hungary and Poland. These developments may materialise in an increase in default, leading to the adoption of government-backed moratorium measures for bank customers. Thus, the rise in funding costs and the legal changes implemented represent an additional risk factor, notably for banking groups exposed to these geographies. This risk may take the form of a devaluation of assets held or the need to make provisions to address the implicit legal risk and may negatively put pressure on the Portuguese banking system's future profits.

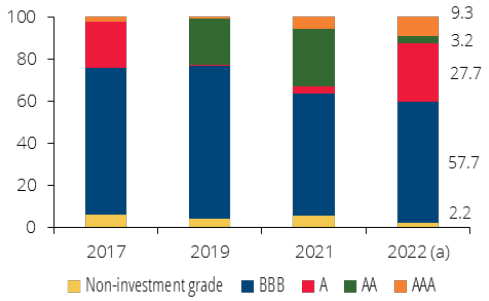
The recent rise in interest rates has also been reflected in the materialisation of market risk. In the first half of the year, associated with the increase in market interest rates, there was an overall 10.6% reduction in the market value of sovereign debt securities held by the banking system (Chart I.1.37). The reduction in the value of these securities is particularly important given their weight in the securitised debt portfolio, but also since most of these instruments are traded on repurchase markets as collateral for inter-institutional funding.

Chart I.1.37 • Changes in the market value of government debt securities by accounting approach | Per cent



Source: Banco de Portugal. | Notes: The figures presented incorporate changes in the market value of sovereign debt portfolios held from December 2021 to June 2022. Portfolio recomposition (purchase/sale) transactions are excluded. (a) Includes securities measured at amortised cost (IFRS9); (b) includes securities measured at fair value through other comprehensive income (IFRS9); (c) includes securities measured at fair value through profit or loss (IFRS9); (d) includes securities recorded as held for trading (IAS39).

Chart I.1.38 • Credit rating of the sovereign debt portfolio held by the banking system | Per cent



Sources: Banco de Portugal and Refinitiv. | Notes: (a) Figures for 2022 refer to June 2022. For the remaining periods, year-end data are reported. For presentation purposes, the credit rating was converted to Fitch's rating.

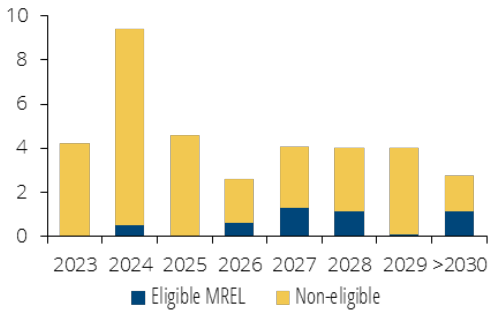
The net impact of market risk on the banking sector depends on the maturity of debt portfolios, the accounting approach and the perception of risk intrinsic to each issuer. Although a significant share of its balance sheet is composed of securities, the Portuguese banking sector also concentrates a significant share of this exposure in sovereign debt, of 14% in June, compared with 12% in the European Union. Compared with debt issued by the private sector, securities issued by European sovereigns have higher credit quality and liquidity overall. In addition, over the past few years, most domestic institutions have recognised the potential impact associated with interest rate risk in a timely manner and have active strategies in place to mitigate this risk. Since early 2022, banks have partially shifted their portfolios, choosing to keep these securities until their

maturity, with 71% of the portfolio booked at amortised cost, and diversifying the composition of the sovereign portfolio (Chart I.1.38). Given the rise in government debt yields observed between June and November, a gross impact of 0.32 p.p. on the CET1 ratio of all major Portuguese banks is estimated. However, this effect is expected to be further mitigated by the hedging strategies adopted by banks, covering around 70% of debt booked at fair value, and by the prudential filter for sovereign debt, still in force this year, with a loss (and unrealised gain) neutralisation rate of 40%. As a whole, these two effects are expected to mitigate the impact on the CET1 ratio by around 50%.

Rising interest rates are expected to increase banks' net interest income. The rise in interbank interest rates since the beginning of the year is reflected in an increase in Portuguese banks' net interest income. This effect chiefly resulted from a rise in interest on loans, which, due to a high share of variable rate assets, see their rate of return increasing in line with interbank interest rates. On the other hand, given that around 75% of the Portuguese banking sector's liabilities are mostly customer deposits (partly demand and non-interest-bearing deposits), the increase in money market interest rates should have a delayed and comparatively smaller impact on deposits, resulting in a positive net effect on the banking system.

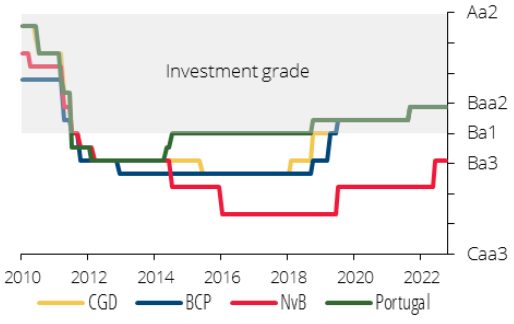
The increase in the cost of market financing is expected to reduce the banking sector's net interest income. The increase in interbank interest rates and risk premia in the bond market was also reflected in the banking sector's financing conditions. As a result, the cost of market financing rose, but no fragmentation was identified in financing conditions across euro area geographies. For Portuguese banks, the structure of the stock of debt issued shows that a significant share (38.2%) of these securities will mature before 2024 (Chart I.1.39). Among these issuances, the eligible share to meet the minimum requirement for own funds and eligible liabilities (MREL) accounted in June for around 46% of the Portuguese banking system's own funds. As a whole, the need for institutions to carry out new issuances in order to replace existing funding and comply with MREL requirements in a context of rising interest rates should increase funding costs, thereby reducing net interest income. Also, the increase in market funding exposes Portuguese banks to changes in risk perception in international financial markets. However, debt issued by Portuguese banks accounted for only 4.1% of their liabilities in June, which was comparatively lower than that of the European banking system (16.5%). Accordingly and despite the need to increase their market financing, the impact on the funding costs and needs of Portuguese banks should be proportionately lower than that of their European counterparts.

Chart I.1.39 • Maturity of bank issuances | EUR billions



Source: Refinitiv. | Notes: Figures for the main Portuguese banks. Issuances are identified as eligible based on the criteria set out for compliance with the minimum requirement for own funds and eligible liabilities (MREL). The total value of issuances considers mortgage bonds (Senior Secured), bonds and credit securities (Unsecured, Senior Unsecured, Senior Non-Preferred and Subordinated unsecured). Latest observation: 14 November 2022.

Chart I.1.40 • Evolution of credit ratings for Portugal and banks | EUR billions



Source: Refinitiv. | Notes: The rating shown for banks refers to Moody Deposit. Latest observation: November 2022.

The expiry of the extraordinary monetary policy measures may be reflected in the banking system's financing and liquidity conditions, as ECB funding will foreseeably decline. Given the original maturity of these instruments (3 years), institutions will have to replace, at least partially, the liquidity associated with these programmes with other sources of funding, which should put pressure on financing costs. For Portuguese banks, this risk is still modest, given the smaller weight of central bank funding on their balance sheet (8.9% of assets in June 2022), particularly when compared to the significant volume of customer deposits with the banking system (69.4% of assets in June 2022). In October, the Governing Council recalibrated the terms and conditions of refinancing operations (TLTRO III) to ensure consistency with the monetary normalisation process.[3]

Portuguese banks have undergone a significant adjustment process, making it possible to mitigate the impacts associated with the materialisation of the risks listed above. In recent years, the banking system has reduced its NPL ratio, increased liquidity, improved its profitability and operational efficiency, and set historically high capital ratios. This process, coupled with the reduction in public indebtedness, has helped to improve investors' perception of the banking sector's risk. This has coalesced into better credit ratings for major institutions to levels above investment grade (Chart I.1.40 – Evolution of credit ratings). Together with improved risk management practices, the system's soundness should reduce fragmentation risks and banks' financing costs.

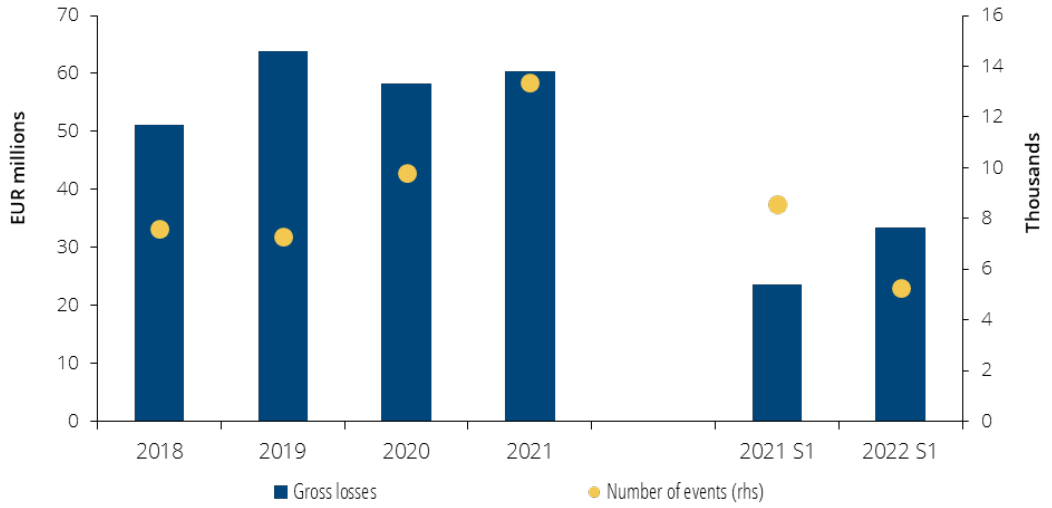
Given the challenging environment and the risks identified, institutions are expected to: (i) take a proactive approach in assessing their customers' ability to pay and to adjust loan conditions to possible difficulties, and (ii) follow appropriate provisioning practices and prudent capital conservation behaviour, thereby promoting their ability to absorb potential losses in the future.

The digitalisation of financial services is on a rising trend, accelerated by the circumstances imposed by the pandemic (see Box 5 of the December 2021 issue of the *Financial Stability Report*). The ongoing digital transformation brings opportunities as well as some risks for the banking system, in particular for incumbents.

The accelerating digitalisation process renders it more necessary to strengthen operational resilience, including protection against cyber-attacks. Operational risk events and related losses have been on the rise (Chart I.1.41). The increasingly comprehensive use of technology and the growing interlinkages between financial institutions and common IT service providers amplify the systemic nature of cyber risk. The current environment of geopolitical uncertainty increases the likelihood of cyber risk materialising. So far, there is no record of incidents that have caused systemic disruptions in the Portuguese financial sector. However, as pointed out by the Portuguese Cybersecurity Centre, the banking sector posted the most incidents in 2020 and 2021 in Portugal.

[3] See the ECB's website.

Chart I.1.41 • Operational risk events and related losses



Source: Banco de Portugal.

Banks are using digital transformation to increase internal efficiency and diversify sources of revenue. Digital transformation plans involve large investments, the gains of which will be evident in the medium term. One of the ways to overcome this challenge has also been the increasing use of external providers by outsourcing technology services and partnering up with and/or acquiring FinTechs. The FinTech ecosystem, by its very digital nature, is not limited to the domestic market. It involves supervised entities and entities providing support services to other supervised entities, and is constantly evolving.

Portuguese banks have already started employing technological innovation in their business, but this has been a gradual process. This includes, for instance, innovation related to the use of big data analytics technologies with advanced artificial intelligence and machine learning techniques. This technology can be beneficial for banks, although it also poses associated risks (Box 4). Against a background of increasing use of data, it is important to ensure its reliability, and the Banco de Portugal is conducting special independent audits on compliance with supervisory reporting rules, which are expected to be concluded by the end of next year.

Another area for innovation is that related to virtual assets. The Basel Committee on Banking Supervision is working on the prudential treatment of crypto-assets (expected to be completed by the end of 2022) and political agreement is expected to be reached in Europe on the adoption of the Regulation on Markets in Crypto-assets (MiCA Regulation), which should be officially published in the spring of 2023. At national level, the Banco de Portugal believes that activities involving virtual assets do not fall within the list of activities provided for in the Legal Framework of Credit Institutions and Financial Companies. However, with the entry into force of Law No 58/2020 of 31 August 2020, which amended Law No 83/2017, it was established that activities involving virtual assets may be carried out in Portuguese territory only by an entity which, for that purpose, obtains prior registration with the Banco de Portugal, even if the applicant is engaged in another profession or activity covered by Law No 83/2017 and is the subject of an authorisation or qualification process. In addition, the Banco de Portugal launched its Public Consultation No 7/2022, adjusting the preventive money laundering and terrorist financing (ML/TF) obligations in the financial sector to operators engaged in activities involving virtual assets, including how they should relate to financial entities.

In the context of preventing of money laundering and terrorist financing (ML/TF), Notice of the Banco de Portugal No 1/2022 – implementing the preventive ML/TF obligations in the financial

sector – entered into force and Public Consultation of the Banco de Portugal No 7/2022 was launched. Also, the Banco de Portugal has issued warnings to the supervised sector on emerging ML/TF risks and trends in order to guide compliance with obligations towards riskier situations. The Banco de Portugal has also continued to monitor the negotiation process of the European package of legislative proposals known as the "AML Package", in particular the adoption by the Council of the European Union of the general approach to the Regulation providing for the establishment of a European ML/TF prevention authority.

With regard to supervision, the Banco de Portugal completed the thematic cycle on correspondent relationships and launched a new cycle of inspections on measures to control business relationships or operations with applicants to or beneficiaries of residence rights in Portugal to carry out investment activities. The Bank also participated in a technical assistance project funded by the European Commission to improve the ML/TF risk assessment model of supervised entities.

At its meeting on 16 June 2022, the Eurogroup decided to strengthen the crisis management and deposit insurance (CDMI) framework for institutions, but not to move forward in parallel with the establishment of a European Deposit Guarantee Scheme (EDIS). However, an institutional framework that includes EDIS and which allows for full mutualisation in the steady state is key for (i) depositor confidence to no longer depend on the geographical location of the bank and (ii) the current misalignment between decision-making and funding centres to be corrected. It is therefore important that EDIS is not overlooked in the negotiations on the future legislative proposals for the revision of the European crisis management framework to be presented by the European Commission.

Financial risks associated with climate change and the transition to a low-carbon economy, amid an accelerating energy transition process partly driven by the invasion of Ukraine, may affect financial stability. In this respect, the banking system faces major challenges. On the one hand, they arise from its counterparties' exposure to climate change risks that can influence the intrinsic risk of balance sheet exposures. On the other hand, they arise from the performance of its core tasks in managing risks and providing funding to the economy while adapting to the transition process, marked by high uncertainty.

At the heart of this adaptation process (also) affecting the financial sector – including in terms of regulation and supervision – is largely the dissection and incorporation of the financial risk associated with climate science phenomena. In particular, this entails the incorporation of a forward-looking perspective to capture the idiosyncrasies of climate-related and environmental risks. Against this background, the European framework for prudential regulation and supervision for credit institutions is undergoing a transformation in order to better adapt to Environmental, Social and Governance (ESG) risks, including climate-related and environmental risks.

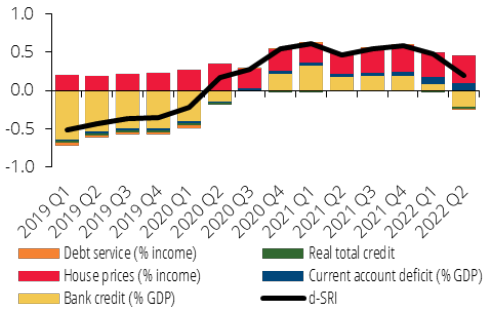
The methodologies and practices used to identify, measure and manage risks are also being challenged. Indeed, the scale and intensity of the transformations and impacts associated with climate change and the transition to a low-carbon economy, combined with the specificities of this (new) source of financial risks, signal a paradigm shift in the financial system. However, institutions' proactivity is key to assessing the strategic resilience of their business to different climate change and energy transition scenarios. While recognising that challenges lie ahead, in particular in terms of data and methodologies, it is important that institutions make the best possible use of available information, the employment of proxies and other relevant information collected as part of their interaction with counterparties.

1.4 Macroprudential policy

The financial cycle is currently marked by a slowdown in the build-up of domestic cyclical systemic risk, increased financial stress – conditioned by inflation expectations and monetary policy normalisation – and uncertainty about the outlook for economic growth. In the second quarter of 2022, after a period of stabilisation at around 0.5 standard deviations above its historical median, the domestic cyclical systemic risk indicator (d-SRI) decreased due to the effect of the reduction in non-financial private sector indebtedness (Chart I.1.42). Even considering these recent developments, the indebtedness ratios of the non-financial private sector have yet to reach their pre-pandemic values, but in June 2022 the indebtedness ratios of households and firms stood only one percentage point above those seen at the end of 2019 (Sections 1.3.2 and 1.3.3). As a result of credit developments, the current stage of cyclical systemic risk build-up has been mainly driven by the persistent increase in house prices. The protracted period of low interest rates, rising housing demand by non-residents and limited housing supply contributed to this increase. In the most recent period, labour and material shortages constraining activity in the construction sector have also played a major role.

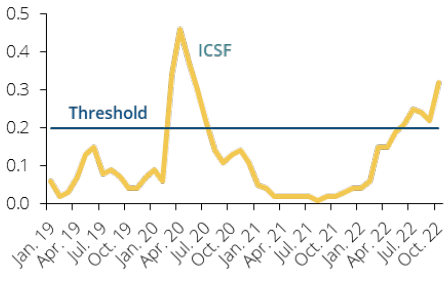
The composite indicator of financial stress (Portuguese acronym: ICSF), which concurrently signals the abrupt deterioration in financing conditions and periods of stress in the financial system, increased from March to October 2022, exceeding in June the value identified in Braga, Pereira and Reis (2014) as the threshold of change to a high-stress regime (0.20) (Chart I.1.43). Developments between March and July were associated with increased stress in the bond, foreign exchange and financial intermediaries market segments, while the significant increase in the ICSF in October 2022 to 0.32 was due to heightened volatility in the equity, money and financial intermediaries market segments.

Chart I.1.42 • Domestic cyclical systemic risk indicator | Standard deviations from the median



Sources: ECB and BIS (Banco de Portugal calculations). | Notes: The d-SRI, developed by Lang et al. (2019), is an aggregate indicator aimed at identifying the build-up of cyclical imbalances generated in the domestic non-financial private sector. For further details on the d-SRI for Portugal, see the June 2019 issue of the *Financial Stability Report*.

Chart I.1.43 • Composite indicator of financial stress | Index

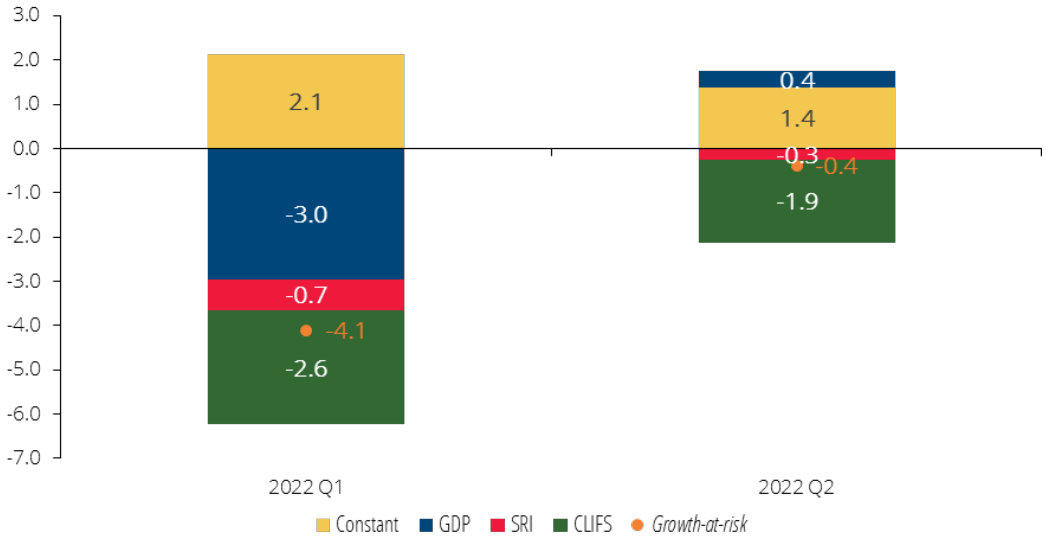


Source: Banco de Portugal. | Notes: Latest observation: October 2022. The ICSF (Braga et al., 2014) aggregates a set of indicators from five market segments: money market, bond market, equity market, financial intermediaries and foreign exchange market. The indicator aims at identifying the most relevant stress events affecting the Portuguese financial markets. The threshold corresponds to that identified in Braga et al. (2014) as the value of change to a high-stress regime.

Projections for economic activity in the second half of 2022 point to stalling growth, in contrast to 2.4% growth (quarter-on-quarter rate of change) in the first quarter of the year (*Economic Bulletin*, October 2022). For 2023, IMF projections as well as those for the State Budget for 2023 point to a deceleration in economic growth to a range between 0.7% and 1.3% (year-on-year rate of change). Assuming a negative extreme event with a 10% probability of materialising (Growth-at-Risk),

the year-on-year rate of change in GDP at a one-year-ahead horizon rose significantly from -4.1% to -0.4% between the projections using data up to the first and second quarters of 2022 respectively (Chart I.1.44). Behind this apparent improvement in the tail of the distribution, however, is a high degree of uncertainty, as it does not incorporate forward-looking information, such as that underlying the IMF and the 2023 State Budget projections, nor, for instance, the impact of the latest energy price developments. These estimates are negatively influenced by accumulated cyclical risk and financial stress. In the exercise of the first quarter of 2022, fluctuations in GDP were also relevant, compared to the second quarter of 2022, thereby amplifying the negative effects of the financial cycle stage.

Chart I.1.44 • Contributions of the explanatory and control variables to projected Growth-at-Risk on the basis of information available up to 2022 Q1 and 2022 Q2 | Per cent and percentage points



Sources: Banco de Portugal, European Central Bank and Statistics Portugal (Banco de Portugal calculations). | Notes: Growth-at-Risk estimates for one-year projection horizons (per cent). Growth-at-Risk is the estimate of the 10th percentile of the distribution of the year-on-year rate of change in GDP for Portugal projected one year ahead. The estimated quantile regression model includes as explanatory variables GDP in contemporary terms, a financial stress indicator that aggregates a set of indicators from three market segments: bond market, equity market and foreign exchange market (Country-Level Index of Financial Stress – CLIFS) and the domestic systemic risk indicator (d-SRI). Contributions are in percentage points. To estimate the model, only the information available to the policymaker from the first quarter of 1991 to the projection quarter is used.

On 29 September 2022, the ESRB issued a general warning, supported by an ECB statement on 2 November 2022, given the higher probability of tail-risk scenarios materialising.[4] According to the warning, credit institutions should act as a first line of defence, by ensuring that their provisioning practices and capital planning are adequate. In addition, the warning encourages the actions of microprudential authorities, in supervising institutions, and macroprudential authorities, through capital measures enhancing the resilience of the financial system. However, such actions should preclude a procyclical impact given that, when market access is less favourable, it may lead banks to unduly restrict the supply of credit to the economy, thereby penalising economic growth in the medium term.

