FINANCIAL STABILITY REPORT

JUN. 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

Over the past few months, the European economy has been under the simultaneous influence of two unprecedented exogenous shocks of international reach. In some dimensions, the Russian Federation's invasion of Ukraine has amplified the effects of the COVID-19 pandemic. It has particularly affected energy and commodity markets and supply chains, leading to increased uncertainty, constraining the recovery in economic activity and exacerbating the inflationary pressures that had already stemmed from the pandemic. In addition, the balance of risks surrounding inflation projections is skewed upwards owing to the possibility of a longer conflict and additional constraints on energy supply.

The monetary policy of the European Central Bank (ECB) started the normalisation process in December 2021, marked by the announcement of the end of net purchases under the pandemic emergency purchase programme (PEPP) in March 2022, while remaining accommodative and supporting favourable financing conditions amid high inflation. As the normalisation process continues, the ECB announced in June 2022 the end of net purchases under the asset purchase programme (APP) as of 1 July and an increase in key interest rates also starting in July. A September increase was also signalled, the calibration of which will depend upon the medium-term inflation outlook.

The main risks to financial stability are:

- The risk of a further reassessment of risk premia, despite the correction that has already taken place. A significant reassessment may interact with the vulnerabilities accumulated during the pandemic and reduce asset prices, with an impact on the financial system, especially on the valuation of portfolios;

- The risk of a fall in residential real estate prices resulting from changes in financing conditions. In the context of the recent higher growth in housing loans, it is crucial to ensure that it does not become a key determinant of price developments in the real estate market. The adoption of the macroprudential Recommendation on new credit agreements led to an improvement in the risk profile of borrowers and in the characteristics of the housing loan portfolio. The loan-to-value (LTV) ratio of the housing loan portfolio indicates resilience to a potential correction in residential real estate prices;

- The reduction in real disposable income due to inflation and the effect of rising interest rates on debt service pose the most relevant risks to households' financial situation. Uncertainty regarding developments in economic activity and, consequently, employment accrue to that. However, the support measures and the increase in savings and deposits in 2020 and 2021 may mitigate the impact of these shocks, albeit in a differentiated manner according to income and the scope of such measures;

- The increased probability of firm default, reflecting the combined effect of the financial vulnerability of some of these firms, the incomplete recovery in activity and profitability of some sectors following the pandemic and the current macroeconomic and financial environment;

- The added risk to the downward path foreseen for the general government debt-to-GDP ratio arising from uncertainty about developments in economic activity and the increase in financing costs. According to the projections published by the European Commission and the International Monetary Fund, the debt ratio is expected to decline further in the coming years, although it should remain high;

- The increase in interest rates is expected to result, in the coming years, in an improvement in banks' net interest income and an increase in the recognition of impairment and potential losses from the devaluation of fair value assets. The impact of each of these factors is conditioned by developments in economic activity and should be differentiated according to the time horizon.

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: (i) a slowdown in global trade and in the globalisation of production processes, with a possible increase in production costs, reflecting geopolitical risks and disruptions to global value chains; (ii) the geopolitical pressure on energy markets, coupled with the need for the energy transition arising from the climate crisis, which will require large investments and lead to added uncertainty as to the technological capacity required for this transformation; and (iii) the increase in the digitalisation of the economy, accelerated by the pandemic crisis, resulting in an increase in risks associated with it, namely cyber risks and those related to money laundering and terrorist financing.

The materiality of these challenges will require considerable investment efforts from the different resident institutional sectors. Banks' ability to generate capital, the fiscal policy leeway and the indebtedness and debt servicing of the non-financial private sector, which are interrelated, are vulnerabilities that affect and constrain the investment decisions of the various sectors. It is therefore increasingly important that the funds made available to the Portuguese economy through the Recovery and Resilience Plan (RRP) are used efficiently.

Macroprudential policy should take into account the current challenges to financial stability, more structural and lasting vulnerabilities and the origin of systemic risk. Particularly relevant in recent months was the amendment to the Recommendation relating to new credit for house purchase and new consumer credit, with the maximum maturity of new credit agreements for house purchase being dependent on the borrowers' age to promote the convergence of the average maturity of these loans towards 30 years.

I Financial stability outlook

1 Vulnerabilities, risks and macroprudential policy

1.1 Key vulnerabilities and risks

The economic recovery from the pandemic, which had started to consolidate, is now facing the challenges stemming from the new surge in measures to combat the pandemic in Asia and from the invasion of Ukraine by Russia. These developments have created a highly unpredictable economic, social and geopolitical framework. The European economy faces two large exogenous shocks simultaneously, with impact on energy and commodity markets and in supply chains, which constrain economic growth prospects and introduce inflationary pressures. Thus, the longer-lasting effects of the pandemic, such as increases in public and private indebtedness, are now joined by those triggered by geopolitical uncertainty.

Between March and June 2022, the growth projected for the Portuguese economy for the current year was revised upwards, reflecting the higher than expected momentum in activity during the first quarter of the year. However, the deterioration in the international environment constrains developments in activity in the following quarters, resulting in downward revisions to quarter-on-quarter rates of change in GDP. Inflation projections have been revised upwards over the whole horizon, especially for 2022.

The ECB monetary policy started the normalization process in December 2021, marked by the announcement of the end of net purchases under the PEPP in March 2022, while remaining accommodative and supporting favourable financing conditions amid high inflation. As the normalisation process continues, the ECB announced in June 2022 the end of net APP purchases as of 1 July and an increase in key interest rates also starting in July. A September increase was also signalled, the calibration of which will depend upon the medium-term inflation outlook.

In the current context of uncertainty and monetary policy normalisation, the main vulnerabilities and risks to financial stability are:

- The risk of a further reassessment of risk premia, despite the correction that has already taken place. The increase in uncertainty has materialised in higher volatility in international financial markets, which constrains investors' prospects and may lead to an increase in their risk aversion. Despite the previous correction of sovereign and corporate debt yields and some equity markets, there is a risk of further corrections. A significant repricing may interact with the vulnerabilities accumulated during the pandemic and lead to an additional fall in asset prices, with an impact on the financial system, especially on the valuation of portfolios.
- The risk of a fall in residential real estate prices resulting from changes in financing conditions. In line with international developments and despite the uncertainty arising from the pandemic crisis, residential real estate market prices continued to increase in Portugal, reflecting, among others, housing demand by non-residents, which did not change, and supply shortages. In recent years, domestic bank credit has not been the main factor behind the rise in housing prices. However, in the context of the recent higher growth in housing loans, it is crucial to ensure that it does not become a key determinant of price developments in the real estate

market. The adoption of the macroprudential recommendation on new credit agreements led to an improvement in the risk profile of borrowers and in the characteristics of the housing loan portfolio. The loan-to-value (LTV) ratio of the loan portfolio for house purchase indicates resilience to a potential correction in residential real estate prices.

- **The reduction in real disposable income due to inflation and the effect of rising interest rates on debt service pose relevant risks to households' financial situation**. Uncertainty regarding developments in economic activity and, consequently, employment accrue to that. However, the support measures and the increase in savings and deposits in 2020 and 2021 may mitigate the impact of these shocks, albeit differentiated according to income and the scope of such support measures.

- **The combined effect of (i) the financial vulnerability of some NFCs, (ii) the incomplete recovery in activity and profitability of some sectors following the pandemic and (iii) the current macroeconomic and financial environment is expected to have a sharper impact on a subset of firms, increasing their probability of default.** The final impact of the increase in input costs on NFCs' financial situation will depend not only on their cost structure and public support received, but also on the persistence of shocks and firms' ability to pass-through these increases to final product prices. Higher financing costs, the impact of which will depend on firms' leverage, also add to that.

- **The increase in financing costs and uncertainty about developments in economic activity constitute an added risk to the downward trend experienced by the general government debt-to-GDP ratio.** According to the projections published by the European Commission and the International Monetary Fund, this ratio is expected to decline further in the coming years, although it should remain high, with particular emphasis on the uncertainty surrounding the projection of the determinants of this trend. Nevertheless, the historically low average cost and the average residual debt maturity (seven years) partially mitigate this risk.

- **For the banking system, developments in the economic environment in recent months increase the likelihood of market and credit risk materialising, as well as of an increase in banks' net interest income.**

  – In particular, the increase in interest rates is expected to result, in the coming years, in an improvement in banks' net interest income and an increase in the recognition of impairment and potential losses from the devaluation of fair value assets.

  – The impact of each of these risk factors is conditioned by developments in economic activity and should be differentiated according to the time horizon.

Over the medium term, structural challenges are likely to affect the various sectors of the economy broadly, with implications for economic growth and inflation.

- Heightened geopolitical risks and disruptions to global value chains intensified a trend that started with the pandemic, of a slowdown in global trade and in the globalisation of production processes, with a possible increase in production costs. Nevertheless, the Portuguese economy may benefit in part from these developments, taking advantage of its location and proximity to the European and US markets;

- The geopolitical pressure on energy markets, coupled with the need for the energy transition arising from the climate crisis, will require large investments and lead to added uncertainty as

to the technological capacity required for this transformation. Thus, despite the incontrovertible long-term benefits, transition costs are expected in the short term;

- The increase in the digitalisation of the economy, accelerated by the pandemic crisis, has also resulted in an increase in risks associated with it. Cyber risks and those related to money laundering and terrorist financing are of particular importance to financial institutions. It is therefore necessary to continue to ensure that investments fostering digital transformation also provide operational resilience, including adequate control of emerging risks.

Banks' ability to generate capital, the fiscal policy leeway and the high indebtedness and debt servicing of the non-financial private sector, which are interrelated, are vulnerabilities that affect and constrain investment decisions to address these challenges.

In the coming years, the implementation of the Recovery and Resilience Plan (RRP) should enable public and private investment to be financed without recourse to public or private indebtedness, increasing the Portuguese economy's ability to cope with its structural challenges. This will have favourable implications in terms of economic growth and the financial situation of the various economic agents. However, in implementing the RRP, the challenges inherent to the time window for using the funds (2021-26) and compliance with intermediate targets must be taken into account. These challenges were worsened by the disruption of value chains and rising prices. In addition, the implementation of the RRP may contribute to increasing the inflation rate by stimulating demand at a time when there are supply constraints.

1.2 Macroeconomic and financial markets environment

The Portuguese economy grew by 4.9% in 2021, following the pandemic-induced recession. The inflation rate increased throughout the second half of the year, mainly because of developments in services and energy prices, reaching 2.8% year on year in December 2021. The current and capital account balance improved but remained below that recorded in 2019. The international investment position became less negative, with Portugal's net external debt reaching its lowest point since the third quarter of 2009. The fiscal deficit declined by 3 percentage points in 2021 to 2.8% of GDP, while the public debt ratio declined but still remained among the highest in the euro area. In the first quarter of 2022, GDP grew by 11.9% year on year and 2.6% quarter on quarter. The quarter-on-quarter GDP acceleration was driven by a more positive contribution from private consumption. The contribution of net external demand remained slightly positive. Data for April 2022 show a recovery in tourism, with overnight stays by non-residents peaking since the start of the pandemic.

In 2022 the economy faces a new exogenous shock due to the war in Ukraine. The current situation reflects a supply shock still stemming from disruptions caused by the pandemic and now exacerbated by the Russian invasion of Ukraine, which interacts with an additional demand adjustment through the deterioration of economic agents' confidence as a result of geopolitical uncertainty. Measures to combat the pandemic caused disruptions in production and supply chains that later prevented supply from keeping-up with the recovery in demand, leading to price increases. Russia's invasion of Ukraine and further lockdown measures in Asia exacerbated this shock, with an additional impact on inflation.

The geopolitical environment raises uncertainty about economic activity and prices. The duration of the invasion and sanctions imposed on Russia, as well as the possibility of new COVID-19

outbreaks, could lead to inflationary pressures building up, with an impact on real income, confidence and trade flows owing to constraints in global supply chains.

Although the Portuguese economy is not directly exposed to Ukraine and Russia, indirect effects, mainly via prices, may be significant. Portugal is among the EU countries with lower trade flows with these two countries and is less energy dependent on these geographies. It is also geographically far from the conflict and is seen as a safe country, aspects that could benefit tourism and thus economic activity. Likewise, the Portuguese financial system's direct exposure to Russia and Ukraine is negligible, with a small exposure of credit institutions to firms with business relations with these two countries. However, second-round effects may be relevant not only because of the increase in inflation, including via a loss of real income, but also because of a possible reduction in external demand from more directly affected countries and greater constraints on global value chains. These factors, together with the normalisation of monetary policy in the euro area, will have potential repercussions on the financial sector via increased credit risk.

Between March and June 2022, projected annual growth for 2022 has been revised up, reflecting buoyant activity at the beginning of the year and inflation projections have also been revised upwards over the whole horizon, especially for 2022. In the projections published in the June 2022 issue of the *Economic Bulletin* of the Banco de Portugal (Table I.1.1) the Portuguese economy will continue to grow in 2022-24. GDP is projected to increase by 6.3% in 2022, 2.6% in 2023 and 2.0% in 2024. Over the same period, growth in external demand is assumed to be 4.9%, 3.2% and 3.5%. Inflation will rise to 5.9% in 2022 and afterwards decline to 2.7% in 2023 and 2.0% in 2024. Oil prices should decline gradually between 2022 and 2024. Underlying these projections is also an increase in the short-term interest rate over the projection period, with three-month Euribor rates rising from 2022 onwards and reaching positive territory in 2023.

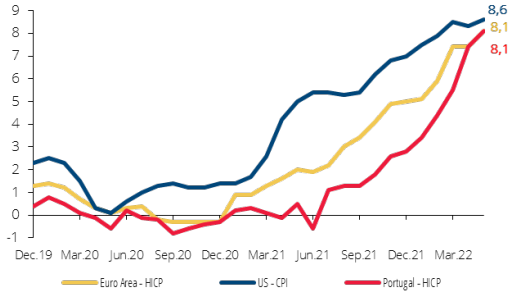
Table I.1.1 • Projections of Banco de Portugal for 2022-24 | In percentage and percentage points

	EB June 2022				EB March 2022			
	2021	2022 (p)	2023 (p)	2024 (p)	2021 (p)	2022 (p)	2023 (p)	2024 (p)
Gross domestic product (arc)	4.9	6.3	2.6	2.0	4.9	4.9	2.9	2.0
Domestic demand contribution (p.p.)	2.5	2.6	1.0	1.1	2.5	1.6	1.0	1.0
Exports contribution (p.p.) *	2.4	3.7	1.6	0.9	2.4	3.3	1.9	1.0
Current plus capital account (% of GDP)	0.7	0.4	2.2	1.0	0.7	-0.4	1.8	0.7
Harmonised index of consumer prices (yoy)	0.9	5.9	2.7	2.0	0.9	4.0	1.6	1.6
HICP - Energy goods	7.5	18.8	4.5	0.0	7.5	14.2	-2.1	-1.8
HICP - Excluding energy goods	0.4	4.8	2.5	2.2	0.4	3.1	1.9	2.0

Source: Banco de Portugal. | Notes: * Contribution to GDP growth net of imports. Demand aggregates net of imports are obtained subtracting an estimate of imports which are necessary for each component.

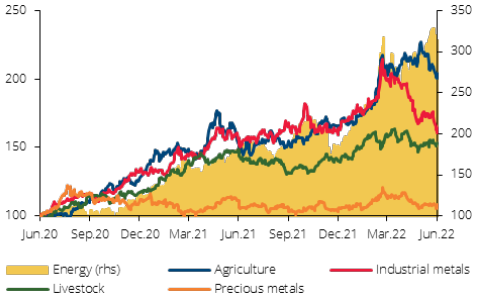
Since mid-2021 there has been a consistent increase in inflation at international level (Chart I.1.1). Inflation is expected to remain high during 2022 in the euro area (year-on-year rate of change in the harmonised index of consumer prices was 8.1% in May 2022), mainly owing to energy and commodity prices (Chart I.1.2). However, moderating energy costs, the easing of supply disruptions related to the pandemic and the normalisation of monetary policy should lead to a decline in inflation. According to the June Eurosystem projections, inflation is expected to stand slightly above the target still in 2024, but to converge towards the medium-term objective as the aforementioned imbalances are gradually corrected and uncertainty dissipates. However, the balance of risks surrounding euro area inflation projections is skewed upwards owing to the possibility of a longer conflict in Ukraine and the imposition of additional economic sanctions on Russia.

Chart I.1.1 • Inflation | Year-on-year rate of change, per cent



Sources: Eurostat, U.S. Bureau of Labor Statistics and Statistics Portugal. | Note: last observation: May 2022.

Chart I.1.2 • Commodities prices | Index

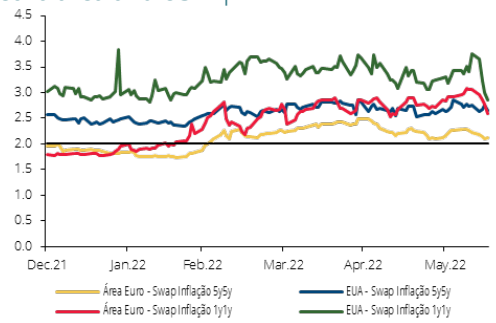


Source: Refinitiv | Notes: S&P Commodity Index. Base value of 100 on 16 June 2020. Last observation: 16 June 2022.

The persistence of high inflation has led to a faster normalisation of monetary policy at global level, although geopolitical uncertainty continues to constrain the pace of central bank action. In an environment of high uncertainty, the interaction of supply and demand effects warrants additional caution in monetary policy decision-making. According to some indicators, inflation expectations are still above central banks' targets (Chart I.1.3). These inflationary expectations and, more recently, monetary authorities' actions have weighed on investors' expectations for official interest rates in the euro area (Chart I.1.4).

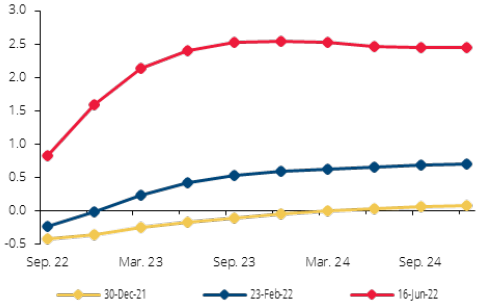
Despite being at different paces in different countries, central banks have started to operationalise the normalisation of monetary policy. This has translated into a decrease in net asset purchases, key interest rate rises and/or signalling less accommodative monetary policy in the near term. At its meeting on 9 June 2022, the ECB took further steps in normalising its monetary policy by announcing that it intends to raise the key ECB interest rates by 25 basis points at its July monetary policy meeting and that it expects to raise key ECB interest rates again in September. The calibration of this rate increase will depend on the updated medium-term inflation outlook. Regarding the asset purchase programmes, the Governing Council decided that net asset purchases under its asset purchase programme (APP) would end as of 1 July 2022. The Governing Council also intends to continue reinvesting, in full, the principal payments from maturing securities purchased under the APP for an extended period of time past the date when it starts raising the key ECB interest rates, and, in any case, for as long as necessary to maintain ample liquidity conditions and appropriate monetary policy stance.. Regarding the pandemic emergency purchase programme (PEPP), the Governing Council intends to keep reinvesting until the end of 2024 and, in the event of renewed market fragmentation related to the pandemic, PEPP reinvestments can be adjusted flexibly across time, asset classes and jurisdictions at any time.

Chart I.1.3 • 5y5y and 1y1y inflation swaps – euro area and USA | Per cent



Source: Refinitiv. | Notes: Inflation expectations implied in the 5-year, 5-year and 1-year, 1-year inflation swaps contracts. Closing market quotes. Last observation: 16 June 2022.

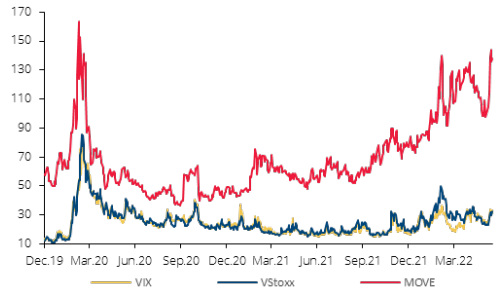
Chart I.1.4 • Implied interest rate in the 3-month Euribor futures contract | Per cent



Source: Refinitiv. | Notes: For each date a 30-day rolling average of the interest rate implicit in the 3-month Euribor futures is calculated. Last observation: 16 June 2022.

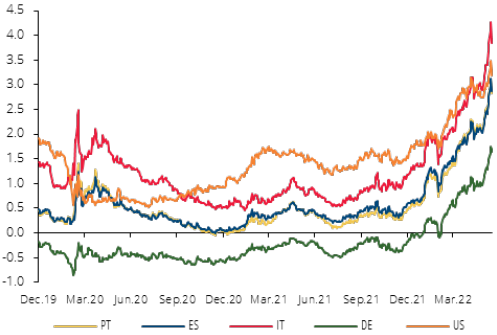
In international financial markets, heightened uncertainty has materialised into greater volatility, which constrains investors' prospects and may lead to an increase in risk aversion. Since the beginning of the year, volatility in these markets has remained high, reaching peaks just after the invasion of Ukraine (Chart I.1.5). In equity markets, volatility has recently decreased somewhat, but in debt markets it has remained high, reflecting the environment of uncertainty, also on the process of monetary policy normalisation.

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



Source: Refinitiv. | Note: Last observation: 16 June 2022.

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



Source: Refinitiv. | Notes: Data series correspond to the closing quote of Government bond yields with 10-year maturity. Last observation: 16 June 2022.

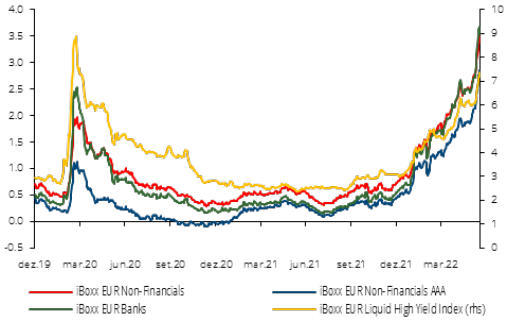
Sovereign debt yields have been increasing since the end of 2021. The upward developments in sovereign debt yields have been particularly pronounced in the United States, as the normalisation of monetary policy by the Federal Reserve started earlier and at a faster pace. The sovereign debt yields of the euro area Member States underwent a brief reversal after Ukraine's invasion, but quickly resumed their upward trend (Chart I.1.6). The widening of yield differentials for some geographies relative to the German benchmark (Chart I.1.7), which in Portugal represents an increase of around 50 basis points from the beginning of the year to 16 June 2022, reflects concerns that in the event of an economic slowdown, the normalisation of monetary policy may affect more indebted economies. Despite the increase in yield spreads on Portuguese sovereign debt, rating agencies have maintained their ratings and in some cases revised the outlook upwards.

The increase in sovereign debt yields is also reflected in rising corporate debt yields. In the riskier segments, yields are already above those observed before the pandemic (Chart I.1.8). Rating agencies have emphasised the resilience of Portuguese banks and maintained the ratings assigned.

Chart I.1.7 • 10-year sovereign yield spreads | Basis points

Source: Refinitiv. | Notes: yield spreads in relation to the 10-year German benchmark. Closing prices. Last observation: 16 June 2022.

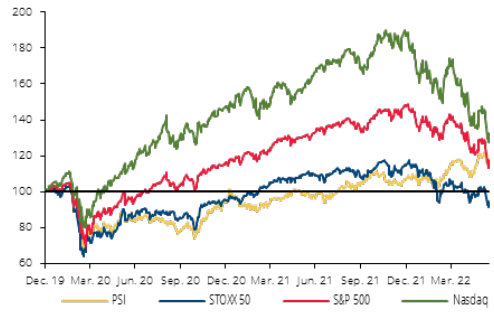
Chart I.1.8 • Euro area NFCs and banks debt securities yields | Per cent



Source: Refinitiv. | Notes: Average yield of iBoxx indexes. Last observation: 16 June 2022.

The stock market has lost value since the beginning of 2022 and remains highly volatile. The correction observed in the stock market (Chart I.1.9) reflects the combination of the deterioration in economic growth prospects and clear signs of monetary policy normalisation. This correction occurs after an extended period of valuations, during which signs of overvaluation emerged, which have been waning (Chart I.1.10). However, these developments/volatility have been heterogeneous in terms of sectors and geographies.

Chart I.1.9 • Equity indexes | Points



Source: Refinitiv. | Notes: Stock market indexes with the base value set at 100 on 31 December 2019. Closing prices. Last observation: 16 June 2022.

Chart I.1.10 • Price-to-earnings ratio | 3-month moving average

Source: Refinitiv. | Notes: Dotted lines represent average price-to-earnings since January 2007. Closing market quotes. Last observation: 16 June 2022.

Investments in crypto-assets have also shown high volatility and the interconnectedness with the traditional international financial system has increased. In recent months, several crypto-assets have been widely devalued. Despite their still small relative size[1], these (unregulated) markets have become increasingly important for financial stability on account of the growing connections with other traditional assets and financial intermediaries. Not only individual investors act in these

[1] ECB, Financial Stability Review, May 2022, Special Feature "Decrypting financial stability risks in crypto-asset markets".

markets, but increasingly asset managers investing in "traditional" financial assets have also started to invest in crypto-assets to meet greater customer demand. In particular, investments in stablecoins (some of which reached asset values comparable to those of large prime money market funds domiciled in Europe) have been growing. Thus far, disruptions in some stablecoins[2] have been identified as contained and have not involved fire-sales of "traditional" financial assets or affected traditional financial markets. However, they signal risks to financial stability, even in relation to stablecoins, also because of the lack of transparency about the assets they use as collateral (Box 1).

Given the macrofinancial environment and its reflection in international financial markets, the risk of a further reassessment of risk premia remains, despite the adjustments that have already taken place. A significant repricing may interact with the vulnerabilities accumulated during the pandemic and lead to a fall in asset prices, with an impact on the financial system, especially on the valuation of portfolios.

Other types of risks, such as cyber security, are heightened by geopolitical tensions. Recent cyber attacks illustrate the increased systemic risks, which could affect not only the financial sector, but also extend to infrastructures and firms in other sectors critical to economic activity.

Finally, in the medium term, other structural challenges may have implications for production costs, affecting economic growth and inflation rates. Geopolitical tensions accentuated a trend, which began with the pandemic, of a slowdown in global trade, as a result of national initiatives or country sub-groups aimed at mitigating the effects of external shocks on production and distribution chains. This trend may thus lead to a reversal of the globalisation process, even if its extent is still uncertain. The expected and necessary acceleration of decarbonisation goes in tandem with this trend. Russia's invasion of Ukraine is expected to accelerate the transition to green energy, which will bring clear benefits in the long term, but could entail higher short-term costs.

1.3 Sectoral risk analysis

1.3.1 Residential and commercial real estate market

In Portugal – as in Europe – residential real estate prices continued to increase in the second half of 2021. In the third and fourth quarters, the housing price index grew by 11.5% and 11.6% year on year. In the euro area, growth in the fourth quarter was 9.4%. Confidencial Imobiliário's *Portuguese Housing Market Survey* (PHMS) of April 2022 suggests that demand for housing has remained stable in recent months. In turn, the recent period saw some reduction in the new supply of residential real estate. Against this background, the indicator of housing sales expectations declined during the first quarter of 2022, while the expectation is of price rises in the coming months. The number and amount of residential real estate transactions also continued to increase in 2021, 7% and 24% respectively, compared to 2019, and 20% and 31% respectively compared to 2020. In 2021 and the first quarter of 2022, the average absorption time of a house for sale remained stable between six and seven months, while it was slightly lower in the Lisbon and Porto metropolitan areas. This indicator has been relatively stable since 2019, posting its highest figure in 2010, with significant differences across regions (13 months in the Lisbon metropolitan area and 23 months in the Porto metropolitan area).

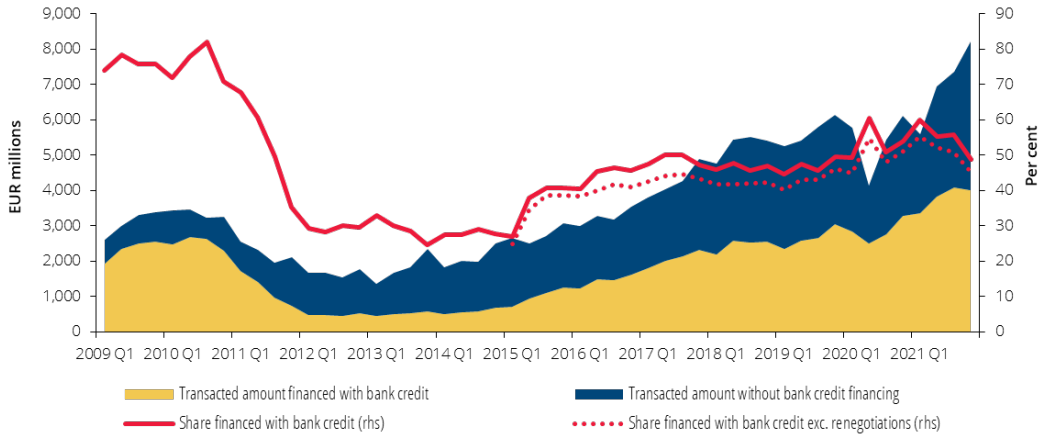
The share of residential real estate transactions financed with domestic bank credit was 55% in 2021, well below the 76% share observed in 2009 (Chart I.1.11).

The number and median value of rents on new agreements continued their upward trend in 2021, growing by 9.4% and 7.7% respectively (9.7% and 5.5% in 2020). Nevertheless, the buoyancy of the

[2] As an example it can be mentioned the loss of parity of Tether (the biggest global stablecoin) following the collapse of TerraUSD.

rental market remains below that of the housing market. The price-to-rent ratio, which compares house price and rent price developments, continues to increase in Portugal and the euro area.

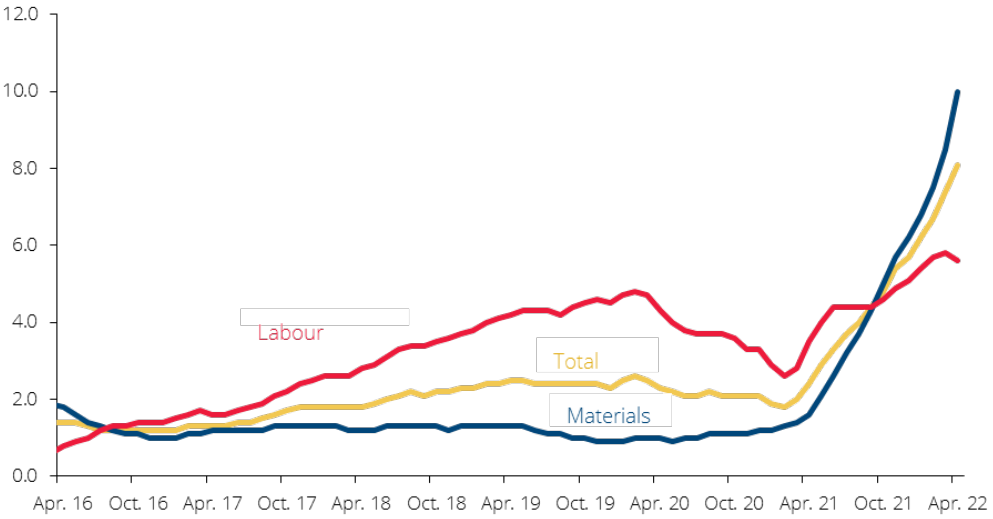
Chart I.1.11 • Transactions in dwellings versus new housing loans



Sources: Banco de Portugal and Statistics Portugal. | Notes: The way information on transactions of dwellings is calculated has been revised by Statistics of Portugal. Transactions of dwellings in which the buyer belongs to the institutional sector of Households are now reported on a quarterly basis. For more details see note House Price Index of INE. Last observation: 2021 Q4.

The shortage of new housing supply has contributed to the rise in residential real estate prices. The construction sector remained resilient throughout 2020 and 2021, with a recovery in building permits. However, the sector lost momentum in 2021, with gross value added (GVA) growing by 2.2% (4.3% in 2020). In turn, gross fixed capital formation (GFCF) in housing accelerated in real terms in 2021 (8.9% growth from 2020 and 1.7% from 2019). Labour and materials shortages and the resulting increase in construction costs are additional factors of upward pressure on residential real estate prices (Chart I.1.12).

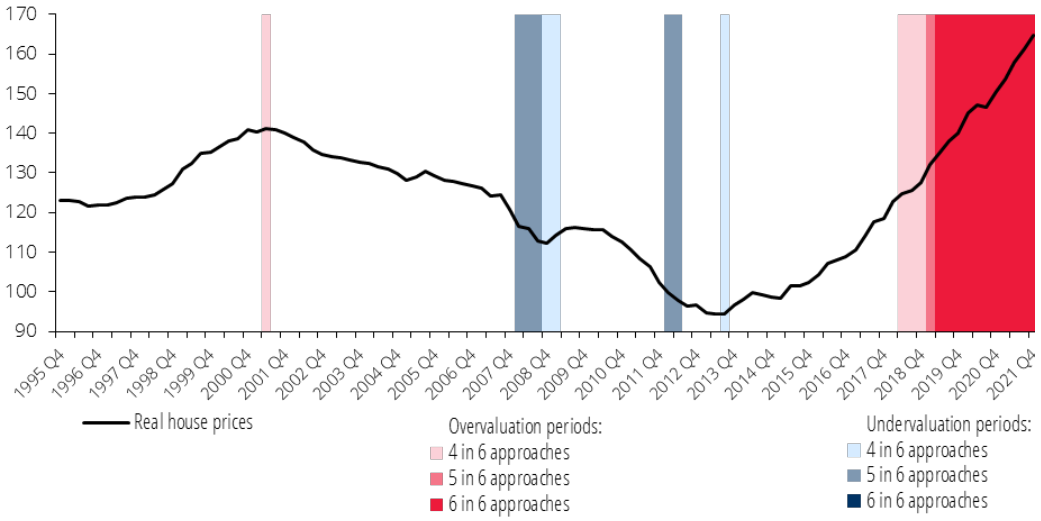
Chart I.1.12 • Average change of the last 12 months of New Housing Construction Costs Index | Per cent



Source: Statistics Portugal.

There are signs of overvaluation of residential real estate (Chart I.1.13). However, these estimates do not take into account factors such as demand by non-residents and tourism activities, which have contributed to price developments in this market. Vulnerabilities in this market tend to be associated with medium-term factors and may take some time to result in a price correction (Box 2).

Chart I.1.13 • Valuation measures of house prices in Portugal



Source: Banco de Portugal calculations and OECD. | Note: Overvaluation and undervaluation periods correspond to periods in which, from the six approaches considered, at least four identify an imbalance in house prices.

Demand for housing by non-residents increased. In 2021, the number and amount of residential real estate transactions by non-residents grew by 1% and 23% respectively, compared to 2019, and 23% and 37% respectively, compared to 2020. Non-residents accounted for 5.4% of the number of housing transactions in Portugal in 2021 (5.2% in 2020). In 2021, 10% of new housing loans were granted by monetary financial institutions located in Portugal to non-residents, more than doubling the figure for 2019 (4.6%). Ongoing geopolitical tensions in Europe are expected to intensify the demand for housing by non-residents in countries with high social peace and security levels, such as Portugal.

In 2021, growth in residential real estate prices in Portugal occurred simultaneously with the acceleration in the stock of loans for house purchase. Over a longer horizon, however, the correlation between growth in loans for house purchase and the increase in residential real estate prices is low, unlike other euro area countries (Chart I.1.14).

Chart I.1.14 • Cumulative change in house prices and in the stock of housing loans for the euro area countries | Per cent

Sources: European Central Bank and OECD. | Notes: Cumulative change between 2016Q4 and 2021Q4. Cyprus and Malta were excluded from the sample due to missing data.

In a context of high inflation, declining real disposable income and rising financing costs stemming from the normalization of monetary policy reduce households' borrowing capacity and may lead to a reduction in demand for residential real estate. In addition, the normalization of monetary policy is expected to contribute to a decline in the search for yield in the residential real estate market. However, residential real estate is expected to remain attractive in a context of portfolio diversification by investors. Moreover, higher expected inflation may promote demand for residential real estate for hedging reasons, associated with house purchase as a store of value.

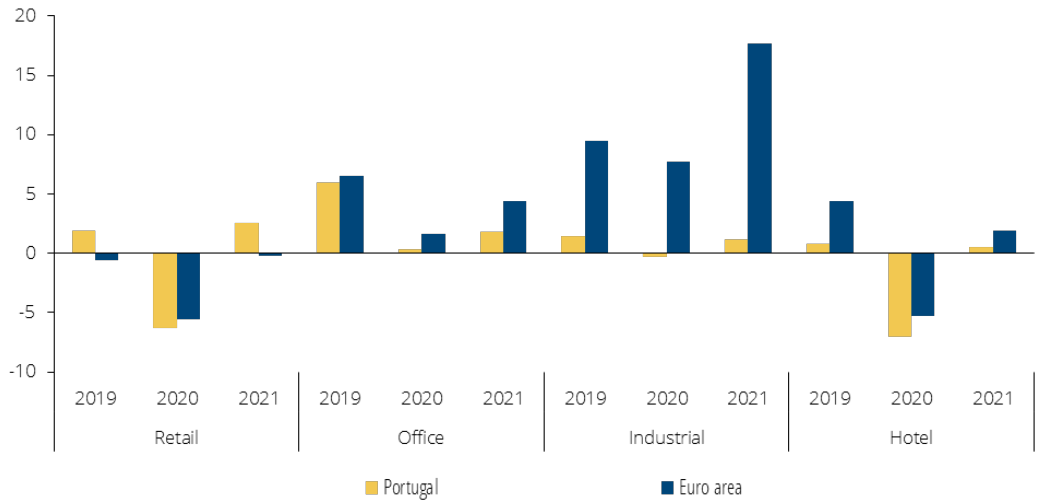
The distribution of the housing loan portfolio's loan-to-value (LTV) ratio of domestic banks reflects the banking sector's resilience to a correction in house prices. As at December 2021, 92% of the housing loans portfolio had an LTV of less than 80% (Section 2.4). In addition, the entry into force of the Banco de Portugal's Macroprudential Recommendation has contributed to an improvement of the borrowers' risk profile associated with new loans for house purchase (Section 1.4).

