FINANCIAL STABILITY REPORT

Assessment of risks and vulnerabilities in the financial system

JUNE 2024

BANQUE DE FRANCE
EUROSYSTÈME

CONTENTS

Overview

The strong resilience of the French and European financial systems during the period of monetary tightening, coupled with the continued decline in inflation observed since December, have increased the likelihood of a "soft landing" for the French and European economies. Against this backdrop, our perception of the risks attached to the French financial system remains stable versus December 2023, although we cannot rule out a deterioration in the macroeconomic or geopolitical environment.

The European Central Bank (ECB) lowered its three key rates by 25 basis points on 6 June, and the pass-through of past rate hikes to non-financial sector loan rates now appears to be complete. Regarding the credit channel of monetary policy transmission, flows of new loans to the non-financial sector appear relatively stable, and outstanding loans are also stabilising, although loan volumes are primarily determined by demand which means that the pass-through of monetary policy to volumes is slower than it is to rates.

Past interest rate hikes are continuing to be passed through to non-financial corporation (NFC) balance sheets. French NFCs' average cost of debt tends to be relatively sticky as they mainly borrow at fixed rates, which delays the transmission of past rate hikes to their financial situation. However, compared to their Eurosystem peers, who carry a higher share of floating-rate debt, they will also be slower to benefit from any further rate cuts in 2024 and 2025.

As with any period of uncertainty, the upheaval of the French electoral calendar in June 2024 opened a period of market volatility, affecting French sovereign debt yields and stock market valuations (especially those of financial intermediaries). Owing to the cut-off date for the finalisation of this report, it does not provide an analysis of these recent developments.

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Vulnerabilities remain significant for those non-financial agents most exposed to higher interest rates, but the real estate market adjustment is proving orderly

Risks to NFCs are continuing to rise. The number of corporate bankruptcies is continuing to rise and is nearing its long-term trend, although figures vary according to business size and sector of activity. A special chapter in the report focuses on the financial situation of large companies in the face of higher interest rates. Their debt service ratio had already increased in 2023 and should rise even further in 2024 as they gradually refinance their outstanding debt at higher rates. However, this vulnerability is offset by high cash levels, although individual situations are highly heterogeneous.

The marked rise in interest rates since July 2022 has also put pressure on the residential and commercial real estate sectors. Price falls in the residential real estate market, which accounts for the bulk of banks' real estate exposure, have now become significant. However, the sector is showing signs of improvement and poses limited risks to financial stability, owing to the prevailing household debt structure and macroprudential standards. The correction in the commercial real estate market is proving more substantial and may be linked to structural factors. Nonetheless, the risks posed by the segment remain contained as banks and insurers have limited direct exposure and investment funds have put in place liquidity management tools.

Sovereign risk remains a focus of concern for France in a challenging fiscal environment. The announcement of a widening of the budget deficit and of Standard & Poor's downgrade of France's credit rating did not immediately trigger a significant reaction in spreads or sovereign credit default swaps (CDS). However, the environment of uncertainty poses a higher risk to French debt yields – as demonstrated by the recent widening of the OAT-Bund spread.

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Despite the deteriorated geopolitical environment and an uncertain political and macroeconomic context, the high levels of equity market valuations reflect solid corporate results, while risk aversion in bond markets has declined

Risk premia remain very low while the valuations of the main stock market indices stand at historically high levels. However, in France as well as other countries, these valuations still appear to be driven by a limited number of sectors (tech and luxury in France). The current rise in valuations for the US technology sector, driven by optimistic expectations for artificial intelligence, has all the appearances of being a speculative phenomenon; yet an orderly correction is unlikely to pose any real risk to financial stability, especially if it is concentrated on a few stocks. Elsewhere, valuation indicators for French NFC stocks appear consistent with the excellent results posted in 2023, which were boosted by high profit margins in an inflationary environment.

Consequently, there is still a risk of a disorderly adjustment in valuations, in part due to geopolitical risks and the threat of a macroeconomic deterioration. Geopolitical risks remain high, but, as of June 2024, have not led to heightened volatility, either in commodity or global equity markets. However, new geopolitical shocks could trigger an abrupt rise in risk premia, along with supply chain disruptions and disorderly stock market corrections for those firms most exposed.

Corporate market funding is benefiting from a decline in corporate credit risk aversion among market participants. In particular, corporate credit spreads (between high yield and investment grade bonds) have narrowed, confirming investors' appetite for NFC debt securities. However, this spread compression essentially concerns lower risk tranches.

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Banks and insurers have confirmed their resilience in the face of rising funding costs and non-financial sector risks

Monetary policy tightening in the euro area has not led to a reduction in French banks' balance sheets – in fact they have expanded slightly over the past two years, in contrast with those of their Eurosystem peers which have shrunk slightly over the same period. New lending by French banks has continued to rise, albeit at a slower pace, financed by higher deposits and by the issuance of debt securities to replace ECB refinancing operations (TLTROs). Despite favourable financing conditions, however, the interest banks pay on their liabilities has risen faster than that earned on their assets, which in part explains the decline in their net interest margins. The specific features of the French financing model have also played a role: as the majority of lending is at fixed rates, the interest banks earn on their assets depends on the speed of loan renewal.

French banks' liquidity and solvency ratios remain well above regulatory requirements, and are higher than in 2023. The average liquidity coverage ratio (LCR) rose to 147% in 2023, well above the regulatory threshold of 100%, helped by the issuance of debt securities. French banks have a diversified financing structure and investor base. The average Common Equity Tier 1 (CET1) ratio also stands above the regulatory requirement.

The cost of risk remains limited, although there has been a slight deterioration in overall asset quality, notably due to a rise in the non-performing loan ratio on corporate lending. However, the outstanding amount of non-performing loans remains low. French banks' exposure to commercial real estate remains contained and is primarily domestic. Their exposure to leveraged loans also appears to be limited and has declined. Finally, the structure of lending for house purchases in France helps to limit the associated risks for banks.

French insurers confirmed their robust solvency levels in 2023, although there is still some heterogeneity across the sector. Insurers' average solvency capital coverage ratio remains above regulatory requirements, but declined slightly over 2023 (256% in the first half of 2023 compared with 250% in the second half), mainly as a result of bank-insurers and non-life undertakings. The returns on their investment portfolios are also improving, and unrealised capital losses appear to be more limited. Higher interest rates have allowed their bond portfolios to yield higher income. Against this backdrop, we have also observed an increase in revaluation rates on individual life insurance contracts, with returns rising to 2.6% in 2023 from 2% in 2022. Finally, the rise in rates has triggered limited numbers of policy redemptions. The life insurance segment has been supported by positive net inflows into unit-linked products.

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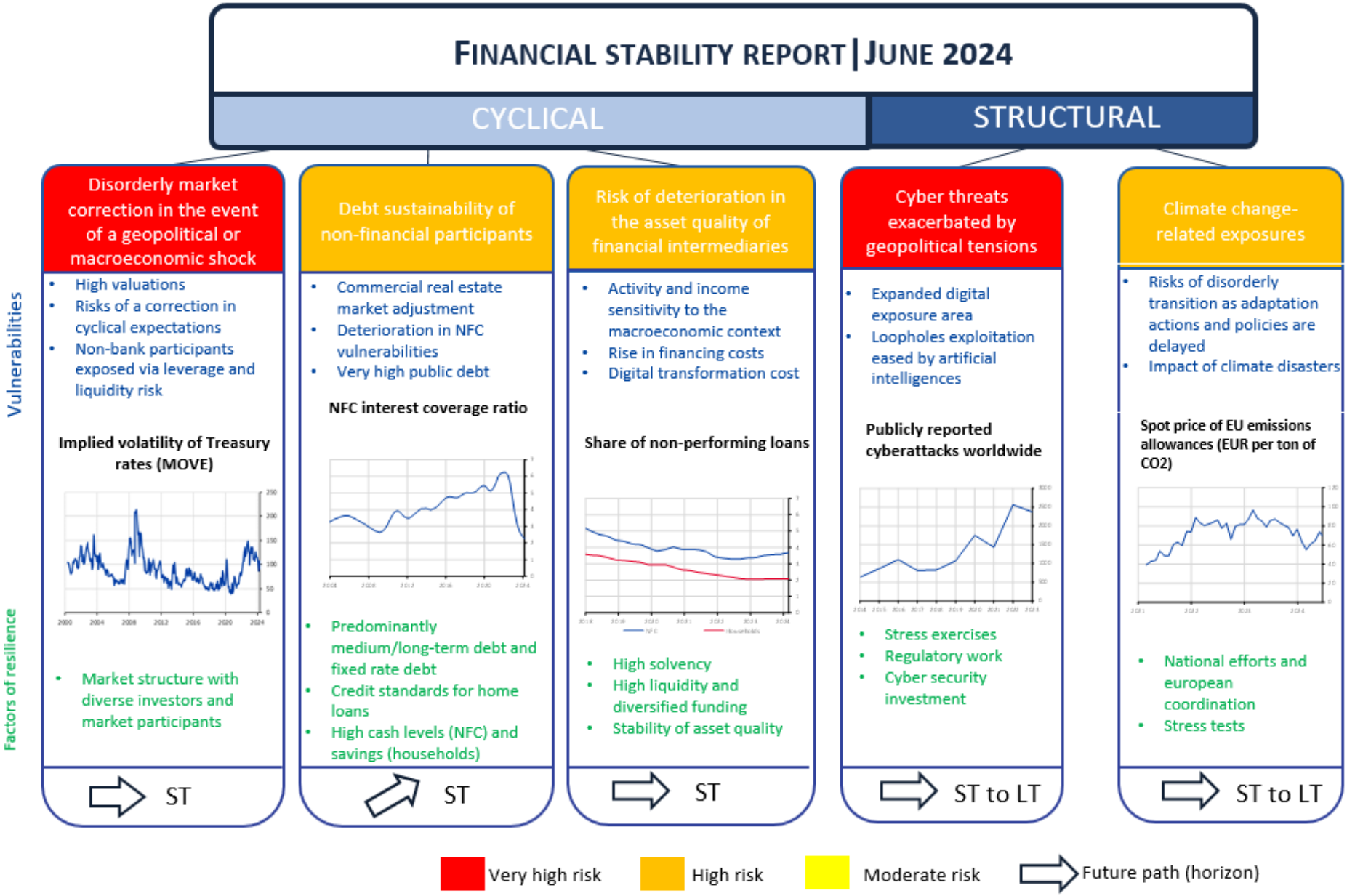
Cyber and climate risks remain key financial stability issues

The number and share of cyberattacks targeting the financial sector are rising, increasing the risk that a financial institution might suffer tail losses. Generative artificial intelligence can be used to create increasingly complex and hard to detect attacks, making cyberthreats the top risk globally for businesses in 2024. At the European level, the entry into application of the Digital Operational Resilience Act (DORA Regulation) in January 2025 should help to increase firms' resilience. A special chapter in this report looks in depth at the potential benefits and risks of artificial intelligence (AI) for financial stability. In addition to cyber risks, depending on how it is deployed, AI could increase financial market volatility and procyclicality and generate a risk of concentration of market participants.

As climate risks continue to rise, the Intergovernmental Panel on Climate Change (IPCC) has highlighted the growing vulnerability of populations and ecosystems to global warming. Physical risks (such as natural disasters or extreme temperatures) are on the rise. Supervisors are therefore monitoring financial institutions' ability to withstand these risks and incorporate them into their risk management strategy. At the level of the financial system as a whole, dedicated stress tests are carried out to estimate the banking and insurance sectors' exposure to climate risks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CYCLICAL
STRUCTURAL
Vulnerabilities
Factors of resilience
Disorderly market correction in the event of a geopolitical or macroeconomic shock
High valuations
Risks of a correction in cyclical expectations
Non-bank participants exposed via leverage and liquidity risk
Implied volatility of Treasury rates (MOVE)
Market structure with diverse investors and market participants
ST
Debt sustainability of non-financial participants
Commercial real estate market adjustment
Deterioration in NFC vulnerabilities
Very high public debt
NFC interest coverage ratio
Predominantly medium/long-term debt and fixed rate debt
Credit standards for home loans
High cash levels (NFC) and savings (households)
ST
Risk of deterioration in the asset quality of financial intermediaries
Activity and income sensitivity to the macroeconomic context
Rise in financing costs
Digital transformation cost
Share of non-performing loans
High solvency
High liquidity and diversified funding
Stability of asset quality
ST
Cyber threats exacerbated by geopolitical tensions
Expanded digital exposure area
Loopholes exploitation eased by artificial intelligences
Publicly reported cyberattacks worldwide
Stress exercises
Regulatory work
Cyber security investment
ST to LT
Climate change-related exposures
Risks of disorderly transition as adaptation actions and policies are delayed
Impact of climate disasters
Spot price of EU emissions allowances (EUR per ton of CO2)
National efforts and european coordination
Stress tests
ST to LT
Very high risk
High risk
Moderate risk
Future path (horizon)

Measures taken by the public authorities

On 6 June 2024, the Governing Council of the European Central Bank (ECB) voted to reduce the three principal interest rates by 25 basis points. Consequently, the deposit facility rate, the main refinancing operation rate and the marginal lending rate have been reduced to 3.75%, 4.25% and 4.50% respectively. In light of an updated assessment of the inflation outlook, the dynamics of underlying inflation and the strength of monetary policy transmission, the Council deems that it is now appropriate to soften the degree of monetary policy restriction. Furthermore, the Council reaffirmed its commitment to ensuring that inflation returns to its 2% medium-term target in a timely manner. It also stated that it would maintain policy rates at a sufficiently restrictive level for as long as necessary to achieve this objective. The approach to determining the appropriate level and duration of restriction will continue to be data-dependent and meeting-by-meeting.

In addition, since 1 March 2023, the Eurosystem has been reducing its asset purchase programme (APP) portfolio at a measured and predictable pace. Additionally, since July 2023, the Eurosystem has stopped reinvesting the full principal payments from maturing securities. In regard to the Pandemic Emergency Purchase Programme (PEPP), the Governing Council has announced its intention to reduce the portfolio by an average of EUR 7.5 billion per month over the second half of 2024, while maintaining flexibility in its reinvestments. It intends to have completed reinvestments under the PEPP by the end of 2024.

Besides, on 13 March 2024, the Governing Council announced[1] a series of changes to the operational framework for implementing monetary policy. The revision confirms the steering of short-term money market rates through the adjustment of the deposit facility rate (DFR) and the provision of abundant liquidity by the Eurosystem using a broad range of instruments. One of the most significant alterations is the reduction in the spread between the main refinancing operation (MRO) rate and the DFR from 50 to 15 basis points, which will take effect on 18 September 2024.

In regard to French macroprudential policy, the primary measures remained in place during the first half of 2024. The increase in the credit protection reserve rate[2] (countercyclical capital buffer – CCyB) from 0.5% to 1%, which was announced in December 2022,[3] came into effect on 2 January 2024. The sector-specific systemic risk buffer (sSyRB) which came into force on 1 August 2023,[4] remains in place. The measure requires systemically important French banks to maintain a buffer amounting to 3% of their exposures to heavily indebted French companies,[5] should such exposures exceed 5% of their Tier 1 capital.[6] In the context of residential real estate, the prevailing standard for housing credit [7] remains in effect, and the three technical adjustments, as decided by the *Haut Conseil de Stabilité Financière* (HCSF – High Council for Financial Stability) at its meeting of 4 December 2023[8], came into force on 1 January 2024.

At the European level, the banking sector has been reinforced by the implementation in April 2024 of the "banking package",[9] which incorporates the Basel III accord into European Union legislation. The principal provisions of the package regulation are scheduled to come into force on 1 January 2025, while those of the directive are to take effect on 1 January 2026. Additionally, the banking package enhances[10] European

[1] Changes to the operational framework for implementing monetary policy (europa.eu).
[2] CCyB notice – December 2023.
[3] HCSF press release of 13 December 2022 and Decision No. D-HCSF-2022-06.
[4] HCSF press release of 31 July 2023 and Decision No. D-HCSF-2023-3.
[5] In other words, those whose total debt-to-EBITDA ratio at the highest level of consolidation is strictly higher than 6 or negative.
[6] See explanatory note: sSyRB adoption procedures - August 2023.
[7] Decision No. D-HCSF-2021-7.
[8] HCSF press release of 4 December 2023 and Decision No. D-HCSF-2023-6.
[9] European Parliament plenary debate on the banking package – European Commission, April 2024.
[10] For further details of the measure, see: The banking package and its challenges – ACPR March 2024

supervisory harmonisation and facilitates more effective identification emerging risks, including those associated with climate change and crypto-assets. Furthermore, reforms to the crisis management and deposit guarantee frameworks are ongoing. At the end of April 2024,[11] the European Parliament adopted an amended version of the Commission's proposal to extend the resolution framework to a greater number of small and medium-sized banks and limit the involvement of deposit guarantee funds.

Additionally, notable advancements were made in the negotiations surrounding insurance sector regulations, with legislators attaining a political consensus on 13 December 2023 concerning the amendments to Solvency II.[12] On 23 April 2024, the Parliament's ECON Commission voted to ratify the agreement, with the revised directive anticipated to be adopted by the autumn of 2024. The agreement encompasses measures[13] to direct the financial savings managed by insurers towards financing the economy, enhance the management of sustainability risks and introduce a macroprudential framework to reinforce financial stability. The measures are expected to come into force in the autumn of 2026.

Significant advances were also made in Europe in the first half of 2024 with regard to the regulation of other non-bank financial intermediaries (NBFI). This was evidenced by the revision[14] of the Alternative Investment Fund Managers Directive (AIFMD) and of the regulation on undertakings for collective investment in transferable securities (UCITS). Fund managers are now required to implement at least one or two liquidity management tools (LMT) in accordance with the specifications set forth in a pre-defined list, contingent on the type of fund in question. Furthermore, the regulations pertaining to the provision of loans by alternative investment funds (AIF) have been harmonised,[15] and the obligations to report to supervisory authorities and investors have been extended. In February 2024, European legislators also reached a provisional agreement on the adoption of EMIR 3,[16] the principal aim of which is to reduce the EU's exposure to systemic third-country central counterparties. In a broader sense, the ECB's May 2024 financial stability review[17] emphasised that enhancing the resilience of the NBFI sector is a fundamental step towards advancing the European capital markets union, an objective that has gained renewed momentum since the beginning of 2024. It is also noteworthy that on 22 May 2024, the European Commission initiated[18] a public consultation on macroprudential policies for non-bank intermediation.

Furthermore, international efforts are ongoing to enhance the resilience of the investment fund sector: in particular, the Financial Stability Board (FSB) is engaged in the implementation of reforms pertaining to money market funds,[19] the liquidity preparedness of non-bank entities in response to margin and collateral calls,[20] the risks associated with excessive leverage,[21] and the interlinkages between non-bank entities and the broader financial sector.

Additionally, French and European authorities are implementing measures to mitigate structural risks to the financial system, particularly in the digital field. The DORA Regulation, which came into force in January 2023 and will apply from January 2025, establishes an overall framework for the digital operational resilience of EU financial

[11] Texts adopted by plenary on economic and financial matters, first reading closed - European Parliament, April 2024
[12] Solvency II and the Insurance Recovery and Resolution Directive IRRD: Council and Parliament agree on new rules for the insurance sector - European Council
[13] For details of the measure, see: Revue de la directive Solvabilité 2: vers un régime proportionné - ACPR March 2024
[14] Directive (EU) 2024/927 of the European Parliament and of the Council of 13 March 2024 amending Directives 2011/61/EU and 2009/65/EC as regards delegation arrangements, liquidity risk management, supervisory reporting, the provision of depositary and custody services and loan origination by alternative investment funds (europa.eu)
[15] The European Union has created a minimal harmonisation framework for the granting of loans by AIFs. It notably requires AIFs to retain 5% of the risk in the event of transfer of the loan, sets an investment limit per entity of 20% of the fund's capital, and gives each Member State the option of banning AIFs from lending to individuals. Funds whose main activity is lending are subject to increased requirements: they must be closed (except if the loan amounts are under 50% of their NAV) and are subject to leverage limits (300% for closed funds and 175% for open funds).
[16] Capital markets Union: Council and Parliament agree on improvements to EU clearing services (europa.eu)
[17] Financial Stability Review – ECB May 2024, see also Statement by the ECB Governing Council on advancing the Capital Markets Union | Banque de France
[18] Commission launches consultation on macroprudential policies for Non-Bank Financial Intermediation - European Commission
[19] Thematic Review on Money Market Fund Reforms: Peer review report - Financial Stability Board (fsb.org)
[20] Liquidity Preparedness for Margin and Collateral Calls: Consultation report - Financial Stability Board (fsb.org)
[21] FSB Work Programme for 2024 - Financial Stability Board

entities. It addresses, in particular, the financial sector's reliance on technology companies and the associated cyber risk.

In March 2024, the EU adopted the AI Act, which establishes a framework of regulations governing the use of artificial intelligence, with the stipulation that the level of risk posed by the technology in question will determine the extent of the regulatory oversight. This regulation applies to banking and insurance services that are considered of "high" risk. Prior to being made available on the market, these systems must be registered and declared compliant. In France, the ACPR is responsible for monitoring how banks and insurers utilise these systems. This report provides a detailed examination of the potential risks to financial stability posed by artificial intelligence.

Subsequent to the implementation of the Markets in Crypto-Assets (MiCA) Regulation in June 2023, the European Commission enacted four delegated acts pertaining to the regulation of digital assets in February 2024.

The first half of 2024 also saw the conclusion of a number of regulatory initiatives aimed at addressing the financial risks associated with climate change and environmental challenges. The Corporate Sustainability Reporting Directive (CSRD), which was incorporated into French law in December 2023, significantly broadens the scope of corporate sustainability reporting requirements in terms of both nature and application. The new rules came into effect in January 2024. In February 2024, legislators also reached a provisional agreement on the regulation on the transparency and integrity of environmental, sustainability and governance (ESG) rating activities. The European regulation establishing a pan-European label for green bonds (EuGBS), together with transparency rules for sustainable financial instruments, will enter into force in December 2024.

Adopted by the Council in June 2022, the "Fit-for-55" legislative package is designed to reduce greenhouse gas (GHG) emissions by 55% in the European Union (EU) by 2030 in comparison to 1990 levels. In 2024, the Commission requested that European supervisory authorities conduct stress tests to evaluate the financial sector's capacity to finance the transition and its vulnerability to transition-related risks. Three scenarios developed by the European Systemic Risk Board (ESRB) are being subjected to testing, including a shock to brown assets linked to an abrupt transition and a shock combining climate risks and standard market turbulence. A total of 70 EU banks, including seven large French banks, are participating in the exercise. The objective is to facilitate the advancement of methodologies and scenarios, both for supervised entities and supervisory authorities. It is of the utmost importance that these scenarios are developed in order to ensure a comprehensive and long-term analysis of climate risks. The results are scheduled for completion by September 2024 and are anticipated for release in early 2025 in a joint report by the ESRB, ECB, and European supervisory authorities.

At the 2021 Conference of the Parties (COP26), over 500 financial institutions pledged to achieve carbon neutrality by 2050 in alignment with the Glasgow Alliance for Net Zero. The agreement requires the establishment of transition plans comprising intermediate milestones for achieving net zero. This obligation to align with the Paris Agreement trajectories has already been applied to certain financial institutions under the 2019 French Climate and Energy Law. However, the CSRD extended the scope of its application, requiring all subject companies (including banks and insurers) to publish transition plans. Furthermore, the CRD6 introduced the requirement for banks to publish and adhere to transition plans, which have thus become pivotal instruments for the management of climate risks. The supervisory authorities will conduct periodic assessments of the extent to which financial institutions are exposed to these risks and will have the authority to take enhanced supervisory actions. They will be able to require that institutions modify their strategies, governance structures, or risk management practices, or strengthen the objectives, metrics, and actions set forth in their transition plans.

The CRD6 has tasked the European Banking Authority (EBA) with the formulation of guidelines on the content of transition plans. In January 2024, the EBA published a consultation document on ESG risks which delineates the obligations of banks to identify, quantify, manage and monitor such risks. Furthermore, the document

specifies the minimum requirements for the content of transition plans, including methodological prerequisites, objectives, and performance indicators. It is anticipated that the document will be finalised by December 2024.

The obligation to develop transition plans has been incorporated into the Solvency II Directive for insurers, albeit with different terminology. Insurers are required to develop "specific plans, quantifiable targets, and processes to monitor and address the financial risks arising in the short, medium, and long term from sustainability factors, including those arising from the process of adjustment and transition trends towards the relevant Member States and Union regulatory objectives and legal acts in relation to sustainability factors, in particular those set out in Regulation (EU) 2021/1119 (European Climate Law)." Besides, the plans must be operationalised, with details provided on how this will be achieved.

In addition to climate change, the issue of nature-related financial risks has been the subject of growing attention since the adoption of the Kunming-Montreal Global Biodiversity Framework at COP15 in 2022. Target 15 of the framework encourages private sector entities, particularly multinational corporations and financial institutions, to quantify and disclose their exposure to, reliance on, and impact on biodiversity. The 2019 Energy and Climate Law in France and the 2023 CSRD in Europe have recently reinforced the requirements for financial institutions to report on two key areas: firstly, how they take climate and biodiversity risks into account in their investment policy; and secondly, the resources implemented to contribute to the ecological transition. The Nature Task Force, established by the Network for Greening the Financial Sector (NGFS), is advocating for the incorporation of nature-related financial risks within the domain of ESG risks.

1. Cross-cutting analysis of vulnerabilities

Latest update: 7 June 2024

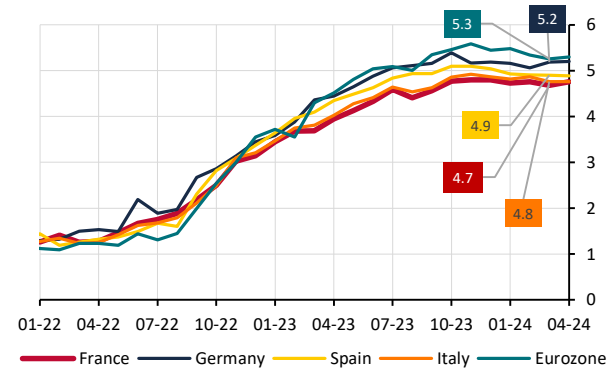
1.1 The likelihood of a soft landing for Europe has increased, but the risks associated with macroeconomic conditions and the geopolitical environment remain elevated

Higher interest rates have slowed credit activity and impacted debt service costs

The pass-through of monetary tightening to lending rates now appears to be largely complete. Policy rates have been raised by 450 basis points (bps) since July 2022. Compared with previous cycles, rates have risen more and over a shorter period. Lending rates may have plateaued, with rates on new loans to households actually starting to fall. The tightening of monetary policy has been passed on to lending rates for banks and households (see Charts 1.1 and 1.2 respectively), which have risen from record lows, reaching 4.01% in France in April 2024 for new housing loans, compared with 1.69% for outstanding housing loans. In terms of magnitude and speed, the increase in lending rates mirrors the change in policy rates, with a transmission to new lending rates comparable to that seen in previous cycles.

Chart 1.1: Interest rates on new loans to French NFCs

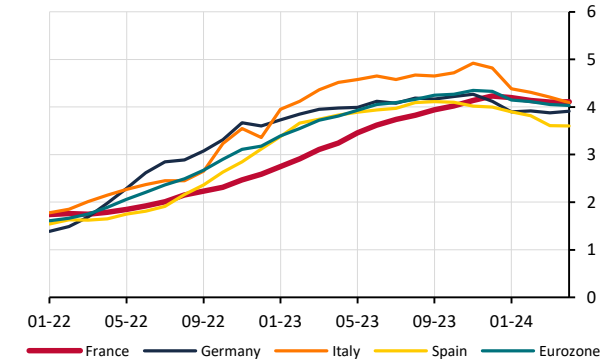
x: time / y: % rate



Source: Banque de France.
Most recent value: April 2024.

Chart 1.2: Interest rates on new home loans

x: time / y: APR (%)

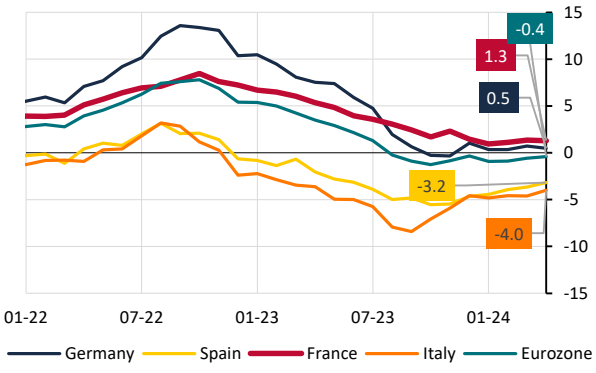


Source: Banque de France.
Most recent value: April 2024.

However, monetary policy continues to influence credit growth. New credit flows are relatively stable and outstanding stocks are also stabilising, but it remains more difficult to determine whether credit volumes have stabilised (i.e. the growth rate has stopped falling). The pass-through to loan volumes appears to be longer than the pass-through to borrowing costs, as the former are primarily determined by the strength of credit demand. According to the ECB's latest Bank Lending Survey (BLS), credit demand from households and firms continued to weaken in France and in the euro area in the first quarter of 2024. In April 2024, the growth rate of loans to households in France was 1%, while the growth rate of loans to NFCs was 1.3% year-on-year (see Chart 1.3).

Chart 1.3: Annual growth rate of outstanding credit to NFCs

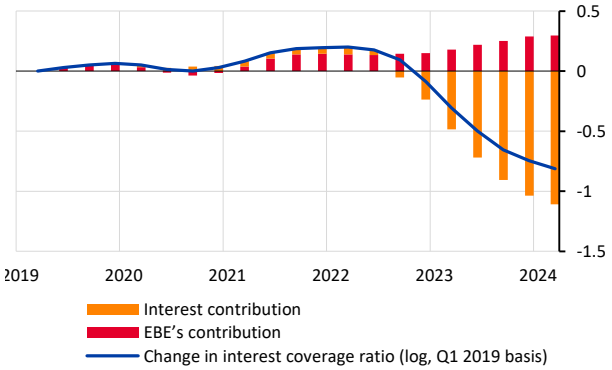
x: time / y: annual % growth rate, outstanding credit



Source: Banque de France.
Most recent value: April 2024.

Chart 1.4: Interest coverage ratio, change and decomposition, French NFCs

x: time / y: change in interest coverage ratio, log, base Q1 2019



Note: the interest coverage ratio is calculated by dividing NFC (annualised) operating earnings by the (annualised) interest payable by NFCs. The change in the ratio is measured from Q1 2019.
Source: Quarterly Sectoral Accounts, Banque de France calculations.
Most recent value: Q1 2024.

The transmission of monetary policy through the balance sheet channel is also ongoing[22]. In France, transmission via the balance sheet channel (an increase in the policy rate should lead to a deterioration in borrowers' interest coverage ratios (ICRs) by increasing their interest expenses)[23] appears to be at least as rapid as during the last period of monetary tightening in 2005-2007. **Indeed, despite slower credit growth, the non-financial companies' ICR is falling more sharply than during that period (see Graph 1.4) because interest rates have risen much faster. However, only 40% of outstanding loans have been renegotiated (i.e. adjusted in the case of floating rate debt or refinanced at higher rates in the case of fixed rate debt). Around 20% of loans will need to be refinanced by 2026, with the remainder having longer maturities.**

… but market participants anticipate monetary policy easing

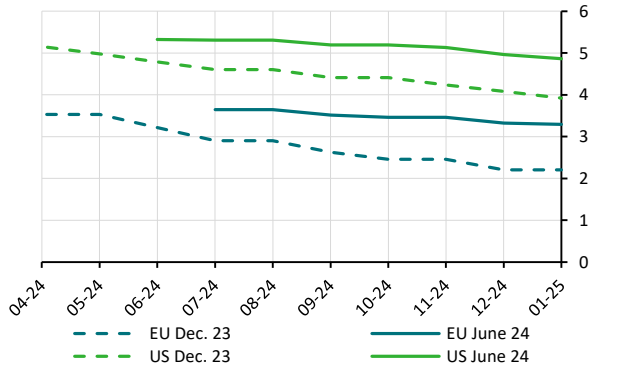
The observed decline in inflation reinforces expectations of a soft landing. According to the Banque de France's June 2024 projections, after an average annual rate of 5.7% in 2023, headline inflation is expected to ease significantly, falling to 2.5% in 2024 and 1.7% in 2025 and 2026, as food, energy and manufactured goods prices fall. Inflation in services is projected to decline more slowly. For the euro area, the Eurosystem projects HICP inflation to be 2.5% in 2024 (against 2.3% expected in March and after 5.4% in 2023) and 2.2% in 2025.

Over the course of the first quarter of 2024, the gap between policy rate expectations and the monetary policy actually implemented by central banks in advanced economies has narrowed. The US Federal Reserve has revised its inflation and growth outlook, while markets have revised their expectations quite sharply (see Chart 1.5), although the adjustment has been orderly. In Europe, expected policy rate cuts have been scaled back significantly (67.5 bps of cuts expected in 2024 on 1 June 2024 according to the overnight index swap (OIS) curve, compared with 166 bps at the end of 2023). Thus, while euro area long-term interest rates rose slightly after December, they have been broadly unchanged since February (see Chart 1.6). Expectations for rate cuts have fallen even more in the United States (around 29 bps expected by end-2024 on 7 June 2024, compared with 163 bps at end-2023, see Chart 1.5), where inflation has remained above expectations and growth is also stronger. The gap in expected policy rates at the end of the year between the euro area and the United States has thus widened by more than 30 basis points since the end of December 2023.

[22] The French home financing model makes it possible to reduce the impact of this channel in the short and medium term, notably through fixed-rate lending, which accounts for the vast majority of loans.
[23] Bernanke, Ben S., and Mark Gertler. 1995. "Inside the Black Box: The Credit Channel of Monetary Policy Transmission." *Journal of Economic Perspectives*, 9 (4): 27-48.

Chart 1.5: ECB and Fed policy rate expectations

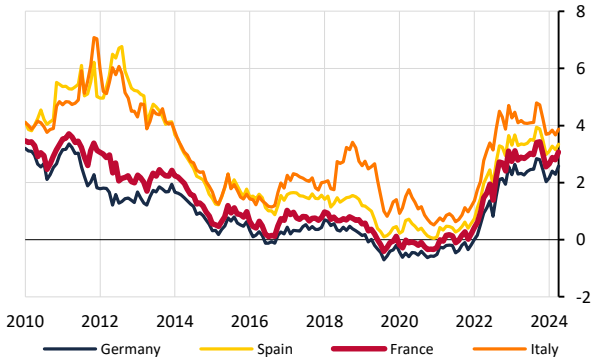
x: time / y: % rate



Sources: Bloomberg, Banque de France calculations.
Most recent value: 7 June 2024.

Chart 1.6: 10Y sovereign interest rates

x: time / y: % rate



Sources: Bloomberg.
Most recent value: May 2024.