[4] See ESRB warning and ECB statement.

The Banco de Portugal decided to maintain the countercyclical capital buffer rate at 0% during the fourth quarter of 2022. Despite the recovery in economic activity after the pandemic crisis, the medium to long-term outlook is still constrained by uncertainty.

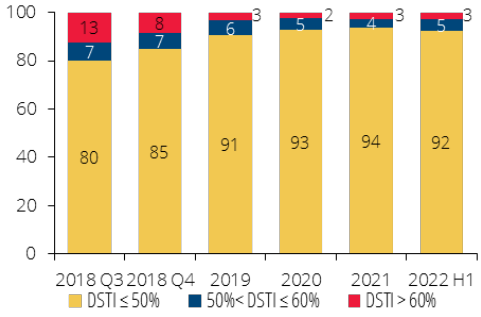
The ECB's monetary policy strategy should expressly take into account financial stability considerations in monetary policy decision-making. Therefore, monetary policy decisions should rest on two complementary analyses: economic analysis and monetary and financial analysis. The strategy highlights the importance of monitoring transmission mechanisms in calibrating monetary policy instruments and recognising that financial stability is a precondition for price stability.

Macroprudential policy should take into account its interaction with monetary policy, through continuous monitoring of the financial system's resilience. This is desirable in a context of rising interest rates that amplifies conditions for the materialisation of systemic risk. The Portuguese banking sector is currently more resilient than in the run-up to the 2008 financial crisis. Higher capitalisation is partly the result of an increase in capital buffers that can be used by institutions or released by macroprudential authorities during periods of risk materialisation. For the combined buffer requirement, the buffers' usability to absorb losses without leading to a breach of the minimum requirements for the leverage ratio or the minimum requirement for own funds and eligible liabilities applied to Portuguese systemically important institutions compares very well with the average of European banks (Special issue "Usability of capital buffers as a result of their interaction with minimum regulatory requirements").

The macroprudential Recommendation relating to new credit for house purchase and new consumer credit, issued in 2018, has been effective in promoting the adoption of prudent credit standards, while strengthening the resilience of institutions and borrowers. The Recommendation has improved the risk profile of borrowers by introducing ceilings on loan-to-value (LTV) and debt service-to-income (DSTI) ratios and on loan maturities, limiting borrowers' probability of default and losses given default. The design of the recommended limit on the DSTI ratio incorporated an interest rate shock (of up to 300 basis points, in the case of variable or mixed rate loans with a maturity of more than 10 years). This feature of the Recommendation is consequential in the current context of rising interest rates and prospects for additional increases after a very protracted period of abnormally low interest rates. In addition, the Recommendation excludes credit agreements intended to prevent or address arrears situations, namely through refinancing or consolidation of other credit agreements, as well as through the renegotiation of the terms and conditions of prior credit agreements.

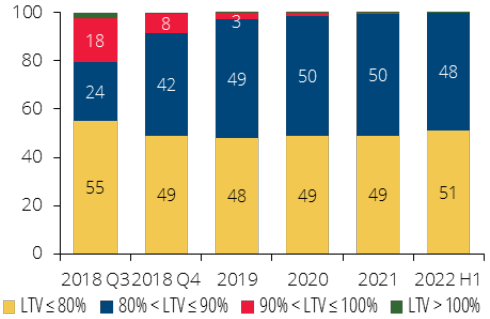
In the first half of 2022, institutions continued to comply with the guidelines set out in the macroprudential Recommendation relating to new credit for house purchase and new consumer credit. 92% of new credit agreements for house purchase and new consumer credit was granted to borrowers with a DSTI ratio of 50% or less, calculated according to the definition in the Recommendation, i.e. assuming interest rate increases (Chart I.1.45). New credit granted to borrowers with a DSTI ratio of between 50% and 60% increased slightly from 2021, accounting for 5% of total new business in the first half of 2022. Only around 3% of total new loans granted in this period were associated with borrowers with a DSTI ratio of over 60%, a significant decrease from the third quarter of 2018, when it stood at 13%. Results also show that, in the first half of 2022, almost all new credit for house purchase had an LTV ratio of 90% or less (Chart I.1.46). Also, more than half of new credit for house purchase had an LTV ratio below 80%.

Chart I.1.45 • Distribution of new credit for house purchase and new consumer credit by DSTI ratio | Per cent



Source: Banco de Portugal. | Notes: Based on information reported by a sample of 13 institutions, representing around 95% of new credit to households. The DSTI ratio was calculated in line with the Recommendation, assuming shocks to the interest rate and to the borrower's income.

Chart I.1.46 • Distribution of new credit for house purchase by LTV ratio | Per cent

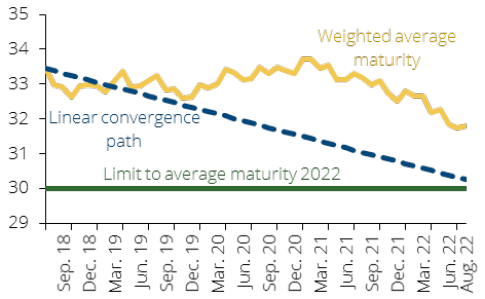


Source: Banco de Portugal. | Note: Information reported by a sample of 9 institutions, representing around 93% of new credit for house purchase.

Although the upper limit to the maturity of new business is being complied with, the weighted average maturity of credit for house purchase started to deviate from the objective set in the Recommendation from 2020 onwards. By recommending the convergence of these loans' average maturity to 30 years by the end of 2022, the goal is to: (i) prevent the limits on the DSTI ratio from being circumvented by the extension of the loan maturity, (ii) ease the extension of the loan maturity in the event of borrowers' arrears, and (iii) converge with other European Union countries. In August 2022 the average maturity stood at 31.8 years (Chart I.1.47). Assuming a linear and gradual convergence trend between the start date of the Recommendation and the end of 2022, the average maturity of new credit for house purchase should have stood at 30.3 years in August 2022, corresponding to a difference of approximately one year and six months from the actual value. In order to foster convergence of the weighted average maturity of new business to 30 years by the end of 2022, the Banco de Portugal adjusted the Recommendation in April 2022, reducing the maximum maturity of new business on the basis of the age of borrowers.

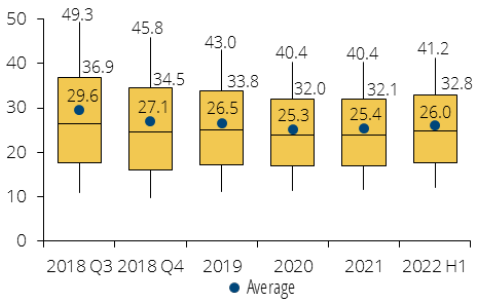
In the first half of 2022, over three-quarters of new credit to households were granted to borrowers with an actual DSTI ratio of 33% or less. Over that six-month period, the average actual DSTI ratio was 26.0%, i.e. 0.6 p.p. higher than in 2021. These developments reflect the effect of an increase in interest rates on new loans, which may be amplified in the wake of the expected developments in interest rates. In particular, it is estimated that, if expectations of increases in interest rates (based on market expectations as measured by three-month EURIBOR futures) and income (in line with developments in compensation per employee under the State Budget for 2023) materialise, the rising instalments of loans for house purchase will contribute to a deterioration in the average loan service-to-income (LSTI) ratio by 4.8 p.p. between June 2022 and December 2023, to 21.5% (Box 1 "The impact of rising interest rates on household debt service"). This change will also have an impact on the distribution of the DSTI ratio. However, compared to the third quarter of 2018 (the most recent period before full implementation of the Recommendation), both the average and the dispersion of the distribution of the actual DSTI ratio decreased. The effect of the reduction in dispersion was mainly associated with a drop in the higher percentiles. The 90th (75th) percentile dropped from 49.3% (36.9%) in the third quarter of 2018 to 41.2% (32.8%) in the first half of 2022 (Chart I.1.48).

Chart I.1.47 • Weighted average maturity of new credit for house purchase | In years



Source: Banco de Portugal. | Notes: On the basis of information reported by a sample of 9 institutions, representing around 93% of new credit for house purchase. The average maturity is weighted by the amount of credit granted.

Chart I.1.48 • Distribution of the actual DSTI ratio for new loans to households | Per cent



Source: Banco de Portugal. | Notes: The chart represents the quartile distribution of the actual DSTI ratio, i.e. without taking into account the shocks on the interest rate and on the borrower's income set out in the Recommendation. The lower and upper ends correspond to the 10th percentile and the 90th percentile, while the bottom and top of the boxes correspond to the 25th and 75th percentiles. These distributions are based on data available in the Central Credit Register.

The potential materialisation of risk in the financial system associated with climate change calls for an assessment of the need for macroprudential policy action. Systemic implications can arise from the concentration of climate-related risks, the protracted time horizon and the high uncertainty associated with climate change, as well as the interlinkages across financial system sectors through, for instance, common exposures. Accordingly, a macroprudential approach can mitigate risks across financial sectors and prevent the transfer of risk to less regulated parts of the financial system. However, macroprudential action in this area is still under discussion. Irrespective of the role that macroprudential policy may play, the response to climate change is primarily a responsibility of public policies.

The updated list of third countries to which the Portuguese banking system is exposed for the purposes of recognising and setting countercyclical capital buffers, effective until the second quarter of 2023, remained unchanged. This list includes the Republic of Mozambique and the Macao Special Administrative Region of the People's Republic of China. Given that they are not monitored by the ESRB, the Banco de Portugal will continue to monitor cyclical systemic risk developments by means of macroeconomic and financial indicators described in the methodology adopted.

In 2022 the Banco de Portugal decided not to reciprocate a number of macroprudential measures imposed by EU macroprudential authorities on account of their non-materiality. These measures have been set by the macroprudential authorities of the Netherlands, the Republic of Lithuania, Belgium and Germany and are respectively: (i) the establishment of a floor for the average risk weight applicable to exposures secured by residential property located in the Netherlands addressed to credit institutions using the internal ratings-based approach, (ii) the introduction of a 2% systemic risk buffer rate for all retail exposures to natural persons resident in the Republic of Lithuania that are secured by residential property, (iii) the application of a 9% systemic risk buffer rate to all retail exposures to natural persons that are secured by residential property located in Belgium, and (iv) the application of a 2% systemic risk buffer rate to all exposures to natural and legal persons secured by residential property located in Germany.

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Lang, J. H., Izzo, C., Fahr, S., and Ruzicka, J. (2019). "Anticipating the bust: a new cyclical systemic risk indicator to assess the likelihood and severity of financial crises". *ECB Occasional Paper Series*, No 219.

2 Banking system

In the first half of 2022, banks operated against a background of economic recovery and key interest rates increases in response to rising inflation. This helped improve some of the sector's indicators. Negative impacts were contained. Deteriorating macroeconomic conditions stemming from the ongoing invasion of Ukraine could result in risks materialising in the banking system.

The banking system's return on assets (ROA) increased to 0.71% in the first half of the year, 0.15 p.p. more than in the first half of 2019. These developments reflected the increase in net interest income, receiving an additional contribution from international activity, although this is expected to reverse in the third quarter of the year. The increase in profitability was also driven by a historically low loan loss charge, justified by lower credit impairments. The operating efficiency of the banking system continued to follow a favourable trend, despite the increase in operating costs in this period.

The share of non-performing loans continued to decline, standing at its lowest level (3.4%). This development was mainly caused by the decline in the 'unlikely to pay' component and, to a lesser extent, by the increase in performing loans. The gross NPL ratio for NFCs and for credit for consumption and other purposes remains higher (7.6% and 7.2% respectively) than for loans for house purchase (1.4%). Although NPL ratios are higher in the sectors most affected by the pandemic (9.9%) and by rising energy and/or other commodity prices (8.2%), these sectors also have the highest NPL impairment coverage ratio (86% and 80% respectively). The share of stage 2 loans stood at 10.5%, remaining above the pre-pandemic period and close to the combined value of European SIs. Loans that would benefit from a moratorium and state-guaranteed loans to NFCs have shown few signs of deterioration.

Debt servicing costs on bank loans for house purchase have increased. Floating rate loans for house purchase have remained predominant (around 90% of the stock), despite the increase in new fixed or mixed rate loans in recent years (around 15% in the first 9 months of 2022). In addition, growth in loans for house purchase has stabilised (3.8% in September 2022), while the share of loans to households secured by real estate on banks' balance sheets continued to decline, standing at 25% of assets in June 2022. In turn, the LTV ratio remained at or below 80% for over 90% of total loans for house purchase.

The end of pandemic support measures for corporate financing resulted in a deceleration in bank lending to firms. The share of sectors most affected by the increase in energy and/or other raw materials costs in the portfolio of loans to NFCs amounted to 36.4%, of which 12.4 p.p. were simultaneously the most affected by the pandemic crisis.

The funding structure has remained stable and traditional liquidity indicators have remained high, as in recent years. In June 2022 the weight of customer deposits remained historically high, and the conversion ratio continued the downward trend observed in recent years, standing at 79%. Funding obtained from central banks declined slightly and accounted for 8.9% of assets, while the proportion of cash balances at central banks maintained its upward path, standing at 13.9%.

Most of the main institutions in the Portuguese banking system comply with the intermediate MREL requirements set for 1 January 2022, as around €3.5 billion in financial instruments eligible for the calculation of these requirements were issued in the course of 2022. The weight in assets of liabilities represented by securities remained small (3.8%). The need to comply with MREL requirements makes Portuguese banks more sensitive to changes in the risk perception of international financial markets.

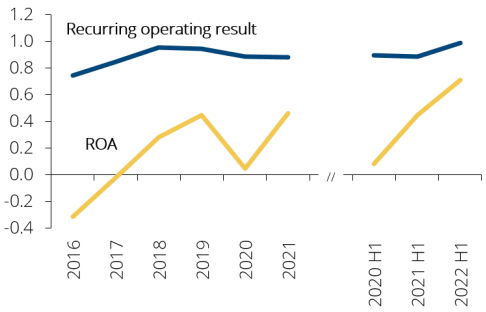
The total capital ratio decreased by 0.5 p.p. from December 2021, standing at 17.5%, although it remains historically high. This decline was observed in institutions where the ratio was higher and

resulted from the distribution of dividends, after being temporarily suspended as a response to the pandemic, and from the impact of rising interest rates on securities measured at fair value. The negative impact of the rise in yields on the valuation of debt securities and consequently, on regulatory capital, is expected to be mitigated by the increase in the proportion of sovereign debt securities valued at amortised cost recorded in recent years and by contracting of risk hedging instruments for around 70% of the debt measured at fair value. The application by some banks of the prudential filter to sovereign debt also mitigated the impact of rising yields.

2.1 Profitability

In the first half of 2022, return on assets (ROA) rose by 0.26 p.p. from the same period in 2021, to 0.71% (Chart I.2.1), 0.15 p.p. more than in the first half of 2019. Developments in 2022 reflected contributions from a 0.29 p.p. decrease in provision and impairment costs and a 0.10 p.p. increase in operating income. Net interest income stood at 1.49% of average assets, 0.05 p.p. up from 2021 (Table I.2.1). Overall, international activity increased its contribution, with net interest income accounting for 0.38% of (total) average assets, 0.10 p.p. more than in the first half of 2021 (Table I.2.2). However, the higher contribution of international activity to net interest income, mainly caused by sharp interest rate increases in Poland (Section 1.2), is expected to be temporarily offset in the next six months, by the need to register impairments associated with the housing loans moratorium plans that entered into force in Poland in July 2022. Based on the evolution of percentiles 5 and 95, the improvement in profitability was broadly based across the main institutions, accompanied by a reduction in the dispersion. Return on equity (ROE) also rose 3.7 p.p. to 8.8%.

Chart I.2.1 • ROA and Recurring operating result | As a percentage of average assets



Source: Banco de Portugal. | Notes: The return on assets (ROA) consists of the net result as a percentage of average assets. Recurring operating result corresponds to net interest income plus net fees and commissions less operational costs. Annualised figures.

Table I.2.1 • Profitability | As a percentage of average assets

	2020	2021	2020 H1	2021 H1	2022 H1
Recurring operating result	0.89	0.88	0.90	0.88	0.99
of which: net interest income	1.52	1.42	1.55	1.44	1.49
Income from financial op.	0.03	0.15	-0.05	0.25	0.15
Net provisions and imp.	-0.84	-0.49	-0.68	-0.49	-0.20
Other results	-0.03	-0.09	-0.09	-0.20	-0.23
ROA	**0.05**	**0.46**	**0.08**	**0.44**	**0.71**
Percentile 5	-2.92	0.03	-2.43	-0.34	0.13
Percentile 95	1.06	0.77	0.68	0.95	1.21

Source: Banco de Portugal. | Notes: The return on assets (ROA) consists of the net result as a percentage of average assets. Recurring operating result corresponds to net interest income plus net fees and commissions less operational costs. Annualised figures.

In contrast to the downward trend of recent years, the contribution of net interest income to ROA has increased. This reflected the increase in interest on loans granted to the non-financial private sector (NFPS) and on debt securities, especially those issued by credit institutions and central banks, and was mitigated by the increase in interest on deposits, mainly of the NFSS (Table I.2.2). Developments in net interest income mainly reflected a price effect, given the more significant

increase in the implicit interest rate on assets compared to that on liabilities, 0.20 p.p. and 0.05 p.p. respectively, which contrasts with the downward trend observed in previous years.

Turning to domestic activity, the interest rate spread on loans and deposits on new business with the NFPS reversed the downward trend observed in last few years (Chart I.2.2). Thus, in an environment of ample liquidity in the system, the continued rise in interbank market interest rates can be expected to have an additional positive impact on net interest income, either through explicit indexation or through rollovers with an impact on the net interest income of outstanding amounts. In the first half of 2022, the aggregate annual increase in the interest rate spread on new loans reflected an increase for households (+ 0.45 p.p.) and a plateau for NFCs.

Table I.2.2 • Net interest income | As a percentage of average assets

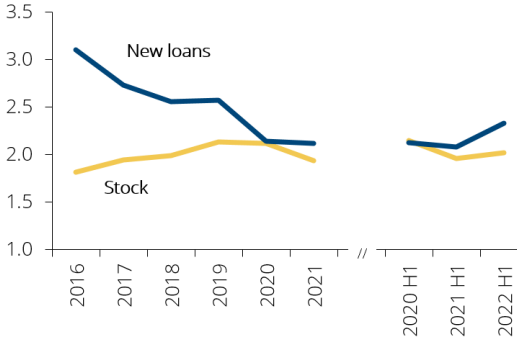
	2019	2020	2021	2019 H1	2020 H1	2021 H1	2022 H1
Overall activity	1.64	1.52	1.42	1.64	1.55	1.44	1.49
Derivatives	0.04	0.02	0.00	0.04	0.03	0.00	0.00
Debt securities	0.36	0.30	0.27	0.38	0.32	0.26	0.31
Loans	1.64	1.44	1.29	1.63	1.50	1.30	1.34
of which: NFCs	0.68	0.60	0.53	0.67	0.62	0.56	0.54
of which: Households	0.82	0.73	0.67	0.81	0.76	0.66	0.72
Other assets	0.02	0.00	0.00	0.02	0.01	0.00	0.01
Deposits	-0.27	-0.12	-0.03	-0.29	-0.19	-0.02	-0.06
Debt securities issued	-0.09	-0.08	-0.07	-0.09	-0.08	-0.07	-0.09
Other liabilities	-0.06	-0.04	-0.04	-0.06	-0.04	-0.04	-0.03
Memorandum items:							
Domestic activity	1.29	1.23	1.12	1.30	1.23	1.16	1.11
Non-domestic activity	0.35	0.29	0.29	0.34	0.32	0.28	0.38

Source: Banco de Portugal. | Note: Annualised figures.

The banking system's operational efficiency continued to show favourable developments. Compared to the first half of 2021, the cost-to-core-income ratio narrowed by 3.2 p.p., to 55.1% (Chart I.2.3). This improvement was mainly due to an increase in net interest income and net fees, with contributions of -3.7 p.p. and -2 p.p. respectively. Unlike the same half-year periods in recent years, operating costs increased in the first half of 2022 by 4.6% (+2.6 p.p. contribution to the cost-to-core-income ratio). An increase in staff costs and other general administrative costs contributed 2.5 p.p. and 1.2 p.p. respectively, driving this change in operating costs. However, the share of operating costs in average assets decreased slightly to 1.21%, its lowest over the past decade.

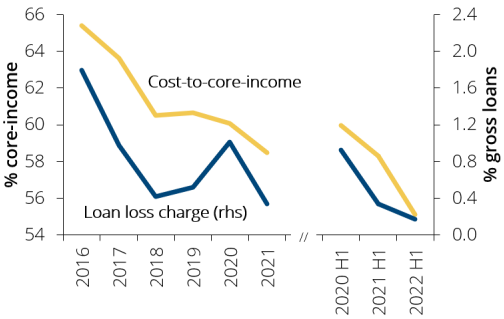
The flow of provisions and impairments, as a percentage of average assets, continued the downward trend observed in the same half of 2021, contributing 0.27 p.p. to the increase in ROA. The reversal of the base effect of provisions (0.18 p.p.), mostly recorded in the same period by one bank to implement an operational and commercial transformation plan, and the decline in credit impairment flows (0.10 p.p.) contributed to this. After reaching higher levels during the pandemic (0.93% in June 2020), the loan loss charge continued to decline to 0.17% in the first half of 2022, its lowest compared with 0.41% in the same period in 2019. This 0.17 p.p. year-on-year reduction mainly reflected the lower flow of credit impairments, as well as the increase in the loan portfolio.

Chart I.2.2 • Interest rate spread for the SPNF – Domestic activity | Per cent



Source: Banco de Portugal. | Notes: The non-financial private sector includes NFCs and households. Average annual rates weighted by their respective amounts. The series refers to the reporting on an individual basis of the other monetary financial institutions resident in Portugal.

Chart I.2.3 • Cost-to-core-income and loan loss charge



Source: Banco de Portugal. | Note: annualised figures

In the first half of 2022 the Portuguese banking system's ROA was higher than the euro area average (Table I.2.3). The Portuguese banking system's profitability continued to be characterised by a greater contribution from net interest income. Contributions from provision and impairment costs as well as operating costs are similar to those in the euro area.

Table I.2.3 • Profitability – International comparison | As a percentage of average assets

2022 H1	PT	EA
Net interest income	1.49	1.08
Net fees and commissions	0.71	0.65
Income from financial op.	0.15	0.14
Operating costs	-1.21	-1.17
Net provisions and imp.	-0.20	-0.17
Other results	-0.23	-0.10
ROA	**0.71**	**0.43**
Recurring operating result	**0.99**	**0.56**

Sources: Banco de Portugal and ECB (*Consolidated Banking Data*). | Note: Annualised figures.