The pandemic led to differentiated developments in the residential and commercial real estate market, both in Portugal and in the euro area. The prices for some commercial real estate sub-sectors 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, most affected by restrictions on mobility, devalued by 6.3% and 7.0% respectively. In 2021, commercial real estate valuation recovered, with the MSCI index increasing by 1.6% and growth being broadly based across all segments (Chart I.1.15). Associated with these developments, retail real estate assets increased by 2.5% in 2021 (1.9% in 2019). In the office segment, the shortage of supply (especially in the prime segment) contributed to price and rental resilience during the pandemic, despite the uncertainty introduced by the possibilities of new distance-working practices. This segment posted a 1.8% valuation in 2021. The industrial and logistics real estate segment also showed resilience to the pandemic shock. Prices fell by 0.3% in 2020, but increased by 1.2% in 2021 (1.5% in 2019). The expansion of e-commerce has contributed to the buoyancy of this segment and boosted investment in new construction.

Statistics Portugal's Commercial Property Price Index (Índice de Preços das Propriedades Comerciais – IPPC) increased by 5.1% in 2021. This index has shown moderate growth in recent years, including in 2020 (2.8%), and less volatile developments than the MSCI index. The

differences between the two indexes are due to distinct samples and methodologies. The IPPC is calculated based on commercial real estate transaction prices, while the MSCI index mirrors real estate valuation in a sample.

Chart I.1.15 • Developments in commercial real estate assets valuations per segment | Per cent



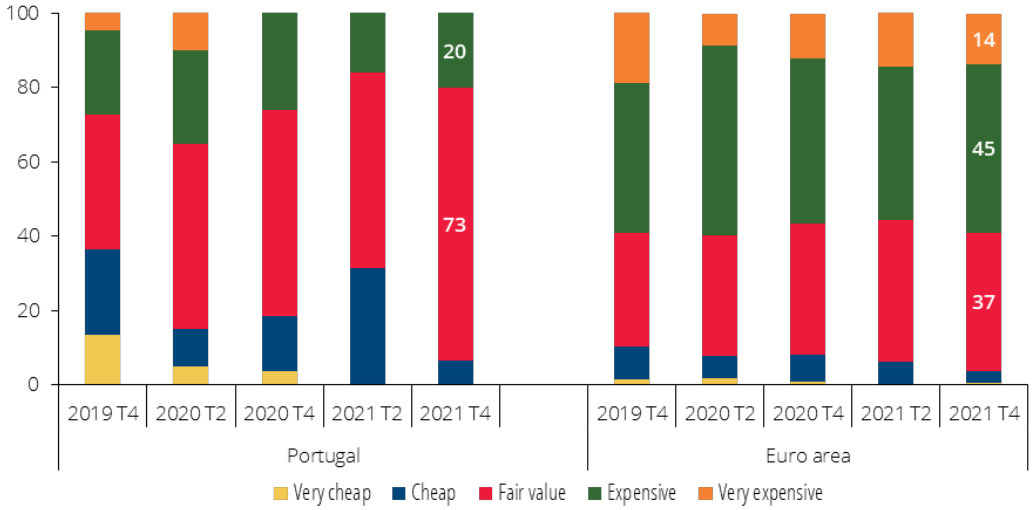
Source: Morgan Stanley Capital International (MSCI).

The improvement in the pandemic situation in the second half of 2021 and the consequent easing of restrictions on mobility fostered a recovery in the accommodation sector. Real estate assets valued by 0.5% in 2021, after a devaluation of 7% in 2020 (0.8% in 2019). The prospects of market participants are that the sector will continue to recover over the next few years, supported by the recovery in tourism activity, despite the risks to overall economic activity.

In 2021, investment in commercial real estate in Portugal totaled €2.2 billion, compared with €2.7 billion in 2020 and €3.3 billion in 2019. The higher profitability of the domestic commercial real estate market compared to other countries stimulated investment by non-residents and in 2021 – as in previous years – foreign capital was dominant.

Most market operators assess prices in the commercial real estate market as appropriate in Portugal. Before the onset of the pandemic, views on price adequacy in the commercial real estate market were polarized. At the end of 2019, 36% of market participants assessed commercial real estate as cheap (or very cheap), while 27% assessed real estate as expensive (or very expensive). During the pandemic, there has been some volatility in market agents' perceptions but more recently there is a relative consensus (73% of operators) that prices in the commercial real estate market reflect the fair value of assets. This contrasts with the situation observed for the euro area, where 37% of market participants assessed real estate as reflecting fair value, while 59% assessed real estate as expensive or very expensive (Chart I.1.16).

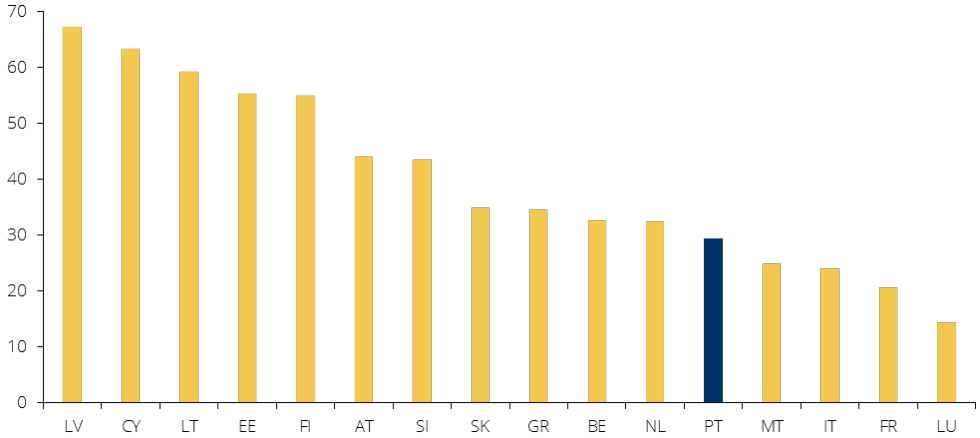
Chart I.1.16 • View of Current Market Valuation Levels of commercial real estate in Portugal and the euro area | Per cent



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

Portuguese banks' exposure to commercial real estate is contained, compared with exposure to residential real estate and the situation in Europe. In December 2021 loans to NFCs secured by commercial real estate accounted for around 25% of total loans to NFCs on a consolidated basis, €23 billion, compared with an exposure of around €110 billion in loans to households secured by real estate, almost entirely loans for house purchase. Banks' exposure also includes a residual component of loans to NFCs for purchase or construction of commercial real estate, which is not secured by commercial real estate. Information on loans to NFCs secured by commercial real estate allowing an international comparison is not available. In Portugal, however, the share of loans to NFCs secured by (commercial or other) real estate is lower (29%) than in most euro area countries, where it ranges from 14% to 67% (Chart I.1.17).

Chart I.1.17 • Loans to NFC collateralized by real estate in Portugal and in the euro area - September 2021 | As a percentage of total loans to NFC



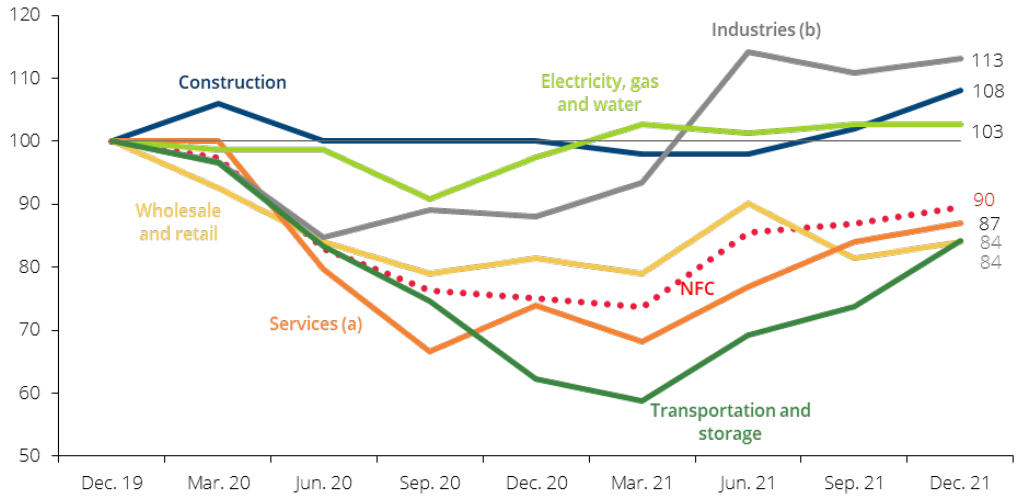
Source: European Central Bank (*Consolidated Banking Data*) and Banco de Portugal. | Notes: Consolidated data. Ratio obtained from values net of impairments. Loans to NFCs secured by (commercial or other) real estate. Data not available for Germany, Spain and Ireland.

1.3.2 Non-financial corporations

At the end of 2021 and the beginning of 2022, NFC activity continued to recover from the pandemic shock, with main financial indicators improving. However, the shock and subsequent recovery are asymmetrical. Sectors with a business model based on intensive personal contact, which were particularly affected are recovering more slowly.

In 2021, NFCs' profitability reached 90% of 2019 figure (compared with 75% in 2020). Trade, transport and storage and other services (including accommodation and food services) maintain profitability below the NFC average compared to 2019. By contrast, at the end of 2021, industry and construction have already outpaced the profitability observed in 2019 (Chart I.1.18).

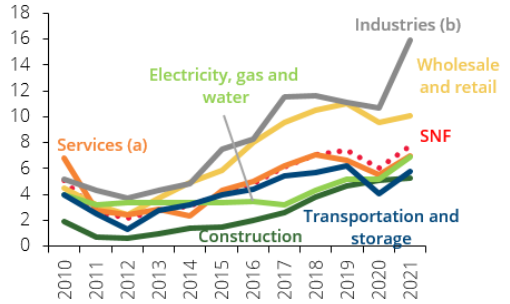
Chart I.1.18 • Profitability ratio (EBITDA/Total assets), by sector of activity | Index December 2019=100



Sources: Banco de Portugal and Statistics Portugal. | Notes(a) Includes services except trade and transport and storage (identified in the chart); (b) Includes extractive industry.

NFCs' capital ratio, measured as the ratio of equity to assets, increased in the course of 2021, as it had occurred in 2020, maintaining the upward trend observed since 2013. This was broadly based across the various sectors of activity. NFCs' financing expenses coverage ratio recovered in 2021, after a decline in 2020, standing 0.4 p.p. above that observed in 2019. Developments in this ratio followed the improvement in EBITDA (earnings before interest, taxes, depreciation and amortisation) in 2021, with heterogeneity across sectors of activity reflecting the different performance of profitability (Chart I.1.19).

Chart I.1.19 • Interest coverage ratio, by sector of activity | EBITDA percentage

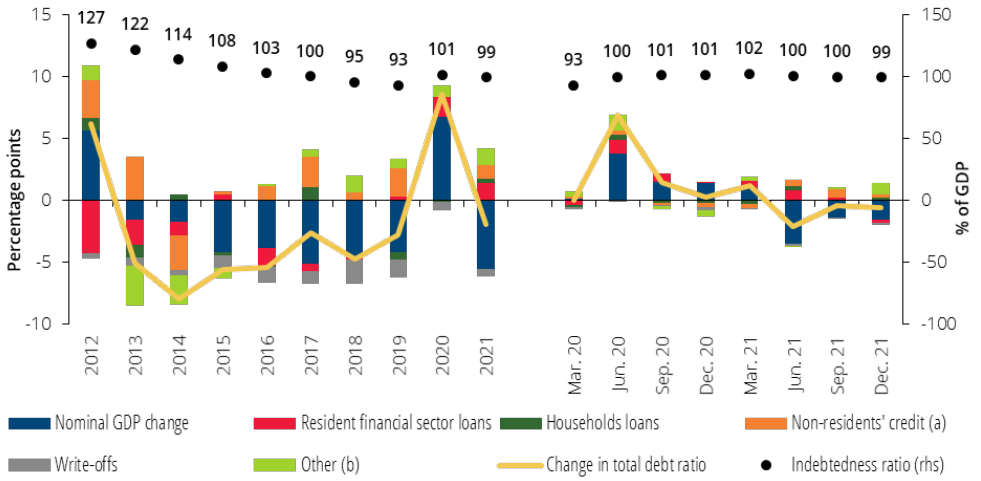


Sector of activity	2010	2012	2019	2020	2021
NFC	5.1	2.2	7.4	6.0	7.8
Wholesale and retail	4.5	2.4	11	9.6	10.1
Transportation and storage	4.0	1.3	6.2	4.1	5.8
Services [a]	6.8	2.4	6.6	5.5	7.0
Electricity, gas and water	4.0	3.4	5.2	5.2	6.9
Industries [b]	5.2	3.7	11.1	10.7	15.9
Construction	1.9	0.6	4.7	5.1	5.3

Source: Banco de Portugal. | Notes: The interest coverage ratio corresponds to the number of times the EBITDA generated by the companies is higher than the financing expenses; A higher value of the ratio translates a lower financial pressure. (a) Includes services except trade and transport and storage (identified in the chart);(b) Includes extractive industry.

In 2021, NFCs' debt-to-GDP ratio decreased by 1.9 p.p., partly reversing the 8.6 p.p. increase observed in 2020 and returning to the downward trend observed before the pandemic. In both years, the key contribution to this change was the developments in nominal GDP (Chart I.1.20). In the first half of 2021, the pandemic containment measures continued to limit activity in various sectors of activity and NFCs used support measures, such as State-guaranteed credit lines, with an increase in loans granted by the resident financial sector (Table I.1.2).

Chart I.1.20 • Contributions to the changes in NFC' indebtedness ratio



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

During the pandemic crisis, Public Guarantee Schemes, ensuring firms' liquidity and mitigating the materialisation of credit risk, contributed to the increase in the stock of loans to NFCs. The second and third quarters of 2020 were the periods with the largest net flow of loans, which was largely associated with State-guaranteed loans. These loans were granted mainly by banks with which firms already had a credit relationship. In turn, new firms in the credit market made a relatively limited contribution, especially for State-guaranteed loans (Table I.1.2).

In the first quarter of 2022, the contribution of State-guaranteed loans was negative for the first time since the onset of the pandemic crisis. This reflects the phasing-out of this support and the regular repayments that occur as the grace period for some of these loans ends. The grace period of around 20% of total State-guaranteed loans is estimated to end in the third quarter of 2022, corresponding to 30% in the case of State-guaranteed loans granted to the sectors most affected by the pandemic crisis.

The conditions of access to these credit lines limited their being granted to firms in a vulnerable financial situation. As documented in previous issues of this Report, firms that used State-guaranteed loans had good credit quality before the pandemic, particularly when compared with firms that benefited from moratoria. In this context, the share of State-guaranteed loans granted to zombie firms was relatively low. In addition, the gross NPL ratio for State-guaranteed loans granted in the context of the pandemic is residual (Section 2.4).

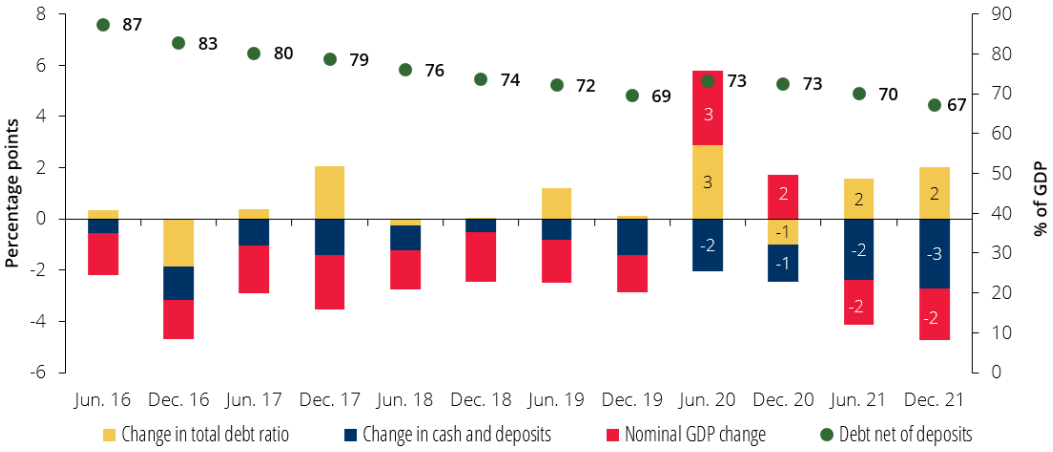
Table I.1.2 • Contributions to the net flow of loans to NFCs (quarterly)

	Unit	Mar. 20	Jun. 20	Sep. 20	Dec. 20	Mar. 21	Jun. 21	Sep. 21	Dec. 21	Mar. 22
Growth of loan stock	%	-0,8	5,4	1,8	-0,2	1,0	1,4	0,2	-0,8	0,2
Loans with public guarantee [a]										
Enterprises new to the credit market [b]	pp	-	0,1	0,2	0,1	0,1	0,0	0,0	0,0	0,0
Bank's new customers [c]	pp	-	0,5	0,2	0,1	0,1	0,0	0,0	0,0	0,0
Bank's customers [d]	pp	-	5,7	2,1	0,8	1,1	0,9	0,1	0,1	-0,3
Other loans										
Enterprises new to the credit market	pp	1,1	0,6	0,9	0,8	0,4	0,8	0,4	0,8	1,7
Bank's new customers	pp	1,0	1,2	0,7	1,0	1,3	0,9	0,7	1,2	0,8
Bank's customers	pp	-3,0	-2,7	-2,3	-2,9	-2,0	-1,4	-1,0	-3,0	-2,0

Source: Banco de Portugal. | Notes: (a) Loans with public guarantee launched to address the pandemic crisis; (b) Companies new to the credit market: companies with no credit at the end of the quarter prior to contracting the loan; (c) New client of the bank: loans to companies which, at the end of the quarter prior to contracting the loan, had no credit with the bank granting the new loan; (d) Customers of the bank: loans to companies which, at the end of the quarter prior to contracting the loan, had credit with the bank granting the new loan.

In 2021, NFCs' indebtedness net of deposits, as a percentage of GDP, decreased by 5.3 p.p., to stand 2.2 p.p. below the figure observed in 2019. Economic growth (-3.8 p.p.) and the increase in NFC deposits (-5.1 p.p.) contributed to this decrease, as the stock of debt posted a positive contribution of 3.6 p.p. (Chart I.1.21).

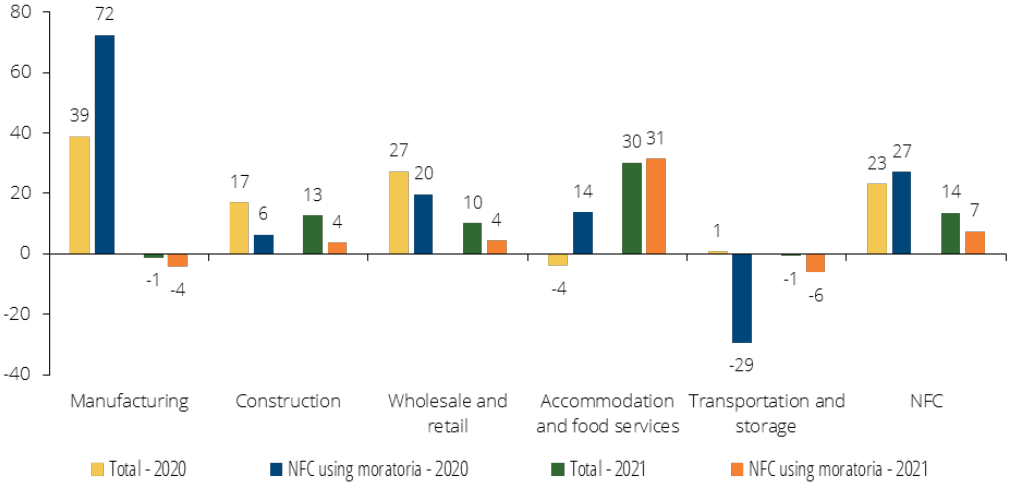
Chart I.1.21 • Contributions to the changes in NFCs debt net of deposits



Sources: Banco de Portugal and Statistics Portugal.

Firms' deposits increased during the pandemic crisis. In 2020, this increase was higher for firms that benefited from moratoria, indicating that part of taking-up this support measure was due to precautionary reasons. It should also be noted that firms in the accommodation and food services sector that had loans under moratoria were able to accumulate deposits in the two years under review. In this sector of activity, the growth rate of firms' deposits that benefited from moratoria was 31% in 2021, a very similar share to that observed for the sector as a whole (30%) (Chart I.1.22).

Chart I.1.22 • Change in NFC deposits with G8, in 2020 and 2021, by sector of activity
| As a percentage



Source: Banco de Portugal. | Note: Deposits with the 8 most significant institutions (G8) represent around 90% of OMFI deposits. Given the availability of information, the rate of change for 2020 corresponds to the change between December 2019 and March 2021 and the rate of change for 2021 corresponds to the change in deposits between March 2021 and March 2022.

Following the end of the public moratorium between September and December 2021, there was no significant increase in credit risk materialisation, although default is higher in the contracts that benefited from moratoria. In the last quarter of the year, the share of loans that were under moratoria classified into increased risk categories (stage 2) and restructured increased. By contrast, its impairment coverage ratio increased. The proportion of loans to NFCs with worse financial indicators was higher in firms that benefited from a moratorium, justifying that financial

institutions maintain a preventive and proactive approach to assessing credit risk (Box 3). Defaults may increase as a consequence of resuming the regular repayment plan (more than half of the NFCs had at least one loan under moratoria), the withdrawal of other support measures, a possible greater than expected slowdown in economic activity and the increase in the cost of credit.

Disruptions in value chains and higher prices of intermediate products and energy will tend to particularly affect the sectors that use these inputs more intensively, with particular emphasis on electricity and manufacturing (Box 4). In Portugal, the industrial producer price index showed a year-on-year rate of change of 24.5% in May 2022 (24.7% in the previous month). Excluding the energy component, this index increased by 16.4% year on year (16.0% in April).

Sectors considered most vulnerable to rising production costs, namely agriculture, fishing, transport, social sector, and some industries have benefited from State support measures. As occurred at the onset of the pandemic crisis, the European Commission adopted a temporary crisis framework for state aid rules, facilitating the adoption of support measures at the national level. The reduction in the tax on oil products and the suspension of the carbon tax increase will have a broadly based impact across the various economic sectors. Liquidity support measures, such as deferring tax payments and State-guaranteed credit lines, are targeted at the most affected sectors. In the case of the transport and social sectors, extraordinary one-off support was paid for the purchase of fuel and an anti-pollution additive. A subsidy was also created for firms especially affected by the increase in the price of natural gas (*Apoiar as Indústrias Intensivas em Gás*), with quarterly payments during 2022. Other sectors that are particularly affected are agriculture and associated activities, and dedicated support has been implemented for these sectors, which includes tax deductions and a subsidy to pay for electricity, as well as subsidies on investments for the energy transition (Table I.1.3).

Table I.1.3 • Support measures to NFCs, in the context of rising energy and other intermediate product prices

Description	Sector supported	Nature
ISP rate reduction equivalent to the decrease in VAT applied to fuels from 23% to 13%; succeeds IVaucher. Start in April 2022.	All	Fiscal
Suspension of carbon tax increase (impact €0.05/L).	All	Fiscal
Measure adopted by Portugal and Spain introducing an exceptional and temporary mechanism for the adjustment of electricity generation costs, within the scope of the Iberian Electricity Market.	All	Production subsidies
Extraordinary and exceptional support to the purchase of fuel and additives by public buses, goods transport and the social sector. Paid once only in 2022.	Transports and social sector	Production subsidies
Subsidy to companies especially affected by the increase in the price of natural gas. Up to 30% of cost increase/maximum of €400,000 per company. April to December 2022. Measure adopted following approval by the European Commission, with an endowment of 160 million euros.	NFCs operating in the most vulnerable sectors. Manufacturing Except energy production, agriculture and fisheries and companies covered by the sanctions on Russia	Production subsidies
VAT payment exemption on fertilizers and animal feed (March to December 2022). Subsidy for the payment of electricity up to 20% of the cost. Reduction of ISP rate on diesel (€0.034/L).	Agriculture and fisheries	Production subsidies and fiscal
Reinforcement of support funds for the installation of photovoltaic panels, in 2022 and 2023.	Agro-industry, agricultural exploitation, hydro-agricultural exploitations	Support to energetic transition

Description	Sector supported	Nature
Temporary reduction of 50% in the tax on heavy goods transport vehicles.	Transports	Fiscal
Easing of tax payments and social security contributions (between 3 and 6 instalments).	NFC operating in the most vulnerable sectors: Agriculture, fisheries, transport, social sector and specially affected industries, such as textiles, paper pulp manufacturing, ceramic and glass industry, steel industry, cement production and chemical industry	Fiscal and Social Security
Credit line with public guarantee (allocation of 400 million euros) – "Linha de Apoio à Produção".	NFC operating in the most vulnerable sectors: Manufacturing industries and some segments of transport and storage	Credit line
Credit line designed to provide liquidity support to companies in the pig production sector and producers of cow's milk (allocation of 8.5 million euros).	Companies with cattle or pig breeding activities. Until 31 December 2022	Credit line

The risk of losses for the financial sector should be assessed by combining the impacts of the increase in the cost of inputs with the financial vulnerability of firms. Among the sectors with the highest leverage ratio are some of the sectors most affected by the pandemic crisis (transport and storage, accommodation and food services, and administrative activities). In 2020, the financial debt ratio and the financial debt ratio net of deposits increased for most firms operating in these sectors, an increase that was more pronounced in the accommodation and food services sector. In these sectors, there was also an increase in the concentration of firms with higher debt ratios net of deposits.

The accommodation and food services sector is among those most affected by the pandemic and has a cost structure that makes it likely to be cumulatively affected by the increase in energy and commodity costs. In March 2022, bank loans to firms in this sector accounted for 10% of total loans granted to NFCs (Box 4). Nevertheless, firms have also accumulated deposits, which mitigates the risk of default in the short term (Chart I.1.22).

The impact of the invasion of Ukraine on tourism is still uncertain. On the one hand, prices can be expected to increase, reflecting energy costs in transport prices, and demand may decrease due to lower real income and higher precautionary saving. In return, Portugal may benefit from being geographically further away from the conflict area. In April 2022, activity in the tourism accommodation sector continued to recover and, for the first time since the onset of the pandemic, there was positive growth compared to the same month of 2019, namely a 1.6% increase in the number of guests and a 1.1% in overnight stays. In the European Commission's economic forecast released in May 2022, tourism is one of the vectors supporting growth of the Portuguese economy in the period 2022-24.

The geopolitical and macroeconomic environment leads to uncertainty regarding developments in NFCs' financial situation. The results of the Fast and Exceptional Enterprise Survey (IREE), conducted between 9 and 22 May 2022, indicate that for 83% of Portuguese firms, the recent international environment had a negative impact on the estimate of turnover for 2022. Of these, around 90% considered the increase in energy costs, the increase in the prices of other commodities/intermediate goods and the increase in transport costs as factors relevant or very relevant for the potential negative impact. In turn, problems in the supply of commodities/intermediate goods were referred to as relevant or very relevant by around 80% of firms. The final impact of the increase in input costs on NFCs' financial situation will depend not only on the cost structure and public support but also on the persistence of shocks and the ability of firms to reflect them in final product prices.

Interest rate increases in financial markets reflect expectations of central banks' response to the more persistent and pronounced increase in inflation Nevertheless, this increase has mostly affected long-term rates and, in Portugal, the interest rate on new loans to NFCs has remained stable (Section 2.2). In the April 2022 Bank Lending Survey (BLS) in Portugal, banks expected the tightening of credit standards to continue in the second quarter of 2022. In the *Survey on the Access to Finance of Enterprises in the Euro Area* (SAFE), conducted between 7 March and 15 April 2022, euro area NFCs expected deterioration in access to bank loans and credit lines for the first time since the onset of the pandemic crisis. A very large share of firms reported expecting an increase in interest rates on bank loans, as well as on other financing costs.

Rising financing costs may put financial pressure on the most indebted firms and/or firms that have not yet recovered their pre-pandemic activity and profitability. For the most financially vulnerable economic agents, liquidity constraints stemming from the rise in nominal interest rates may be crucial, despite historically low interest rates and an undetermined impact in terms of real interest rates. However, the measures adopted in response to the pandemic, particularly the State-guaranteed credit lines with high maturities and favourable conditions, and the accumulation of liquidity in 2020 and 2021 may mitigate this impact. The recently observed increase in the average maturity of loans to NFCs and the share of loans associated with higher interest rate fixation periods may also act as a mitigating factor (Section 2.2).

In the medium term, high indebtedness and debt service effects constrain firms' investment decisions. This is relevant in view of digitalisation and the adaptation of business models to structural changes stemming from climate change and energy transformation.

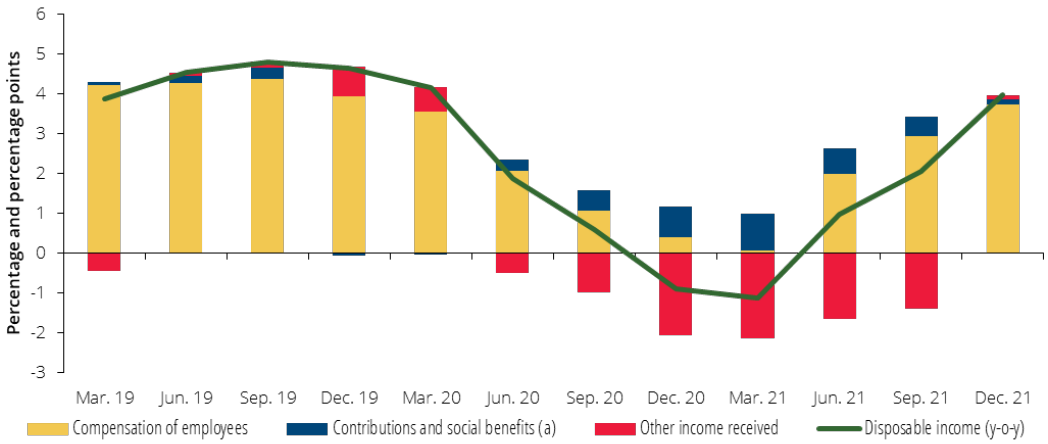
The implementation of the Recovery and Resilience Plan (PRR) will stimulate economic activity and the financial situation of NFCs. The direct impacts, in particular in terms of the capitalisation of firms (*Fundo de Capitalização e Resiliência*), add to the indirect impact of demand. Disruptions in value chains and rising prices in materials pose a risk to the implementation of the plan. In addition, the PRR implementation may contribute to the worsening of inflation, by stimulating demand at a time when there are constraints on the supply of some goods.

1.3.3 Households

Households' nominal disposable income recovered from the second quarter of 2021 onwards, posting a year-on-year rate of change of 4% in 2021 and exceeding the 2019 figure (3%). The policies supporting employment and income adopted during the pandemic prevented changes in households' disposable income from reflecting the reduction in nominal GDP.

In the course of 2021, the contribution of net social benefits to developments in disposable income declined in a sustained manner. By contrast, contributions from compensation and other income categories increased, most notably gross operating surplus, whose contribution turned positive in the last quarter of 2021, spilling over the consolidation of the recovery in economic activity, with nominal GDP growth of 5.7% in the year as a whole (Chart I.1.23).

Chart I.1.23 • Households disposable income | Year-on-year rate of change



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

The household saving rate declined to 11%, 2 p.p. less than in 2020. This development is similar to that observed in the euro area. In Portugal, these figures remain above the average of the previous decade (8%), although they continue below the euro area average.

In terms of investment from household saving, the purchase of financial assets, in particular deposit-taking, continued to stand out, albeit less relevantly. In turn, investment in real assets, largely in housing, increased to 5.2% of disposable income, from 3.7% in 2013, during the most acute phase of the sovereign debt crisis, and 7.4% in 2007, before the onset of the international financial crisis (Table I.1.4).

Table I.1.4 • Source and application of household funds | As a percentage of disposable income

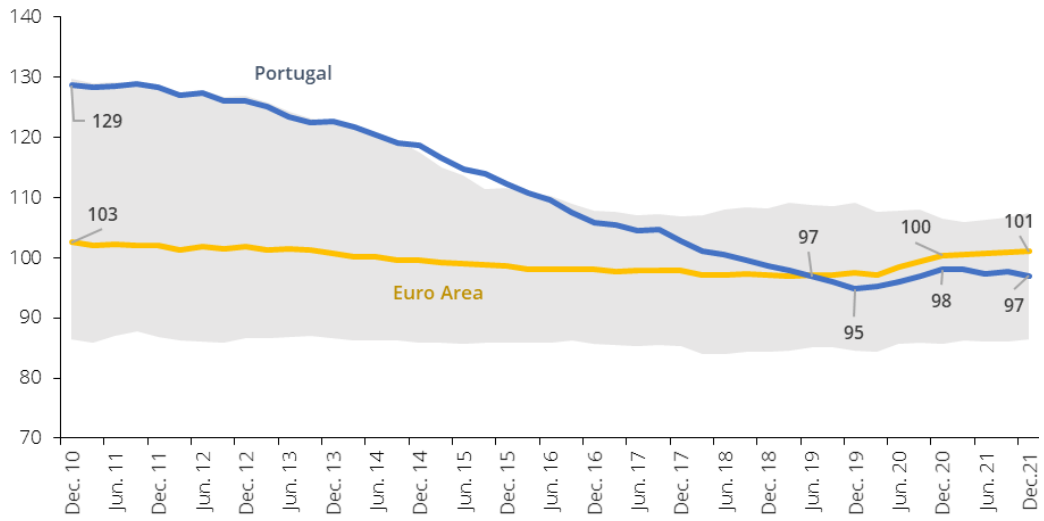
	2018	2019	2020	2021
Current savings in the euro area	12.5	13.1	19.4	17.3
Current savings in Portugal	6.8	7.2	12.7	10.9
Assets				
Investment in real assets[a]	4.8	5.0	4.6	5.2
Balance of capital transfers	-0.6	-0.4	-0.5	-0.4
Net acquisition of financial assets	3.2	3.8	10.9	8.8
o.w. Currency and deposits with resident banks	5.9	3.6	8.2	6.0
Liabilities				
Financial debt[b]	0.4	1.0	1.8	3.3
Net purchases of other financial liabilities[c]	0.2	0.2	0.6	-0.6

Sources: Banco de Portugal, Eurostat, Statistics Portugal (Banco de Portugal calculations). | Notes: Consolidated figures in nominal terms. (a) Corresponds to the sum of gross fixed capital formation, changes in inventories, acquisitions less disposals of valuables and acquisitions less 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 stock of loans for house purchase accelerated mostly until September 2021 (annual rate of change (arc) at 3.9%), with its growth increasing slightly in the following months (arc at 4.2% in April 2022). In the case of loans for consumption and other purposes, there has been a recent acceleration (arc adjusted at 3.2% in April) owing to the dynamics in consumer credit (Section 2.2), albeit at rates well below the peak recorded in October 2018 (arc at 8.2%).

The household indebtedness ratio as a percentage of disposable income decreased by 1 p.p. to 97%, remaining below the euro area, which has shown similar developments recently. The downward trend in this ratio, which began in 2012, was interrupted by the pandemic crisis, with this ratio posting its record low at the end of the last quarter of 2019, 95% (Chart I.1.24).

Chart I.1.24 • Evolution of 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. The grey area corresponds to the interval between the third and the first quartile of the distribution for a set of euro area countries (Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, the Netherlands, Portugal, Slovenia and Spain).

The end of the credit moratoria in the course of 2021 did not make a significant contribution to default in the loan portfolio. Nevertheless, loans that were under moratoria have a lower credit quality than the average of loans to households. The last quarter of 2021 saw an increase in the share of loans associated with moratoria and classified as stage 2 or as restructured (Box 5).

Developments in real household disposable income have been hampered by rising inflation, with this effect expected to continue throughout 2022. In May 2022, the year-on-year rate of change in the Harmonised Index of Consumer Prices was 8.1% and the average year-on-year rate of change was 3.3%.

In the current macroeconomic and geopolitical environment, together with the expected rise in market interest rates, households' financial situation may deteriorate, increasing their risk of default. In Portugal, the share of loans for house purchase with a floating rate is around 90%, meaning that the increase in market interest rates results in an increase in debt service. The most frequent reference rate is the 12-month Euribor. This effect adds to the reduction in real disposable income and the impact of the pandemic crisis on the financial situation of some households (Section 2.2).