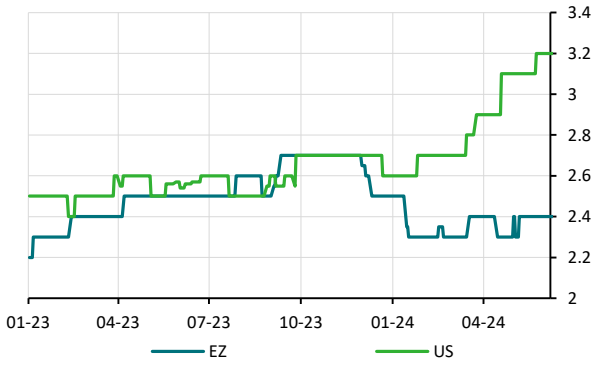
Even a small difference in the sequencing of US and European monetary policy could complicate the transmission of a rate cut to euro area long-term interest rates

Economic activity in France and the euro area should strengthen from 2025 onwards, but the risks surrounding the Banque de France's baseline scenario for France remain elevated. Economic activity in France is expected to grow at a moderate pace of 0.8% in 2024, although household consumption should be boosted by the recovery in purchasing power due to milder inflation. This should allow growth to strengthen to 1.2% and 1.6% in 2025 and 2026 respectively, with additional support from a pick-up in private investment as interest rates ease. This forecast is based on the assumption that the budget deficit will be significantly reduced, falling towards 4% of GDP in 2026. Whatever happens, the coming period of gradual recovery and monetary easing will be conducive to the fiscal consolidation needed to bring government debt under control. For the euro area as a whole, the Eurosystem has revised upwards its projections for GDP growth to 0.9% in 2024 (from 0.6% in March and 0.6% in 2023), with stronger expansions in the following years (1.4% in 2025 and 1.6% in 2026). Euro area inflation is expected to ease over the forecast horizon.

Economic conditions in Europe are very different from those in the United States. US growth and inflation are stronger than expected last year (see charts 1.7 and 1.8) and the US labour market remains buoyant, putting upward pressure on wages and inflation, which is expected to reach 3.1% in 2024 according to economists surveyed by Bloomberg. However, the growth gap with the euro area is expected to narrow steadily, with the International Monetary Fund (IMF) forecasting US growth of 2.1% in 2024 and 1.7% in 2025, in line with the euro area. Looking further ahead, the gap in productivity gains and a more subdued population growth in Europe could exacerbate the discrepancy between European and US growth trajectories.

Chart 1.7: Bloomberg consensus estimates on 2024 inflation forecasts (consumer price index) for the euro area and United States

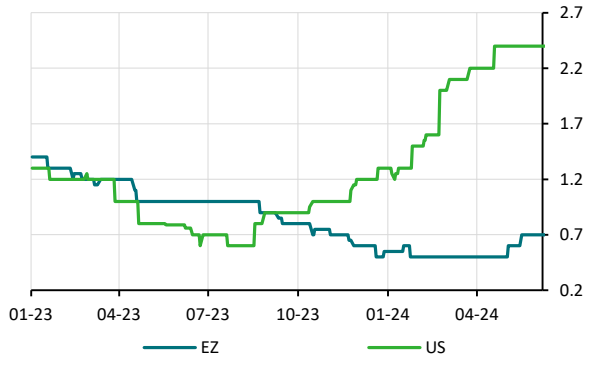
x: time / y: % rate



Source: Bloomberg.
Note: Consensus estimates compiled by Bloomberg from a panel of market strategists.
Most recent value: June 2024.

Chart 1.8: Bloomberg consensus estimates on 2024 growth forecasts for the euro area and United States

x: time / y: % rate

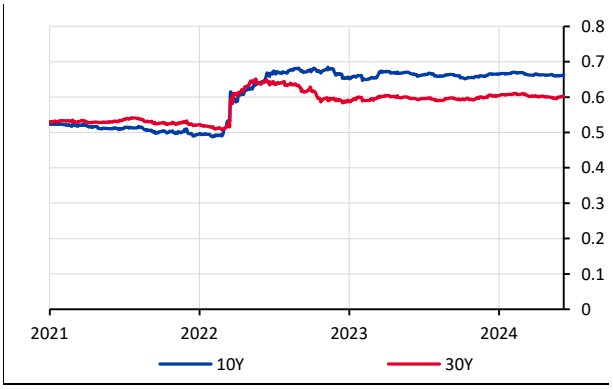


Source: Bloomberg.
Note: Consensus measures compiled by Bloomberg from a panel of market strategists.
Most recent value: June 2024.

The current market consensus is for a small near-term lag in the sequencing of monetary policy. As the ECB started to cut rates earlier than the US Federal Reserve (Fed), the market consensus on 7 June was for up to three cuts by the ECB in 2024, but only one by the Fed (-67.5 bps vs. -29 bps). The elevated correlation between long-term interest rate movements in the US and European bond markets, which has been particularly pronounced since 2022, could lead to some stickiness in European long-term interest rates (see Chart 1.9). This would reduce the pass-through of policy rate cuts in the euro area to financial conditions. Tighter monetary policy in the United States has the potential to make bond markets more volatile via reduced liquidity or a negative impact of higher interest rates on the path of government debt. This is particularly true for the US Treasury market, where volatility is currently at elevated levels (see Chart 1.10).

Chart 1.9: Correlation of French and US 30Y and 10Y sovereign yields

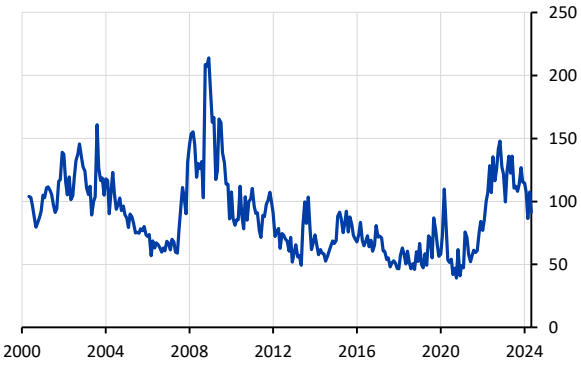
x: time / y: correlation coefficient



Sources: LSEG Datastream, Banque de France calculations.
Note: Rolling two-year correlation between the first difference in daily yields on 30Y / 10Y OATs (FR) and 30Y / 10Y USTs (US).
Most recent value: 7 June 2024.

Chart 1.10: Implied volatility of the US sovereign bond market

x: time / y: MOVE



Sources: Bloomberg, Banque de France calculations.
Note: The MOVE is an indicator of the implied volatility of US Treasury yields, calculated based on options pricing.
Most recent value: 31 May 2024.

The weakness of the yen and Japan's highly accommodative monetary policy over many years have made yen carry trades popular with international investors. Carry trades seek to exploit the difference in policy between the Bank of Japan and other leading central banks (Fed, ECB, Bank of England) by borrowing in a low-yielding currency, in this case the yen, and investing in a higher-yielding one. This involves selling yen on the spot market to buy the higher-yielding currency for resale. As a result, investors bear at least part of the currency risk.[24] The scale of these trades, the exact amount of which is difficult to measure despite the interest they are attracting from bank analysts and the financial media, poses risks to global financial stability and could act as an accelerant for potential shocks, especially in currency and fixed-income markets. A further rise in Japanese interest rates or a spike in currency market volatility could trigger a massive unwinding of short yen positions. This could cause the yen to appreciate sharply against other currencies and push up yields in other fixed income markets currently benefiting from carry trade positions, including potentially European, US and some emerging bond markets. Japanese financial institutions held 6% of outstanding French government bonds (OATs) at the end of2022.[25]

Geopolitical risk remains elevated and could affect financial stability via multiple channels

Upcoming elections, including in the United States, are fuelling uncertainty about the future of global value chains. With 4.1 billion people worldwide heading to the ballot box in 2024, election results could reshape strategic positions and lead to new trade restrictions, as happened between the United States, China and the European Union in 2019. A decline in the value of trade following the introduction of protectionist measures and a reconfiguration of production chains would create inflationary risks by making imported products more expensive, as well as the risk of a disorderly share price correction for exposed companies.

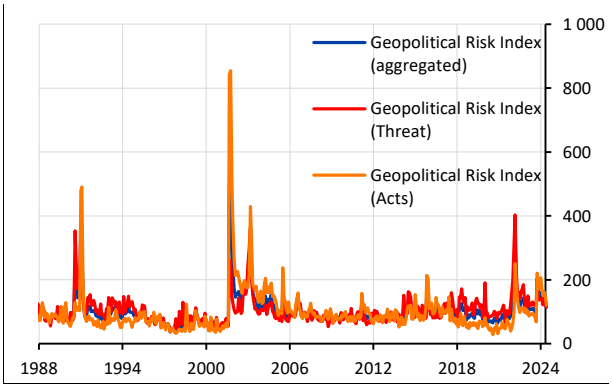
Market participants are also closely monitoring changes in China's position on the global stage and in its economic and trade policies. Against the background of heightened tensions with some of its main trading partners, a significant reduction in trade volumes with China would accentuate the vulnerabilities of companies and financial institutions with the largest exposure to the Chinese market and could affect financial stability, mainly through the asset price channel (see box).

The low degree of substitutability between oil and natural gas and the specific characteristics of their respective markets, such as transport methods and production and consumption areas, have led to a divergence in oil and gas price movements in recent months. However, prices do not seem to have been much affected by the significant deterioration in the geopolitical environment, as evidenced by the rise in the Geopolitical Risk Index (GPR) compiled by Dario Caldara and Matteo Iacoviello (see Chart 1.11). The GPR index, a leading measure of the global level of geopolitical risk, reflects the total number of references to geopolitical risk[26] in ten English-language newspapers[27] since 1985. It is therefore subject to some limitations and biases due to the small number of papers on which it is based, all of them in English and the fact that editorial stances remain subjective. Although the GPR as a whole has responded to the major geopolitical developments since Russia's invasion of Ukraine, it has moved less significantly than during previous crises involving the United States more directly, such as the 9/11 attacks or the Gulf War. The rise in the GPR since 2022 has not led to a pronounced and sustained reaction in the VIX, the US stock market volatility index, which is at its lowest level since 2019 (see Chart 1.12). Supply chains could still be disrupted or interrupted in transit zones, as was the case in the autumn of 2023, when attacks in the Red Sea made maritime transport more expensive, pushing up risk premiums and the volatility of Brent prices. However, volatility spikes due to increases in risk premiums in response to significant geopolitical events did not last long, with participants subsequently revising risk levels downwards.

[24] Investors usually hedge part of the currency risk via currency swaps.
[25] ECB, *Financial Stability Review*, May 2023.
[26] The terms are divided into seven categories, including for example war, terrorism and nuclear threat.
[27] Specifically, the publications in question are *The Chicago Tribune*, *The Los Angeles Times*, *The New York Times*, *The Wall Street Journal*, *The Washington Post*, *The Philadelphia Inquirer*, *The Daily Telegraph, Financial Times*, *The Guardian*, and *The Globe and Mail*.

Chart 1.11: Long-run change in the GPR index ("threats" and "acts" categories)

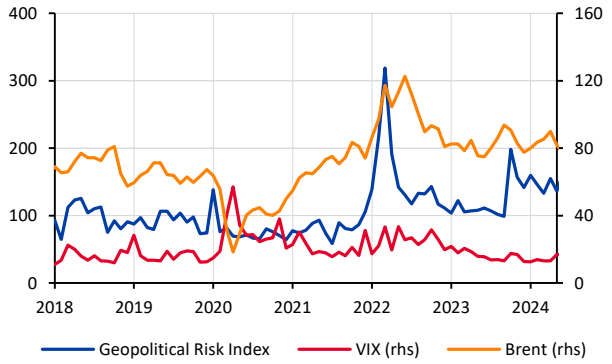
x: time / y: index



Sources: Caldara, Iacoviello (2022).
Most recent value: June 2024.

Chart 1.12: Change in VIX and Brent price relative to geopolitical risk

x: time / y [left]: index; [right]: VIX; Brent price (in USD)



Sources: Caldara, Iacoviello (2022); Thomson Reuters.
Most recent value: June 2024.

Box 1.1: Channels for the transmission of geopolitical risk to financial stability

By Thibaut Piquard

Geopolitical risk is defined as the probability of international events occurring that adversely affect international relations and the economy. Geopolitical risk includes armed conflict, tensions between countries and terrorism, as well as country risk factors, such as forced nationalisations and protectionist measures.

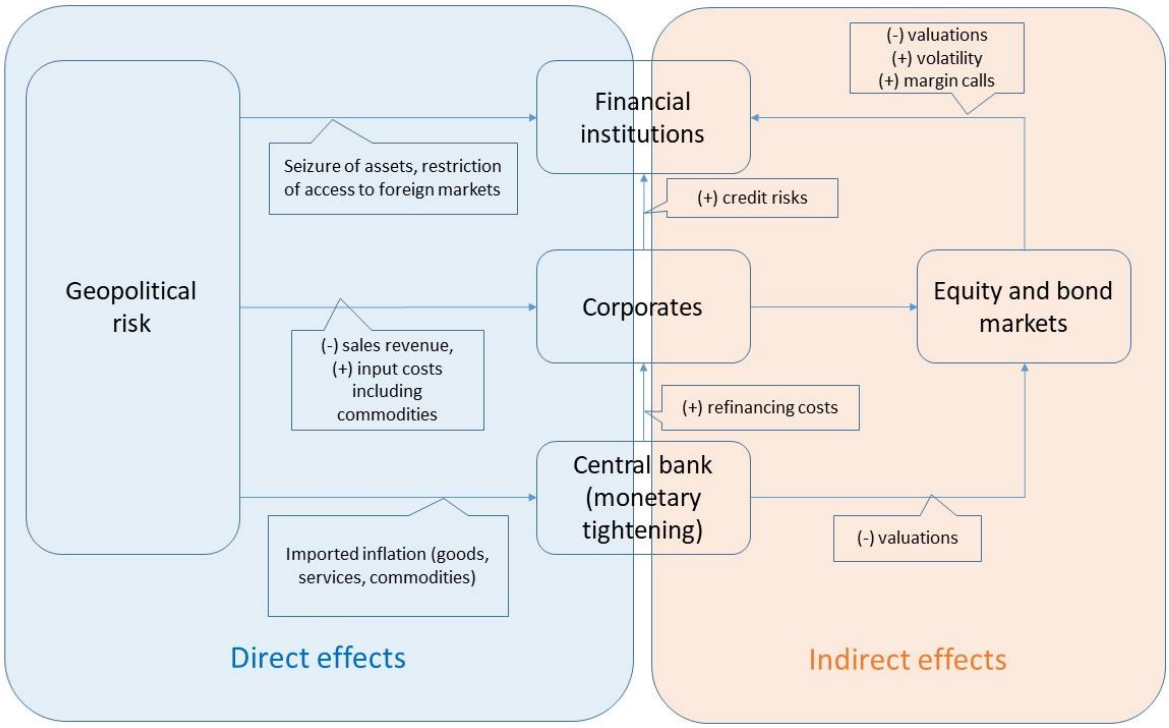
The materialisation of geopolitical risk could have an immediate impact on financial institutions. An armed conflict can result in loss of assets (through destruction, seizure, etc.). In the event of financial sanctions targeting a third country, financial institutions that have a presence there may also be directly affected by asset seizures and incentives to withdraw from the country (e.g. withdrawals by French banks from Russia when the war in Ukraine began), as well as by restricted access to capital markets and the disconnection of the payment systems of countries targeted by sanctions. Geographical diversification helps to make financial institutions more resilient to this risk. The materialisation of geopolitical tensions also increases the level of cyber risk, since financial institutions are high-value targets for cybercriminals. Insurers active in international trade credit insurance could be directly exposed to losses at the corporations that they insure.

The most serious consequences of geopolitical risk for the financial system stem from falls in the prices of securities issued by companies and heightened volatility in a market environment that is made even more uncertain because this risk is hard to insure against. Trade restrictions and increased costs and times for international transportation depress companies' expected turnover and raise their production costs. The effect of these two channels is to lower companies' profitability expectations, which brings their valuations down while increasing their credit risk. Falling equity and bond market valuations lead to losses in the portfolios of financial institutions. Declining asset prices coupled with greater uncertainty fuel an increase in volatility (which may also affect sovereign debt), which is exacerbated by the fact that there are no products to insure against geopolitical risk. This increase itself leads to potential refinancing problems, as well as increased liquidity needs among financial intermediaries to satisfy margin calls. Heightened volatility following the outbreak of the war in Ukraine did not cause any notable failures, but the stress affected liquidity on energy markets as well as the ability of investors to meet margin calls.

Falling valuations and increased premiums for risky assets could see portfolios switched into safer assets. Increased risk premiums on corporate securities might prompt the most risk-averse investors, especially insurers and pension funds, to switch part of their portfolios into risk-free assets, including investment grade sovereign debt, gold and USD-denominated securities. These reallocations could cause safe-haven currencies, such as the US dollar and Swiss franc, to appreciate relative to other currencies.

Geopolitical risk also has a material indirect impact on financial stability via the increase in imported inflation. Trade sanctions make inputs and imported goods (commodities, but also potentially manufactured products) scarcer and more expensive. Imported inflation may force the central bank to hike rates in an effort to bring inflation back to its target. Higher rates then feed through to financial institutions and the real economy by pushing up refinancing costs, lowering asset prices and causing activity to contract.

Illustration of channels for the transmission of geopolitical risk



Source: Banque de France.

1.2 The new interest rate environment and the cost of the Covid-19 pandemic have exacerbated the vulnerabilities of the non-financial sector

The ongoing transmission of higher rates increases non-financial corporations vulnerabilities in a contained manner

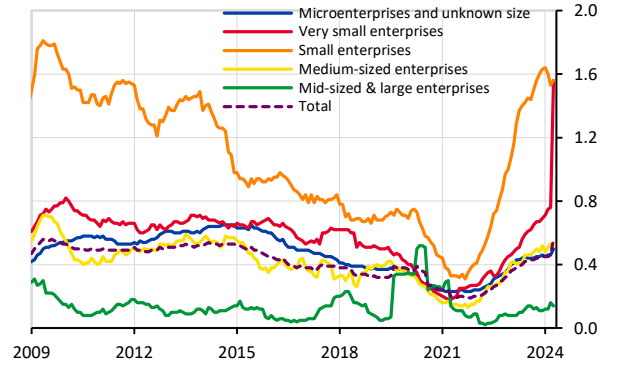
The vulnerabilities of non-financial corporations (NFCs) are linked to their financing costs, although their overall balance sheet strength is a source of resilience. Rising interest expense continues to weigh on the interest coverage ratio, which is now below its long-term average. Even if financial conditions continue to ease in the second half of 2024, it seems unlikely that market interest rates will return to levels comparable to those prevailing until 2021. Accordingly, fixed-rate debt due for renewal will probably have to be rolled over at considerably higher rates than those originally written. More than half of the outstanding stock of corporate debt taken out during the low interest rate environment remains to be renewed. As a result, the average cost of NFC debt (outstanding

amounts and new loans) is expected to rise further in 2024 and 2025, and corporate finances could worsen slightly in 2024 before starting to turn around in 2025, depending on the scenario (see chapter 2).

In parallel, the repayment capacity of French SMEs and mid-tier firms, as measured by Banque de France ratings, remained broadly intact at end-2023. The profit margin of French small- and medium-sized enterprises (SMEs) coped with the slowing economy and held up overall in 2023.[28] SMEs also reduced their debt ratio, notably by bolstering equity and paying back state-guaranteed loans. SMEs cash reserves shrank, but remain far higher than in the pre-Covid period. This was also true for mid-tier firms, which overall claim to be resilient.[29] In fact, in 2023, the finances of mid-tier firms stabilized at higher overall levels than those of 2019.

Chart 1.13: Share of business failures in outstanding credit, by company size

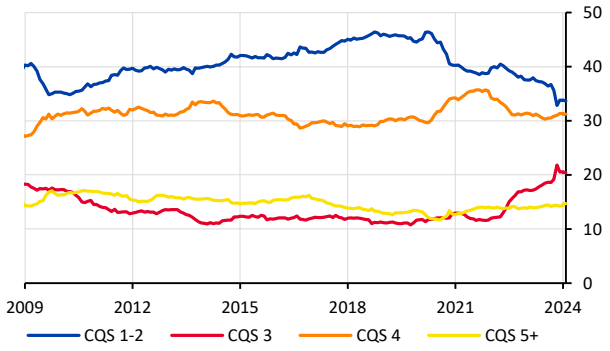
x: time / y: % of outstanding credit



Source: Banque de France.
Note: Loans to insolvent legal units are divided by the total centralised monthly amount of credit. The resulting monthly ratios are then added up over the 12 preceding months. A single legal unit is responsible for the sharp increase in the share of outstanding amounts in default in the very small enterprise (VSE) category. If that unit is stripped out, the share of VSE failures in outstanding credit is 0.85%.
Most recent value: April 2024.

Chart 1.14: Distribution of credit to companies, by Banque de France rating

x: time / y: % of outstanding credit



Source: Banque de France.
Scope: French companies rated by the Banque de France.
Note: CQS = Credit Quality Step. CQS 1-3 are accepted as collateral for monetary policy operations, whereas CQS 4 and above are not.
Most recent value: March 2024.

The effects of higher rates on NFC credit risk are sizeable but remain contained. The share of French NFC non-performing loans (NPLs) reported by banks increased slightly to reach 3.6% in December 2023 (see section 1.4). However, the number of failures continues to rise and has now exceeded its long-run average (see Chart 1.13). Meanwhile, the share of bank credit allocated to companies whose capacity to honour their financial commitments remains strong but that could be subject to uncertainty is at a historically high level (see Chart 1.14). Approximately 20% of loans to companies rated by the Banque de France were associated with ratings equivalent to BBB (CQS 3) in the first quarter of 2024. However, the share of lower-quality ratings, equivalent to high yield (CQS 4 and higher), was unchanged in the first quarter of 2024. Average ratings for bond-issuing NFCs have also been stable since 2022.

Stress on the real estate market primarily concerns commercial real estate, while the risks to residential real estate look low

The marked rise in interest rates since July 2022 has fuelled tensions on the residential and commercial real estate sectors, with the latter coming under greater strain.

The residential real estate market has now experienced a substantial downturn, albeit with recent signs of improvement. Our December 2023 Financial Stability Report described the shock affecting the sector: the rapid run-up in home lending rates from January 2022 onwards reduced households' home buying power (by 11 m²

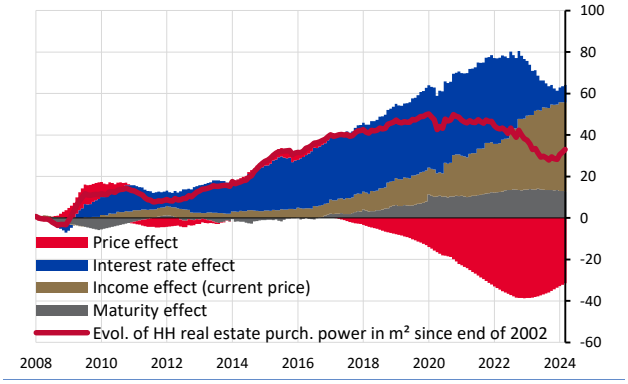
[28] *Bulletin de la Banque de France*, "La situation financière des PME en 2023: vers un atterrissage en douceur", B. Bureau and L. Py, forthcoming.
[29] *Bulletin de la Banque de France*, "Dans un contexte économique ralenti, les entreprises de taille intermédiaire affirment leur solidité", M. Graignon and A. Merebier, forthcoming.

between January 2022 and March 2024), although effects varied across the country. This situation caused buyers and sellers alike to adopt a wait-and-see attitude, which depressed housing demand. Transaction numbers have now fallen by a comparable amount to the last market reversal (29% 12-month cumulative decrease in transactions in the existing-homes segment between 2021 and 2024, compared with a 32% downturn between 2006 and 2009). Prices have come down sharply as result, declining by 5.2% overall between the first quarter of 2024 and the first quarter of 2023, with Paris recording an especially steep drop (7.9%). The price/income ratio has seen a corresponding decrease, echoing its movement during the last period of falling house prices between 2007 and 2009 (9% decline between the second quarter of 2022 and the third quarter of 2023 – the same as between the fourth quarter of 2007 and the third quarter of 2009). On the new-homes market, 12-month cumulative reservations were still down sharply in the retail segment in the first quarter of 2024 (33.8% lower than in the first quarter of 2023) but showed growth in the institutional segment (16.8% higher than in the first quarter of 2023). The recent fall in home lending rates could however drive a reversal in the trend (see Chart 1.15). Whereas home loan production was roughly stable in early 2024, several leading indicators are pointing to a slight pickup, consistent with the start of a turnaround in lending rates. Provision of new home loans thus rebounded sharply in April 2024, as monthly production excluding renegotiations reached EUR 8.9 billion after EUR 6.9 billion in March, for a 29% increase.

The risks to financial stability linked to residential real estate are limited. For one thing, the structural features of France's home financing system mitigate the disruptive consequences of a fall in prices. This is because bank lending policies are based on an assessment of the borrower's solvency rather than the market value of the asset, the bulk of outstanding home loans are guaranteed by a third party and are therefore less risky than mortgages, and loans are almost always at fixed interest rates. For another, reduced credit coupled with the macroprudential policies in place have helped to bolster household finances: household indebtedness has shrunk slightly, but remains high compared with the rest of the euro area (97% of gross disposable income, compared with 83.9% in Germany in the fourth quarter of 2023), while credit standards remain sound (average debt-service-to-income ratio of 30.8% in December 2023). Hit by both demand- and supply-side issues, companies in the construction sector are reporting a substantial and rising NPL ratio (7.66% in December 2023). However, these firms do not present a major risk to financial stability, as bank exposures to the construction sector make up just 5.6% of outstanding loans to non-financial corporations.

Chart 1.15: Household purchasing power and contributions from different factors

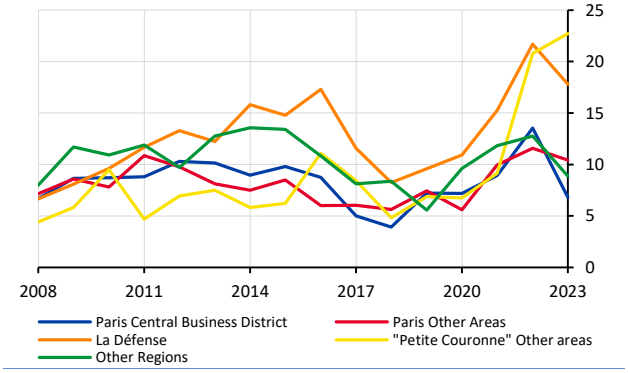
x: date / y: home buying power in m²



Source: Banque de France, INSEE.
Note: The vertical bars show the cumulative contributions of different factors. BP: buying power, m²: square metres.
Most recent value: Q1 2024.

Chart 1.16: Office vacancy rates, by geographical area, France

x: date / y: %

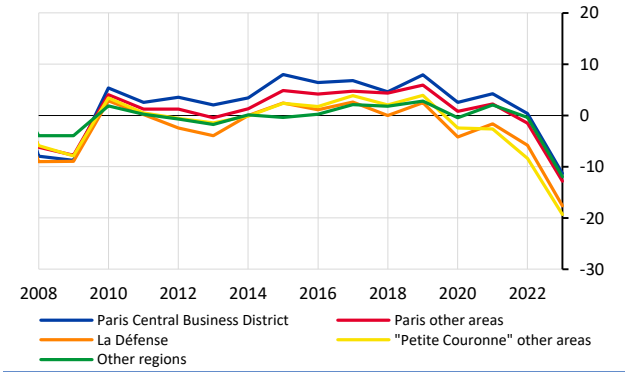


Source: MSCI.
Most recent value: 2024.

The commercial real estate market has undergone an even more substantial correction, which could continue due to major structural changes. Transaction volumes are shrinking and fell to EUR 14.8 billion in 2023 from EUR 42.2 billion in 2019. The collapse in commercial real estate prices, which was already notable in 2023, accelerated further in early 2024: transaction prices for offices in the Île-de-France region decreased by 19.5% year-on-year in the first quarter (against a fall of 16.5% in the fourth quarter of 2023 and 9.4% in the second quarter of 2023, see Chart 1.17). Several signs, however, point to the significant role of structural shifts, linked particularly to the rise of teleworking, which is encouraging companies to scale back and recentre office usage: while the vacancy rate for the Paris central business district (CBD) fell below its 2000-2020 average, the share of vacant offices stayed above 15% in 2023 in the La Défense business district and the Paris Inner and Outer Rings (see Chart 1.16). This is also reflected in differing valuation dynamics (see Chart 1.17). Furthermore, the price-to-book ratio of real estate companies is still well below one, seemingly indicating a long-term correction (see Chart 1.18). Accordingly, prices look set to continue trending downwards, especially in less central locations.

Chart 1.17: Annual price growth of offices, by geographical area

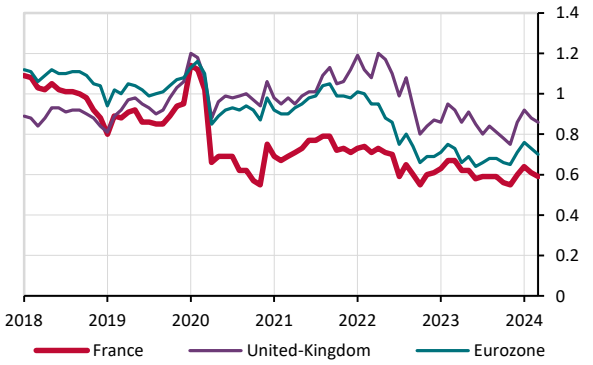
x: date / y: %



Source: MSCI.
Most recent value: 2024.

Chart 1.18: Price-to-book ratio, real estate companies

x: date / y: ratio



Source: Refinitiv Datastream.
Note: The price-to-book ratio is calculated by dividing a company's market capitalisation by the book value of its equity. Most recent value: March 2024.

However, the French financial sector's exposure to commercial real estate is contained. The assessment of risks related to commercial real estate distinguishes credit risk from market risk. In both cases, the exposures of French financial institutions are essentially domestic.

Credit risk is not the primary concern in France. It is structurally mitigated by the financing conditions of French companies in the commercial real estate sector (fixed rates, long maturities). Although the NPL ratio increased in this segment over recent months, it remains below that of French NFCs as a whole (2.49%, compared with 3.69% in December 2023). In addition, the exposure of French banks to commercial real estate is still among the lowest in the euro area (see Section 1.4).

Market risks linked to a fall in real estate values are more significant but should remain under control. Real estate funds are closely monitored, because their leverage is high compared with other types of funds and their assets are extremely concentrated from a geographical and sector standpoint. At a time when net inflows are declining, with some funds even recording net outflows, liquidity risk could arise and force funds into sales, further accelerating the fall in commercial real estate prices. To prevent these risks, most funds have already set up liquidity management tools. Although French insurers play a bigger role on the commercial real estate market than in other jurisdictions, their direct exposure remains small (see below).

Sovereign debt remains a factor of vulnerability

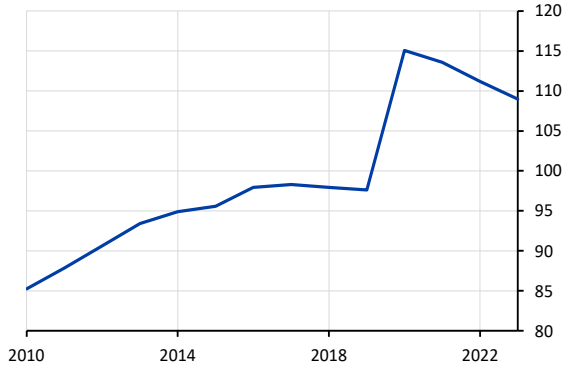
The Covid-19 pandemic saw the government take much of the burden off the private sector and onto its own balance sheet as it intervened to stabilise the economy and support affected companies and households through

initiatives such as solidarity funds, the job retention scheme, state-guaranteed loans and tax and social security relief. These actions were crucial to help mitigating the effects of the health crisis, but they also had a major impact on French government finances. Health-related measures cost around EUR 150 billion over the three years from 2020 to 2022. Once the pandemic was over, the energy crisis triggered by the war in Ukraine continued to weigh on the government finances, owing to measures such as "fuel cheques", subsidies and reduced taxation.

In 2023, the government deficit stood at EUR 154.0 billion, or 5.5% of GDP (up from 4.8% in 2022), while government debt was 110.6% of GDP at end-2023[30] (base 2014, down from 111.9% in 2022). The deterioration was primarily due to lower than expected revenues (particularly from VAT, income tax, corporate income tax and social security contributions), along with a denominator effect owing to more muted growth in nominal GDP.

Chart 1.19: Debt-to-GDP ratio

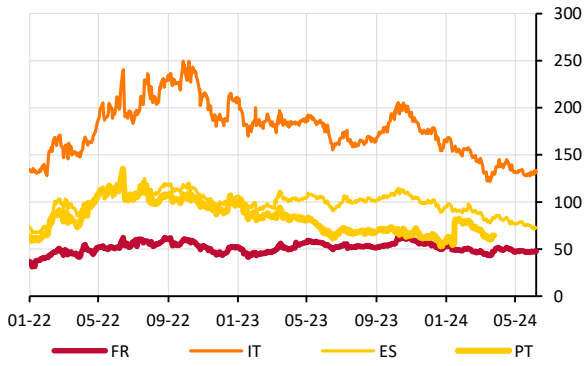
x: date / y: %



Source: INSEE.
Most recent value: December 2023.

Chart 1.20: European sovereign spreads

x: time / y: spreads (in basis points)



Source: Bloomberg.
Most recent value: June 2024.

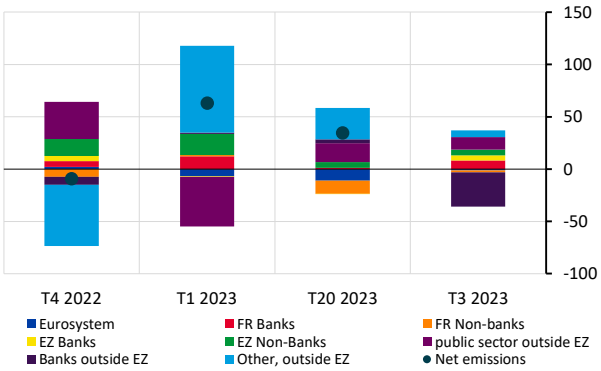
The new interest rate environment is having an adverse impact on French government debt. After amounting to EUR 29 billion in 2020, interest expense is expected to reach approximately EUR 55 billion in 2024 according to projections under the stability programme and then exceed EUR 80 billion in 2027. This poses considerable challenges for long-term financial sustainability.

Announcements that the government deficit had widened and that Standard & Poor's had downgraded France's credit rating did not immediately trigger a major deterioration in spreads or sovereign CDSs, illustrating the confidence of market participants in France's sovereign debt. On 7 June, France's credit spreads were relatively stable, reflecting continued investor confidence (see Chart 1.20). The elevated correlation between France's 10Y yield spreads and those of the sovereign bonds of other euro area countries, similarly, does not suggest that investors view France's situation differently than that of other European countries.

[30] INSEE revised nominal GDP in 2023 with the transition from base 2014 to base 2020, causing the government debt ratio to change to 109.9% of GDP in 2023.

Chart 1.21: Net purchases of French sovereign debt, by investor

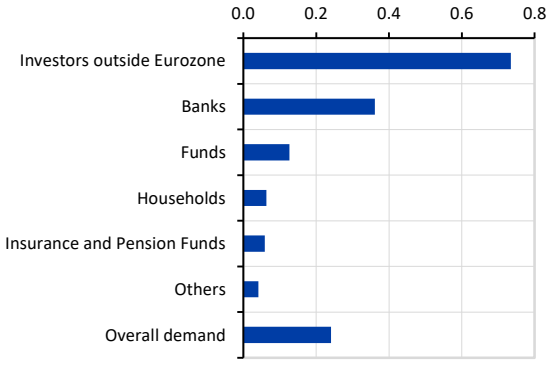
x: time / y: amounts in EUR billion



Source(s): IMF, SHS-S, SDW.
Note: Geographical scope: EA investors and non-EA investors. Most recent value: Q3 2023.