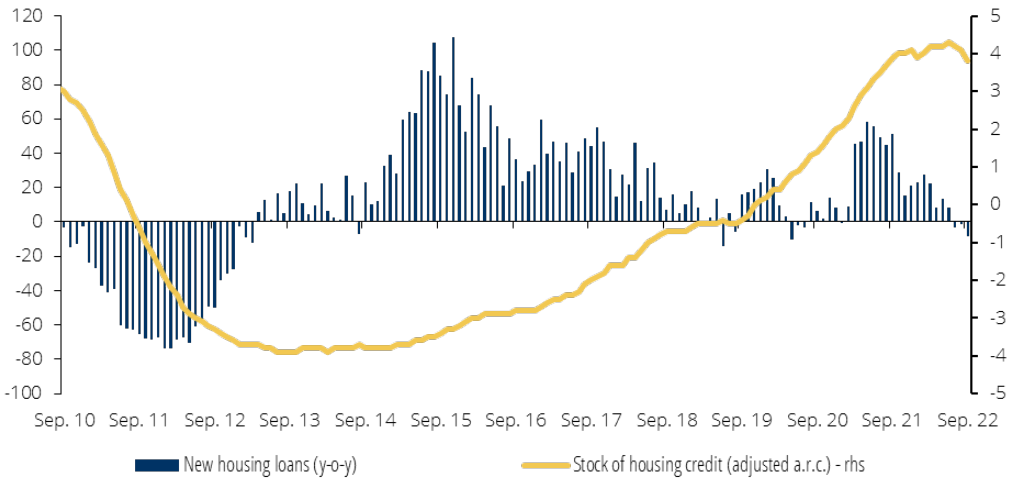
2.1 Credit standards

In June 2022 the bank loan portfolio (net of credit impairments) grew by 3.7% year on year, compared with a 3.9% change at the end of 2021. The most relevant contributions were made by loans to households, 2.5 p.p., and NFCs, 1.2 p.p.

The annual rate of change in the stock of bank loans to households stood at 3.7% in September 2022, identical to that in December 2021, reflecting a gradual acceleration in consumer loans and a stabilisation of loans for house purchase (Chart I.2.4). The stock of loans for house purchase recorded an annual rate of change adjusted for securitisation and loan transfers of 3.8% in September (4.1% in December 2021). The annualised quarterly rate of change, calculated on the basis of seasonally adjusted data, accounting for securitisation and loan transfers, stood at 2.8%

in September 2022 (3.9% in July). The rate not adjusted for securitisation and loan transfers was slightly higher at 4.4% but remained below that of the euro area, 5.1%, in September 2022.

Chart I.2.4 • Annual rate of change in the stock of loans for house purchase and year-on-year rate of change in new loans for house purchase | Per cent

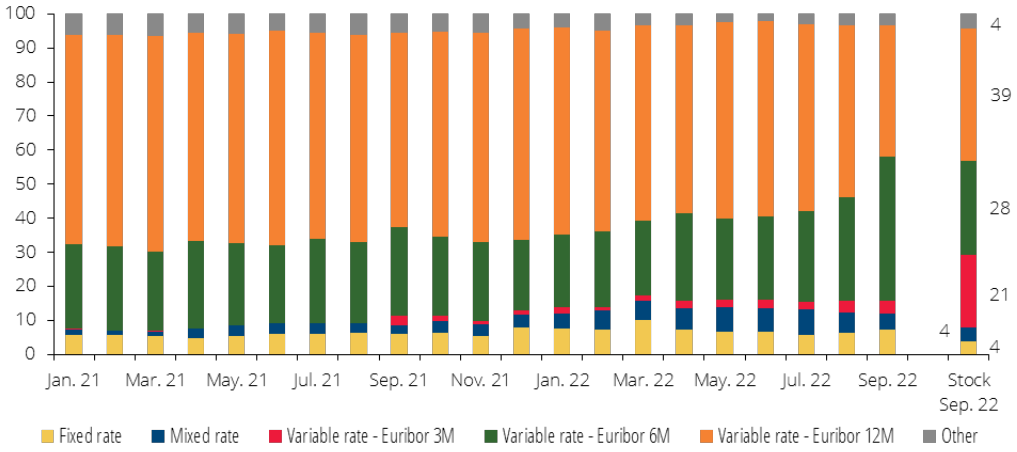


Source: Banco de Portugal.

New loans for house purchase continued to increase in the first half of 2022 but slowed down significantly in the third quarter. New loans for house purchase grew by 24.1% and 10.1% year on year, in the first and second quarters of 2022 respectively (34.1% in 2021). In the third quarter, however, they contracted by 4.5% compared with the same period a year earlier. In September 2022 the average interest rate (AAR - annualised agreed rate) on new loans for house purchase stood at 2.2%, 1.4 p.p. higher than at the end of 2021. The annual percentage rate of charge (APRC), which includes charges other than interest, has also been rising. In the first nine months of 2022, the APRC on loans for house purchase increased by 1.6 p.p., standing at 4.0% in September, 1.3 p.p. above the euro area average.

New fixed or mixed rate loans for house purchase have increased in recent years, accounting for 13% of the amount of new loans in the first nine months of 2022. However, the stock of floating rate loans for house purchase remains predominant (around 90% in September) and the increase in money market interest rates will affect debt servicing capacity. More recently, the 6-month reference rate has become predominant in new loans surpassing the weight of the 12-month rate (Chart I.2.5).

Chart I.2.5 • Monthly flow of new loans and stock of loans for house purchase by type of rate and reference rate | Per cent



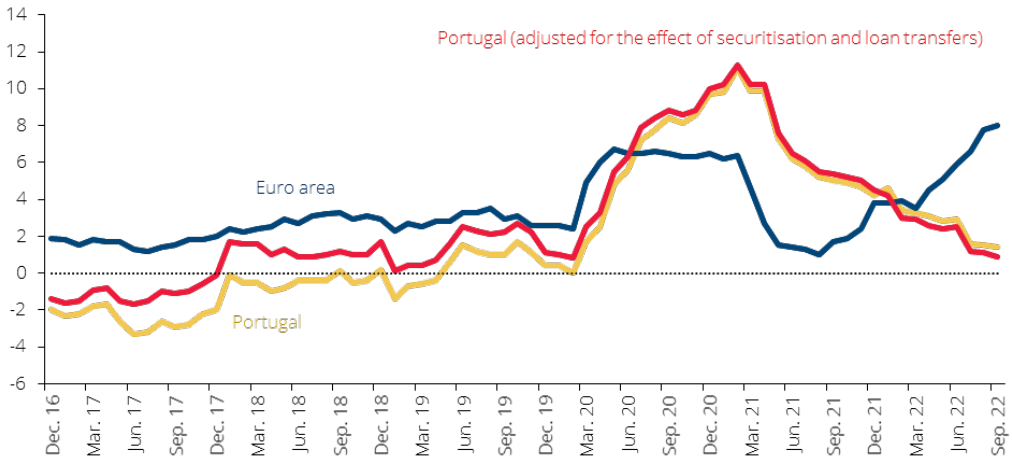
Source: Banco de Portugal. | Notes: The classification of the mixed rate is based on the date the contract is signed, from when a fixed rate period is in force that differs from one contract to another. The share of mixed rate stock may include contracts that are already in the floating rate period or close to the end of the fixed rate period.

New consumer loans increased, year on year, by 47.9% and 20.6% in the first and second quarters of 2022 (11.1% in 2021). The stock of consumer credit accelerated during the first nine months of 2022, with the annual rate of change reaching 6.1% in September (2.7% in December 2021). In the first nine months of 2022, the average interest rate and the APRC on consumer loans increased by 0.7 p.p. and 0.4 p.p. to stand at 7.9% and 10.1% respectively in September (6% and 6.6% in the euro area). In contrast to loans for house purchase, most of these agreements have a fixed interest rate. In September 2022 floating rate contracts accounted for around 20% of consumer credit stock.

Credit standards for loans to households became tighter according to the October 2022 Bank Lending Survey. Credit standards for loans for house purchase tightened, while those for consumption and other purposes remained broadly unchanged. In the third quarter of 2022 there was a slight decline in demand for loans for house purchase and a slight increase in the proportion of rejected loan applications. Banks anticipated slightly tighter credit standards for loans to households for the fourth quarter of 2022 and a decline in demand for loans by households, mainly for house purchase. In the euro area, banks' increased risk perception translated into a tightening of loans for house purchase in the third quarter of 2022. In consumer credit, higher risk perception was also reflected in a tightening of credit standards. The third quarter of 2022 saw a substantial decline in demand for loans for house purchase owing to lower consumer confidence and housing market prospects. In the October survey, euro area banks anticipated a tightening of credit standards for loans to households and a decrease in demand for loans for house purchase and consumer loans during the fourth quarter of 2022.

Bank loans to corporations grew less since March 2021. Regarding domestic activity, the annual rate of change in loans granted by the banking system to NFCs was 1.4% in April 2022 (0.9% when adjusted for securitisation and loan transfers), compared with 5% in the same month of 2021 and 4.2% in December 2021. Developments in Portugal contrast with a rate in the euro area that accelerated to 8% in September 2022 (7.8% in August, Chart I.2.6).

Chart I.2.6 • Annual rate of change of bank loans to NFC | Per cent

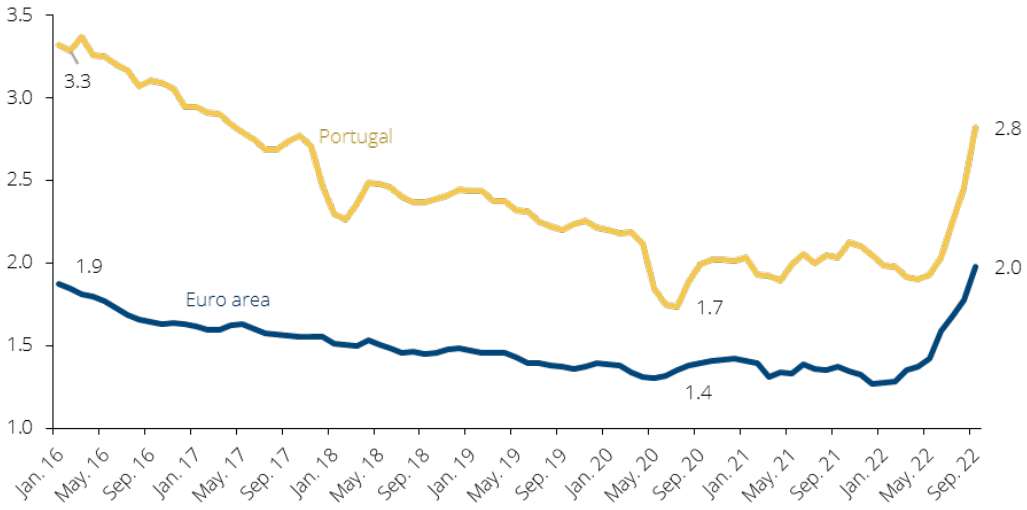


Source: Banco de Portugal. | Notes: Annual rates of change (ARC) are computed referring to the end-of-month bank loans' stock changes, adjusted for changes not defined as transactions, namely, reclassifications, write-offs and exchange rate and price revaluations. The adjusted ARC is also adjusted for securitisations and loan transfers. ARC figures for Portugal refer to loans granted by resident monetary financial institutions to resident NFCs. Activity on an individual basis. Latest observation: September 2022.

The volume of loans granted to NFCs by resident banks has reached a plateau. This stock's annualised quarterly rate of change, using seasonally adjusted data and adjusted for securitisation and loan transfers, stood at -0.9% in September 2022 (-0.6% in August).

The average interest rate on new loans to NFCs increased from June onwards in Portugal and the euro area. In Portugal, in the first half of 2022 the average interest rate was 2%, reaching 3% in September (+1.1p.p.). That month, the figures observed in Portugal and the euro area were above pre-pandemic figures, but lower than in 2016. The differential to the euro area average interest rate on new loans was 0.6 p.p. in September, lower than in the pre-pandemic period (0.9 p.p. in 2019) (Chart I.2.7).

Chart I.2.7 • Developments in the average interest rate on new loans to NFCs, in Portugal and the euro area | Per cent



Source: ECB. | Notes: The average interest rate on new loans is the average of the rates applied to loans below and above €1 million weighted by the amounts of new loans. The chart provides the moving average over the past three months, so the figures differ slightly from those in the text. Latest observation: September 2022.

In the course of 2022, some sectors of activity reduced the volume of loans. In September, the accommodation and food services sector, one of the most affected during the pandemic, posted an annual rate of change of -5.2%. In 2020 and 2021, these sectors made an above-average contribution to the growth of the credit stock due, among other factors, to the impact of government-guaranteed loans. However, in 2022, as activity picked up, this effect disappeared and their contribution became negative. This was also caused by the end of the grace period for principal repayment of a significant percentage of the State-guaranteed loans (Section 1.3.3). By NFC size, the rate on loans granted by resident institutions to microenterprises was positive (6.8%), compared with negative figures for other sizes (Table I.2.4).

Table I.2.4 • Annual rates of change of bank loans to NFC – domestic activity | Per cent

	Dec 16	Dec 17	Dec 18	Dec 19	Dec 20	Dec 21	Jun. 22	Sep 22
Total	-2.0	-2.0	0.2	0.4	9.7	4.2	2.9	1.4
Manufacturing, mining and quarrying	1.7	0.8	3.7	0.1	9.6	10.3	6.6	5.5
Construction and real estate	-6.1	-0.9	-2.1	1.8	5.3	0.0	1.7	2.3
Trade	1.5	1.6	-2.2	2.2	9.5	5.1	5.2	4.0
Accommodation and food service activities	4.1	2.6	4.8	2.3	25.3	7.6	-0.4	-5.2
Transportation and storage	-4.1	-10.6	-3.1	-9.3	0.4	0.1	-2.5	-2.6
Microenterprises	-3.8	0.5	4.5	6.2	13.9	7.7	7.9	6.8
Small-sized enterprises	-1.9	0.8	-1.9	-1.1	13.3	4.2	0.1	-1.3
Medium-sized enterprises	-2.6	-6.5	-3.4	-1.9	6.1	2.1	-0.3	-1.4
Large enterprises	5.0	-4.0	0.6	-3.1	3.8	2.1	3.6	-0.1

Source: Banco de Portugal. | Notes: Annual rates of change are computed referring to end-of-month bank loans' stock changes, adjusted for changes not defined as transactions, namely, reclassifications, write-offs and exchange rate and price revaluations. Annual rates of change refer to loans granted by resident monetary financial institutions to resident NFCs.

In the third quarter of 2022, loans granted to firms that benefited from the moratorium made a negative contribution to the growth of the stock of loans to NFCs. This was observed for firms in the highest or intermediate risk class. Firms with the best credit rating contributed positively to developments in this aggregate (Table I.2.5).

Table I.2.5 • Contributions to the year-on-year rate of change of the stock of loans to NFCs – domestic activity | Percentage points

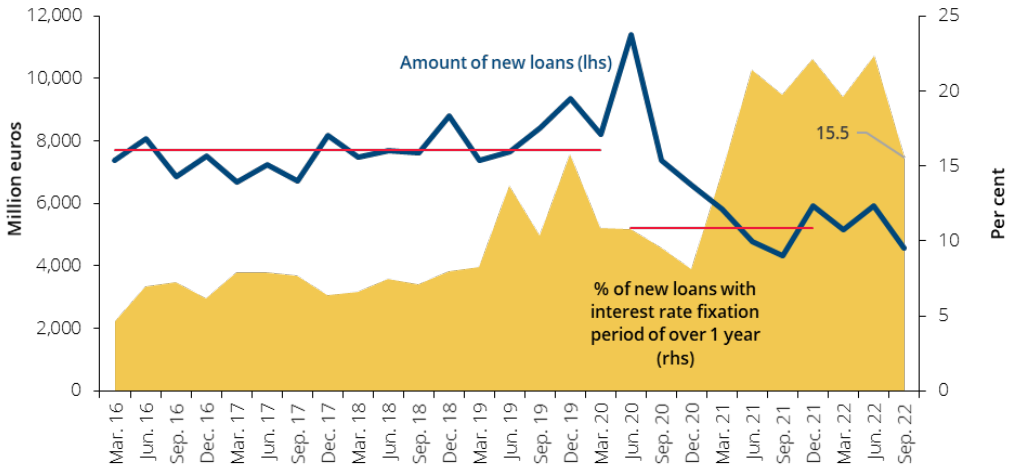
		Class 1 (lower risk)	Class 2	Class 3 (higher risk)
NFCs that did not make use of the public moratorium	Mar 21	2.0	1.8	0.4
	Sep 21	1.6	0.9	0.0
	Mar 22	2.2	0.5	-0.3
	Sep 22	2.0	0.3	-0.1
NFCs that made use of the public moratorium	Mar 21	2.1	2.2	0.7
	Sep 21	0.8	0.5	-0.3
	Mar 22	0.5	-0.4	-1.0
	Sep 22	0.4	-1.2	-1.3

Source: Banco de Portugal. | Notes: NFCs that made use of the public moratorium are those for which at least one contract was under the public credit moratorium between March 2020 and December 2021. Credit risk, as measured by probability of default (PD), is based on credit ratings available in the In-house Credit Assessment System (ICAS) of the Banco de Portugal. Lower risk class (risk class 1) corresponds to the enterprises with a PD in one year of 1% or less; risk class 2 corresponds to enterprises with a PD in one year of above 1% and below or equal to 5% and the higher risk class (risk class 3) corresponds to the enterprises with a PD in one year of above 5%. Domestic activity. Risk classes refer to NFCs financial indicators in 2020.

The volume of new lending to NFCs remained constant during the first half of 2022, remaining below the pre-pandemic period (Chart I.2.8).

As of December 2020, new loans with a fixed-interest period of over one year increased. In the third quarter of 2022, this aggregate corresponded to 16% of the amount of new loans granted. In view of the actual and expected rise in interest rates, these dynamics may mitigate the impact on firms' financing costs and the materialisation of credit risk in firms, in the short term.

Chart I.2.8 • New loans to NFCs, quarterly figures and share of new loans with interest rate fixation period of over one year



Source: Banco de Portugal. | Notes: Latest observation: September 2022. The horizontal lines are the average amount of new loans between the first quarter of 2016 and the first quarter of 2020 (pre-pandemic period) and the average amount between the first quarter of 2021 and the second quarter of 2022.

The increase in the maturity of the stock of loans to NFCs was more marked in the sectors most affected by the pandemic. In September 2022, around 47% of loans had a residual maturity of more than four years, compared with 46% in December 2019. In September, 54% of loans to firms in the sectors most affected by the pandemic had a residual maturity of more than four years, while exposure with a residual maturity of more than eight years increased. State-guaranteed credit lines, the most common maturity of which was six years, contributed to an increase in the proportion of loans with a maturity of between four and six years.

The October Bank Lending Survey expects a tightening of credit standards for loans to NFCs in the final quarter of 2022, especially for long-term loans to small and medium-sized enterprises (SMEs). Demand for credit by NFCs is expected to decline, in particular for long-term loans by large enterprises. Conversely, institutions expect an increase in demand for short-term loans. Lower investment needs and the interest rates contributed to the decline in credit demand, partly offset by added need to finance current activity.

2.2 Credit quality of assets

The share of non-performing loans remained on its downward path in the first half of the year. The gross NPL ratio decreased by 0.3 p.p. to 3.4% from the end of 2021, with reductions in NFCs and households (Table I.2.6), with the differential continuing to decline compared with the median of the euro area ratio (1.5 p.p. in June 2022). The decline in non-performing loans – particularly

unlikely to pay – and, to a lesser extent, the increase in performing loans (the denominator effect) contributed to these developments. New NPL inflows were largely offset by total or partial repayments and NPL cures (Table I.2.7). The share of loans to the NFPS that benefited from a moratorium now accounts for 17.0% (-2.2 p.p. compared to December 2021), increasing by 1.4 p.p., to 35.2%, their NPL share in total NPLs of NFPS. Despite the slight reduction in NPLs, the gross NPL ratio of this aggregate increased by 0.8 p.p. to 9.4%, by reducing the denominator (a 0.9 p.p. contribution).

Table I.2.6 • Gross NPL ratio | Per cent

	Dec. 18	Dec. 19	Dec. 20	Dec 21	Jun. 22
Total gross NPL ratio(a)	9.4	6.2	4.9	3.7	3.4
Percentile 5(b)	3.3	2.4	2.1	1.8	1.6
Percentile 95(b)	22.6	11.8	9.4	6.4	6.7
Non-financial private sector	10.5	7.0	5.8	4.9	4.5
Non-financial corporations	18.5	12.3	9.7	8.1	7.6
Most affected sectors:					
By the pandemic(c)	16.4	13.4	11.8	11.1	9.9
By energy/commodity price increases(d)	15.0	11.7	9.7	9.0	8.2
Households	5.1	3.7	3.4	2.8	2.6
House purchase	3.8	2.4	2.0	1.6	1.4
Consumption and other purposes	10.5	8.2	8.5	7.5	7.2
Euro area median	3.1	2.9	2.5	2.0	1.8

Sources: Banco de Portugal and ECB. | Notes: (a) Corresponds to the ratio between the gross value of NPLs and the total gross value of loans. It includes loans and cash balances at central banks and credit institutions, loans to the general government, other financial corporations, non-financial corporations, and individuals. (b) Percentiles were obtained from the asset-weighted distribution of the gross NPL ratio. (c) The most affected sectors by the pandemic include those listed in Decree-Law 22-C/2021 and/or the sectors eligible for the economic recovery support line – Retomar programme. To allow an aggregation by CAE section, the sections considered most affected are those in which the stock of loans granted to the most affected CAE subclasses (five-digit level) accounted for, in June 2022, at least around 50% of total exposure of the respective CAE section. (d) The sectors most affected by energy and/or other commodity price increases correspond to the CAE sections in which the stock of loans granted to the CAE subclasses as defined in Box 4 in the June 2022 issue of the *Financial Stability Report*, accounted for, in June 2022, at least around 50% of total exposure of the respective section.

Table I.2.7 • Gross NPL ratio – contributions to the change

	Total	NFC	Households
Gross NPL ratio, Dec 2021 (%)	3.7	8.1	2.8
Write-offs (p.p.)	-0.16	-0.42	-0.07
NPL sales (p.p.)	-0.09	-0.10	-0.13
New NPL, net of cures (p.p.)	0.04	0.16	0.03
Other denominator effects (p.p.)	-0.09	-0.18	-0.06
Gross NPL ratio, Jun. 2022 (%)	3.4	7.6	2.6

Source: Banco de Portugal. | Notes: NPL sales include securitisations. The "New NPLs, net of cures" item reflects all the other NPL inflows and outflows, including inflows of loans as NPLs and outflows by cure, amortisation, and foreclosure. Other denominator effects reflect changes in the stock of loans that are not related to the NPL stock (e.g. net flow of performing loans).