However, some factors mitigate households' risk of default. The reduction in indebtedness observed in the pre-pandemic period, which was broadly based across different incomes, was

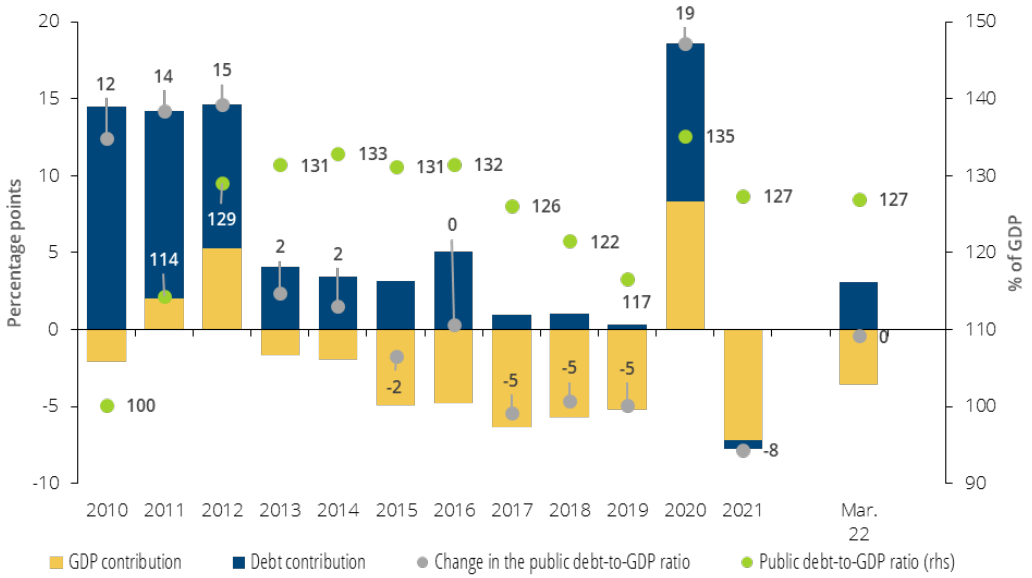
noteworthy. Similarly, the improvement of new borrowers' risk profile as a result of the macroprudential recommendation, which includes a 3 p.p. increase in the reference rate when calculating the debt service to income ratio for loans with a floating rate with a maturity of more than ten years. In addition, in the short term, households that increased their saving during the pandemic crisis and built up liquidity buffers may more easily address the above factors.

Viewed in isolation, inflation leads to a reduction in the real value of debt. However, if persistent and driven by supply shocks accompanied by lower economic growth and lower real income, it could lead to an increase in financing costs and result in a reduction in the debt servicing capacity of households.

1.3.4 General government

In the first quarter of 2022, Maastricht public debt declined to 127% of GDP, from a peak of 138.9% in the same period a year earlier. Developments during 2021 and 2022 are in line with the economic recovery and the progressive phasing-out of public support measures (Chart I.1.25).

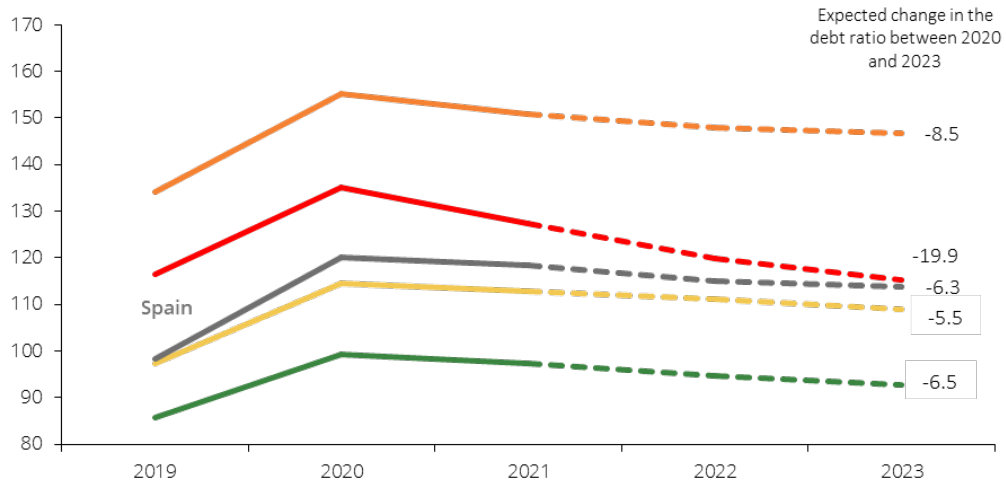
Chart I.1.25 • Contributions to the change in public debt



Sources: Banco de Portugal and Statistics Portugal. | Note: March 2022 change is calculated against December 2021.

According to available projections, including those by the European Commission and the IMF, the ratio should continue to decline in the coming years and Portugal will be one of the countries where this reduction will be most pronounced (Chart I.1.26). However, a slowdown in economic activity and a reversal of the cycle of decreasing interest expenditure, coupled with still high indebtedness, will put further pressure on public accounts.

Chart I.1.26 • Projections for the evolution of public debt | As a percentage of GDP

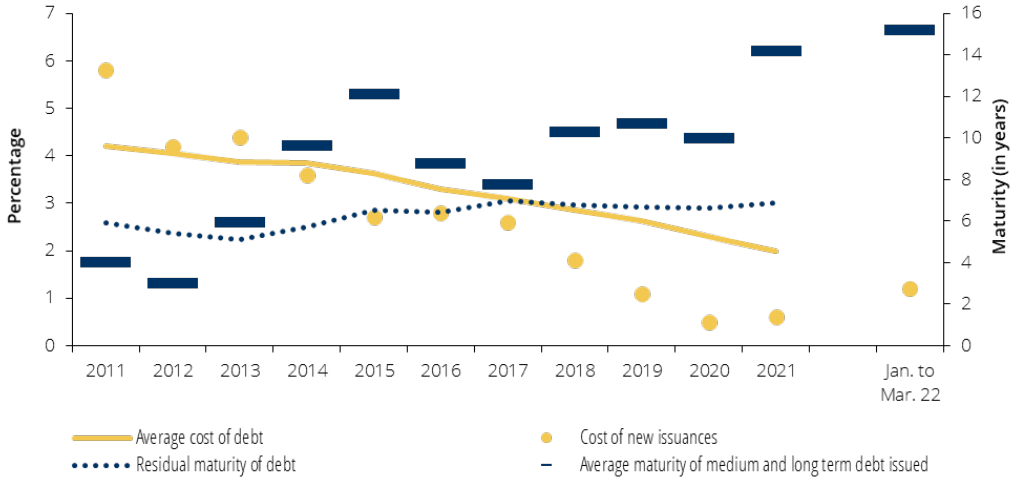


Source: European Commission. | Note: May 2022 projections.

The increase in financing costs constitutes a risk to the planned reduction path of the general government debt to GDP ratio. However, the issuance of debt securities with longer maturities and bond swap operations allowed for an increase in the average debt maturity, virtually constant since 2017, and a reduction in the short-term refinancing risk (Chart I.1.27).

The implicit cost of public debt, corresponding to the ratio of interest expenditure to the average stock of debt, has been on a declining trend since 2012, reaching a low of 1.9% in 2021. This evolution resulted from the compression of the yield spreads associated with Portuguese public debt, in a context of very low interest rates.

Chart I.1.27 • Cost and maturity of public debt

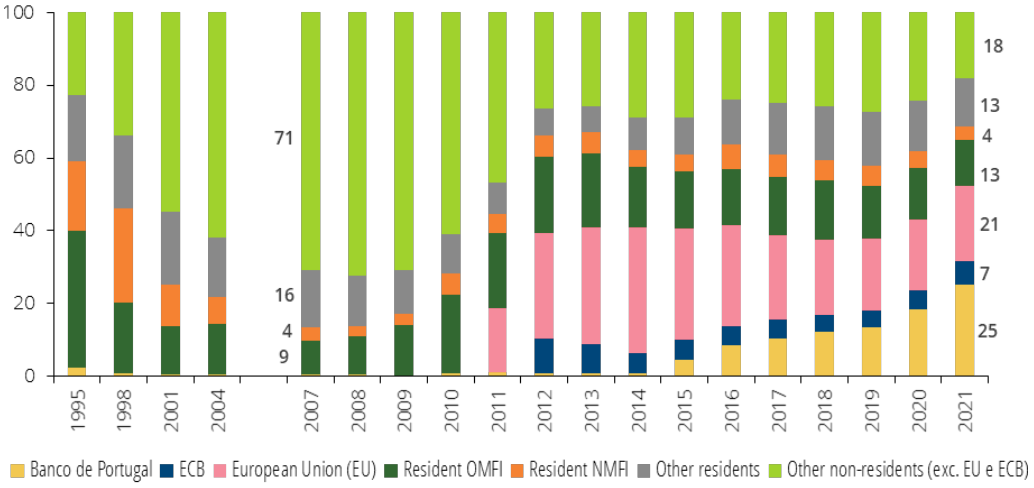


Sources: European Central Bank, Banco de Portugal, Instituto de Gestão do Crédito Público and Statistics Portugal. | Notes: The implicit average cost of the debt stock corresponds to the ratio between interest expenditure and the average debt stock. The cost of debt issued in each period is weighted by amount and maturity and includes Treasury Bills, Treasury Bonds, OTRV and MTN issued in the corresponding year. The average maturity of medium and long-term debt comprises Treasury Bills and MTNs issued in the corresponding year.

From the beginning of 2022 until 16 June, Portuguese 10-year government debt yields increased by 235 basis points, to stand at 2.84%. These developments follow the trend observed in the euro area and also reflect the widening of the yield spread against Germany by 47 basis points. Similarly, the average allotment rate for new issuances by Portugal has been increasing throughout 2022. However, the yield observed in 2022 is still historically low and similar to the figures observed in the last quarter of 2017. Despite its increase, the spread against the German rate remains contained and below that observed at the onset of the pandemic crisis.

The ECB has reiterated its intention to avoid the fragmentation of the public debt market in the euro area. Despite the end of the asset purchase operations, the full reinvestment of securities reaching maturity remains planned, with flexibility in terms of maturities and jurisdictions, in particular with regard to the PEPP. In addition, the high share of Portuguese public debt held by the Eurosystem (50% of the marketable debt) and the European Union (loans) reduces the impact of market movements on the change in yields and indirectly, on the cost of public debt. The share of domestic public debt held by resident financial institutions, excluding the Banco de Portugal, was low in December 2021 (17%, Chart I.1.28).

Chart I.1.28 • Structure of Portuguese public debt holders | Per cent



Sources: European Central Bank, Banco de Portugal, Instituto de Gestão do Crédito Público and Banco de Portugal calculations. | Notes: (a) For the Eurosystem (ECB and Banco de Portugal) it includes securities purchased under the asset purchase programmes (PEPP, PSPP and SMP); (b) Data on asset purchases under the PEPP refer to January 2021 and 2022 and not December 2020 and 2021, as they are made available by the ECB on a bi-monthly basis; (c) The part referring to the European Union corresponds to loans contracted during the Financial Assistance Programme to Portugal and under the SURE and PRR (loans component).

As regards contingent liabilities arising from the granting of State-guaranteed loans, conditionality, set ex ante, in the access to these loans mitigates the likelihood that this risk will materialise. Nevertheless, risks to economic activity developments and the nexus between sovereign and NFCs constitute a vulnerability to financial stability.

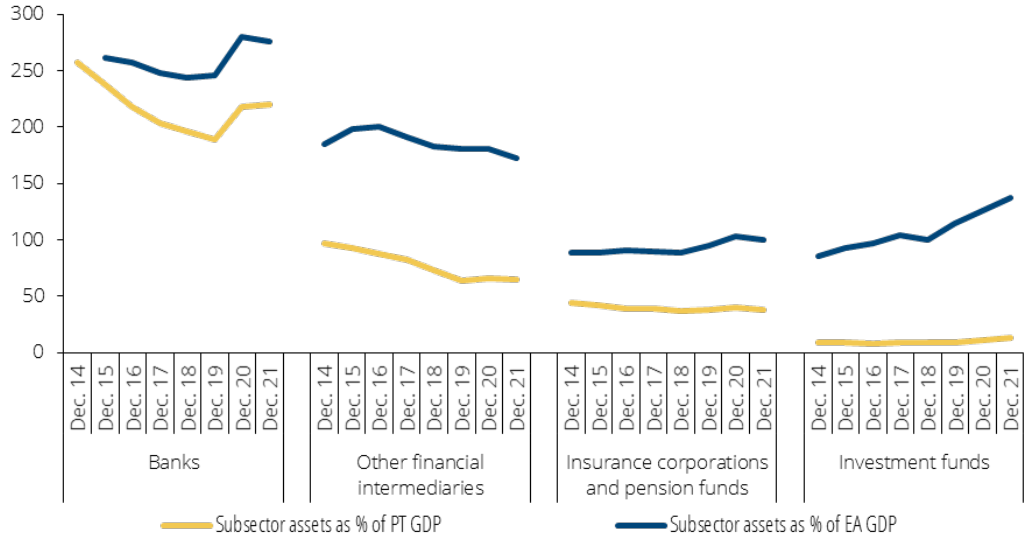
The results obtained from estimating the cost of equity for a number of listed euro area banks confirm the importance of some macroeconomic and financial variables in explaining changes in banks' risk perception in a given country. These variables include the relative growth pace of the economy and the interest rates on government bonds in each country. These results point to an increased need to ensure the sustainability of domestic public debt in the current context of expectations of interest rate increases, to minimise the negative effect that possible sovereign risk shocks may have on the banking system. It is therefore very important to foster a downward trend

in the public debt ratio through a fiscal policy appropriate to the challenges posed by the high stock (and weight in GDP) of public debt and the normalisation of the ECB's monetary policy (Special issue "Determinants of cost of equity for listed euro area banks").

1.3.5 Non-banking financial sector

The non-banking financial sector has a small weight in the Portuguese economy, at 116%, compared to the euro area, at 410%. The small size of the non-banking financial sector in Portugal, compared to 220% of the banking sector GDP, reflects NFCs' lower market financing and greater reliance on bank credit (Chart I.1.29). The link of the non-banking financial sector with the Portuguese banking system declined by 0.6 p.p. in 2021, now accounting for 4.3% of banking assets. This trend makes it possible to mitigate the risk of contagion arising from a potential adverse event that impacts some entities in the financial sector.

Chart I.1.29 • Relative size of the financial system subsectors and direct interlinkages – Portugal and euro area | As a percentage of GDP



Sources: European Central Bank 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 SSFP, 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" in the *Statistical Bulletin*.

At the end of 2021, direct exposure of investment funds and other European financial intermediaries to Russia was relatively small (0.45% of total assets) and consisted mainly of listed shares. Although no significant redemption flows have materialised so far, sanctions imposed on Russian entities in reaction to the invasion, the trading ban for foreign investors on the Moscow stock exchange and the exclusion of Russian financial instruments from some indices have introduced additional challenges in the valuation of Russian assets. Until April 2022, 123 European funds (including ETF and one MMF) with a total balance-sheet value of €13.5 billion were forced to suspend redemptions given the difficulty in valuing their assets. In order to mitigate the risk of contagion and liquidity, some European investment funds have separated Russian assets from their portfolio.

The impact of the invasion has also materialised in an increase in volatility in the commodity derivatives market. Energy producers contract short positions to hedge a decline in energy prices. Because of the surge in oil and natural gas prices, some of these firms faced significant liquidity problems as they were asked to reinforce their margin by clearing members. This effect also propagated to the price of other commodities – such as the suspension of nickel trading on the London Stock Exchange (LME) after a market member had started substantial purchases of this metal to cover its short positions. Although they are not of systemic importance, these episodes show that high concentration in some market segments may trigger pro-cyclical effects, affecting the functioning of financial markets.

Risk premia on sovereign and private debt increased. The invasion of Ukraine has materialised in an increase in risk premia, which increases duration risk and reduces the value of some assets held by investment funds. In the medium term, the persistence or acceleration of this effect may materialise in an increase in redemptions, particularly in portfolios made up of assets with longer maturities. In addition, the aforementioned factors of uncertainty increase the risk of instability in asset management whose portfolios are exposed to emerging and money markets.

However, in the national context, direct and indirect exposure to the assets and countries directly involved in the Ukraine war is residual.

The share of investment funds in Portugal is small (13.1% of GDP vs 137.4% of GDP in the euro area), and the impact associated with the invasion of Ukraine did not materialise into increased risks for the sector. Despite the period of high volatility in international financial markets, recent developments in underwritings and redemptions remove, for the time being, fears of a lack of liquidity in the domestic market. In asset management, domestic open-ended securities and real estate investment funds significantly increased their net subscriptions in 2021 (€2,527 and 348 million, respectively). In the first quarter of 2022, the devaluation of units was accompanied by net redemptions (€318 million and €31 million, respectively), which, being contained, do not pose liquidity problems for the sector.

The increase in inflation and risk premia should also weigh on the portfolios of the insurance and pension funds sectors. In the short term, inflationary pressures are likely to constrain the profitability of some segments (e.g. the non-life segment) owing to the unanticipated increase in their liabilities. In addition, given the high exposure of these sectors to public and private debt with high maturity, the normalisation of monetary policy should be reflected in a reduction in the value of these assets. Over the medium term, however, higher interest rates will benefit the profitability of these two sectors. Insurance companies' activity is characterised by taking on long-term liabilities, funded by the remuneration of short and medium-term assets. Thus, the potential increase in interest rates will be reflected in an increase in discount rates – reducing the value of their long-term liabilities – and an increase in yields – by raising the return on its assets. These two effects should make it possible to alleviate the pressure on the insurance sector created, in particular, by the prolonged low-interest rate environment and to reduce the risk of reinvestment of its portfolio.

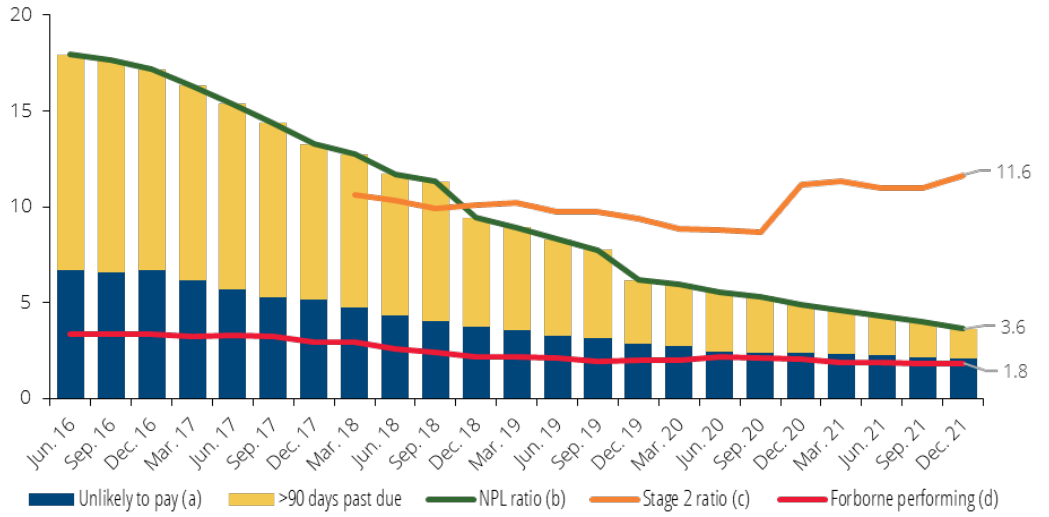
The insurance and pension fund sectors continue to exhibit adequate levels of solvency and activity. The overall coverage ratio of the insurance sector's solvency capital requirement increased by 14 p.p. to 207% in 2021. The total value of its assets remained relatively stable in 2021, with growth in the asset portfolio affecting linked life products. In the pension fund sector, the value of wealth increased by 5%.

1.3.6 Banking system

The banking system continued to reduce its NPL ratio, improved its profitability and maintained historically high capital ratios. However, several challenges remain, in some cases intensified by the current environment.

The NPL ratio continued the downward trend observed since June 2016 (Chart I.1.30). This trend benefited from the support measures adopted during the pandemic crisis and the significant adjustment made by the sector in recent years. However, following the withdrawal of some support mechanisms, there was a slight increase in default among loans that were under moratoria, which accounted for 19.2% of total loans in December 2021. The increase in credit risk for these loans can also be seen in the rise in stage 2 loans (11.6%), reflecting ongoing elevated perceptions of risk compared to the pre-pandemic period (Boxes 3 and 5). The effects of the pandemic crisis are also evident in the euro area, where, even though the NPL ratio reached its lowest level since 2008, stage 2 loans increased to 8.7%, signalling a potential deterioration in credit quality. In addition, there are risks related to the war in Ukraine, namely higher inflation and interest rates, which are expected to materialise in an increase in credit risk for the banking system.

Chart I.1.30 • Asset quality evolution | Per cent



Source: Banco de Portugal. | Notes: (a) Corresponds to the ratio of loans classified as unlikely to pay to total gross value of loans; (b) corresponds to the ratio of gross value of NPLs to total gross value of loans. Includes loans and cash balances at central banks and credit institutions, loans to general government, other financial corporations, non-financial corporations and households; (c) Stage 2 – loans that have deteriorated significantly in credit quality since initial recognition, but offer no objective evidence of a credit loss event; (d) corresponds to the ratio of forborne but performing loans to total gross value of loans.

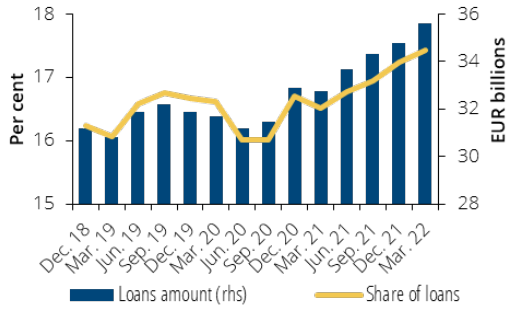
Developments in the economic environment in recent months, assessed by a comparison between the two central scenarios corresponding to the December 2021 and June 2022 projections of the Banco de Portugal, foresee an increase in the materialisation of credit and market risks for 2022, which are expected to be partially offset by the increase in net interest income (Special issue "Profitability and solvency of the Portuguese banking system in an environment of rising interest rates"). The rise in interest rates, compared to expectations in December 2021, should result in an improvement in net interest income in the coming years and an increase in recognition of impairments and potential losses from the devaluation of government debt securities measured at fair value.

However, according to the comparison between the two central scenarios, the impact of each of these risk factors should be differentiated by intensity and time horizon. In the short term, a slightly negative impact on capital is projected to dominate. In the medium term, despite the rise in credit risk impairments and the materialisation of market risk, these two effects are expected to be more than offset by an increase in accumulated earnings via net interest income. Indeed, over a three-year projection horizon, there should be a negative effect on the CET1 ratio in the first year but a positive impact from 2023 onwards.

The rise in long-term interest rates is expected to increase the materialisation of market risk for the banking system. The rise in these interest rates is likely to be reflected in a decrease in the market value of some assets, most notably government debt, and consequently lead to the recognition of losses. However, the impact on the banking sector will depend on the maturity of debt portfolios, the accounting approach and the perception of risk intrinsic to each sovereign. The materiality of this impact has led most institutions to adopt strategies to hedge interest rate risk. According to the information collected, most of the debt measured at fair value in the portfolio of the main Portuguese banks is hedged by financial derivatives, such as swaps or interest rate futures. Regarding December 2021 and ignoring potential hedging strategies, a possible 100 b.p. rise in the government yield curve would reduce by 2.2 p.p. the market value of assets held by banks at fair value. Finally, the increase in bond market yields should result in a positive contribution to the banking system's profitability as bonds replace the current securities portfolio with higher yields.

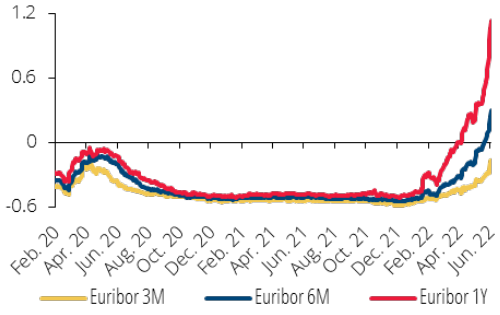
The rise in interest rates, taking into account a comparison of the two central scenarios mentioned above, is expected to materialise in an increase in credit risk impairments. Credit risk materialisation has been lower than anticipated at the start of the pandemic crisis. The risk management practices adopted in recent years, reinforced by supervisory measures adopted during the pandemic, which remain valid, should mitigate the materialisation of credit risk. In addition, the share of fixed-rate loans has been gradually increasing since 2016 (Chart I.1.31). This trend will make it possible to partially mitigate the impact on borrowers' debt service and, consequently, credit risk for banks. Similarly, although impairments are expected to increase, default probabilities remain historically low. For loans to households, in particular more recent ones, the risk will tend to be minimised by the introduction of the Macroprudential Recommendation relating to new credit for house purchase and new consumer credit, which explicitly envisages a scenario of increased interest rates in the assessment of risk when a loan is taken out.

Chart I.1.31 • Percentage and amount of fixed-rate loans



Source: Banco de Portugal. | Notes: Total amount of loans granted to households and firms at fixed rate. Fixed rate means that the interest rate remains constant for the duration of the contract, not being subjected to changes in the reference rate.

Chart I.1.32 • 3-, 6-months and 1 year EURIBOR | Per cent

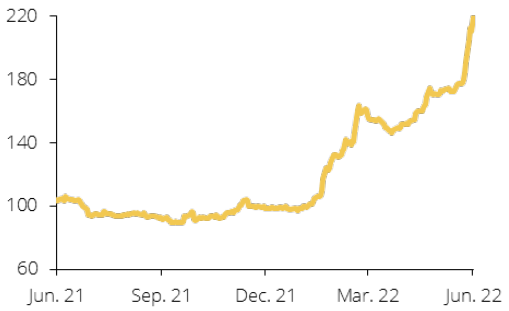


Source: Refinitiv. | Note: Last observation: 16 June 2022.

The rise in interest rates is expected to have an overall positive impact on the banking system's net interest income. The normalisation of monetary policy and the corresponding rise in interbank interest rates (Chart I.1.32) are expected to increase Portuguese banks' net interest income. This effect will result from an increase in interest received on loans that, due to a high share of floating-rate assets, should see their rate of return increase in line with interbank rates. In addition, given that the liabilities of the Portuguese banking sector are mostly customer deposits, partly demand and non-interest-bearing deposits (Chapter 2), the increase in interest rates should have a comparatively smaller impact on financing costs in the short term, resulting in a positive net effect on the banking system.

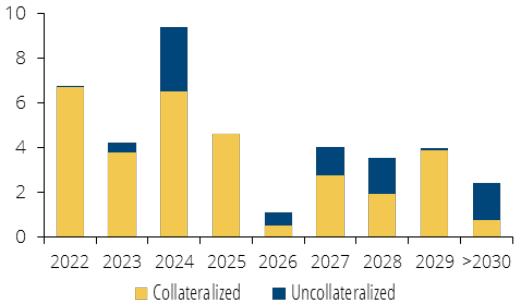
The cost of market financing for the banking sector is expected to increase. Expectations associated with the monetary policy normalisation process have been reflected in a recent rise in market interest rates, including for European bank debt. Thus far, this rise has been more pronounced for debt with longer maturities than the slight increase observed in short-term debt. The rise in the risk premium for the banking sector also suggests a higher risk perception by market agents (Chart I.1.33). Debt issued by Portuguese banks accounted for only 4% of their consolidated balance sheet at the end of 2021. However, financing costs should rise. The structure of debt issued by banks shows that a significant proportion is expected to mature before 2024 (Chart I.1.34). The need for institutions to issue new debt to replace existing issues, together with complying with the minimum requirement for own funds and eligible liabilities (MREL), in a context of rising interest rates, should increase financing costs and thus profitability in the medium term.

Chart I.1.33 • Price index of Portuguese banks' issuances | Jan. 2022 = 100



Source: Refinitiv. | Notes: Values for the main Portuguese banks. The index is based on uncollateralised issuances (Unsecured, Senior Unsecured, Senior Non-Preferred and Subordinated Unsecured). The rate shown refers to implicit Ask value, weighted by the issue value and the bank's total assets. Last observation: 16 June 2022.

Chart I.1.34 • Banks' issuance maturities | EUR billions



Source: Refinitiv. | Notes: Values for the main Portuguese banks. Mortgage bonds are included in collateralised issuances (Senior Secured – Mortgage). Bonds and credit securities (Unsecured, Senior Unsecured, Senior Non-Preferred and Subordinated Unsecured) are included in uncollateralised issuances. Updated on: 16 June 2022.

The rise in interest rates will also be reflected in financing costs. The review of the extraordinary monetary policy measures adopted by the ECB during the pandemic crisis, particularly the targeted longer-term refinancing operations (TLTROs) in June 2022, may be reflected in the short-term financing conditions of the banking system. Over the medium term, given the original maturity of these instruments (three years), banks will have to replace this funding (or part thereof) in an environment of higher interest rates.

Overall, the increase in net interest income should be higher than the costs associated with the materialisation of credit risk and market risk (Special issue "Portuguese banking system's profitability and solvency in a context of rising interest rates"). However, the relative size of these

impacts will largely depend on the pace of recovery in economic activity and the magnitude and speed of monetary policy normalisation.

There is an increased need for banks to invest in digitalisation to continue to meet customer preferences, realise efficiency gains and ensure operational resilience. Customers require more efficient and convenient online services, and the institutions themselves are forced to use IT to increase efficiency while maintaining resilience and reducing costs (at least in the medium term). This trend is not new but has been accelerated by the pandemic. Over the past two years, Portuguese banks have invested considerably in IT infrastructure and are expected to continue doing so in the coming years.

The ongoing transformation also poses several risks to the banking sector. In addition to more immediate threats from incumbent competitors that adapt faster to customer preferences and operational vulnerabilities that may materialise in the near term, there are more structural challenges affecting traditional banking:

- Competition from technology-based entities, notably BigTechs, but also some FinTechs. In Portugal, competition from this entity type is not yet significant, although it puts pressure on Portuguese banks to adapt to new customer preferences. FinTechs, which typically specialise in market niches (and thus have a comparative advantage without having part of the fixed costs, including compliance costs, of traditional banks), can, in some cases, also be a means for banks to speed up their digitalisation process via outsourcing and/or acquisitions;
- Increasing, albeit still contained, competition from activities using decentralised financial systems (DeFi), requiring banks to allocate resources in order to understand in a timely manner how best to integrate these new trends into their traditional business models (Box 1).

An acceleration in digitalisation increases the points of entry for cyberattacks and strengthens their systemic nature, potentially leading to their materialisation in the current geopolitical risk environment. The wider use of technology (digital channels and remote work) and greater reliance on external suppliers (outsourcing and cloud computing) make banks more dependent on the availability of IT services and more vulnerable to cyber risk. Given the growing interlinkages between institutions and common IT service providers, the possibility of these risks becoming systemic is not negligible. The current geopolitical risk environment increases the likelihood of attacks.

There is no record of incidents that have caused systemic disruptions in the Portuguese financial sector. Nevertheless, supervisors have been signalling an increase in the number and aggressiveness of cyber incidents and continue to consider cybersecurity as one of their supervisory priorities. In April 2022, the Banco de Portugal approved the transposition of the TIBER-EU framework for advanced cyber security testing (seeking to mimic the tactics, techniques and procedures of attackers threatening technological infrastructure critical for financial institutions).

Risks related to climate change and energy transition also impact on the banking sector and are likely to affect financial stability over the next few decades. The structural challenges facing the banking system stem from its exposure to climate change risks (which may influence the intrinsic risk of its balance sheet exposures) and their role in the continued provision of funding to the economy throughout the transition process – which should be orderly – towards a more sustainable economy. Given the importance of these risks to the banking system, it is important to assess the credit quality of firms belonging to climate policy-relevant sectors (CPRS) (Box 6).

An acceleration of the energy transition process, also driven by the current geopolitical conflict, may increase risks to the banking system. Following Russia's invasion of Ukraine, the European Commission adopted an action plan (the REPowerEU Plan) on 18 May 2022 to make Europe

independent from Russian fossil fuels. This plan contains ambitious targets to diversify gas supplies and speed up the reduction in the use of fossil fuels in combination with increased energy efficiency; the acceleration of the transition process thus further reinforces the need for institutions to proactively adopt mitigation strategies and integrate climate-related and environmental risks into their risk management policies and assessments of resilience to these risks.

There are also challenges related to the European framework for prudential regulation and supervision for credit institutions, which is evolving and adapting to Environmental, Social and Governance (ESG) risks, especially regarding climate-related environmental risks. For example, a recent development in microprudential regulation is the publication, on 2 May, of a Discussion Paper[3] of the European Banking Authority (EBA) on the prudential treatment of exposures associated with environmental objectives under own funds (or Pillar 1) requirements, which will be under public consultation for a period of three months. The document follows up on the EBA's mandate to assess whether a specific prudential treatment would be warranted for exposures related to assets or activities substantially associated with environmental and/or social objectives or subject to environmental and/or social impacts. Taking into account the input received, the EBA will prepare the final report with potential policy recommendations, which, per the proposed amendment to the Capital Requirements Regulation (CRR) (under negotiation), is to be sent to the European Parliament, the Council and the European Commission by June 2023. If it is deemed appropriate, the European Commission may submit a legislative proposal.[4]

From a macroprudential point-of-view, the various European institutions and the Banco de Portugal responded to the European Commission's call for advice on existing macroprudential tools for managing financial stability risks related to climate change, among others (Section 1.4).

Important supervisory initiatives will also take place in the short term, with particular emphasis on the ECB's microprudential supervisory stress test on climate-related risks and a thematic review of the environmental and climate-related risk management practices of the institutions under its supervision, the results of which may be incorporated into the SREP.

In December 2021, the European leaders reiterated the mandate set out at the December 2020 Euro Summit, which foresees the finalisation by the Eurogroup of a stepwise and time-bound work plan on all outstanding elements needed to complete the Banking Union.

The Eurogroup's work in an inclusive format focused on four dimensions: (I) strengthening the framework for bank crisis management; (ii) creating a more robust common protection for depositors; (iii) facilitating a more integrated banking market, and (iv) encouraging greater diversification of banks' sovereign bond holdings. At their meeting on 16 June 2022, the members agreed that, as an immediate step, work on the Banking Union should focus on the first dimension. Subsequently, the Eurogroup is expected to review the state of the Banking Union and identify further measures concerning the other three dimensions in a consensual manner.

With regard to strengthening the common framework for bank crisis management and national deposit guarantee schemes, four broad elements have been agreed on in connection with (i) further harmonisation and clarification of the so-called public interest assessment (PIA) – a key element in assessing the application of a possible resolution measure to an institution; (ii) broadened application of resolution tools, including for smaller banks; (iii) further harmonisation of the use of national deposit guarantee funds, while ensuring appropriate flexibility for facilitating the potential market exit of banks in a manner that preserves the value of their assets and provides for the introduction of a harmonised least-cost test, administered by national authorities, to govern the use of national deposit guarantee schemes outside payout to covered depositors;

[3] See EBA's website.

[4] See Banco de Portuga'sl website (in Portuguese only).

and (iv) harmonisation of targeted features of national insolvency frameworks applicable to the banking sector.

The current resolution system is inappropriate for small and medium-sized credit institutions and/or those whose business model is based on deposits (and therefore have increased restrictions on compliance with the minimum requirement for own funds and eligible liabilities under the bank resolution framework (MREL)). It is therefore essential that the review of the common framework for bank crisis management and national deposit guarantee schemes addresses these limitations and clarifies the application of the PIA as well as the use of the Single Resolution Fund to promote financial stability.

As agreed by the Eurogroup in an inclusive format, the European Commission is now expected to bring forward legislative proposals to review the aforementioned European framework. The co-legislators are expected to reach an agreement on these proposals during the current institutional cycle (early 2024). The European Commission is also expected to review the State aid framework for the banking sector to ensure consistency with the agreement on the common framework for bank crisis management and national deposit guarantee schemes.

On the European Deposit Insurance Scheme (EDIS) – the third and final pillar of the Banking Union — only a framework that provides for full mutualisation of risk in the new steady state will ensure that depositor confidence no longer depends on the geographical location of the bank. It will also address the current misalignment between decision-making and financing centres, where the costs of supervisory and resolution decisions taken at the European level are borne at the national level, in a context where Member States have limited instruments and less flexibility to safeguard financial stability.

Finally, additional initiatives to promote, through regulatory policy, greater integration of the banking market and greater diversification of banks' exposures to sovereigns will need to consider the impacts they may have, especially in financial crisis situations. Their implementation should be subject to robust mechanisms that ensure financial stability, especially in crises, not only in the EU but also in each Member State.

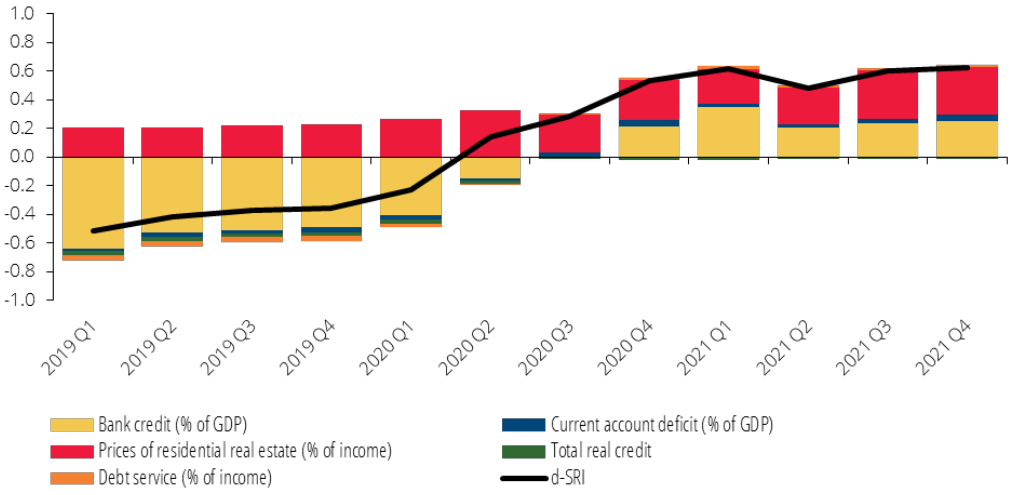
Concerning the prevention of money laundering and terrorist financing (ML/TF), the Banco de Portugal issued several supervisory measures as a result of supervisory actions completed in previous periods, disseminated information to the private sector and closely monitored the implications of the war in Ukraine. In this specific context, the Banco de Portugal (i) has liaised closely with the competent authorities on restrictive measures and collected information to assess exposure to sanctioned persons and entities, as well as the procedures adopted in this context by the entities subject to its supervision; and (ii) has communicated warnings and guidelines to the industry, in line with the decisions issued by the EBA and the European Commission, to ensure the financial inclusion of displaced Ukrainian nationals and avoid widespread de-risking practices vis-à-vis Russian and Belarussian citizens who do not have any links to the sanctions regimes. The Banco de Portugal has also been carrying out thematic inspections on issues identified as high risk in the national ML/TF risk assessment and has been involved in the negotiation process of the European package of legislative proposals – the AML Package – presented by the European Commission in July 2021. Work was also concluded to prepare a new regulatory instrument to implement preventive ML/TF obligations in the financial sector, following Public Consultation No 1/2022.