Chart 1.22: Average price elasticity (absolute value) of demand from euro area institutional sectors for EUR-denominated debt securities

x: holding sector /y: unit



Source: ECB, SHS-S and CSDB, Banque de France estimates. Notes: Elasticities are derived from estimates by euro area holding sector provided by a demand-based asset pricing model. The sample covers the periods from Q3 2017 to Q1 2023. "Other" includes NFCs and the sovereign; "Banks" include credit institutions and money market funds; "Funds" include investment funds and other financial institutions.

Recent net French sovereign debt issuance has been chiefly absorbed by foreign investors. Non-EA non-bank investors were by far the largest net buyers of sovereign debt between the fourth quarter of 2022 and the third quarter of 2023, acquiring EUR 60.8 billion of the EUR 89.3 billion in net issues (see Chart 1.21). They were followed by EA non-bank investors, chiefly funds and insurers, which bought EUR 47.3 billion. Holdings of the non-EA public sector (central banks, sovereign funds, etc.) increased by EUR 18.3 billion. Finally, French banks resumed increasing their holdings of domestic sovereign debt by buying EUR 27.2 billion. The high elasticity of non-EA investors to the price of debt (for a given price increase, their demand goes up by more) enables net issuance to be absorbed without overly affecting yields (see Chart 1.22). Shocks to the demand of these investors or changes in risk tolerance could thus put sovereign debt prices under strain.

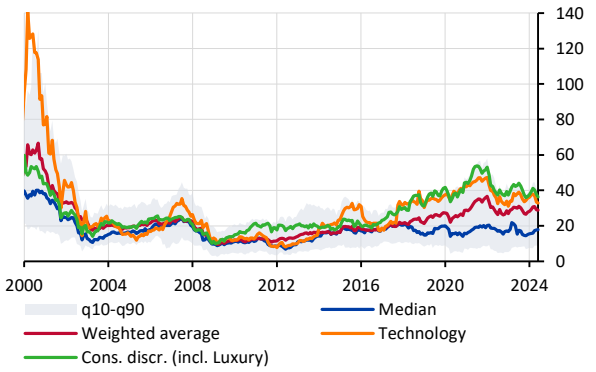
1.3 The risk of a market correction persists in the event of a deterioration in macroeconomic and geopolitical conditions

High valuations on the equity market given the macroeconomic and geopolitical risks

Equity valuations climbed until early June 2024, buoyed by expectations of a soft landing for the economy. High-yield corporate credit spreads also continued to narrow to historically low levels, despite the troubles experienced by a few issuers (i.e. Atos, Altice), which have not generated contagion effects on the rest of the market. Investor bullishness seems to be supported by expectations that the rate-hiking cycle will end soon and that the economy will be broadly resilient, as indicated by the high profit margins of major European companies.

Chart 1.23: CAPE ratio, CAC 40 shares

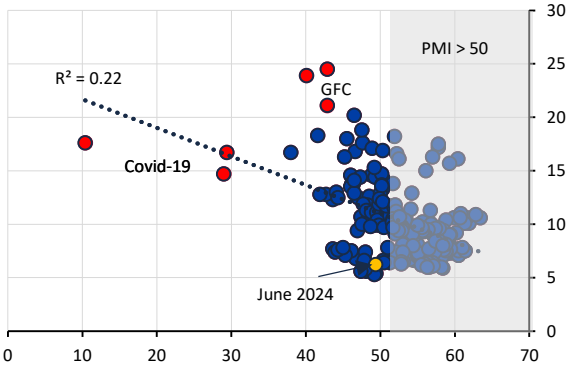
x: time / y: CAPE ratio



Sources: Eikon Refinitiv, IBES, FRED database, DSF-SRV calculations.
Notes: The chart shows the CAPE ratio for CAC 40 shares. The CAPE ratio for each CAC 40 component is calculated monthly by dividing the share price by average earnings per share over the past five years, adjusted for inflation. Descriptive statistics are then calculated monthly on a cross-sectional basis: CAC 40 weighted average, CAC 40 median, 10th and 90th percentiles for CAC 40 shares, weighted averages for the tech and consumer discretionary sectors.
Most recent value: June 2024.

Chart 1.24: Services PMI vs. CAC 40 risk premium

x: PMI /y: CAC 40 risk premium



Sources: Eikon Refinitiv, IBES, FRED database, S&P Global, Banque de France calculations.
Notes: The Purchasing Managers Index (PMI) is an index constructed from monthly surveys of purchasing managers at major French companies. A value of over 50 points to an economic expansion relative to the previous month, while a score of below 50 signals a contraction.
The CAC 40 risk premium is estimated using a dividend discount model that considers companies' short- and long-term return growth profile and the risk-free rate.
The black line shows the regression line between the CAC 40 risk premium and the PMI, estimated between 2004 and 2024.
Most recent value: June 2024.

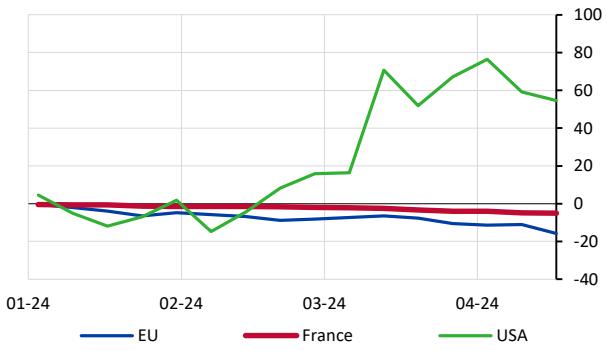
However, reasons for caution remain. Valuations of CAC 40 stocks remain high given current economic and geopolitical conditions. Cyclically adjusted price-to-earning (CAPE) ratios of CAC 40 stocks are above their long-run average (+35% as a weighted average for the overall index, see Chart 1.23). However, there are significant sector disparities within the index. The high valuations are mainly driven by tech and discretionary consumption (luxury goods), two high-margin sectors that have not been badly affected by the inflationary environment. High valuations in the French tech sector are connected to the US market's excitement about artificial intelligence (see Box 1.2), but the sector accounts for a smaller share of the CAC 40 index compared with the US S&P 500, where the "Magnificent Seven" make up almost 30% of the index. In addition, unlike during the dot.com bubble of the 2000s, when expected productivity gains pushed up the valuations of all CAC 40 shares, investor bullishness about the artificial intelligence sector has not yet spread to other sectors of the index (see median in Chart 1.23).

An analysis of CAC 40 risk premiums also shows that in early June the additional rate of return required by investors to provide capital to French companies, as compared with French sovereign bonds, was still low. Unlike the CAPE ratio, the risk premium integrates companies' future growth prospects and the level of interest rates (i.e. the discount rate on future dividends; when interest rates go down, future cash flows gain value today).[31] This premium remained low in June 2024, both from a historical perspective and with regard to economic conditions (see Chart 1.24). Consequently, the equity market is vulnerable to an abrupt increase in investor risk aversion should macroeconomic or geopolitical conditions worsen.

[31] In theory, equity prices reflect future income discounted using the risk-free rate, to which is added the risk premium demanded by investors, and fluctuate according to these components. A dividend discount model may be used to calculate the risk premium from market prices, analysts' earnings growth expectations and the risk-free rate.

Chart 1.25: Cumulative flows into/out of equity funds, by domicile

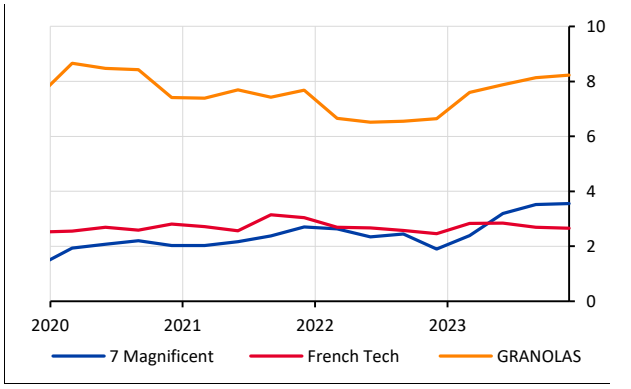
x: time / y: % of total assets at the start of the period



Source: Lipper, Banque de France calculations.
Most recent value: April 2024.

Chart 1.26: Tech sector share of French equity funds

x: time / y: % of total assets



Source: OPC titres, CSDB, Banque de France calculations.
Note: French tech companies are corporations that are classified as technology firms and included in the SBF 120 index. The Magnificent Seven are Nvidia, Meta, Tesla, Amazon, Alphabet, Microsoft and Apple. The Granolas, a collection of European stocks, are GlaxoSmithKline, Roche, ASML, Nestlé, Novartis, Novo Nordisk, L'Oréal, LVMH, AstraZeneca, SAP and Sanofi.
Most recent value: December 2023.

Despite high valuations, European and French equity funds continued to record outflows at the start of the year (see Chart 1.25)**,** unlike US equity funds, which saw net inflows at the start of the year, notwithstanding the dip in April. The stock market outlook for the "Magnificent Seven" may be galvanising inflows to US equity funds. The exposure of French equity funds to the US tech sector remains contained and comparable to the exposure of the sector in France (see Chart 1.26).

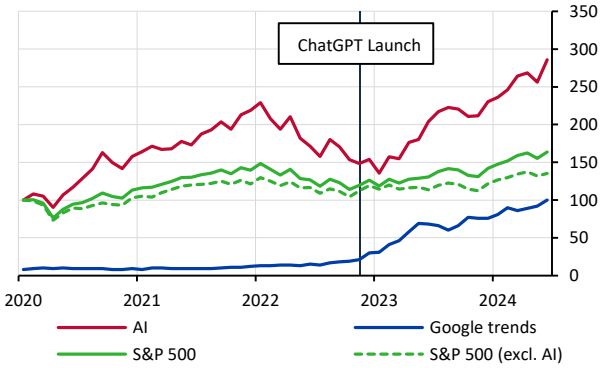
Box 1.2: Artificial intelligence, a new dot.com bubble?

By Tristan Jourde

Excitement around ChatGPT, a chatbot based on generative artificial intelligence (AI), attracted investor attention to the potential of AI, sending the stock prices of companies from the sector soaring. After falling in 2022 due to the increase in interest rates, US firms in the AI sector gained more than 90% between November 2022 and June 2024, compared with 37% for the S&P 500 (or 20% for the S&P 500 excluding AI; see Chart 1.27). These performances recall the dot.com bubble of the early 2000s. A massive correction for AI companies could have a major impact on investor portfolios, with repercussions for the wider market in the event of forced sales, bearing in mind that the tech sector makes up around 30% of the S&P 500 index, as compared with 23% during the dot.com bubble (see Chart 1.28).

Chart 1.27: Performance of US AI-linked equities

x: time / y: 1 January 2020 = 100



Sources: Refinitiv Eikon, Google trends, Banque de France calculations.
Notes: Selected AI-related companies are Apple, Amazon, Arista Networks, Alphabet, IBM, Intel, Meta, Microsoft, Micron Technology, Nvidia, Oracle and Tesla. Google trends reflect the number of Google searches associated with the topic of artificial intelligence.
Most recent value: June 2024.

Chart 1.28: Tech sector share of the S&P 500 index

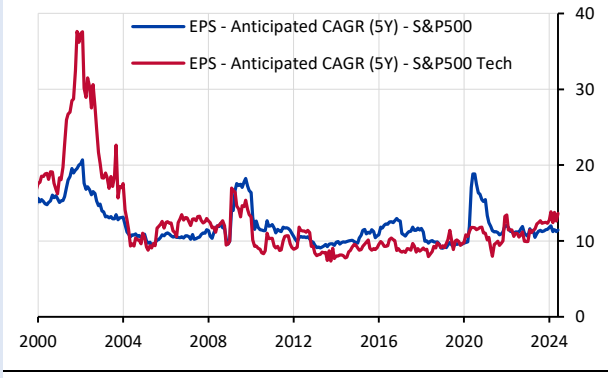
x: time / y: % of the index

Sources: Refinitiv Eikon, Banque de France calculations.
Most recent value: June 2024.

Comparisons with the dot.com bubble tend to allay concerns about the formation of an AI bubble, although the risk of disappointment persists for some very highly-valued companies. On the one hand, tech firms are far less highly valued than they were in 2000, with a CAPE ratio of 41, compared with 83 in August 2000. The same goes for other sectors: the S&P 500 index's CAPE ratio is currently 33 compared with 52 in August 2000. On the other hand, whereas financial analysts were forecasting very strong earnings growth for tech firms over 2000, today's expectations are more reasonable on average (which is to say they are in line with those of other sectors; see Chart 1.29) and were not powerfully impacted by the launch of ChatGPT. The overall situation notwithstanding, some firms in the AI sector, such as Nvidia, Amazon, Arista Networks and Tesla, look highly valued judging by their CAPE ratios. Given that these valuation levels are largely attributable to the strong earnings growth expected for the next five years, the market could penalize these securities in the event of a letdown (see Chart 1.30).

Chart 1.29: Expected earnings per share growth, S&P 500 companies

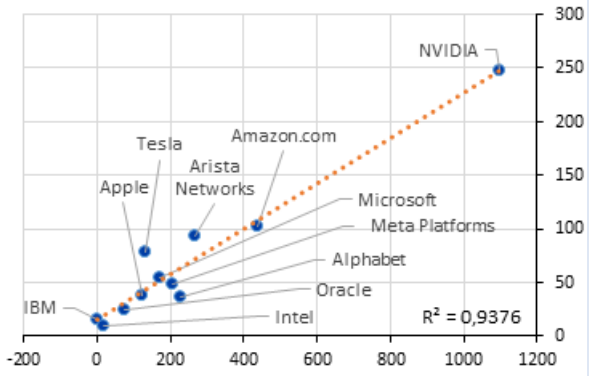
x: time / y: average annual growth in earnings per share (%)



Sources: Refinitiv Eikon, IBES, Banque de France calculations.
Notes: Average annual growth in earnings per share expected by financial analysts over the next five years is calculated monthly.
Most recent value: June 2024.

Chart 1.30: Valuation of AI-related companies and expected earnings per share growth

x: expected EPS growth in five years (%) / y: CAPE ratio



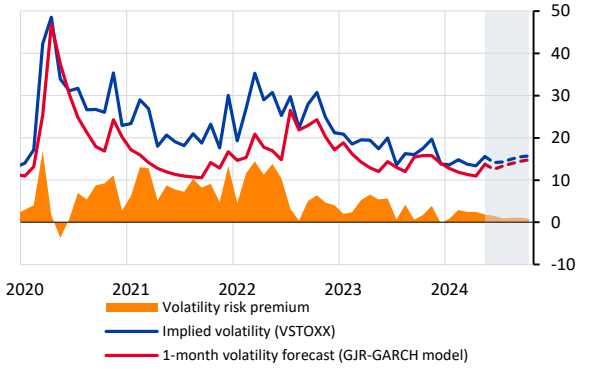
Sources: Refinitiv Eikon, IBES, Banque de France calculations.
Notes: The chart compares the CAPE ratio of AI-related companies against expected growth in earnings per share – calculated as the growth rate between average earnings over the last five years and earnings in five years expected by financial analysts for each company.
Most recent value: June 2024.

Equity market volatility is low and remains insensitive to geopolitical risk

Equity market volatility was historically low in the first half of the year (10th percentile between 2000 and 2024), well down on its level of end-2022 (22%) and close to all-time lows (9% in March 2017 for the VIX). The volatility risk premium demanded by investors, based on a comparison of implied and realized volatility levels, is also low on a one-month horizon (see Chart 1.31). Whereas implied volatility is usually higher than realized volatility, in a sign of investor risk aversion, currently their levels are virtually aligned. While volatility can always increase rapidly in the event of an adverse shock with the potential to dent investor confidence, history shows that periods of low volatility on equity markets have tended to last (2004-2008; 2013-2015; 2016-2020; see Chart 1.32).

Chart 1.31: Volatility risk premiums on the Eurostoxx 50

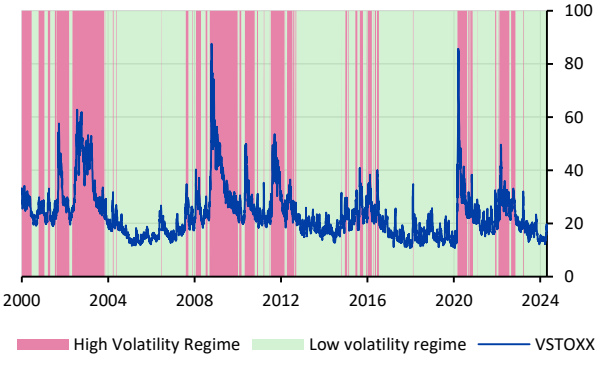
x: time / y: annualised volatility (%)



Sources: Bloomberg, Banque de France calculations.
Notes: The chart shows the change in the volatility risk premium, which compares the difference between one-month implied volatility derived from option prices with the one-month volatility forecasts of an autoregressive model (GJR-GARCH). The greyed area shows six-month forecasts based on VSTOXX futures prices and the six-month predictions of the GJR-GARCH model.
Most recent value: November 2024.

Chart 1.32: Volatility regimes

x: time / y: annualised implied volatility (%)



Sources: Bloomberg, Banque de France calculations.
Notes: The chart shows volatility regimes (VSTOXX) estimated using a Markov regime-switching model. The historical probability of moving from a low-volatility to a high-volatility regime is less than 1%.
Most recent value: June 2024.

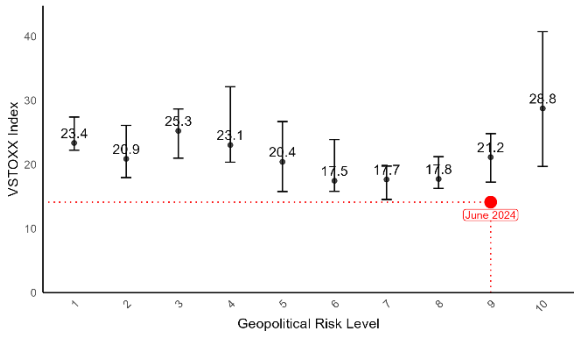
Volatility is mild given the challenging macroeconomic and geopolitical conditions. At a time of severe geopolitical stress, current volatility levels on equity markets seem low. In June 2024, geopolitical risk hit elevated levels (just below the 90th percentile according to the index compiled by Caldara and Iacoviello, 2022), but that

has not yet triggered an increase in equity market volatility, bucking past trends observed during periods of extreme risk (see Chart 1.33). Similarly, European indicators of business conditions are pointing to an economic slowdown, which has tended to increase volatility in the past. The lack of a reaction by equity market volatility to macroeconomic and geopolitical risks may be because large European companies continue to report solid profit margins (around 8%, compared with 4% in early 2021), and financial analysts appear to be expecting a broadly resilient economy over the medium term.

Technical factors may also explain why volatility is compressed. Although the volatility of the Eurostoxx 50 index may have decreased markedly over recent months, the volatility of the equities making up the index has remained relatively stable (see Chart 1.34). This is attributable to a reduction in the correlation between European equities, reflecting a lower risk of contagion between different countries and business sectors. Finally, the compression of volatility may be partly due to the rise of exchange-traded funds (ETFs) dealing in yield-enhancing structured products, such as covered calls, which have attracted more than USD 70 billion since 2020.[32] These funds hold long positions in equities (e.g. S&P 500 ETF) and sell call options to earn premiums. The issuance of such products may mitigate volatility owing to dynamic hedging of option exposures by banks (i.e. sale of the underlying asset, such as an S&P 500 forward contract), which intensifies as the market rises (and conversely, purchase of the underlying when the market falls). Overall, questions remain over the impact of these strategies on the volatility of equity markets and on the risk of an abrupt rebound in volatility in the event that positions are unwound.

Chart 1.33: Equity market volatility and level of geopolitical risk

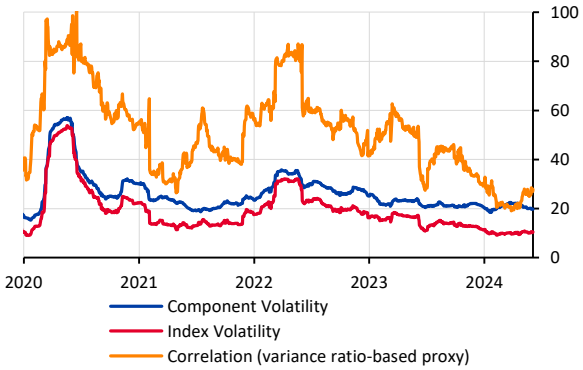
x: risk category / y: implied volatility (VSTOXX) as a %



Sources: Bloomberg, Caldara and Iacoviello (2022), Banque de France calculations.
Notes: The chart shows the distribution of implied volatility (median, 1st and 3rd quartiles) based on geopolitical risk (quantiles from the index by Caldara and Iacoviello, 2022). Level 10 corresponds to the highest risk category. The red dot shows implied volatility in June 2024 and is situated at the current geopolitical risk level (9).

Chart 1.34: Comparison of the volatility of the Eurostoxx 50 index and its components

x: time / y: annualised volatility (%)



Sources: Refinitiv, Banque de France calculations.
Notes: The annualised volatility of the Eurostoxx 50 and of each of its components is calculated daily on a rolling 60-day window. The correlation between the index components is derived from the ratio of the index's variance to the average variance of the components.
Most recent value: June 2024.

Box 1.3: Bitcoin ETFs approval in the United States caused crypto-asset valuations to soar

By Claire Brousse

Between early January and early June 2024, valuation of the crypto-asset market leapt by 53% (see Chart 1.35)**.** The increase was mainly driven by the US Security Exchange Commission's approval of spot Bitcoin ETFs on 10 January 2024, which investors interpreted as a legitimization of crypto-assets by the US regulator.

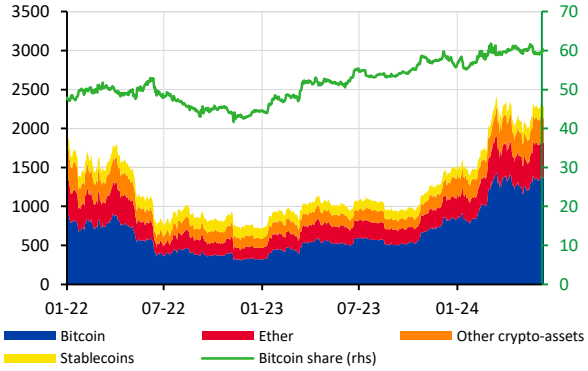
[32] The BIS proposed this idea in its most recent quarterly review. See Todorov K. and Vilkov G. "What could explain the recent drop in VIX?" *BIS Quarterly Review*. 4 March 2024.

Following this announcement, the price of Bitcoin has increased by 56% reaching nearly USD 70,759 in early June, higher than its all-time high in November 2021. Bitcoin accounts for 53% of the crypto-asset market valuation. This increase was reinforced by expectations of the "halving", that took place on 20 April 2024. Built into the Bitcoin protocol, the halving[33] consists in cutting by half the reward for mining[34] each block on the blockchain.

In the short and medium term, spot Bitcoin ETFs could create a new contagion channel between crypto-assets and the traditional financial system. The availability of crypto-asset index funds on regulated markets and their issuance by regulated financial institutions could lead to increased investor confidence in these products.. On the other, market participants may now invest indirectly in crypto-assets without being subject to the constraints associated with direct holding, by using the intermediation of supervised financial entities. This could lead to increased investor participation in the crypto-asset market, particularly for diversification purposes. Since they were launched on the US market, spot Bitcoin ETF flows have amounted to $15.2 billion USD 15.2 billion. The SEC is currently considering the market launch of spot Ether ETFs after approving the registration of Ether ETFs on 23 May 2024 (Ether accounts for 17% of the crypto-asset market valuation).

Chart 1.35: Crypto-asset market valuation and Bitcoin market share

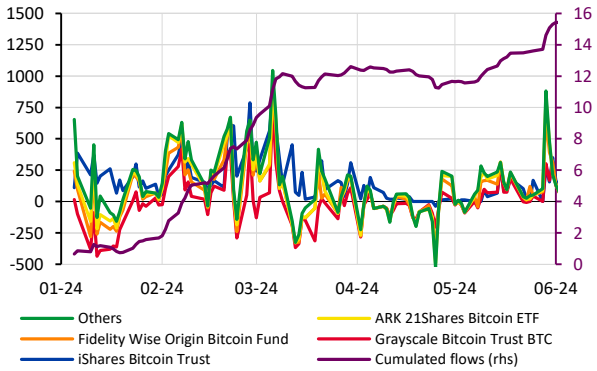
x: time / y [left]: USD billion; y [right]: %



Sources: Eikon.
Most recent value: June 2024.

Chart 1.36: Spot Bitcoin ETFs flows

x: time / y [left]: daily flows in USD million; y [right]: cumulated flows in USD billion



Sources: Bloomberg.
Most recent value: June 2024.

In addition, crypto-asset ETFs could create new interconnections between traditional financial participants and crypto-asset firms (see Chart 1.36). ETF issuers must physically hold the underlying Bitcoins and usually entrust their custody to crypto-asset specialized firms with a strong concentration on the Coinbase crypto exchange. This US crypto exchange holds the Bitcoin reserves of 8 of the 11 ETFs launched on the market, which increases its systemic importance in the event of cyberattacks or a failure. This risk is further exacerbated by the fact that spot Bitcoin ETFs hold 4.5% of Bitcoin in circulation.

National and international regulators are monitoring interconnectedness between financial institutions and crypto-asset markets. To date, spot Bitcoin ETFs cannot be launched on the market in Europe, but US ETFs are accessible to European investors, thereby increasing the interconnectedness between financial institutions and the crypto-asset market. The Markets in Crypto-Assets Regulation (MiCAR), which comes into force in December 2024, will strengthen the supervisory framework and the marketing of financial products linked to crypto-assets at European level.

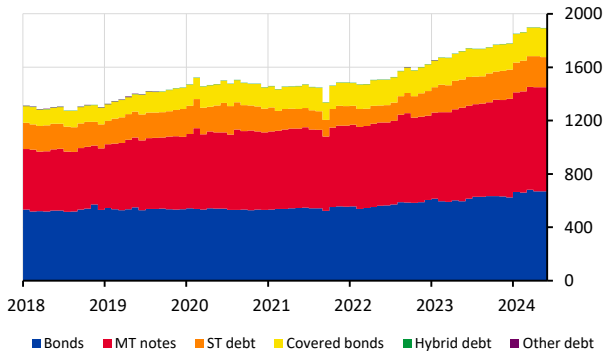
[33] The halving takes place approximately every four years (every 210,000 blocks) to slow the pace of Bitcoin issuance, which maximum supply is capped at 21 million.
[34] Mining refers to the computational power required to validate transactions on the blockchain (Proof-of-Work).

Reduced aversion to corporate credit risk is also perceptible on the bond market

Echoing dynamics in the equity market, the increase in outstanding amounts of corporate bond debt driven by bank issuance and the compression of corporate spreads testify to reduced aversion to corporate credit risk among market participants. Outstanding corporate market debt has increased significantly in France since 2023 (10.9% increase between January 2023 and May 2024), especially for medium-term notes (21.0% increase for the 5Y-10Y segment, see Chart 1.37). Meanwhile, yields on high-yield (HY) debt are continuing to decrease ever since 2022. The French HY-IG spread, which stood at 87 bps on 7 June, has not been as narrow since 2017. However, this situation is not unique to France, as the HY-IG spread in the euro area as a whole has followed a similar path (see Chart 1.38).

Chart 1.37: Outstanding debt of French financial corporations, by type of instrument

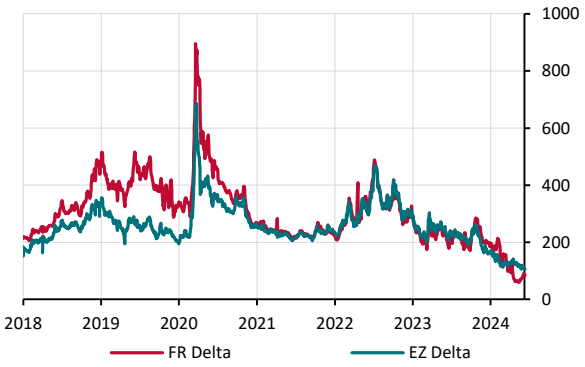
x: time / y: EUR billion



Sources: ECB (CSDB).
Note: Medium-term (MT) notes are notes whose maturity is typically between five and ten years, while ST debt refers to short-term money market instruments.
Most recent value: 31 May 2024.

Chart 1.38: Difference between IG and HY spreads on French and European corporate bonds

x: time / y: difference between HY and IG option-adjusted spreads in basis points

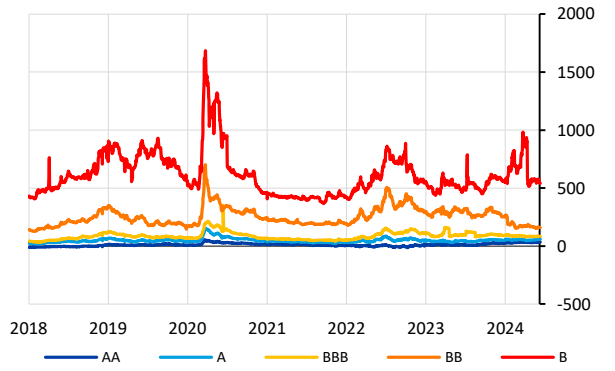


Sources: Eikon.
Note: Spreads are determined using the ICE BofAML Global Bond Index methodology. Underlying securities are corporate bonds issued publicly on the eurobond market or on the domestic markets of euro area member countries, rated by a credit rating agency, and meeting the following criteria: at least 18 months to final maturity at the time of issuance, residual duration of at least one year, a fixed coupon schedule, and a minimum outstanding amount of EUR 250 million.
Most recent value: 7 June 2024.

However, spreads have not narrowed across the entire HY corporate bond market. While spreads on BB debt have decreased to a record low, B spreads remain on par with 2022 levels (see Chart 1.39). In other words, spread compression has chiefly benefited less risky HY debt categories.

Chart 1.39: Spreads on European bonds, by rating

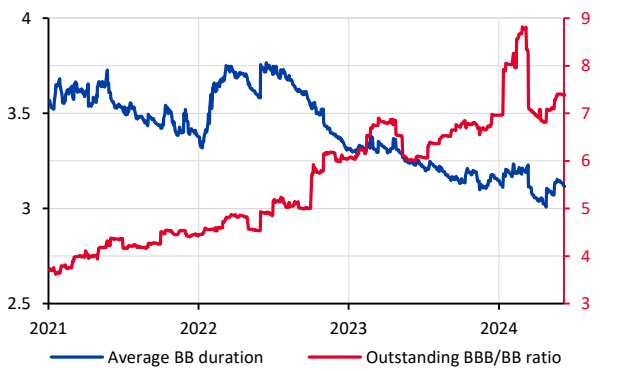
x: time / y: option-adjusted spread in basis points



Sources: ECB (CSDB), Eikon.
Note: Average spreads by rating are calculated based on spreads for companies within the same rating class. For example, AA+, AA and AA- ratings are aggregated as AA ratings.
Most recent value: 7 June 2024.

Chart 1.40: Average duration of BB outstandings and ratio of BBB outstandings to BB outstandings, European NFCs

x: time / y [left]: years; [right]: multiple



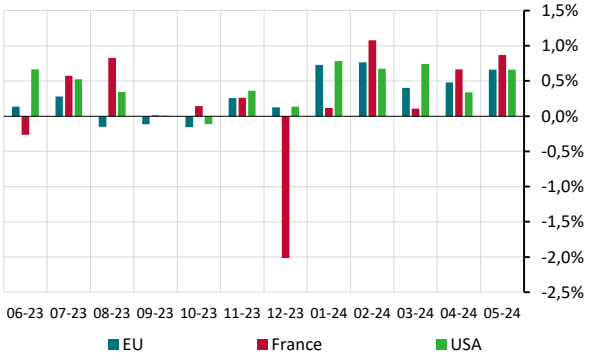
Sources: ECB (CSDB), Eikon.
Most recent value: 7 June 2024.

Spread compression may be partly attributable to a change in the composition of HY bonds. First, the average duration of these securities has shortened. The average duration of BB corporate bonds has fallen in recent years from three and a half to three years. Second, the BB market has shrunk relative to the BBB market (the next IG debt rating segment). The ratio of outstanding amounts on these two markets is approximately 7.0x today, compared with 4.0x in 2021 (see Chart 1.40).

In line with the change in outstanding stocks, bond funds have seen increased net inflows since the end of the first quarter of 2024 (funds invested in sovereign debt and corporate debt combined). This trend is clear in the euro area, as well as in France and the United States (see Chart 1.41). These funds remain exposed to liquidity risk, i.e. a mismatch between the liquidity of liabilities (the frequency with which investors may ask to redeem their units) and the liquidity of the portfolio, which depends on the liquid assets held by the fund, but also the liquidity of the underlying market.

Chart 1.41: Monthly flows into/out of bond funds, by domicile

x: time / y: as a % of total assets at the beginning of the period



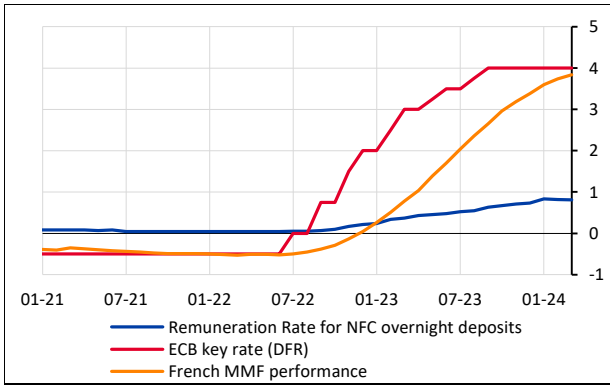
Source: EPFR, Banque de France calculations.
Note: Monthly flows from June 2023 to May 2024. Outflows in December in France were due to heavy outflows from three specific funds.

Higher rates increased the attractiveness of money market funds and strengthened the interconnectedness between banks and money market funds

Higher interest rates contribute to inflows flows into money market funds. Money market funds (MMFs) continue to see inflows in Europe and especially in the United States (see Chart 1.43), despite continued pronounced quarter-end seasonal effects in France, and the end of the tax year in the United States, explaining outflows in April. Investors are showing appetite for these short-term investments, whose appeal stems partly from the fact that their returns are more sensitive to policy rates than the remuneration of bank deposits[35] (see Chart 1.42). French MMFs have seen their total assets increase by 39.5% since July 2022, as performances returned to positive territory (+3.84% in March 2024).

Chart 1.42: MMF returns, remuneration of deposits and policy rates in France

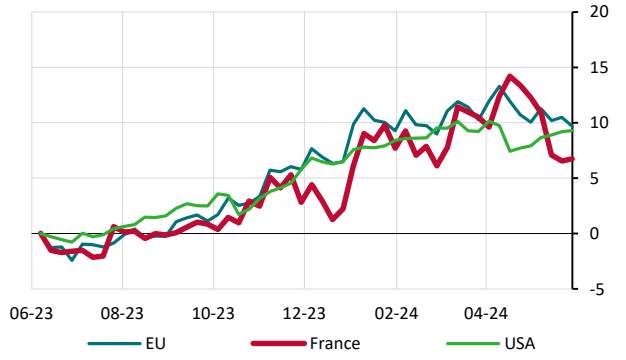
x: time / y: % rate



Source: Banque de France.
Most recent value: March 2024.