Despite the reduction in the NFCs' NPL ratio, the manufacturing sector deteriorated slightly. The NFCs' gross NPL ratio stood at 7.6%, down by 0.5 p.p. from December 2021. The reduction in unlikely to pay NPLs made a slightly higher contribution than the increase in performing loans to developments in the ratio. For a subset of larger banks (64% of the system's assets), the reduction in NPLs was mainly due to repayments and write-offs. In the sectors most affected by the pandemic, the gross NPL ratio stood at 9.9% (-1.3 p.p.). In the sectors most affected by energy

and/or other commodity price increases – the latest phenomenon – the reduction was lower (-0.8 p.p.), to 8.2%. In the manufacturing sector, which accounts for 18% of NFCs' total loans, the gross NPL ratio increased to 7.7% (+0.4 p.p.) from the end of 2021. For State-guarantee loans to NFCs granted in the context of the COVID-19 crisis, the gross NPL ratio stood at 1.7% (+0.6 p.p. compared to December 2021), significantly below the ratio for NFCs' total loans, in line with the lower credit risk of these loans (Box 2 of the December 2020 issue of the *Financial Stability Report*). For most of these loans, the capital repayment grace period had ended by the first half of the year. For the remaining loans – around 30% of NFCs' total loans that have benefited from State guarantees – half of them will probably have ended in the third quarter and the other half will gradually end by mid-2023.

The gross NPL ratio for loans to households for house purchase and consumption and other purposes decreased slightly. The households' gross NPL ratio stood at 2.6%, down by 0.2 p.p. from December 2021. In the segments of loans for house purchase and consumption and other purposes, the ratios decreased to 1.4% (-0.2 p.p.) and 7.2% (-0.3 p.p.) respectively. In the housing segment and for a subset of larger banks (64% of the system's assets), the reduction in NPLs was essentially due to cures and repayments. Sales and write-offs also contributed significantly to the reduction in loans to households for consumption and other purposes.

The NPL impairment coverage ratio stabilised compared to the end of 2021, although it continues to increase in loans to firms belonging to sectors with higher vulnerability and loans to households for house purchase. In June, the NPL impairment coverage ratio stood at 52.6% (Table I.2.8). Compared to December 2021, the reduction in loan impairments was offset by the decrease in non-performing loans. For loans to NFCs, the indicator also remained stable at 53.1%, standing 3.4 p.p. lower than in December 2019. However, the sectors most affected by the pandemic and energy and/or other commodity price increases posted rises of 0.5 p.p. and 1.2 p.p., to 86.4% and 80.0%. For loans to households, the ratio maintained the upward path observed in recent years, standing at 51.9%, 0.8 p.p. higher than the end of 2021 and 9.6 p.p. higher than the end of 2019. Developments in the first half of the year reflect increased coverage in the housing segment (+ 1.9 p.p. to 34.6%), amid a 0.9 p.p. decrease in coverage in the consumption and other purposes segment (to 64.0%).

Table I.2.8 • Gross NPL impairment coverage ratio | Per cent

	Dec. 18	Dec. 19	Dec. 20	Dec. 21	Jun. 22
Gross NPL impairment coverage ratio[a]	52.0	51.5	55.0	52.5	52.6
Non-financial corporations	56.5	56.5	56.4	53.2	53.1
Most affected sectors:					
By the pandemic[b]	59.8	68.9	79.7	85.8	86.4
By energy/commodity price increases[c]	59.2	63.4	76.7	78.9	80.0
Households	40.7	42.3	50.3	51.0	51.9
House purchase	27.1	26.3	30.6	32.7	34.6
Consumption and other purposes	59.8	58.8	66.2	64.9	64.0
Euro area median	43.7	43.2	42.9	42.1	42.4
Memorandum items:					
NPL ratio net of impairments[d]	4.5	3.0	2.2	1.7	1.6
Euro area median	1.9	1.4	1.5	1.0	0.9

Sources: Banco de Portugal and ECB. | Notes: (a) It corresponds to the ratio between the accumulated impairments on NPLs and the gross value of NPLs. (b) The most affected sectors by the pandemic include those listed in Decree-Law 22-C/2021 and/or the sectors eligible for the economic recovery support line – Retomar programme. To allow an aggregation by CAE section, the sections considered most affected are those in which the stock of loans granted to the most affected CAE subclasses (five-digit level) accounted for, in June 2022, at least around 50% of total exposure of the respective CAE section. (c) The sectors most affected by energy and/or other commodity price increases correspond to the CAE sections in which the stock of loans granted to the CAE subclasses as defined in Box 4 in the June 2022 issue of the *Financial Stability Report*, accounted for, in June 2022, at least around 50% of total exposure of the respective section. (d) It corresponds to the ratio of non-performing loans (NPL) net of impairment to total gross loans.

The share of non-performing loans net of impairments in total loans stabilised. The NPL ratio net of impairments stabilised at 1.6%, with the differential remaining the same compared with the median ratio in the euro area (0.7 p.p.). For loans to NFCs and households for house purchase, the ratios declined by 0.2 p.p., to 3.6% and 0.9% respectively. For loans to households for consumption and other purposes, the indicator remained stable at 2.6%.

The forborne component of loans maintained its downward path for all institutional sectors. In June, the ratio of forborne loans stood at 3.5%, down by 0.3 p.p. from December 2021 (Table I.2.9). The decline in forborne loans, mainly from their non-performing component, contributed slightly more than the increase in performing loans in the denominator. These developments were broadly based across all institutional sectors. The impairment coverage ratio associated with these loans was 32.0% (-1.1 p.p. compared to the end of 2021).

The ratio of stage 2 loans decreased from the end of 2021, but it remained above the pre-pandemic period. In the first half of the year, the ratio of stage 2 loans decreased by 1.1 p.p. to 10.5% (9.4% in December 2019) (Table I.2.10). This brought the indicator closer to the figure posted by the 111 significant institutions (SIs) participating in the Single Supervisory Mechanism (9.7% in June). For the NFC segment, the ratio decreased by 2.5 p.p. to 16.4%. For loans to households, the ratio stood at 8.1% (-0.4 p.p.), decreasing to 7.5% (-0.4 p.p.) and 10.3% (-0.5 p.p.) in the sub-segments of housing and consumption and other purposes respectively. The decline in the ratio was more pronounced in NFCs than in households, with a larger increase in the corresponding indicator also observed during the pandemic. However, a still higher differential compared to 2019 persists in NFCs. The impairment coverage ratio of total stage 2 loans was 6.8% (+ 0.1 p.p.).

Table I.2.9 • Forborne loans ratio | Per cent

	Dec. 18	Dec. 19	Dec. 20	Dec. 21	Jun. 22
Total forborne loans ratio[a]	7.1	5.2	4.7	3.8	3.5
of which: NPLs	4.9	3.2	2.6	2.0	1.8
Non-financial corporations	13.7	10.3	9.4	7.6	7.0
Households	4.0	3.1	3.2	3.0	2.8
House purchase	3.5	2.8	2.7	2.6	2.3
Consumption and other purposes	6.0	4.3	4.9	4.5	4.4
Memorandum items:					
Forborne loans impairment coverage ratio[b]	37.6	34.5	34.0	33.1	32.0

Source: Banco de Portugal. | Notes: (a) Corresponds to the ratio of total gross loans with forbearance measures to total gross loans. (b) Corresponds to the ratio of accumulated impairments of loans with forbearance measures to total gross loans with forbearance measures.

Table I.2.10 • Stage 2 loans ratio | Per cent

	Dec. 18	Dec. 19	Dec. 20	Dec. 21	Jun. 22
Stage 2 loans ratio[a]	10.1	9.4	11.2	11.6	10.5
Non-financial corporations	13.1	12.6	18.6	18.8	16.4
Households	8.6	7.7	7.8	8.5	8.1
SSM–significant institutions[b]	n.a.	n.a.	9.3	9.1	9.7
Memorandum items:					
Stage 2 loans coverage ratio[c]	3.7	5.0	6.1	6.6	6.8

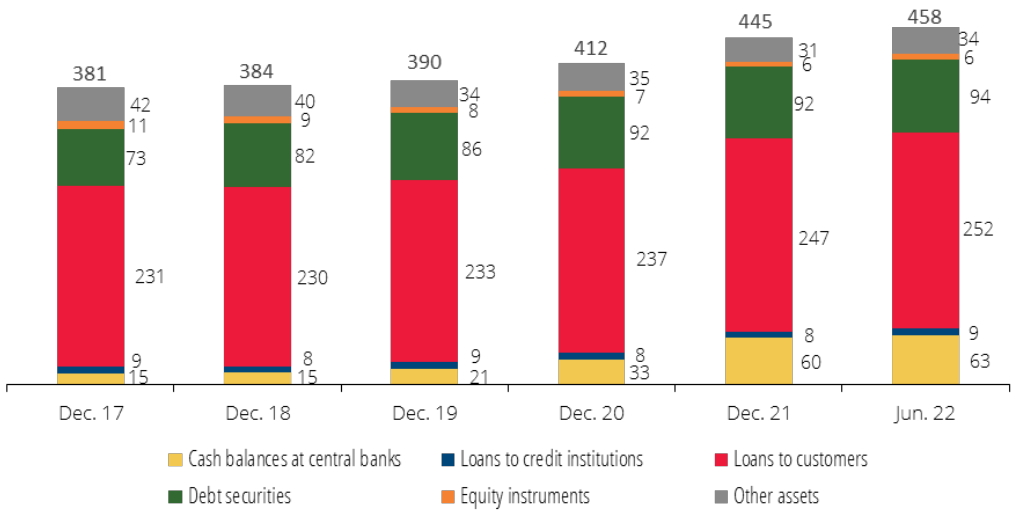
Sources: Banco de Portugal and ECB. | Notes: (a) Corresponds to the ratio of total gross stage 2 loans to total gross loans. (b) The stage 2 loan ratio for all 111 significant institutions (SIs) participating in the Single Supervisory Mechanism. (c) Corresponds to the ratio of accumulated impairments to the gross value of stage 2 loans.

The international economic environment brings new challenges for firms and households, which could boost the materialisation of credit risk. In the first half of the year, the key credit quality indicators improved after a period of high pandemic uncertainty. However, the coming months may reverse this trend, depending on the impact that deceleration in economic activity, inflationary pressure and the process of monetary policy normalisation will have on firms' and households' ability to cope with debt servicing. These developments are likely to have a greater impact on borrowers starting with a more unfavourable financial situation and those sectors most affected by energy and/or other commodity price increases. Nevertheless, the government support measures announced should mitigate these impacts.

2.3 Concentration of exposures

The banking system's assets increased by 2.9% in the first half of the year (8% in 2021), reflecting growth in loans to customers, amounting to €252 million (Chart I.2.9), and, to a lesser extent, in central bank assets and other assets. Asset classes the Portuguese banking system is exposed to, and which represent potential vulnerabilities given the risks to financial stability, are characterised in this section.

Chart I.2.9 • Banking system's assets | EUR billions



Source: Banco de Portugal. | Notes: "Other assets" include cash, cash balances and loans to central banks, cash balances at other credit institutions, derivatives, tangible assets and intangible assets and other assets. Total assets are shown at the top of each column.

The end of measures to support the financing of firms during the pandemic resulted in a deceleration in loans to non-financial corporations (NFCs), maintaining their weight in total assets (19.4%). Loans to firms most affected by the pandemic crisis represented 28.1% of the stock of loans to NFCs in June, a slight decrease (-0.7) from year-end 2021. In turn, exposure to sectors most affected by the increase in energy and/or other commodity costs amounted to 36.4%, of which 12.4 p.p. were simultaneously the most affected by the pandemic crisis.

Despite the increase in overall exposure to the real estate market, this exposure's weight in the banking system's assets maintained a downward trend, standing at 33.4% in June (Table I.2.11). The overall exposure to real estate increased by 1.2% from December 2021, owing mainly to the increase in loans to households secured by real estate and, to a lesser extent, loans to NFCs in the construction and real estate activities sectors. In terms of composition, loans to households secured by real estate continue to account for the largest share in assets (24.9%).

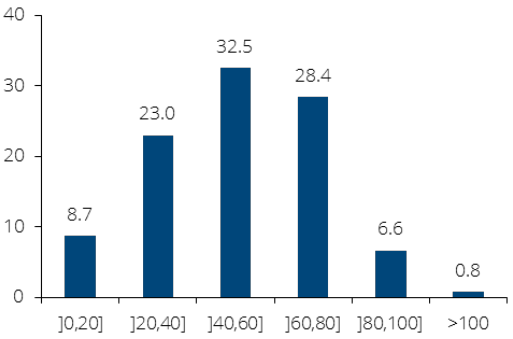
In June, 93% of the stock of loans to households for house purchase had a loan-to-value (LTV) ratio of 80% or less (Chart I.2.10). The distribution of this ratio suggests the banking system can accommodate a potential fall in residential real estate prices without incurring large losses.

Table I.2.11 • Exposure to real estate | As a percentage of assets

	Dec. 16	Dec. 19	Dec. 20	Dec. 21	Jun. 22
Loans to households collateralised by RE	28.1	27.1	26.1	25.1	24.9
Loans to NFCs of construction and RE activities [a]	5.4	4.9	4.5	4.0	4.0
Loans to NFCs collateralised by RE [b]	3.3	3.5	3.5	3.4	3.2
Real estate funds [c]	1.6	1.1	1.0	0.9	0.7
Real estate owned [d]	1.9	1.1	0.9	0.5	0.5
Total	40.3	37.8	36.0	34.0	33.4

Source: Banco de Portugal. | Notes: (a) does not exclude loans granted to projects not related to the real estate sector, such as public works; (b) excludes loans to NFCs in the construction and real estate activities sectors; (c) includes loans and mutual funds shares; (d) gross values.

Chart I.2.10 • Distribution of the stock of loans for house purchase by LTV ratio – June 2022 | Per cent



Source: Banco de Portugal. | Notes: LTV: loan-to-value, the ratio of the loan to the value of the property pledged as collateral. Indicator based on data from the Central Credit Register at the loan level. Whenever the date of the last valuation of the property is prior to 2022Q1, its current value is estimated using Statistics Portugal Housing Price Index.

In June, sovereign debt securities accounted for 14.2% of assets, a 0.6 p.p. Decrease from the end of 2021. This change reflected both a reduction in debt securities measured at fair value, which exceeded the rise in securities valued at amortised cost, and an increase in assets. The component at amortized cost has become the largest by far, accounting for around 70% of the portfolio (Table I.2.12).

The composition of the public debt portfolio of Portuguese banks showed greater geographical diversification. Turning to domestic activity, the decrease in exposures to sovereign debt securities by 0.7 p.p. reflected a reduction in the share of Italian, Spanish and Portuguese sovereign debt. Portuguese debt now accounts for slightly less than half of the portfolio. In turn, there was an increase in exposure to debt securities from other countries, most notably French debt securities (Table I.2.13).

Table I.2.12 • Sovereign debt securities by portfolio

	Dec. 18	Dec. 19	Dec. 20	Dec. 21	Jun. 22
% assets					
Total	15.3	15.5	16.2	14.8	14.2
At amortised cost[a]	4.9	5.4	7.6	8.3	10.0
At fair value[b]	10.4	10.1	8.6	6.5	4.2
% portfolio					
At amortised cost[a]	32.3	35.0	46.8	56.0	70.7
At fair value[b]	67.7	65.0	53.2	44.0	29.3

Source: Banco de Portugal. | Notes: (a) Includes debt securities recorded in assets held to maturity and other accounts receivable (IAS39), as well as amortized cost (IFRS9); (b) Includes debt securities held for trading (IAS39), as well as debt securities at fair value through Other Comprehensive Income (IFRS9), debt securities recorded as held for trading and at fair value through profit or loss (IAS39/IFRS9), as well as non-trading assets at fair value through results (IFRS9).

Table I.2.13 • Sovereign debt securities – domestic activity | As a percentage of assets

	Dec. 18	Dec. 19	Dec. 20	Dec. 21	Jun. 22
Portugal	8.8	8.0	8.0	6.4	6.1
Spain	2.1	2.5	3.3	3.3	3.1
Italy	1.6	2.3	2.4	2.0	1.4
Other	0.6	0.9	1.0	1.7	2.2
o.w. France	0.2	0.2	0.2	0.5	0.8
o.w. Ireland	0.1	0.2	0.3	0.4	0.5
o.w. USA	0.2	0.1	0.1	0.2	0.3
o.w. Belgium	0.0	0.0	0.0	0.2	0.3

Source: Banco de Portugal. | Notes: The series refers to the reporting on an individual basis of the other monetary financial institutions resident in Portugal. Exposure by country is expressed as a percentage of other monetary financial institutions' total assets.

In order to mitigate the potential impacts arising from the fair value component, it is important that institutions adapt this portfolio's management model to their ability to absorb losses. Against a background of increases in yields, fair value assets devalued during the first half of the year. This devaluation is also expected to occur during the second half (Section 1.3.6). In addition to the lower weight of fair value assets, the interest rate hedging instruments contracted by banks on a significant part of this portfolio mitigate the capital impact.

The Portuguese banking system is also subject to credit risk associated with the devaluation of financial assets stemming from climate change, physical and transition risks, which may unfold over the coming years. A significant part of the stock of loans to NFCs is in sectors relevant for climate policy (58% at the end of 2021, 31 p.p. of which relate to negatively affected sectors). Another asset class potentially exposed to climate-related transition risks is loans to households secured by real estate. Preliminary results, based on a representative sample (around 70%) of loans for the purchase of own and permanent residence, use energy spending in dwellings to approximate their energy efficiency and suggest that 63% of these loans are linked to lower efficiency. However, only a small part of this exposure has current LTV ratios above 80%, thus mitigating any impact from a reduction of the value of less efficient immovable property (Box 5).

Direct interlinkages in the financial sector continued to decline, albeit slightly. In June, the banking sector's exposure to financial sector counterparties stood at 14.6% of banks' assets (19.6% in 2016). Underlying the small decline observed in the first half of the year (-0.2pp) was a slight increase in currency and deposits with other resident banks and conversely, a decrease in debt securities of other resident banks and other intermediaries (excluding investment funds). In a context where common risks stemming from financial markets and/or the real economy are materialising, direct interlinkages in the domestic financial sector may play a relevant role in the pass-through and amplification of these shocks.

2.4 Financing and liquidity

In the first half of the year, the funding structure of the Portuguese banking sector remained stable and traditional liquidity indicators continued to be high, as in recent years, in an environment where the Eurosystem is expected to continue to ensure favourable financing conditions. Although the ECB accelerated the normalisation of monetary policy in response to the surge in inflation, by increasing interest rates, discontinuing net asset purchases under the asset purchase programmes (APP) and more recently, by changing the TLTRO III rate, a substantial change in the liquidity conditions of the banking sector is not expected soon.

Customer deposits have strengthened their preponderance in the funding structure of the banking system, which can be seen as an important mitigating factor in the current environment of increased volatility in international financial markets. The increase in customer deposits from December 2021 was 4.5%, accounting for 69.4% of assets, with contributions of 1.3 p.p. and 2.8 p.p. from NFCs and households respectively (Table I.2.14). Funding obtained from central banks declined slightly, 0.4 p.p., and accounted for 8.9% of assets (4.4% in December 2019), while the proportion of cash balances at central banks remained on the upward path, standing at 13.9%. The share of securities liabilities in assets decreased to 3.8%, -0.3 p.p. from December 2021 and December 2019. The loan-to-deposit ratio, which corresponds to the ratio of loans to customers net of impairment over customer deposits, continued the downward trend observed in recent years, standing at 79.2% (-1.9 p.p. from the end of 2021).

Over the course of 2022, four major institutions in the Portuguese banking system issued instruments eligible for compliance with the minimum requirement for own funds and eligible liabilities (MREL), totalling around €3.5 billion, mostly preferred and non-preferred senior debt. Most of the main institutions in the Portuguese banking system complied with the intermediate MREL requirements set for 1 January 2022. However, after 1 January 2024 the transition period

ends, with MREL requirements becoming mandatory and more demanding, making Portuguese banks more sensitive to changes in risk perception by international financial markets (Section 1.2).

The liquidity coverage ratio (LCR) remained broadly unchanged from December 2021, standing at 262% (Chart I.2.11). This development was the result of an increase in available assets by 2.1 p.p., which accounted for 26.7% of assets. Net liquidity outflows remained stable compared with the previous half-year.

The asset encumbrance ratio, i.e. the share of total assets and collateral received that is used as collateral for obtaining liquidity, decreased by 1.1 p.p. from the end of 2021, to stand at 17% in June (+1.9 p.p. than in December 2019). The share of unencumbered assets eligible for monetary policy operations was 22.8%, down by 0.4 p.p. from December 2021 due to changes in the denominator.

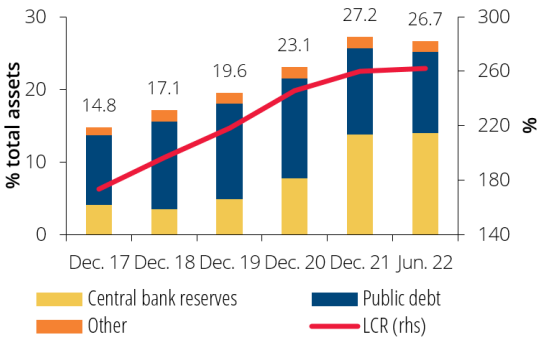
The net stable funding ratio (NSFR) grew by 2.4 p.p. in the first half of the year, to 145%, significantly above the 100% minimum requirement in place (Table I.2.14). While the LCR is based on a 30-day stress period, the NSFR requires a minimum amount of funding that is expected to be stable over the one-year time horizon, calculated by assigning weights to net asset exposures and off-balance-sheet positions, according to residual maturity. This available stable funding must address the required stable funding, which is also calculated using weighting factors that take into account the need for rollover and the time horizon of the instruments financing the asset. In June 2022, stable funding consisted of retail deposits and, to a lesser extent, funding from financial customers and central banks. In the same period, the component of instruments requiring stable funding was mainly comprised of loans.

Table I.2.14 • Asset financing structure, loan-to-deposit ratio and net stable funding ratio

% of total assets	Dec. 19	Dec. 20	Dec. 21	Jun. 22
Central bank deposits	4.4	7.8	9.4	8.9
Other CI deposits	9.2	7.2	6.1	5.9
Customer deposits	68.5	68.0	68.4	69.4
Debt securities issued	4.1	3.6	4.1	3.8
Other liabilities	4.6	4.7	3.7	4.1
Equity	9.3	8.8	8.3	7.9
Memorandum items:				
Loan-to-deposit ratio	87.1	84.7	81.1	79.2
Net stable funding ratio	n.a.	n.a.	143	145

Source: Banco de Portugal.

Chart I.2.11 • Liquid assets and liquidity coverage ratio (LCR)



Source: Banco de Portugal. | Note: The liquidity coverage ratio corresponds to the ratio of available liquid assets and net cash outflows calculated under a 30-day stress scenario.

2.5 Capital

In the first half of the year the total capital ratio declined, albeit remaining historically high. The total capital ratio decreased by 0.5 p.p. from the end of 2021, to 17.5%, as a result of the decline observed in the institutions where the ratio was higher (Chart I.2.12). The decrease in the core components of CET1 capital and to a lesser extent, the increase in risk-weighted assets, partly offset by the increase in Tier 2 capital, contributed to these developments. The Tier 2 capital

contribution to the total capital ratio increased by 0.1 p.p. from December 2021, standing at 1.8% of risk-weighted assets.