1.4 Macroprudential policy

The domestic systemic risk indicator (d-SRI) stabilised at positive figures in 2021, following a period of persistent and sharp increase. Notwithstanding the upward trend seen in the indicator since the first quarter of 2015, the acceleration observed in 2020 was driven by the contribution of changes in bank credit as a percentage of GDP in the wake of the pandemic crisis (Chart I.1.35). A sharp fall in economic activity, reflected in the denominator, and the measures to mitigate the impact of the pandemic, in particular State-guaranteed credit lines and moratoria schemes, reflected in the numerator, contributed to these developments. At the same time, residential real estate prices contributed to the increase in the d-SRI.

In the fourth quarter of 2021, the indicator stabilised close to the figure observed in the first quarter. This reflects a recovery in economic activity and the phasing-out of the temporary measures adopted during the pandemic. Future developments in the d-SRI will be determined by (i) the mechanical effect of the correction of the fall in GDP, which will contribute to the stabilisation of cyclical systemic risk, (ii) developments in residential real estate prices; and (iii) developments in non-financial private sector indebtedness, whose contribution to cyclical systemic risk is uncertain at the current juncture.

Chart I.1.35 • Domestic Systemic Risk Indicator | Standard deviations from the median



Source: Banco de Portugal calculations. | Notes: The d-SRI, developed by Lang et al. (2019), is an aggregate indicator aimed at identifying the accumulation of cyclical imbalances created in the domestic non-financial private sector. Positive figures for the d-SRI point to the build-up of cyclical systemic risk, whilst negative figures point to its materialisation. For further details on the domestic systemic risk indicator for Portugal, see Box 3 in the June 2019 issue of the *Financial Stability Report*.

The risk of a significant correction in house prices was assessed to be fairly limited over the course of 2021 (Box 2). A build-up of financial vulnerabilities, a pick-up in consumer confidence and continued signs of house price overvaluation were the main drivers behind these developments.

The Banco de Portugal maintained the countercyclical capital buffer rate for credit exposures to the domestic private non-financial sector at 0% of total risk exposures for the second quarter of 2022. However, developments in cyclical systemic risk and, in particular, the build-up of risks in the residential real estate market will continue to be closely monitored.

On 29 March 2022, the Banco de Portugal notified less significant credit institutions that the relief measures on (i) the exclusion of central bank exposures from the leverage ratio; and (ii) guidance on additional own funds and the combined buffer would cease on 31 March 2022 and 31

December 2022 respectively.[5] This decision follows the ECB's announcement on 10 February 2022 for significant credit institutions. These measures had been adopted at the onset of the pandemic crisis to promote financial stability and ensure the financial system's ability to provide the liquidity needed to support households and firms. Beyond the acute phase of the pandemic crisis and in view of the banking sector's current capital levels, it is important to return to the minimum capitalisation levels required before the crisis.

Together with the national macroprudential authorities, the European Systemic Risk Board (ESRB) concluded an exercise in February 2022 to assess risks and vulnerabilities in the residential real estate market and the macroprudential policies adopted to mitigate these risks in EU Member States, Iceland, Liechtenstein and Norway. As in 2019, Portugal was assessed as medium risk, the macroprudential policy implemented by the Banco de Portugal was deemed to be appropriate and sufficient to mitigate the risks identified, and no warnings or recommendations were issued. The outcome shows that financial stability risks related to residential real estate have continued to increase in several countries.[6] Despite their heterogeneity, the key vulnerabilities highlighted by the ESRB assessment in the medium term are (i) rapid house price growth and possible overvaluation; (ii) the level and dynamics of household indebtedness; (iii) the growth of housing credit; and (iv) signs of a loosening of lending standards. The risk associated with the residential real estate market remained high in five countries (Denmark, Luxembourg, Netherlands, Norway and Sweden), medium in 19 countries and low in the remaining countries. Following this assessment, the ESRB issued warnings to five countries (Bulgaria, Croatia, Hungary, Liechtenstein and Slovakia) and recommendations to two countries (Austria and Germany).[7]

In 2021 institutions generally continued to comply with the guidelines set out in the macroprudential Recommendation relating to new credit for house purchase and new consumer credit. In March 2022, the Banco de Portugal published the fourth *Macroprudential recommendation on new credit agreements for consumers – progress report*.[8] Results show that almost all new credit for house purchase had a loan-to-value (LTV) ratio below or equal to 90%, a limit on the LTV ratio set out in the Recommendation for new credit for the purchase of own and permanent residence (Chart I.1.36). Around 94% of new credit for house purchase and new consumer credit was granted to borrowers with a debt service-to-income (DSTI) ratio with a shock, i.e. considering an interest rate rise and/or a reduction in income of 50% or less. Loans granted to borrowers with a DSTI ratio of between 50% and 60% and over 60% totalled 4% and 3% of new business respectively, below the limits of the exceptions provided for in the Recommendation.

In the past year, three quarters of new credit was granted to households with an actual DSTI ratio of 32% or less.[9] Compared with the time of implementation of the Recommendation, in the third quarter of 2018, the average actual DSTI ratio declined by 4 p.p. (Chart I.1.37). Between 2018 and 2021 there was also a less disperse distribution of the DSTI ratio, mainly associated with a decrease in the higher percentiles. The 90th (75th) percentile decreased from 49.3% (36.9%) in the third quarter of 2018 to 40.4% (32.1%) in 2021.

[5] Press release available on the Banco de Portugal's website (in Portuguese only).

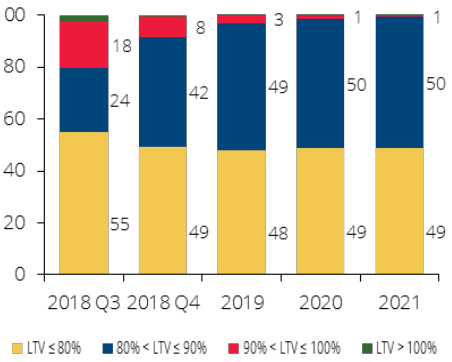
[6] Press release available on the Banco de Portugal's website.

[7] For more details on the ESRB assessment conducted in 2019, see Box 1 in the December 2019 issue of the *Financial Stability Report*.

[8] Report available on the Banco de Portugal's website.

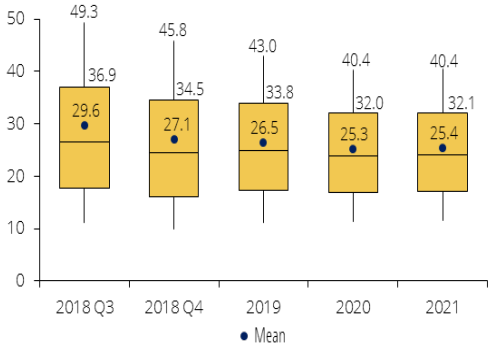
[9] The actual DSTI ratio does not take into account the shocks on the interest rate and/or on the borrower's income set out in the Recommendation.

Chart I.1.36 • Distribution of new credit for house purchase by LTV ratio | Per cent



Source: Banco de Portugal. | Notes: Based on information reported by a sample of 13 institutions.

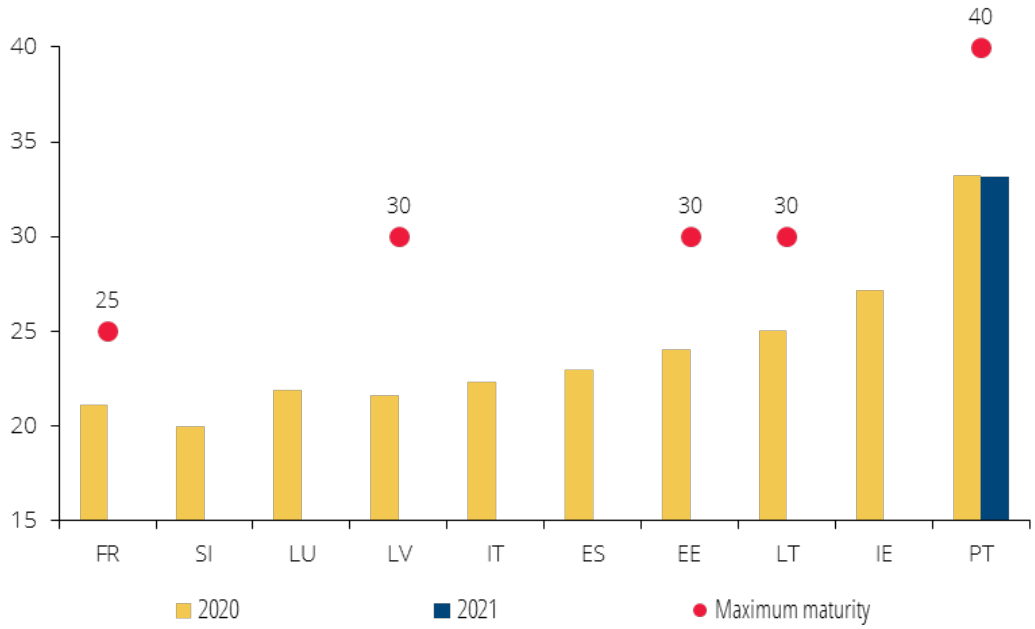
Chart I.1.37 • Distribution of the actual DSTI ratio for new loans to households | Per cent



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 CCR.

The Banco de Portugal amended the macroprudential Recommendation, with the maximum maturity of new credit agreements for house purchase being dependent on the borrowers' age to promote the convergence of the average maturity of these loans towards 30 years. Institutions have been complying with the guideline set out in the Recommendation on the maximum maturity of 40 years for new credit for house purchase. Since 2018, the Recommendation also sets out a linear and gradual convergence of the average maturity of these loans towards 30 years by the end of 2022. The average maturity of new credit was expected to stand at 30.8 years in December 2021, but was in fact 32.5 years. In order to promote convergence of the average maturity of new credit for house purchase and given the strong concentration in maturities between 35 and 40 years (around half of the loans in the fourth quarter of 2021), the Banco de Portugal adjusted the Recommendation, with the maximum maturity of new credit agreements for house purchase being dependent on the borrowers' age. With effect from 1 April 2022, the Banco de Portugal recommends the following limits to the maximum maturity of new credit agreements for house purchase: 40 years for borrowers aged 30 or under; 37 years for borrowers aged over 30 and up to and including 35; and 35 years for borrowers aged over 35. As regards the EU countries for which information is available, Portugal is the country with the highest average maturity of new credit for house purchase, at around 33 years (Chart I.1.38). This situation and the fact that the limit to the maximum maturity of 40 years corresponds to the highest value among countries for which information is available also contributed to amending the Recommendation.

Chart I.1.38 • Maximum and annual average maturity of new credit for house purchase by country | In years



Sources: Information published by the respective national authorities. | Note: In addition to Portugal, up to early 2022 Malta is the only EU country which to date has adopted a maximum maturity of 40 years.

The increase in cyclical systemic risk in several EU countries, associated with the residential real estate market, has fuelled the debate on the adoption of sectoral macroprudential policy measures. The main instruments available to national macroprudential authorities can be grouped into two categories. There are those that act directly on the borrower's credit standards (so-called borrower-based measures) and those applicable to institutions that act on capital (capital measures). Capital measures directly enhance the resilience of the financial system; measures targeting borrowers indirectly promote the resilience of the financial sector by improving the risk profile of borrowers of new credit, resulting in a reduction of the institutions' expected losses. Increasing resilience through borrower-based instruments tends to materialise over time, while capital measures tend to increase resilience more immediately. These two types of instruments can thus be complementary. Combined, they can, under certain circumstances, promote financial stability more quickly and effectively.

The origin of systemic risk is relevant for the design of macroprudential policies. If systemic risk builds up across sectors, then applying capital measures to the exposures of credit institutions to these sectors, such as the countercyclical capital buffer (CCyB), may be the most appropriate. Adopting such a measure may lead to changes in the composition of the credit portfolio as it encourages financial institutions to invest in exposures with lower risk weights. If systemic risk builds up in a specific sector of the economy, the use of sectoral tools, such as the sectoral systemic risk buffer (sSyRB) or risk weights for certain exposures, may be more appropriate. These instruments directly affect banks' credit portfolio, helping it become less exposed to the identified source of systemic risk.

European Economic Area (EEA) macroprudential authorities have consequently implemented, over the past two years, capital measures such as the systemic risk buffer (SyRB) or the CCyB, in parallel with borrower-based measures (Table I.1.5). More recently, a number of countries have implemented sectoral capital measures, such as the sSyRB.

Table I.1.5 • Combination of instruments' categories and implementation of sectoral capital measures by EEA Member States

Country	Capital measure	Implementation	Borrower-based measure	Implementation
Germany	– CCyB rate of 0.75% – sSyRB rate of 2.0% for the exposures secured by residential property	February 2023		
Austria	SyRB rate between 0.5% and 1.0%	June 2021	Limits to LTV and DSTI ratios and to maximum maturity[(a)]	September 2018
Belgium	sSyRB rate of 9.0% for the retail exposures of institutions applying the IRB approach	May 2022	Limits to LTV, DTI and DSTI ratios[(a)]	January 2020
Slovakia	CCyB rate of 1.0%	August 2020	Limits to LTV, DTI and DSTI ratios and to maximum maturity	November 2014 January 2020
Slovenia	– sSyRB rate of 1.0% for exposures to natural persons secured by residential property – sSyRB rate of 0.5% for the exposures to natural persons not covered by the aforementioned sSyRB rate	January 2023	Limits to LTV[(a)] and DSTI ratios and to maximum maturity	September 2016 November 2019
Estonia	CCyB rate of 1.0%	December 2022	Limits to LTV and DSTI ratios and to maximum maturity	March 2015
France	CCyB rate of 0.5%	April 2023	Limits to DSTI ratio and to maximum maturity	January 2020 January 2022
Ireland	CCyB rate of 0.5%	June 2023	Limits to LTV and LTI ratios	February 2015 January 2018
Iceland	SyRB rate of 3.0%	April 2016	Limits to LTV and DSTI ratios	July 2017 December 2021
Liechtenstein	SyRB rate between 1.0% and 2.0%	January 2020	Limit to LTV ratio	February 2015
Lithuania	sSyRB rate of 2.0% for exposures secured by residential property	July 2022	Limits to LTV and DSTI ratios and to maximum maturity	November 2011 July 2017
Luxembourg	CCyB rate of 0.5%	January 2021	Limit to LTV ratio	January 2021
Norway	– CCyB rate of 2.5% – SyRB rate of 4.5%	March 2023 December 2020	Limits to LTV and DTI ratios	July 2015 January 2021
Czech Republic	CCyB rate of 2.5%	April 2023	Limits to LTV, DTI and DSTI ratios and to maximum maturity[(a)]	June 2015 April 2022
Romania	SyRB rate between 0.0% and 2.0%	January 2021	Limits to LTV and DSTI ratios and to maximum maturity	November 2011 January 2019

Sources: European Systemic Risk Board and national macroprudential authorities. | Notes: In the last column, the first date corresponds to the beginning of the implementation of borrower-based measures, whilst the second date corresponds to the latest introduction of a measure. Macroprudential measures under the scope of Article 458 CRR (Capital Requirements Regulation) are not presented. DTI (debt-to-income) is the ratio between debt and income. (a) Measure implemented in the form of macroprudential Recommendation.

The normalisation of monetary policy may have implications for the conduct of macroprudential policy. The conduct of monetary policy has been marked in the last decade by the implementation of non-standard measures and a prolonged very low interest rate environment. In addition to the common transmission channel between the two policies through credit, monetary policy decisions may affect financial stability in the short and in the medium term heterogeneously across countries and in different ways (e.g. leverage in the economy, default, and the value of assets used as collateral). Macroprudential policy should consider these effects when selecting and calibrating its instruments, as well as second-round effects, particularly in the current environment of uncertainty. A single approach to the conduct of macroprudential policy in Europe may be counterproductive, and national macroprudential authorities are better prepared to assess the need for the adoption of measures.

The normalisation of the ECB's monetary policy may occur under different scenarios, in terms of instrument calibration and pace of implementation, with different financial stability implications. A gradual normalisation, anchored in economic agents' expectations, will have lower adjustment costs in the economy. In such a scenario, a positive net benefit is more likely to be achieved with the normalisation of monetary policy. If normalisation takes place less gradually and/or occurs late, it will tend to have a more uncertain and potentially more abrupt impact on the economy and financial stability. The complementarity of monetary and macroprudential policies implies coordination between them.

In 2021 the European Commission launched a public consultation on the review of the European legal framework for macroprudential policy. To ensure the resilience of the financial system over the medium and long term, it is essential to reassess and, if necessary, adjust the regulatory framework for macroprudential policy**.** The Commission thus called for advice in four areas: (i) design and functioning of the buffer framework; (ii) missing or obsolete instruments; (iii) internal market considerations; and (iv) global emerging risks.

The Banco de Portugal favours a more flexible and timely use of the CCyB, reinforcing the role of other cyclical systemic risk indicators and reducing reliance on the Basel gap for decisions on this policy instrument.[10] With regard to the need to give greater importance to buffers that may be released by the authorities following an unexpected shock or materialisation of a systemic risk of large magnitude, the Banco de Portugal advocates the possibility of fully or partially reducing the capital conservation buffer. This should occur to address adverse impacts arising from systemic events characterised by a strong impact on the financial system and of low probability, as was the case of the pandemic crisis.

The Banco de Portugal supports continuing the efforts to collect information on credit standards, which form the basis of borrower-based measures. Despite considering that these measures should not be directly included in the European legal framework, the Banco de Portugal supports the collection of indicators to monitor residential real estate developments provided this is in compliance with ESRB Recommendations 2016/14 and 2019/3.

The Banco de Portugal supports a review of the European methodology for identifying and calibrating the other systemically important institutions (O-SII) buffer and is in favour, in particular, of developing a methodology to calibrate the buffer floor. It also proposes a simplification of the applicable procedures to activate and potentially extend macroprudential measures.

Finally, with the aim of addressing global emerging risks – both climate-related and digital, including cybersecurity – the Banco de Portugal encourages the timely collection of information and a reflection on the development of harmonised taxonomies. In particular, the Banco de Portugal advocates collecting information on the new sources of risk to the financial system, also associated with crypto-assets. The Banco de Portugal considers it a priority to harmonise and collect information for an evidence-based design of macroprudential instruments for climate-related risks. However, the European Commission's proposal in the CRD VI (Capital Requirements Directive) already clarifies the possibility of using the current systemic risk buffer framework to address climate-related risks.

References

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*, 219.

[10] Response of the Banco de Portugal available at the European Commission's website.

2 Banking system

In 2021 banking activity was conducted in a recovering economic environment as a result of the fading effects of the pandemic. However, the outbreak of war in Ukraine in early 2022 exacerbated uncertainty about potential impacts on the banking sector in the short to medium term.

Profitability recovered to its 2019 level. The decrease in credit impairment flows, which contrasts with a marked increase in 2020, contributed to a pick-up in return on assets (similarly to Europe) to 0.46%. This recovery mainly reflected an increase in profitability in the lower percentiles of the distribution, thereby reducing heterogeneity in the banking system.

The banking system's assets increased by 8% in 2021 mainly through cash balances at central banks and, to a lesser extent, loans to customers. Monetary policy decisions taken by the ECB in recent years – which were reinforced during the pandemic – have helped enhance banks' liquidity. The stock of loans for house purchase mostly accelerated until September 2021 and it grew slightly over the following months. At the end of 2021, 92% of the stock of loans to households for house purchase had a loan-to-value ratio of 80% or less, allowing the sector to accommodate a correction in residential property prices without incurring large losses. The pace of growth of loans to NFCs has moderated since March 2021, more markedly in the sectors most affected by the pandemic. In March 2022 the weight of the sectors potentially more affected by the increase in energy and/or commodity costs in total bank loans to NFCs was 35.9%, of which 12.8 p.p. related to sectors which were also among those most severely hit by the pandemic crisis (most notably, accommodation and food services and transportation and storage).

NPL ratios remained on a downward path. NPL ratios gross and net of impairments decreased by 1.3 p.p. and 0.5 p.p., to stand respectively at 3.6% and 1.7% at the end of 2021. This decrease was observed in the NFC and household segments, with particular emphasis on the contributions of sales, write-offs and, to a lesser extent, the increase in the loan portfolio (denominator effect). Although the inflow of new NPLs was offset by, inter alia, cures and repayments, the flow of new NPLs in the NFC segment rose from 2020. The gross NPL ratio of the sectors most affected by the pandemic was above the average for firms (11.2% vs 8.1%), but their impairment coverage was also higher (85.3% vs 52.9%).

The quality of the loan portfolio that benefited from the moratorium regime deteriorated over the course of 2021, although only mutedly. In December 2021 loans to the non-financial private sector that were under moratoria (19.2%) saw increases in their NPL (2 p.p.), stage 2 loan (4.8 p.p.) and forborne loan (2.7 p.p.) ratios, some of which were also due to a decline in the denominator (loan repayments, given that, by definition, there is no new business). Despite the benign developments so far, the gradual phasing-out of support measures, together with the current international environment, may contribute to a greater materialisation of credit risks. Given the economic and financial ratios of firms, there is greater credit risk in the sectors potentially most affected by the increase in energy and/or commodity costs and which are also among those most affected by the pandemic crisis.

Customer deposits grew in line with total assets and continue to be the banking sector's main source of funding, making it possible for Portuguese banks to be less sensitive to changes in the risk perception of international investors. At the end of 2021 the system's structural liquidity continued to rise, with the loan-to-deposit ratio standing at 81%. Funding obtained from central banks in Portugal and the euro area has increased markedly since 2019, reflecting the ECB's support measures in response to the pandemic. In 2021 the main banks issued €3.8 billion in eligible instruments for compliance with the MREL. The current uncertainty is feeding into a

deterioration in international market conditions with potential implications for the cost of issuing these instruments.

Banks' capital ratios remained historically high. In 2021 the total capital ratio remained stable at 18%. Despite the end of the supervisory recommendations for non-distribution of income in September 2021, institutions are expected to adapt dividend distribution to the high uncertainty surrounding the current environment. From a more structural perspective, banks should also incorporate emerging challenges, such as digitalisation and energy transition, into their processes and analyses.

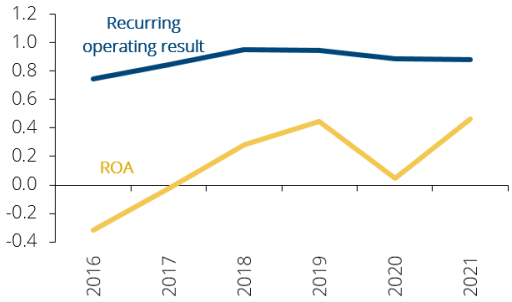
2.1 Profitability

In 2021 return on assets (ROA) stood at 0.46%, similar to that seen in 2019 (Chart I.2.1). The pick-up in ROA compared to 2020 stemmed from a decrease in provision and impairment costs and, to a lesser extent, an increase in income from financial operations (Table I.2.1). Recurring operating result was lower than in 2019. The decline in credit impairment flows comes after the high levels observed in 2020 in the wake of the outbreak of the pandemic. Return on equity (ROE) rose by 4.9 p.p. to 5.4%.

Compared to 2019, the contribution from ROA's recurring operating components decreased, while that of income from financial operations increased. This was set after two years of losses on equity instruments.

Although in 2021 the banking system's ROA was similar to that in 2019, dispersion among institutions narrowed. Turning to the asset-weighted ROA distribution, the 5th percentile moved up from -2.36% in 2019 to 0.03% in 2021 while the 95th percentile decreased from 1.09% to 0.77%.

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) is calculated as 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.

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

	2019	2020	2021
Recurring operating result	0.94	0.89	0.88
Income from financial op.	0.05	0.03	0.15
Net provisions and imp.	-0.38	-0.84	-0.49
Other results	-0.17	-0.03	-0.09
ROA	**0.45**	**0.05**	**0.46**
Percentile 5	-2.36	-2.92	0.03
Percentile 95	1.09	1.06	0.77

Source: Banco de Portugal. | Notes: The return on assets (ROA) is calculated as 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. "Net provisions and imp." correspond to provisions and impairments net of reversals.

Net interest income, as a percentage of average assets, continued its downward trend as observed over the past few years. Since 2019 it has decreased by 0.23 p.p., chiefly due to a lower contribution of interest on loans to the non-financial private sector (NFPS) and, to a lesser extent, sovereign debt securities. This development was mainly mitigated by the reduction in the cost of deposits of the NFPS and with central banks. The reduction in net interest income was mainly a result of lower implied interest rates (price effect), larger for assets than liabilities. Turning to domestic activity, the interest rate spread on loans and deposits on balances with the NFPS narrowed by 18 basis points to 1.9 p.p., while that on new business stabilised at 2.1 p.p.

Nevertheless, spreads remained broadly unchanged after the substantial convergence between the two up to 2020.

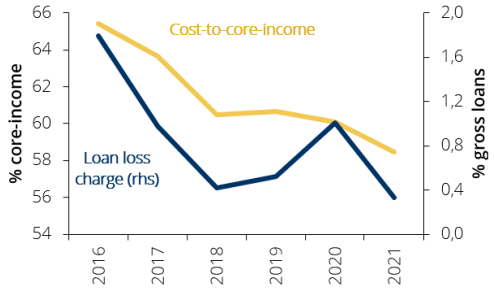
An increase in interbank money market interest rates will tend to have a positive impact on net interest income (Special issue "Portuguese banking system's profitability and solvency in a context of rising interest rates"). Since 2003, on average, approximately 90% of new loans to the NFPS have had an initial rate fixation period of up to one year, although since 2015 this figure has dropped to around 60%. Accordingly, the rise in interbank market interest rates will contribute to a relatively fast increase in interest income. However, the pass-through of the interbank market interest rate increase tends to be greater for loans than for deposits, given that a sizeable share of these deposits are overnight deposits and, as a rule, accrue no interest. For the remaining balance sheet components, the impact of rising interest rates on net interest income is limited.

The banking system's operational efficiency continued to show favourable developments. Compared to 2019, the cost-to-core-income ratio narrowed by 2.2 p.p., to 58.5% (Chart I.2.2). This was due to a decrease in operating costs, a trend that has followed the implementation of restructuring plans. Between 2005 (when operating costs as a percentage of assets started to fall) and 2020, the operating structure of institutions headquartered in Portugal decreased in terms of number of branches and employees by 29% (-1.5 thousand) and 12% (-6.2 thousand) respectively. The investment needed to adequately monitor risks related, inter alia, to anti-money laundering, the prevention of terrorist financing and cybersecurity should not be jeopardised by cuts in operating costs.

In 2021 the flow of provisions and impairments, as a percentage of average assets, decreased by 0.35 p.p., but continued above its 2019 level, although broken down differently between provisions and impairments. The increase in provisions was due, on the one hand, to costs stemming from the optimisation of the branch network and investment in digitalisation and technology processes, and, on the other, to potential losses related to legal risks. Impairments decreased, reflecting the reduction in the flow of impairments on financial assets to below pre-pandemic levels and that on non-financial assets to close to zero. The loan loss charge fell to 0.33%, below its 2019 level (Chart I.2.2). This reduction reflected a lower flow of credit impairments, but also benefited from an increase in the portfolio of loans to customers.

In the first three quarters of 2021 the Portuguese banking system's ROA was similar to the euro area average (Table I.2.2). The Portuguese banking system's profitability continued to be characterised by a greater contribution from net interest income and higher provision and impairment costs than in the euro area. Contributions from net fees and commissions as well as operating costs are similar to those in the euro area. The Portuguese banking system's ROE was below the euro area average. For a number of euro area banks, the ROE median has been below cost of equity (CoE) in recent years (Special issue "Determinants of the cost of equity of listed banks in the euro area").

Chart I.2.2 • Cost-to-core-income and loan loss charge



Source: Banco de Portugal. | Notes: Cost-to-core-income consists of the ratio between operating costs and the sum of net interest income and net commissions. The loan loss charge consists of the flow of credit impairments as a percentage of total average gross loans to customers.

Table I.2.2 • Profitability – International comparison | As a percentage of average assets

2021 Q1-Q3	PT	EA
Net interest income	1.43	1.05
Net fees and commissions	0.69	0.65
Income from financial op.	0.18	0.16
Operating costs	-1.23	-1.19
Net provisions and imp.	-0.47	-0.18
Other results	-0.13	-0.02
ROA	0.46	0.47
Recurring operating result	0.88	0.51

Source: Banco de Portugal and European Central Bank (Consolidated Banking Data). | Note: Annualised figures.

2.2 Credit standards

In 2021 the portfolio of bank loans to customers (net of credit impairments) grew by 4.2%, compared with a 2.0% change in 2020. This was mainly due to an increase in loans to households and NFCs, with contributions of 2.6 p.p. and 1.2 p.p. respectively. The contribution made by households was more significant than in 2020, while that of firms remained relatively stable. In turn, institutions' exposure to debt securities issued by NFCs decreased by 5.7% in 2021.

The annual rate of change in the stock of bank loans to households stood at 3.9% in April 2022 (3.7% in December 2021), reflecting the increase in consumer and housing loans, albeit with slightly mixed developments (Chart I.2.3). The stock of loans for house purchase accelerated chiefly up to September 2021, with the annual rate of change adjusted for securitisation and loan transfers standing at 3.9%. In the following months, the annual rate of change increased somewhat, standing at 4.2% in April 2022. The annual rate of change unadjusted for securitisation and loan transfers was slightly higher and remained below that of the euro area (4.8% and 5.3% respectively in April 2022), but the spread has been narrowing.

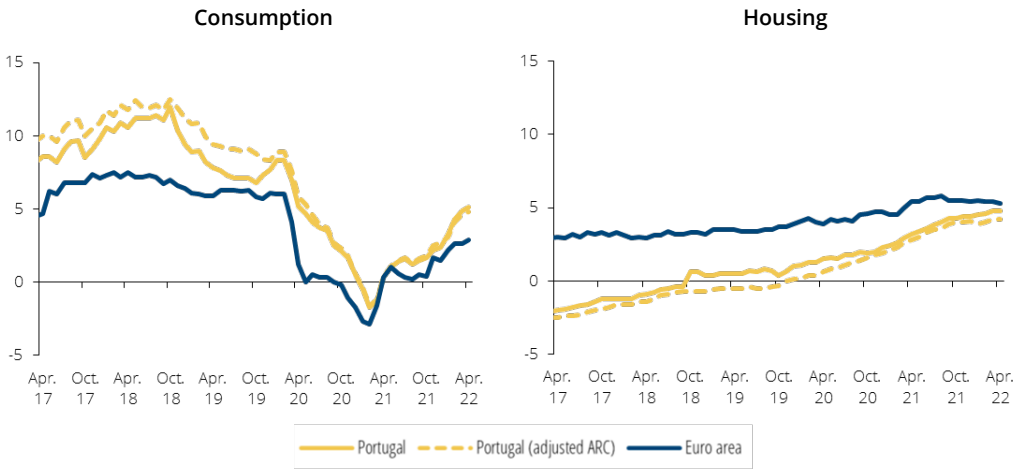
New loans for house purchase continued to increase in 2021, but slowed down in the first quarter of 2022. New loans for house purchase grew by 34.1% in 2021 and 24.1% in the first quarter of 2022, year on year (7.4% and 11.1% in the euro area respectively). In April 2022 the average interest rate on new loans for house purchase stood at 1%, 0.2 p.p. higher than at the end of 2021. The annual percentage rate of charge (APRC), which includes charges other than interest, has been on the decline, but is still one of the highest in the euro area. In April 2022 the APRC on loans for house purchase stood at 2.8%, 0.9 p.p. above the euro area average.

Since the end of 2021, new loans for house purchase with a fixed or mixed rate have increased, accounting for 18% of new loans in the first quarter of 2022 (15% in 2021). Loans for house purchase with variable interest rates are still predominant. In April 2022 credit agreements for house purchase with a variable interest rate accounted for around 90% of stock. Rising money market interest rates may impact the debt servicing capacity of households, and this potential impact should be reflected in a timely manner by financial institutions in their risk management practices.

New consumer loans grew by 11.1% in 2021, but the volume of new loans in this segment remained below that of 2019. The stock of consumer credit accelerated during the first four months of 2022, with the annual rate of change reaching 4.8% in April (2.7% in December 2021). New consumer credit was in line with developments in private consumption. In 2021 new

consumer loans accounted for 37% of the consumption of durable goods, compared to 41% in 2019 (35% in 2020). For 2021 as a whole, the average interest rate (AAR) and the APRC on these loans remained relatively unchanged from 2020. In the first four months of 2022, the AAR increased by around 0.5 p.p. to 7.8%, while the APRC remained unchanged at 9.7% (5.3% and 6% in the euro area respectively). In contrast to loans for house purchase, most consumer credit agreements have a fixed interest rate. As at April 2022 agreements with a variable interest rate accounted for only around 12% of the stock of consumer credit.

Chart I.2.3 • Annual rates of change of bank loan to households | 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. Additionally, the adjusted ARC is also adjusted for securitisation and loan transfers. ARC figures for Portugal refer to loans granted by resident monetary financial institutions to households. Activity on an individual basis. Last observation: April 2022.

Credit standards for loans to households remained broadly unchanged. According to the January and April 2022 Bank Lending Survey (BLS), credit standards for loans for house purchase remained unchanged, while credit standards for consumer credit and other purposes eased, reflecting competitive pressures and higher risk tolerance. In the April survey, banks anticipated the maintenance of credit standards for the second quarter of 2022 and a slight increase in demand for housing and consumer loans. In the euro area, banks' increased risk perception translated into a tightening of loans for house purchase in the first quarter of 2022. Turning to consumer credit, higher risk tolerance was reflected in an easing of credit standards. In the April survey, euro area banks anticipated a tightening of credit standards for housing and consumer loans during the second quarter of 2022.

Since March 2021 the pace of growth in bank loans to firms has been slowing down. With regard to domestic activity, the annual rate of change in loans granted by the banking system to NFCs was 3.1% in April 2022 (2.7% when adjusted for securitisation and loan transfers), compared to 9.9% in the same month of 2021 and 4.2% in December 2021.

Growth in loans to NFCs has been particularly contained in the recent past. The annualised quarterly rate of change, calculated on the basis of seasonally adjusted data and adjusted for securitisation and loan transfers, stood at 1.9% in April 2022 (0.4% in March).

The deceleration in bank loans was more pronounced for SMEs and the sectors most affected by the pandemic crisis, particularly in the accommodation and food services sector. The deceleration in these sectors followed stronger growth than in other sectors in 2020. The slowdown in loans to firms in the construction and real estate activities sector and, more recently, manufacturing and

mining and quarrying as well as transportation and storage also contributed to these developments (Table I.2.3).

The stock of loans associated with firms that resorted to support measures grew at a gradually slower pace in 2021 and the first few months of 2022. This reflected both a deceleration in exposure associated with firms that used State-guaranteed credit lines and the end of the public moratorium on loans, particularly among SMEs.

Table I.2.3 • Annual rates of change of bank loans to NFC – domestic activity | Per cent

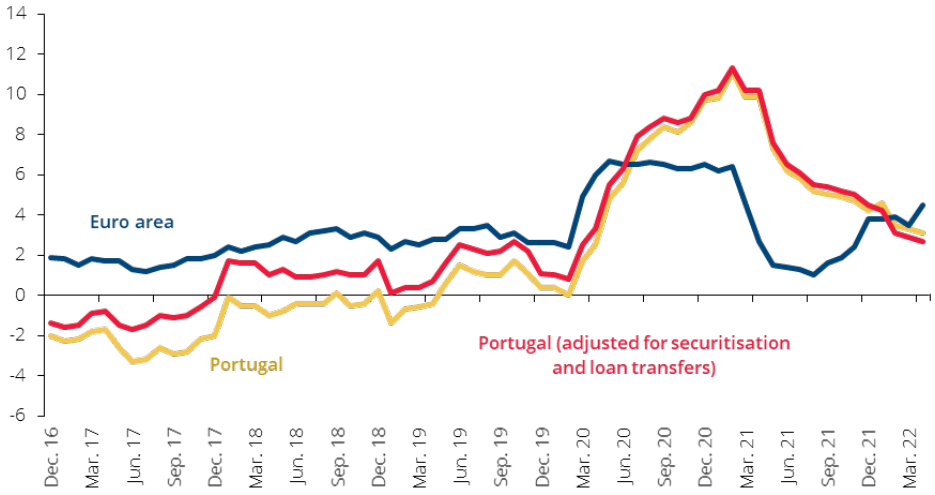
	Dec. 16	Dec. 17	Dec. 18	Dec. 19	Dec. 20	Apr. 21	Dec. 21	Apr. 22
Total	-2.0	-2.0	0.2	0.4	9.7	9.9	4.2	3.1
Manufacturing, mining and quarrying	1.7	0.8	3.7	0.1	9.6	15.8	10.3	5.8
Construction and real estate	-6.1	-0.9	-2.1	1.8	5.3	5.3	0.0	1.0
Trade	1.5	1.6	-2.2	2.2	9.5	10.2	5.1	5.0
Accommodation and food services	4.1	2.6	4.8	2.3	25.3	24.5	7.6	2.8
Transportation and storage	-4.1	-10.6	-3.1	-9.3	0.4	5.5	0.1	-3.1

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. ARC refer to loans granted by resident monetary financial institutions to resident NFCs. Accommodation and food services and trade refer to "accommodation and food service activities" and "Wholesale and retail trade; repair of motor vehicles and motorcycles", respectively.