Chart 1.43: Cumulative flows into/out of MMFs

x: time / y: % of total assets at the start of the period



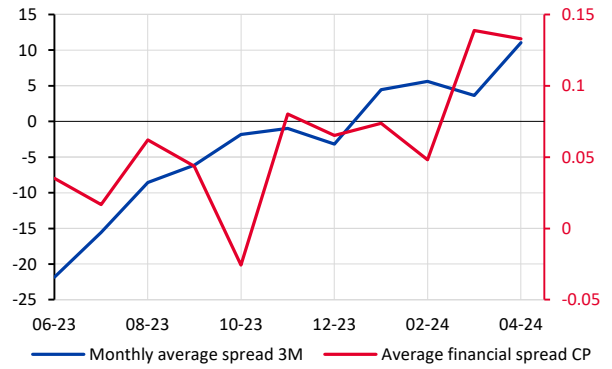
Source: EPFR, Banque de France calculations.
Note: Cumulative flows since 7 June 2023.
Most recent value: 17 April 2024.

At the same time, issuance of bank short-term debt securities (with a maturity below one year) increased. Outstanding bank commercial paper on the French market stood at EUR 238.8 billion in April 2024, for a year-on-year increase of 12.2% (see Chart 1.45). MMFs remain the main investors in this market. Increased issuance has strengthened the interconnectedness between banks and MMFs: outstanding commercial paper issued by the six main French banking groups accounted for 10.3% of outstanding debt securities issued at the end of December 2023, compared with 7.6% at end-March 2022. Besides increasing issuance volumes, higher policy rates have led to higher market rates for financial CP (see Chart 1.44). The repo market also became more expensive, with its spread relative to overnight index swaps (OIS) moving into positive territory since the start of the year in the one-month segment.

[35] Performance shown is calculated over the previous 12 months, which partly explains the lag in the adjustment between policy rates and MMF performance.

Chart 1.44: Repo and financial commercial paper spreads relative to OIS

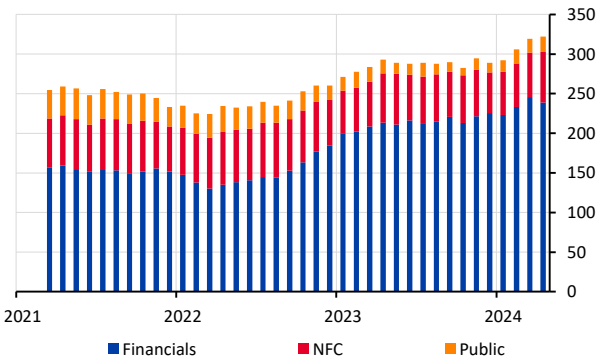
x: time/ y:[left] %, [right] basis points



Source: SFTDS, Bloomberg, STCN, Banque de France calculations.
Note: the repo spread is calculated as the monthly average between the French 1M repo rate and the 1M OIS.
Financial CP has a maximum maturity of one year. The spread is calculated against the OIS of the same maturity.
Most recent value: April 2024.

Chart 1.45: Outstanding commercial paper (France)

x: time/ y: EUR bn



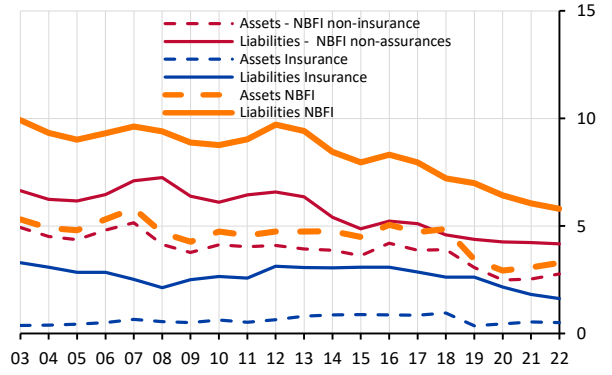
Source: STCN, CSDB, Banque de France calculations.
Most recent value: April 2024.

The banking and insurance sector is interconnected with investment funds but funds' leverage and liquidity risks are contained

Vulnerabilities within funds could materialise as a result of the sector's interconnectedness with the wider financial system (banks and insurers especially). On aggregate, the exposure of French banks' assets to the non-bank sector is moderate (see Chart 1.46). Funds hold mainly short-term bank debt and accordingly represent a moderate share of bank liabilities. However, increased interconnectedness could increase the transmission of shocks between funds and banks, including across borders, since a significant part of French banks' exposure goes through non-resident non-bank entities. Interconnectedness with insurers are mostly via securities holdings. (see Chart 1.47).

Chart 1.46: Claims and liabilities of French banks vis-à-vis resident non-bank finance

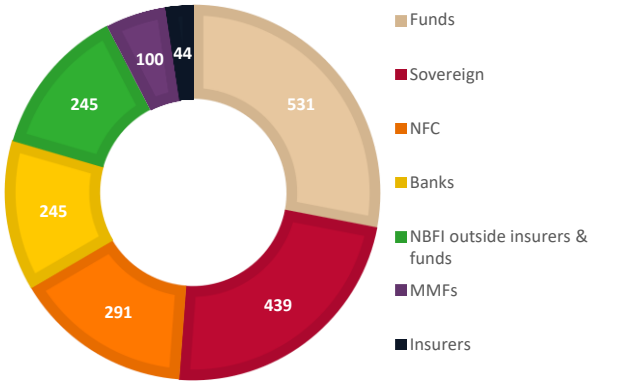
x: time / y: % of total assets of French banks



Source: Quarterly financial accounts, ACPR and Banque de France calculations. Note: Data taken from the FSB annual data collection.
Most recent value: 2022.

Chart 1.47: Decomposition of the securities portfolio of French insurers, by sector counterparty

EUR bn



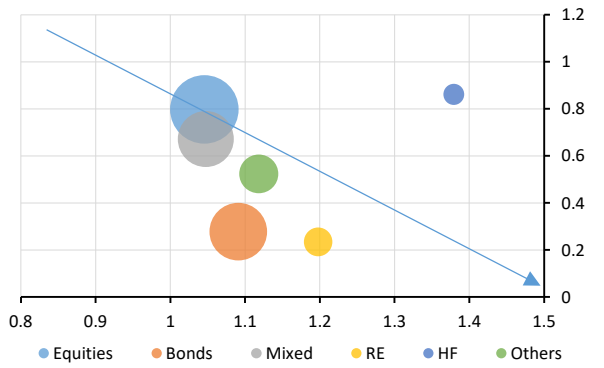
Sources: SHS, Banque de France calculations.
Note: Data in Q3-2023. Debt securities, equities, fund units held by European residents (or non-Europeans if the depository is European).
Most recent value: Q3 2023.

Funds are exposed to liquidity risk differently based on their assets and liabilities characteristics. A liquidity mismatch could make funds more vulnerable to shocks and lessen their ability to meet redemption requests from investors. The mismatch occurs if investors can ask to redeem their units (liquidity of liabilities) at a frequency that

exceeds the ability of the fund to sell securities held in the portfolio to honour these requests (liquidity of assets). Liquid assets (cash, short-term securities, MMF units) may be used to partially honour redemption requests. Portfolio liquidity also depends on the liquidity of underlying markets and on the similarity of the portfolios of investors operating on the market. Bond and mixed funds seem to be more exposed to liquidity risk than equity funds, since listed shares are usually more liquid than bonds (see Chart 1.48 for the euro area and 1.49 for France): the aggregate liquidity measure of these funds, which is broader than their strict liquidity ratios is among the lowest, but with limited leverage. In France, real estate funds have lower frequency redemption periods, allowing them to have open-ended structures with better asset/liability alignment.

Chart 1.48: Comparison of leverage and liquidity levels of open-ended funds in the euro area

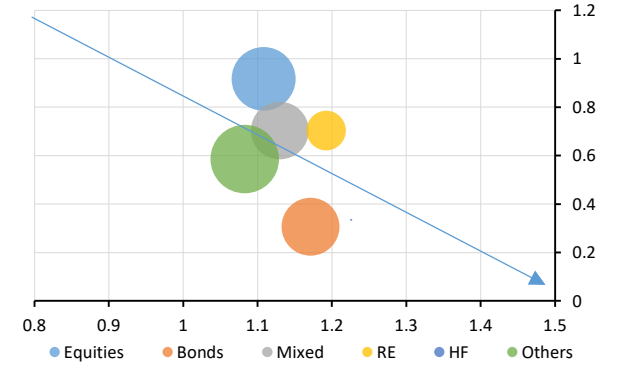
x: leverage / y: liquidity



Source: ECB, IVF, Banque de France calculations.
Note: the liquidity ratio is defined as the ratio of deposits maturing in less than one year, fund shares units held, debt securities maturing in less than one year, euro area sovereign bonds and equities issued in advanced economies, to issued fund sharess. Leverage is defined as the ratio of total assets to total units issued. Higher ratios indicate greater levels of vulnerability. RE funds denote real estate funds, while HF denotes hedge funds.
Most recent value: Q1 2024.

Chart 1.49: Comparison of leverage and liquidity levels of open-ended funds in France

x: leverage / y: liquidity



Source: ECB, IVF, Banque de France calculations.
Note: the liquidity ratio is defined as the ratio of issued fund units to deposits maturing in less than one year, fund units held, debt securities maturing in less than one year, euro area sovereign bonds and equities issued in advanced economies, to total issued fund shares. Leverage is defined as the ratio of total assets to total units issued. Higher ratios indicate greater levels of vulnerability. RE funds denote real estate funds, while HF denotes hedge funds.
Most recent value: Q1 2024.

The risk of excessive leverage in France appears to be contained. Real estate funds and hedge funds, which are considered to have significant use of leverage at the European level, have contained leverage on aggregate in France,[36] although they represent a small share of the total assets of French funds. Charts 1.48 and 1.49 show only financial leverage and thus exclude synthetic leverage via derivatives markets.

1.4 Banks and insurers are showing continued resilience in the face of rising funding costs and non-financial sector risks

The tightening of monetary policy did not affect the size of the balance sheet of French banks, but their interest margins have suffered as the cost of liabilities has risen faster than the cost of assets

Monetary policy tightening in the euro area did not affect the size of the aggregate balance sheet of the six largest French banks, which remained stable over the last two years at EUR 8,671 billion, unlike that of their Eurosystem peers, which contracted slightly over the same period (see box). In particular, although it is tending to slow, lending by French banks has grown briskly, with a 4.9% increase over two years, supported on the liabilities side by deposit growth and the issuance of securities to replace TLTROs. Over the past year, loans and advances to NFCs and households have risen at a slower pace (+0.6% year-on-year, for a total of EUR 3,812 billion) and at a lower pace than the deposits of thesecounterparties (+2.5% year-on-year increase, for a total of EUR 3,623 billion).

[36] The threshold beyond which leverage is considered to be "excessive" depends on the type of fund (open- or closed-ended), its level of interconnectedness with the wider financial system, and the nature of leverage (financial or synthetic). For example, in 2023 the Central Bank of Ireland introduced a macroprudential measure, via Article 25 of the AIFMD, to limit the leverage of real estate funds to 60% of their total debt relative to their total assets.

On the liabilities side, the repayment of TLTROs (EUR 265 billion over one year) was notably offsetr by securities issuance (EUR 248.4 billion increase, or 2.9% year-on-year).

Box 1.4: The aggregate balance sheet of France's six largest banks has remained stable since monetary policy tightening was announced, with lending continuing to be brisk

By the Centre de Modélisations Analytiques

Over the two years from March 2022 to March 2024, normalisation and then tightening of Eurosystem monetary policy did not alter the size of the balance sheet of France's six largest banks (see Chart 1.50), which was unchanged at EUR 8,671 billion.

Chart 1.50: Aggregate assets of the main French banks (Top6, EUR 12 billion increase)

March 2022 (EUR 8,659 bn) vs. March 2024 (EUR 8,671 bn)

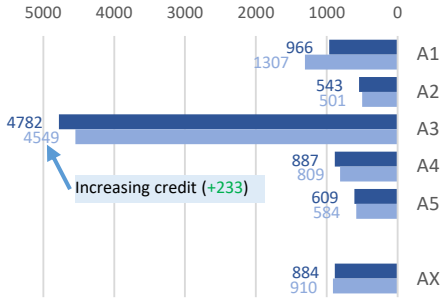
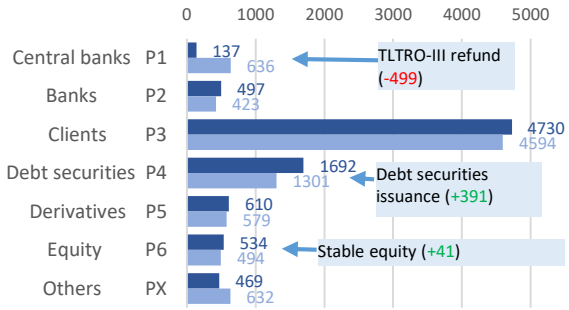


Chart 1.51: Aggregate liabilities of the main French banks (Top6, EUR 12 billion increase)

March 2022 (EUR 8,659 bn) vs. March 2024 (EUR 8,671 bn)



Sources: ECB data & Banque de France calculations.

By way of comparison, the trend is different for a sample of the 22 largest Eurosystem banks excluding France, as total assets shrank by EUR 163 billion between end-March 2022 and end-March 2024 to EUR 12,180 billion. Credit growth over the period was proportionately weaker than at the main French banks (see Chart 1.52).

Chart 1.52: Aggregate assets of the main European banks excluding France (Top 22)

March 2022 vs. March 2024

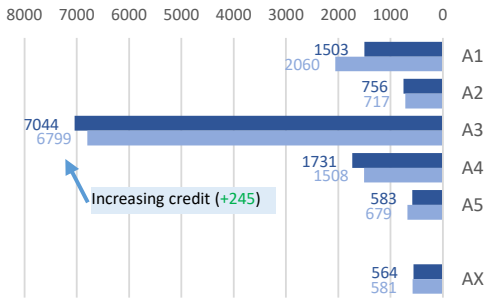
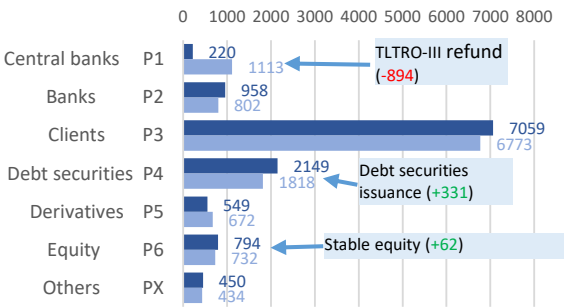


Chart 1.53: Aggregate liabilities of the main European banks excluding France (Top 22)

March 2022 vs. March 2024



Sources: ECB data & Banque de France calculations.

The increased reliance on market financing pushed up the funding cost of French banks and penalized their net interest margin (NIM), which was generally affected by the fact that the cost of liabilities rose faster than the increase in interest income earned on assets. Accordingly, the NIM of the six main French banks, which makes up more than 40% of net banking income, contracted by 8.6% in 2023 to EUR 63.9 billion. Quarterly data for March 2024 show that NIM was broadly unchanged relative to March 2023 (increase of 0.9% to EUR 15.6 billion). The structural features of the French banking model mean that the net interest margin of the main French banks is likely to remain less sensitive to interest rate fluctuations than that of their European peers (see box).

Box 1.5: The net interest margin of the main French banking groups should remain less sensitive to interest rate fluctuations than that of their European peers

By the Centre de Modélisations Analytiques

Overall, the recent increase in interest rates boosted the cumulative net interest margin of the main European banks[37] in 2022 and 2023, while that of French banks was relatively stable. This unusual change in the net interest margin of French banks may have surprised observers, but it can be explained by the differences observed in the structure of their aggregate balance sheet.

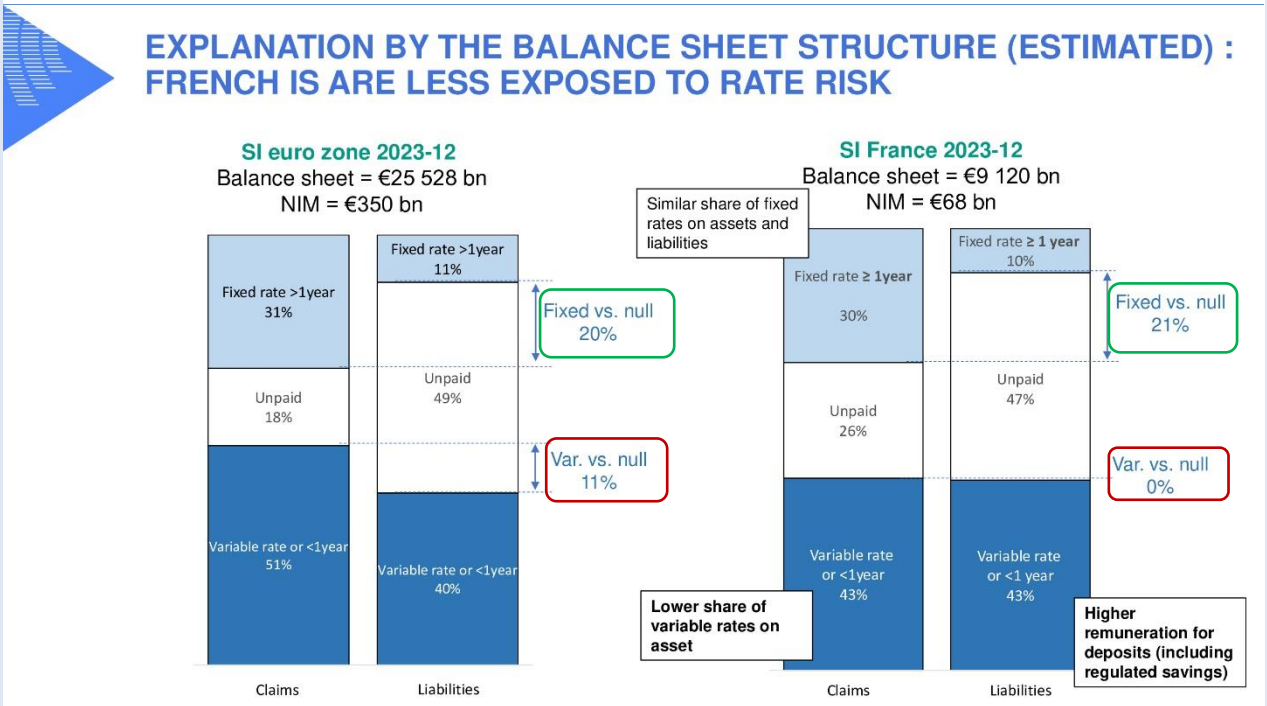
For French banks, at end-2023, the balance is almost perfect between asset and liability items earning floating interest rates, or, equally, subject to a fixed rate revisable in less than one year. They each account for 43% of total assets, meaning that banks' net floating-rate assets were close to zero. Conversely, on the aggregate balance sheet of European banks, net assets earning floating rates are equivalent to 11% (= 51% for assets – 40% for liabilities) of total assets. Accordingly, when interest rates go up, the net interest margin of European banks is structurally growing, while that of French banks will stay the same. Note also that net fixed-rate assets maturing in more than one year make up approximately 20% of the total assets of both European banks and French banks, so the discrepancy between them is not large (see Chart 1.54.)

The recent trend in the net interest margin of the main European banks has been accurately modelled[38] based on the observed macroeconomic scenario and accounting and prudential data gathered by the ECB.

This modelling approach has been used to conduct a five-year projection exercise aimed at estimating the aggregate annual net interest margin of the main European (and French) banks, within the framework of a scenario based on the Eurosystem's economic forecasts (Charts 1.55 and 1.56).

[37] "Main banks" are understood here to mean all banks classified by the ECB as "significant institutions".
[38] "Projecting Banks' Net Interest Income: an Asset-Liability approach applied to the Euro Area", *Working Paper* No. 931, December 2023.

Chart 1.54: Comparison of the aggregate balance sheet structures of the main European and French banks

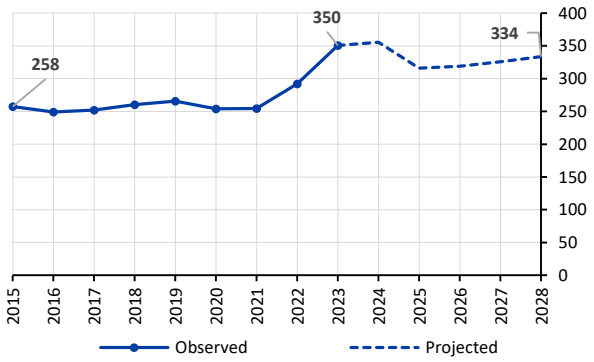


Sources: ECB & Banque de France calculations.

The five-year projections indicate that the NIM of European banks should decline slightly while remaining within a range of between EUR 300 billion and EUR 350 billion, or well above that observed through to 2021, when net interest margin was steady at around EUR 250 billion. The contribution by French banks to this margin is expected to stay within a range of EUR 60-80 billion, or close to the observed average.

Chart 1.55: Historical and projected cumulative net interest margin of the main European banks

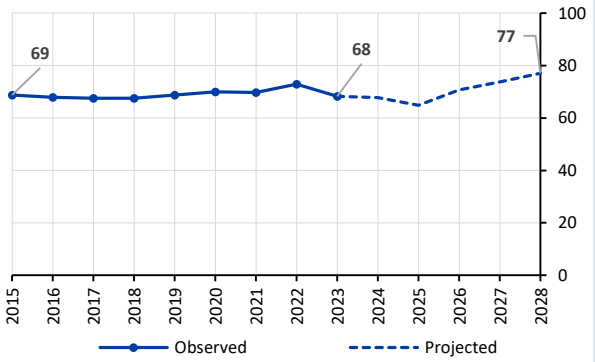
x: time / y: EUR billion



Sources: ECB data & Banque de France calculations.

Chart 1.56: Historical and projected cumulative net interest margin of the main French banks

x: time / y: EUR billion



Sources: ECB data & Banque de France calculations.

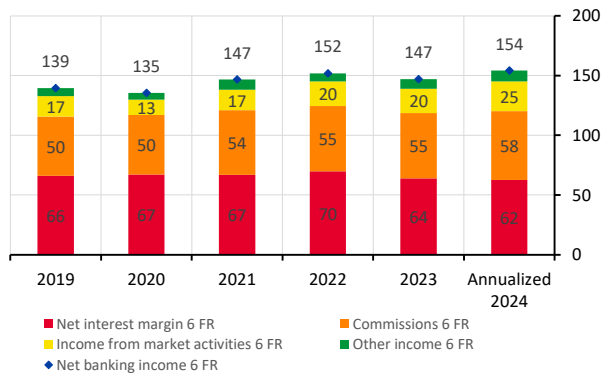
These projections, were prepared in a non-stressed framework, are for information purposes: they are not forecasts. However, when the main parameters of the underlying scenarios for interest rates and new business volumes are varied, the resulting differences remain minor, pointing to the strong resilience of French and European banking systems.

NB: Net interest margin makes up the lion's share of banks' earnings: it primarily includes interest earned/paid on i) non-financial customer loans/deposits; ii) loans to/from other banks - including central banks - and iii) interest on securities held/issued, plus income from interest rate derivatives used to hedge these transactions. Note also that, although standardised by banking supervisors, net interest margin is also dictated by accounting choices, which vary from institution to institution. In particular, the interest generated by some bond portfolios could, if securities are measured at fair value, be booked under income from market activities rather than net interest margin. This practice is widespread among French banks and may reduce their interest margin (and commensurately increase their market income) compared with other European banking groups.

The 2023 net banking income (NBI) amounted to EUR 146.9 billion (down 3.3%),benefiting from the diversification of French banks' income sources, which included commissions (EUR 54.7 billion) and income from market activities EUR (20.2 billion). Figures for the first quarter underline the significance of these other income sources, with commission income in particular historically high levels, while NIM was below EUR 16 billion. On an annualised basis and notwithstanding seasonal effects, NBI could grow by around 5% (see Charts 1.57 and 1.58). The NIM of French banks is expected to recover gradually over the course of the year: interest expense on liabilities should stabilise, while interest income is expected to go up as outstanding loans are rolled over. In contrast to French banks, other comparable euro area banks[39] benefited rapidly from higher interest rates and their NIM increased sharply (by 21%). Since the latter accounts for over 60% of NBI, it pushed net banking income up by 14% in 2023. Projections using data from the first quarter of 2024 show that NIM is set to continue growing, but more slowly, while commission income is expected to increase.

Chart 1.57: Annual NBI – 6 banking groups, FR

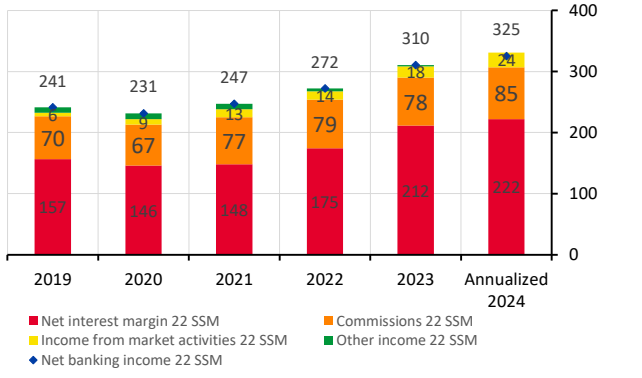
x: year / y: amount in EUR billion



Source: regulatory data, ACPR calculations.
Most recent value: March 2024.

Chart 1.58: Annual NBI – 22 banking groups, SSM excl. FR

x: year / y: amount in EUR billion



Source: regulatory data, ACPR calculations.
Most recent value: March 2024.

French banks continue to report strong levels of liquidity and solvency, underlining their resilience

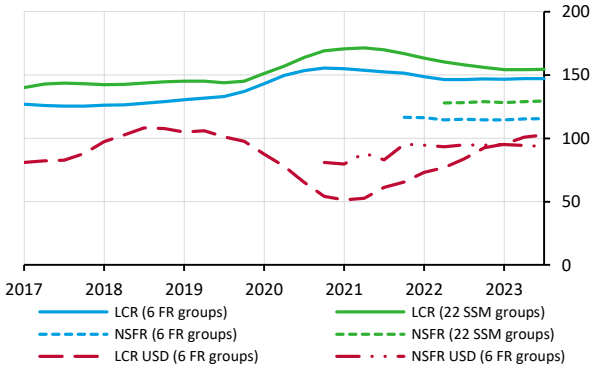
The regulatory liquidity ratios of the main French banking groups increased slightly over 2023 and in the first quarter of 2024 (see Chart 1.59). These indicators were not affected by the severe stress experienced by the financial system in the first half of 2023 connected with regional bank failures in the United States and UBS's takeover of Credit Suisse. The risk of contagion to European institutions was largely contained. The one-year rolling average of the aggregate liquidity coverage ratio (LCR), which tracks short-term liquidity, stood at 147.2% in March 2024, well above the minimum requirement of 100%.

The net stable funding ratio (NSFR), which tracks longer-term liquidity, was also above the minimum requirement and came to 115.5% in March 2024, up 0.44 basis points over one year, reflecting the fact that funding requirements (+3.3%) increased by less than funding resources (+3.7%).

[39] *Sample of 22 euro area banks supervised by the Single Supervisory Mechanism (SSM).*

Chart 1.59: Regulatory liquidity ratios of the six main French banks and 22 main European banks

x: time / y: % rate



Source: COREP data. The AGORA database, which is used for cross-country comparisons, provides NSFR data only from December 2022. Most recent value: March 2024.

The funding structure of France's banking groups is largely diversified between "wholesale" funding and retail customer deposits; resources in USD have made up a stable share since 2019 (20.7% of total funding in March 2024). French banks continue to have satisfactory access to market financing, which is diversified in terms of the investor base and products. They enjoyed strong demand from investors in 2023, allowing them to issue a large amount of securities (see above).

The solvency ratios of French banks also remain comfortably above the regulatory requirements. The aggregate Common Equity Tier 1 (CET1) solvency ratio of the six main French banking groups reached 15.41% at end-March 2024, down by 14 bps over one year, as the 3.1% increase in CET1 (numerator) was offset by a 4% increase in risk-weighted assets (denominator). The solvency ratio of France's banks is 1.1 percentage points higher than that of their European peers in the SSM.

The cost of risk and exposure of the French banking sector to commercial real estate remain low

The overall asset quality of France's six main banking groups[40] deteriorated slightly owing to the macroeconomic downturn and continued normalisation in the number of corporate failures, which reverted to pre-Covid levels. The NFC non-performing loan ratio increased to 3.7% on 31 March 2024 (up 0.3 of a point over one year) and could keep rising, particularly if the number of corporate failures continues to normalise. Three sectors have NPL ratios of more than 8%, but relatively low loan volumes relative to total outstanding loans to NFCs (EUR 1,805 billion): i) building and public works (8.2%, EUR 83 billion); ii) accommodation and food services (8.6%, EUR 45 billion) and iii) health (9.2%, EUR 37 billion). The household NPL ratio is steady at 2.1%.

Cost of risk remains under control but could increase in 2024. French banks have a relatively low cost of risk in volume terms, **comparing favourably to other SSM banks** (EUR 10.6 billion in volume terms, 6 bps difference relative to other banks in the ratio of the cost of risk to customer outstandings). With the slower pace of growth and normalisation in the number of NFC failures, French banks are likely to be faced with increased cost of risk in 2024, following a deterioration in the quality of their assets.

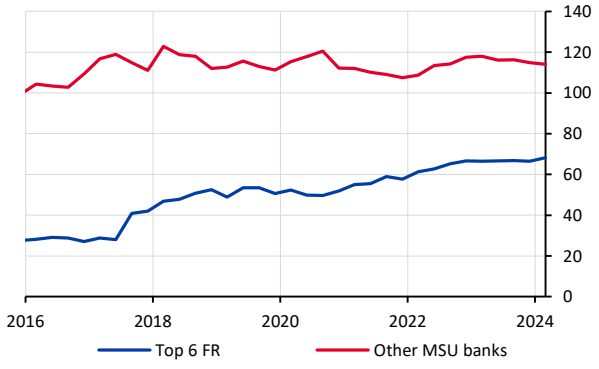
French banks' commercial real estate exposures are relatively small compared with their European peers. Based on regulatory data, loans and advances granted by the six main French banks to companies and secured by commercial real estate totalled EUR 277.2 billion on 31 March 2023, up 5.9% over one year, or 3.2% of total assets and 67.9% of CET1 (compared with an average of 115.1% for other SSM banks, see Chart 1.60). The vast majority of these loans and advances (72.9%) are to counterparties resident in France, while counterparties resident in the United States make up a mere EUR 2.9 billion, or 1.1% of total loans and advances.

[40] BNPP, Société Générale, Groupe Crédit Agricole, BPCE, Groupe Crédit Mutuel and La Banque Postale.

The credit quality of French banks' commercial real estate exposures remains above that of their European peers. The NPL ratio edged up to 3.3% on 31 March 2023 (increase of 0.4 of a point over one year), but remains below the average among other SSM banks (4.6%). The provisioning ratio for non-performing loans granted by French banks to companies and secured by commercial real estate stood at 30.1% on 31 March 2023, which is relatively high, and when the share of collateral and sureties for these loans is taken into account (62.3%), the overall NPL coverage rate (provisions + collateral and sureties) stands at 92.8% (see Chart 1.61).

Chart 1.60: Loans to companies secured by commercial real estate as a % of CET1 – French banks versus other SSM banks

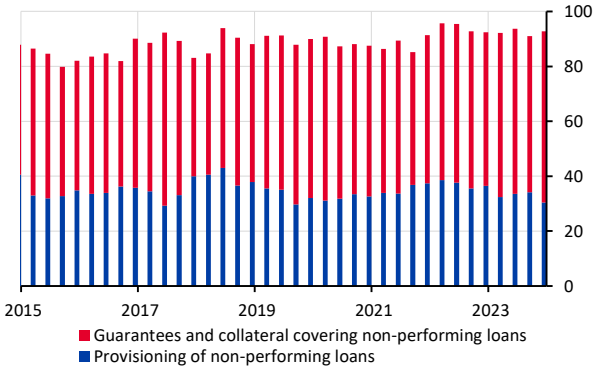
x: time / y: % rate



Sources: ACPR (FINREP 18 report).
Most recent value: March 2024.

Chart 1.61: Coverage through provisions, collateral and sureties of NPLs granted by French banks to companies and secured by commercial real estate

x: time / y: % rate



Sources: ACPR (FINREP 18 report).
Most recent value: March 2024.

The exposure of French banks[41] to leveraged finance remains relatively low but increased over the first quarter of 2024, following a sharp decrease in 2023. It reached EUR 184 billion at end-March 2024, or roughly the same as at end-March 2023. This exposure amounts to 2.2% of banks' total assets (stable over one year). Leveraged loans in the banking book account for 87% of this exposure, or an outstanding amount of EUR 159.7 billion, and make up 8.8% of total NFC lending by five of the six French banking groups.

Over the first quarter of 2024, issuance of leveraged loans rose, amounting to EUR 10.1 billion, or 60% up on the low point in the first quarter of 2023, but remained below the long-run average of EUR 12.2 billion. **However they still present an intrinsically high level of risk,** as around 51% of issues have leverage of more than six times and over 68% have few or no covenants.

The NPL ratio in this segment has jumped since the third quarter of 2023, reaching 9.1% on 31 March 2024 (up 2.7 points on 31 March 2023). The gap with the NPL ratio for other NFC lending is widening. In addition, there is a substantial 16-point difference in coverage ratios for outstanding leveraged loans (29.3%) versus non-leveraged loans to NFCs (45.5%).

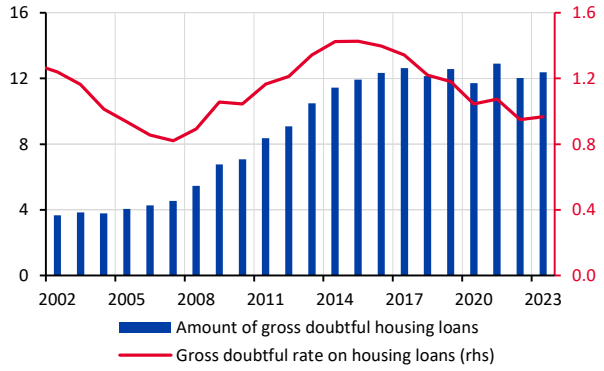
The risks associated with home lending by French banks remain contained (see Chart 1.62)**.** Based on data collected by the ACPR as part of its annual home lending survey, the ratio of doubtful home loans[42] by French banks[43] was stable at 0.97% on 31 December 2023 (0.02 of a point higher than one year previously). According to data collected by the European Banking Authority (EBA) as part of its EU wide Transparency Exercise, the share of

[41] The data concern only the five largest French banking groups: BNPP, SG, GCA, BPCE and GCM, for which we are able to track exposure to and issuance of leveraged transactions over time. Banque Postale submitted specific reporting for the first time only at the end of 2023.
[42] A doubtful loan is a loan where there is uncertainty over the borrower's ability to repay the loan or pay the interest due.
[43] Home loans granted by French banks to economic agents based on French territory or intended to finance assets located on French territory.

non-performing loans[44] to retail customers and secured by real estate[45] was 0.75%[46] in June 2023 for borrowers resident in France, which is lower than the average reported by European banks (0.94%, see Chart 1.63).