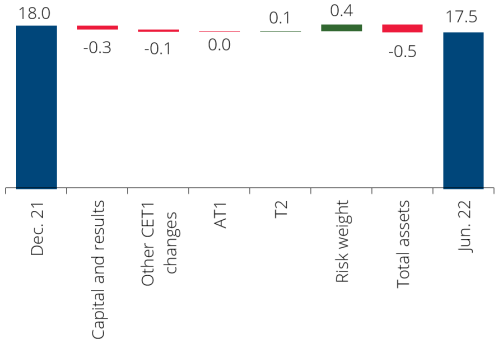
The reduction in CET1 capital was associated with the return to dividend distribution and the impact of rising long-term yields. In June, the gross CET1 ratio decreased by 0.5 p.p. from the end of 2021 to 15.0% (Table I.2.15). The distribution of dividends and to a lesser extent, the impact of rising interest rates on debt securities measured at fair value through other comprehensive income contributed largely to this reduction. The application by some banks of the prudential filter to sovereign debt also mitigated the negative impact of rising yields on CET1. In the context of continuing interest rate increases, the reconfiguration of the debt securities portfolio, in particular the decrease in the fair value component and the increase in the portion valued at amortised cost (Section 2.4), will continue to mitigate this negative impact on own funds.

The average risk weight remained on a downward path due to the reduction of the indicator for higher-weight institutions. In June, the average risk weight stood at 43.0%, down by 1.0 p.p. from December 2021. The reduction occurred in institutions with the highest weight, reducing the heterogeneity of the Portuguese banking system, but stabilising the differential against the euro area.

The leverage ratio has narrowed but remains significantly above the minimum requirement of 3%. The prudential leverage ratio stood at 6.6%, down by 0.4 p.p. from the end of 2021. The increase in the total exposure of the banking system and the reduction in Tier 1 capital made similar contributions to this development.

The capitalisation of financial institutions should remain robust against the risks inherent to the banking system. The uncertainty associated with the current economic environment (Section 1.2) reinforces modernisation and structural risk challenges. Institutions should reflect the latest risks in the assessment of their exposure and ensure capital adequacy for the exposure. For this purpose, if the institution's specific situation so requires and to strengthen the capacity to absorb potential losses, the institution may retain profits.

Chart I.2.12 • Total capital ratio – level and contributions to changes
| Per cent and percentage points



Source: Banco de Portugal.

Table I.2.15 • Capital ratios and average risk weight

% of risk-weighted assets	Dec. 18	Dec. 19	Dec. 20	Dec. 21	Jun. 22
Total capital ratio[a]	15.1	16.9	18.0	18.0	17.5
Percentile 5	13.2	13.9	12.3	12.0	12.2
Percentile 95	17.3	19.5	24.5	29.0	24.5
CET1 ratio[b]	13.2	14.3	15.3	15.5	15.0
% of total assets	**Dec. 18**	**Dec. 19**	**Dec. 20**	**Dec. 21**	**Jun. 22**
Average risk weight[c]	54.4	53.3	48.6	44.0	43.0
Percentile 5	38.9	35.6	32.9	26.4	28.1
Percentile 95	66.9	64.8	59.5	55.5	50.0
Euro area	39.4	39.3	35.9	35.7	34.8

Sources: Banco de Portugal and ECB. | Notes: (a) Ratio of total own funds to risk-weighted assets. (b) Ratio of Common Equity Tier 1 capital to risk-weighted assets. (c) Ratio of risk-weighted assets to total assets.

Box 1 • The impact of rising interest rates on household debt service

In the wake of the sovereign debt crisis, the household indebtedness ratio declined significantly, raising this institutional sector's resilience to adverse shocks. According to information from the Portuguese Household Finance and Consumption Survey (ISFF – latest edition, 2020), indebted households significantly reduced their debt-to-income ratio between 2010 and 2020 (from 224% to 131%), particularly those in the lowest income quintiles. The instalment burden, as measured by the debt service-to-income ratio, fell broadly across income quintiles (from 20% to 13% for indebted households as a whole).

The reduction in the weight of indebtedness in income, combined with an increase in labour market participation and an increase in household disposable income, characterised the pre-pandemic period. In addition, alongside recourse to credit moratoria and household income support, the increase in the saving rate in the first quarters of the pandemic crisis contributed to the sector's accumulation of bank deposits. Taken together, these factors fostered the sector's greater resilience to the interest rate rise associated with the normalisation of monetary policy in response to inflationary pressures. Despite greater resilience to adverse shocks, household saving capacity is heterogeneous, which may make it difficult for households with less liquid assets to accommodate a higher debt service burden, especially if the period of high inflation should continue.

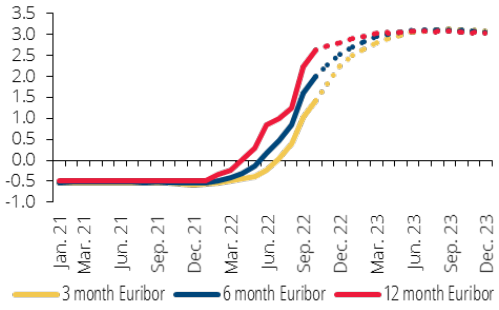
The debt service burden on bank loans for house purchase, mostly with a variable interest rate, has been increasing. To quantify the impact of the rise in Euribor rates on the debt service of loans for house purchase, expected developments in 3, 6 and 12-month Euribor rates up to December 2023 are considered. This is based on market expectations in 3-month Euribor futures (Chart B1.1), translating into values of 3% in December 2023 for 3, 6 and 12-month Euribor rates.

The analysis is based on information on over 1.4 million loans for house purchase (not exclusively for permanent housing, which are estimated to be close to 1.1 million) from the Central Credit Register (CRC), corresponding to almost €90 billion outstanding. Half of the credit agreements' borrowers are aged 41-54, with only 10% of agreements having borrowers aged 35 or under. These loans are estimated to be associated with around 1.2 million households. The 5th and 95th percentiles of loans with information on borrowers' income (68% of the total under analysis) are €700 and €6,400 respectively per month on average, with a median value of close to €1,800.

The total value of instalments paid by households in loans for house purchase is estimated to increase from around €390 million in June 2022 to €520 million in December 2023. The average household debt, i.e. around €64,000, translated into an estimated average instalment of €279 in June 2022, is expected to increase by €92 up to the end of 2023 (Chart B1.2).

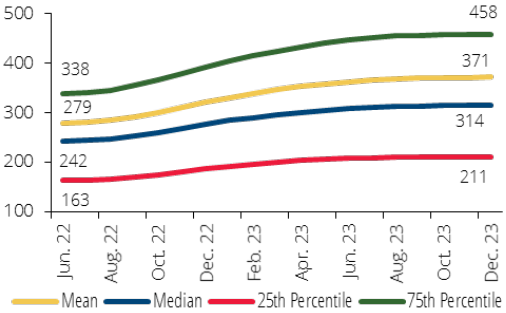
For 41% of loans for house purchase, the increase in instalments between June 2022 and December 2023 is expected to be lower than €50 (Table B1.1). Only in 18.1% of agreements will there be increases above €150. However, banks' exposure to these loans was 43.8% of the stock in June 2022. This higher exposure stems from the fact that, for the same contractual conditions (interest rate and residual maturity), loans with a higher outstanding amount experience larger instalment increases.

Chart B1.1 • Euribor rates (expected rates as of November 2022) | Per cent



Source: Refinitiv (Banco de Portugal calculations). | Notes: The average of October 2022 expectations for interest rates implied by 3-month Euribor futures contracts for each period were considered as expected developments for the 3-month Euribor (linear interpolation for the months when there is no expectation). For the 6-month Euribor, the values expected for the 3-month Euribor due in the month under review and the third month thereafter were taken into account, together with those due in the sixth and ninth following months for the 12-month Euribor.

Chart B1.2 • Expected developments in the distribution of instalments of loans for house purchase | In euro



Source: Banco de Portugal. | Notes: Projection of instalments for 94% of the stock of loans for house purchase in June 2022 (90% of loans), based on the expected change in the reference rate between the last update period and the following update period of each agreement. It does not include agreements with an end date prior to 31 December 2023.

Table B1.1 • Share in total agreements and in the stock of loans for house purchase by class of increase in instalments between June 2022 and December 2023 | Per cent

	Increase (€)						
	<30	[30;50[	[50;100[	[100;150[	[150;200[	[200;300[	≥300€
% loans	27.3	13.6	24.6	16.4	9.1	6.4	2.6
% stock	8.9	6.2	19.9	21.3	16.4	15.9	11.4

Source: Banco de Portugal. | Notes: Projection of instalments for 94% of the stock of loans for house purchase in June 2022 (90% of loans), based on the expected change in the reference rate between the last update period and the following update period of each agreement. It does not include agreements with an end date prior to 31 December 2023.

The higher debt service burden of loans for house purchase will contribute to a rise in the average loan service-to-income (LSTI) ratio of 4.8 p.p. to 21.5% by December 2023 (Table B1.2). For the calculation of the LSTI, the agreements' underlying income was updated on the basis of developments in compensation of employees from the date of the last income update reported until 2022 and 2023.[5] For 10% of agreements this ratio will exceed 41.2% at the end of 2023.

In June 2022 only 5.1% of loans for house purchase had a current LSTI of over 40%, which will increase to 10.9% in December 2023 (Table B1.3). However, more than half the agreements will continue to have a current LSTI of 20% or less. From a bank exposure perspective, the share of stock with an LSTI of over 40% will increase by 9 p.p. to 16.8%.

Loans for house purchase granted between 2019 and 2022 have the largest increase in the average instalment between June 2022 and December 2023. This is because a high share of the

[5] Up to 2021, the update is based on Statistics Portugal's data on compensation of employees. The evolution for 2022 and 2023 is based on the projected growth rate in the 2023 State Budget (only in Portuguese).

amount taken out is still outstanding (Table B1.4). These agreements also show a higher change in the current average LSTI, with an expected increase of 6.5 p.p. to 23.7%.

Table B1.2 • Distribution of LSTI of loans for house purchase | Per cent

	Jun. 22	Dec. 22	Dec. 23
Average	16.6	19.3	21.5
10th percentile	4.0	4.5	5.0
25th percentile	7.9	9.1	10.0
Median	13.7	15.8	17.6
75th percentile	21.7	25.1	28.1
90th percentile	31.8	36.9	41.2

Table B1.3 • Agreements and stock of loans for house purchase by LSTI class

	% loans		% stock	
	Jun. 22	Dec. 23	Jun. 22	Dec. 23
≤20%	70.9	57.1	63.6	44.9
]20%;30%]	17.3	21.0	20.5	24.2
]30%;40%]	6.7	11.0	8.2	14.2
]40%;50%]	2.6	5.3	3.4	7.3
>50%	2.5	5.6	4.3	9.4

Sources: Banco de Portugal, Statistics Portugal and Ministry of Finance. | Notes: The LSTI is the ratio of the instalment of the loan for house purchase to the average monthly income of borrowers (annual income divided by 12 months). It only considers 70% of the stock of loans for house purchase. It excludes agreements associated with exceptions to the DSTI ratio limit laid down in the macroprudential recommendation. Data on income is taken from Instruction 33/2018 or the CRC when not reported in the Instruction. Income is updated between the latest update and that which is expected to be in place in 2022 and 2023 for each agreement, based on the growth rate of 'wages and salaries' per employee (projection of the growth rate for 2022 and 2023 based on the forecast for 'compensation of employees' – which adds 'employers' social contributions' to the 'wages and salaries' component – of the State Budget). However, developments in individual income over the life cycle of borrowers were not taken into account, which is relevant due to the long original maturities of loans for house purchase.

Table B1.4 • Average instalment, LSTI and outstanding amount by year of inception of the agreement

	Average instalment Jun. 22 (€)	Δ Dec. 23- Jun. 22 (€)	Average LSTI Jun. 22 (%)	Δ Dec. 23- Jun. 22 (pp)	Average outstanding amount	% loans	% stock
<2003	227	28	17.9	1.5	21,104	17.4	5.8
[2003;2007]	249	73	16.2	4.2	50,048	28.0	22.0
[2008;2013]	268	98	15.6	5.1	64,050	17.7	17.8
[2014;2018]	310	117	16.4	5.5	81,480	14.3	18.3
[2019;2022]	345	144	17.2	6.5	101,843	22.6	36.1
Total	279	92	16.6	4.8	63,663		

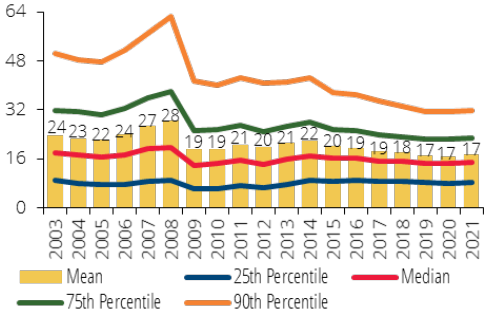
Sources: Banco de Portugal, Statistics Portugal and Ministry of Finance. | Notes: Projection of instalments for 94% of the stock of loans for house purchase in June 2022 (90% of agreements), based on the expected change in the reference rate between the last update period and the following update period of each agreement. It does not include agreements with an end date prior to 31 December 2023. The calculation of the LSTI follows the methodology set out in the note to Tables B1.2 and B1.3, considering only 70% of the stock of loans for house purchase.

Loans granted since the second half of 2018 already fall within the scope of the macroprudential measure introduced in July 2018 by the Banco de Portugal, setting a limit on the ratio of the amount of monthly instalments of all loans held to the net monthly income (DSTI, debt service-to-income) considering an increase in the reference rate in the case of variable or mixed-rate loan agreements. This is likely to have contributed to improving the risk profile of loans with more recent inception dates and to stabilise the ratios of the instalment of loans for house purchase to income at the origination of agreements (Chart B1.3). The macroprudential recommendation was introduced in a context of easing of credit standards, backed by continued growth in economic activity, a protracted low interest rate environment and real estate price growth.

The higher share of agreements in which borrowers have higher income acts as a mitigating factor in the risk of these loans, as borrowers will more likely change the composition of their consumption by replacing or postponing non-essential expenses, making it possible to dampen the impact of the increase in instalments. The share of lower-income households in the stock of credit for house purchase is low in Portugal, in line with that observed in other euro area

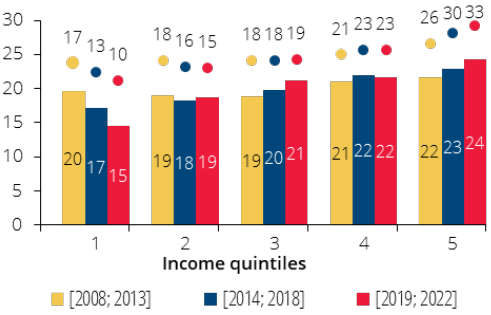
countries.[6] In 2020 only 12% and 22% of households in the lowest income classes (first and second quintiles) had been granted credit for own and permanent residence (31% for total households).[7] The impact of inflation on lower-income households stems mainly from the increase in the price of essential goods,[8] limiting the possibility of consumption substitution. However, in the most recent inception years of agreements there is a smaller share of households in the lower income quintile of those with outstanding loans for house purchase, both as regards the number of agreements and the stock of loans (Chart B1.4).

Chart B1.3 • Original LSTI of the stock of loans for house purchase | Per cent



Source: Banco de Portugal. | Notes: Data from Instruction 33/2018 on outstanding loans at the end of 2021. The original LSTI corresponds to the ratio of the first instalment to the average monthly income (annual income divided by 12 months) of borrowers at the inception date of the agreement.

Chart B1.4 • Agreements and stock of loans for house purchase by income quintile and year of inception | Per cent



Sources: Banco de Portugal, Statistics Portugal and Ministry of Finance. | Notes: Values based on 70% of the stock of loans for house purchase in June 2022, excluding agreements associated with exceptions to the DSTI ratio limit laid down in the macroprudential recommendation. Income from agreements with an inception date prior to 2022 updated according to the note to Tables B1.2 and B1.3. The bars correspond to the share in the number of agreements and the points to the share in the stock of loans (outstanding in June 2022) in each class of year of inception of agreements.

The increase in average instalments in absolute terms is lower for loans for house purchase associated with the first two income quintiles. However, the impact on the average LSTI is more relevant for agreements in the first income quintile and is expected to increase by 7.7 p.p. between June 2022 and December 2023 (Table B1.5). These agreements accounted for 14.6% of the stock of loans for house purchase in June 2022.

[6] ECB, *Financial Stability Review*, November 2022.

[7] *Inquérito à Situação Financeira das Famílias* (ISFF) 2020 – Portuguese Household Finance and Consumption Survey 2020.

[8] Box 6 of the October 2022 issue of the *Economic Bulletin*.

Table B1.5 • Average instalment and LSTI by income quintile

		Average instalment Jun. 22 (€)	Δ Dec. 23- Jun. 22 (€)	Average LSTI Jun. 22 (%)	Δ Dec. 23- Jun. 22 (€)	% stock
Income quintiles	≤1,035€	229	74	29.8	7.7	14.6
	]1,035€;1,523€]	250	87	19.7	5.5	17.2
	]1,523€;2,127€]	269	96	15.0	4.4	18.8
	]2,127€;3,354€]	297	111	11.3	3.5	21.5
	>3,354€	390	139	7.3	2.2	27.8
Total		279	92	16.6	4.8	

Sources: Banco de Portugal, Statistics Portugal and Ministry of Finance. | Notes: Values shown for 70% of the stock of loans for house purchase. Projection of the instalment based on the expected change in the reference rate between the last update period and the next update period of each agreement. It does not include agreements with an end date prior to 31 December 2023. The calculation of the LSTI follows the methodology set out in the note to Tables B1.2 and B1.3.

Box 2 • Risk of corporate insolvency in Portugal: banking sector exposure at risk as a result of the pandemic shock

The abrupt and unexpected interruption of economic activity during the pandemic raised non-materialised fears of a significant increase in the number of corporate insolvencies in Portugal and the euro area (ESRB 2021). However, the current environment of uncertainty and the possible lagged effect of the pandemic crisis mean it is not possible to dispel fears of a wave of insolvencies.

Focusing on the stock of loans, this Box assesses the risk to the banking sector from those firms that had a higher probability of becoming insolvent during the pandemic period. To this end, the developments observed in insolvencies are combined with potential determinants (e.g. firms' financial situation) as a starting point to assess the increased risk for the banking sector arising from firms with a high probability of becoming insolvent.

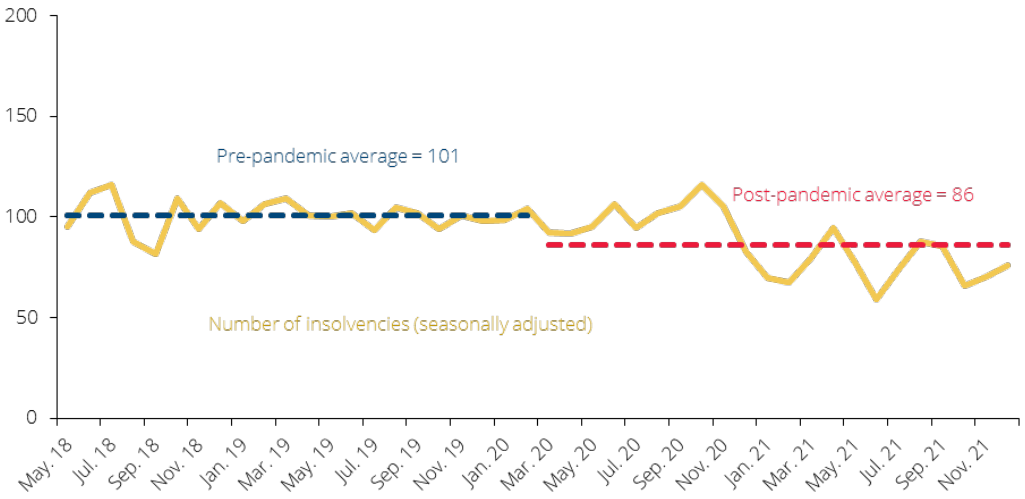
In particular, it tries to quantify the expected value of loans to NFCs at risk of default given the probability of corporate insolvency. In view of the insolvencies that occurred between 2015 and 2019, the relationship between financial and economic activity indicators of firms – as well as indicators of bank characteristics – and the materialisation of insolvencies was determined. Then, each firm's probability of becoming insolvent was estimated for 2020, 2021 and 2022. In this analysis, only firms with bank loans were considered in each year, and no account is taken of a forward-looking macroeconomic scenario that includes, among other factors, the recent sharp increase in interest rates.

The number of insolvencies fell during the pandemic. The number of insolvencies remained in line with that observed before the pandemic until the end of 2020, falling more significantly in 2021. Between March 2020 and December 2021, on average, 15 fewer firms with bank credit became insolvent per month, compared to the same period before the pandemic crisis (Chart B2.1). During this period, there was a 14% reduction in the total number of firms that became insolvent. This pattern is also shown for the total number of firms in Portugal[1] and in other geographies (Elsinger et al. (2021), Dörr, Julian Oliver et al. (2022), Eckert & Mikosch (2022)).

Despite the fall in the average number of insolvencies in most sectors of activity, this number increased for the accommodation and food services sector (Table B2.1). The decline was most pronounced in the wholesale and retail trade, professional, scientific, technical, administrative and support service activities, and manufacturing sectors. However, in accommodation and food services – one of the sectors most affected by the pandemic shock – the average number of insolvencies was around 70% higher than in the pre-pandemic period. The fall in insolvencies during the pandemic crisis may have been influenced by the business support measures and/or the suspension of the deadline for filing for debtor's insolvency under Article 18(1) of the Portuguese insolvency code (*Código da Insolvência e da Recuperação de Empresas*). According to Nogueira (2022), the public credit moratorium reduced the base probability of insolvency from 6.4% to 3.9%, and there is no evidence that the suspension of the deadline to file for debtor's insolvency reduced insolvencies during the pandemic.

[1] On developments in insolvencies during the pandemic period as well as the financial situation of firms initiating insolvency proceedings see Box 1 of the December 2021 issue of the *Financial Stability Report*.

Chart B2.1 • Developments in the number of insolvencies | In number



Sources: Banco de Portugal and Ministry of Justice (Citius). | Notes: A firm is considered insolvent with the initiation of insolvency proceedings. Initiating insolvency proceedings corresponds to any formal act whereby a creditor or borrower brings an application for insolvency before a court. Excluding public undertakings, head offices and the classes under sections K, O, T and U of the Portuguese Classification of Economic Activities (CAE) Rev.3 and insolvencies of households. Monthly figures. Only firms with bank loans at the time of insolvency are considered. The series of the number of insolvencies per month has been seasonally adjusted using the TRAMO-SEATS methodology. The "Pre-pandemic average" series is the average of the monthly number of seasonally adjusted insolvencies in the period from May 2018 to February 2020. The "Post-pandemic average" series is the average of the monthly number of seasonally adjusted insolvencies in the period from March 2020 to December 2021. Latest observation: December 2021.