In April 2022 the annual rate of change in loans to NFCs in the euro area (4.5%) exceeded the rate in Portugal. After the start of the pandemic crisis, loans to firms grew more strongly in Portugal than in the euro area, with significant contributions from State-guaranteed credit lines (Chart I.2.4). The end of the public moratorium, the reduction in new loans associated with State-guaranteed credit lines (due to cuts in endowments and a tightening in the sectors of activity they are directed to) and the acceleration of loans to firms in the euro area in the recent past have brought annual rates of change closer, although the rate in the euro area increased more markedly in April 2022.

The pandemic crisis deteriorated the credit quality of the stock of bank loans to NFCs, but the weight of the lower risk class increased in the most recent period. In December 2020, 60% of the stock of loans to NFCs was associated with firms in the intermediate risk (38%) and higher risk classes (22%), taking into account the firms' financial situation at the end of 2019 (before the pandemic). Looking at the financial situation of firms at the end of 2020, the combined share was 64% (Table I.2.4). In 2021 the weight of the lower risk class in the stock increased, to stand at 38% in December 2021 and March 2022. This change resulted from a higher share of new loans to firms with lower risk, compared with their share in the stock, and a decrease in exposure associated with riskier firms, with a more significant contribution from firms with agreements that were under moratorium (Chart I.2.5).

Chart I.2.4 • Annual rate of change of bank loans to NFC | Per cent



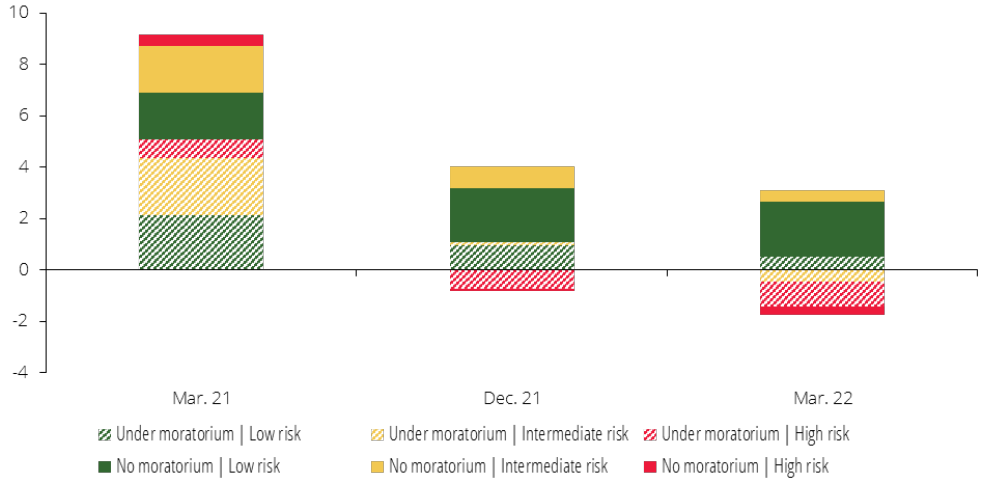
Source: Banco de Portugal. | Notes: Annual rates of change (ARC) are computed referring to the end-of-month bank loans' stock changes, adjusted for changes not defined as transactions, namely, reclassifications, write-offs and exchange rate and price revaluations. ARC figures for Portugal refer to loans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

Table I.2.4 • Loans to NFC, by credit risk class | Per cent

		Risk class 1 (Low risk)	Risk class 2 (Intermediate risk)	Risk class 3 (High risk)
Stock	**2020, pre-pandemic risk**	**40**	**38**	**22**
	2020	36	41	24
	2021	38	40	22
	Mar. 2022	38	40	22
New business	**2020, pre-pandemic risk**	**53**	**33**	**14**
	2020	51	37	12
	2021	45	38	17
	Q1 2022	49	37	14

Source: Banco de Portugal. | Notes: Credit risk, measured as the probability of default (PD), refer to credit notations available from the In-house Credit Assessment System (ICAS). New business refers to new business of enterprises with available credit risk information. 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%. Risk classes refer to PD estimates considering 2020's NFCs financial indicators, with the exception of pre-pandemic risk, which refers to PD estimates referring to 2019's NFCs financial indicators. Domestic activity. Rounding up may lead the total weight of all risk classes to differ from 100 per cent.

Chart I.2.5 • Contributions to the year-on-year rate of change of the stock of loans to NFCs, by credit risk class | In percentage points



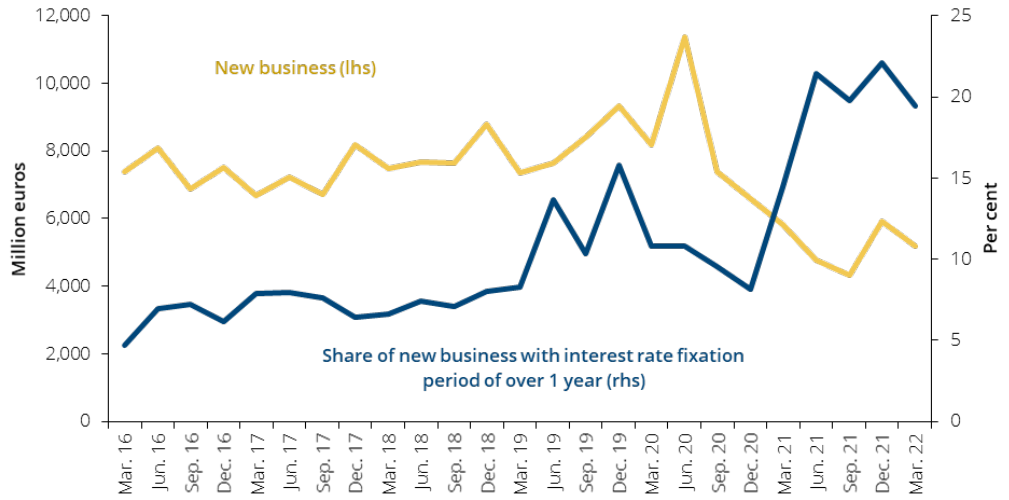
Source: Banco de Portugal. | Notes: The category *under moratorium* corresponds to NFCs for which at least one contract was under moratorium between March 2020 and December 2021. Credit risk, measured as the probability of default (PD), refer to credit notations available from the In-house Credit Assessment System (ICAS). 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 PD estimates considering 2020's NFCs financial indicators.

In 2021 and the first quarter of 2022, the volume of new loans to NFCs was lower than prior to the pandemic and was higher in the lower risk class. New loans to NFCs in 2021 and in the year ending in March 2022 were below the average volume of new business observed between 2017 and 2019 (Chart I.2.6). This was partly due to a decrease in new loans with an original maturity period of less than one year, which seems to have been related in part to the procurement of State-guaranteed credit lines with a longer maturity and the public moratorium. As in the run-up to the pandemic, the lower risk class posted the highest share of new loans in 2021 and the first quarter of 2022.

Firms that made use of the public moratorium contributed to the increase in new loans in the fourth quarter of 2021. However, the stock of loans associated with these firms did not increase. According to the Bank Lending Survey, debt refinancing/restructuring and renegotiation contributed to an increase in corporate demand for credit in the last quarter of 2021 and the first quarter of 2022. In the fourth quarter of 2021 these factors seem to have been more relevant for firms that benefited from moratoria, for which new business increased across all risk classes.

The average interest rate on new loans to NFCs has been relatively stable in the most recent period, and the interest rate differential with the euro area average has remained below that seen prior to the pandemic crisis. The average interest rate on new loans to NFCs was stable in 2021, standing at 2.0% for new business, similarly to 2020. In the quarter ending in April 2022, the average interest rate was 1.9%, as in the first quarter of the year. Despite the lower amount of new State-guaranteed credit lines, interest rates on new loans remained low by historical standards in 2021 and the first quarter of 2022. The differential with the euro area average interest rate, defined as the difference between the interest rate on new business in Portugal and that in the euro area, was 0.7 p.p. (0.6 p.p. in 2020) and remained below that prior to the pandemic (0.9 p.p. in 2019). In the first quarter of 2022 and the quarter ending in April, the differential stood at 0.7 p.p.

Chart I.2.6 • New business to NFC, quarterly figures and share of new business with interest rate fixation period of over 1 year



Source: Banco de Portugal. | Note: Last observation: March 2022.

The maturity of the stock of loans to NFCs increased during the pandemic crisis, particularly for firms in the most severely affected sectors of activity. In March 2022 around 54% of loans had a residual maturity of more than four years, compared with 45% in December 2019 (Table I.2.5). To this contributed State-guaranteed credit lines, whose most common maturity was six years. The extension of the maturity of the stock of loans was broadly based across firms, but was more marked in the sectors most affected by the pandemic. For these firms, there was also an increase in exposure with a residual maturity of more than eight years. This was not the case for firms in activity sectors less affected by the pandemic.

New loans with longer interest rate fixation periods may limit firms' vulnerability to interest rate hikes. The share of new loans with an interest rate fixation period of over one year moved up from the second quarter of 2021, when it reached 22% of new business (Chart I.2.6). Although less markedly, the increase in the share of new business with longer interest rate fixation periods preceded the pandemic crisis. This behaviour may help mitigate the credit risk of firms, as it limits firms' exposure to the impact of rising market interest rates.

The share of the stock of loans with a residual maturity of more than one year and longer interest rate update periods also rose after the pandemic crisis. The share of loans associated with interest rate update periods of over six months on agreements with a maturity of more than one year increased from 30% in December 2019 to 43% in March 2022 (Table I.2.6). The increase in exposure with these characteristics persisted even after the amount of new loans associated with State-guaranteed credit lines declined.

Table I.2.5 • NFCs loan stock, by residual maturity | Per cent

Loans residual maturity, years	Undefined	≤ 1 year	]1;2]	]2;4]	]4;6]	]6;8]	> 8 years
Total loans							
December 2019	13.9	17.8	5.7	17.2	13.5	9.7	22.3
December 2020	10.8	13.3	5.9	17.3	20.9	9.3	22.4
March 2022	11.1	12.6	5.7	17.0	24.0	7.6	22.1
NFCs on sectors most affected by the pandemic							
December 2019	12.1	17.8	6.0	18.1	12.1	8.9	25.0
December 2020	8.8	11.7	4.6	17.1	23.6	8.3	25.9
March 2022	7.6	9.3	4.2	15.3	27.1	8.0	28.6

Source: Banco de Portugal. | Notes: Information from the Central Credit Register (CCR). The *Undefined* category refers to loans for which no maturity is identified or those which the original maturity was exceeded. The most affected sectors are considered to be those listed in Decree-Law 22-C/2021 and the sectors eligible for the support line for economic recovery - Retomar programme (see the Retomar disclosure document at the Banco Português de Fomento website, only in Portuguese).

Table I.2.6 • NFCs loan stock, by loans' interest rate update frequency and loans' residual maturity | Per cent

	December 2019			March 2022		
Residual maturity	Less than or equal to 1 year	More than 1 year and less than or equal to 6 years	More than 6 years	Less than or equal to 1 year	More than 1 year and less than or equal to 6 years	More than 6 years
Loans' interest rate update frequency:						
Non-updatable	9.4	5.8	5.2	7.0	5.9	4.6
Monthly	5.4	4.1	4.7	2.5	4.3	4.2
Quarterly	4.3	7.0	3.5	3.2	6.2	2.8
Biannually	5.0	7.7	8.1	4.1	13.1	8.1
Yearly	1.8	7.9	6.4	2.3	14.5	7.6
Other	5.7	3.8	4.0	4.6	2.7	2.5

Source: Banco de Portugal. | Note: Information from the Central Credit Register (CCR). The *Monthly* category also includes the daily interest rate update frequency.

The current environment casts uncertainty about developments in corporate credit demand. In the April 2022 Bank Lending Survey, banks pointed to an increase in credit demand by SMEs in the second quarter of 2022, particularly for short-term loans. Supply chain disruptions, whose effects have been exacerbated by the invasion of Ukraine, may contribute to an increase in demand for liquidity in the short term and to changes in credit demand over the medium term stemming from changes in investment decisions. Following three consecutive quarters of stabilisation in credit standards to firms, banks signalled expectations of somewhat tighter credit standards. In turn, euro area banks pointed to significantly tighter credit standards in the second quarter of 2022.

2.3 Credit quality of assets

In 2021 the credit quality of total loans continued to improve. The gross NPL ratio decreased by 1.2 p.p. from the end of 2020, to 3.6% (4.8% in the non-financial private sector) (Table I.2.7). This was partly due to a reduction in non-performing loans, mainly stemming from the decline in loans more than 90 days past due, and, to a lesser extent, the increase in performing loans (denominator effect). The NPL market remained active during the COVID-19 pandemic, further helping reduce the stock of NPLs on balance sheets. For the entire portfolio, although the effect of new NPL inflows was offset, inter alia, by cures and repayments, this amount increased compared to the end of 2020. The increase in new NPLs was posted in the NFC segment. The NPL ratio narrowed the most for institutions whose ratio was higher at the end of 2020, which lowered heterogeneity in the system and kept the convergence path towards the euro area median of the ratio. In turn, the credit quality of loans that were under moratoria, which accounted for 19.2% of loans to the NFPS in December 2021, showed signs of deterioration, although less markedly than that expected at the start of the pandemic crisis (Boxes 3 and 5).

Non-performing loans to NFCs declined, although there was a slight increase in the unlikely-to-pay component. At the end of 2021 the NFCs' gross NPL ratio stood at 8.1%, down by 1.6 p.p. from December 2020. The decrease in non-performing loans, largely through sales and write-offs, chiefly contributed to these developments (Table I.2.8). However, the unlikely-to-pay-NPL component increased slightly in this segment, making a positive contribution to developments in the ratio (+0.2 p.p.). The gross NPL ratio of the sectors most affected by the pandemic remained higher than in other sectors (11.2%), although it also declined compared to the end of 2020. Nevertheless, in addition to posting an increase in this ratio to 11.1% (+1.1 p.p.), accommodation and food services – one of the most affected sectors (8.2% of loans to NFCs, on a consolidated basis) – is still among the sectors potentially more affected by energy and/or other commodity price increases. The sector's higher vulnerability should be mitigated by a recovery in tourism in 2022, although uncertainty persists over a longer horizon. State-guaranteed loans granted in the context of the COVID-19 pandemic had a significantly lower gross NPL ratio (1.1%).

Non-performing loans continued to decrease in the portfolio of loans to households. In loans to households for house purchase and for consumption and other purposes, the gross NPL ratio decreased by 0.4 p.p. and 1.0 p.p., to 1.6% and 7.4% respectively. For a subset of larger banks (65% of the system's assets), this was mainly the result of an increase in the cures (housing) and sales (consumption and other purposes) components of non-performing loans. For these institutions, the reduction in NPLs due to write-offs was considerably smaller in the housing segment compared to consumption and other purposes.

The NPL impairment coverage ratio decreased for total non-performing loans, but remained significantly above the euro area median. In December 2021 the NPL impairment coverage ratio narrowed by 2.7 p.p. from the end of 2020 to 52.2% (Table I.2.9). Among other factors, the reduction in NPLs on balance sheets with higher coverage is likely to have played a role. Nevertheless, the overall coverage remains 8.9 p.p. above the median of the ratio in the euro area. The NPL coverage ratio in NFCs decreased to 52.9%, although it increased in the sectors more affected by the pandemic and those potentially more affected by energy and/or other commodity price increases, to 85.3 % and 74.2% respectively. For loans to households for house purchase, the ratio widened by 2.1 p.p. to 32.6%, while it narrowed by 1.4 p.p. to 64.8% for loans for consumption and other purposes.

Table I.2.7 • Gross NPL ratio | Per cent

	Dec. 17	Dec. 18	Dec. 19	Dec. 20	Dec. 21
Total gross NPL ratio[a]	13.3	9.4	6.2	4.9	3.6
Percentile 5[b]	6.2	3.3	2.4	2.1	1.8
Percentile 95[b]	27.9	22.6	11.8	9.4	6.4
Non-financial private sector	14.6	10.5	7.0	5.8	4.8
Non-financial corporations	25.2	18.5	12.3	9.7	8.1
Most affected sectors (potentially):					
By the pandemic[c]	24.4	16.4	13.4	11.8	11.2
By energy/commodities price increases[d]	21.7	15.0	11.7	9.7	9.1
Households	7.1	5.1	3.7	3.4	2.8
House purchase	5.7	3.8	2.4	2.0	1.6
Consumption and other purposes	13.1	10.5	8.2	8.5	7.4
Euro area median	3.5	3.1	2.9	2.5	2.1[e]

Sources: Banco de Portugal and European Central Bank (Consolidated Banking Data). | Notes: (a) Corresponds to the ratio between the gross value of NPLs and the total gross value of loans. Includes loans and cash balances at central banks and credit institutions, loans to 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 program. To allow an aggregation by CAE section, were considered as the most affected sections those in which the stock of loans granted to the most affected CAE subclasses (five-digit level) represented, in March 2022, at least around 50% of the total exposure of the respective CAE section. (d) The sectors potentially most affected by price increases in energy and/or other commodities correspond to the CAE sections in which the stock of loans granted to the CAE subclasses as defined in Box 4, represented, in March 2022, at least around 50% of the total exposure of the respective section. (e) September 2021.

Table I.2.8 • Gross NPL ratio – contributions to the evolution

	Total	NFC	Households
Gross NPL ratio, Dec. 2020 (%)	4.9	9.7	3.4
Write-offs (p.p.)	-0.32	-0.74	-0.17
NPL sales (p.p.)	-0.42	-0.94	-0.20
New NPL net of cures (p.p.)	0.01	0.38	-0.05
Other denominator effects (p.p.)	-0.52	-0.34	-0.14
Gross NPL ratio, Dec. 2021 (%)	3.6	8.1	2.8

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 new NPLs net of cures, amortisations and foreclosures. Other denominator effects reflect changes in the stock of loans that are not related with the NPL stock (e.g. net flow of performing loans).

Non-performing loans net of impairments remained on their downward path. In December 2021 the NPL ratio net of impairments decreased by 0.5 p.p. from the end of 2020, to stand at 1.7%. The differential with the median of the euro area ratio remained unchanged from December 2020. In loans to NFCs, the indicator decreased by 0.4 p.p. to 3.8%. Similarly, the ratios of loans to households for house purchase and for consumption and other purposes narrowed, to stand at 1.1% (-0.3 p.p.) and 2.6% (-0.2 p.p.) respectively.

The gradual phasing-out of the measures implemented in response to the COVID-19 pandemic did not give rise to a higher share of forborne loans by the end of 2021. The ratio of forborne loans stood at 3.7%, down by 1.0 p.p. from December 2020 (Table I.2.10). Unlike what was expected with the end of the credit moratoria, the end of these support measures did not lead to an increase in the forborne component in total loans, whose contribution to the reduction in the ratio was 0.5 p.p., chiefly due to a decrease in non-performing forborne loans. By contrast, loans that were under moratoria saw increases in the share of forborne loans, both for NFCs (Box 3) and households (Box 5). The impairment coverage ratios associated with the total and the non-performing part of forborne loans stood at 32.8% (-1.3 p.p.) and 54.2% (-0.2 p.p.) respectively.

Table I.2.9 • Gross NPL impairment coverage ratio | Per cent

	Dec. 17	Dec. 18	Dec. 19	Dec. 20	Dec. 21
Gross NPL impairment coverage ratio[a]	49.4	52.0	51.5	55.0	52.2
Non-financial corporations	53.9	56.5	56.5	56.4	52.9
Most affected sectors (potentially):					
By the pandemic[b]	57.9	59.8	68.9	79.7	85.3
By energy/commodities price increases[c]	58.3	59.2	63.4	76.7	78.4
Households	37.1	40.7	42.3	50.3	50.9
House purchase	22.8	27.1	26.3	30.6	32.6
Consumption and other purposes	62.6	59.8	58.8	66.2	64.8
Euro area median	42.5	43.7	43.2	43.0	43.4[d]
Memorandum items:					
Net NPL ratio[e]	6.7	4.5	3.0	2.2	1.7
Euro area median	2.1	1.9	1.4	1.5	1.1[d]

Sources: Banco de Portugal and European Central Bank (Consolidated Banking Data). | Notes: (a) 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 program. To allow an aggregation by CAE section, were considered as the most affected sections those in which the stock of loans granted to the most affected CAE subclasses (five-digit level) represented, in March 2022, at least around 50% of the total exposure of the respective CAE section. (c) The sectors potentially most affected by price increases in energy and/or other commodities correspond to the CAE sections in which the stock of loans granted to the CAE subclasses as defined in Box 4, represented, in March 2022, at least around 50% of the total exposure of the respective section. (d) September 2021. (e) Corresponds to the ratio of NPLs net of impairments to total gross loans.

In 2021 the share of stage 2 loans remained on the upward path that started in 2020, albeit less markedly, reflecting continued heightened risk perceptions compared to the pre-pandemic period. In December 2021 the ratio of stage 2 loans was 11.6% (0.5 p.p. above the end of 2020 and 2.3 p.p. compared to December 2019). The increase in stage 2 loans (numerator) contributed mostly to this increase, reflecting banks' heightened credit risk perceptions. Although the increase was more contained than that observed in 2020, the amount of loans transferred between stages remained positive towards the impairment stages posing higher credit risks (Chart I.2.7). The ratio of stage 2 loans in loans to NFCs increased by 0.2 p.p. from December 2020 to 18.8%. This ratio was lower for State-guaranteed loans granted in the context of the COVID-19 crisis (14.9%). In loans to households for house purchase and for consumption and other purposes, the ratios stood at 7.9% (+0.9 p.p.) and 10.7% (+0.2 p.p.) respectively.

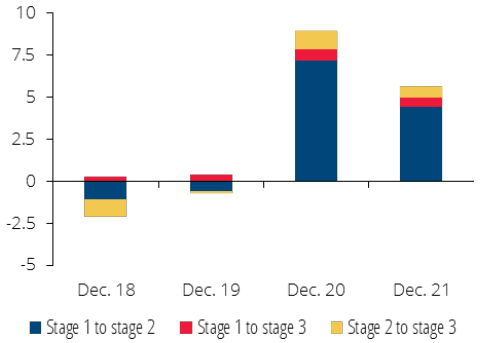
Although more favourable developments in asset quality indicators than anticipated at the onset of the pandemic crisis continued in 2021, some uncertainty remains surrounding both the end of the support measures in response to this crisis and international developments in 2022. The support measures taken in response to the COVID-19 pandemic have contributed significantly to minimising disruptions in the financial situation of borrowers, preventing a further materialisation of credit risk. Nevertheless, the end of credit moratoria and capital and/or interest grace periods for State-guaranteed loans, the normalisation of monetary policy, the most recent energy crisis and the increase in commodity prices (Box 4) reinforce the need for institutions to maintain prudent risk management to mitigate borrowers' debt servicing difficulties.

Table I.2.10 • Forborne loans ratio | Per cent

	Dec. 17	Dec. 18	Dec. 19	Dec. 20	Dec. 21
Forborne loans ratio[a]	9.4	7.1	5.2	4.7	3.7
of which: NPL	6.5	4.9	3.2	2.6	1.9
NFC	17.9	13.7	10.3	9.4	7.6
Households	4.8	4.0	3.1	3.2	3.0
House purchase	4.2	3.5	2.8	2.7	2.6
Consumption and other purposes	7.3	6.0	4.3	4.9	4.5
Memorandum items:					
Forborne loans impairment coverage ratio[b]	34.7	37.6	34.5	34.0	32.8

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.

Chart I.2.7 • Loan transfers between impairment stages (net of outflows) | Billion euros

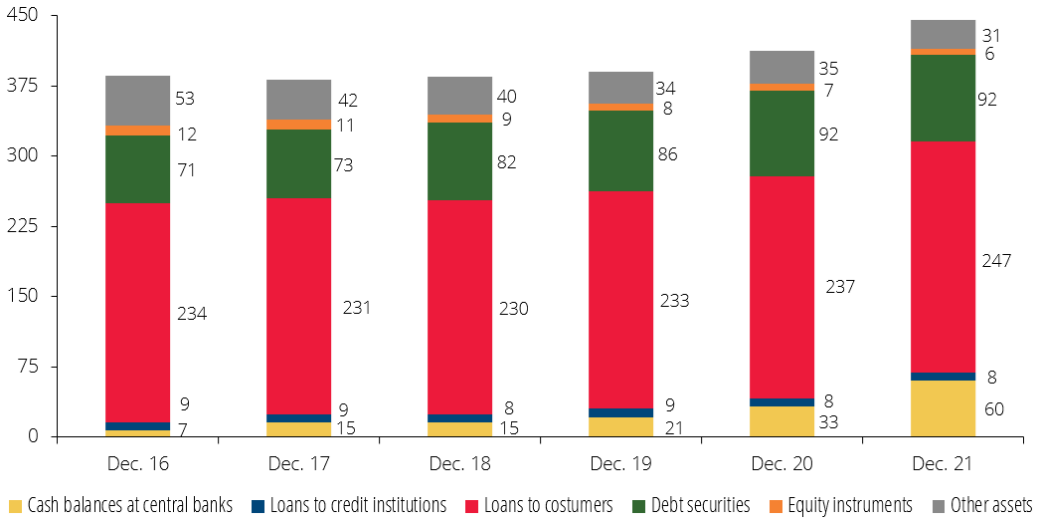


Source: Banco de Portugal. | Note: Loan transfers between impairment stages are net of outflows, for example, the amount from stage 1 to stage 2 represents the difference between the amounts transferred from stage 1 to stage 2 and from stage 2 to stage 1.

2.4 Concentration of exposures

The banking system's assets increased by 8% in 2021 (5.5% in 2020), reflecting in particular the growth in cash balances at central banks and, to a lesser extent, loans to customers (Chart I.2.8). Developments in cash balances at central banks cannot be separated from the banking system's current liquidity position (Section 2.5). To analyse the concentration of exposures, asset classes the Portuguese banking system is exposed to, and which represent potential vulnerabilities to the risks that may fall on financial stability, are characterised.

Chart I.2.8 • Banking system's assets | EUR billions



Source: Banco de Portugal. | Note: "Other assets" include cash, loans to central banks, cash balances, cash balances at other credit institutions, derivatives, tangible assets and intangible assets and other assets.

Measures to support the financing of firms in the context of the pandemic crisis have contributed to an increase in banks' exposure to loans to non-financial corporations (NFCs). Compared to 2019, this exposure rose by around €6 billion, with a significant contribution made by State-guaranteed loans (Section 1.3.2). However, reflecting the increase in assets, there was a 0.9 p.p. decrease in the share of loans to NFCs, to 19.5% in 2021. Loans to firms most affected by the pandemic crisis represented 28.7% of the stock of loans to NFCs in December 2021, an increase of 0.7 p.p. (2.5 p.p. from 2019). The increase in this exposure compared to the pre-pandemic period mainly reflected an increase in the weight of the accommodation and food services sector, which at the end of 2021 corresponded to 10% of total loans granted to NFCs (7.3% at the end of 2019). There is also an exposure to sectors more affected by the increase in energy and/or other commodity costs, which in March 2022 stood at 36.6%, with 12.8 p.p. also being more affected by the pandemic crisis (Box 4).

The banking system's exposure to firms is also subject to the materialisation of credit risk associated with the devaluation of financial assets stemming from climate transition risks, which may unfold over the coming years. The carbon intensity of the Portuguese economy weighted by bank loans to NFCs was higher than GVA-weighted carbon intensity. In 2021 around 58% of the stock of loans was granted to NFCs in climate-policy-relevant sectors (CPRS). The stock of loans to NFCs in CPRS posted higher credit risk than the total stock of loans to NFCs, although the lower risk class accounted for a higher weight for the negatively affected CPRS (Box 6).

Despite the increase in overall exposure to real estate, the path of this exposure's weight in the banking system's assets remained on the downside, standing at 34.1% in 2021 (Table I.2.11). The overall exposure to real estate increased by 2.2% from December 2020, mainly owing to the increase in loans to households secured by real estate and, to a lesser extent, loans to NFCs (excluding the construction and real estate activities sectors) secured by real estate. In terms of composition, loans to households secured by real estate continue to account for the largest share in assets (25.1%).

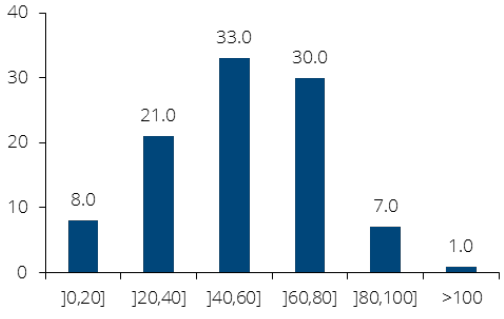
At the end of 2021, 92% of the stock of loans to households for house purchase had a loan-to-value (LTV) ratio of 80% or less (Chart I.2.9). The distribution of the LTV ratio of the loan portfolio for house purchase points to the banking system's ability to accommodate a potential fall in residential real estate prices without incurring large losses.

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

	Dec. 17	Dec. 18	Dec. 19	Dec. 20	Dec. 21
Loans to households collateralized by RE	28.0	27.5	27.1	26.1	25.1
Loans to NFCs of construction and RE activities [(a)]	5.2	5.1	4.9	4.5	4.0
Loans to NFCs collateralized by RE [(b)]	3.2	3.5	3.5	3.5	3.4
Real estate funds [(c)]	1.5	1.3	1.1	1.0	0.9
Real estate owned [(d)]	1.9	1.5	1.1	0.9	0.7
Total	39.8	38.9	37.8	36.0	34.1

Source: Banco de Portugal. | Notes: (a) It 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.2.9 • Current LTV of housing loans stock in 2021 | As a percentage of the portfolio



Source: Banco de Portugal. | Notes: : Indicator based on granular data at the loan level (Central Credit Register). Whenever the date of the last valuation of the property is prior to 2021Q3, its current value is estimated using Statistics Portugal Housing Price Index.

In 2021 sovereign debt securities accounted for 14.7% of assets, a 1.5 p.p. decrease. 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 amortised cost component reached 8.2% of assets, thus exceeding the fair value component (Table I.2.12). The weight of sovereign debt securities on the balance sheet is heterogeneous across institutions, with an increase in dispersion (4% and 19% in the 10th percentile and the 90th percentile respectively). The increase in the amortised cost component reduces the exposure to market risk volatility. This stems from the fact that changes in yields do not affect their balance sheet value, but only materialise when this instrument is sold. However, despite a reduction, there is considerable heterogeneity across institutions in terms of the importance of securities valued at amortised cost in the portfolio (6% and 89% in the 10th percentile and the 90th percentile respectively).

Turning to domestic activity, the decrease in exposures to sovereign debt securities by 1.1 p.p. mostly reflected a 1.6 p.p. reduction in the share of Portuguese sovereign debt, which accounted for 6.4% of assets in 2021. The share of exposures to Italian debt also declined, with an increase in exposure to debt securities from other countries, most notably France, Ireland, Belgium and the United States (Table I.2.13).

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 on these assets. Against a background of expectations of higher yields, debt securities measured at fair value are expected to devalue, which would consequently impact capital. The adoption of interest rate coverage strategies contracted by banks partly mitigates this impact. However, risk management is heterogeneous across institutions (Section 1.1).

In domestic activity, between 2020 and 2021 there was an increase in the average residual maturity of sovereign debt securities of the banking system's main institutions from 5.1 to 5.8 years. This increase results in a higher average duration of the portfolio, contributing to greater sensitivity to fluctuations in the market value of debt securities. However, the residual maturity is heterogeneous across the main Portuguese banks, with some posting a reduction. The increase in residual maturity reflected the higher share of securities with original maturity of more than two years.

Interlinkages in the financial sector continued to decline in 2021, with exposure to financial sector counterparties standing at 14.8% of banks' assets (18.7% in 2018). Thus, assets held by banks (deposits, debt securities, loans, shares and other investment fund holdings and listed shares) that have as their counterpart the different financial system sub-sectors decreased by 1.7 p.p. from the exposure, as a percentage of assets, observed in 2020. This was mainly due to a decrease in currency and deposits with other resident banks and in debt securities of other intermediaries (excluding investment funds). In a context of increased common risks stemming from financial markets and/or the real economy, direct interlinkages in the domestic financial sector may play a relevant role in the pass-through and amplification of adverse shocks.

Table I.2.12 • Sovereign debt securities by portfolio

	Dec. 17	Dec. 18	Dec. 19	Dec. 20	Dec. 21
% assets					
Total	13.7	15.3	15.5	16.2	14.7
At amortised cost[(a)]	2.2	4.9	5.4	7.6	8.2
At fair value[(b)]	11.5	10.4	10.1	8.6	6.5
% portfolio					
At amortised cost[(a)]	16.2	32.3	35.0	46.8	55.9
At fair value[(b)]	83.8	67.7	65.0	53.2	44.1

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. 17	Dec. 18	Dec. 19	Dec. 20	Dec. 21
Portugal	8.3	8.8	8.0	8.0	6.4
Spain	1.4	2.1	2.5	3.3	3.3
Italy	1.6	1.6	2.3	2.4	2.0
Others	0.4	0.6	0.9	1.0	1.7
o.w. France	0.1	0.2	0.2	0.2	0.5
o.w. Ireland	0.0	0.1	0.2	0.3	0.4
o.w. USA	0.2	0.2	0.1	0.1	0.2
o.w. Belgium	0.0	0.0	0.0	0.0	0.2

Source: Banco de Portugal. | Notes: The series refer 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.

2.5 Financing and liquidity

Due to the monetary policy measures to provide liquidity to the banking system in the context of the pandemic, funding obtained from central banks now accounts for 9.4% of assets. Since 2019 funding obtained from central banks has increased by 4.9 p.p. (Table I.2.14). This change was broadly based across institutions, with an increase in financing across all asset-weighted distribution quartiles. When weighted by assets, for at least 85% of the system this funding represents more than 5% of the balance sheet, compared to 30% of the system in 2019. Although this type of financing also increased in the euro area, its weight in assets is higher for the Portuguese banking sector.

2020 and 2021 saw an increase in customer deposits, particularly households and NFCs. Growth rose from 4.8% in 2020 to 8.7% in 2021. This notwithstanding, they continued to correspond to approximately 68% of assets. The predominance of this instrument in asset financing makes Portuguese banks less sensitive to changes in risk perception by investors.

The loan-to-deposit ratio continued on its downward path, as a result of lower growth in loans to customers compared with an increase in their deposits. At the end of 2021 the loan-to-deposit ratio reached 81.2%, compared with 87.1% in 2019. Indeed, this ratio has been narrowing since the international financial crisis. In 2008 the loan-to-deposit ratio stood at 153%. Around 90% of the system had a loan-to-deposit ratio of more than 102% in 2008. Currently, 95% of the system has a ratio below 102% and approximately 40% has a ratio below 60%. This reflects the growth in customer deposits and the lower indebtedness of NFCs and households over the past decade.

Following a downward trend, the weight in assets of liabilities represented by securities increased to 4.2% in 2021, back to its 2019 level. This was due to an increase of around €4 billion in the outstanding amount net of redemptions of these instruments. The issuance of eligible instruments for compliance with the minimum requirement for own funds and eligible liabilities (MREL) is likely to have contributed to this increase. In 2021 the main institutions issued €3.8 billion in these instruments. The current uncertain environment, influenced by the effects of the pandemic and the invasion of Ukraine, is contributing to a deterioration in market conditions with implications for the cost of issuing these instruments (Section 1.2).

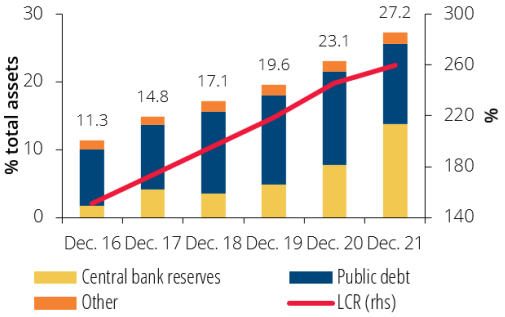
Against a background where assets increased largely through cash balances at central banks, the liquidity coverage ratio reached 260% at the end of 2021 (up by 42 p.p. from 2019) (Chart I.2.10). Over the same period, available liquid assets grew by 7.7 p.p. on the balance sheet, to account for around 27% of assets. This increase was primarily due to growth in cash balances at central banks of approximately 190%. Institutions must comply with a liquidity coverage ratio of at least 100%. In 2021 around 60% (45% in 2019) of institutions had a ratio of 200% or more.

Table I.2.14 • Financing structure
| As a percentage of assets

	Dec. 19	Dec. 20	Dec. 21
Central banks deposits	4.4	7.8	9.4
Other CI deposits	9.2	7.2	6.1
Customer deposits	68.5	68.0	68.4
Debt securities issued	4.1	3.6	4.2
Other liabilities	4.6	4.7	3.7
Equity	9.3	8.8	8.3

Source: Banco de Portugal.

Chart I.2.10 • 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.