Chart 1.62: Gross outstanding doubtful home loans granted in France (in EUR billion) and as a % of total outstandings

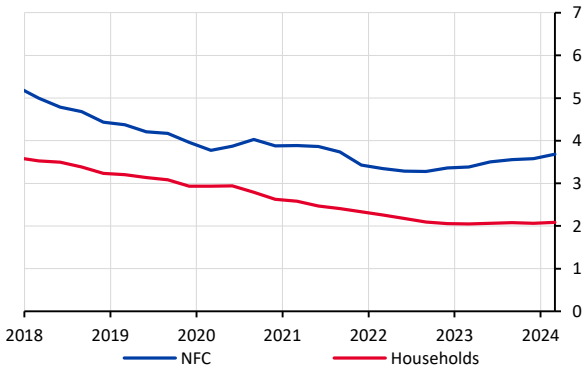
x: time / y [left]: amount in EUR billion; [right]: % rate



Source: ACPR, annual home loans survey.
Most recent value: 2023.

Chart 1.63: NPL ratios, by asset class

x: time / y: % rate



Sources: ACPR (FINREP 18 report).
Most recent value: March 2024.

Insurers have maintained a sound balance sheet structure and managed to improve their return on assets

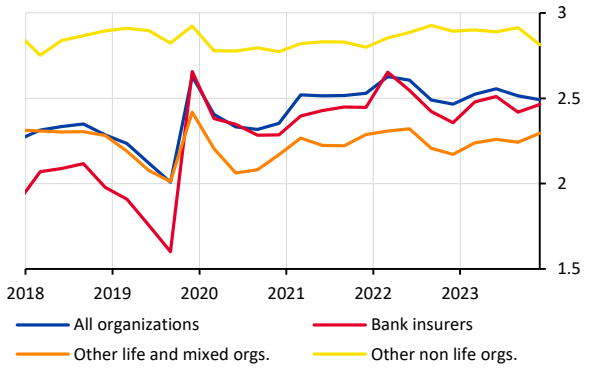
Insurers continue to have a sound balance sheet structure and solid solvency

The overall solvency of insurers is high and has changed little, but individual situations may vary. Insurance undertakings hold own funds that significantly exceed their capital requirements.[47] At the end of the second half of 2023 (cf. Chart 1.64), the average solvency capital requirement (SCR) coverage ratio[48] stood at 249%, compared with 256% at the end of 2023. The decrease particularly concerned "bancassurers" and non-life undertakings and was driven by a reduction in own funds connected with the fall in risk-free rates at the end of 2023.[49] Disparities between undertakings are significant, however. All undertakings have own funds that exceed the regulatory minimum, but 25% of undertakings have a ratio of below 175% while 25% have a ratio of more than 310% (see Chart 1.65). Other non-life undertakings display significant disparities, but their average ratio is over 280%, while bancassurers, which need to be considered in the context of their group's conglomerate structure, have an average ratio of below 250%.

[44] A loan becomes non-performing if information indicates that the borrower is unlikely to repay it or if instalment payments are more than 90 days overdue.
[45] Exposures to retail customers, excluding small and medium-sized enterprises (SMEs), secured by real estate; outstandings subject to the advanced method.
[46] In the data from the EBA's transparency exercise, guaranteed loans are in principle considered to be equivalent to loans secured by real estate.
[47] Around EUR 180 billion at end-December 2023.
[48] The solvency capital requirement (SCR) is the level of own funds needed for an insurance undertaking to meet its obligations over the next 12 months with a probability of at least 99.5%. It is calibrated to ensure that all the quantifiable risks to which the insurance or reinsurance undertaking is exposed are taken into consideration. The SCR coverage ratio is the ratio between eligible own funds and the SCR and must be at least 100%.
[49] In theory, lower interest rates increase the value of long-term technical liabilities (discounted at lower rates) by more than assets (increased value of bond investments). Many other factors also impact the solvency of insurance undertakings, such as surrender risk, the cost of options and guarantees, levels of inflows/outflows, etc.

Chart 1.64: Solvency capital requirement coverage ratio

x: time / y: coverage ratio



Source: ACPR.
Most recent value: Q4-2023.

Chart 1.65: Distribution of SCR coverage ratios, end-December 2023

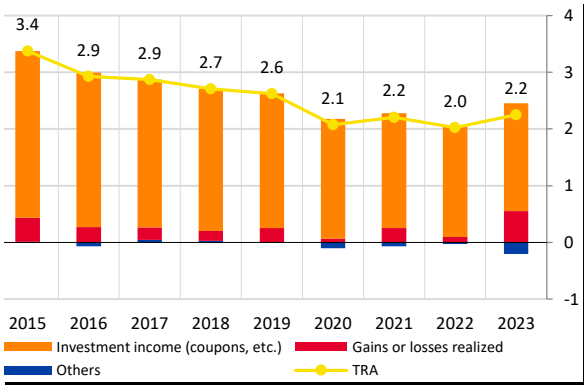
x: type of undertaking / y: 1st quartile, median and 3rd quartiles of coverage ratios

Sources: ACPR.
Value at Q4-2023.

Returns on the investment portfolio of insurers are improving and capital losses are decreasing. The low interest rate environment of recent years has severely constrained the financial income of insurers, particularly bond coupons. Bonds make up about 60% of insurers' investments,[50] ahead of equity holdings (22%). Today's higher interest rate levels generate improved returns on the portfolio of insurers, which can reinvest maturing bonds in higher-yielding securities. These gradual improvements are translating into an increase in the average return on assets of life insurers, which stood at 2.5% in 2023 compared with 2% in 2022 (see Chart 1.66), ending the virtually steady decline of recent years. Moreover, owing to the slight decrease in interest rates in the fourth quarter of 2023, bonds represented unrealised capital losses of around 3% across the overall investment portfolio at end-2023 compared with a loss of 6% at end-2022. Unrealised capital gains continued to be recognised for equities, CIS and real estate, resulting in overall unrealised capital gains of 1%, compared with an unrealised loss of 2% at end-2022 (see Chart 1.67).

Chart 1.66: RoA, life insurers

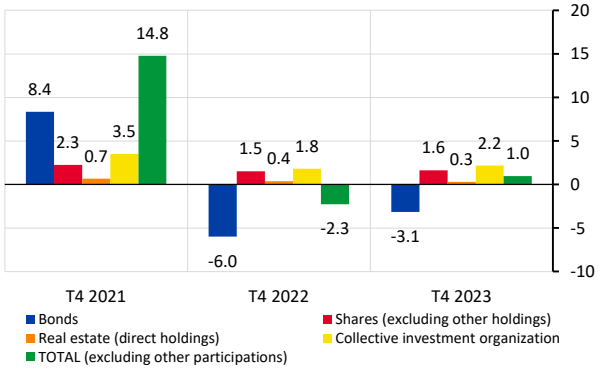
x: time / y: rate of return (%)



Source: ACPR.
Most recent value: 2023.

Chart 1.67: Unrealised capital gain/loss ratio, as a % of the acquisition value of total investments

x: time / y: %



Source: ACPR.
Most recent value: Q4-2023.

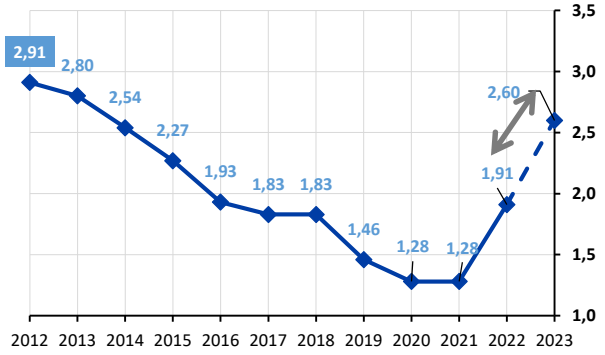
As a result, the revaluation rate for individual life insurance contracts climbed significantly again in 2023, rising to 2.6% (preliminary figure), after 2.0% in 2022 and 1.3% in 2021 (see Chart 1.68). To finance a portion of the return on these contracts, besides taking advantage of the improved return on assets, insurers began to draw on profit-sharing reserves built up during the low-rate period, with a view to keeping step with the rise in interest

[50] After applying the look-through approach to CIS assets.

rates. The reserves thus shrank to 4.5% of technical provisions at end-2023 from 5.4% at end-2022 (see Chart 1.69).

Chart 1.68: Revaluation rate of non-unit-linked investments of life insurance contracts

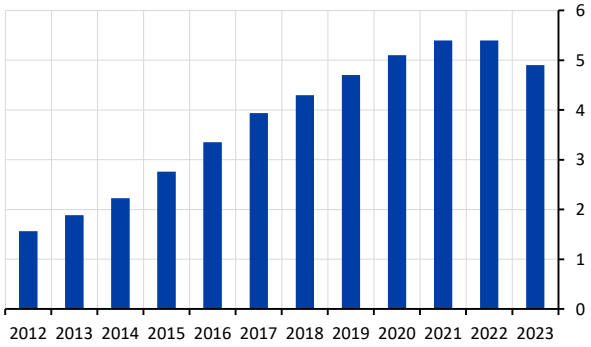
x: time / y: revaluation rate (%)



Source: ACPR.
Most recent value: 2023.

Chart 1.69: Profit-sharing reserves, as a % of the technical provisions of non-unit-linked funds

x: time / y: technical provisions of non-unit-linked funds (%)

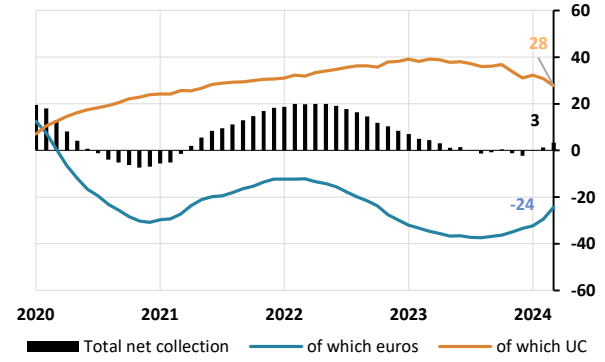


Source: ACPR.
Most recent value: 2023.

Higher interest rates have led to an increase, albeit contained, in surrenders. To offset the decline in the return on euro-denominated funds during the low-rate period, insurers have in recent years promoted investments in unit-linked products, whose market risk is borne by retail investors. While the trend appeared to ease in early 2024, non-unit-linked products have recorded net outflows more or less continuously since the end of 2019. Unit-linked products have provided support to life insurance by posting net inflows across that entire period (see Chart 1.70). With inflation, interest rates and the cost of funding home loans all going up, households may have been encouraged to tap their savings to finance real estate purchases, leading to an upturn in surrenders of life insurance contracts. In addition, the increase in interest rates paid, particularly on bank term deposits, drew some savings towards these products. The average market surrender rate has thus been trending upwards for several months and reached 5.4% for non-unit-linked products at end-2023 (see Chart 1.71). However, this is contained relative to levels seen in the early 2010s and also compared with the proportion of investments that can be easily and immediately converted into cash, which has been around 50%[51] for several years.

Chart 1.70: Net flows into/out of life insurance (12-month cumulative)

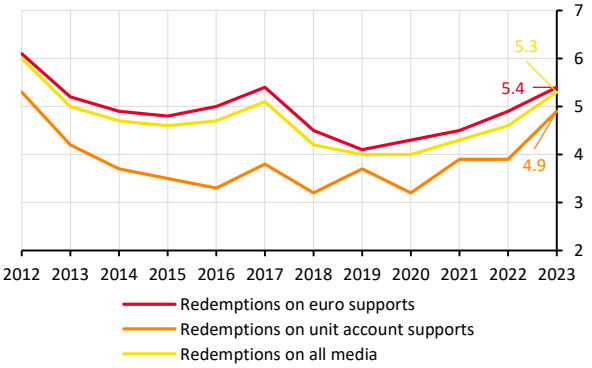
x: time in months / y: net flows (EUR billion)



Source: ACPR.
Most recent value: March 2024.

Chart 1.71: Ratio of surrenders to outstanding life insurance contracts

x: time / y: rate (%)



Source: ACPR.
Most recent value: 2023.

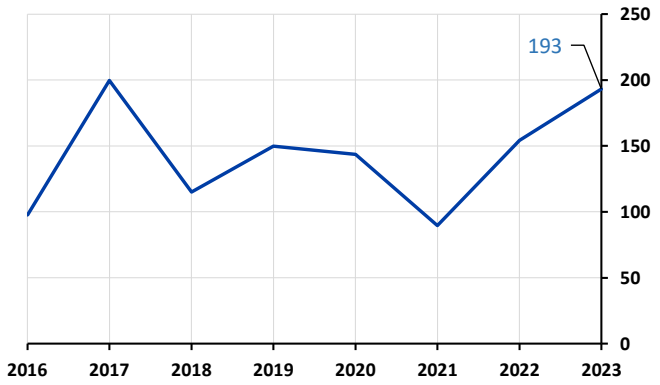
[51] The calculation method for this ratio is inspired by the standards developed by the Basel Committee under the Basel III framework, which introduced a liquidity coverage ratio (LCR) whose purpose is to promote banks' short-term resilience to liquidity risk. This ratio, which is used for example by the European Insurance and Occupational Pensions Authority (EIOPA), represents the share of unencumbered high-quality liquid assets (HQLA) that may converted into cash quickly and easily in private markets in the event of a liquidity crisis lasting three calendar days, relative to all investments.

Underwriting profitability in non-life insurance is improving. In 2022, inflation and natural catastrophes weighed on loss ratios in a number of business lines, especially auto, fire and property insurance. In 2023, the combined ratio (costs of claims and expenses relative to premiums) fell to 98% from 100% at the end of 2022. The improvement was driven by non-life insurance excluding health, whose combined ratio fell from 104% at end-2022 to 101% at end-2023 (see Chart 1.72). The inflationary environment of the past two years, as well as climate change, could however have longer-term effects for guarantees whose prices are not always revised annually. This is particularly true in construction, liability, and death & disability insurance.

In particular, **the increase in the frequency and severity of natural catastrophes** represents one of the main risks to which the non-life insurance sector is exposed. In 2023, the natural catastrophe segment's loss ratio leapt by 36%, while premiums rose by a more moderate 6%. The combined ratio therefore worsened significantly to reach 193%, exceeding the 144% recorded in 2020, a year that featured droughts and flooding, and approaching the level seen in 2017, which was badly affected by Hurricane Irma (see Chart 1.72). Changes in the underwriting result are, however, less volatile and smoothed over several years, as a large share of claims is absorbed by reinsurers, which form a key link in the coverage chain for climate risks thanks to their geographical and temporal diversification. In France, reinsurance against natural disasters does not operate like other categories of insurance through standard market coverage, but rather as a public-private partnership. Specifically, *Caisse Centrale de Réassurance* (CCR – French central reinsurance fund), which is backed by a state guarantee, reinsures virtually the entire market. In 2022 and 2023, the reinsurance balance changed significantly to become markedly positive, but the necessary pricing correction could lead to a short-term increase in the cost of using reinsurance (see Chart 1.73).

Chart 1.72: Combined ratio, natural catastrophe insurance

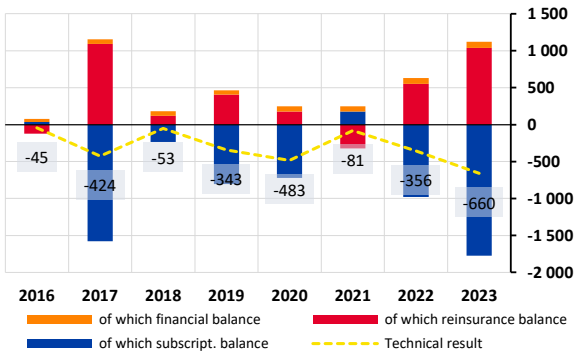
x: time / y: % rate



Source: ACPR.
Most recent value: 2023.

Chart 1.73: Underwriting result components, natural catastrophe segment, since 2016

x: time / y: amount in EUR million



Source: ACPR.
Most recent value: 2023.

Insurers continue to have limited exposure to real estate assets

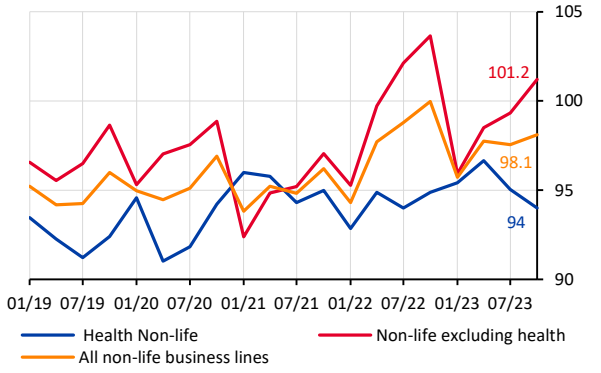
Before applying the look-through approach to CIS, insurers' exposure to real estate assets stood at just under 8% of investments at end-2023 (see Chart 1.75)**.** Virtually all of this exposure corresponds to commercial real estate held via equities and real estate CIS.[52] Over 90% of this commercial real estate is located in the Ile-de-France region and over half is in Paris. Exposure diminished over 2023, owing in particular to negative valuation effects

[52] Assumption: holdings of real estate equities, bonds and CIS are considered to involve commercial real estate exclusively. Direct holdings (analysed in Chart 1.52) make up just 1% or so of investments.

linked to a decline in prices, especially for equities of real estate companies. Unrealised capital gains were down significantly at end-2023, at to 12% compared with 20% at end-2022.

Chart 1.74: Combined ratios at end-September 2023

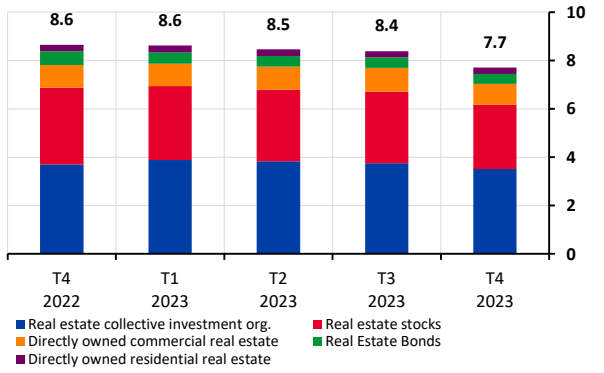
x: time / y: % rate



Source: ACPR.
Most recent value: Q4 2023.

Chart 1.75: Share of real estate in insurers' investments

x: time / y: % rate



Source: ACPR.
Most recent value: Q4 2023.

1.5 At a more structural level, cyber and climate risks remain among the main threats to financial stability

Cyberattacks targeting the financial sector are on the rise, particularly data exfiltration attacks

Amidst a growing digital landscape, cyberattacks targeting the financial sector are on the rise. While the overall number of cyberattacks globally across all sectors in 2023 appears lower than in 2022, a trend that is partly due to geopolitical tensions surrounding the war in Ukraine, cyberattacks specifically targeting the financial sector have been increasing. In 2021, 5% of cyberattacks targeted the financial sector, whereas in 2023, this figure rose to 13% (see Chart 1.76). According to the IMF[53], the potential for extreme losses due to a cyberattack on a financial entity has also increased, reaching $2.2 billion in 2023 compared to $300 million in 2017. The financial sector is particularly exposed to cyberattacks aimed at exfiltrating confidential data for profit.

The upcoming 2024 Paris Olympics further heightens cyber threats to French institutions, infrastructure, and businesses. During the 2021 Tokyo Olympics, 450 million cyberattacks were recorded amidst the COVID-19 pandemic. Experts anticipate eight to ten times that number of cyberattacks during the Paris Olympics[54]. While an increase in cyber incidents targeting French institutions and infrastructure is expected during this period, numerous cybersecurity measures have been deployed for the event.

In January 2024, fintech company EquiLend experienced a ransomware attack, disrupting its services to the financial sector. EquiLend provides securities lending automation services[55], regulatory reporting and data analytics.[56] The cyberattack's consequences were limited as EquiLend disconnected clients from its platform and market participants adapted by using existing manual processes until normal operations resumed. The targeting of EquiLend can be partly attributed to its involvement in a merger and acquisition project [57] , making it more likely to pay the ransom demanded by attackers for fear of jeopardizing the deal. Affiliates of the cybercriminal group Lockbit have already targeted several financial institutions with ransomware attacks, including ION, a provider of trading software for the financial sector, in January 2023, and ICBC New York, a subsidiary of Industrial and

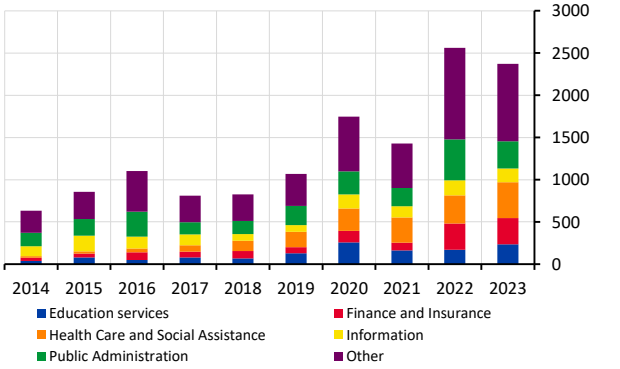
[53] https://www.imf.org/en/Publications/GFSR/Issues/2024/04/16/global-financial-stability-report-april-2024
[54] *JO de Paris 2024: Plus de 4 milliards de cyberattaques prévues, comment les Jeux peuvent-ils résister au hacking? (20minutes.fr)*
[55] Asset managers and banks loan their equities and bonds to hedge funds in return for remuneration. These transactions are vital to short-selling.
[56] Un maillon essentiel de Wall Street pris pour cible par une cyberattaque | Les Échos
[57] Its acquisition by WCAS in mid-2024 was announced shortly before the attack.

Commercial Bank of China that operates as a market intermediary working with clearing houses on the US Treasuries market in November 2023.

Recent technological developments have heightened the threat landscape and industry concerns. The cyber threat landscape is constantly evolving with new technologies, such as generative AI, enabling more sophisticated and harder-to-detect attacks (see Chapter 3). According to the Allianz Risk Barometer 2024,[58] cyber threats are the top global risk for businesses. Furthermore, data exfiltration is the most concerning cyber threat for businesses, followed by cyberattacks against critical infrastructure (electricity or telecommunications providers), ransomware cyberattacks and attacks targeting online service providers (see Chart 1.77). These various attacks could have a systemic impact on the financial system due to its interconnectedness.[59] In France, ransomware attacks increased by 30% between 2022 and 2023.[60] In addition, according to the World Economic Forum (WEF), companies are 2.5 times more likely to pay a ransom when data has been exfiltrated.[61]

Chart 1.76: Increase in cyberattacks, by sector of activity

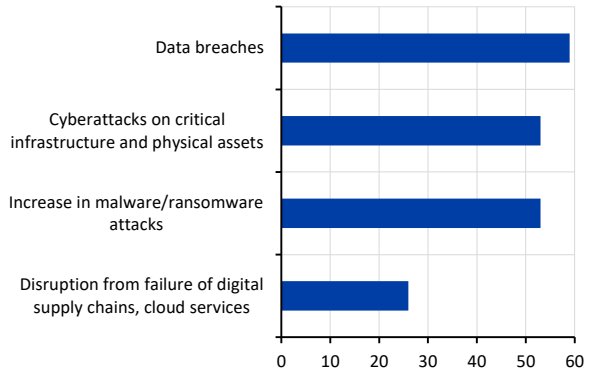
x: time / y: number of identified cyberattacks



Source: CISSM University of Maryland.
Data to end-2023.

Chart 1.77: Types of cyberattacks that companies fear most

x: % rate / y: type of cyberattack



Source: Allianz Risk Barometer 2024.

The resilience of financial institutions is expected to be strengthened by the European DORA Regulation, which will come into effect in January 2025. DORA will mandate, among other things, the establishment of an operational resilience testing program, threat-based penetration testing for critical financial entities, and a framework for overseeing critical IT providers (CTPPs) for the European financial sector. In a report published in April 2024, the European Systemic Risk Board (ESRB) analysed strategic ways to address cyber risk.[62] They include improving information management and sharing, harmonising crisis management and coordination practices, and implementing resolution mechanisms in the event of cyberincidents. The ongoing implementation of a pan-European Systemic Cyber Incident Coordination Framework (EU-SCICF) will also significantly enhance international coordination in the event of an incident.

At national level, the Banque de France coordinates France's Marketwide Robustness Group, a public-private initiative that aims to strengthen the financial stability of the Paris financial center against major operational disruptions. To this end, the GPR organizes annual large-scale crisis simulation exercises, which for several years have centered on a cyberattack scenario. The April 2024 exercise involved a simulated international financial system destabilization campaign orchestrated by a criminal group using data-wiping malware. This exercise was unique in that it was coupled with the second cross-border crisis management exercise of the G7 Cyber Expert Group[63]. The G7 exercise, a result of nearly 18 months of preparation spearheaded by the Banque de France, involved 23 financial authorities across four time zones, with the objective of enhancing their coordination and

[58] Allianz Risk Barometer 2024: Report (survey covering approximately 3,000 companies in 92 countries and 24 sectors of activity).
[59] Assessment of Risks to the French Financial System - June 2022 | Publications (banque-france.fr)
[60] PANORAMA DE LA CYBERMENACE 2023 - ANSSI February 2024
[61] 3 trends set to drive cyberattacks and ransomware in 2024 | World Economic Forum (weforum.org)
[62] ESRB publishes report on operational policy tools for cyber resilience (europa.eu)
[63] Press release: G7 Cyber Expert Group conducts cross-border coordination exercise in the financial sector

response capabilities in the event of a cyber incident with cross-border impacts. Within France, with the participation of over 2,500 financial sector professionals, this exercise once again reaffirmed the significance of public-private cooperation in bolstering preparedness and collective coordination and response capacities in the face of a systemic crisis[64].

The financial system is exposed to climate risk

The most recent report by the Intergovernmental Panel on Climate Change (IPCC), published in March 2023, found that the world's surface temperature had increased by 1.1°C compared with the pre-industrial period. Regardless of the emissions scenario applied, the IPCC estimated that global warming would reach 1.5°C by the start of the 2030s. At the same time, the IPCC noted the growing vulnerability of ecosystems and populations to climate warming and estimated that, compared with its previous estimates, the physical risks (heatwaves, heavy precipitation, severity of droughts, frequency and intensity of rare climate events, accelerated melting of permafrost and Arctic sea ice, etc.) had increased at given warming levels. The succession and accumulation of acute physical phenomena, as well as the rising risk of disorderly transition policies, are creating major risks for financial stability.

Supervisors are therefore paying growing attention to the robustness of financial institutions to climate risks and, in particular, to efforts by banks and insurers to assess and monitor the transition and physical risks associated with climate change. To ensure that financial institutions integrate climate risks into their risk management and strategy, supervisors now have two types of tool at their disposal: climate stress tests and transition plans.

Supervisors use climate stress tests to understand and estimate the exposure of banks and insurers to climate risk. Following an initial pilot exercise by the ACPR in 2021 (which revealed that French banks and insurers have moderate overall exposure to the risks linked to climate change) and a stress test by the SSM in 2022, whose results were mixed, two new exercises were conducted.

In July 2023, the ACPR launched its second climate stress test, which this time focused exclusively on insurers and whose findings were published in May 2024. The exercise aimed to strengthen the capacity of insurance undertakings to anticipate the consequences of climate change and the energy transition on their business in the short, medium and long term, and to adjust their strategies accordingly. Four scenarios (two dynamic long-term scenarios, one baseline and one static short-term scenario) were tested. Whether looking at the short term or the long term, the results of the second climate stress test highlighted significant exposure among insurance undertakings to climate change-related shocks, and underscored the need for insurers to act quickly to recognise climate risks in their strategy, governance and internal models, as applicable. Regarding the exposure of insurers via their investments, a disorderly transition to a low-carbon economy would entail major shocks to the market values of equities linked to fossil fuels, and particularly those linked to coal mining and oil-related activities, which would lead to significant losses of up to 18% depending on the sector and the long-term scenario applied. The real estate sector is also severely affected by 2050 (14% decrease in value) and has a major impact on insurers, because it accounts for a significant portion of their equity holdings (approximately 4.5% of the value of equities and equivalents in 2050 – compared with 0.1% for extraction activities). While sovereign and corporate bonds are proportionately less affected than equities, the most affected fixed income investments in the long term are those associated with the real estate and tech sectors, while those linked to communications and industry appear to be less impacted. As regards to the impact of physical risk, the Nat Cat loss ratio before reinsurance increases by 22% in 2050 between the adverse scenario and the baseline, with strong underlying geographical disparities.

[64] En coordination avec les autorités financières du G7, la Place financière de Paris a mené avec succès un exercice de crise cyber de grande ampleur | Banque de France (banque-france.fr)

Box 1.6: EIOPA/ECB Discussion Paper on insuring climate catastrophe risks

By Aliette Dequet

In France, the natural catastrophe insurance regime, which was established by the Act of 13 July 1982 and is governed by Article L. 125-1 of the Insurance Code, is based on a public-private partnership and features a major role for the state. It works by extending the mandatory and standardised coverage in every property insurance policy (e.g. home insurance), which is covered by payment of an additional premium.

Thanks to this regime, the insurability gap in France is relatively contained, with the IGF estimating that 97% of individuals in metropolitan France were insured against natural catastrophes in 2017. The natural catastrophe insurance regime thus helps to mitigate the physical risk due to climate change. However, the frequency and cost of climate events covered by insurers have increased sharply since 2016, putting the regime's equilibrium at risk. The CCR estimates that the loss ratio could increase solely due to climate by between 27% (RCP scenario 4.5) and 62% (RCP scenario 8.5), on average by 2050.

The government therefore decided at end-2023 to increase the additional premium rates on the property insurance policies funding the regime, starting in 2025. The additional premium applied to home and business property insurance policies will thus rise from 12% to 20%, while for auto policies it will go up from 6% to 9% from 1 January 2025.

This decision chimes with the recent Langreney Report on insurability, which also identified the need to strengthen France's natural catastrophe regime, by proposing, among other things:

- to bolster the regime's financial resources by increasing the additional premium annually (1% increase in the additional premium rate per year), over and above the 20% increase introduced by the government;

- to adjust the additional premium applied based on exposure to climate risk in different geographical areas, in order to equalise the technical margin across the whole country for insurers. An insurer with a larger presence in an at-risk area would therefore be eligible for a smaller premium;

- to put part of the increase in the additional premium towards financing a new individual prevention fund, particularly to support anti-drought measures for homes, such as soil rehydration or installation of waterproof membranes if homes are vulnerable to the risk of clay soil shrinkage/expansion.

Box 1.7: The ecological transition at investment funds

By Vincent Guegan and Dilyara Salakhova

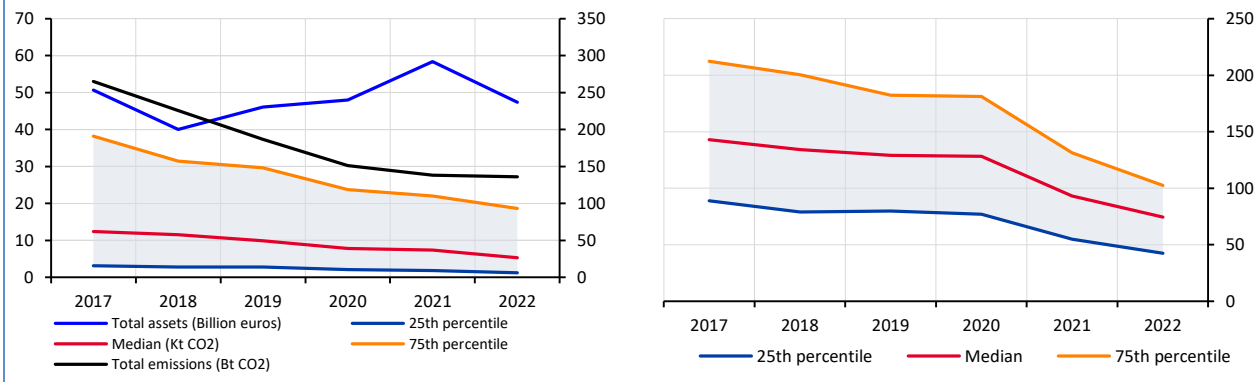
Like other financial institutions, investment funds must manage the financial risks linked to climate change and help to finance the transition to a low-carbon economy. To achieve the goal of carbon neutrality by 2050 set by the European Union, non-financial and financial corporations must take steps to lower their emissions. In this box, we focus on investment funds domiciled in France and whose portfolio is 80% invested in equities on average. In 2022, assets under management at the funds in our sample totalled EUR 240 billion, or approximately 63% of the total assets of equity funds domiciled in France. This study assesses how the carbon emissions of these funds' portfolios changed over the six years from 2017 to 2022 and what factors drove these developments.

European regulations,[65] the Net-Zero Asset Owner Alliance[66] and the ECB[67] suggest two main indicators to assess the transition risk of financial portfolios: financed emissions and carbon intensity of portfolio emissions. Financed emissions, which are measured in tonnes of CO_2 equivalent (CO_2e), show the share of the absolute emissions of corporations financed by a fund holding equities as a proportion of enterprise value. The carbon intensity of portfolio emissions is defined as the weighted average carbon intensity of corporations in the portfolio, i.e. absolute emissions divided by revenue. The two indicators work in tandem. The portfolio's absolute emissions offer a way to measure the real change in emissions, which is essential to assessing whether carbon neutrality has been reached. However, this measure is sensitive to the size of the company and the fund and also to their growth. Emissions intensity offers a way to control for the size of the fund and the company, but measures the carbon efficiency of emissions relative to a financial variable and not necessarily the contribution to actually reducing emissions.

Chart 1.78: GHG emissions (Scope 1&2) of equity fund portfolios between 2017 and 2022

Financed emissions | **Carbon intensity**

x: time / y: EUR billion (right), Mt or KtCO_2e (left); tonnes of CO_2e emissions per EUR million of revenue



Sources: ISS-ESG, CIS, Banque de France calculations.
Notes: GHG – greenhouse gas. The calculation covers all equity and mixed funds domiciled in France that have invested more than 80% of their portfolio in equities. Financed emissions are absolute emissions in tonnes of CO_2e; carbon intensity is the weighted average carbon intensity of companies in fund portfolios (absolute emissions divided by revenue).
Most recent value: Q4 2022.

Financed emissions for all funds in the sample fell by almost 50% between 2017 and 2022, with the main decrease noted before 2020 and stabilisation thereafter (see left-side of Chart 78). In the case of carbon intensity, the trend is reversed for the average fund, with the main decrease occurring after 2020 (see the right-side of Chart 78). The reduction in financed emissions is not linked to a decrease in assets under management, as AUM grew between 2018 and 2021 while emissions shrank.

Changes in carbon intensity are primarily linked to variations in corporations' revenue and to divestment strategies (see the left side of Chart 79). To reach the goal of carbon neutrality, portfolio emissions need to be cut through a reduction in companies' emissions. This factor, however, was weak over the entire period, except in 2020, owing to the Covid-19 effect and the global economic downturn. In the same year, the contraction in corporate revenue fuelled an increase in companies' and funds' carbon intensity, almost completely offsetting the decrease in emissions. Growth in revenue in 2021 accounted for 40% of the decrease in funds' carbon intensity. Divestment – selling off all the equities of a company held by a fund – seems to be a significant factor in the decrease in emissions from 2021, accounting for around 45% of the downturn.