Table B2.1 • Pre-pandemic and post-pandemic insolvencies of firms with bank loans, by sector of activity | In number and as a percentage

	Difference (Mar. 20 to Dec. 21) against (May 18 to Feb. 20)	As % of the annual average from May 18 to Feb. 20
Total firms	-171	-14
Agriculture, forestry and fishing	-3	-12
Mining and quarrying, electricity, gas and water	3	50
Manufacturing	-66	-20
Construction and real estate activities	-27	-19
Wholesale and retail trade	-106	-28
Transportation and storage	-7	-9
Accommodation and food services	57	69
Information and communication	3	17
Professional, scientific technical, administrative and support service activities	-25	-26
Other services	6	10
Sectors most affected by the pandemic	26	6

Sources: Banco de Portugal and Ministry of Justice (Citius). | Notes: A firm is considered insolvent with the initiation of insolvency proceedings. Initiating insolvency proceedings corresponds to any formal act whereby a creditor or borrower brings an application for insolvency before a court. Excluding public undertakings, head offices and the classes under sections K, O, T and U of the Portuguese Classification of Economic Activities (CAE) Rev.3 and insolvencies of households. Figures annualised and calculated as described in the note to Chart B2.1.

The expected value of loans associated with possible firms' insolvency (exposure-at-risk expected value) increased during the pandemic. Between 2015 and 2019, the expected value of loans associated with firms' insolvency, defined as the product between a firm's probability of becoming insolvent and its outstanding loans, was on average around €400 million (Table B2.2). In 2019 this amount was €332 million. In turn, between 2020 and 2022, this figure ranged between €380 million and €649 million.

However, the value of loans associated with firms that became insolvent after 2020 fell. For firms whose insolvency materialised, the average actual exposure was €464 million between 2015 and 2019 (year-end data). Between the end of 2020 and June 2022, this figure never exceeded €172 million.

In June 2022, the expected value of loans associated with firms likely to fail between 2020 and 2022 corresponded to 0.9% of the stock of loans of the firms under review, with only 0.1 p.p. associated with non-performing loans.

Reflecting the widespread recourse to support measures, loans to firms that have both used State-guaranteed credit lines and the moratorium accounted for most of the expected value of loans potentially affected by insolvency (Table B2.3). The set of firms using State-guaranteed credit lines accounted for 61% of the exposure-at-risk expected value, a share that clearly exceeds the weight of these firms in credit granted (49%). This is particularly relevant for the set of firms that used both State-guaranteed credit lines and the public credit moratorium, corresponding to 47% of the exposure at risk and 33% of total exposure respectively. The access conditions to State-guaranteed credit lines were more restrictive than those of the moratorium, thus benefiting firms with higher pre-pandemic credit quality. In line with this assessment, overall exposure to these firms was "performing" in June 2022, thus highlighting the importance of the support measures. Sustained recovery in economic activity contributes to reducing the probability of insolvency in this set of firms.

The breakdown into sectors most and least affected by the pandemic of the expected exposure value associated with firms initiating insolvency proceedings translates the share of these sectors in total credit. In June 2022 the weight of the exposure-at-risk expected value in sectors most affected by the pandemic was close to that of this exposure in total credit (23% and 27% respectively). The weight of firms most affected by rising energy and/or commodity costs and the pandemic corresponded to 12% of the exposure-at-risk expected value.

The expected exposure value associated with firms' potential insolvency arising from firms' financial situation until 2021 is not significant. However, rising interest rates, restrictions in production chains due to new pandemic outbreaks and the invasion of Ukraine, as well as uncertainty about the impact and duration of these two shocks may contribute to the materialisation of corporate insolvencies. There should be continuous monitoring of this exposure.

Table B2.2 • Expected value of loans associated with possible firms' insolvencies and the observed value of loans associated with firms that have already become insolvent (materialised value) | EUR millions

Year	Expected value	Materialised value
Average 2015-2019	400.0	463.9
December 2019	331.8	219.7
December 2020	380.0	171.7
December 2021	649.0	123.4
June 2022	578.7	146.4

Source: Banco de Portugal. | Notes: The expected value of the credit exposure of insolvent firms corresponds to the product between the probability of a firm becoming insolvent and the amount of credit exposure. The probability of a firm becoming insolvent was derived from a logit model, where the dependent variable corresponds to the initiation of insolvency proceedings of a firm and the independent variables correspond to economic and financial ratios of firms, GDP, and variables associated with the credit institutions holding the exposure considered. The materialised value corresponds to the credit exposure of firms with insolvency proceedings initiated in the reference year. The model has been estimated for the period 2015-19 to exclude developments during a pandemic. The amount of loans refers to NFCs for which it was possible to estimate the probability of insolvency and corresponds to 83% of total loans to firms in the Central Credit Register (CCR) in June 2022.

Table B2.3 • Expected value of loans associated *with possible firms' insolvencies* and the observed value of loans associated with firms that have already become insolvent (materialised value), by the use of support measures | EUR millions

June 2022	Expected value	Materialised value
Performing	530.2	19.8
Of which:		
Without recourse to support measures	124.7	0.7
With recourse to the moratorium	84.1	4.9
With recourse to State-guaranteed credit lines	74.7	1.2
With recourse to the moratorium and State-guaranteed credit lines	246.7	13.0
Non-performing	40.0	119.4
Of which:		
Without recourse to support measures	6.0	7.7
With recourse to the moratorium	14.2	19.9
With recourse to State-guaranteed credit lines	1.5	7.5
With recourse to the moratorium and State-guaranteed credit lines	18.4	84.4

Source: Banco de Portugal. | Notes: The expected value of the credit exposure of insolvent firms corresponds to the product between the probability of the firm becoming insolvent and the amount of credit exposure. The probability of a firm becoming insolvent was derived from a logit model, where the dependent variable corresponds to the initiation of insolvency proceedings of a firm and the independent variables correspond to economic and financial ratios of firms, GDP, and variables associated with the credit institutions holding the exposure considered. The materialised value corresponds to the credit exposure of firms with insolvency proceedings initiated in the reference year. The model has been estimated for the period 2015-19 to exclude developments during a pandemic. The amount of loans refers to NFCs for which it was possible to estimate the probability of insolvency and corresponds to 83% of total loans to firms in the Central Credit Register (CCR) in June 2022. The reference to support measures only considers recourse to the public credit moratorium and/or State-guaranteed credit lines. Thus, a firm identified as "Without recourse to support measures" may have resorted to other support measures, such as layoff.

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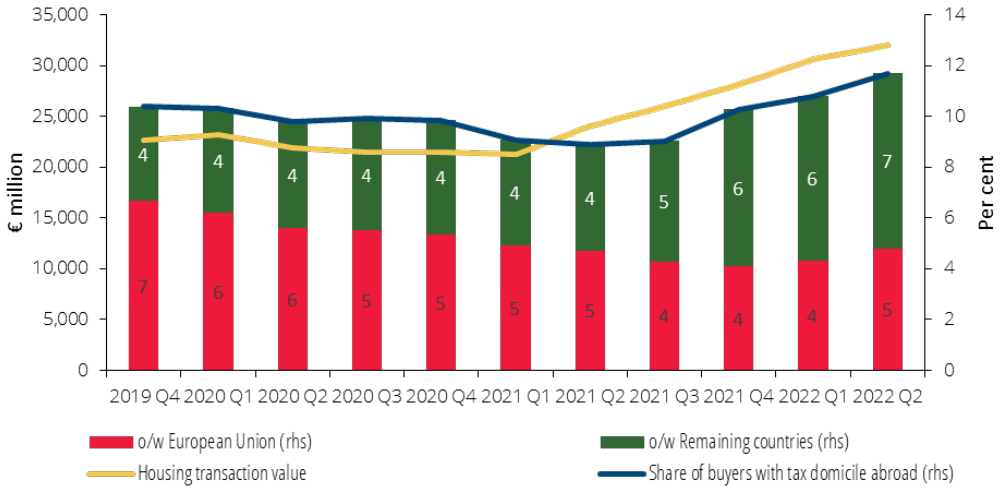
Box 3 • Relevance of non-residents in the buoyancy of the residential real estate market

Over the past 10 years, the significant increase in the participation of non-resident buyers has characterised the residential real estate market in Portugal. After a reduction in the aftermath of the pandemic, housing transactions involving buyers domiciled for tax purposes outside Portugal increased significantly, with a major contribution from buyers with tax domicile outside the European Union (Chart B3.1). In the four quarters ending in June, non-resident buyers accounted for 11.7% of the value of housing transactions in Portugal (8.9% in the four quarters ending in June 2021).

The average transaction value for non-resident buyers is 95% higher than that for resident buyers. For buyers with tax domicile in other EU countries, the average value of a house transaction was €265,000, a figure 55% higher than the average transaction value for buyers with tax domicile in Portugal. In turn, for buyers with tax domicile outside the European Union, the average transaction value was €414,000, an amount 143% higher than the average transaction value involving buyers residing in Portugal. The information available for housing transactions in the Lisbon urban rehabilitation area signals some change in the weight of the buyers' main countries of residence, particularly an increase in purchases by US citizens (Table B3.1).

Chart B3.1 • Housing transactions in Portugal and non-resident share



Source: Statistics Portugal. | Notes: Cumulative values of four quarters. Including transactions by natural and legal persons. The term "non-residents" refers to citizens having their tax domicile outside Portugal. In the case of natural persons, the tax domicile is the place of habitual residence. In the case of legal persons, the tax domicile is the place of the head office or effective management or, in their absence, the place of their permanent establishment in Portugal.

The median price of housing transactions continued to increase in 2021 and 2022, with a differentiation between the median price of transactions for resident buyers and non-resident buyers. In 2021, the rise in the median house price for resident buyers was higher than the median price associated with non-resident buyers (7.4% and 3.2% respectively). Already in the second quarter of 2022, the median price of housing purchased by residents grew by 14.3% year on year and by non-residents grew by 18.6%. The median price of housing purchased by non-residents is higher than the median price of housing purchased by residents in all regions of the country. However, this difference is most pronounced in the Lisbon and Porto metropolitan areas and less significant in the Algarve and the rest of the country.

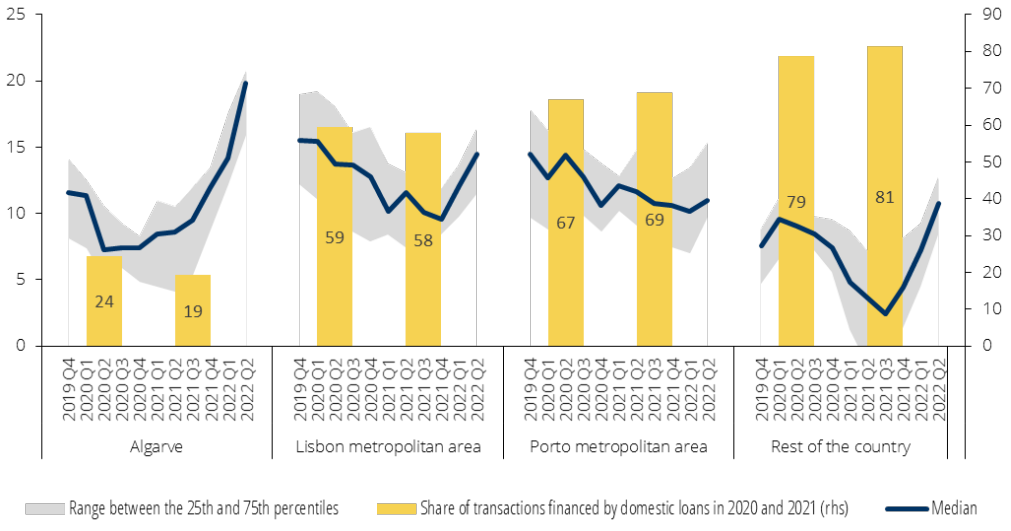
Table B3.1 • Housing transactions in the Lisbon urban rehabilitation area and main buyers by nationality

	2017 H2	2018 H1	2018 H2	2019 H1	2019 H2	2020 H1	2020 H2	2021 H1	2021 H2	2022 H1
Total	509	849	798	750	868	769	697	589	1,067	801
France	125	189	121	146	113	84	114	111	109	120
USA	19	54	35	43	38	40	66	46	173	99
China	60	144	155	115	192	269	151	84	116	85
United Kingdom	49	77	47	50	43	55	36	52	83	61
Germany	12	6	20	23	22	17	20	17	32	44
Brazil	34	52	51	54	66	34	33	25	58	44
Italy	25	24	25	31	45	23	35	42	28	39
Others	185	303	344	288	349	247	242	212	468	309

Source: Confidencial Imobiliário.

Reflecting a higher demand intensity from non-residents in certain parts of the country, the weight of loans in housing transactions differs significantly across regions. In Algarve, the share of transactions financed by housing loans was around 20% in 2021. In the Lisbon and Porto metropolitan areas, housing loans accounted for around 60% and 70% of the transaction value respectively, reaching more than 80% in the other regions (Chart B3.2).

Chart B3.2 • Year-on-year growth of the median transaction price per square metre and share of transactions financed by domestic loans per region | Per cent



Sources: Banco de Portugal and Statistics Portugal. | Notes: The growth percentiles of the median transaction price per square metre were obtained for the presented regions considering municipal-level data, except for the rest of Portugal, where NUTS III-level data was used. The two bars related to the share of transactions financed by domestic loans concern annual figures for 2020 and 2021.

Regional heterogeneity in demand from non-residents contributed to differentiated price developments across regions. Particularly in the recent period, marked by rising demand from

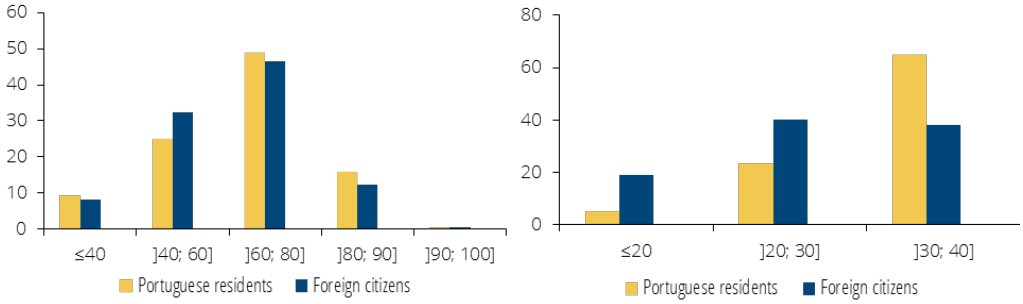
non-residents, house price growth has been most pronounced in regions where their weight is higher and the share of transactions financed by loans is lower. In the second quarter of 2022, the median housing price grew by 19.8% year on year in Algarve, 14.5% in the Lisbon metropolitan area, 11% in the Porto metropolitan area, and 10.8% in the rest of the country. In the aggregate, the share of transactions financed by domestic loans has increased in recent years but remains 25 p.p. lower than in 2009 (Section 1.3.4).

Loans granted to foreign (resident and non-resident) citizens have increased recently but retain a small weight. Between December 2019 and June 2022, the share of foreign citizens in the stock of housing loans increased from 6.4% to 7%. The change in the demand profile, particularly with a higher share of demand for own and permanent residence by working-age foreigners and lower age groups, explains recent growth. In 2021 and the first half of 2022, 10% of the total value of new loans for house purchase was granted to foreign citizens.

Loans granted since 2019 to foreign borrowers have lower average current LTV ratios and shorter average maturities at origination (Charts B3.3). In June, 12.5% of these loans had a current LTV ratio of over 80% (16% in the case of loans granted to domestic citizens in the same period); and 32% had a current LTV ratio between 40% and 60% (25% for domestic citizens). In addition, 40% of housing loans granted to foreign citizens had an original maturity of between 30 and 40 years (65% of that granted to domestic citizens).

Housing transactions by non-residents increased significantly in the recent period, particularly involving buyers resident outside the European Union. House price growth has been most pronounced in regions where the weight of non-residents is higher, and the share of housing transactions financed by domestic loans is lower. Housing loans to foreign citizens have increased in the recent period but remain of small weight. In addition, these loans have lower LTV ratios and shorter average maturities compared with loans granted to domestic borrowers.

Chart B3.3 • Distribution of stock of housing loans granted between 2019 and 2022 H1 by current LTV and original maturity (in years) | Per cent



Source: Banco de Portugal. | Notes: The credit analysis presented in this Box does not distinguish foreign borrowers by residence/tax domicile. To the extent that a significant share of foreign borrowers is considered to be resident, total credit under analysis has no correspondence with the information provided by Statistics Portugal on housing transactions, presented in Chart B3.1. The figures for housing loans granted to Portuguese residents and foreign citizens refer to domestic credit institutions and therefore do not capture loans granted in foreign countries for house purchase in Portugal.

Box 4 • Machine learning: main concepts, opportunities, and challenges for the banking system

Over the past few decades, the banking system has undergone structural changes that triggered the use of various types of methodologies in the collection, processing, analysis, and reporting of information. On the one hand, prudential and accounting requirements have increased the need to assess risk developments more rigorously and report wide ranges of information to supervisory authorities. On the other hand, in parallel with the digitalisation of banking activities, information systems have evolved, allowing for a greater analytical capacity of the information the institutions' managers have at their disposal.

A greater ability to process and analyse information may, for example, result in improved credit risk forecasts, with gains for financial stability. When deciding whether to grant credit, a better forecast of the transaction's risk (the probability of default and loss given default) allows for a more effective and robust determination of the risk-remuneration binomial. Given that the institution must monitor the evolution of the borrowers' risk profile throughout the life of a contract, a better forecast thus contributes to an appropriate recording of impairment and capital requirements.

In the forecasting field, machine learning (ML) techniques have been challenging econometric methodologies. Regarding the forecasting of economic variables, a growing number of studies have pointed to the superiority of ML techniques when compared with traditional econometrics. Chakraborty and Joseph (2017) and Medeiros, Vasconcelos, Veiga and Zilberman (2021) compared a number of econometric models with ML methodologies for inflation forecasting. Moscatelli, Parlapiano, Narizzano and Viggiano (2020) and Barbaglia, Manzan and Tosetti (2021) aimed to predict the probability of default, the former for firms and the latter on loans to households for house purchase. The common conclusion of these studies is that the performance of ML models is superior to that of econometric methodologies.

Unlike econometrics, in ML, the definition of the model's functional form is chosen by complex algorithms that try to fit the observed data as much as possible, without any a priori constraints. ML is a subfield of Artificial Intelligence (AI), whose cost of application has decreased with the rise of computational power. More precisely, it consists of developing algorithms to be applied to databases, focusing primarily on areas such as forecasting, classification and clustering (Athey, 2019). In general, relationships apprehended by the algorithm are determined endogenously by data, allowing greater flexibility in the model's functional form and/or in the variables it is to consider. This flexibility gives the models a greater ability to adjust to the data, thus mimicking the economic phenomenon under review according to the variables available.

There are statistical methodologies, e.g. ordinary least squares (OLS), that are used in both conventional econometrics and in ML, despite differing in how they are applied. In econometrics, the formulation of the model to be estimated and the assessment of results usually have economic theory as a basis. In ML, the algorithm selects the models and variables to be used from the available set. The selection is that which optimises a predefined criterion, which may or may not be based on economic reasoning. Usually, algorithms can be divided between supervised and unsupervised learning (Table B4.1).

Supervised learning aims to adjust an output variable according to other variables. This learning method consists of modelling an interest variable according to a set of explanatory variables. The use of this type of algorithms in the banking system can be found, for example, in forecasting the probability of default and detecting several types of fraud, namely those associated with credit cards. Some of the most used methods in this context have been decision trees, random forests, support vector machines and neural networks (Bozyiğit and Taser, 2022).

Unsupervised learning does not require an output variable, it consists instead of identifying patterns in the variables available in the analysis. The main objective of this learning method is to form similar observation groups (e.g. K-means clustering) or reduce the dimensionality of data

(e.g. principal component analysis). These methodologies have allowed, inter alia, the inclusion of more thorough and/or robust results in analyses through the definition of new variables, the reduction of the number of variables considered in a supervised approach or the detection of outliers. In the context of selecting new variables, Azqueta-Gavaldon, Hirschbhi, Onorante and Saiz (2020) aimed to determine an index to quantify the political and economic uncertainty over time. For this purpose, they turned to natural language processing using content from several reference journals.

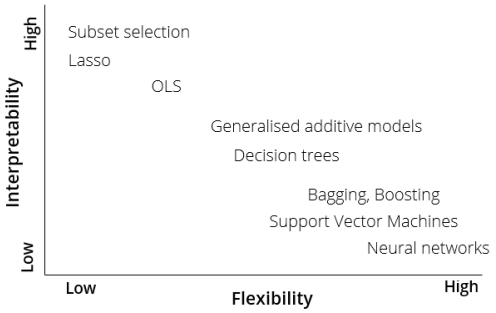
Although ML is more flexible when compared with conventional econometrics and contributes to improve the quality of forecasts by reducing the uncertainty associated with these exercises, this technique can provide findings very difficult to interpret, which could lead to decreased confidence in their quality (Chart B4.1). The autonomy of ML to determine the functional form of the models limits the user's awareness of economic analysis characteristics that might condition results. For instance, autocorrelation in time series, the existence of structural breaks in relationships and seasonality. It is also worth noting that, even under the scope of ML, there are several methods that differ from one another, namely in the flexibility-interpretability trade-off.

Table B4.1 • Supervised vs. unsupervised methods – a few examples

Supervised	Unsupervised
Lasso	K-means clustering
OLS	Principal component analysis
Generalised additive models	Generative adversarial networks
Decision trees	
Random Forest (Bagging)	
Boosting	
Support Vector Machines	
Neural networks	

Sources: Athey and Imbens (2019) and James et al. (2013). | Note: The table does not exhaust the ML methodologies available in the literature.

Chart B4.2 • Trade-off between flexibility and interpretability – supervised ML models



Sources: Bastos and Matos (2021) and James et al. (2013). | Note: The illustration does not exhaust the methodologies available in the literature.

The difficulty in interpreting results that characterises ML may pose risks to institutions if their decision-making is based solely on these methodologies. For example, the reasons for (not) granting credit must be clear and transparent to all of those who are involved in the process. The European Commission is working on regulating artificial intelligence with a view to its users respecting the values, fundamental rights and principles of the European Union, hence avoiding situations of discrimination in access to credit. The analytical tools used in the decision-making process should be varied, not limited to results stemming from the use of ML.

The use of ML methodologies may also pose an additional challenge for supervision authorities. This challenge is linked to the lower levels of transparency and interpretability of results derived from ML methodologies as aforementioned. It was in this context that the European Banking Authority (EBA) published a discussion paper (EBA, 2021) presenting recommendations, challenges and opportunities regarding the use of ML methodologies in internal ratings-based (IRB) models used to calculate regulatory capital requirements for credit risk. Additionally, the BIS

identifies, in its newsletter,[1] the need for institutions and supervisors to assess the management and monitoring risks regarding the use of these methodologies.

Recent literature has developed mechanisms for interpreting results derived from ML models, although there is still a long way to go in this field. Several authors have suggested different techniques of interpreting results, for example, through Shapley values (Lundberg and Lee, 2017) or charts of accumulated local effects (Apley and Zhu, 2020). The resulting field of investigation has been named eXplainable Artificial Intelligence and aims to introduce techniques that allow analysts to understand the models' inherent mechanisms. This will ensure greater security and transparency, translating into increased confidence in the results and in its easier transmission to all the interested parties. In this context, Bracke, Datta, Jung and Sem (2019) present a set of ML model interpretation approaches with application to forecasting the probability of default. Despite the progress made so far, no techniques yet exist that are widely accepted and easy to implement and that make it possible to obtain the interpretation and inference available in conventional econometrics. However, ML can coexist with traditional techniques by being used to carry out robustness analyses of the latter's results.