The stable funding ratio stood at 144%, which means that there was a 44% margin between available and required funding. While the liquidity coverage ratio is based on a 30-day stress scenario, the stable funding ratio assesses the resilience of the liquidity position over a one-year time horizon. On that account, assets and off-balance sheet items are weighted according to their residual maturity. For the instruments financing the asset, they are also weighted taking into account their need for rollover and its time horizon. In 2021 the component of instruments requiring stable funding was mainly comprised of loans. Stable funding consisted of retail deposits and, to a lesser extent, funding from financial customers and central banks.

The monetary policy adopted in the wake of the outbreak of the pandemic made a positive contribution to the banking system's liquidity, and institutions should ensure the maintenance of adequate liquidity levels as monetary policy normalises. Among other things, targeted longer-term liquidity-providing operations (TLTROs) helped stabilise the funding of the banking system. Given their original three-year maturity, institutions will have to redeem these instruments over the coming years. In this regard, the issuance of instruments eligible for MREL may mitigate/offset the reduction in stable (medium-term) funding resulting from these redemptions.

2.6 Capital

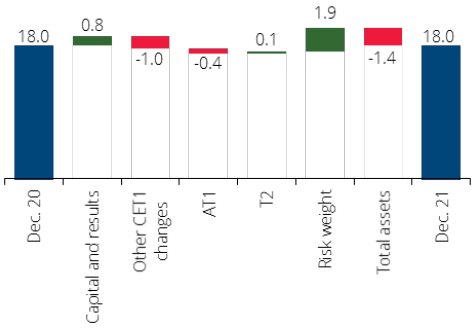
Capital ratios remained at historically high levels in 2021. The total capital ratio remained relatively stable at the end of 2020 at 18.0% (Chart I.2.11). The reduction in risk-weighted assets (RWAs) amid balance sheet expansion and the slight increase in Tier 2 capital offset the decrease in Common Equity Tier 1 capital (CET1) and Additional Tier 1 capital (AT1). The Tier 2 capital ratio increased by 0.2 p.p. from December 2020 to 1.7%.

The CET1 ratio remained on an upward path. In December 2021 the CET1 ratio widened by 0.2 p.p. from the end of 2020 to 15.5%. The reduction in RWAs was partially offset by a slight decrease in CET1 capital, particularly in the 'other CET1 changes' component. In contrast, retained earnings helped strengthen the capital, as a result of the improvement in the system's aggregate results compared to 2020 and in line with the recommendations of the Banco de Portugal, the

European Central Bank and the European Systemic Risk Board as a response to the COVID-19 pandemic. In 2022 some banks resumed their dividend distribution plans.

The reduction in average risk weight was mostly associated with the increase in cash balances at central banks. In December 2021 the average risk weight of the Portuguese banking system stood at 44.0%, exceeding by 9.2 p.p. that in the euro area (Table I.2.15). The downward trend in the weight has steepened from December 2019, declining by 9.3 p.p. over the last two years. This essentially reflected the increase in cash balances at central banks, which represented 13.6% of assets in December 2021 (+8.2 p.p. compared to 2019), as they are associated with a low risk weight. The lower risk of loans to NFCs that benefited from State guarantees in the context of the COVID-19 pandemic also contributed to the decline in the risk weight.

Chart I.2.11 • Total own funds ratio – level and contributions to variations
| In percentage and percentage points



Source: Banco de Portugal.

Table I.2.15 • Risk weights | Per cent

	Dec. 17	Dec. 18	Dec. 19	Dec. 20	Dec. 21
Central governments or central banks	10.7	10.5	8.9	6.7	5.9
Corporates	57.0	59.6	61.2	57.9	57.3
Retail	31.9	32.1	31.7	29.9	29.1
Defaulted exposures	50.7	47.0	50.4	48.7	47.4
Others	53.4	52.7	53.3	49.0	49.6
Memorandum items:					
Average risk weight	56.0	54.4	53.3	48.6	44.0
Euro area	39.2	39.4	39.3	35.9	34.8[a]

Sources: Banco de Portugal and European Central Bank (Consolidated Banking Data). | Notes: The risk weight corresponds to the ratio of risk-weighted assets to assets. (a) September 2021.

The leverage ratio has narrowed, but remains significantly above the minimum requirement of 3%. In December 2021 the prudential leverage ratio stood at 7.0%, down by 0.6 p.p. from the end of 2020. This decrease reflected the increase in the banking system's assets and, to a lesser extent, the reduction in Tier 1 capital.

The institutions' capital is expected to remain adjusted to the current uncertain environment. Although the recommendation to retain earnings has ceased to apply since September 2021, institutions are expected to adapt their dividend distribution to the uncertainty surrounding the current juncture (Section 1.1), fostering the system's resilience via its loss-absorbing capacity and thereby ensuring funding to the economy.

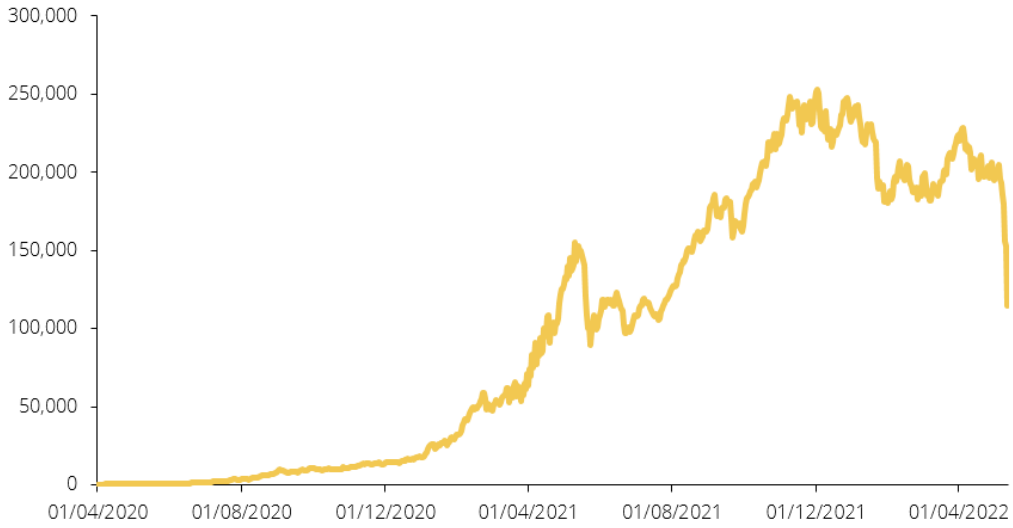
Box 1 • Decentralised Finance: The Good, the Bad and the Ugly

Decentralised Finance (DeFi) has grown rapidly since the so-called DeFi Summer of 2020 (Chart B1.1). Potential reasons include the low-interest-rate environment, which may have led to a search for yield but also speculation in the wider crypto market and fear of missing out (FOMO). Although the overall volume is small, this could change if DeFi activity continues to grow at a rapid pace, potentially creating risks to financial stability. It also has to be noted that the DeFi space is very volatile. As of 9 May 2022, TVL (Total Value Locked) in DeFi, i.e., the overall value of crypto assets that are being deposited in different DeFi protocols, had dropped by almost 30% from its all-time high in December 2021. This has been due to a wider crash in the crypto market, underlining the high volatility in this ecosystem. As of 2021, Portugal ranked 18th in terms of DeFi adoption by countries worldwide.[11] This box will give a brief overview of the concept of DeFi, its potential risks and opportunities, as well as some policy implications.

What is DeFi?

Decentralised Finance (DeFi) refers to an ecosystem in which financial transactions are conducted through so-called smart contracts, without relying on centralised intermediaries. Loosely speaking, DeFi mimics functions of the traditional financial system, including market-making and lending. DeFi also allows its users to earn income on the crypto assets that they are holding. DeFi uses public blockchains as a backbone. These blockchains (e.g., Ethereum, Solana and Binance Chain) are capable of hosting smart contracts, decentralised applications that can support a large range of financial services. Smart contracts are, in essence, algorithms which automatically execute transactions when pre-specified conditions are being fulfilled.

Chart B1.1 • Total Value Locked (TVL) in DeFi | In millions of USD



Source: Defillama. | Notes: The graph depicts the Total Value Locked (TVL) into DeFi protocols (in millions of USD), between January 2019 and May 2022. TVL represents the overall value of crypto assets that are being deposited in different DeFi protocols.

The vision of DeFi is to increase the security, efficiency, transparency, accessibility, openness and interoperability of financial products and services.[12] It still remains to be seen whether this vision will turn into reality. Because DeFi is inevitably interlinked with the highly volatile market in crypto

[11] Chainalysis (2021). *The 2021 Geography of Cryptocurrency Report*, October 2021.

[12] European Commission (2022). *European Financial Stability and Integration Review 2022*.

assets, the accompanying risks have to be carefully evaluated. On the one hand, some DeFi applications can pose serious risks for consumers, as detailed in the next section. On the other hand, DeFi can have interlinkages with the traditional financial sector, which might lead to the spillover of risks, notably during market turbulences.

Risks and opportunities

DeFi is a relatively recent phenomenon and therefore a still little-explored topic. It requires close monitoring to properly understand its associated risks and opportunities.

Proponents of DeFi argue that it leads to a democratisation of finance and more financial inclusion. DeFi protocols do not discriminate between users, i.e., as long as borrowers can deposit the requested crypto collateral, the loan is being executed and credit conditions do not depend on further borrower characteristics. However, as DeFi is very complex, it is not clear whether this goal can be achieved, as even well-informed investors might not be able to assess, understand, and/or evaluate the associated risks (e.g., the inherent automatic liquidation of the loan if the collateral falls below a certain threshold value). If the DeFi space continues to grow, more regulation as well as financial education will be needed to ensure that this new technology will lead to more financial inclusion as DeFi's proponents are arguing, without putting financial stability at risk.

Another potential advantage of DeFi is its openness. This means that smart-contract code is open-source, so everyone can download and potentially evaluate it. However, it is rather unlikely that the average DeFi user would actually have the ability to evaluate the code properly. Campbell et al. (2021)[13] argue that one can rely on the "wisdom of the crowd" and independent code audits to ensure the soundness of the contract. While there is now an industry developing around the auditing of smart contracts, it often still lacks accountability and common standards. Once the technology has matured and if independent code audits become more widespread, this might be the case. To date, however, the DeFi space suffers from a sizable number of hacks and code exploits.

DeFi is currently too small to pose a serious risk for financial stability. The space is still developing and a lot of kinks need to be ironed out before it will be able to reach a large share of the population. However, if it manages to overcome its current shortfalls and provided that adequate regulation has also been put into place, it might lead to a number of opportunities. DeFi could make financial intermediation faster and more efficient, as for instance loan contracts are drawn up automatically and without the need of a trusted centralised intermediary. This would in all likelihood lead to a decrease in costs for financial market participants. Furthermore, some of the technological innovations that originate from DeFi might be used by traditional financial intermediaries as well, thereby spurring competition. The use of public blockchains leads to an increase in transparency, to the extent that all the respective transaction data is publicly available. As detailed below, the absence of a single point of failure might lead to more resilience with respect to cyber risk. Overall, DeFi may contribute to financial sector innovation, as DeFi products are composable, meaning that different products can be combined in order to form a new one. This is possible due to the common underlying code infrastructure. However, this leads to an increase in complexity. Notwithstanding the potential opportunities, DeFi poses a number of fundamental risks.

DeFi suffers from potential concentration risk, which can occur if activity is being concentrated on a certain blockchain. At the moment, this is the case with Ethereum, as almost 64% of DeFi activity[14], measured by TVL, is concentrated on this blockchain. However, this value has been declining rapidly since the beginning of 2021, when it still stood at 97%. Since transaction fees on Ethereum, called "gas", are high, cheaper alternatives are emerging, the Solana blockchain (currently 3.7% of TVL) being

[13] Campbell, R.H., A. Ramachandran, J. Santoro (2021). *DeFi and the Future of Finance*. John Wiley & Sons.

[14] https://defillama.com/chains as of 30 May 2022.

a prominent example. It might therefore be expected that the level of concentration will decrease further over time.

Governance risk is another issue present in DeFi. Aramonte et al. (2022) subsume this under the label "decentralisation illusion.[15] Protocol governance is a democratic mechanism that enables changes in the respective DeFi protocol. Often in the early stages of the protocol, developers keep enough so-called governance tokens to make sure that they have the relevant majority in terms of voting rights to implement changes. In the beginning, if used appropriately, this is a sensible way of ensuring that potential glitches in the protocol can be fixed quickly. Over time, more governance tokens are being issued and thereby the share of the founders is being diluted. A potential way of addressing governance risk would be to restrict the maximum share of governance tokens to be held by an individual or entity. However, since one investor can hold multiple wallets and thereby multiple public keys, stringent Know Your Customer (KYC) requirements would be essential.

Another criticism of DeFi is the increased importance of cyber risk, which might lead to more vulnerability in this purely digital space. In its April 2022 edition of the Global *Financial Stability Report*, the IMF estimates that cyber attacks on DeFi protocols deplete about 30% of the TVL in the respective protocols.[16] Apart from the money lost in such attacks, the respective protocols then also suffer from a loss in confidence. However, while there is an increased risk of attacks, the decentralised nature of DeFi could also act as a sort of protective shield since there is no single point of attack due to the contracts being run and verified in a distributed way (i.e., on a large number of nodes). If appropriately set up, this could increase service availability and the integrity of record keeping.[17] However, given the large number of hacks and code exploits, the risks are currently outweighing the opportunities.

One important aspect that raises regulatory concerns is that the DeFi system allows all investors to achieve very high leverage, irrespective of their financial sophistication. In DeFi, leverage can easily be built up by borrowing on one protocol and then using the borrowed funds to be pledged as collateral on another protocol. This process can be repeated and lead to the built-up of very long chains of leverage. The potential losses for investors could be substantial as they might not always fully understand the associated risks. Some have likened this to the subprime mortgage crisis of 2008 in the US, when new, complex and largely unregulated financial products in the non-bank financial sector spilled over into the regulated financial system, triggering the global financial crisis.[18]

DeFi relies heavily on the use of so-called stablecoins. These crypto assets have a peg against a fiat currency (predominantly the US dollar), another crypto asset, or exchange-traded commodities such as gold. Due to their supposedly fixed value, stablecoins are heavily used for borrowing in the DeFi ecosystem. However, stablecoins are not necessarily stable and could, potentially with a certain level of frequency, be subject to runs, similar to bank runs. A run on a stablecoin could be triggered by a loss in confidence or by significant shifts in the value of the respective coin/asset. The problem is exacerbated by the absence of insurance schemes, similar to deposit insurance or a lender of last resort. The swift liquidation of reserve assets to cover those redemptions could have, in turn, negative contagion effects on the traditional financial system. Tradable assets' markets (e.g., the short-term government debt market, commercial papers) could be affected by significant price volatility, similar to that brought about by "fire sales." Runs on stablecoins are not just a theoretical possibility, they have already occurred in the past. The latest significant example was TerraUSD, which lost its peg to the US dollar in May 2022.[19] This, in turn, led to a further decline in confidence in the market,

[15] Aramonte, S., W. Huang, and A. Schrimpf (2022). "DeFi risk and the decentralisation illusion". BIS Quarterly Review, Bank for International Settlements, December.

[16] IMF (2022). *Global Financial Stability Report*, Chapter 3. April 2022.

[17] FSB (2019). *Decentralised financial technologies: Report on financial stability, regulatory and governance implications*.

[18] Allen, Hilary J. and Allen, Hilary J. "DeFi: Shadow Banking 2.0?" (forthcoming). William & Mary Law Review.

[19] It has to be noted though that TerraUSD was an algorithmic stablecoin, which was not collateralised by cash or short-term papers but the peg was maintained by an algorithm that automatically minted or burned (permanently removed a coin from circulation) coins, depending on demand for the stablecoin. Therefore, while the run on TerraUSD had implications for other crypto assets, its effects remained contained to the crypto market.

resulting in Tether (USDT), the largest stablecoin in the market, to temporarily lose its peg as market participants reacted to the uncertainty about the exact composition of its reserves, which had already been criticised in the past. As a result, the market value of Tether declined by 9%.

Interlinkages between DeFi and the traditional financial system are increasing. Therefore, it is possible that potential problems in the DeFi market, if it reaches a certain volume, might spill over into traditional financial markets. While stablecoins are currently the biggest concern in this regard, as they act as a bridge between the two worlds, other channels of interconnectedness are arising. Some parts of the traditional asset management industry (e.g., hedge funds, asset managers, family offices) have started to invest in crypto assets and use DeFi protocols. There are now DeFi protocols that have been specifically set up for institutional investors. Another potential effect of an increase in DeFi activity, if it has reached a certain volume, is that it might have an impact on bank credit to the real economy. Banks use deposits to be able to grant loans to companies. If more and more money is put into DeFi instead of bank deposits, this can lead to significantly less and more expensive bank loans, putting the core function of banks in financial intermediation at risk.

Policy implications

DeFi is currently a largely unregulated space. This is due to it still being a relatively young area but also due to its unique features, mainly its anonymous and decentralised nature. Regulators will have to strike a balance when it comes to DeFi. On the one hand, they need to ensure that financial stability is preserved and consumers are protected. On the other hand, they need to be careful not to stifle innovation, which could improve the overall efficiency of the wider financial system.

With respect to limiting the spillovers from DeFi and crypto-asset markets to the traditional financial system, the Basel Committee on Banking Supervision is currently working on bringing the banking exposures to crypto assets within the prudential regulatory framework , with the aim of finalising the prudential treatment around the end of 2022.

Strategies to bring DeFi within the regulatory perimeter are already being discussed, although in an initial phase. One challenge is that DeFi protocols have no obvious supervisory or regulatory access points. Some DeFi protocols are governed by so-called DAOs (Decentralised Autonomous Organisation), which could potentially serve as an access point. However, it still needs to be clarified how DAOs should be regulated. All of these issues are exacerbated by the borderless nature of DeFi, which will require strong international collaboration in order to avoid regulatory arbitrage. While the principle of "same activity, same risk, same regulation" can serve as an important guideline, it is likely that some tailor-made regulatory solutions will be necessary due to some unique DeFi features. A proactive and prudent forward-looking regulatory and supervisory approach with respect to DeFi and crypto assets is needed in order to provide an environment in which DeFi will be able to deliver on the potential opportunities it promises.

Box 2 • House Prices-at-Risk: analysis of the risk of a significant correction in residential real estate prices

In Portugal, a phase of recovery in house prices began from 2014 onwards. This recovery was driven by factors such as low interest rates, increasing demand for housing by non-residents, economic recovery, the bolstering of tourism activities, and the rigidity in housing supply. The persistent increase in residential real estate prices, even during the pandemic crisis, and the normalisation of monetary policy to address recent inflationary pressures justify close monitoring of the risk associated with a correction in house prices. Despite the mitigating factors, adverse developments in house prices would result in potential losses for economic agents.

This Box analyses the distribution of house price changes in Portugal conditional on the financial and economic situation prevailing in 2021. The analysis is based on a quantile regression model and local projections (Koenker and Bassett, 1978; Jordà, 2005), which allows an assessment of the response – at various projection horizons – of the different percentiles of the distribution of house price changes to variations in financial and economic conditions. The variable of interest is the year-on-year rate of change in house prices, in real terms, projected h periods in the future. The explanatory variables are set for the current period and include (i) the year-on-year rate of change in house prices in real terms, which captures persistence in house price changes; (ii) the cyclical systemic risk indicator, as a measure of financial vulnerability (Lang et al., 2019); (iii) the Country Level Indicator of Financial Stress, which captures financial conditions (Duprey et al., 2017); (iv) the Consumer confidence indicator, which is used as a proxy for the economic cycle; (v) the deviation of the price-to-income ratio from its long-term average as a measure of potential price over- or undervaluation in the residential real estate market; (vi) a variable that isolates the period of the euro area sovereign debt crisis in order to exclude the effect of this crisis that was not associated with a housing crisis in Portugal; and (vii) foreign direct investment in real estate, which in the recent period explains part of the house price dynamics. The model has been estimated using quarterly information between 1996 and 2021.

Significant price falls occur infrequently and thus tend to be associated with the lower and extreme percentiles of the distribution. This situation justifies that the analysis in this Box focuses on assessing developments in the estimate of the 10^{th} percentile, known as House Prices-at-Risk (HPaR). The HPaR can be interpreted as an indicator signalling a potential worsening of price developments in the residential real estate market, as a more negative estimate for the 10^{th} percentile is associated with the risk of a more significant fall in house prices for the same probability. However, a positive or slightly negative estimate for the HPaR indicates that the risk of a significant fall in house prices is virtually nil. The analysis is conducted for the one-year and three-year projection horizons, denominated short and medium term respectively, given their relevance for monitoring vulnerabilities in the residential real estate market as part of promoting financial stability.

Developments in the risk of a significant correction in house prices in 2021

Chart B2.1 presents estimates for the short and medium term of the HPaR, taking into account the conditions that prevailed in each quarter of 2021. The HPaR measure – analysed for the short term – showed an improvement trend during 2021, which was interrupted at the end of 2021. This development was mainly due to the continued rise in house prices over the course of 2021, a variable that has an estimated positive partial effect on this measure over the short-term horizon. At the end of 2021, the 10^{th} percentile is estimated to be around 1.6%; therefore, according to this metric, there was no risk of a correction in house prices in the short term. In the medium term, the HPaR measure evolved in a broadly similar way to that of the short-term measure, i.e. an improvement over the first three quarters of 2021. This development is mainly due to a stabilisation of the accumulation of financial vulnerabilities, a recovery in consumer confidence and persisting signs of house price overvaluation. The improvement observed in the estimate of the 10^{th} percentile of changes in house prices was fully reversed in the last quarter of 2021. This

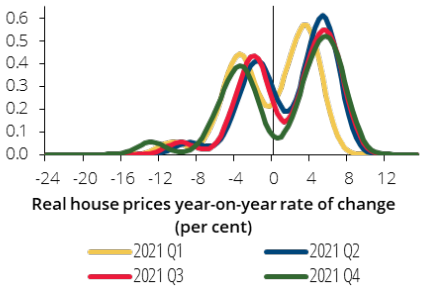
deterioration in the HPaR, between the third and fourth quarters of 2021, reflects the slowdown in the recovery of consumer confidence, the increase, albeit slight, in the accumulation of financial vulnerabilities, and a continued increase in foreign direct investment in real estate. Over the medium term, the results indicate that the 10th percentile of house price changes, in real terms, would be between -3.2% and -1.7%, suggesting an increase in the risk of house price correction. However, the results do not indicate significant falls that could trigger major losses for the economy.

In the course of 2021, the estimate of the 10th percentile of house price changes was always lower for the medium term than for the short term, supporting the view that the build-up of vulnerabilities in the residential real estate market may take some time to materialise into a price correction. Despite this declining trend between the short and medium term, the risk of a significant fall in prices is not material at any of the projection horizons. However, the estimated probability of a negative change in house prices in the medium term has always been higher than that estimated for the short term. In addition, the estimated distribution of house prices in the medium term did not change significantly during 2021, indicating that there were no significant changes in the probability of a correction of residential real estate prices (Chart B2.2). In the course of 2021, the probability of significant falls particularly in house prices, i.e. equal to or greater than 10%, stood at around 4% or less. The slight rightward shift in the estimated distribution between the first and the remaining quarters of 2021 is a result of the economic recovery and the continued positive developments in the real estate market driven by foreign direct investment. The cyclical behaviour of house price changes explains the existence of two spikes in estimated distributions, indicating in particular that price falls are less likely to occur than price increases, as the probability mass is greater to the right of zero.

Chart B2.1 • Estimate of the 10th percentile of house price changes, in real terms, in 2021 | Per cent

Source: Banco de Portugal. | Note: The short and medium-term refer to the one-year and three-year projection horizons respectively.

Chart B2.2 • Estimated distributions of house price changes, in real terms, for the medium term in 2021 | Probability density



Source: Banco de Portugal. | Note: Distributions correspond to the estimates for conditional distributions of the year-on-year rate of change in house prices, in real terms, taking into account conditions that prevailed in 2021 Q1 (yellow), 2021 Q2 (blue), 2021 Q3 (red) and 2021 Q4 (green).

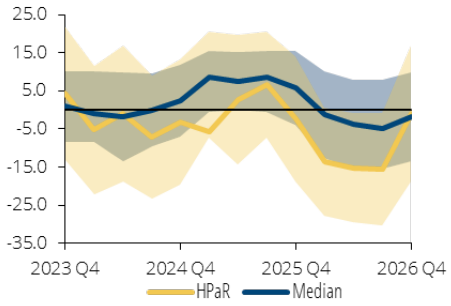
Out-of-sample projections of the 10th and 50th percentiles of house price changes, in real terms

The projections – obtained directly – for the 10th (HPaR) and 50th (median) percentiles of the conditional distribution of house prices, based on the conditions that prevailed in the last quarter of 2021, for the projection horizons of between two and five years, point to an overall decline in the 10th percentile until the end of 2024 and in the 50th percentile until the first half of 2024 (Chart B2.3). However, these estimates are not statistically significant. From 2025 onwards, an improvement is projected for both percentiles, expected to last until the end of that year. After that period, the results point to a further decline of the two percentiles, especially so for the 10th percentile. The

fact that these projections are negative over the initial projection horizon indicates an increase in the probability of a correction in house prices but does not suggest significant falls. These projections are conditional (i) on the chosen specification of the model, (ii) on the projection horizon, the longer it is, the greater uncertainty it creates; and (iii) on the conditions that prevailed at the end of 2021, whose future developments may be different due to the uncertainty generated by the invasion of Ukraine and its impact on economic activity, as well as the normalisation of monetary policy.

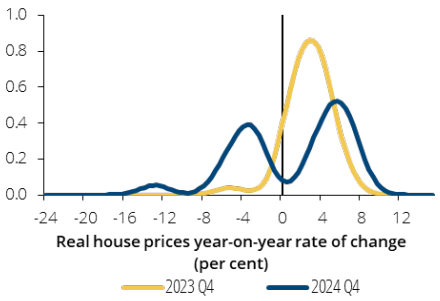
The analysis of estimated conditional distributions (Chart B2.4) allows two conclusions to be drawn. First, the model projects a distribution for 2024 with a lower average than that of the 2023 distribution, indicating an expectation of deterioration in house prices from 2023 to 2024 in the central scenario. Second, the model projects an increase in uncertainty, as measured by the standard deviation, associated with house price developments from 2023 to 2024. The projected distribution becomes less concentrated around positive values, suggesting a more negative outlook for house price developments. This reinforces the need to continue monitoring developments in the residential real estate market.

Chart B2.3 • Out-of-sample projections of the 10th and 50th percentile of house price changes, in real terms, in 2021 Q4 | Per cent



Source: Banco de Portugal. | Note: The shaded areas correspond to the 95% confidence intervals for out-of-sample projections of the HPaR measure (yellow area) and the median (blue area), calculated using bootstrapping.

Chart B2.4 • Estimated distributions of house price changes, in real terms, in 2021 Q4 | Probability density



Source: Banco de Portugal. | Note: The distributions correspond to the conditional distributions of the year-on-year rate of change in house prices, in real terms, taking into account the conditions that prevailed in 2021 Q4.

Conclusion

In the course of 2021, the risk of a significant correction in house prices was assessed as rather limited for the short and medium term. Nonetheless, estimates of the 10th percentile of house price changes are lower for the medium term than for the short term, suggesting that vulnerabilities in the residential real estate market take some time to translate into price correction. However, it is important to note that the results obtained are conditioned by the model, the projection horizon and the prevailing conditions at each point in time, which may evolve differently in the future. Current circumstances and this analysis justify the need to continue monitoring risks in the residential real estate sector, particularly in the context of normalisation of monetary policy and persistent growth dynamics in house prices.

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Box 3 • Credit quality of loans to non-financial corporations that benefited from the public loan moratorium

The end of the public loan moratorium on loans to NFCs led to the resumption of repayments for a significant amount of loans. The moratorium helped to cushion the decrease in firms' liquidity resulting from a sharp contraction in economic activity during the COVID-19 pandemic. By March 2022, 26.0% of total loans to NFCs had benefited from the moratorium (Table B3.1). The moratorium ended on 30 September 2021 for most loans, and until the end of that year for the remainder. The re-establishment of the regular payment schedule entails an increased outflow of funds from NFCs, which may lead to the materialisation of default risk, particularly for those lagging behind in post-pandemic recovery and more affected by price increases in energy and/or other commodities.

The quality of loans that benefited from the moratorium showed contained signs of deterioration until the first quarter of 2022, when assessed by the NPL ratio. By March 2022, the gross NPL ratio had increased by 2.6 p.p. compared to December 2020, standing at 12.5%. This ratio compares to 8.1% in December 2021 for total loans to NFCs (Section 2.3) and 28% in December 2014, in the wake of the sovereign debt crisis. The increase in the NPL ratio on loans that benefited from the moratorium resulted in 1.4 p.p. from the increase in non-performing loans, essentially from the component more than 90 days past due (1.2 p.p.). In the last two quarters, the decrease in performing loans in denominator, by virtue of restarting the repayment of loans that benefited from the moratorium, contributed to a more significant increase in the gross NPL ratio. Repayment of loans always contributes to increasing this ratio as it decreases the denominator of the indicator, in a period when there are no new requests for the moratorium.

Table B3.1 • Non-performing loans that benefited from the moratorium associated with NFC – consolidated basis | Per cent

	Jun. 20	Dec. 20	Jun. 21	Sep. 21	Dec. 21	Mar. 22
Gross NPL ratio[a]	8.1	9.9	10.3	10.5	11.9	12.5
NPL ratio UtP[a]	6.6	9.3	9.6	9.6	10.8	10.3
NPL ratio past due >90d[a]	1.5	0.6	0.7	0.9	1.2	2.2
NPL impairment coverage ratio[b]	38.1	45.0	47.2	48.2	46.6	47.1
Memorandum item:						
Total gross NPL ratio[c]	11.2	9.7	8.7	8.3	8.1	n.a.
% loans that benefited from the moratorium[c]	26.5	29.2	30.6	29.7	27.8	26.0

Source: Banco de Portugal. | Notes: Loans that have benefited from the moratorium include loans under moratorium or with an expired moratorium at each point in time. Information on loans under moratorium from June 2020 refers only to the eight largest institutions in the banking system. Data from December 2020 onwards refers to the whole sector. (a) As a percentage of loans that benefited from the moratorium. (b) Corresponds to the ratio of accumulated impairments on NPLs to the gross value of NPLs that benefited from the moratorium. (c) As a percentage of total loans to NFCs.

The ratio of loans past due of those that ended a moratorium in September 2021 shows no significant credit risk materialisation. In March 2022, the ratio of instalments past due and not repaid by the agreed deadline to the total exposure amount of loans ending the moratorium in September 2021 was 0.7% (0.7% for SMEs), while, for contracts that had never been under moratorium and had no loans past due as at September 2021, it was 0.4% (0.5% for SMEs). These figures reflect the small size of loans past due in both subsets six months after the end of the moratorium. For NFCs that applied for the moratorium, the materialisation of credit risk was also reduced in the other loan contracts held by them and that did not benefit from this support.

In March 2022, loans to NFCs in sectors deemed to be most affected by the pandemic crisis and those that benefited from State-guaranteed credit lines showed a lower share of loans past due. The ratios of loans past due in the most affected sectors (in accordance with Decree-Law No 22-C/2021

and the *Retomar* programme) and in the least affected sectors stood at 0.4% and 0.8% respectively. In contracts that benefited from the moratorium, the ratio of loans past due was lower for firms that had also made use of State-guaranteed credit lines. These results are likely to be related, inter alia, to the broader range of support measures for the most affected sectors and the most restrictive eligibility conditions of State-guaranteed credit lines in relation to those of the moratoria; therefore, firms that had made use of the first type of measure had a lower risk level from the outset.

The absence of significant materialisation of credit risk may be reflecting the short period that has elapsed since the end of the public moratorium. The time elapsed since the end of the moratorium may still be not enough to note the full extent of any deterioration in loans that have benefited from the moratorium. Banks have, however, continued to identify a higher credit risk in such loans, resulting in a higher share of stage 2 loans throughout 2021, from 28.4% at end-2020 to 32.7% at end-2021 (Table B3.2). This share was significantly higher than that of total loans to NFCs, which stood at 18.8% in December 2021 (18.6% in December 2020). In the last quarter of 2021, the increase in the share of loans that benefited from the moratorium at stage 2 was the result of the decrease in performing loans (denominator effect), as stage 2 loans, which had been increasing since the beginning of the year, have decreased. The decrease in stage 2 loans was sharper in the first quarter of 2022, leading to a slight drop in their share in total loans that benefited from the moratorium, to 32.4%.

Banks' perception of higher risk on loans that made use of the moratorium was also reflected in the increase in NPL impairment coverage. In March 2022, the NPL impairment coverage ratio increased by 2.1 p.p. compared to December 2020, to 47.1%. In December 2021, the ratio stood at 46.6%, which was lower than that of the total NFC loan portfolio (52.2%).

Table B3.2 • Stage 2 and forborne loans to NFCs that benefited from the moratorium – consolidated basis | Per cent

	Jun. 20	Dec. 20	Jun. 21	Sep. 21	Dec. 21	Mar. 22
Stage 2 loans ratio[a]	17.3	28.4	29.6	30.9	32.7	32.4
Forborne loans ratio[a]	9.2	10.7	12.0	12.2	12.7	13.0
of which: NPL[a]	4.7	6.1	6.0	6.1	7.4	7.7
Stage 2 impairment coverage ratio[b]	5.2	7.4	7.0	7.0	6.9	6.7
Forborne impairment coverage ratio[c]	23.5	29.8	28.1	29.0	34.2	34.9
Forborne NPL impairment coverage ratio[d]	39.3	44.3	46.9	48.4	51.4	52.4
Memorandum item:						
Total stage 2 loans ratio[e]	11.9	18.6	18.5	19.1	18.8	n.a.
Total forborne loans ratio[e]	10.1	9.4	8.4	8.1	7.6	n.a.

Source: Banco de Portugal. | Notes: Loans that have benefited from the moratorium include loans under moratorium or with an expired moratorium at each point in time. Information on loans under moratorium from June 2020 refers only to the eight largest institutions in the banking system. Data from December 2020 onwards refers to the whole sector. (a) As a percentage of loans that benefited from the moratorium. (b) Corresponds to the ratio of accumulated impairments to the gross value of stage 2 loans that benefited from the moratorium. (c) Corresponds to the ratio of accumulated impairments to the gross value of forborne loans that benefited from the moratorium. (d) Corresponds to the ratio of accumulated impairments to the gross value of non-performing forborne loans that benefited from the moratorium. (e) As a percentage of total loans to NFCs.

The ratio of forborne loans to total loans that have benefited from the moratorium has increased, particularly in non-performing forborne loans. In March 2022 the ratio of forborne loans that had benefited from the moratorium increased by 2.3 p.p. from December 2020, to 13.0%. The increase in forborne loans contributed 1.1 p.p. to this development, particularly in non-performing forborne loans (0.9 p.p.). In December 2021, this share stood at 12.7%, outperforming that of the total NFC loan portfolio by 5.2 p.p. Impairment coverage of these loans kept pace with the increase in risk, particularly in the non-performing component.

In March 2022, the share of loans to NFCs with more unfavourable financial indicators was higher in firms that benefited from the moratorium. The end of the credit moratorium has an impact on the firm's entire debt servicing. In March 2022, in the banking system's seven major institutions (G7), total loans associated with NFCs that had at least one contract under moratorium accounted for 56.6% of total loans to NFCs (Table B3.3). Taking the median of the equity and cash-to-assets ratios by sector of activity as a reference, in March 2022, the gross NPL ratio of the exposure associated to NFCs below the median value of both financial indicators was 5 p.p. higher in firms that had benefited from the moratorium (compared to those which had not), standing at 14.3% for this group of firms. In turn, the gross NPL ratio of exposure to NFCs with cash-to-assets ratio below the median and financing expenses coverage ratio of below 2 was 18.5% for firms that benefited from the moratorium, 9 p.p. above the NFCs that had not made use of this support measure. Note that in the two breakdowns defined herein, banks' total exposure was higher for firms that had made use of the moratorium.

Table B3.3 • G7 loans[(a)] to NFCs and NPL ratios in March 2022

	NFCs that benefited from the moratorium[(b)]		NFCs that did not benefit from the moratorium	
	% of total loan amount	Gross NPL ratio (% of the category's loan amount)[(c)]	% of total loan amount	Gross NPL ratio (% of the category's loan amount)[(c)]
Total	56.6	9.4	43.4	6.8
NFCs with capital ratio and cash–to-assets ratio lower than the sector of activity median[(d)]	23.7	14.3	14.8	9.0
NFCs with financing expenses coverage ratio lower than 2 and cash-to-assets ratio lower than the sector of activity median[(d)]	17.6	18.5	9.9	9.9
Sectors potentially more affected by the rise in energy and/or commodity costs [(e)]	22.7	8.2	13.4	4.7
NFCs with State-guaranteed credit lines with grace period ending between April 2022 and December 2022	14.7	8.1	3.2	1.2

Source: Banco de Portugal. | Notes: (a) Exposure of the seven largest institutions of the banking system (G7) identified in the Central Credit Register (CCR). (b) NFCs that benefited from the moratorium correspond to the exposure of firms that had at least one loan contract benefiting from public moratorium between March 2020 and December 2021. (c) Corresponds to the ratio of the outstanding amount identified as non-performing to the total outstanding amount in March 2022. (d) The median of the equity and cash-to-assets ratios was calculated at December 2020 with reference to the firm's sector of activity, considering 11 sectors of activity: agriculture, mining and quarrying, electricity, gas and water, manufacturing, construction and real estate activities, other construction, trade, transportation, accommodation and food services, telecommunications, professional, scientific, technical and administrative activities and other services. The equity ratio corresponds to the ratio of equity to total assets. The cash-to-assets ratio corresponds to the ratio of cash and bank deposits to total assets. The financing expenses coverage ratio corresponds to the ratio of EBITDA to financing expenses. (e) Sectors potentially more affected by the rise in energy and/or commodity costs defined as in Box 4.