The decrease in carbon intensity for our overall sample is primarily due to two factors: the change in the composition of funds in the sample and also in the composition of companies held in fund portfolios (see the right side of Chart 79). Every year, from 2017 to 2022, the elimination of more polluting funds and the

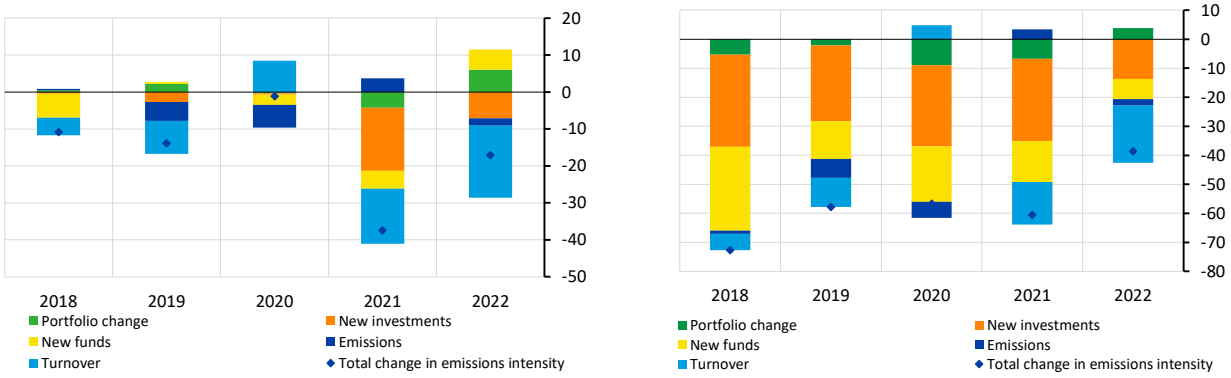
[65] Regulation (EU) 2019/2088 on sustainability-related disclosures in the financial services sector (SFDR)
[66] Target-setting protocol of Net-Zero Asset Owner Alliance convened by UN
[67] ECB carbon emissions indicators

divestment of companies with the highest carbon intensity contributed 44% and 27% on average, respectively, to the reduction in the carbon intensity of our overall sample.

Chart 1.79: Decomposition of the change in carbon intensity, by factor

Entire sample	Funds that reduced their carbon intensity

x: time / y: tonnes of CO_2e emissions per EUR million of revenue



Sources: ISS-ESG, CIS, Banque de France calculations.
Notes: The calculation covers equity and mixed funds domiciled in France that invest more than 80% of their portfolio in equities. The change in carbon intensity is linked to the change in each asset's weight in the portfolio, except in the case of total divestment and purchase of new companies (Chg. portfolio), the change in the emissions of companies held (Emissions), the change in revenue, the difference between purchases of new companies and total divestment (new investment), and the change in the scope of funds (difference between funds added to and removed from the base). Most recent value: 2022.

To reach Europe's goal of carbon neutrality by 2050, it is vital for the financial sector to ensure that the economy's absolute emissions are reduced. Selling high carbon-intensity assets might be a good strategy for reducing the climate risk of individual portfolios, but does not contribute to the transition to a low-carbon economy. Financial institutions must engage with the entities in which they invest to ensure that corporate emissions are genuinely reduced. It is important for asset managers to set up rigorous transition plans, to invest in activities that are eligible for or aligned with the transition objectives, and to develop a clear divestment strategy to signal to companies the financial sector's intentions as regards the ecological transition.

2. French companies facing higher interest rates

By Lucille Collet, Aurélien Espic, Lisa Kerdelhué

Since summer 2022, French non-financial corporations (NFCs) have had to cope with a historical increase in borrowing costs. This chapter begins by assessing the pass-through of higher interest rates to companies over 2023. The transmission of policy rates to the rates on new loans to French companies did not happen immediately but by mid-2024 the process seemed to be complete (see Chapter 1). Since the debt of French companies is largely at fixed rates,[68] the transmission of higher interest rates to macroeconomic aggregates is however still underway (see Chapter 1) and is materialising as corporations deal with new funding needs while activity slows down.

The chapter then sketches out some short-term prospects, based on the individual situations of listed French and European companies at end-2023. Since 2022, debt service has represented a growing burden for these companies;[69] this vulnerability could become more pronounced in 2024, depending on a variety of possible scenarios,[70] as companies gradually refinance their debt stock at higher interest rates. However, this vulnerability is offset by high levels of cash, which give firms room for manoeuvre, such that ultimately, few large French companies appear to be at risk from higher interest rates. Companies viewed as vulnerable, due to substantial indebtedness and a low interest coverage ratio, finance themselves at higher rates than other firms on the markets, but their financing conditions are stable, in an environment featuring risk appetite, and they boast a diversified investor base.

Thus, while some individual firms could become more vulnerable in the short term, on the whole, large French companies look to be resilient to higher interest rates, particularly owing to their solid cash reserves, which give them room to manoeuvre. NFC financing conditions and debt repayment capacity could however deteriorate in a more adverse economic scenario in which interest rates stay high or if market conditions worsen.

2.1 Transmission of monetary policy to companies

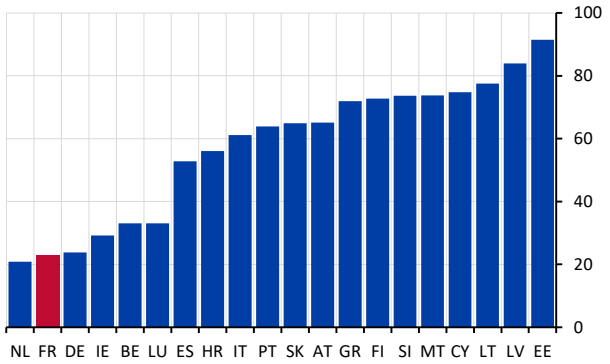
The transmission of monetary policy to French non-financial companies is progressing gradually

In France, funding structures featuring fixed rates and long maturities have shielded non-financial corporations (NFCs) from the rapid increase in rates, but also expose them to a more progressive and more persistent increase in the cost of debt. Floating-rate debt accounted for a mere 22% of total outstanding debt in December 2023 (see Chart 2.1). This low proportion, which has been stable over time, is due partly to the prevalence of market debt, which uses fixed rates more extensively than debt bank does (see Chart 2.2).

[68] See Debt structure and rising interest rates: focus on European companies | Banque de France (banque-france.fr)
[69] This analysis does not apply to SMEs, however (see Box 2.1).
[70] These scenarios are based on the Banque de France's December 2023 macroeconomic projections and on assumptions for the future path of funding costs at large French companies.

Chart 2.1: Share of outstanding floating-rate debt

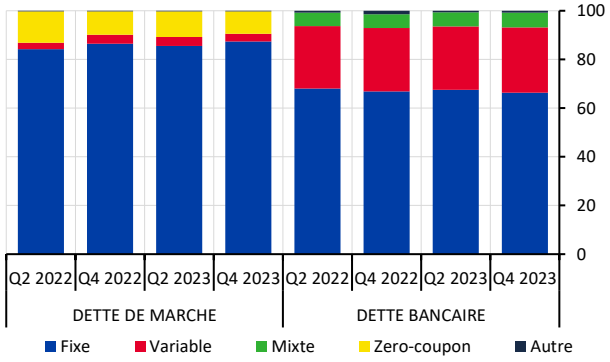
x: country / y: share of outstanding debt, %



Scope: euro area NFCs, December 2023.
Sources: AnaCredit, CSDB.

Chart 2.2: Debt interest rate structure, French companies

x: time / y: share of outstanding debt, %

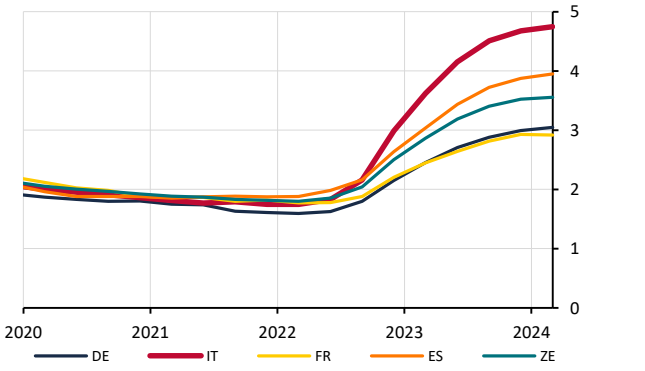


Scope: euro area NFCs.
Sources: AnaCredit, CSDB.
Note: in France, bank lending accounts for 66% of business financing, with debt securities making up the other 34%[71]

If a company chooses to refinance its debt, its average borrowing cost may rise as outstanding fixed-rate debt comes due. The increase will depend on the loan's maturity, repayment arrangements and interest rate movements.[72] The progressive increase in the cost of debt is reflected particularly in the cost of bank financing in France (see Chart 2.3). The average rate on outstanding amounts in Germany and France, in March 2024, was approximately 60 basis points lower than the average in the euro area, owing to the significant role of long-dated fixed-rate loans in both countries.[73]

Chart 2.3: Average cost of outstanding debt bank and issued securities

x: date / y: interest rate, %



Scope: euro area NFCs.
Notes: The detailed databases cover only part of companies' interest-bearing liabilities, which can be monitored using sector data in the national accounts.
Sources: ECB (AnaCredit, CSDB), authors' calculations, Debt structure and rising interest rates: focus on European companies | Banque de France (banque-france.fr)

[71] Financing of enterprises - March 2024 | Banque de France (banque-france.fr)
[72] See Debt structure and rising interest rates: focus on European companies | Banque de France (banque-france.fr)
[73] The average borrowing rate in France could remain below the euro area average, as other structural factors may account for the difference in average NFC bank lending rates in euro area countries.

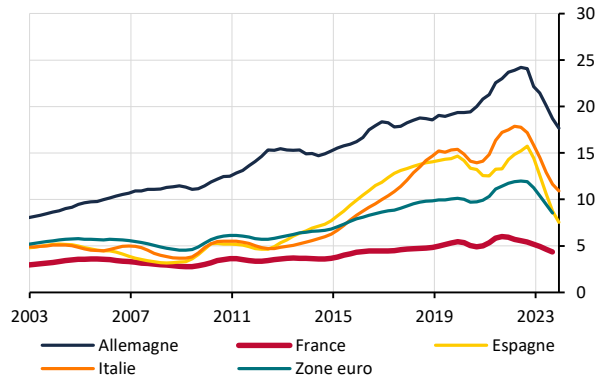
High cash reserves are partly offsetting the increase in borrowing costs, thereby safeguarding the repayment capacity of companies at the macroeconomic level

Upside pressure on interest rates depresses the interest coverage ratio (ICR) of companies in France and other major euro area countries (see Chart 2.4). The ICR offers a way to assess the capacity of a company to pay the interest on its debt. Interest charges have risen with the increase in interest rates. However, profit margin,[74] i.e. the share of gross operating surplus in value added, has remained intact at the macroeconomic level in France. The profit margin of companies, which fell to 31% in 2022 as support measures linked to the Covid-19 crisis were phased out, rebounded to 32.7% in 2023 (average of 31.4% over the 2000–2022 period)[75,76]. The ICR, calculated based on the national accounts as gross operating surplus divided by interest expense, is structurally lower in France than in other large euro area countries due to the share of interest linked to intragroup lending by multinationals,[77] which is relatively significant as a proportion of income.[78]

The relatively high cash reserves of French NFCs are a factor of resilience amid the increase in interest rates, as interest on these reserves has helped, all other things being equal, to cushion the increase in the debt financing burden. The ratio of cash (or liquid assets) to debt provides a proxy for liquidity buffers at the macroeconomic level (see Chart 2.5). In France, company cash reserves were stable between 2022 and 2023 (see Chart 2.6), so the gradual decrease in the cash ratio in France between 2021 and 2023 was due to a slight increase in outstanding nominal debt.

Chart 2.4: Gross ICR

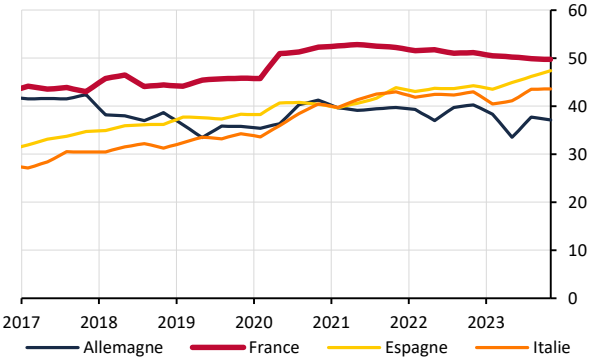
x: date / y: gross operating surplus and mixed income / interest expense



Scope: euro area NFCs.
Most recent value: Q3 2023.
Sources: ECB, QSA.

Chart 2.5: Gross cash buffers

x: time / y: cash[79]/debt, %



Scope: euro area NFCs.
Most recent value: Q4 2023.
Sources: ECB, QSA.

In 2022 and 2023, business leaders' views on their cash positions deteriorated relative to the historical trend (2014-2024) in the Banque de France's monthly survey of business conditions. Steady cash reserves at the macroeconomic level may mask more contrasting individual situations, because increased production and

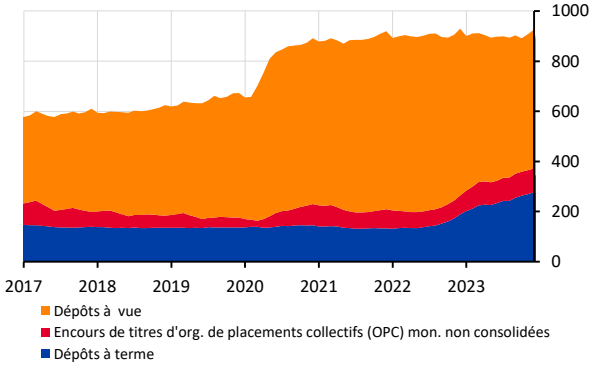
[74] The profit margin shows what is left to the company after paying labour and settling production taxes net of subsidies. A high margin is generally attributable to the use of substantial working capital; it does not necessarily imply a high return on capital employed (gross operating surplus has to be divided by this working capital), but may make it possible to finance investments. Although largely based on business statistics to estimate the NFC account, the national accounts profit margin differs in several conceptual aspects from that of business statistics. For example, in the national accounts measure, the margin is increased to recognise unreported activity at some companies (INSEE, 2024).
[75] Margin, investment and self-financing rates of non-financial companies - France - FRENCH ECONOMY DASHBOARD (insee.fr)
[76] Share of gross operating surplus in value added at factor cost.
[77] Rise in interest rates: European companies will not be affected at the same pace (banque-france.fr)
[78] Interest linked to trade credit is not deducted when calculating interest expense for the sector accounts.
[79] Cash is made up of MMF units as well as sight and term deposits.

borrowing costs affect companies differently depending on their individual cash levels (see Section 2 for an analysis of the diversity of corporate situations). Companies also probably revised target levels for their precautionary cash holdings upwards in a setting of heightened uncertainty, recent inflation and increased funding costs.

The increase in interest rates is prompting companies to reallocate cash to deposits and interest-bearing financial instruments (see Chart 2.7). Net interest flows divided by income, i.e. interest expense net of interest income divided by gross operating income,[80] were relatively stable in the euro area between 2017 and 2023. There were however differences between the large euro area countries. Flows were negative in France in 2022, as interest-bearing cash offset the effects of higher interest rates. The rebound in net interest flows in 2023 in France was attributable to two factors: higher policy rates fed through with a delay to interest expense compared with other euro area countries, and interest income stabilised. Conversely, the stable flows recorded by German companies illustrate the benefits of the savings that these firms have built up.

Chart 2.6: Sources of cash, French NFCs

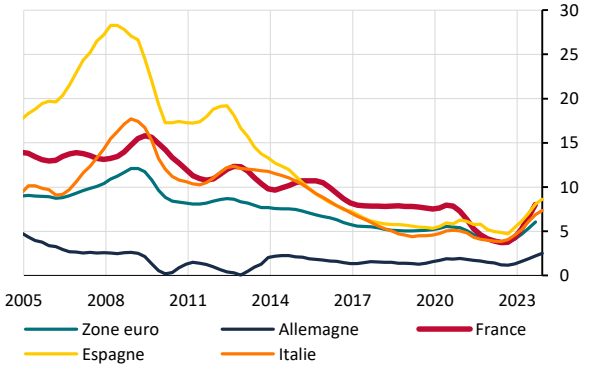
x: time / y: EUR billion



Scope: euro area NFCs.
Most recent value: Q4 2023.
Sources: ECB, QSA.

Chart 2.7: Net interest flows divided by income

x: time / y: (interest expense – interest income) / gross operating surplus



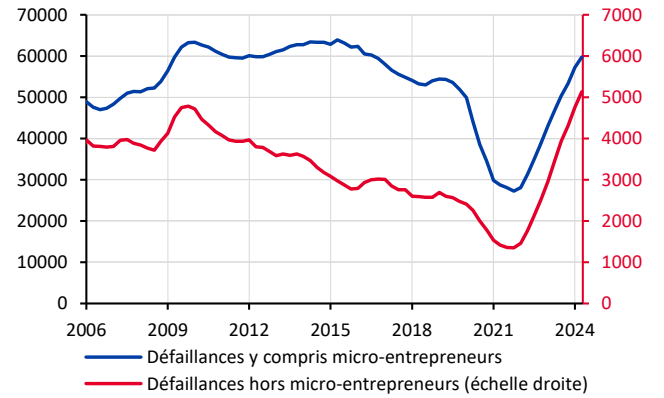
Scope: euro area NFCs.
Most recent value: Q3 2023.
Sources: ECB, QSA.

However, the increase in debt repayment costs may affect companies unevenly. NFCs with smaller liquidity buffers, or facing a larger increase in production and funding costs without the ability to pass the increase on to their final selling prices, are more vulnerable. The number of business failures, particularly when microcompanies are excluded, remains on a catch-up trend and now exceeds its average level between 2010 and 2019 (if microcompanies are stripped out, see Chart 2.8). The indicators of increased credit risk for French NFCs are rising but remain contained (see Chapter 1, Section 1.2).

[80] Mixed income, from production activities before interest, rent or charges paid or received for the use of assets, is included. Mixed income is remuneration for work done by the owner (or family members) of a company without legal personality (such as when the firm's legal personality is not different from that of its owner). Mixed income may not be distinguished from the owner's entrepreneurial profit.

Chart 2.8: French business failures, by company size

x: date / y: number of failures (legal units)



Sources: Banque de France, Banque de France calculations.
Most recent value: April 2024.

NFC access to funding also looks resilient at the macroeconomic level

The transmission of monetary policy has modified the NFC funding mix and paved the way for deleveraging at the macroeconomic level. Companies finance themselves in five main ways: bank loans, issuance of debt securities at various maturities (money market and bond), trade credit, internal financing and fundraising on the equity market. Higher interest rates push up the cost of debt financing and may prompt companies to prefer internal financing. Current deleveraging by companies is due to the cumulative effect of slower growth in bank credit and bond debt and a larger increase in equity

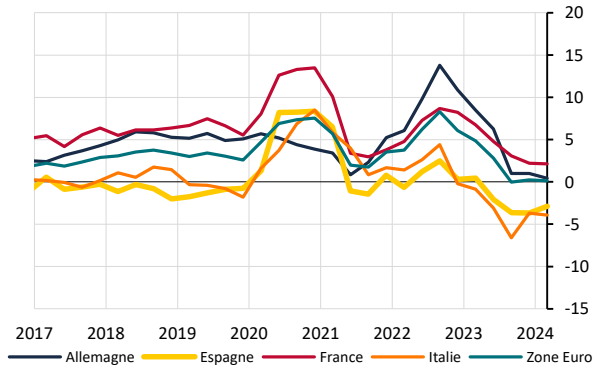
Credit from French banks to French NFCs, which makes up 30% of bank lending by euro area banks to euro area NFCs, continued to grow at a positive rate in 2023. It reached its lowest level since 2014 in France, but was still above the euro area average (see Chart 2.10). In France, as in the rest of the euro area, banks report a downturn in credit demand from businesses since the first quarter of 2023, but the share of companies that say they received the credit that they requested remains stable and high in France.

The market financing of French NFCs, which makes up 40% of euro area NFC financing, slowed considerably in 2022-2023 as monetary policy passed through more rapidly to market rates than to bank rates. However, market financing has caught up since early 2023 as market rates have once again fallen below interest rates on new loans, partly offsetting the credit slowdown. The cost of financing via debt securities went from 4.39% in September 2023 to 3.82% in April 2024, whereas the average interest rate on new loans to NFCs, which has been relatively stable since November 2023, stands at 4.76%. Growth rates for market financing are aligned in the major euro area countries, except for Italy, which has seen a faster catch-up (see Chart 2.10).

Decreased leverage, i.e. total debt divided by equity in the national accounts, is also contributing to NFC resilience. The French leverage ratio is not only trending downwards – it is also lower in France than in other large euro area countries (see Chart 2.11). Increased equity financing, whether through retained earnings or external fundraising, limits companies' exposure to interest rate risk (see Chart 2.12).

Chart 2.9: Growth of outstanding bank loans

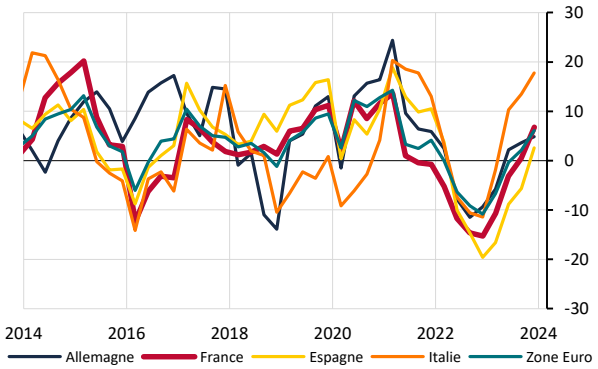
x: date / y: year-on-year, % of outstanding amount[81]



Scope: euro area NFCs.
Most recent value: Q1 2024.
Sources: ECB, QSA.

Chart 2.10: Growth of outstanding market financing

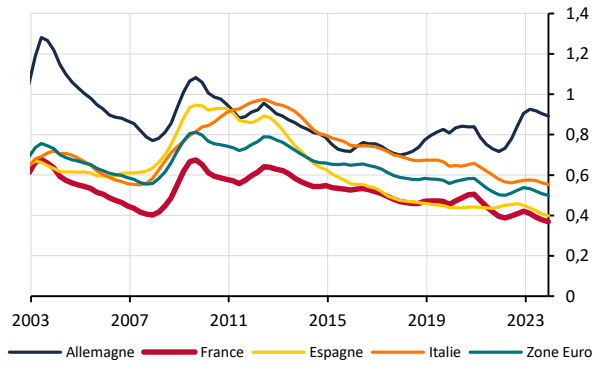
x: date / y: year-on-year, %, gross outstanding debt securities of French NFCs, non-consolidated, valued according to the rules of the system of national accounts[82].



Scope: euro area NFCs.
Most recent value: Q4 2023.
Sources: ECB, QSA.

Chart 2.11: Leverage

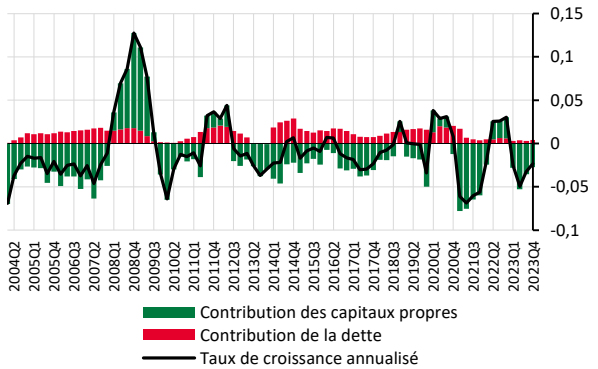
x: date / y: total debt / equity



Scope: euro area NFCs.
Most recent value: Q4 2023.
Sources: ECB, QSA.

Chart 2.12: Leverage of French companies – Debt and equity contributions

x: date / y: total debt / equity



Scope: euro area NFCs.
Most recent value: Q4 2023.
Sources: ECB, QSA.

2.2 Diverse situations necessitating a granular approach

However, the sensitivity of companies to the increase in interest rates cannot be assessed solely at the macroeconomic level. Pockets of vulnerability could persist and pose risks to financial stability, notably depending on the size of vulnerable companies and their interconnectedness with their environment and the financial system. If a large company is in trouble, its suppliers could be hurt through the loss of market outlets, while its customers must find other supply sources. In addition, the funding needs of these companies might create connections between financial intermediaries, amplifying potential vulnerabilities.[83] Also, French financial intermediaries could be exposed to foreign companies, particularly via market securities, making it necessary to extend the analysis beyond the situation of France. This section therefore examines the situations of listed

[81] The growth rate is calculated with reference to an index of notional stocks, rather than to outstandings directly, making it possible to describe series trends while avoiding the effects that non-transactions would have on stock growth rates.
[82] Outstanding debt securities must be valued at market value (*F.8 Valuation of Debt Securities at Both Market and Nominal Value,* IMF Committee on Balance of Payments Statistics).
[83] Do highly indebted large corporations pose a systemic risk? | Banque de France (banque-france.fr).

companies, based on their consolidated balance sheets, which makes it possible to compare French companies to other European companies at end-2023.

The number of large companies that are vulnerable to the level of interest rates increased in 2023

This section studies the exposure of large companies to a subset of vulnerabilities linked to the level of interest rates. A company's level of indebtedness may be assessed using two financial ratios:[84] the interest coverage ratio (ICR), defined here as earnings before interest and taxes (EBIT) divided by interest payments, and a solvency ratio, defined here as the ratio of financial debt to earnings before interest, taxes, depreciation and amortisation (EBITDA). The second of these ratios relates the level of indebtedness to earnings generated by the company's business. It helps to assess a company's solvency independently of the interest rate scenario. An ICR of less than three and a solvency ratio of more than four[85] are traditionally viewed as initial warning thresholds.[86] A company may be considered as *a priori* vulnerable to an increase in interest rates if both of these thresholds are simultaneously breached, pointing to high debt service. However, since a company's risks is inherently multidimensional, this level of vulnerability does not necessarily signal a risk of imminent default: rather, it indicates that the company would probably adjust its balance sheet and activity to maintain debt ratios that are acceptable to its creditors and shareholders.

An analysis of the heterogeneity of NFC vulnerabilities to interest rate risk requires the use of granular balance sheet data. To facilitate European comparisons, the analysis in Sections 2 and 3 is based on the balance sheets of listed European companies whose balance sheets are available for each year between 2019 and 2023. The sample comprises 2,752 companies, including 261 French firms, 278 from Germany and 247 British companies. These companies represent a significant share of NFC debt calculated based on the national accounts. In France, companies in the sample hold EUR 756 billion in financial debt, or approximately 35% of the debt of French NFCs (the coverage ratio for the euro area is the same).[87]

Indebtedness levels measured according to these ratios may vary considerably between companies. In France, for example, the share of listed companies with an ICR of between 0 and 3 increased between 2019 and 2023, but the share of companies with a negative ICR shrank (see Chart 2.13). Conversely, in the rest of Europe, while the share of companies with an ICR of between 0 and 3 also increased between 2019 and 2023, the share of companies with a negative ratio held steady (see Chart 2.13). The share of listed companies with a solvency ratio of more than 4 fell between 2019 and 2023 in France and elsewhere in Europe.

[84] These ratios and their associated thresholds are used as standard in financial stability analyses, as for example in the ECB's most recent *Financial Stability Review* or this study by the US Federal Reserve.
[85] Or less than 0 in the event of negative EBITDA.
[86] Guidance on leveraged transactions (europa.eu).
[87] Since the sample is not confined to companies at the highest level of consolidation, these statistics must be treated with caution, as some debt may be counted several times and geographical scopes vary across sources (the national accounts include debt held by French subsidiaries of a foreign group but that excludes the debt of foreign subsidiaries of French groups).

Chart 2.13: Distribution of large French companies according to their ICR

x: time / y: number of companies, % of the total

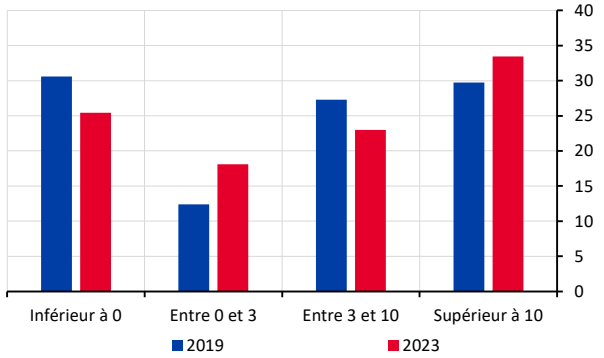
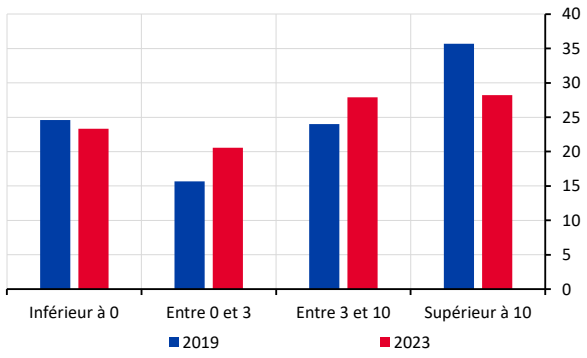


Chart 2.14: Distribution of other large European companies according to their ICR

x: time / y: number of companies, % of the total



Scope: listed European companies with a balance sheet for each year from 2019 to 2023. The number of companies varies across countries: Germany 278, France 261, United Kingdom 247, rest of continental Europe 1,966.
Note: a company is considered to be heavily indebted if its ICR is below 3 and its debt/EBITDA ratio is negative or higher than 4.
Sources: Refinitiv Eikon, Banque de France calculations.

A company that is heavily indebted according to one of these criteria is not necessarily vulnerable if it has enough liquidity to deleverage. Plentiful cash reserves enable a firm to deleverage at lower cost.[88] Including the level of cash reserves as a factor of resilience is a way to identify the net vulnerability of companies to the level of interest rates. The ratio of net cash[89] to turnover can be used to assess how much room for manoeuvre a firm has. Its median level is approximately 30 days of turnover, which thus acts as another warning threshold for heavily indebted companies.[90] For the purposes of this chapter, we therefore consider that a company is vulnerable in the current environment if it is i) heavily indebted (i.e. its ICR is below 3 and its solvency ratio is higher than 4 or negative); and ii) its net cash is below 30 days of turnover.

In 2023, the number of heavily indebted or vulnerable large European companies rose, getting back to 2019 levels. In 2022, the share of heavily indebted companies was still below but close to the 2019 level (see Chart 2.15). The share of vulnerable companies was well below the 2019 level, particularly owing to the plentiful liquidity that accompanied the Covid crisis[91] (see Chart 2.16). A major turning point occurred in 2023, as large French companies returned to their 2019 indebtedness and vulnerability levels. These levels are slightly below those in most European countries, with the exception of a handful of countries, including the United Kingdom.

[88] Firm Balance Sheet Liquidity, Monetary Policy Shocks, and Investment Dynamics | Barcelona School of Economics Working Papers (bse.eu)
[89] Net cash is defined as the sum of cash, cash equivalents and short-term investments less short-term borrowing.
[90] This ratio is used to relate cash reserves to two essential liquidity needs of NFCs, namely repaying short-term debt and advancing a portion of production costs. Other more conventional ratios focus exclusively on the first of these two reasons.
[91] What Individual Data Tells us about the Covid-19 Impact on Corporate Liquidity in 2020 | Banque de France (banque-france.fr).

Chart 2.15: Share of heavily indebted large companies

x: time / y: number of companies, % of the total

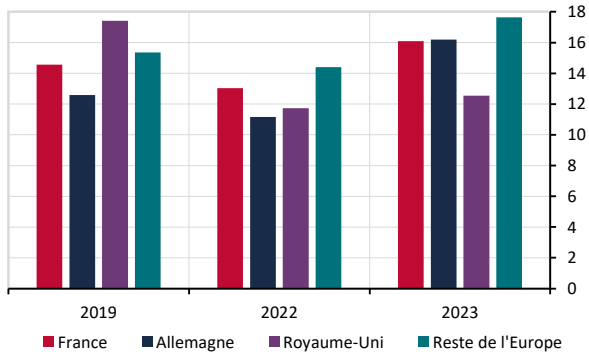
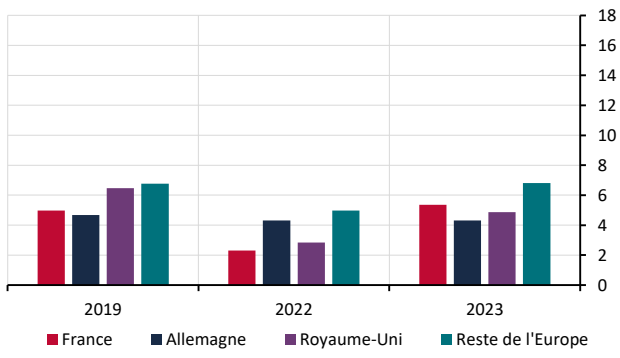


Chart 2.16: Share of vulnerable large companies

x: time / y: number of companies, % of the total



Scope: French companies with a balance sheet for each year from 2019 to 2023.
Note: a company is considered to be heavily indebted if its ICR is below 3 and its debt/EBITDA ratio is negative or higher than 4. A company is considered to be vulnerable if it is considered to be heavily indebted and if its liquidity ratio expressed in days is below 30.
Sources: Refinitiv Eikon, Banque de France calculations.

Box 2.1: Effects of higher interest rates on French SMEs

By Benjamin Bureau, Maïté Graignon, Abel Merebier, Loriane Py

The Banque de France conducted an exhaustive analysis of 2023 balance sheets to assess the situation of French SMEs.[92] On aggregate, the profit margin of French SMEs withstood the economic slowdown. Their debt ratio also fell, in particular thanks to equity strengthening and repayment of state-guaranteed loans. SME cash reserves shrank, but remain far higher than in the pre-Covid period. Overall, against a backdrop of rising interest rates, the repayment capacity of French SMEs, as measured by Banque de France ratings, remained broadly intact at end-2023.

This was also true for medium-sized firms, which affirmed their resilience amid the economic slowdown. In 2023, the finances of medium-sized firms were steady at overall higher levels than in 2019 (debt ratio, median cash reserves, return on capital employed).

Looking beyond the aggregate situation, the dispersion of individual positions, which has always existed, increased strongly with the Covid-19 crisis, including within the same sector and/or size category, although a post-crisis normalisation process was apparent in 2023. However, unlike during the 2009 recession, heightened dispersion can be observed at both the bottom and top ends of the distribution. Pockets of vulnerability may thus have formed within France's production system and need to be analysed particularly in the context of monetary tightening.

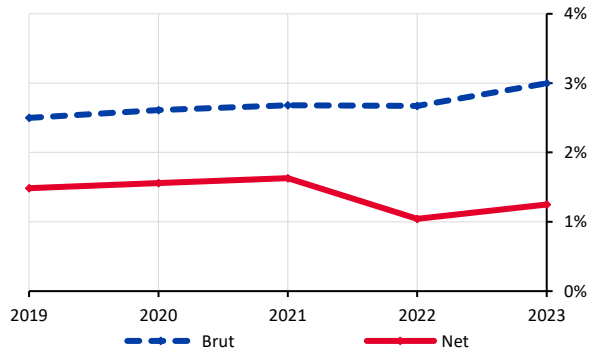
This is because tightening represents a major challenge for non-financial corporations generally, but especially for SMEs, which are more fragile on average and whose funding sources are less diversified than those of large companies. Several elements, however, mitigate the risks specifically linked to higher interest rates. Chart 2.17 shows interest expense (net or gross of interest earned) divided by valued added: the ratio was lower in 2023 than it was prior to the Covid-19 crisis, if interest earned is included.

Financial analysts consider an ICR of approximately 3 to be critical. In this regard, we see in Chart 2.18 that the percentage of SMEs below this critical threshold did not go up with the rise in interest rates (approximately 20% in 2023, the same as in 2019).