In conclusion, the use of ML is a challenge and an opportunity for the banking system. A challenge because institutions should prevent the transparency behind their decisions from being affected by the use of ML. An opportunity because the banking system may thus improve the analytical tools that support decision-making. In any case, institutions should be capable of equipping themselves with human and technological resources congruous to the complexity its adoption implies.

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[1] Available at the BIS website.

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Box 5 • Exposure of the banking system to climate transition risks inherent in the housing loan portfolio – exploratory analysis

In various climate transition scenarios, the need to reduce greenhouse gas (GHG) emissions will imply a substantial increase in the price of carbon allowances. This rise will be reflected in energy prices, thus penalising economic agents that show greater difficulties in replacing carbon-intensive energy sources with cleaner and cheaper sources.

Household wealth may also be affected by environmental impacts on its main asset, immovable property value. In order to meet energy certification requirements for immovable property and/or reduce related emissions, investment is needed to improve its efficiency. Failure to support such investment will negatively impact the value of less efficient immovable property.

This Box presents an approach to quantify the exposure of the Portuguese banking system to climate transition risks from housing loans. Based on households' energy expenditure on housing, their vulnerability is estimated according to (i) the share of such expenditure in income and (ii) the energy efficiency of immovable property, approximated by energy costs per m² and inhabitant. Subsequently, this information is used to characterise the banking system's portfolio of loans secured by real estate and for the purchase of own and permanent residence.

This approach could be useful as a starting point for a more comprehensive exploration of the impacts associated with climate transition on the banking sector, with a focus on households. It should be considered an initial work on this topic, with some limitations still remaining in the existing information.

Household Budget Survey

The Household Budget Survey (Portuguese acronym: IDEF) is one of the sources of information. This survey is carried out every five years to update the volume and structure of household expenditure. As the survey planned for 2020/21 was not carried out due to the pandemic, information from the latest available survey was used, which was conducted in 2015/16 and contains data for 2015. Therefore, this analysis does not incorporate any changes in the composition of expenditure in response to changes in relative prices or other structural changes.

In 2015, the average annual energy bill per household in housing (expenditure on electricity, gas and other fuels) was €1,222. The distribution of the energy expenditure-to-income ratio was an average (median) of 10.3% (6.8%). For income below the median, the average (median) value was 14.7% (10.1%) and the right distribution tail was wider, justified by the demand rigidity of this type of expenditure (Chart B5.1). This pattern indicates that these households are more vulnerable to energy price rises. Electricity and gas expenditure accounted for 60% and 34% of the housing energy bill in Portugal, with the remaining 6% being expenditure in liquid and solid fuels.

IDEF includes other variables characterising households and their dwellings. This information makes it possible to understand how energy costs vary according to socio-economic factors. These relationships can be applied to households with credit secured by immovable property recorded in the Central Credit Register (CCR).

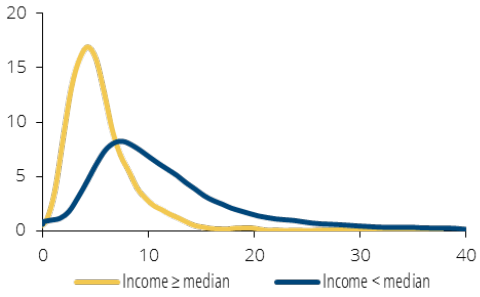
The estimated model explains energy costs on housing based on annual income, household size,[1] size of the immovable property and location. For example, the average annual energy bill is €1,691 (€824) for the highest (lowest) income quintile (Chart B5.2) and €1,391 (€1,122) for households with (without) dependent children. Moreover, a binary variable is added identifying dwellings with

[1] Use of the OECD-modified equivalence scale that assigns a value of 1 to the first adult, 0.5 to the remaining adults of the household and 0.3 to each child.

associated housing loans and other binary variables identifying the reporting quarter of the survey to monitor in terms of seasonality patterns.

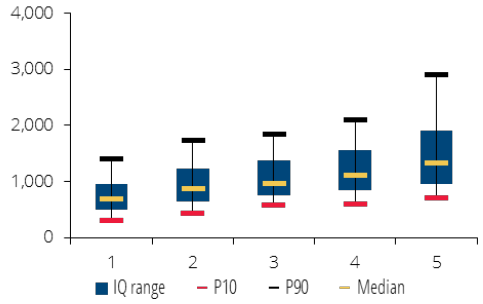
The regressors included in the model present the expected signal and are mostly statistically significant. Energy costs increase according to income, the number of household members and dwelling size. In addition, the results suggest that the energy bill is lower in the south and for immovable property with associated housing loans.

Chart B5.1 • Distribution of energy expenditure-to-income ratio | Probability density



Source: Banco de Portugal and Statistics Portugal (IDEF).

Chart B5.2 • Energy expenditure in housing per income quintile | In euros



Source: Banco de Portugal and Statistics Portugal (IDEF).

Central Credit Register

Borrowers' income and the size (in m²) of the immovable property pledged as collateral are not available on the CCR. For this reason, in order to rebuild these variables in the CCR, reporting under Instruction of the Banco de Portugal No 33/2018 was used, according to the Abreu et al. methodology (2021),[2] to reconcile the databases.

In Instruction No 33/2018, borrowers' income is reported with reference to the update date (updated income) or the date of origination of the contract (original income). Thus, in order to express the income of all borrowers in the same year, an adjustment factor was applied, which is proportional to wage developments since the reference year of the reported income and 2021.

Immovable property size was approximated using the ratio of the value of the immovable property reported under Instruction No 33/2018 to the median value of the bank valuation for the municipality/NUTS 2 where it is located and with reference to the month and year of valuation. Where the valuation date of the immovable property is prior to January 2011, its value has been updated for 2021 using Confidencial Imobiliário's residential real estate price indices.

Using these variables, which characterise households and dwellings, energy costs have been extrapolated to households with loans secured by immovable property recorded in the CRC.

At the end of December 2021, the portfolio of loans secured by immovable property for own and permanent residence accounted for around 97% of the housing loan stock. Despite some limitations in the information characterising households and dwellings, it was possible to include around 65% of this exposure in this analysis.

[2] Working Paper of the Banco de Portugal, "The impact of a macroprudential borrower based measure on households' leverage and housing choices", November 2021.

The distribution of the energy expenditure-to-income ratio in the housing loans under review posted an average (median) of 7% (5.8%). By breaking down the distribution by quintile, 36% of these loans were allocated to borrowers with an energy expenditure-to-income ratio above 6.6%, i.e. in the higher quintiles (4 and 5) (Chart B5.3). These loans are concentrated in the lower income quintiles (1 and 2), which represents a greater vulnerability of these households to energy price rises, given in general their lower wealth levels and a lower ability to change the composition of their consumption. Governmental policies targeting economically vulnerable households and promoting investment in the thermal comfort of dwellings could help reduce energy bills and thus mitigate these impacts.

Another factor to be taken into account in the analysis is energy-efficient housing. Currently, it is not possible to cross-check the energy certification information for the housing stock with CCR data; therefore, it was necessary to use proxies to measure the energy efficiency of immovable property. Thus, the energy intensity of immovable property has been approximated by energy costs in dwellings in relation to the size of the household and the size of the immovable property. Considering that the expected energy efficiency of each immovable property will probably vary according to its location and size, a direct comparison of the energy intensity ratio between immovable property may not be accurate. Therefore, households (and their immovable property) were broken down into different subsamples on the basis of these two variables,[3] and the 10th percentile of energy intensity was calculated for each, which can be understood as their efficiency benchmark. The energy intensity of each household was then broken down according to the benchmark of the subsample to which it was allocated, resulting in a standardised and comparable indicator between households (immovable property) with different characteristics. Higher values of this indicator are therefore associated with lower energy efficiency levels.

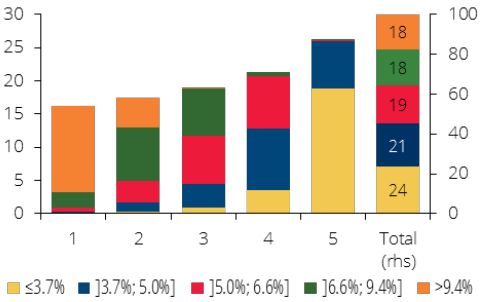
Despite the limitations (e.g. not incorporating information on the quality of construction of immovable property or equipment related to air conditioning and domestic hot water production), this indicator is used as proxy for the energy efficiency of immovable property.

63% of the housing loans under review were concentrated in the higher energy-intensity quintiles (3, 4 and 5), i.e. those referring to lower energy-efficient immovable property (Chart B5.4).[4] However, only 4% of this exposure has current loan-to-value (LTV) ratios above 80%, thus mitigating any impact from a reduction of the value of less efficient immovable property on banks' exposure. Looking ahead, loan maturity may be a relevant factor in the "duration" of this risk, as (i) new immovable property transactions will be associated with a lower level of risk (given existing requirements) and (ii) credit supply conditions depend on energy efficiency, creating additional incentives to improve the older immovable property.

[3] Location refers to NUTS2 (seven regions); the size of the immovable property in m² was divided into quintiles.

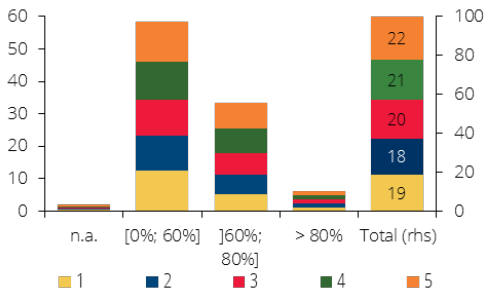
[4] According to ADENE data, 68% of certificates issued between 2014 and 2022 for residential buildings had a lower energy certification (C, D, E, F).

Chart B5.3 • % of loans secured by immovable property, per energy expenditure-to-income ratio and income quintile | Per cent



Source: Banco de Portugal and Statistics Portugal (IDEF).

Chart B5.4 • % of loans secured by immovable property, per current LTV and energy efficiency level | Per cent



Source: Banco de Portugal and Statistics Portugal (IDEF). Notes: The standard efficiency indicator has been divided into quintiles where the 1st corresponds to a higher efficiency level; the current LTV calculated based on granular data at the loan level (CCR). Whenever the date of the last valuation of the immovable property is prior to 2022Q1, its current value is estimated using Statistics Portugal's Housing Price Index.

II Special issues

The impact of rising interest rates on firms' debt service

Usability of capital buffers as a result of their interaction with regulatory minimum requirements

The impact of rising interest rates on firms' debt service

1 Framework

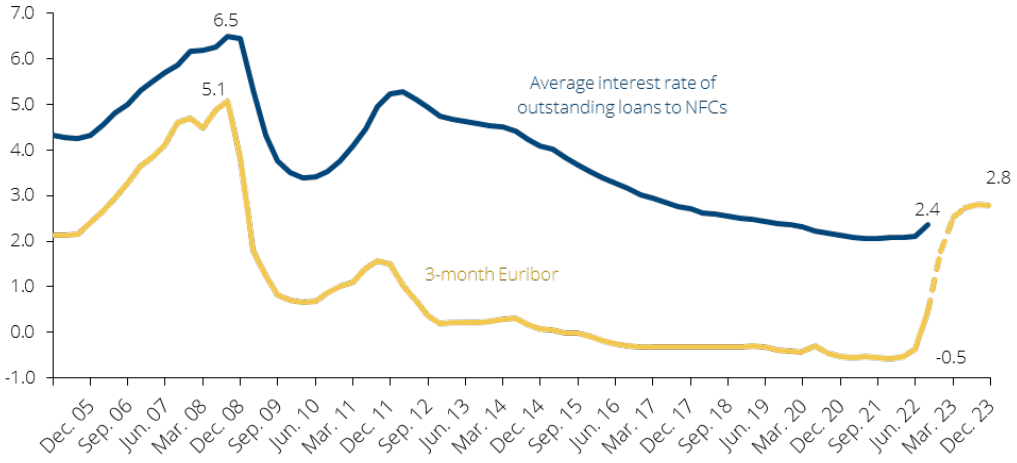
Money market interest rates posted an abrupt increase recently. Market-based expectations point to a continuation of this upward trend and convergence of Euribor rates across maturities to close to 3% by mid-2023. This is historically a normal value, but a significant change compared to the last 15 years (Chart 1).

This shock will rapidly increase the financing costs of firms. Increasing interest rates will have an immediate impact on the cost of new lending to firms and a lagged impact on stock. Nevertheless, the combination of maturity and interest rate fixation periods structures for bank loans to firms will imply a rapid pass-through of the increase in money market interest rates to the cost of the stock of credit, although some temporary compression in spreads could be observed (see Castro G. & Santos C., (2010)). In August 2022, around 70% of the stock of loans to firms were linked to a Euribor rate with a maturity of up to 12 months and around 15% – although granted at a fixed rate or with another type of rate – had a residual maturity of less than 1 year, and therefore refinancing is expected to take place at a higher cost (Chart 2).

The ability of firms to cope with an increase in interest rates is higher than in previous crises, but vulnerabilities remain, associated with firms that are more impacted by recent economic developments. The reduction in indebtedness and the increase in firms' capital between the sovereign debt crisis and the pandemic crisis, as well as the recovery of firms' profitability after the pandemic shock, will mitigate the materialisation of default stemming from increasing interest rates. The accumulation of deposits by firms during the pandemic crisis, reinforcing the increased liquidity already observed since 2013, also contributed to the current position of less vulnerable firms in relation to previous crises. However, these mitigating factors may be of lesser value for firms that were most impacted by the pandemic crisis and/or increased costs of energy and/or other commodities.

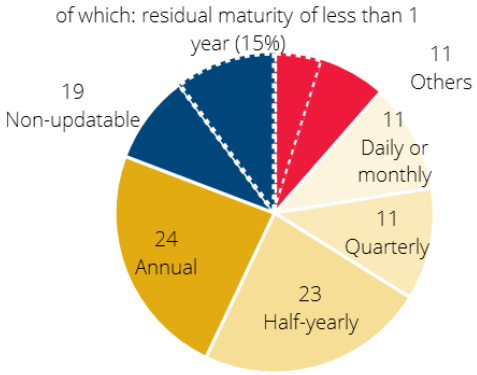
This Special issue analyses the impact of rising interest rates on the debt servicing capacity of non-financial corporations until the end of 2023. Based on the model by Augusto et al. (2022), two indicators are analysed: (i) the financing expenses coverage ratio (hereinafter referred to as ICR, the acronym for interest coverage ratio, a similar concept) as measured by the ratio of EBITDA to interest expenses, and (ii) the share of vulnerable firms, defined as firms with an ICR below 2. In this analysis, only firms with bank loans or other financial debt and with positive equity at the end of 2021 were considered.

Chart 1 • Average interest rate of NFCs loan stock and 3-month Euribor | Per cent



Sources: Banco de Portugal and Refinitiv.

Chart 2 • Decomposition of the stock of loans to NFCs by interest rate update frequency in August 2022 | Per cent



Source: Banco de Portugal. | Notes: Information from the Central Credit Register. The dashed lines represent the category "of which: residual maturity of less than 1 year" of the "Non-updatable" category (blue) and "Others" (red).

2 Methodology and projection scenarios

The exercise is based on the simulation model for the balance sheet, the profit and loss account and the cash flow statement by Augusto et al. (2022), which combines granular information per firm available at the Central Balance Sheet Database and Central Credit Register with the Banco de Portugal's projections for the Portuguese economy from the June 2022 issue of the Economic Bulletin. Taking into account the monetary policy decisions taken since June 2022 and market expectations, this exercise considered a path of interest rates on loans to firms based on implied expectations for the 3-month Euribor in the corresponding futures contracts (average of September's expectations), while maintaining their average spread.

The projection for GVA and other variables in the macroeconomic scenario does not mirror the conditions associated with this path. Assuming that the most significant increase in interest rates on loans could be related to a less favourable macroeconomic scenario in 2023 and, therefore, with lower EBITDA growth, the results obtained could be taken as a lower bound for the impact until the end of 2023. In turn, the recent upward revision of the 2022 forecast could contribute to an improvement in the projection outcome.

The simulation exercise builds on the financial situation of private firms with bank loans or other financial debt and with positive equity at the end of 2021, in a universe of 229,000 that account for 75% of total bank credit, 78% of total assets of private firms and 87% of staff working.

Interest is estimated by applying the interest rate to bank loans and other financial debt, thereby fully passing on the increases to the cost of financing. In turn, debt is the result of a sequential exercise which considers, each quarter, (i) the estimated repayments based on the observed average residual maturity and (ii) new financing arising from a firm's liquidity needs, assuming that it only obtains such financing if its GVA has increased in previous years or if it meets the eligibility criterion defined as a ratio of EBITDA to financing expenses higher than 2. Debt restructuring is not taken into account.

EBITDA is estimated based on the firms' profit and loss account, where changes in its components are aligned with the GVA projection of the sector of activity to which the firm belongs, considering a breakdown into 13 sectors.

The potential increase in the return on firms' financial assets stemming from rising interest rates, especially for deposits, is not considered in this exercise. This simplification is mainly justified by the lack of representativeness and significant intertemporal irregularity of such income. In addition, against a context of abundant liquidity in the banking system and virtually nil interest rates on deposit balances, that return is expected to increase slowly and to still low levels.

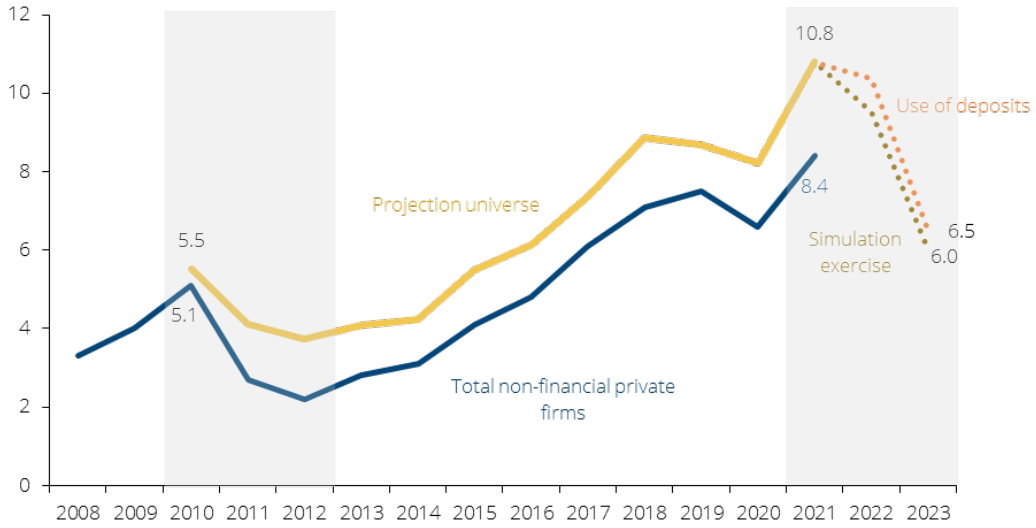
In a second simulation exercise, the possibility was considered that firms would reduce their cost of financing through an additional repayment of financial debt in the amount of the liquidity surplus accumulated in recent years. A firm uses its deposits until it maintains: (i) an amount consistent with the average liquidity ratio of firms in the same sector of activity and of a similar size in the period 2017-19 or (ii) an amount equal to the average of the firm's deposits in the same period if this latter amount is lower than the former.

3 Change in the ICR and the share of vulnerable firms

The increase in interest rates decreased the ICR from 10.8 in 2021 to 9.5 in 2022 and 6.0 in 2023 (Chart 3). In the latter year, the ICR is lower than in 2019 and close to 2015-16, taking the projection universe as a reference. These results are similar to those presented in Box 2 of the October 2022 issue of the Economic Bulletin, albeit based on different simulation assumptions. The 4.8 decrease in the ICR stems from firms' increased interest expenses, whose effect is estimated at -6.2, while the improvement in operating income and the indebtedness stability have an estimated impact of +1.3 (Table 1).

The estimated reduction in the ICR between 2021 and 2023 is greater than that observed during the sovereign debt crisis, but the ratio is estimated to remain above that observed between 2010 and 2012. Against a comparable universe, the 4.8 fall in the ICR between 2021 and 2023 compares with a 2.7 decline between 2010 and 2012, when EBITDA was the main driver of the ratio reduction (-1.9).

Chart 3 • Developments in financing expenses coverage ratio | Number of times



Source: Banco de Portugal. | Notes: Financing expenses coverage ratio (ICR) is defined as the ratio of aggregate EBITDA to aggregate interest expenses. "Projection universe" considers firms with positive equity and financial debt in December 2021. "Total non-financial private firms" considers all firms in Portugal. "Use of deposits" considers the additional repayment of financial debt to the amount of accumulated liquidity surpluses compared to 2017-19.

Table 1 • Contributions to developments in the financing expenses coverage ratio, comparison between the simulation exercise period and the sovereign debt crisis | Difference in the number of times

	Initial year	T_{+1}	T_{+2}
Change in ICR			
Simulation exercise	2021	-1.3	-3.5
Sovereign debt crisis	2010	-2.3	-0.4
EBITDA contribution			
Simulation exercise	2021	0.7	0.3
Sovereign debt crisis	2010	-1.5	-0.4
Interest rate contribution			
Simulation exercise	2021	-2.2	-4.0
Sovereign debt crisis	2010	-0.8	-0.2
Financial debt contribution			
Simulation exercise	2021	0.2	0.1
Sovereign debt crisis	2010	0.0	0.2

Source: Banco de Portugal. | Notes: Financing expenses coverage ratio (ICR) is defined as the ratio of aggregate EBITDA to aggregate interest expenses. The contribution of debt and interest is calculated assuming that the firms' total interest expenses correspond to the product between the value of the interest rate and their financial debt. The change in the ICR and the contributions for the "Sovereign Debt Crisis" series is based on the pool of firms with positive equity and financial debt in 2010, in line with the definition of the universe of firms set for the simulation exercise.

The higher 2023 ICR than in the 2010-12 period reflects a better starting point than that of 2010. In 2021, the ICR was 10.8, approximately double that of 2010 (5.9). This difference is mainly the result of substantially lower implicit interest rates (4.6% and 2.7% respectively) for similar nominal

debt levels and EBITDA. However, in 2021, the firms' leverage ratio (measured by the ratio of financial debt to total assets) was lower than in 2010 (30.6% and 37.6% respectively), reflecting the adjustment of the firms' financial situation following the sovereign debt crisis.

The most significant decline is the estimated reduction of 6.5 units of the ICR in the sectors that were more affected by increased energy and/or other commodity prices, but which were not affected by the pandemic. In contrast, firms affected by both shocks show the lowest decrease in the ICR between 2021 and 2023, by 2.9 units (Table 2). Across firm sizes and sectors of activity, a sharper decline is estimated for micro-enterprises and manufacturing firms.