Firms that made use of the moratorium may be more vulnerable to the materialisation of adverse shocks in the short term. In March 2022, the share of sectors most exposed to a rise in energy and/or commodity costs (Box 4) in total loans, corresponded to 22.7% in firms that benefited from a moratorium, 9 p.p. higher than in firms that had not made use of this support measure. In sectors potentially most affected by the aforementioned price changes, the gross NPL ratio was 4 p.p. higher in firms that had applied for a moratorium, standing at 8.2%.

The end of grace periods for a part of State-guaranteed loans (SGL) will increase some firms' debt servicing throughout 2022. In March 2022 total exposure associated with SGL firms with a capital repayment grace period ending between April and December 2022 was higher in firms that had applied for the moratorium (14.7%, compared to 3.2% for all other NFCs).

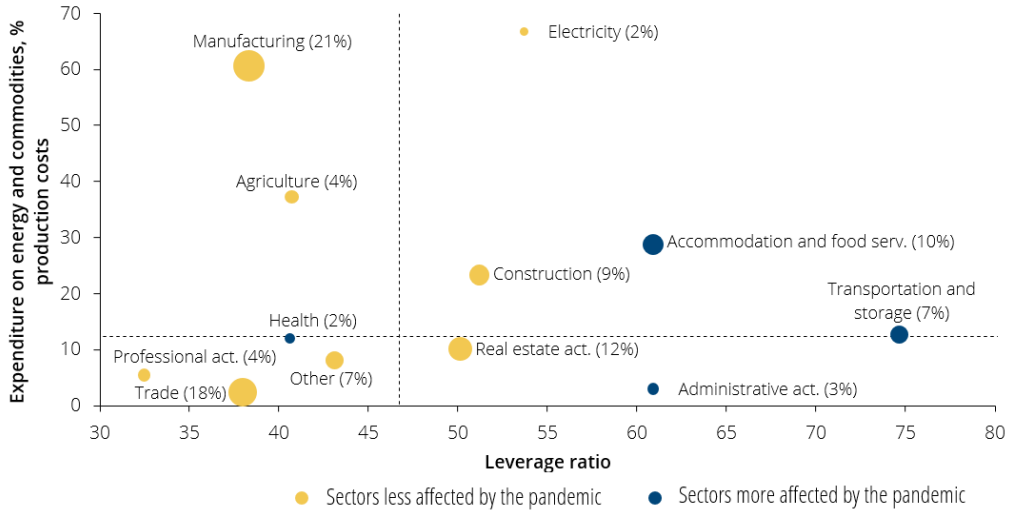
The phasing out of measures implemented in response to the COVID-19 pandemic and the most recent international developments may condition NFCs' performance, reinforcing the importance of preventive risk management by banks.

Box 4 • Credit risk of loans to NFCs potentially more affected by the rise in the cost of energy, other commodities and the pandemic

In addition to the effects related to the pandemic, non-financial corporations (NFCs) in Portugal have been affected by the rise in energy and commodity prices, as well as disruptions to global supply chains. Firms whose production processes are more reliant on these goods have experienced an increase in their production costs, which could reduce profit margins if they fail to fully pass on such increases to the price of final goods. As a result, this could reduce their ability to fulfil their obligations. This box assesses the banking system's exposure to these firms, identifying those that show greater signs of financial vulnerability and consequently higher credit risk.

Among the more energy and commodity-intensive sectors in total production costs are electricity and manufacturing (Chart C4.1). However, the most financially vulnerable sectors, reflected in a higher leverage ratio, are transportation and storage, accommodation and food services and administrative activities. These sectors are also among those most affected by the pandemic crisis. The banking system has a high exposure to manufacturing (21%), which is more energy and commodity-intensive in production costs. Trade and real estate activities have a lower intensity of these goods in production and a significant share of the stock of bank loans to NFCs (18% and 12% respectively). Leverage is relatively low in manufacturing and trade.

Chart B4.1 • Energy and commodity intensity in production and leverage ratio, by sector of activity



Source: Banco de Portugal. | Notes: The leverage ratio (obtained funding over the sum of equity and obtained funding) was calculated on the basis of data from the Simplified Corporate Information (Informação Empresarial Simplificada – IES) for 2020. Energy and commodity costs refer to the average of expenditure on electricity and fuel and on commodity purchases from 2017 to 2019. Production costs correspond to average expenditure on employees, supplies and external services and the cost of goods sold and material consumed between 2017 and 2019. Dashed lines refer to the median values of the ratios. Excludes firms belonging to sections K, O, T and U of the Portuguese Classification of Economic Activities (CAE) Rev.3. "Other" includes sections B, E, J, P, R, S and head offices (CAE 70100). The sectors most 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. To allow for aggregation by CAE section, the sections where the stock of loans granted to the more affected CAE subclasses (five-digit level) accounted for at least 50% of the total exposure of the CAE section in March 2022 were the ones considered as more affected. The circle size corresponds to the share of each CAE section in the stock of loans to NFCs in March 2022, identified in brackets.

In order to quantify the banking sector's exposure to loans to NFCs in sectors potentially more affected by the rise in energy and/or commodity costs, according to the five-digit Portuguese Classification of Economic Activities (CAE), those considered had a value above the 75th percentile

in at least one of the following ratios: energy costs over total production costs or expenditure on commodities over total production costs.

In March 2022 the sectors potentially more affected by an increase in energy and/or commodity costs accounted for 36.6% of the stock of bank loans to NFCs, of which 12.8 p.p. related to sectors among those most affected by the pandemic crisis (Table C4.1).

Table B4.1 • Stock of loans to NFCs (March 2022) – domestic activity

	%
Most affected sectors:	
By the rise in energy and/or commodity costs and the pandemic	12.8
Only by the rise in energy and/or commodity costs	23.9
Only by the pandemic	15.8
Least affected sectors	47.6

Source: Banco de Portugal. | Notes: Sectors most 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 C4.1). Excludes firms belonging to classes in sections K, O, T and U of the Portuguese Classification of Economic Activities (CAE) Rev.3. The sectors most 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.

There is greater credit risk, assessed through firms' economic and financial ratios, in the sectors potentially more affected by the rise in energy and/or commodity costs which also fall within the sectors most affected by the pandemic crisis (Table C4.2, panel A). In March 2022 there was a larger share in the stock of loans to NFCs in these sectors with cash holdings and overall liquidity below the 25th percentile in each of the ratios (53.7% and 34.6% respectively, compared with 47.0% and 22.0% for total NFCs) and, consequently, increased cash needs and greater difficulties in fulfilling their obligations in the short run. There is also a higher share of loans to NFCs with values below the 25th percentile of the profitability and interest coverage ratios (44.8% and 44.3% respectively, compared with 21.3% and 20.1% for total NFCs) and above the 75th percentile of the leverage and indebtedness ratios (36.8% and 58.7% respectively, compared with 32.1% and 43.4%).

In turn, the stock of loans to NFCs in sectors potentially more affected only by the rise in energy and/or commodity costs is less concentrated in more leveraged and indebted firms. However, there is also a larger share in the stock of loans to NFCs in these sectors with lower cash holdings (50.1% compared with 47.0% for total NFCs).

In March 2022 firms in sectors that were only potentially more affected by the rise in energy and/or commodity costs had lower credit risk than total NFCs (50.8% and 38.2%, respectively, in the lower risk class) (Table C4.2, panel B). Nevertheless, for situations where NFCs also belong to the sectors more affected by the pandemic, the share of intermediate and higher risk classes is larger.

All in all, particular attention should be paid to developments in loans to sectors of activity for which the impact of higher energy and/or commodity costs adds to weaknesses arising from the pandemic crisis, namely accommodation and food services, and transportation and storage. The sectors most vulnerable to these impacts, but which were less affected by the pandemic crisis, such as agriculture and manufacturing, were more financially sound.

Table B4.2 • Breakdown of the stock of loans to NFCs (March 2022) | Per cent

A. By sector of activity and economic and financial ratio quartiles

	Sectors more affected by energy and/or commodities and pandemic			Sectors more affected only by energy and/or commodities			Sectors more affected only by the pandemic			Total		
	< p25	[p25, p75[	>= p75	< p25	[p25, p75[	>= p75	< p25	[p25, p75[	>= p75	< p25	[p25, p75[	>= p75
Cash to assets ratio[(a)]	53.7	40.4	5.9	50.1	46.1	3.8	38.7	49.6	11.7	47.0	46.2	6.8
Current ratio[(b)]	34.6	48.3	17.1	19.7	63.0	17.3	26.2	55.7	18.1	22.0	56.9	21.2
Profitability[(c)]	44.8	50.6	4.7	11.5	81.2	7.3	29.9	61.2	8.9	21.3	70.6	8.1
Leverage ratio[(d)]	3.2	60.1	36.8	4.5	72.4	23.1	4.7	58.4	36.9	4.7	63.2	32.1
Indebtedness ratio[(e)]	2.8	38.5	58.7	3.8	57.0	39.3	4.4	50.3	45.3	4.5	52.1	43.4
Interest coverage ratio[(f)]	44.3	48.6	7.0	10.9	76.8	12.3	29.9	59.6	10.5	20.1	68.8	11.1

B. By sector of activity and credit risk class

	Risk class 1 (lower risk)	Risk class 2	Risk class 3 (higher risk)
Most affected sectors:			
By the rise in energy and/or commodity costs and the pandemic	23.2	45.3	31.4
Only by the rise in energy and/or commodity costs	50.8	37.0	12.2
Only by the pandemic	35.1	41.7	23.2
Least affected sectors	36.9	39.0	24.1
Total	38.2	39.8	22.0

Source: Banco de Portugal. | Notes: The sectors most affected by the rise in energy and/or commodity costs or by the pandemic follow the definitions set out in the footnote to Table C4.1. The calculation of the quartiles of each economic and financial ratio considered information from IES for 2020 for NFCs with bank loans in March 2022. 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 probability of default (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%. (a) Corresponding to the ratio of the firm's liquid financial assets (currency and bank deposits) to total assets; (b) Ratio of current assets to current liabilities; (c) Calculated as the ratio of EBITDA (earnings before interest, taxes, depreciation and amortisation) to equity plus obtained funding. Obtained funding includes loans from financial institutions, subsidiaries and shareholders, debt securities and other funding. Equity and obtained funding are measured at book value; (d) Ratio of obtained funding to the sum of equity and obtained funding; (e) Resulting from each firm's ratio of financial debt to total assets; (f) Ratio of EBITDA to financing expenses.

Box 5 • Credit quality of loans to households that benefited from credit moratoria

Moratoria – one of the support measures during the pandemic crisis – have made it possible to alleviate households' debt servicing costs and consequently, mitigate the materialisation of credit risk during the most pronounced period of the crisis. In March 2022, around 13% of total loans to households had benefited from moratoria, of which 12 p.p. were loans for house purchase. For the vast majority of loans for house purchase, payment of instalments resumed in October 2021. For consumer loans, such repayments generally resumed earlier. Thus, the stock of loans that were under moratoria has been declining.

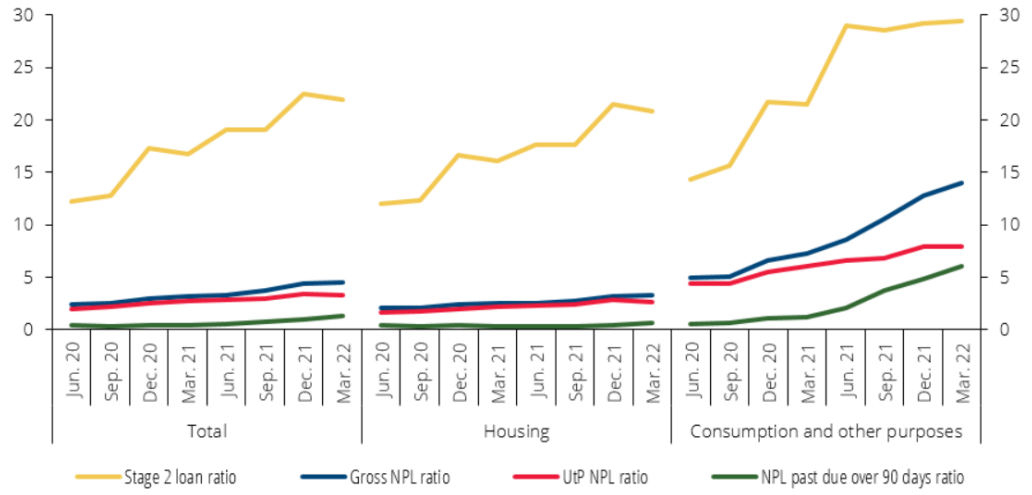
Despite the upward trend in credit quality in the total portfolio of loans to households (Section 2.3), there was a slight deterioration in the subset of loans that were under moratoria. Compared to June 2020, the non-performing loans (NPLs) ratio for loans that benefited from moratoria increased by 2.1 p.p., to 4.6%, until March 2022. This growth was more moderate in loans for house purchase (1.2 p.p., to 3.3%) than in consumer loans (9 p.p., to 14%). In the aggregate, developments reflected the contributions of unlikely-to-pay (UtP) loans and loans more than 90 days past due, by 1.3 p.p. and 0.8 p.p. respectively (Chart B5.1). By purpose, UtP loans for house purchase grew predominantly, while for consumption and other purposes the increase in NPLs resulted largely from loans more than 90 days past due. At the level of each borrower, there is evidence that default on a given agreement did not materially reflect greater difficulties in servicing the debt following the end of moratoria on other loans.

The NPL impairment coverage ratio associated with loans to households that benefited from moratoria decreased by 1 p.p., to 28.8%. This decline occurred in the fourth quarter of 2021 as a result of lower coverage for UtP loans. An increase in NPLs for house purchase – which typically have lower impairment coverage due to the existence of real estate collateral – contributed to these developments.

The forbearance of loans to households that were under moratoria increased mainly from the last quarter of 2021. In March 2022, forborne loans accounted for 7.3% of this sector's loans that were under moratoria, i.e. 3.9 p.p. more than in June 2020. In December 2021, this ratio stood at 7%, 4 p.p. higher than the households' loan portfolio (Section 2.3). When properly implemented, forbearance measures may limit additional losses for the banking sector, as they make it possible to match loan conditions with the borrower's ability to pay, although they imply the granting of funds to those who are experiencing or are likely to experience financial difficulties.

The share of loans that have benefited from moratoria classified as stage 2 has increased and, in December 2021, was higher than the one for total loans to households. About 21.9% of the loan portfolio that benefited from moratoria was classified at stage 2 in March 2022, an increase of 9.6 p.p. from June 2020. Growth in stage 2 loans reflected increases in the housing segment and consumption and other purposes segment, with the former making a larger contribution due to its relevance in the portfolio. The extension of the economic effects of the pandemic crisis, with consequences for households' financial situation, is likely to have contributed to the increase in stage 2 loans, which reflects an increased perception of credit risk by banks.

Chart B5.1 • Loans to households that benefited from moratoria | Per cent



Source: Banco de Portugal. | Note: The information on loans under moratoria for June 2020 refers only to the eight largest institutions in the banking system.

The highest latent risk of loans to households that were under moratoria compared with this sector's total portfolio is confirmed when assessing (i) the existence of default by the borrower in the pre-pandemic period and (ii) the existence of current default in another agreement by that same borrower, even though the weight in total loans to households simultaneously meeting these criteria is small. For loans to households with no amount past due in March 2022, 2.3% of the portfolio that benefited from moratoria met these two criteria simultaneously (Table B5.1). Although this share is higher than that observed for loans to households that were not under moratoria (0.8%), the share in total loans to households is low (0.3%). By segment, the share of loans for consumption and other purposes meeting the two criteria is higher than that of loans for house purchase (2.7% vs 2.3%).

In March 2022, 11.0% of the portfolio of loans to households that benefited from moratoria met only one of the criteria (9.4 p.p. associated with pre-pandemic default). The share was 5.4% for loans to households that were not under moratoria. Consumption and other purposes show a higher share than housing, with 13.2% for loans that benefited from moratoria and 7.8% for all other cases.

Institutions should ensure an adequate credit risk assessment, also in view of the uncertainty surrounding the current international situation.

Table B5.1 • Amount of loans associated with households with pre-pandemic default and/or households with current default in other agreements

	Loans that were under moratoria			Loans that were not under moratoria		
	Total	Housing	Consumption and other purposes	Total	Housing	Consumption and other purposes
% of the structure of each portfolio						
No default	86.7	87.1	84.0	93.8	94.6	91.1
Pre-pandemic default or current default	11.0	10.7	13.2	5.4	4.6	7.8
Pre-pandemic and current default	2.3	2.3	2.7	0.8	0.8	1.1
% of total loans to households [(a)]						
No default	13.0	11.2	1.7	79.8	62.1	17.7
Pre-pandemic default or current default	1.6	1.4	0.3	4.6	3.0	1.5
Pre-pandemic and current default	0.3	0.3	0.1	0.7	0.5	0.2

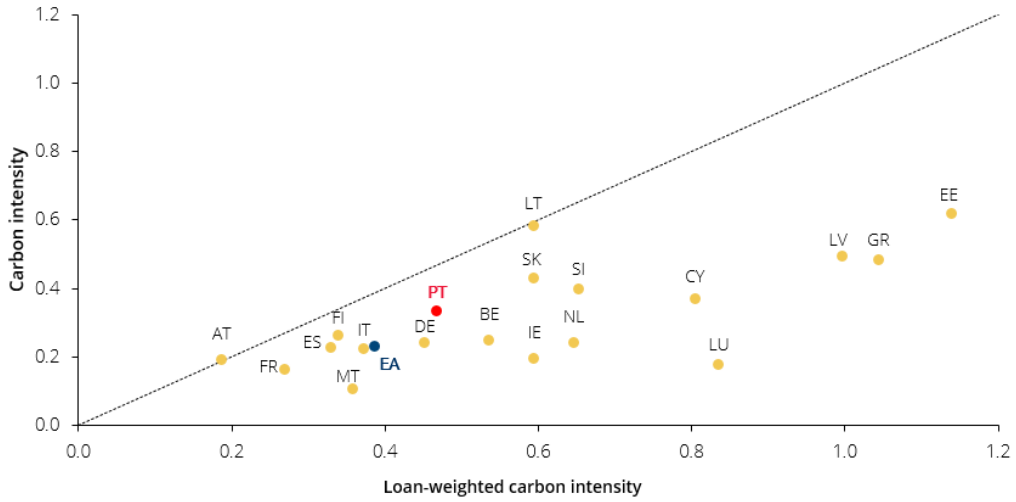
Source: Banco de Portugal. | Notes: Information from the Central Credit Register (CCR). It excludes the amount granted to non-profit institutions serving households (NPISH) and the amount associated with loans that had past due in March 2022. Loans are classified as follows: (i) pre-pandemic default, i.e. cases where one or more borrowers had a loan or loans past due for at least three consecutive months between December 2018 and February 2020 (not excluding the agreement itself) and/or (ii) current default, i.e. default in other agreements in March 2022 and at least in the previous two months. (a) The figures in the columns referring to the total add up to 100% and the purpose details the composition of the total.

Box 6 • Climate transition and credit risk of NFCs

The banking system is subject to the materialisation of financial risks associated with climate change, such as physical and transition risks. Physical risks relate to potential economic costs and financial losses stemming from an increased frequency and intensity of extreme weather events, as well as long-term changes in weather patterns. These impacts include, amongst others, damaged physical capital and a reduction in labour productivity. Transition risks are associated with possible impacts of structural changes to the economy and society from reducing greenhouse gas (GHG) emissions. This process should reduce the life expectancy of certain carbon-intensive assets, hence having a significant direct impact on some economic agents and, eventually, the economy as a whole. Through transition risks, the banking system's exposure to firms is subject to the materialisation of credit risk associated with the devaluation of financial assets. This box aims primarily to outline the credit risk of NFCs associated with climate policy relevant sectors (CPRS), according to their financial characteristics.

In 2020, the carbon intensity of the Portuguese economy weighted by bank loans to NFCs was higher than that weighted by gross value added (GVA). This difference reflects a higher weight of sectors more intensive in GHG emissions in the Portuguese banking system's portfolio, when compared with the sectoral composition of the economy's GVA. Nevertheless, loan-weighted carbon intensity has been declining since 2018, mainly due to the decrease in total GHG emissions of NFCs and, to a lesser extent, to a shift in the portfolio towards less carbon-intensive sectors. In the euro area in 2020, most countries showed a similar carbon intensity pattern (higher when weighted by the portfolio of loans to NFCs). The Portuguese banking system presented a deviation below the euro area average (Chart B6.1).

Chart B6.1 • Carbon intensity of the economy and of the banking system's loan portfolio
| kg CO2 equivalent / euro



Sources: European Central Bank (Consolidated Banking Data) and Eurostat. | Notes: 2020 figures. The carbon intensity indicator corresponds to the ratio of greenhouse gas (GHG) emissions to the gross value added (GVA).

In 2021, CPRS represented 58% of total loans to NFCs. Sectors associated with the production of fossil fuels, intensive in GHG emissions or in energy use, may experience more negative impacts from the transition to a low-carbon economy. These sectors accounted for 26% of bank loans to NFCs. Loans to firms in sectors in which the impact of the climate transition is uncertain (sectors not directly affected by the introduction of a carbon tax or that carry out ancillary activities, whose

impact depends on developments in sectors that are directly affected by the increase in carbon costs) represented 31%. In turn, exposure to firms that should benefit from the transition process (e.g. firms producing or using renewables) was residual.

The materialisation of credit risk associated with the transition to a low-carbon economy may add to the current higher credit risk of loans to CPRS, assessed by firms' financial characteristics. This risk will reflect impacts from structural changes in the economy likely to occur over an extended time horizon. There is a higher share of loans to CPRS firms with lower cash to assets ratio, profitability and interest coverage ratio and with higher indebtedness and leverage ratios, compared with total NFCs (Table B6.1). CPRS with an uncertain impact (including most construction, real estate and accommodation sub-sectors) contribute the most to this pattern.

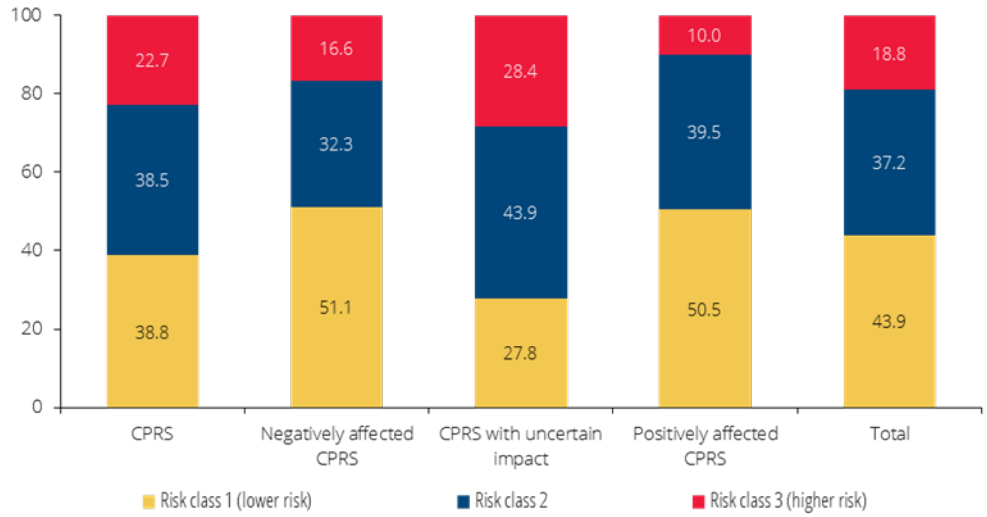
Table B6.1 • Stock of loans to NFCs by CPRS[(a)] and by quartile of economic and financial ratios | Per cent

	Negatively affected CPRS			CPRS with uncertain impact			CPRS			Total		
	< p25	[p25, p75[	>= p75	< p25	[p25, p75[	>= p75	< p25	[p25, p75[	>= p75	< p25	[p25, p75[	>= p75
Cash to assets ratio[(b)]	45.1	50.3	4.6	50.5	43.1	6.5	47.7	46.7	5.6	45.3	47.8	6.8
Profitability[(c)]	15.7	77.6	6.7	33.4	61.0	5.6	25.1	68.8	6.1	21.1	71.0	7.9
Leverage ratio[(d)]	4.6	61.2	34.2	5.5	44.9	49.6	5.0	52.3	42.7	5.6	57.0	37.4
Indebtedness ratio[(e)]	4.1	50.0	45.9	5.2	35.3	59.5	4.6	41.6	53.8	5.0	47.4	47.6
Interest coverage ratio[(f)]	22.8	67.2	10.0	36.5	56.2	7.3	29.9	61.6	8.5	25.5	64.5	10.0

Source: Banco de Portugal. | Notes: (a) Marques and Carvalho (2021) "Assessment of the exposure of the Portuguese banking system to non-financial corporations sensitive to climate transition risks", Banco de Portugal, *Occasional Papers*. Stock of loans net of impairments. For the calculation of the quartiles of each ratio, the information provided by the 2019 IES (before the effects of the pandemic crisis) on NFCs with bank loans in December 2021 was taken into account. Excludes firms under sections K, O, T and U of the Portuguese Classification of Economic Activities (CAE) Rev.3. (b) Corresponds to the ratio of the firm's liquid financial assets (currency and bank deposits) to total assets; (c) Defined as the ratio of EBITDA (earnings before interest, taxes, depreciation and amortisation) to equity plus obtained funding. Obtained funding includes loans from financial institutions, subsidiaries and shareholders, debt securities and other funding. Equity and obtained funding are measured at book value; (d) Ratio of obtained funding to the sum of equity and obtained funding; (e) Resulting from each firm's ratio of financial debt to total assets; (f) Ratio of EBITDA to financing expenses.

Based on the credit risk classification of firms before the impact of the pandemic crisis, the stock of loans to NFCs belonging to CPRS had a higher credit risk than the total stock of loans to NFCs in December 2021, with a larger share of intermediate risk and higher risk classes (Chart B6.2). However, this is chiefly due to CPRS with an uncertain impact, while negatively affected CPRS have a larger share of the lower risk class. The impact of climate risks is likely to be amplified if firms have larger vulnerabilities at the outset. More leveraged or less liquid firms that are more affected by climate risks may contribute to a build-up of risk and to a higher probability of materialisation. The extended time horizon associated with the transition process to a low-carbon economy suggests that regular analyses of its impact on NFCs should be carried out.

Chart B6.2 • Stock of loans to NFCs by credit risk class and by CPRS | Per cent



Source: Banco de Portugal. | Notes: Stock of loans net of impairments. Credit risk, as measured by the probability of default, is based on credit ratings available in the In-house Credit Assessment System (ICAS) of Banco de Portugal. Risk classes are based on the probability of default before the impact of the pandemic crisis. Risk class 1 (lower risk) corresponds to firms with a probability of default (PD) in one year of 1% or less; risk class 2 corresponds to firms with a PD in one year of above 1% and below or equal to 5% and risk class 3 (higher risk class) corresponds to firms with a PD in one year of above 5%. Domestic activity.

II Special issues

Profitability and solvency of the Portuguese banking system in an environment of rising interest rates

Determinants of cost of equity for listed euro area banks

Profitability and solvency of the Portuguese banking system in an environment of rising interest rates

1 Introduction

Low interest rates have been identified as one of the main causes of the low profitability of the banking sector over the past few years. The current outlook for monetary policy normalization may help reverse this situation by impacting positively on Portuguese banks' net interest income, as deposit repricing is typically more subdued than that of loans. Nevertheless, higher interest rates could also lead to higher levels of impairment, by making it more difficult for debtors to meet their commitments. Moreover, higher long-term interest rates may result in depreciation of securities held with a negative impact on banks' profitability and/or own funds.

This Special issue analyses developments in the profitability and solvency of the Portuguese banking system in a context of rising interest rates, based on the topdown model developed by the Banco de Portugal. This model projects the financial position and prudential capital of a sample of banks corresponding to 85% of the Portuguese banking system's assets in December 2021. This projection considers a three-year horizon and two macroeconomic and financial scenarios.

Several studies estimate the relationship between macroeconomic and financial variables and banks' profitability. Kok et al. (2015) examine the main profitability drivers for a group of 98 European Union (EU) banks between 1994 and 2014, considering bank-specific factors, macroeconomic variables and structural factors. Their conclusion is that real GDP growth is positively and significantly related to bank profitability. An upturn in economic activity is associated with higher demand for loans and financial intermediation, with a positive impact on net interest income and fees. Furthermore, lower economic activity contributes to a deterioration in banks' asset quality and an increase in the need to recognize impairments, with a negative impact on bank profitability.

For a group of 109 major international banks having their head office in 14 advanced economies, between 1995 and 2012, Borio et al. (2017) study the link between monetary policy and bank profitability. They find evidence of a positive relationship between, on the one hand, short-term interest rates and yield curve slope and, on the other hand, bank profitability. This outcome suggests that the positive impact on net interest income overshadows the negative impact on impairment recognition for credit risk and other results, probably related to the depreciation of portfolio securities. Overall, this study suggests that very low interest rates and a flat yield curve impact negatively on bank profitability. In turn, the authors find no statistically significant relationship between GDP growth rate and bank profitability.

The IMF (2018) finds that real GDP growth and the NPL ratio are the main drivers of the largest euro area banks' profitability. It also concludes that higher short-term interest rates and a steeper yield curve do not seem to contribute to bank profitability: the steeper yield curve will contribute to higher net interest income, but higher long-term interest rates will drop the value of long-term portfolio securities. In this study, which uses data between 2007 and 2016 for 109 banks supervised by the Single Supervisory Mechanism, the effect of securities depreciation is significant, offsetting gains in net interest income. Moreover, there is a positive but not significant relationship between profitability and short-term interest rates.

Martinho et al. (2017) estimate a linear dynamic model of bank profitability for the 2000-2015 period using accounting information from 110 banks from 15 EU Member States. This study highlights a positive contemporaneous effect of GDP growth on profitability and a negative contemporaneous effect of the country risk premium, the latter factor mainly through impairments. As regards the impact of short-term interest rates, this study finds an overall positive impact on profitability, even though it is not possible to identify the transmission channels. For the Portuguese banking system, the contribution of money market interest rates and country risk premium are the main factors behind the decline in profitability over the period under analysis, particularly after 2008. The abrupt increase in impairments' recognition is another relevant factor explaining the decline in profitability, consistent with the deterioration in macroeconomic conditions after 2008.

The results of several econometric studies on this subject are not always consensual. Martinho et al. (2017) argue that the impact of interest rate changes on net interest income, for example, is a key theme in a bank's management, and different decisions will be made by different banks depending on their position and risk appetite, their structure of fixed and floating rate assets and liabilities, among other factors.

An alternative to analyse profitability and solvency developments is to consider a semi-structural model instead of a reduced form model adopted in the studies above. An advantage of semi-structural models is their capacity to capture the specificities of each bank and permit a more precise identification of the transmission channels. This approach uses satellite models where some of the major projection components are modelled. This is the approach used in the topdown model underlying this Special issue's projections.

The main transmission channels of macroeconomic projections on banks' financial statements are net interest income, credit risk, through impairment recognition, and market risk, recognizing potential capital losses on debt securities at fair value. In the topdown model, these channels are mainly affected by the macroeconomic activity projection and by interest rates.

This Special issue considers the macroeconomic and financial projections published in the Banco de Portugal's December 2021 and June 2022 *Economic Bulletins*. June projections encompass major revisions to the international environment, including an upward revision of market expectations for interest rates. The cumulative economic activity projection is similar to that in December. In this context, by comparing the results of the two scenarios it is possible to approximate the impact of the upward revision of market interest rate expectations, consistent with expected monetary policy decisions, in accordance with the macroeconomic scenarios considered.

2 Macroeconomic and financial scenario

The reference scenario for this analysis, the so-called low interest rate scenario, corresponds to the projections published by the Banco de Portugal in its December 2021 *Economic Bulletin*. On that date, the Banco de Portugal estimated, for Portugal, economic growth of 4.8% in 2021 and 5.8% in 2022, followed by a more moderate pace of expansion in 2023 and 2024, 3.1% and 2.0%, respectively (Table 1). This followed a historical fall in GDP in 2020 (-8.4%). Economic activity developments were projected to be constrained in the short term by a renewed wave of the pandemic in Europe and the reintroduction of strict containment measures, which would impact the pace of recovery, particularly in tourism-related sectors. Another factor identified as restricting economic activity developments would be global supply chain disruptions leading to shortages of raw materials and other commodities and to an increase in their prices. The economic recovery was projected to lead to a decline in the unemployment rate to below pre-pandemic levels.

Short-term interest rates would increase slightly from 2023 but remaining very low. They would reach a positive value in 2024 only. In turn, the Portuguese sovereign debt yield would reach 1.1% by the end of the projection horizon.

Table 1 • Macroeconomic and financial scenarios | In percentage and percentage points

	Economic Bulletin December 2021				*Economic Bulletin* June 2022				Comparison between Bulletins		
	2021	2022	2023	2024	2021	2022	2023	2024	2022	2023	2024
Gross Domestic Product (yoy)	4.8	5.8	3.1	2.0	4.9	6.3	2.6	2.0	0.5	-0.4	0.0
Unemployment rate	6.6	6.0	5.7	5.6	6.6	5.6	5.4	5.4	-0.5	-0.3	-0.2
Harmonized index of	0.9	1.8	1.1	1.3	0.9	5.9	2.7	2.0	4.1	1.5	0.7
3-month Euribor	-0.5	-0.5	-0.2	0.0	-0.5	0.0	1.3	1.6	0.4	1.5	1.5
10-year sovereign debt yield											
Portugal	0.4	-	-	-	0.4	-	-	-	1.5	1.6	1.6
Spain	0.5	-	-	-	0.5	-	-	-	1.5	1.5	1.5
Italy	1.0	-	-	-	1.0	-	-	-	1.7	1.8	1.7

Sources: Banco de Portugal and Eurosystem. | Notes: values in percentage except for comparative columns where figures are in percentage points. yoy: year on year rate of change. Three-month Euribor values correspond to annual average values. Sovereign debt yields correspond to average values for the last quarter of the year. Exercise assumptions based on market expectations.

The higher interest rate scenario corresponds to projections published in the June 2022 *Economic Bulletin*. GDP is projected to grow by 6.3% in 2022 and converge to rates closer to the estimated long-term growth rate in subsequent years: 2.6% in 2023 and 2.0% in 2024. The rate of change projected for 2022 results from the dynamic effect of activity developments in the preceding year, coupled with the recovery from the pandemic crisis, which continued into the beginning of this year. The carry-over effects of projection revisions will entail a lower annual growth in 2023 than previously forecast. Moreover, the worsening of the international environment, in particular due to the invasion of Ukraine by the Russian Federation, affects the Portuguese economy, which is being hit by the indirect impacts of the conflict. These impacts include heightened uncertainty, higher inflation rates and increased disruption in global production chains.

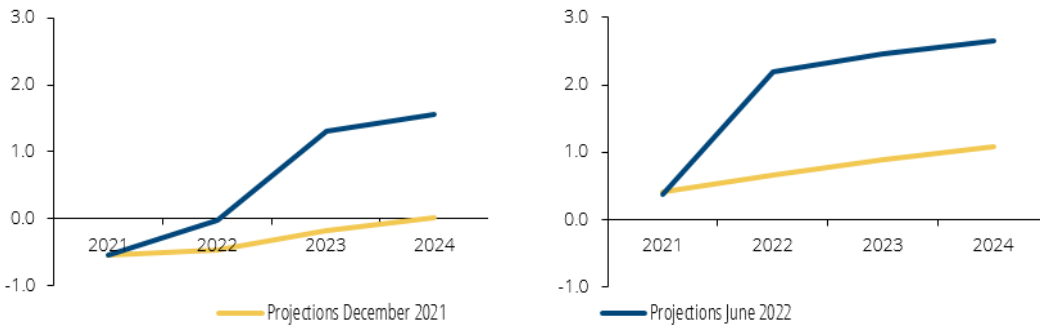
Compared to December 2021 projections, the GDP growth rate is 0.5 p.p. higher in 2022 and 0.4 p.p. lower in 2023. In cumulative terms, the projected GDP growth rate is the same in both scenarios. Inflation is expected to increase over the entire projection horizon, the difference between scenarios being 4.1 p.p. in 2022.

The assumptions for monetary and financial conditions correspond to a gradual increase in short-term interest rates in the euro area, averaging zero by 2022. Compared to December 2021 projections, short-term interest rates are therefore assumed to be two years ahead of their non-negative values. These developments are consistent with the anticipation of the normalization of the European Central Bank's (ECB) monetary policy, in a framework of upside risks for price developments.

The comparison between these two scenarios highlights the projection for short and long-term interest rates (Chart 1). In the higher interest rate scenario, the short-term interest rate becomes positive by the end of the third quarter of 2022, while in the low interest rate scenario, the interest rate would become positive, but very close to zero, in the second quarter of 2024 only. In the last projection year, this interest rate assumes values around 1.5% in the high interest rate scenario, which means an increase of around 210 basis points compared to 2021. As regards the 10-year Portuguese sovereign debt yield, a gradual increase is projected for both scenarios. The higher rate scenario includes market information for the first months of 2022, contributing to a sharp increase in the sovereign debt yield in 2022. Therefore, in that year, the Portuguese sovereign debt yield is 150 basis points higher in the higher interest rate scenario than in the low interest rate scenario. This differential is maintained over the projection horizon. The difference between the

value projected in the higher interest rate scenario for the end of 2024 and the December 2021 value is around 230 basis points.