[92] Full analysis was released in July 2024 in two bulletins and a blog post.

Chart 2.17: Interest expense share of value added

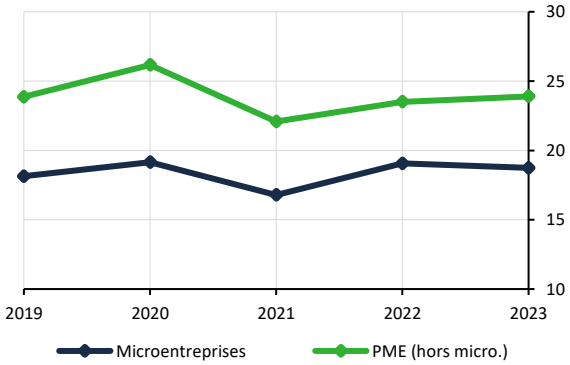
x: date / y: %



Notes: The chart shows the interest expense to value added ratio of SMEs (excluding microcompanies). Interest expense is either net of interest income (solid line), or gross (dotted line).
Source: Banque de France, FIBEN database (June 2024).

Chart 2.18: % of SMEs with an ICR < 3

x: date / y: %



Sources: Banque de France, FIBEN database (June 2024).

Several elements account for these results:

- Banque de France surveys reveal that SME access to credit is similar to the pre-Covid situation.
- Most of the debt of French companies is at fixed rates and renewed over several years (see Gueuder and Ray, 2024).

As rates have gone up, SMEs are earning a higher return on their deposits.

What vulnerability levels for 2024-2025?

Although it is hard to genuinely forecast the debt ratios of each company, we can identify companies that could become vulnerable if their trajectory parallels the average trajectory of French companies as a whole. We propose two scenarios for this macroeconomic and financial trajectory in 2024 and 2025:

- **In the baseline scenario,** which reflects the market consensus in May 2024 on the future path of monetary policy, policy rates decrease by 75 bps in the second half of 2024, followed by a 60 bps fall in 2025. Changes in EBITDA and EBIT in 2024 and in 2025 are based on forecasts for growth, inflation and the profit margin of NFCs carried out by the Banque de France in June 2024.[93] We assume that cash reserves grow at the pace of the company's net earnings, that turnover increases at the pace of GDP, and the level of financial debt remains unchanged (which is the same as assuming relative deleveraging, since operating surplus increases).[94]

- **In the adverse scenario,** policy rates decrease by just 25 bps in 2024 and remain constant in 2025. Changes in EBITDA and EBIT in 2024 are again based on the Banque de France's June 2024 forecasts, but we assume in this instance that business conditions are worse than expected in 2025, insofar as they follow the 2024 trend. We assume that cash reserves grow at the pace of the company's net earnings, that turnover increases at the pace of GDP, and the level of financial debt remains unchanged. This scenario offers a way to examine the assessment's sensitivity to the future path of interest rates and cannot be considered to be a stress test.

[93] Macroeconomic projections – June 2024 | Banque de France (banque-france.fr)
[94] Our scenarios are constrained by the Banque de France's public forecasts, which accounts for these simplifying assumptions.

We assume that the interest rate on new business loans is equal to the policy rate plus 100 bps. Note that the timing of the decrease in policy rates influences the average interest rate on new loans over the year. Rate cuts at the end of the year will have little impact on the financial statements for the current year, but will affect those of the following year.

Cash reserves increase at the pace of the company's net earnings, which correspond in their simplified version to EBIT less interest expense plus interest income. Interest income is assumed to be made up of the interest earned on cash reserves, of which 37% is assumed to be interest-bearing (see Chart 2.6), at the average interest rate on French NFC deposits.[95] We assume that the average interest rate on NFC deposits changes at the same pace as the ECB deposit facility rate, which moves differently according to the scenario.

Table 2.1: Simulation assumptions

	2023	2024 (baseline)	2025 (baseline)	2024 (adverse)	2025 (adverse)
Change in policy rates	Observed	-75 bps	-60 bps	-25 bps	0 bps
Average interest rate on *new* loans	4.5%	4.8%	4.0%	4.93%	4.75%
Annual change in the average cost of debt (outstandings + new flows)	**+108 bps**	**+49.5 bps**	**+1.6 bps**	**+54.7 bps**	**+28.0 bps**
Real GDP	Observed	+0.8%	+1.2%	+0.8%	+0.8%
GDP deflator	Observed	+2.9%	+1.5%	+2.9%	+2.9%
Profit margin	Observed	+0%	+0.6%	+0%	+0%
Debt	Observed	+0%	+0%	+0%	+0%

Determining the impact of the change in policy rates on the average cost of business debt requires to make assumptions about the structure of that debt. Since much of the debt of French companies is at fixed rates, the increase in interest rates was far from having been totally passed on to the average cost of debt at end-2023, as shown by Banque de France studies.[96] We assume that just 25% of the debt of listed French companies is at floating rates or matures in less than one year, meaning that an increase in interest rates over the year immediately affects the cost of all of these instruments.[97] For the remaining 75%, we assume that just 20% of this debt sees its conditions change each year, which corresponds to fixed-rate debt maturing in five years and principal to be repaid upon maturity, for example.[98] Fixed-rate debt, which on average was negotiated five years ago at a lower cost, is rolled over at a higher rate, irrespective of the interest rate scenario. The resulting increase in the average cost of debt is applied incrementally to the previous year's cost of debt, thus assuming a constant spread for each company.[99]

[95] Interest rates on deposits March 2024 | Banque de France (banque-france.fr)
[96] Debt structure and rising interest rates: focus on European companies | Banque de France (banque-france.fr)
[97] This value is consistent with estimates for French companies as a whole, based on the AnaCredit and CSDB databases.
[98] Fixed-rate debt maturing in more than one year covers a wide variety of instruments. However, market debt, which makes up the majority of the financial debt of large companies, is largely redeemable at maturity, which supports this assumption.
[99] Note that if this methodology is applied to the 2022 annual accounts, the cost of debt should have risen by 120 bps in 2023. The sample's median cost of debt increased by 108 bps over the period.

Chart 2.19: Share of heavily indebted or vulnerable listed French companies, baseline scenario

x: time / y: number of companies, % of the total

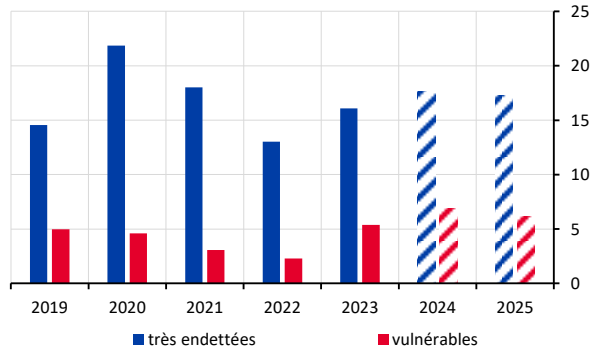
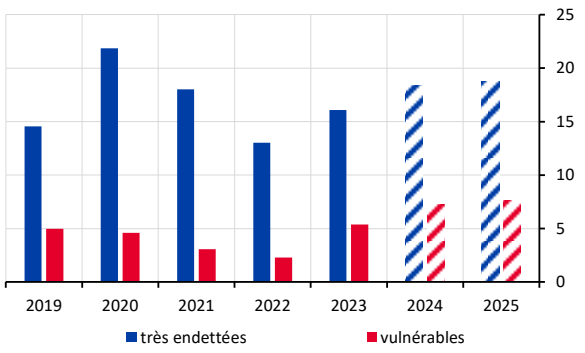


Chart 2.20: Share of heavily indebted or vulnerable listed French companies, adverse scenario

x: time / y: number of companies, % of the total



Scope: French listed companies with a balance sheet for each year from 2019 to 2023.
Note: a company is considered to be heavily indebted if its ICR is below 3 and its debt/EBITDA ratio is negative or higher than 4. A company is considered to be vulnerable if it is considered to be heavily indebted and if its liquidity ratio expressed in days is below 30. Values for 2024 and 2025 are derived from a projection.
Sources: Refinitiv Eikon, Banque de France calculations.

This exercise reveals that while a relatively substantial share of large French companies are in principal exposed to higher interest rates owing to their debt burden, their level of vulnerability is contained by liquidity buffers that look large enough overall to enable companies to cope (see Charts 2.19 and 2.20). However, the projections need to be treated with care since they assume uniform business conditions for all companies. For example, reactions to monetary tightening may exhibit sector-specific differences (see Box 2.2). Furthermore, companies identified as particularly vulnerable will likely undertake more radical deleveraging than average companies in a bid to maintain a balance sheet structure that is acceptable to their creditors. This type of behaviour was already noted in 2023, insofar as the share of vulnerable companies increased, but the share of outstanding debt held by vulnerable companies shrank (see Charts 2.21 and 2.22). Such adjustments reduce the outstanding amount of at-risk debt, at the cost of adjustments to capital expenditure or payroll if the firm has no cash surplus.

Chart 2.21: Share of debt held by heavily indebted or vulnerable French companies, baseline scenario

x: time / y: share of financial debt, % of the total

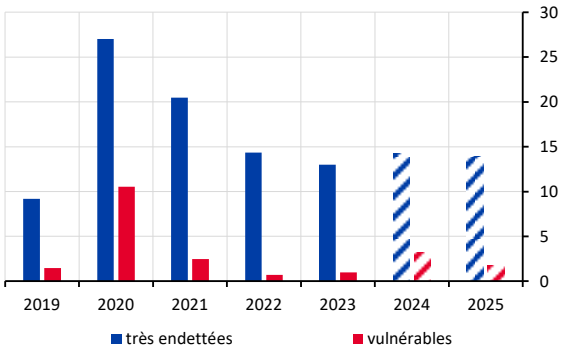
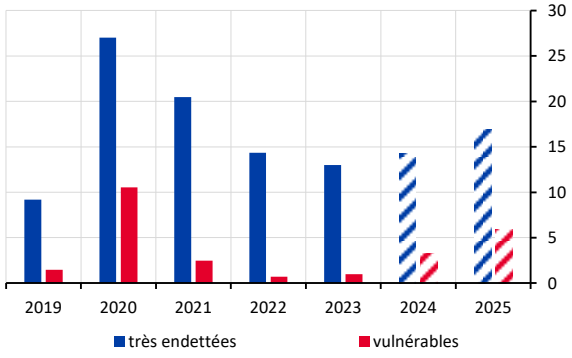


Chart 2.22: Share of debt held by heavily indebted or vulnerable French companies, adverse scenario

x: time / y: share of financial debt, % of the total



Scope: listed French companies with a balance sheet for each year from 2019 to 2023.
Note: a company is considered to be heavily indebted if its ICR is below 3 and its debt/EBITDA ratio is negative or higher than 4. A company is considered to be vulnerable if it is considered to be heavily indebted and if its liquidity ratio expressed in days is below 30. Values for 2024 and 2025 are derived from a projection.
Sources: Refinitiv Eikon, Banque de France calculations.

Box 2.2: Real estate and construction companies and monetary policy shocks - a historical perspective

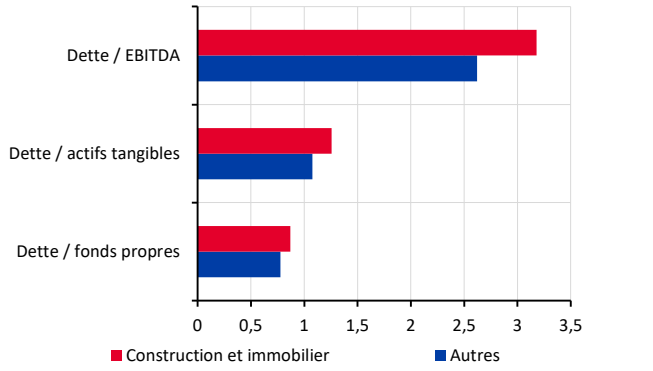
By Aurélien Espic

Changes in interest rates do not affect all companies equally. While the literature has highlighted multiple factors accounting for the heterogeneity of company reactions to an increase in interest rates (risk level, liquidity of assets, debt structure, etc.), this box focuses on the reaction by real estate and construction firms.[100] These companies have a number of features that could amplify their reaction to interest rate changes. Due to their business model, their debt ratio is higher than that of other companies on all metrics (see Chart 2.23).[101] Furthermore, since banks are the source of much of their debt, they are in principal more responsive to a conventional domestic monetary policy shock.[102] In addition, their upstream position in the production chain (through the supply of commercial real estate) and the significance of credit standards for the demand directed towards them (through the supply of residential real estate in particular) make them especially sensitive to macroeconomic shocks. Finally, their use of loans secured by the value of real estate assets exposes them to increased amplification of macroeconomic fluctuations.[103] The credit dynamics of these corporations are thus a major determinant of the financial cycle.[104]

This box examines the sensitivity of the debt of French companies to conventional monetary policy shocks between 1999 and 2014. Monetary policy shocks are calculated based on changes in interest rate swaps around ECB monetary policy decisions.[105] A local projections model[106] is then used to estimate the effect of a shock on corporate indebtedness at different horizons. The model explains the cumulative growth rate of corporate indebtedness through the monetary tightening shock and macroeconomic control variables (growth rate, inflation, unemployment, short- and long-term interest rates from the previous year) plus individual control variables (total assets, leverage and income divided by total assets in the previous year). The model also includes fixed effects for each firm in order to control for sources of unobserved heterogeneity.

Chart 2.23: Debt ratios of French companies

x: ratio / y: type of debt ratio



Scope: French non-financial corporations with a 12-month balance sheet, 1999-2014
Source: Fiben Groupes database, IFRS and FR accounting standards, Banque de France calculations.

[100] Companies in building construction (sector NACE 41) are companies that are engaged in constructing new buildings (such as developers) or renovating existing ones. Real estate companies (sector NACE 68) are companies that own and rent real estate assets.
[101] For more on these companies, see H1 2023 Risk Assessment, Ch.3, Banque de France.
[102] Alder, M., Coimbra, N., & Szczerbowicz, U. (2023). Corporate Debt Structure and Heterogeneous Monetary Policy Transmission. *Banque de France Working Paper* No. 933.
[103] See Kiyotaki, N., & Moore, J. (1997). Credit cycles. *Journal of political economy*, 105(2), 211-248.
[104] Ivashina, V., Kalemli-Özcan, S. Laeven, L., & Müller, K. (2024). Corporate debt, boom-bust cycles, and financial crises. *NBER Working Paper* No. 32225.
[105] Jarociński, M., & Karadi, P. (2020). Deconstructing monetary policy surprises—the role of information shocks. *American Economic Journal: Macroeconomics*, 12(2), 1-43.
[106] Jordà, Ò. (2005). Estimation and inference of impulse responses by local projections. *American Economic Review*, 95(1), 161-182.

Chart 2.24: Reaction of the financial debt of companies to a monetary tightening shock

x: year since the shock / y: cumulative growth in financial debt, %

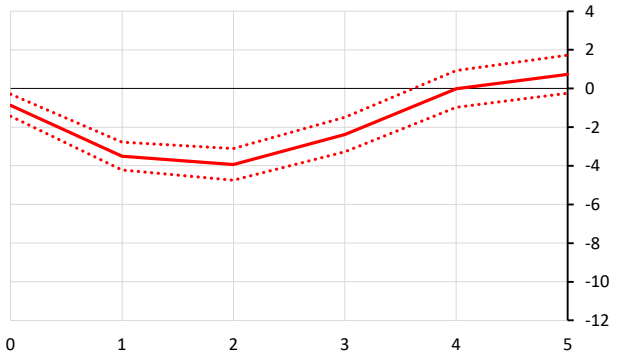
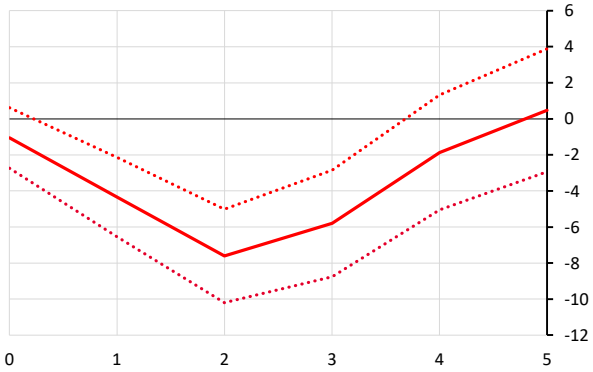


Chart 2.25: Reaction of the financial debt of real estate and construction companies to a monetary tightening shock

x: year since the shock / y: cumulative growth in financial debt, %



Scope: French companies with a 12-month balance sheet, 1999-2014
Notes: the solid line shows the value of the estimator, while the dotted lines show the confidence interval at the 5% level. Standard deviations are clustered at the level of the firm and the year. The growth rate calculated here is the mid-point growth rate: the absolute change between t and t-1 is divided by the average values at t and t-1. This rate is thus between -2 and 2, making it possible to include extreme variations without skewing the estimate. Over the period, the sample contains 4,792 observations for real estate and construction companies, compared with 45,619 observations for other companies.
Sources: Fiben, consolidated balance sheets, IFRS and FR accounting standards, Banque de France calculations.

Chart 2.24 shows the average reaction by French companies. A monetary policy shock reduces the debt of companies by 4% after two years, which is the peak of the reaction. To highlight the reaction by real estate and construction firms, the projection model is adjusted to split companies into two groups. Chart 2.25 shows the reaction of real estate and construction companies to the same interest rate shock. As expected, the effect is almost twice as high at its peak, with debt decreasing by around 8% after two years. These results are subject to greater uncertainty, however, due to the relatively small number of companies in these sectors.

2.3 Companies exposed to the increase in interest rates enjoy stable funding structures on fixed income markets

After having identified which listed companies have high debt service that exposes them to the increase in interest rates (see Section 2.2), this section describes the financing conditions of these firms compared with the other listed companies in the sample. While creditors correctly identify additional risk for the heavily indebted NFCs in the sample, these companies enjoy financing conditions and investor bases that are similar to those of the other listed companies.

This section focuses on financing conditions on fixed income markets,[107] as bank debt made up just 32% of the financing of French companies in the sample in 2022 (compared with 36% on average for large French groups[108]).[109]

[107] This section uses detailed data on the debt securities of companies, but at a non-consolidated level. However, the debt issued by groups' lead companies accounts for the lion's share of the consolidated financial debt of the companies in the sample, as reported on their balance sheets.
[108] *Bulletin Banque de France* – January 2024 Une situation financière des grands groupes toujours très satisfaisante en 2022, en dépit de la hausse de l'inflation | Banque de France (banque-france.fr)
[109] In addition, for companies in the sample, this bank financing is mainly within subsidiaries: the bank debt of the identified companies represents just 10% of their consolidated balance sheet.

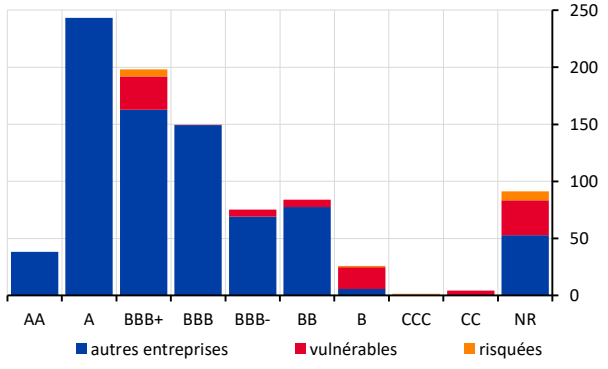
On average, companies with the greatest exposure to interest rate risk finance themselves at higher rates on the markets

On average, listed French NFCs identified as heavily indebted have worse credit ratings than other NFCs, reflecting recognition of this risk by credit rating agencies. Note however that debt indicators alone cannot entirely explain the distribution of NFC ratings, which are subject to multifactor determinants. In France, heavily indebted NFCs are mostly rated BBB to BBB- (55% of outstanding amounts on average between January 2020 and May 2024). Speculative-grade ratings (below BBB-) make up a minority share of outstanding amounts among these companies (22% on average over the period) (unrated companies make up 17%). Heavily indebted French NFCs are better rated, relatively speaking, than their European peers: in the euro area, most ratings were speculative grade (52%) on average over the period. However, heavily indebted or vulnerable NFCs do make up the majority of the sample's lowest-rated outstanding amounts, accounting for 72% of the outstanding amounts of euro area NFCs rated B or lower (see Chart 2.26) in May 2024. Credit rating agencies thus appear to distinguish NFCs that are exposed to the increase in interest rates from other companies in the sample, while also recognising the diversity of risks within the group of heavily indebted NFCs.

The increase in policy rates led to a swift and pronounced increase in yields on bonds issued by heavily indebted NFCs, and caused the spread between heavily indebted NFCs and other listed NFCs in France to widen (see Chart 2.27). The spread narrowed in 2023 and 2024 however, with average yields to maturity of French NFCs coming into line with those of euro area NFCs amid the overall compression of credit spreads (see Chart 2.27 and Chapter 1). Thus, in May 2024, the average yield on the debt securities of heavily indebted NFCs reached 5.18% in France and 5.51% in the euro area, compared with 3.27% for other French NFCs, giving a spread of 191 bps, which has narrowed since May 2022. The average yield of heavily indebted NFCs has remained stable in the euro area and fallen in France since May 2022. Credit spreads among heavily indebted companies are not uniform and fluctuate significantly according to rating levels. The average yield of heavily indebted NFCs rated BB continues to rise in France, with the spread reaching 247 bps in May 2024, compared with 254 bps in the euro area.

Chart 2.26: Outstanding market debt of listed euro area NFCs, by rating and exposure to interest rate risk in May 2024

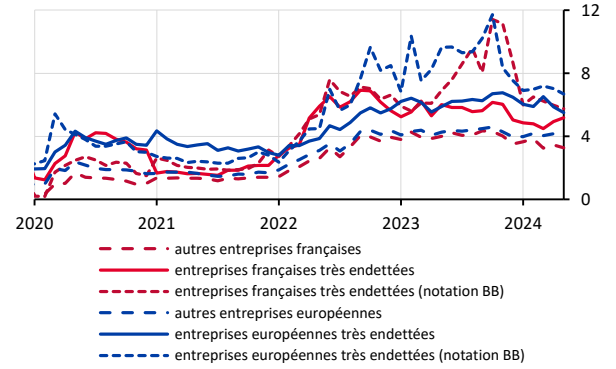
x: time / y: EUR billion



Scope: Bond debt issued by NFCs identified as vulnerable based on the methodology and scope detailed in the second section. Debt issued in EUR by the group (non-consolidated) and held in the euro area is taken into account.
Note: a company is considered to be heavily indebted if its ICR is below 3 and its debt/EBITDA ratio is negative or higher than 4.
Sources: Refinitiv Eikon, CSDB, Banque de France calculations.

Chart 2.27: Average yield of French and European NFCs, by type of risk

x: date / y: average yield to maturity weighted by outstandings (%)



Scope: listed European companies with a balance sheet for each year from 2019 to 2023. The number of companies varies from one country to the next: Germany 278, France 261, United Kingdom 247, rest of continental Europe 1,966.
Most recent value: May 2024.
Note: A company is considered to be vulnerable if it is considered to be heavily indebted and if its liquidity ratio expressed in days is below 30.
Sources: Refinitiv Eikon, CSDB, Banque de France calculations.

Heavily indebted companies also benefit from a bond debt structure featuring fixed rates and long maturities

Overall, the interest rate structure of the market debt of heavily indebted NFCs is aligned with that of companies in general. In France and in the euro area, the interest rate structure of the market debt of companies identified as heavily indebted is dominated by fixed rates (93% and 90% in May 2024 in France and the euro area respectively), as it is for listed companies generally.

The most vulnerable companies do however stand out because of the increase in their share of short-term debt securities (commercial paper). Vulnerable NFCs, i.e. those with a high debt burden and low cash reserves, carry more debt via zero-coupon commercial paper (CP). The CP share has increased, solely for these NFCs, since January 2022 in France, rising from 17% to 39% of outstanding amounts in December 2023, while the average cash ratio of these firms, expressed in days of turnover, worsened between 2022 and 2023. The average maturity of CP issued by these same NFCs also fell, reaching 89 days in May 2024 compared with 217 days in May 2021. The growing use of CP could point to growing cash concerns for vulnerable NFCs.

The bonds issued by heavily indebted French NFCs have longer maturities than those of their European peers. Heavily indebted NFCs are not facing a "maturity wall", even though the majority of their outstanding debt will have to be repaid or rolled over by 2028. In France, heavily indebted NFCs will have to repay 59% of their bond debt between 2024 and 2028, including 26% before the end of 2025 (see Chart 2.28). In this regard, the bond debt structure of the heavily indebted companies in our sample is closely aligned with the debt of French NFCs as a whole, whose median residual maturity is four years.[110] Heavily indebted European NFCs however must repay 69% of their outstanding debt between 2024 and 2028, including 22% between 2024 and 2025. Long maturities are thus more widespread in the bond debt of heavily indebted French NFCs than in the debt of European companies. In terms of their maturity schedule, heavily indebted French NFCs are also comparable to the rest of France's listed NFCs, which are going to have to repay 56% of their bond debt between 2024 and 2028, including 26% between 2024 and 2025 (see Chart 2.29).

Chart 2.28: Maturity schedule for the bond debt of heavily indebted listed NFCs

x: date / y: % of total outstandings

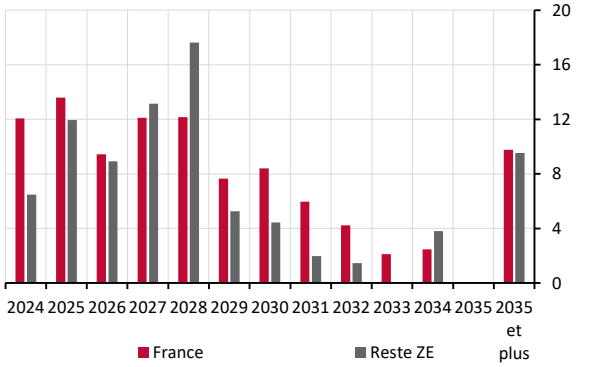
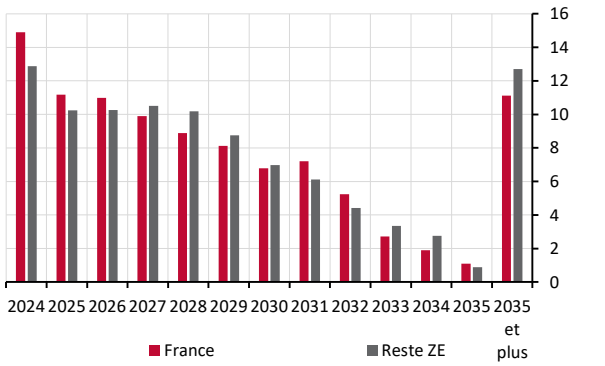


Chart 2.29: Maturity schedule for the bond debt of listed NFCs

x: date / y: % of total outstandings



Scope: Bond debt issued by NFCs identified as vulnerable based on the methodology and scope detailed in the second section. Debt issued in EUR by the group (non-consolidated) and held in the euro area is taken into account.
Most recent value: May 2024.
Note: a company is considered to be heavily indebted if its ICR is below 3 and its debt/EBITDA ratio is negative or higher than 4. A company is considered to be vulnerable if it is considered to be heavily indebted and if its liquidity ratio expressed in days is below 30.
Sources: Refinitiv Eikon, CSDB, Banque de France calculations.

[110] Debt structure and rising interest rates: focus on European companies | Banque de France (banque-france.fr)

The investor base of vulnerable companies on fixed income markets is representative of companies as a whole

The main holders of the bonds of French NFCs that are vulnerable to interest rate risk are investment funds (41% of holdings in the fourth quarter of 2023) and insurers (38%) (see Chart 2.30). The investor base of vulnerable French NFCs thus displays a degree of concentration that is similar to the investor base of other listed French NFCs. The riskiest NFCs have a larger share of money market funds and NFCs and a smaller share of banks in their investor base. The investor base of vulnerable European NFCs is markedly different, with fewer holdings by insurers but higher bank holdings in the fourth quarter of 2023.

Chart 2.30: Investor base by sector and exposure to interest rate risk, NFCs

x: date / y: % of total holdings

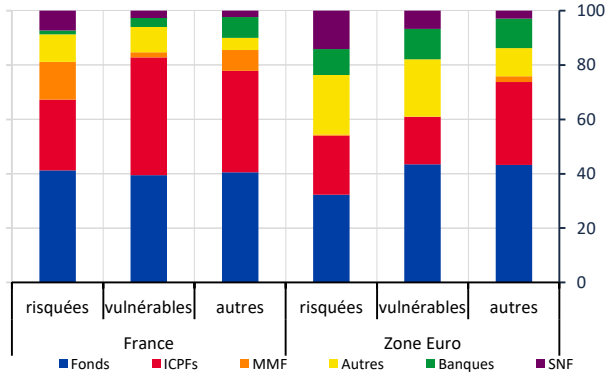
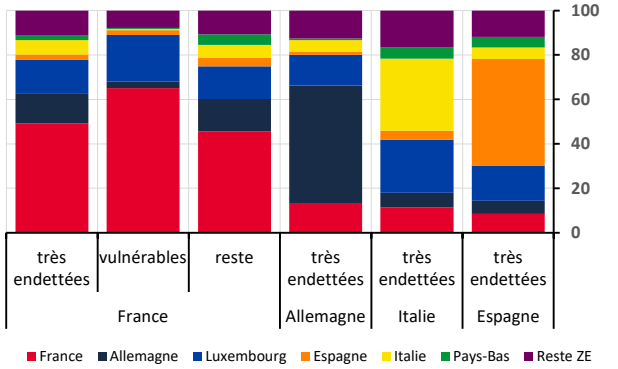


Chart 2.31: Investor base by country and exposure to interest rate risk, NFCs

x: date / y: % of total holdings



Scope: Bond debt issued by NFCs identified as vulnerable based on the methodology and scope detailed in the second section. Debt issued in EUR by the company (without consolidating debt issued by subsidiaries) and held in the euro area is taken into account.
Most recent value: fourth quarter of 2023.
Note: a company is considered to be heavily indebted if its ICR is below 3 and its debt/EBITDA ratio is negative or higher than 4. A company is considered to be vulnerable if it is considered to be heavily indebted and if its liquidity ratio expressed in days is below 30.
Sources: Refinitiv Eikon, CSDB, SHS-S, Banque de France calculations.

Vulnerable companies depend primarily on domestic holders, as do all vulnerable European companies. In France, French holders accounted for 50% of holdings of heavily indebted NFCs in the fourth quarter of 2023, compared with 45% for the other listed NFCs in the sample. Holdings of heavily indebted European NFCs also show a domestic bias, although it is less pronounced in the case of Italian NFCs. In the fourth quarter of 2023, domestic holders accounted for 53% of the holdings of heavily indebted NFCs in Germany, 48% in Spain and 32% in Italy (see Chart 2.31). Heavily indebted European NFCs have a more pronounced domestic bias than their non-vulnerable peers, unlike heavily indebted French NFCs.

Box 2.3: Non-bank loans are a growing but risky alternative for the financing of NFCs with the greatest exposure to the increase in interest rates

By Lucille Collet

The most heavily indebted NFCs have various debt financing options: bank financing, the high-yield bond market and non-bank loans, including private credit. Private credit, which refers to the direct financing of companies through non-bank credit outside the bond market and provided by alternative funds, has been growing strongly for several years. These funding methods are typically used by NFCs owned by private equity funds. Accordingly, 77% of private credit transactions in Europe[111] involve companies sponsored by private equity funds. Private credit and high-yield bonds serve companies that exhibit different characteristics but that share high levels of leverage. Private credit funds primarily finance mid-sized companies, whereas high-yield

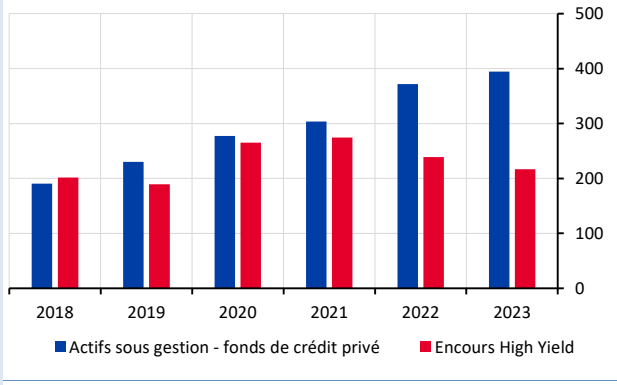
[111] International Monetary Fund *Global Financial Stability Report* – Chapter 2 – The Rise and Risks of Private Credit, April 2024 The Last Mile: Financial Vulnerabilities and Risks (imf.org)

bonds are mainly aimed at large companies. Private credit funds present themselves as an alternative to high-yield bonds for companies that do not have access to such instruments (see Block et al. (2023)).[112] In 2022, outstanding private credit reached EUR 390 billion in Europe (see Chart 2.32), compared with EUR 239 billion for high-yield bonds.

Bank financing remains a major funding source for the most heavily indebted NFCs. In 2017, the ECB's single supervisory mechanism (SSM) introduced enhanced monitoring of bank exposures to leveraged finance, defined as exposures to borrowers, other than SMEs, whose debt-to-EBITDA ratio exceeds 4.[113] Between 2018 and 2022, these exposures increased as financial covenants became less stringent. Between 2022 and 2023, volumes of leveraged bank lending shrank as interest rates went up. In France, outstanding leveraged loans on the balance sheets of the five main banking groups reached EUR 157 billion in the fourth quarter of 2023, compared with approximately EUR 186 billion in the fourth quarter of 2022.[114] The ratio of non-performing loans in the leveraged loans of French banks has been rising since end-2022, however, and reached 9.1% in the first quarter of 2024. It is naturally higher than the ratio for non-leveraged NFCs lending, which has held steady at 3.2%.

Chart 2.32: Assets under management at private credit funds, total outstanding high-yield bonds, Europe

x: time / y: EUR billion



Scope: Europe, including the United Kingdom.
Source: Pitchbook, CSDB, Banque de France calculations.

While non-bank loans are a way to diversify the funding mix of NFCs, they could increase the exposure of companies to the ups and downs of financial cycles. During financial crises, non-bank lenders on syndicated loan markets[115] reduce their NFC lending business by 50% more than banks (Aldasaro et al. 2023).[116] This contraction is only marginally due to differences in the characteristics of borrower companies, since non-bank lenders lend more to heavily indebted companies than banks. The procyclicality of non-bank lending may however vary depending on the type of loan. Issues of direct loans by private credit funds appear to have been more stable post-Covid-19 than issues of other non-bank loans or high-yield bonds.[117]

[112] Block et al. 2023 A Survey of Private Debt Funds | NBER
[113] Guidance on leveraged transactions (europa.eu)
[114] Outstanding leveraged loans for all systemically important institutions supervised by the SSM totalled approximately EUR 450 billion in Q3 2023. ECB-Annual-Report-on-supervisory-activities_2023.pdf (banque-france.fr)
[115] Syndicated loans are a type of financing provided by a group of lenders, often banks and other financial institutions, to a single borrower. Loans are syndicated when they are too large or risky for a single lender. Bank loans to large companies are often syndicated. These loans may also be provided to non-banks, such as securitisation vehicles (with a view to issuing collateralised loan obligations – CLOs) or investment funds.
[116] Aldasaro et al. 2023 Non-bank lending during crises (bis.org)
[117] International Monetary Fund *Global Financial Stability Report* – Chapter 2 – The Rise and Risks of Private Credit, April 2024 The Last Mile: Financial Vulnerabilities and Risks (imf.org)

3. Artificial intelligence challenges for the financial system

By Claire Brousse, Olivier Fliche, Jules Joyez and Julien Uri

Artificial intelligence technologies offer numerous opportunities for the financial sector, with applications including customer service, process optimization, risk management, and market activities. However, due to its nature, artificial intelligence presents challenges in data management, modelling, and governance. It could exacerbate financial stability risks, particularly procyclicality, market volatility, market concentration, and cyberattacks. Moreover, the potential for misuse, such as information manipulation, could destabilize the financial system. The potential impacts of artificial intelligence remain difficult to quantify as they will depend on the scale and modalities of its adoption. Nevertheless, a governance framework and risk management approach tailored to artificial intelligence-*specific challenges are necessary to mitigate risks. The European artificial intelligence Act, adopted in May 2024, is specifically designed to promote trustworthy artificial intelligence.*

3.1. The development of artificial intelligence presents opportunities for the financial system and the economy

Artificial intelligence technologies have undergone a remarkable acceleration in recent years.