Table 2 • Developments in the financing expenses coverage ratio by firm segments
| Number of times

	Observed			Simulation exercise		Use of deposits	
	2019	2020	2021	2022	2023	2022	2023
Total	8.7	8.2	10.8	9.5	6.0	10.4	6.6
Size							
Micro	13.6	12.5	13.9	10.1	6.9	12.2	8.3
Small	10.7	10.2	13.8	12.8	8.2	15.0	9.7
Medium	9.5	8.5	10.6	10.4	6.5	11.4	7.1
Large	7.0	6.8	9.1	7.9	4.9	8.3	5.1
Sector of activity							
Manufacturing	13.5	11.5	15.7	14.4	8.8	15.9	9.7
Construction and real estate	7.6	7.4	7.4	6.5	4.3	7.2	4.7
Trade	10.9	9.7	12.9	13.7	9.0	15.8	10.3
Accommodation and food services	12.4	-0.6	6.2	5.9	4.6	6.6	5.1
Pandemic impact and increased costs of energy and/or other commodities							
Less affected	7.0	8.3	10.1	9.4	6.1	10.3	6.7
Only energy and/or commodities	9.6	9.2	12.2	9.6	5.7	10.4	6.2
Pandemic only	12.7	7.5	12.7	11.5	7.6	13.0	8.6
Both	11.1	4.0	7.1	6.5	4.2	7.1	4.5

Source: Banco de Portugal. | Notes: Financing expenses coverage ratio (ICR) is defined as the ratio of aggregate EBITDA to aggregate interest expenses. Only firms with positive equity and financial debt in December 2021 were considered. The column "Use of deposits" considers the additional repayment of financial debt to the amount of accumulated liquidity surpluses compared to 2017-19. Sectors that are more affected by a rise in energy and/or commodity costs are considered to be those with a value above the 75th percentile (unweighted figures) in at least one of the following aggregate ratios (by CAE subclass): energy costs over total production costs or expenditure on commodities over total production costs (according to the definition of the Chart B4.1 of the June 2022 issue of the *Financial Stability Report*). The sectors more affected by the pandemic include those set out in Decree-Law No 22-C/2021 and/or those eligible for the support line for economic recovery – Retomar programme.

However, the firms that were more affected by both shocks show the largest decrease in the ICR when considering the time range between 2019 and 2023 (-6.9). Interest rates are rising after a period of heterogeneity in the economic performance of the sectors of activity. Thus, changes in the ICR reflect the impact of the pandemic crisis and firms' recovery profile, in addition to developments in the amount of interest expenses each period. The estimated fall between 2019 and 2023 is larger in the sectors that were more affected by both shocks, but the impact of the increased interest rate between 2021 and 2023 is mitigated as a result of the continued economic recovery of some of these sectors in 2022. In particular, the ICR for accommodation and food services corresponds to 4.6 in 2023, around one third of that observed before the pandemic crisis

in 2019 (12.4). This reduction occurred mainly between 2019 and 2021(-6.2 units), with an estimated reduction of 1.6 units between 2021 and 2023.

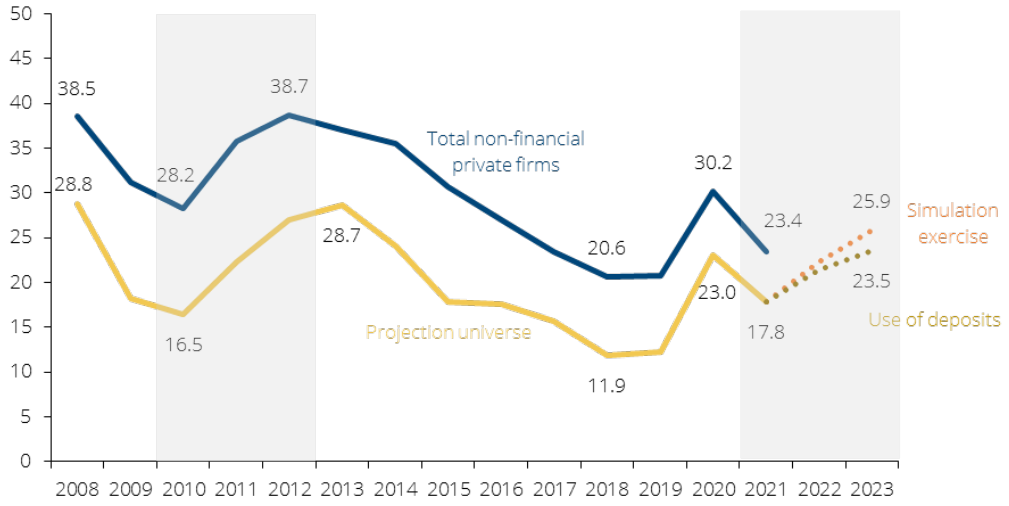
The possibility of repaying debt with deposits mitigates the fall in the ICR, but the ratio would remain below 2021 figures. In 2023, considering the effect of deposits, the ICR would be 0.6 units higher for all firms. The mitigating effect is higher in micro and small enterprises, 1.4 and 1.5 units, and in the manufacturing and trade sectors, 0.9 and 1.3 units. In turn, this effect is less strong for firms that are more affected both by rising costs of energy and/or other commodities and by the pandemic, 0.3 units.

Companies may also use own funds to repay their debt, limiting the impact of interest increases. This possibility was assessed by reducing the share of profit distribution to half its historical value. In aggregate terms, this assumption is estimated to increase the ICR by 0.2 units.

Between 2021 and 2023, the share of vulnerable firms is estimated to increase by 8 p.p. following favourable developments in 2021, yet remaining below that observed during the sovereign debt crisis. This indicator makes it possible to identify firms that are more fragile and complement the analysis of the firms' aggregate based on the ICR. The share of vulnerable firms is estimated to increase to 26% in 2023 (Chart 4). This figure is higher than in 2020 (23%), but lower than in 2013 (29%). The use of deposits for debt repayment partially mitigates this increase, although the share of vulnerable firms (24%) remains higher than in 2019 (12%). If the use of own funds were to be considered additionally, this share would be reduced to around 23%.

An increase in the share of vulnerable firms between 2021 and 2023 is broadly based across all sectors of activity, firm sizes and categories. (Table 3). The increase in vulnerability is more significant in the construction and real estate sectors (+13 p.p.) and the sectors that are more affected by rising prices of energy and/or commodities and less affected by the pandemic crisis (11 p.p.). By size, the largest increase in this indicator occurs in large firms (+11 p.p.). However, the mitigating effect of deposits is also greater for the latter two groups of firms (5 and 4 p.p.). In the construction and real estate activities sectors, the proportion of firms with financing expenses coverage ratios close to the vulnerability threshold in 2021 is higher than in most sectors, which contributes to the more pronounced increase in 2022.

Chart 4 • Developments in the share of vulnerable firms | Per cent



Source: Banco de Portugal. | Notes: A firm is considered vulnerable if the ratio of EBITDA to interest expenses in the current year is below 2 or if the EBITDA is negative. Asset-weighted figures. The projection universe considers firms with positive equity and financial debt in December 2021. The series "Total non-financial private firms" considers all private firms in Portugal and the series "Use of deposits" considers the additional repayment of financial debt in the amount of accumulated liquidity surpluses compared to 2017-19.

Table 3 • Developments in the share of vulnerable firms by firm segments | Per cent

	Observed			Simulation exercise		Use of deposits	
	2019	2020	2021	2022	2023	2022	2023
Total	12.3	23.0	17.8	22.3	25.9	21.4	23.5
Size							
Micro	18.3	32.8	26.4	31.7	31.0	30.0	29.4
Small	15.4	24.9	16.6	22.6	22.6	21.8	21.4
Medium	11.9	25.9	20.2	25.3	26.5	24.8	25.9
Large	9.1	17.0	13.9	17.0	25.3	16.3	21.1
Sector of activity							
Manufacturing	7.7	19.7	15.9	19.8	19.8	19.2	19.3
Construction and real estate	21.8	27.0	26.7	38.2	39.5	36.8	38.2
Trade	8.2	20.6	11.8	14.7	14.3	14.1	13.7
Accommodation and food services	10.5	69.6	39.5	41.5	42.5	40.8	42.0
Pandemic impact and increased costs of energy and/or other commodities							
Less affected	16.4	21.9	17.1	22.4	23.3	21.6	22.4
Only energy and/or commodities	7.4	17.0	15.8	18.1	26.7	17.4	21.9
Pandemic only	11.6	27.6	16.2	20.8	22.5	19.9	21.0
Both	10.1	50.3	34.1	37.8	38.5	37.4	38.3

Source: Banco de Portugal. | Notes: A firm is considered vulnerable if the ratio of EBITDA to interest expenses in the current year is below 2 or if the EBITDA is negative. Asset-weighted figures. Only firms with positive equity and financial debt in December 2021 were considered. The column "Use of deposits" considers the additional repayment of financial debt in the amount of accumulated liquidity surpluses compared to 2017-19. The sectors most affected by the rise in energy and/or other commodity costs and the sectors most affected by the pandemic are defined as detailed in the notes of Table 2.

4 Conclusions

Considering the maturity and the fixation period of interest rates on bank loans to firms, the expected increase in interest rates until mid-2023 will likely have a significant and relatively rapid impact on their cost of financing, which poses a risk to debt servicing capacity.

However, in 2021, firms' financial situation was more favourable than that observed during the sovereign debt crisis, owing to the adjustment process that took place between 2013 and 2019, the increase in deposits in a recent period and the recovery of the economy after the pandemic shock.

Based on an estimation model for the balance sheet, the profit and loss account and the cash flow statement per firm, the impact on the financing expenses coverage ratio and the share of vulnerable firms to the end of 2023 was analysed in comparison with the period of the sovereign debt crisis, a period with rising interest rates.

In 2023 firms are estimated to have an ICR of 6.0, lower than in 2019 (8.7), reversing the 2021 improvement, when the ICR was 10.8. These developments are estimated for most sectors of activity – albeit more markedly for manufacturing – and all firm sizes.

The estimated reduction in the ICR between 2021 and 2023 (-4.8 units) is greater than that of the sovereign debt crisis (-2.7 units), although it remains at a higher level than in that period. This reflects firms' different situations at the starting point, which was more favourable in 2021 than in 2010, as a result of the adjustment that took place following the sovereign debt crisis, and favourable developments in the EBITDA over the projection period.

Between 2021 and 2023, the share of vulnerable firms is estimated to increase from 18% to 26%, after favourable developments in 2021, but lower than that observed during the sovereign debt crisis (29% in 2013).

Against rising interest rates, firms will be able to use their own resources to repay their debt and limit the increased costs of financing. The possibility of using liquidity surpluses accumulated in recent years will allow the ICR and the share of vulnerable firms, estimated for 2023, to be reduced by 0.5 units and 2 p.p, respectively. However, this is insufficient to reverse the main findings. A decrease in firms' profit distribution would lead to a negligible additional reduction of these indicators. In turn, the recent upward revision of the forecast for economic activity in 2022 may contribute to the materialisation of a more favourable situation than that estimated.

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Usability of capital buffers as a result of their interaction with regulatory minimum requirements

1 Introduction

The regulatory framework governing the banking sector is primarily aimed at increasing the resilience of each institution and the financial system. In the European Union (EU), institutions must meet three requirements at the same time: (i) risk-based capital requirements (RW), including the Combined Buffer Requirement (CBR); (ii) leverage ratio requirements (LR); and (iii) minimum requirements for own funds and eligible liabilities (MREL).

The CBR can only be used to absorb losses if using it does not lead to a breach of parallel minimum requirements. As the own funds used to meet the CBR can contribute to fulfilling more than one regulatory requirement, when such own funds are necessary to meet the minimum requirements of another regulatory requirement, the effectiveness of CBR as a macroprudential tool is affected (see the Special issue of the June 2020 *Financial Stability Report*).

This Special Issue quantifies the materiality of the restriction against the usability of the CBR depending on its interaction with parallel minimum requirements: LR and MREL. The analysis was based on data as at June 2022, without considering assumptions on the issuance of instruments eligible for MRELs in the coming years. The issuance of eligible liabilities to meet MREL in the coming years would increase the usability of the CBR interacted with MREL. The sample includes the banking groups operating in Portugal identified as other systemically important institutions (O-SIIs) in the 2021 financial year (Banco Comercial Português, Caixa Geral de Depósitos, Santander Totta, LSF Nani Investments, Banco BPI, and Caixa Económica Montepio Geral).

2 Description of the regulatory requirements

Capital buffers are one of the main macroprudential policy instruments in the EU. RW requirements set a minimum amount of own funds corresponding to a percentage of the total risk-weighted exposure amount. The aim is to prevent institutions from taking on more risk without holding an appropriate capital level to cover that risk.

Capital buffers are aimed at enhancing the financial system's capacity to absorb unexpected losses to preserve financial stability and mitigate systemic risk. These buffers can be used to absorb losses in adverse periods. To ensure proper alignment of incentives, institutions that do not comply with CBRs are subject to automatic restrictions on: (i) profit distribution, (ii) the payment or creation of obligations to pay variable remuneration, or (iii) making payments on additional Tier 1 instruments, until compliance is restored in accordance with a capital conservation plan authorised by the competent (microprudential) authority.

Prudential requirements (RW and LR) apply to credit institutions and investment firms.

LR requirements are expressed as a percentage of the total exposure measure, which includes on-balance sheet assets and off-balance-sheet items that are not risk-weighted. The introduction of a regulatory minimum for the leverage ratio acts as a complementary measure to the risk-based capital requirements, by restricting the build-up of excessive leverage in the expansionary phase

of the financial cycle. In addition, the LR requirement mitigates risks stemming from underestimated capital requirements calculated using an internal ratings-based approach (IRB).

The resolution requirements (MREL) aim to ensure that institutions and entities established in the EU have sufficient loss-absorbing and recapitalisation capacity to: (i) ensure the continuity of essential financial services, (ii) maintain the stability of the financial system, (iii) reduce moral hazard by minimising reliance on public financial support to failing institutions, and (iv) protect depositors. The MREL should be met through own funds and eligible liabilities and is expressed in two ratios that must be met simultaneously: (i) as a percentage of total risk-weighted exposure amount (MREL-RW) and (ii) as a percentage of the total exposure measure (MREL-LR). All other things being equal, if institutions increase their eligible liabilities, they increase the usability of the CBR own funds by no longer needing those own funds to comply with MREL.

The simultaneous use of the same unit of own funds to meet capital buffers and parallel minimum requirements (LR and MREL) affects how buffers can be used (Table 1). Only the part of the capital buffers that is not simultaneously used to meet the LR or that part of Common Equity Tier 1 capital that is not necessary to comply with MREL and is available for building up capital buffers can be used for its loss absorption purpose. Any non-compliance with the other requirements (LR and MREL) may in turn lead to the intervention of the microprudential or resolution authority, including through the application of supervisory and early intervention measures. In addition, this may lead to the institution being assessed as "failing or likely to fail" and, in the extreme case, to the withdrawal of the authorisation of activity (except in the case of non-compliance with MREL).

In a situation where the usability of CBR is restricted, if the macroprudential authority decides to release, in full or in part, a capital buffer, the institution may not benefit from this measure if this leads to a breach of minimum LR requirements or if capital buffers are insufficient because part of that capital is necessary to comply with MREL.

Table 1 • Summary of regulatory requirements

Regulatory requirement	Purpose	Requirement ratio denominator
Risk-based capital requirements (RW)	Prevent institutions from taking on more risk without having an appropriate level of own funds to cover this risk	Total risk-weighted exposure amount
Leverage ratio requirements (LR)	Restrain the accumulation of excessive leverage in the expansionary phase of the cycle and mitigate risks emerging from underestimated capital requirements determined through internal approaches	Total exposure measure
Requirements for own funds and eligible liabilities (MREL)	Allow institutions to absorb losses expected in resolution or at the point of non-viability, as appropriate, and to be recapitalised after the implementation of actions provided for in the resolution plan	Total risk-weighted exposure amount (MREL-RW) and total exposure measure (MREL-LR)

2 Usability of capital buffers

This section quantifies, for Portuguese O-SIIs, the percentage of the CBR that is affected by parallel minimum requirements (LR and MREL).

Interaction between CBR and LR

The usability of the CBR is limited by the difference between the amounts of own funds needed to meet the leverage ratio minimum requirements (MR-LR) and minimum requirements based on risk (MR-RW). There is a restriction on the usability of the CBR in situations where the amount of own funds to meet MR-RW is lower than for MR-LR. In the reverse scenario, where the amount of own funds to meet MR-RW is higher than that of MR-LR, there would be no restriction on the (partial or total) usability of the CBR.

The structure of the institution's balance sheet, in particular the risk weights of each asset, determines the amount of own funds necessary to meet RW and LR requirements. The lower the average risk weight, the lower the possibility for the CBR to be used due to the interaction with LR requirements. Therefore, all else being equal, institutions with lower buffer usability will be those with the lowest average risk weight, characterised by a lower amount (in relative terms) of own funds to meet risk-based capital requirements (except for Tier 2 own funds, which cannot be used to meet the leverage ratio).

Around 6% of the CBR associated with the aggregate of the Portuguese O-SIIs is restricted because it is necessary to comply with MR-LR (Table 2). Thus, the amount of own funds available to absorb losses without failure to meet MR-LR corresponds to the management buffer and Pillar 2 Guidance (P2G), and 94% of the CBR. The observed restriction in the use of capital buffers is mainly due to portfolios whose requirements are calculated using the IRB approach, which tend to operate with lower average risk weights.

Interaction between the CBR and MREL-LR

The interaction of RW requirements with MREL-LR requirements limits the usability of the CBR if the institution needs CBR own funds to meet the MREL-LR.

Around 13% of the CBR of the Portuguese O-SII aggregate is restricted to absorb losses due to compliance with MREL-LR (Table 2). Thus, the amount of own funds available to absorb losses without failure to meet MREL-LR corresponds to the management buffer and P2G, and 87% of the CBR of the Portuguese O-SIIs.

Interaction between the CBR and MREL-RW

Own funds used to meet the MREL-RW cannot be used simultaneously to meet the CBR. Institutions must comply with the MREL-RW minimum requirements before they can meet the CBR on top of MREL-RW. If an institution complies with the CBR but does not comply with the CBR on top of MREL-RW, restrictions on distributions (e.g. dividends) that are not automatic apply. Full compliance with MREL-RW, including the CBR on top of MREL-RW in the stacking order of own funds, will ensure 100% usability of the CBR.

Around 2% of the CBR of the Portuguese O-SII aggregate is restricted to absorbing losses because it is necessary to comply with MREL-RW (Table 2). This is because the sum of eligible liabilities, own funds used to meet the MR-RW and P2G, and management buffer are insufficient to comply with MREL-RW.

Table 2 • Summary of CBR usability due to interaction with minimum regulatory requirements

Minimum regulatory requirement	CBR usability
LR	94%
MREL-LR	87%
MREL-RW	98%

Note: The data for Portugal are for June 2022 and the sample corresponds to the banking groups identified as O-SIIs in the 2021 financial year.

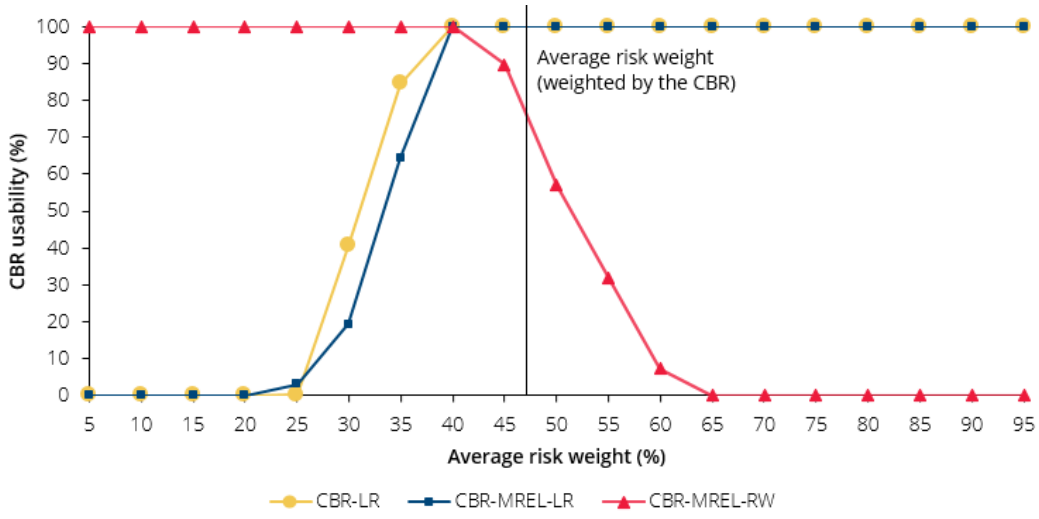
Sensitivity of CBR usability

Restrictions on the usability of the CBR, caused by interactions with other minimum regulatory requirements, depend on: (i) the relative calibration of the requirements at the discretion of the authorities (Pillar 2 Guidance, CBR and MREL); and on (ii) the structure of the institution's balance sheet, in particular the risk weights assigned to each asset.

Chart 1 shows the relationship between the average risk weight and the percentage of usability of the CBR. An increase in the average risk weight increases the usability of the CBR in its interaction with the LR (yellow line) and MREL-LR (blue line) requirements but reduces the usability of the CBR in its interaction with MREL-RW (red line). The vertical line indicates the average risk weight (weighted by the CBR) of the Portuguese O-SIIs.

The issuance of eligible liabilities to meet MREL contributes to an increase in the usability of the CBR interacted with MREL. In Chart 1, this would correspond to the blue line (CBR-(MREL-LR) interaction) moving to the left and the red line (CBR-(MREL-RW) interaction) moving to the right.

Chart 1 • Sensitivity of CBR usability to changes in average risk weights (weighted by the CBR)



Source: Banco de Portugal. | Note: The data for Portugal are for June 2022 and the sample corresponds to the banking groups identified as O-SIIs in the 2021 financial year. The usability of the CBR (%) is weighted by the amount of own funds to meet the CBR of each O-SII.

3 Conclusions

The interactions between the CBR and the other minimum regulatory requirements depend on (i) the relative calibration of the different requirements and (ii) the structure of the institutions' balance sheet, in particular the risk weights assigned to each asset.

In the interaction between the CBR and the requirements that are not risk-weighted (LR and MREL-LR), institutions with lower average risk weights will have a lower buffer usability. This means that they need a lower amount of own funds to meet risk-based capital requirements, but the other requirements become more restrictive. In terms of MREL-RW, Portuguese O-SIIs show a slight restriction (2%). It should be noted that CBR usability by Portuguese O-SIIs compares very well with the European bank average. For more details on usability at European level, see the *Report of the Analytical Task Force on the overlap between capital buffers and minimum requirements*, published by the European Systemic Risk Board in December 2021. Unlike the analysis presented in this Special issue, that analysis uses dynamic balance sheet assumptions, i.e. the results for European countries are calculated in a scenario in 2024 where each institution achieves full compliance with the final MREL targets, including the CBR on top of the MREL-RW, and has a minimum management buffer of 1% of risk-weighted assets.

The introduction and full implementation of the output floor, defined by the Basel Committee on Banking Supervision and currently under discussion, could contribute to an increase in the usability of the CBR interacted with minimum requirements not risk-weighted (LR and MREL-LR), due to the potential increase in the average risk weights of institutions using the IRB approach to calculate risk weights. The issuance of eligible liabilities to meet MREL in the coming years is paramount to the usability of the CBR due to its interaction with MREL.

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