Chart 1 • Short-term interest rate – 3-M Euribor (lhs) and Portuguese 10-year sovereign debt yield (rhs) | Per cent



Sources: Banco de Portugal and Eurosystem. | Note: Exercise assumptions based on market expectations. Three-month Euribor values correspond to annual average values. Sovereign debt yields correspond to average values for the last quarter of the year.

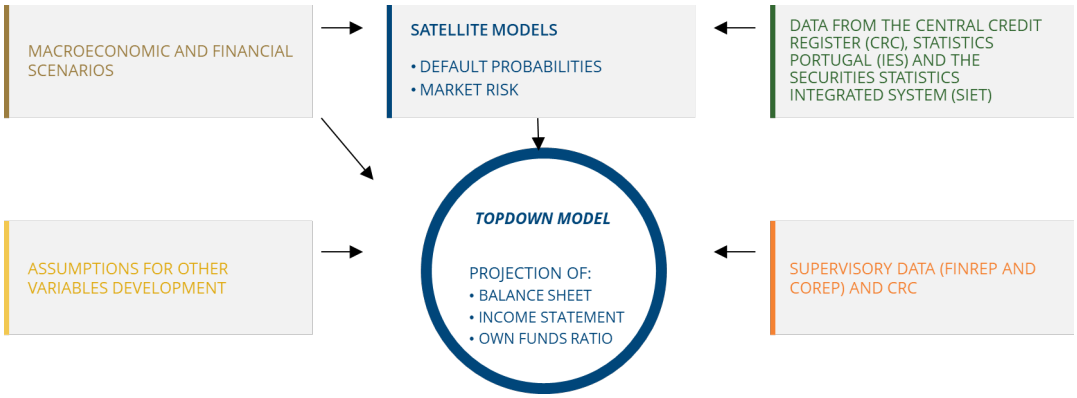
In sum, June 2022 projections correspond to a scenario where short-term and long-term interest rates are higher throughout the projection period. Although with a different profile, the GDP growth rate is, in cumulative terms, similar in both scenarios.

3 Topdown model for the Portuguese banking system

The topdown model projects developments in the financial position and prudential capital of the Portuguese banking system at a consolidated level, based on a macroeconomic and financial scenario. The main source of information for each bank's starting point stems from supervisory data (FinRep and CoRep). The model projects developments in the balance sheet, income statement and own funds until 2024, taking the position as at December 2021 as a starting point.

The macroeconomic scenario is reflected in banks' financial statements by modelling some of the variables with the greatest impact on banks' profitability and solvency, such as probabilities of default, interest rates and loans and deposit volumes (Figure 1).

Figure 1 • Topdown model



Source: Banco de Portugal.

The topdown model includes the channels that are often responsible for significant changes in Portuguese banks' financial position, namely net interest income, credit risk and market risk.

Net interest income represents the most significant part of revenues generated by the Portuguese banking system. Net interest income projection depends on the projection of volumes associated with interest payment or receipt, as well as with the associated interest rates. Note that both loans and deposits, and their interest rates, follow the macroeconomic scenario. On the deposits side, account is taken of the structure of fixed-term deposits and overnight deposits in each bank's balance sheet. The composition of deposits develops in line with the change in interest rates because, as the interest rate on fixed-term deposits increases, the weight of overnight deposits is expected to fall since their opportunity cost increases. This is relevant since interest rates paid on overnight deposits are usually close to zero and not very sensitive to the macroeconomic scenario.

The projection of interest on the debt securities portfolio held by banks takes into account the average maturity of the portfolios. The pass-through of interest rate increases to the average coupon of the portfolio is faster in banks with shorter average maturity portfolios. The debt securities portfolio is assumed to follow the increase in liquidity arising from the issuance of securities eligible for MREL. Developments in issued debt reflect banks' issuance needs to meet the applicable MREL requirements over time. The cost of issuing these securities has been calibrated given recent issuances and developments in medium-term interest rates forecast in the scenarios. As regards the issued debt not eligible for compliance with MREL requirements, it is conservatively assumed that it has a short maturity, which results in a relatively quick pass-through of the rise in yields to the average cost of this funding source.

In the current monetary policy context, this model also considers the end of TLTRO III, with possible replacement of this type of funding, at maturity, by other sources of liquidity, if required. It is assumed that excess liquidity and/or liquidity shortfalls will be offset by the use of central bank funding and/or investments. The ECB reference interest rates, used in the topdown model to project interest associated with Eurosystem operations, reflect developments in short-term interest rates.

In the credit risk analysis, the probability of default (PD) parameter is assumed to follow the underlying macroeconomic scenario and the loss given default (LGD) parameter is assumed to remain constant. The PD path determines the evolution of transition probabilities between credit stages, allowing for the determination of loan amounts per stage over time. The starting point value for transition probabilities between stages corresponds to the average value in the past three years, as reported in FinRep. Each stage amount is associated to an expected loss that also develops with PD. Expected loss changes lead to the recognition of impairments that are taken to the profit and loss account. It is assumed that once in stage 3, loans can no longer return to other stages representing a better credit quality, and that there are no write-offs.

The PD model is estimated by using data from the Central Credit Register (CCR) of the Banco de Portugal and, for non-financial corporations, also by taking into account information on the financial position of each corporation reported in the *Informação Empresarial Simplificada* (IES), with particular emphasis on return on assets, debt cost and indebtedness.

The market risk analysis estimates the impact of interest rate changes on the valuation of sovereign debt securities. The characterization of each bank's exposure to sovereign debt securities is obtained from the Banco de Portugal's Securities Statistics Integrated System. The projection of the interest rate impact considers the duration of each bank's portfolio, the percentage of the portfolio at fair value and its exposure to different geographies. It is assumed that the impact will be directly reflected in equity and not through income. Note that hedging strategies that mitigate the effects of an interest rate increase are taken into consideration.

The remaining financial items are also projected. For example, net commissions projection assumes that the average relationship over the past three years between this item and some balance sheet variables, namely loans and debt securities, remains constant. As regards operating costs, a similar assumption is made to the projection of net commissions, but only considering the

last year under review, also requiring that their value will not be reduced from the starting point of the exercise. This assumption is not applicable to banks with restructuring plans, and these plans are reflected, albeit conservatively, in the projections of the topdown model. Income from financial operations are assumed to be null, reflecting the absence of transactions with securities exploiting market opportunities.

Regulatory capital reflects projections in the financial statements. Accumulated profit in equity depends on assumptions made about dividend distribution. For this simulation, given that the aim is to compare two scenarios, it was decided to assume that earnings are 100% retained.[20]

Deductions from capital due to shortfalls in non-performing loans (NPL) against applicable requirements over the projection period are also projected, in accordance with the Addendum on NPL[21] and the Prudential Backstop.[22] The age and coverage of NPL are considered for this calculation. The positive impacts on own funds of the transitional provisions associated with the implementation of IFRS 9 (including the new dynamic component introduced with the CRR Quick Fix[23] in 2020) are also estimated, as well as those associated with the sovereign filter that enables the impact on regulatory capital of changes in the value of the sovereign debt portfolio as at 1 January 2020 to be partially neutralized. The topdown model considers the effects associated with prudential rules that foresee that own fund deductions are calculated as a function of the CET1 level, thus potentially amplifying the adverse effects of scenarios with negative impacts on banks' equity, as when CET1 decreases these deductions increase.

To calculate risk-weighted assets (RWA) it is assumed that the implicit risk weight associated with each risk segment remains the same as that reported in December 2021 by each bank. Therefore, variations in total RWA in the model are explained by variations in the value of assets and changes in their composition. RWA developments in lending to non-financial corporations are excluded insofar as, according to the model, the credit risk weight of this segment increases as government-backed loans granted to firms under support measures during the COVID-19 pandemic decrease. RWA for operational risk depend on developments in average gross operating income.

4 Simulation results

The macroeconomic scenario for June 2022 shows a historically high economic growth followed by a surge in interest rates. In the topdown model, this macroeconomic dynamic leads to an increase in the banking system's return on assets (ROA) compared to 2021, supported by growth in net interest income and a contained cost of risk at pre-pandemic levels. In turn, internal capital generation will help to accommodate the effects on solvency of market risk arising from the depreciation of government debt securities at fair value, as a result of the rise in long interest rates. The risk-weighted assets projection essentially reflects the evolution of loans granted and a lower weight of government-backed loans over the projection horizon.

The analysis of the simulation results, in terms of differences between scenarios, makes it possible to highlight the effect on the banking system's capital ratios of a higher increase in short and long-term interest rates accompanied by a similar amount for GDP cumulative growth. The effects are differentiated over time (Chart 2)

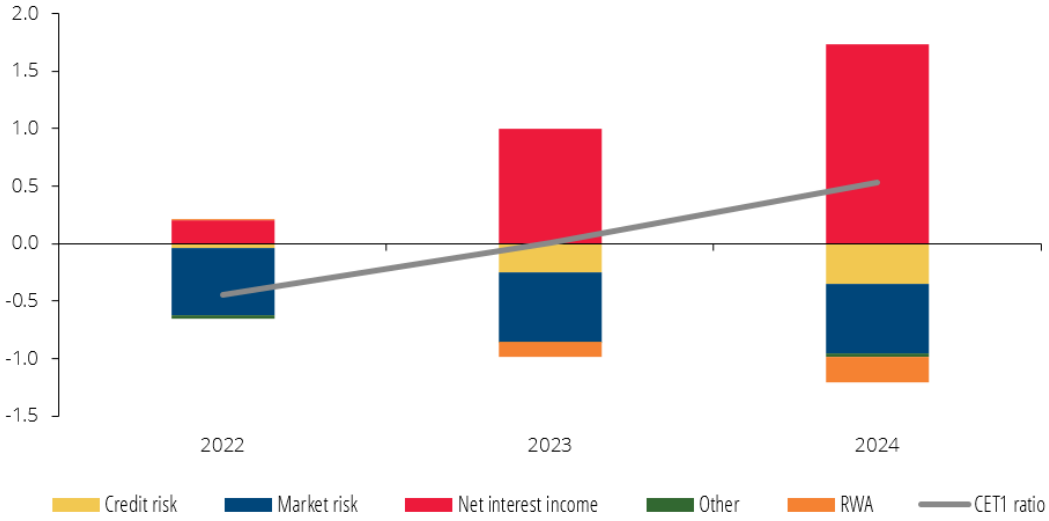
[20] Overall, assumptions on the distribution of results are calibrated by using public information. In determining the distribution rate, possible distribution restrictions arising from the application of the Maximum Distributable Amount (MDA) are considered.

[21] Communication on supervisory coverage expectations for NPEs (europa.eu).

[22] Regulation (EU) 2019/630 of the European Parliament and of the Council.

[23] Regulation (EU) 2017/2395 and Regulation (EU) 2020/873 of the European Parliament and of the Council.

Chart 2 • Difference between scenarios of the CET1 capital ratio | In percentage points



Source: Banco de Portugal. | Notes: The difference is defined by the projected CET1 ratio in the higher interest rate scenario minus the projected CET1 ratio in the low interest rate scenario, in each year. The same definition applies to the other items.

In the short term, the CET1 capital ratio is lower in the higher interest rate scenario than in the low interest rate scenario. This stems from a higher recognition of potential capital losses on sovereign debt securities at fair value that is not offset by a stronger increase in net interest income. In the higher interest rate scenario, the surge in long-term interest rates gives rise to a greater depreciation of those securities. The impact of these market developments on the banking sector depends on the duration of banks' sovereign debt portfolios and the accounting portfolio where these assets are booked, as well as the geographical distribution of the securities, to the extent that yield changes differ across countries. It also depends on the interest rate hedging strategies adopted by the banks. In 2022, this impact is still partially mitigated for banks that have adopted the so-called sovereign filter provided for in the CRR Quick Fix.

Over the medium term, the more negative impact of market risk and the increase in the recognition of impairments for credit risk is more than offset by higher net interest income.

Throughout the projection, a gradual improving profitability in the higher interest rate scenario, supported by higher net interest income generation and higher than the increase in credit risk impairments, will lead to a higher return on assets in this scenario.

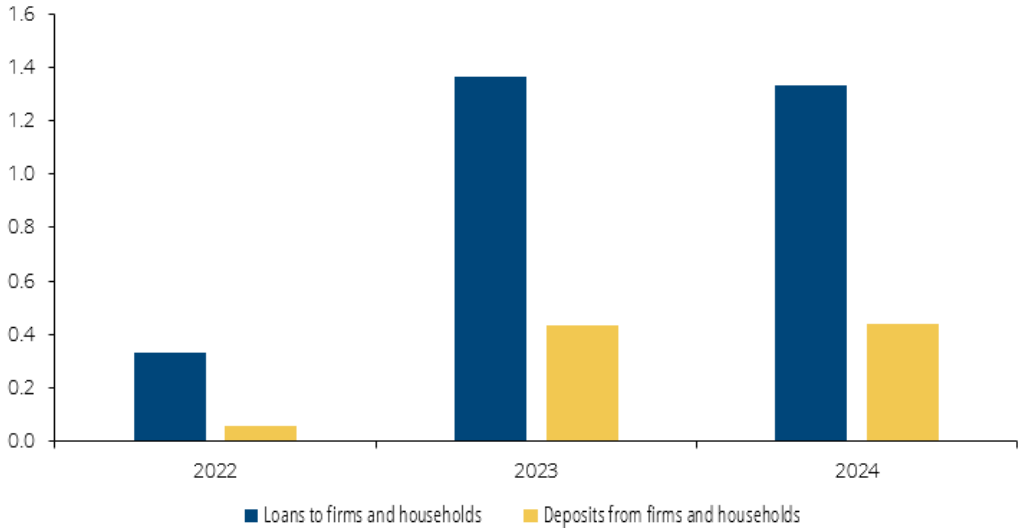
Higher risk-weighted assets, associated with a larger loan portfolio and greater exposure in default, also contribute to the relative impact of the higher interest rate scenario on the banking system's capital ratio.

The higher growth in net interest income in the higher interest rate scenario essentially reflects the evolution of interest rates in operations with customers (loans and deposits). The pass-through of money market rates to lending rates implied in banks' portfolios follows the short and long term dynamics estimated in Castro and Santos (2010), broken down by segment. In housing loans, the rise in Euribor is quickly passed through as the interest rate of a large share of these loans is Euribor-linked. In loans to firms, the speed of the pass-through is similar, also due to shorter maturities. In turn, in consumer loans, with a higher weight of fixed rate operations, the rise in Euribor is passed on to the interest rates on outstanding credit more sluggishly. Overall, in view of the weight of housing loans and loans to firms in total lending in the banking system (around 80%), the rise in Euribor has a significant and rapid impact on net interest income.

The sharper rise in money market interest rates results in a widening of the difference between interest rates on loans and deposits from operations with customers (Chart 3). This results from

the time lag in the pass-through of changes in these rates to interest rates on outstanding amounts of operations with customers, as the speed of adjustment is slower for deposits than for loans: in general, the average interest rate fixing period is longer for the former. In addition to the above for the loan portfolio, overnight deposits remuneration is very low (or even zero) and does not react to changes in money market interest rates. This effect is all the stronger the greater the weight of these deposits in the financing structure. The very low interest rate environment has resulted in a greater weight of overnight deposits in the Portuguese banking system, by reducing the opportunity cost of holding them. However, in line with the increase in the remuneration of fixed-term deposits and the consequent rise in the opportunity cost of holding overnight deposits, the weight of fixed-term deposits in total deposits is projected to increase.

Chart 3 • Difference between scenarios of interest rates on loans and deposits from operations with customers | In percentage points



Source: Banco de Portugal. | Notes: The difference is defined by the average interest rate on loans to firms and households projected in the scenario with higher interest rates minus the average interest rate on loans to firms and households projected in the scenario with low interest rates, in each year. The difference in the average interest rate on deposits from firms and households is defined in the same way. It considers fixed-term deposits and overnight deposits.

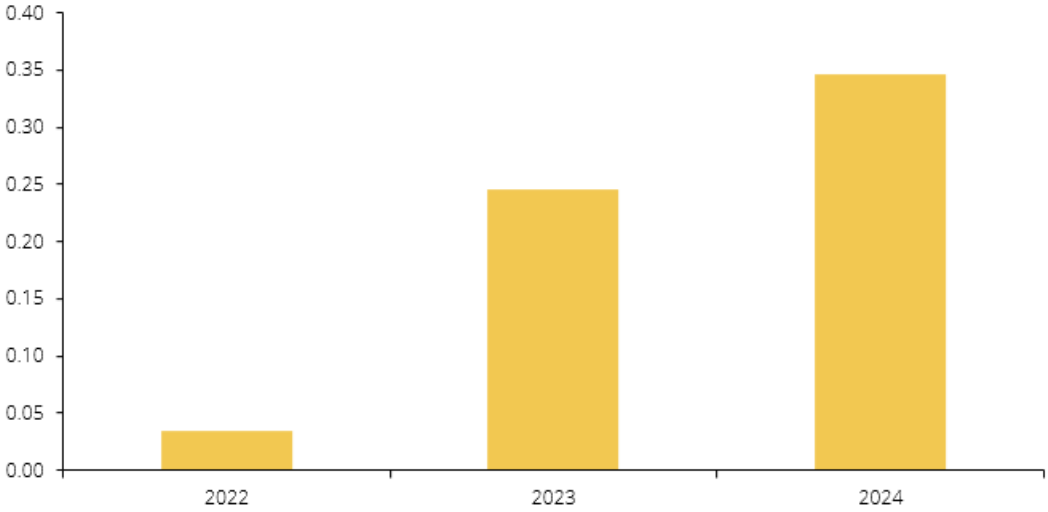
The widening of the difference between interest rates on loans and deposits from operations with customers has already been observed in the Portuguese banking system between 2005 and 2007, in a context of rising money market interest rates (*Financial Stability Report*, June 2017). In that time, another positive effect on net interest income resulted from the positive difference between the volume of loans and the volume of deposits, which helped to amplify the price effect. This amplifying effect no longer exists as the loan-to-deposit ratio has fallen significantly and is below one. Nonetheless, the contribution of net interest income from customers to return on assets over the projection period is higher (0.4 p.p.) in the higher interest rates scenario.

The other net interest income components hardly contribute to explaining the increase in net interest income between scenarios. In particular in the securities component, considering the difference in weight of debt securities held and issued in the balance sheet, the difference between interest rates and rollover assumptions for these securities, the impact on net interest income is very subdued over this projection horizon.

Under the higher interest rate scenario, the sharpest rise in short-term interest rates, with cumulative GDP growth remaining the same, negatively affects banks' profitability due to a higher recognition of impairments for credit risk (Chart 4). This scenario will lead to more events of default and an increase in the expected loss on loans to customers compared to the other scenario. The

increase in the probability of default essentially reflects the highest rise in interest rates. Although the probabilities of default are higher in the higher interest rate scenario, they remain low.

Chart 4 • Difference between scenarios of the accumulated impairment flow | As a percentage of risk-weighted assets



Source: Banco de Portugal. | Note: The difference is set by the value of loan impairments for firms and households projected in the higher interest rate scenario minus the same value of impairments projected in the low interest rate scenario, accumulated over the projection years.

5 Conclusions

The consideration of the macroeconomic and financial scenarios published in the December 2021 and June 2022 *Economic Bulletin*s of the Banco de Portugal allows to approximate the impact of the upward revision on market interest rate expectations, interacting with the economic activity, on the profitability and solvency of a sample of banks representing 85% of the Portuguese banking system assets as at December 2021.

The outcome of the simulations using the topdown model allows to conclude that a sharper increase in short and long term interest rates, maintaining the same accumulated economic growth, will enhance net interest income and increase loan impairment recognition and potential capital losses arising from the depreciation of government debt securities at fair value.

In the short term, the CET1 capital ratio is lower under the higher interest rate scenario. This outcome results from a higher recognition of potential capital losses on sovereign debt securities held at fair value, which is not offset by higher net interest income. In the medium term, the most negative market risk impact and the increased recognition of impairments for credit risk will be offset by greater accumulation of results through net interest income. In a three-year horizon, the net effect on the capital ratio in the higher interest rate scenario is positive as the positive effect on net interest income more than offsets the negative effect of market and credit risks materialization.

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Determinants of cost of equity for listed euro area banks

1 Introduction

A higher weight of equity in banks' financing structure promotes the banking sector's capacity to absorb negative shocks arising from adverse financial and economic conditions. However, this financing tends to be more costly than financing through debt issuance. Shareholders require an additional payout that takes into account uncertainty about future dividend flows and stock market valuations. The cost of equity (COE) can be seen as the annual compensation an investor expects to receive for holding shares in a bank.

Understanding the factors that determine the cost for banks to increase their equity is crucial for micro and macro-prudential supervisors of the financial system, as high equity costs relative to expected profitability can threaten financial stability. COE is therefore a particularly relevant concept in the context of low profitability of the European banking business in the past few years.

Banks that are unable to generate profits that at least equate their cost of equity may have greater incentives to take on excessive risks – with higher potential returns – and are more vulnerable to liquidity problems. If this happens, contagion risk among banks may arise due to existing interlinkages that emerge, for example, from their participation in interbank markets.

Institutions with profitability below COE could also reduce their banking business to mitigate regulatory capital requirements and avoid a new capital call that would have little chance of success. Such a reduction would cause a contraction in credit supply to the real economy.

Unlike bank profitability, which can be measured by observable indicators such as Return on Assets (ROA) or Return on Equity (ROE), the COE cannot be observed and must be estimated. However, there is no consensus in the literature on how to best obtain estimates of this latent and subjective concept, contingent on investor's expectations and risk tolerance.

This Special issue summarises the methodology and main results of Zsurkis (2022), with a two-fold aim. First, to estimate the cost of equity of listed euro area banks relying on factor models that use market data only. Here, to contribute to the literature by introducing two alternative risk factors: banking sector risk and country risk. The motivation for considering this option lies in the evidence already reported that the most commonly used factor models find it difficult to reproduce the variability of returns in the financial sector and also the differences in returns across countries. The estimation of the coefficients that measure the sensitivity of returns to risk factors is based on two methodologies that consider the possibility that these parameters are variable over time: rolling regressions and the Dynamic Conditional Beta approach proposed by Engle (2002, 2016). Five factor models already used in the literature have been estimated, as well as the specification proposed in this Special issue, which contains three risk factors: market, banking sector and country. It was concluded that the latter specification adds the best explanatory power to reproduce changes in the COE of each of the banks considered.

Second, we intend to infer the relationship of the estimated COE per bank with profitability proxies, other banking indicators and macro and financial variables, such as proxies of the economic and financial cycle, sovereign debt interest rates and market interest rates. To this end, the system of equation approach proposed by Zellner and Theil (1962) was used. This option allows dealing with the problems of endogeneity and persistence of explanatory variables that, when ignored, may bias estimates.

2 Cost of Equity estimation

2.1 Data

Firstly, all listed banks in the euro area with market capitalization equal to or higher than one billion euro were identified. After applying some filters related to the existence of missing values and the availability of banks' balance sheet data, income statement and capital ratios, the final sample includes 28 banks from 8 countries for the period 2012-2020. Table 1 shows the distribution of banks by country and their representativeness by national banking system in accordance with their assets.

Table 1 • Descriptive statistics by country of the banks under analysis

	DE	ES	FI	FR	GR	IT	NL	PT
Banks	3	6	1	3	2	10	2	1
Weight in the domestic banking sector measured as a % of total assets (2020)	26	80	66	70	47	80	51	21

Sources: Banco de Portugal and Refinitiv. | Note: DE, ES, FI, FR GR, IT, NL and PT refer respectively to Germany, Spain, Finland, France, Greece, Italy, Netherlands and Portugal.

2.2 Methodology

The cost of equity is estimated by using the multiple risk factor models introduced by Sharpe (1964) and Fama and French (1993). Therefore, the functional form is considered to be

$$R_{i,t} = \alpha_i + \beta'_{i,t} f_t + \varepsilon_{i,t}, \quad (1)$$

where f_t represents the vector with proxies for each of the risk factors, $\beta'_{i,t}$ the vector with sensitivities to risk factors that vary over time, and $R_{i,t}$ is the excess return over the i bank's risk-free interest rate for quarter t. The COE is obtained through the expression

$$COE_{i,t} := \beta'_{i,t} \lambda + rf_t \ , \quad (2)$$

where λ represents the constant risk premium vector associated with risk factors and rf_t is the risk-free interest rate.

Table 2 presents estimates for premia associated with market, banking sector and country risks. The risk premium of the banking sector is 1.55 p.p. higher than the market risk premium. As for the country risk premium, it is well above the market for countries like Greece, followed by Portugal, Italy and Spain.

Table 2 • Estimated risk premia | In percentage points

	Market	Banks	Country							
			DE	ES	FI	FR	GR	IT	NL	PT
λ	5.45	1.55	-	1.17	0.00	0.27	8.36	1.54	0.06	2.55

Source: Banco de Portugal estimates. | Note: Market, Banking and Country refer to market, banking sector and country risks respectively.

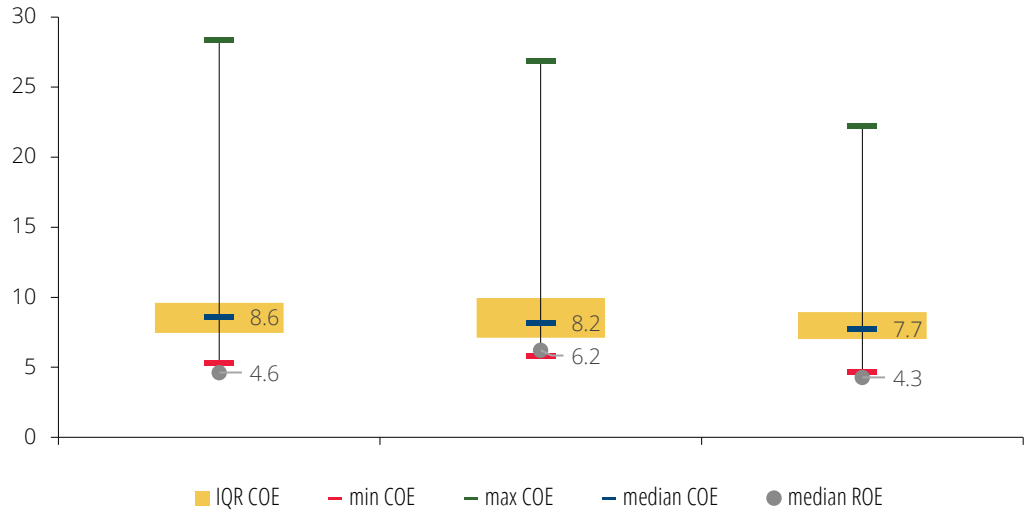
2.3 Selected Cost of Equity time series

The analysis of the predictive ability of the various factor models considered (see Zsurkis, 2022) allows us to conclude that the proposed specification – with market, banking sector and country

risk factors – estimated using the Dynamic Conditional Beta methodology, is the one that best reproduces variations in returns and provides more consistent estimates of the COE for each of the banks considered.

Chart 1 shows the distribution of COE estimates for the 28 banks considered. By comparing 2020 with 2012 and 2016, the figures are more concentrated around the mean. The ROE mean remained systematically below that of the COE.

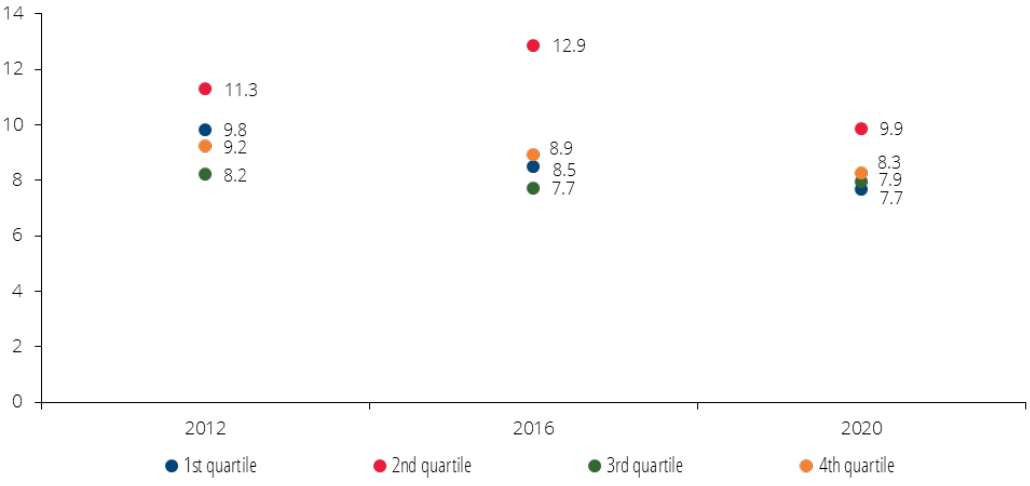
Chart 1 • Dispersion of the COE estimates and the median of the ROE | In percentage points



Sources: Banco de Portugal estimates based on data from Bloomberg and Refinitiv. | Notes: IQR COE, min COE, max COE and median COE refer, respectively to the interquartile range, minimum, median and maximum of the banks' COE by year. A simple average was used to aggregate estimates from a quarterly frequency to an annual frequency; ROE refers to the normalized ROE series provided by Bloomberg, which is calculated based on accounting information.

Chart 2 presents COE estimates by quartile of total assets distribution. The interpretation of this chart seems to rule out the existence of a linear relationship between the size of the bank and its COE, since it is the banks in the second quartile that are facing higher costs of equity in the sample under analysis.

Chart 2 • COE estimates by quartile of total assets | In percentage points



Source: Banco de Portugal estimates based on data from Refinitiv. | Note: Simple annual mean by quartile of total assets distribution.

3 Cost of equity determinants

3.1 Data

Note that COE estimates for each of the 28 banks were based on market information only. In an efficient market, prices reflect reasonable expectations from all participants, considering all relevant information. Therefore, the returns of a listed bank and their sensitivity to risk factors should reflect, for instance, the economic environment of the countries where it operates and the quality of its financial indicators. To simplify the analysis, only indicators referring to the country where the bank's main business is carried out were considered. This option would make it difficult to identify the impact of domestic macro and financial variables on COE if most of banks in the sample had their activity spread across several countries, which is not the case for the sample considered. After some preliminary analyses, the most limited and significant set of variables is the following:

I. OIS_3M – proxy of the euro area 3-month risk-free interest rate (3M euro overnight index swap; source: Refinitiv);

II. GOV – interest rate on 10-year government bonds, as a proxy for sovereign risk (source: OECD);

III. $spread\_GDP$ – the difference between the country's year-on-year GDP growth and the euro area's year-on-year GDP growth, as a proxy for the business cycle (source: OECD);

IV. $credit\_GDP\_gr$ – credit/GDP ratio growth over the previous quarter (in percentage points), an indicator related to the financial cycle (source: BIS);

V. NPL – NPF ratio over total loans (source: Bloomberg);

VI. ROA – return on bank assets (source: Bloomberg);

VII. $Tier\ 1$– Tier 1 capital ratio (source: Bloomberg).

3.2 Methodology

A specific-to-general modelling approach was considered, which consists in starting with a more restricted system of equations and by adding variables and equations provided that statistical significance justifies it. These successive extensions to the initial more restricted system can provide relevant information about the stability of the estimates and also about the additional explanatory power that a certain subset of variables allows to be obtained.

The first, less complex system considers an equation for the COE, another for the euro area 3-month risk-free interest rate (OIS_3M) and a third one for the 10-year government bond interest rate (GOV). Then, a system of equations is estimated by including two more variables: $spread\_GDP_{i,t}$ and $credit\_GDP\_gr$. These four regressors were considered to be exogenous in the COE equation. Lastly, a more general system of equations is estimated, which adds the three variables bank by bank: NPL, ROA and $Tier\ 1$. I.e. this system is composed of eight regressions, the first for the COE and the others for each of the explanatory variables considered. Only the COE equation is presented, the system of equations being available in Zsurkis (2022):

$$COE_{i,t} = \alpha' TD_t + \zeta' BD_t + \kappa' CD_j + \delta_1 OIS\_3M_{i,t} + \delta_2 GOV_{i,t} + \delta_3 spread\_GDP_{i,t} + \delta_4 credit\_GDP\_gr_{i,t} + \theta_1 ROA_{i,t} + \theta_2 Tier1_{i,t} + \theta_3 NPL_{i,t} + \varepsilon_{i,t}\ , \quad (3)$$

where $COE_{i,t}$ is the cost of equity of bank i in the quarter t; TD is a matrix with time dummies that has associated the parameter vector α; BD is a matrix with bank dummies that has associated the parameter vector ζ and intends to capture the fixed effects; CD is a matrix with country dummies and κ the corresponding parameter vector; OIS_3M, GOV, $spread\_GDP$, $credit\_GDP\_gr$, NPL,ROA and $Tier\ 1$ and have already been defined in 3.1.

For the most general system of equations some robustness analyses were carried out: (i) the system was estimated for several subsamples; (ii) some banking variables were removed and/or replaced by other relevant ones; and (iii) the autocorrelation in the system was analyzed in greater detail. Overall, results proved robust to these analyses.

3.3 Results

Table 3 shows the estimates obtained for COE regression considering various specifications.

Banks' cost of equity or COE tends to be inversely associated with the three-month risk-free interest rate (OIS_3M). However, this relationship may be indirect, as some studies point to a positive relationship between short-term interest rates and net interest income. Therefore, an increase in short-term interest rates will have a positive effect on profitability, which will decrease the risk associated with a bank's equity investment and hence the cost of its equity. There is also a positive relationship between COE and the interest rate on 10-year government bonds, which may explain a temporarily higher COE for banks in the countries most affected by the sovereign debt crisis.

Regarding the variables related to economic and financial cycles, $spread\_GDP$ and $credit\_GDP\_gr$, the statistical significance is less strong when lags of the dependent variable are considered, aiming to avoid residual autocorrelation. Still, COE is lower in countries where output growth is above the euro area average (positive $spread\_GDP$). The credit/output ratio growth ($credit\_GDP\_gr$), also contributes to a decrease in COE. This is not a consensual result since expansions in the financial cycle are associated with systemic crises in the banking sector (Borio, 2012). Therefore, a positive rather than negative relationship between $credit\_GDP\_gr$ and COE would be expected. The analysis of the credit/output ratio series for 2012-2020 unveils a strong downward trend only to be reversed at the end of the sample. Therefore the sign of the estimated coefficient associated with $credit\_GDP\_gr$ may be due to the fact that this trend reversal at the end of the sample coincides with an overall decrease in COE.

The explanatory bank-specific variables also play a major role in COE changes. Coefficients associated with ROA and $Tier\ 1$ are negative, suggesting that increases in these variables reduce COE, probably by lowering the investor's risk perception. Moreover, a higher NPL ratio will be reflected in higher COE. These results are in line with those obtained, for example, by Altavilla et al. (2021) and Belkhir et al. (2021). For these banking indicators, the inclusion of lags of the dependent variable is reflected in the magnitude of estimated coefficients (they are smaller in absolute values) but does not change the previous conclusions. As regards estimates by subsamples, the only exception is the statistical insignificance of NPL when only information from 2014 is considered.

Table 3 • Estimated parameters for the COE's equation

	(1)	(2)	(3)	(4)	(5)	(6)
$COE_{i\,t-1}$		0.678***		0.677***		0.630***
$COE_{i\,t-2}$		-0.156***		-0.159***		-0.199***
$OIS\_3M_{i\,t}$	-1.790***	-1.162**	-1.762***	-1.125***	-3.153***	-2.024***
$GOV_{i\,t}$	0.596***	0.363***	0.499***	0.308***	0.481***	0.338***
$spread\_GDP_{i\,t}$			-0.185**	-0.132**	-0.223***	-0.140**
$credit\_GD\_gr_{i\,t}$			-0.141***	-0.074**	-0.131***	-0.067**
$NPL_{i\,t}$					0.059***	0.038**
$ROA_{i\,t}$					-0.873***	-0.418***
$Tier1_{i,t}$					-0.136***	-0.079***
Obs.	893	893	893	893	893	893
R^2	0.758	0.839	0.759	0.839	0.783	0.850

Source: Banco de Portugal estimates. | Notes: * ,** and *** refer to significance levels of 10%, 5% and 1% respectively. Time dummies, by country and by bank, are not shown. Time dummies are usually not statistically significant. Only the dummy for Greece and seven bank dummies are statistically significant.

4 Conclusions

The findings confirm the importance of some macroeconomic and financial variables in explaining variations in the perceived risk or cost of equity associated with banks in a given country. Banks operating in countries growing faster than the euro area will tend to benefit from lower COE levels. As for the bank-specific indicators, variables such as the ROA, $Tier\ 1$ and the NPL ratio explain part of the differences between COE of different banks**.** The dynamics of these variables and of the COE itself seem, in turn, to be strongly influenced by ECB interest rates and the interest rates on each country's government bonds.

Finally, it also should be noted that the Special issue "Portuguese banking system's profitability and solvency in a context of rising interest rates" uses the semi-structural topdown methodology and concludes, for the Portuguese banking system, that an increase in short and long-term interest rates will improve net interest income. However, the outcome of the simulations also points to a negative effect of the increase in interest rates on credit and market risk which, although it may contribute to some deterioration in capital ratios in the short term, is more than offset by the increase in net interest income in the medium term. Therefore, the results of the two Special issues in this report suggest that a rising interest rate environment, by triggering an increase in profitability followed by a decrease in the cost of equity, may be positive for the sustainability of Portuguese banks' business model.

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