Artificial intelligence encompasses a wide array of technologies designed to create systems capable of mimicking human cognitive functions. The development of these technologies is underpinned by various scientific disciplines, including statistics, data analytics, computer science, and cognitive science. The European Union's AI Act[118] defines artificial intelligence as an automated system designed to operate with varying degrees of autonomy, capable of adapting after deployment, and able to infer from input data how to generate outputs such as predictions, content, recommendations, or decisions that can influence physical or virtual environments.

The origins of artificial intelligence date back to the 1940s and 1960s[119] with the creation of a first mathematical model of a neural network in 1943[120] and the publication of an article by Alan Turing in 1950 questioning for the first time a potential intelligence of machines, in which he imagines the Turing test[121]. The development of artificial intelligence has evolved with technological developments over the following decades and has experienced a marked acceleration in the field of machine learning, with deep learning technologies[122].The increase in computing power and the acceleration of research on the subject have made it possible to develop artificial intelligence techniques with increasingly sophisticated technologies and an increasing number of applications.

Generative artificial intelligence has emerged as the most widely recognized branch of artificial intelligence among the general public. Leveraging deep learning-based machine learning algorithms, it produces a variety of new content formats, including text, images, video, and audio. In November 2022, OpenAI, an artificial intelligence research firm, unveiled ChatGPT, a prototype chatbot employing generative artificial intelligence based on large language models to generate text. Trained on both publicly available data and user inputs, ChatGPT garnered unprecedented attention, attracting one million users within just five days—an unparalleled rate of adoption in the history of web applications.

[118] AI Act | Shaping Europe's digital future (europa.eu)

[119] History of [illegible]

[120] McCulloch, Warren S. Pitts, Walter. A logical calculus of the ideas immanent in nervous activity. *The Bulletin of Mathematical Biophysics*, 1943, vol. 5, p. 115-133.

[121] The Turing test judges whether a machine can imitate a human conversation such that it is indistinguishable from a human. Turing, Alan M. *Computing machinery and intelligence*.

[122] Machine learning is a subset of AI that concentrates on developing computer programs designed to learn as they are developed and used. Deep learning is a branch of machine learning that employs neural networks learning techniques.

Chart 3.1: Artificial intelligence fields of study

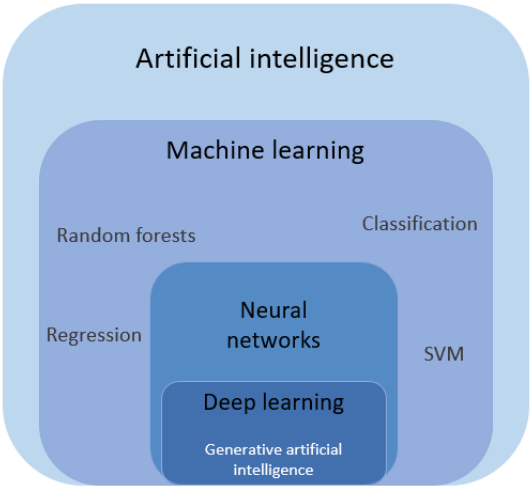
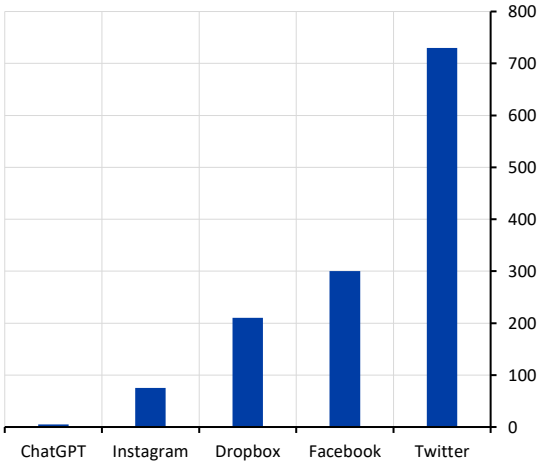


Chart 3.2: Number of days for a service to reach 1 million users since its launch



Source: [left]: Banque de France; [right]: SimilarWeb.
Note: ChatGPT was launched online on 30 November 2022.

Artificial intelligence has already found multiple applications across various industries

In 2022, a survey of over 1,400 international companies revealed that 50% had adopted artificial intelligence technologies (generative or otherwise) in their operations (see Chart 3.3). This survey[123] indicates that while artificial intelligence adoption doubled between 2017 and 2018, it has remained relatively stable in recent years, suggesting that recent artificial intelligence development has been primarily driven by increased applications among existing artificial intelligence adopters. In France, according to a recent survey[124], 35% of companies report using artificial intelligence technologies[125].

These technologies are primarily used to optimize service operations, develop new products, and manage finances. Artificial intelligence is particularly used in the manufacturing sector for predictive inventory management, predictive maintenance of industrial equipment, quality control inspections, and waste management. Artificial intelligence also benefits the agricultural sector through refined weather forecasting to anticipate events that may impact harvests. In the service sector, artificial intelligence enables improvements in customer service (personalized recommendations), dynamic pricing (tourism and transportation), and cybersecurity (system monitoring, analysis of vulnerabilities and threats in real time). Finally, artificial intelligence is also used in healthcare for decision support and computer-assisted surgery.

Generative artificial intelligence is Accelerating Technological Advancement and Expanding artificial intelligence Applications. Generative artificial intelligence is driving a technological surge that is broadening the spectrum of artificial intelligence applications. By enabling the rapid and simple generation of content, generative artificial intelligence can facilitate the automation of various tasks, such as customer service through chatbot integration. This technology has already captivated businesses (see Chart 3.4). While most companies currently employing generative artificial intelligence have limited deployments, they anticipate a significant expansion of its applications in the near future[126]. Key obstacles to broader generative artificial intelligence adoption include data privacy concerns, trust issues, transparency challenges, and a shortage of skilled professionals[127].

AI has the potential to exert a profound influence on the economy, though the extent and nature of this impact remain uncertain. By streamlining the production of goods and services, artificial intelligence could temporarily

[123] The state of AI in 2022—and a half decade in review | McKinsey
[124] "Les employeurs face à l'Intelligence Artificielle" – a survey of a sample of 3,000 French companies with ten or more employees about their use of AI, June 2023 – France Travail.
[125] Structural analysis of France 2023 (note d23-124).
[126] Generative AI: Differentiating disruptors from the disrupted | MIT Technology Review
[127] Data Suggests Growth in Enterprise Adoption of AI is Due to Widespread Deployment by Early Adopters (ibm.com)

boost productivity growth. A 2023 study of US customer support agents revealed a 25% average increase in worker productivity five months after implementing generative artificial intelligence, with the most significant benefits accruing to less experienced and lower-skilled employees[128]. Additionally, artificial intelligence could foster sustained productivity growth by automating idea generation. However, measuring these macroeconomic effects is challenging, as their magnitude hinges on the policies enacted[129]. A March 2024 report by Anne Bouverot and Philippe Aghion estimates that artificial intelligence -driven productivity gains in France could augment GDP by €250 billion to €420 billion[130]. An IMF article[131] from December 2023 suggests that growth gains might be limited if artificial intelligence displaces human workers, but they could be substantial if artificial intelligence development complements human capabilities.

Chart 3.3: Use of artificial intelligence by international companies in 2022

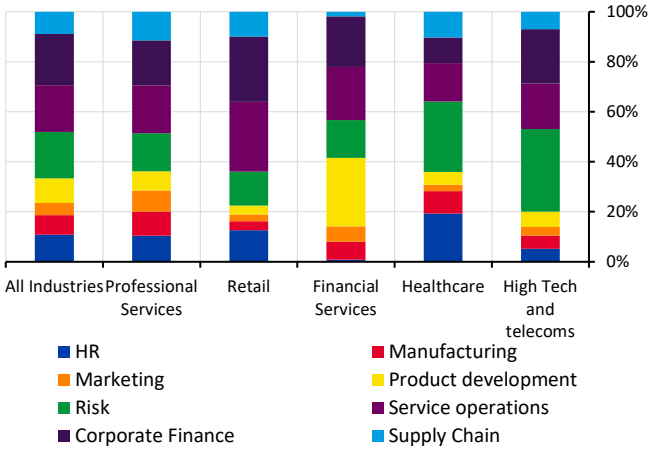
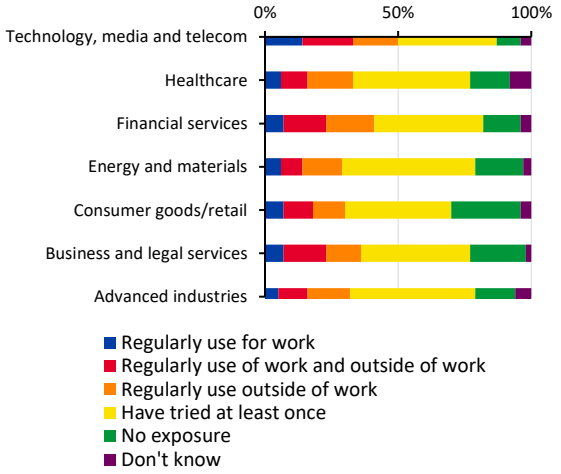


Chart 3.4: Exposure to generative artificial intelligence tools in international companies



Sources: [left]: 2022 McKinsey Survey data; [right]: 2023 McKinsey data.

The financial sector has been a pioneer in adopting artificial intelligence technologies and is poised for even greater utilization in the coming years.

The financial sector has made considerable use of artificial intelligence for many years. The integration of artificial intelligence into financial services dates back to the 1980s with the introduction of artificial intelligence -powered tools for personalized financial and tax advice. Since then, financial institutions have gradually incorporated artificial intelligence into their market activities, such as forecasting, financial analysis, and decision-making.

Banks and insurance companies, have extensively leveraged artificial intelligence. Four primary use cases, each with its associated benefits, can be identified[132]:

- Enhanced customer experience and satisfaction: Through various support systems, decision support tools, and recommendation engines, including chatbots and voicebots, artificial intelligence enables personalized customer experiences. Generative artificial intelligence further enhances customization capabilities, improving the efficiency of marketing and sales processes.
- Optimized value chain: artificial intelligence automates previously manual tasks, optimizing internal processes and reducing costs. Its ability to process unstructured data amplifies these benefits. A prime

[128] Brynjolfsson E., Li D., Raymond L (2023), "Generative AI at Work", *NBER Working Paper Series*.
[129] Trésor-Éco No. 341 (April 2024), "Les enjeux économiques de l'intelligence artificielle" (economie.gouv.fr)
[130] Commission de l'intelligence artificielle, 25 recommandations pour l'IA en France, report coordinated by Anne Bouverot and Philippe Aghion, 13 March 2024.
[131] Acemoglu (D.) and Johnson (S.), Rebalancing AI, December 2023.
[132] See for example two ACPR studies on the digital transformation of France's financial sector: La transformation numérique dans le secteur bancaire français, *Analyses et Synthèses* No. 131, January 2022; La transformation numérique dans le secteur français de l'assurance, *Analyses et Synthèses* No. 132, January 2022.

example in banking is the rise of customer self-service, allowing branch advisors to focus on higher-value activities.

- Risk management: artificial intelligence is used to manage financial risks (e.g., credit risk), operational risks, and compliance risks. It is particularly effective in combating fraud, anti-money laundering, and counter-terrorism financing (AML/CTF) through systems that monitor suspicious transactions and automate alert management.
- Market activities: artificial intelligence is instrumental in improving trend identification and integrating vast volumes of data. For instance, market participants employ machine learning for algorithmic trading to optimize execution strategies based on market conditions. Asset managers also utilize these technologies for portfolio construction and asset valuation. However, it is important to note that some financial institutions have made misleading claims to their clients regarding their use of artificial intelligence, leading to regulatory actions by authorities such as the Securities Exchange Commission[133].

In practice, many use cases combine some or all of these characteristics. For instance, in the banking sector, machine learning systems can assess customer creditworthiness based on their financial data (generating credit scores similar to the U.S. credit score). This leads to reduced loan processing times (improving customer experience and distribution process efficiency) through highly automated processes (optimizing internal operations) while enhancing default prediction through better modelling (reducing risks) [134]. Similarly, in insurance, artificial intelligence systems are used to personalize pricing based on customer profiles, within regulatory limits, and to reduce claim processing time and costs through automated image analysis and advanced report reading capabilities. A survey conducted by Moody's Analytics in November 2023 revealed that 30% of financial institutions surveyed are currently piloting or actively using artificial intelligence for risk management and compliance activities[135].

The rise of generative artificial intelligence is poised to unfold a spectrum of applications in the financial sector. While traditional artificial intelligence is already widely used by financial institutions, the deployment of generative artificial intelligence within this industry appears limited and primarily focused on internal process improvements (risk identification, code development, document generation and synthesis, fraud and money laundering prevention). A December 2023 survey[136] indicates that a vast majority of financial institutions anticipate a surge in generative artificial intelligence applications within three years, with significant implications for their business. Broader development could extend to customer-facing areas.[137]. For example, unlike current -powered chatbots that provide predefined responses, generative artificial intelligence can offer personalized information to users, such as their account balance, recent transactions, or tailored savings product recommendations. Robo-advisors, online platforms that provide financial advice and automated portfolio management, represent an example of "classic" artificial intelligence applications that could be augmented with generative artificial intelligence to enhance customer data collection, and offer personalized product recommendations and advice in natural language[138]. The development of these customer-facing applications necessitates addressing transparency and accountability concerns.

Artificial intelligence-based technologies can facilitate financial system supervision (a concept known as "SupTech"). Artificial intelligence offers opportunities to improve the efficiency of supervisors in carrying out their missions, including risk control solutions[139]. The Banque de France and the Autorité de contrôle prudentiel et de résolution (ACPR) have developed several projects in this area (see box). Similarly, the Monetary Authority of

[133] SEC.gov | SEC Charges Two Investment Advisers with Making False and Misleading Statements About Their Use of Artificial Intelligence Delphia and Global Predictions told customers and potential customers that they were using AI, when in fact they were not. The SEC noted that these firms claimed to be using an AI model, but were not in fact doing so and had therefore misled their customers.

[134] Artificial intelligence and machine learning in financial services - FSB 2017

[135] AI in compliance (moodys.com)

[136] 2023 IIF-EY Survey Report on AI ML Use in Financial Services - Public Report - Final.pdf

[137] Generative Artificial Intelligence in Finance - December 2023 (oecd-ilibrary.org)

[138] Robo-advisors operate according to systems of rules, proposing asset allocations based on the information provided by customers or using complex algorithms that may be employed to monitor portfolios continually and adjust them dynamically. See in particular: Robo-Advising: Less AI and more XAI? - 2021 (institutlouisbachelier.org)

[139] The financial supervisor in the age of AI | Banque de France (banque-france.fr)

Singapore (MAS) uses artificial intelligence to analyse documents for red flags and to analyse transaction data to detect potential market manipulation[140]. The Securities and Exchange Commission (SEC) also employs artificial intelligence to identify fraudulent activities and market manipulation.

3.2 Inherent risks of Artificial Intelligence

While the potential opportunities of artificial intelligence are numerous, its deployment carries inherent risks that could be amplified by generative artificial intelligence. Firstly, artificial intelligence raises concerns related to the quality and confidentiality of the data used for its training. The autonomous and opaque nature of artificial intelligence models also poses the risk of difficulty in understanding and trusting the results provided. Finally, excessive concentration of power among industry players would exacerbate these risks for users and be detrimental to the system as a whole.

Artificial intelligence, through its algorithms and learning processes, gives rise to risks related to data management, particularly data confidentiality. This risk is especially pronounced in generative artificial intelligence systems that learn not only from publicly available data but also from user-provided data (to improve their responses): these tools can thus transmit information learned from one user by generating content for others. According to a June 2023 report by Cyberhaven [141], 10.8% of employees have used ChatGPT at work, and 4.7% of them have already provided confidential company information to the chatbot, with this percentage tending to increase over time. In June 2023, confidential data accounted for 11% of all data copied and pasted directly into the tool. These behaviours pose a significant threat to companies, as sensitive information can be widely disseminated. Furthermore, data transmitted to conversational tools can also be stolen during cyberattacks. To mitigate this risk and protect the confidentiality of financial data, several banking groups including JPMorgan, Bank of America, Goldman Sachs, and Deutsche Bank have banned the use of the ChatGPT online service for their employees. However, these risks could be lower in the case of tools reserved for internal company use, with strict data management rules.

Chart 3.5: Adoption of ChatGPT by employees

x: time / y: cumulative %

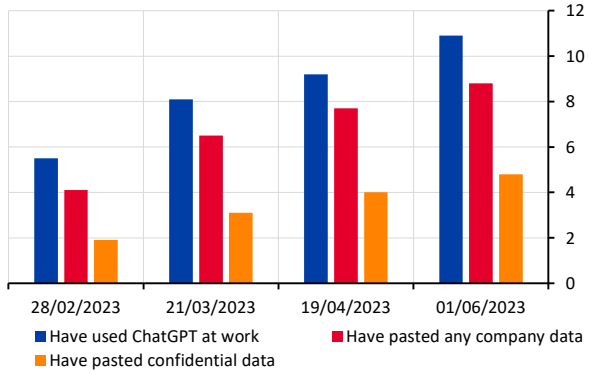
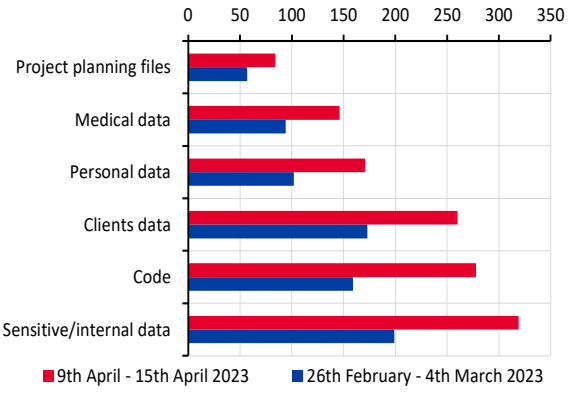


Chart 3.6: Number of incidents involving the transmission of sensitive data to ChatGPT

x: number of incidents per 100,000 employees / y: type of incident



Source: Cyberhaven.

More generally, the quality of results obtained from artificial intelligence technologies is directly dependent on the quality of the data. The use of inadequate data during the training of the tool, or during its use, can lead to erroneous results[142]. Some technologies are limited by their historical data or by the available data sources. For example, GPT 3.5 was trained on historical internet data up to January 2022, so a user may obtain incorrect or outdated information when querying the tool (e.g., no consideration of the war in Ukraine). At this stage, the information generated by generative artificial intelligence tools primarily comes from content written by humans. However, a strong adoption of these tools could lead to a feedback loop: the content they generate could become

[140] Written reply to Parliamentary Question on use of artificial intelligence in supervision of financial institutions (mas.gov.sg)
[141] Report created based on data provided by 1.6 million users of Cyberhaven software worldwide.
[142] Artificial Intelligence, Machine Learning and Big Data in Finance: Opportunities, Challenges, and Implications for Policy Makers (oecd.org)

one of the main sources of information for generative artificial intelligence models. This recursive phenomenon poses a risk of losing the diversity of original information in favour of a standardization of responses that could be potentially biased, erroneous, or outdated[143].

AI can perpetuate historical biases present in the data or create new ones due to its functioning. This can create blind spots or even lead to a lack of fairness. A model trained on biased data will perpetuate - or even reinforce - these historical biases and potentially discriminatory practices. This is especially true since a biased model generates biased results which are then used in its learning process, reinforcing the biases (through recursion). For example, the algorithm used by Apple and Goldman Sachs for credit line allocation decisions reportedly offered lower loan amounts to women than to men, all else being equal [144].Furthermore, biased decisions made by machine learning models can occur even with high-quality data, due to approximations, flaws in the algorithm's construction, or the fact that correlations between variables may be specific to the databases used (reflecting, for example, the characteristics of a historical sample).

Furthermore, artificial intelligence poses risks related to models that can undermine the reliability of results. For example, "hallucinations" are false responses presented as facts by tools using generative artificial intelligence with large language models. These hallucination problems in generative artificial intelligence models are inherent in the nature of large language models, which estimate a probable response based on the words provided by the user and can give abnormal or even false answers. For instance, a company asked ChatGPT to produce an article about the results of a company called Tesma, and ChatGPT created a coherent article but with invented and completely false financial figures. This phenomenon can also occur when the model is trained on false data. Moreover, the same question asked at two different times can generate different answers, highlighting a problem of temporal consistency. A January 2024 article from the Bank for International Settlements (BIS) also illustrates the limitations of generative artificial intelligence models, which invent false answers when faced with novel problems[145].

Technologies using artificial intelligence produce complex results, and their opaque functioning implies difficulties in understanding these results. The results of systems based on artificial intelligence are inherently complex to interpret for a human mind, due to the nature of certain modelling used (neural networks, etc.), which rely essentially on non-linear relationships. Some artificial intelligence firms may sometimes themselves reinforce the opacity of the functioning of tools, in order to protect their intellectual property. As a result, some artificial intelligence tools thus constitute black boxes, whose parameters and functioning are not visible to the entities integrating them into their services and whose sources are not mentioned.

Clear governance is necessary to reduce the risks associated with potential biases, lack of transparency and the reliability of the tool. Clear governance requires defining lines of responsibility for the development and supervision of artificial intelligence-based systems throughout their lifecycle, from development to deployment, along with explicit designation of responsibility for the results produced by the model.

The lack of competition among providers of artificial intelligence-based tools could exacerbate the risks. The costs required for the development of artificial intelligence-based models could entail the risk of dependency on oligopolistic suppliers. At this stage, OpenAI represents 39% of the generative artificial intelligence market compared to 30% for Microsoft, 8% for Amazon and 7% for Google [146]. The concentration of these technologies in a limited number of suppliers (relying on their advantages in terms of data or computing power) could amplify the risk of recursive use of data provided by artificial intelligences for model learning. Models would be trained with data from a limited number of artificial intelligence-based tools and would lose diversity.

Generative artificial intelligence could increase the risks of cyberattacks. Although most chatbots are built with internal safety features, such as refusing to respond to a direct request to create a cyberattack, they are generally

[143] The curse of recursion: training on generated data makes models forget. Shumailov, Ilia, Shumaylov, Zakhar, Zhao, Yiren, et al. 2023.
[144] Bias, fairness, and other ethical dimensions in artificial intelligence – Bank Underground
[145] Testing the cognitive limits of large language models (bis.org)
[146] The leading generative AI companies (iot-analytics.com)

not programmed to refuse the creation of computer code or text that could indirectly serve to launch cyberattacks.

3.3 Artificial intelligence poses significant risks to financial stability

Artificial intelligence presents a range of risks that could potentially exacerbate existing vulnerabilities in the financial system. The widespread adoption of artificial intelligence models by market participants could heighten the risk of herding behaviour, leading to amplified market volatility and procyclicality. Moreover, the deployment of artificial intelligence could lead to increased market concentration and the emergence of new systemic risks. Finally, the financial sector's heavy reliance on technology makes it particularly susceptible to the cyber threats posed by artificial intelligence.

Artificial intelligence (AI) has the potential to exacerbate market procyclicality and volatility. The increasing use of artificial intelligence in trading strategies and investment decisions could create a risk of homogeneous recommendations and herd behaviour, leading to heightened market procyclicality [147]. When multiple market participants employ similar artificial intelligence tools, it can result in a build-up of one-sided trades, amplifying market movements during adverse conditions. For instance, if an algorithm recommends that several large investors sell an asset, the subsequent price decline could trigger sell recommendations for other investors, fuelling the downward price movement and impacting associated hedging positions. This can occur very rapidly, leading to a "flash crash." Such stress events can generate significant liquidity demands for weaker market participants, potentially forcing them to sell assets and spreading stress to other asset classes. Given the high degree of interconnectedness among financial institutions, these movements could have systemic consequences. Furthermore, if models are not fully understood, users may struggle to predict their behaviour under various market conditions and may find it difficult to adjust their strategies during periods of underperformance. Additionally, artificial intelligence can increase the risk of market manipulation. For example, the dissemination of deepfakes, synthetic media created by generative artificial intelligence, could trigger massive market movements and severe volatility.

More broadly, inaccurate risk assessments can lead to significant financial losses for institutions. Underestimation of risks could result in excessive lending or substantial pricing errors, causing significant losses. Similar to traditional statistical models, training artificial intelligence models on inherently incomplete data can amplify losses during crises. Since models are typically trained on historical data, they may not accurately capture the behaviour of an asset during extreme events. Moreover, using a model with incomplete data can lead to incorrect loan pricing by banks or systematic losses on insurance products. Such errors could potentially erode customer confidence, triggering bank runs and, if widespread, could have systemic implications.

The widespread adoption of artificial intelligence (AI) could lead to increased vendor concentration, creating dependency risks and potentially concentrating the financial system. Similar to the risks associated with a large number of market participants using the same software, the widespread use of a limited number of artificial intelligence tools could pose operational risks in the event of a technology failure or outage, hindering business operations. Furthermore, the dominance of a single artificial intelligence provider could amplify interconnections within the financial system and facilitate the spread of shocks[148]. The growing prevalence of -based risk management systems, such as BlackRock's Aladdin and MSCI's RiskMetrics, could reinforce this trend by increasing the concentration of specialized players[149]. Moreover, the development of artificial intelligence tools requires significant upfront investments, placing larger financial institutions in a better position to develop these technologies compared to smaller players. These technological disparities could further contribute to increased concentration within the financial system.

[147] Intelligence artificielle: enjeux pour le secteur financier - Olivier Fliche, Su Yang - Fintech-Innovation Unit, ACPR
[148] SEC.gov | "AI, Finance, Movies, and the Law" Prepared Remarks before the Yale Law School
[149] Artificial intelligence and systemic risk (lse.ac.uk)

Generative artificial intelligence could exacerbate the cyber risks to which the financial system is highly exposed. Generative artificial intelligence enables cyber attackers to create more sophisticated and harder-to-detect attacks. This technology can be used to automate the creation of highly personalized phishing emails in multiple languages with flawless grammar. Similarly, generative artificial intelligence systems can mimic a person's voice (or even image) to impersonate them. Additionally, generative artificial intelligence facilitates attacks involving malicious code. Conversational artificial intelligence agents can generate or modify code, enabling more sophisticated attacks. Artificial intelligence also enables the industrialization of cyberattacks by automating their design and execution, as artificial intelligence can adapt its strategy based on detected vulnerabilities. Furthermore, generative artificial intelligence has enabled a new category of cyberattacks known as indirect prompt injection, which involves manipulating prompts to bypass the tool's built-in security and allowing the generative artificial intelligence to retrieve sensitive information itself. Unlike previous methods, the artificial intelligence tool doesn't simply aid in creating malicious tools; it acts as a malicious actor itself.

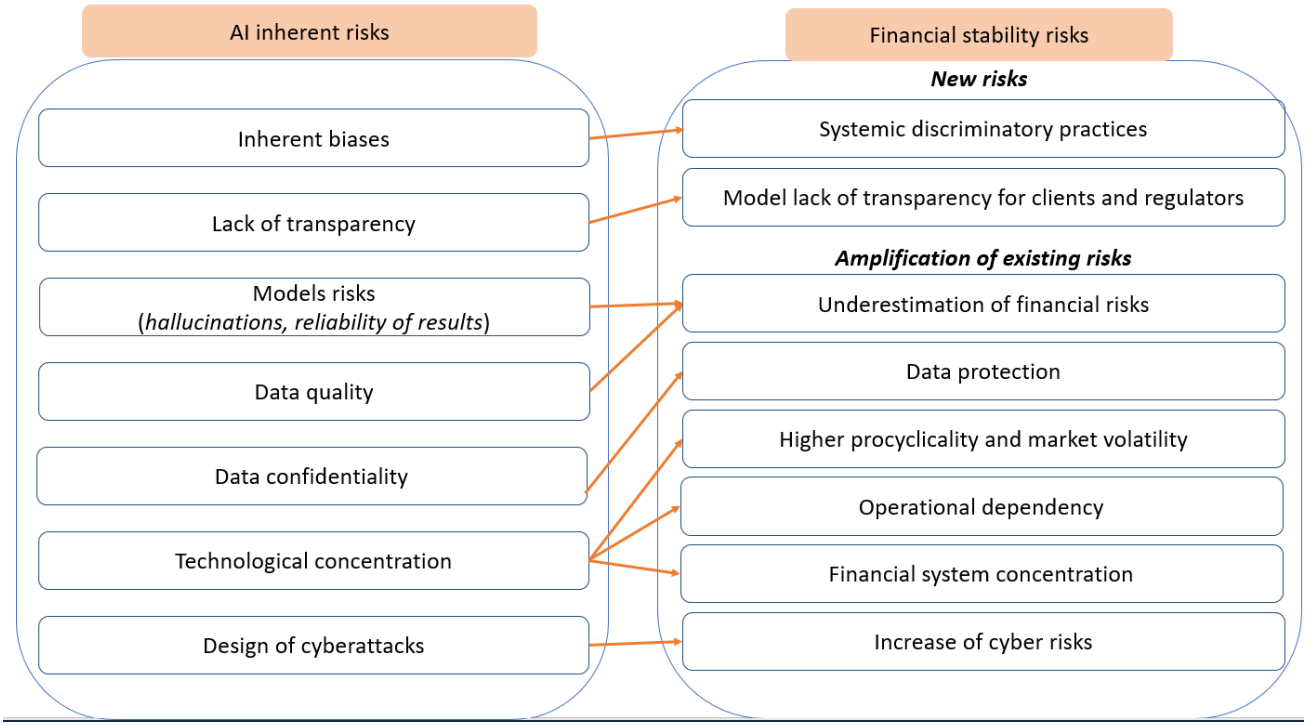
Generative artificial intelligence solutions are being developed to bolster cybersecurity efforts, aiding in threat detection and dynamically strengthening security measures. Preparedness for cyberattacks is an essential component of cyber resilience, and by analysing vulnerabilities in real-time, detecting cyberattacks, and simulating attack scenarios, artificial intelligence can significantly improve cyber resilience. Furthermore, artificial intelligence can automate the response to attacks, implementing tailored protocols based on the specific threat.

The inherent risks of AI, such as potential biases, errors, and the opacity of models, can have a detrimental impact on the reputation of financial institutions. Errors or biases stemming from artificial intelligence models could become systemic within an organization or market, eroding customer trust. Beyond the risks to financial institutions, potential biases and difficulties in understanding model outputs can jeopardize customer and investor protection. A study by the ACPR highlights that conversational explanations provided by robo-advisors tend to inflate customer confidence, making them more likely to follow incorrect recommendations[150]. Consequently, customers may be misinformed about investment risks and make suboptimal decisions.

The ability to understand model outputs is crucial for effective risk management by financial institutions and regulators. Comprehending how an algorithm works is necessary not only to verify calculations[151] but also to examine the variables considered and their respective weights in determining the outcome[152]. Moreover, understanding the functioning of an algorithm is essential for regulators to ensure compliance with regulatory requirements. In the case of internal credit risk models used by banks, algorithms must be easily interpretable and understandable by both bank management, to enable informed strategic decisions regarding portfolio allocation, and regulators, to facilitate the application of prudential regulations [153].

[150] La motivation du conseil par les robo-advisors: vers un éclairage apporté aux clients? | ACPR (banque-france.fr)
[151] Machine Learning and IRB Capital Requirements: Advantages, Risks and Recommendations - Institut Louis Bachelier
[152] Artificial intelligence in central banking (bis.org)
[153] Artificial intelligence and machine learning in financial services - Financial Stability Board (fsb.org)

Diagram 3.1: Typology of artificial intelligence risks for financial stability



Source: Banque de France.

3.4 Structural risks of information manipulation could impact the financial system

Generative artificial intelligence tools make it easier to create fake information for fraud or geopolitical disruption purposes, with potentially destabilising effects for the financial system.

Generative artificial intelligence tools facilitate the creation of deepfakes, which can be used for fraudulent activities and geopolitical destabilization, with potentially disruptive effects on the financial system. Generative artificial intelligence technologies enable the creation of false videos and recordings by superimposing images and sound onto existing content. This process, known as "deepfaking," can be used for manipulation and fraud. In early February 2024, the governor of the Romanian central bank's image and voice were deepfaked to promote fraudulent investments. In September 2023, the chairman of the Securities and Exchange Commission (SEC), Gary Gensler, warned about the risk of significant one-directional market movements caused by deepfakes if false information led to a loss of confidence in an asset.

These artificial intelligence -generated deepfakes can erode trust in financial institutions, potentially triggering bank runs. The US regional banking crisis in March 2023 highlighted how quickly panic can spread among depositors through social media[154]. When artificial intelligence can make false information about banks seem credible, its dissemination can lead to panic and mass deposits withdrawals.

More broadly, disinformation campaigns can destabilize geopolitical situations, leading to significant political, social, and economic consequences. The 2024 World Economic Forum Global Risks Report ranked disinformation as the most severe short-term (two years) threat [155]. To mitigate the risk of deepfake-generated disinformation, companies in the sector are increasingly implementing measures to detect or limit their spread. For example, OpenAI has announced the addition of watermarks to images generated by its systems, while Midjourney has banned the generation of images using the faces of political figures. To improve deepfake detection and

[154] Social Media as a Bank Run Catalyst by J. Anthony Cookson, Corbin Fox, Javier Gil-Bazo, Juan Felipe Imbet, Christoph Schiller: SSRN
[155] The world is changing and so are the challenges it faces | World Economic Forum (weforum.org)

prevention, public awareness is essential, as is collaboration among various stakeholders, including specialized companies, social media platforms, telecommunications operators, and media outlets.

Chart 3.7: Google search volumes for the terms "artificial intelligence" and "deepfakes"

x: time / y: index

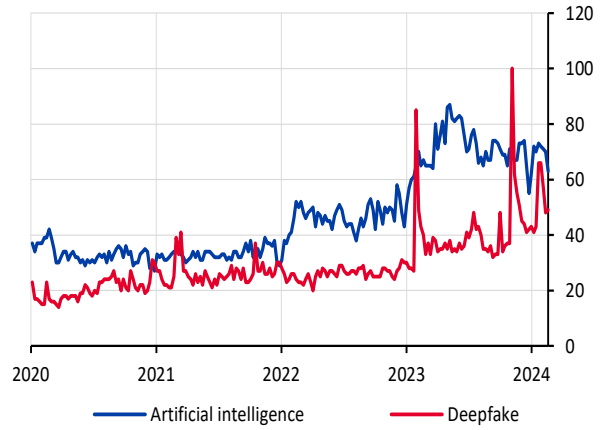
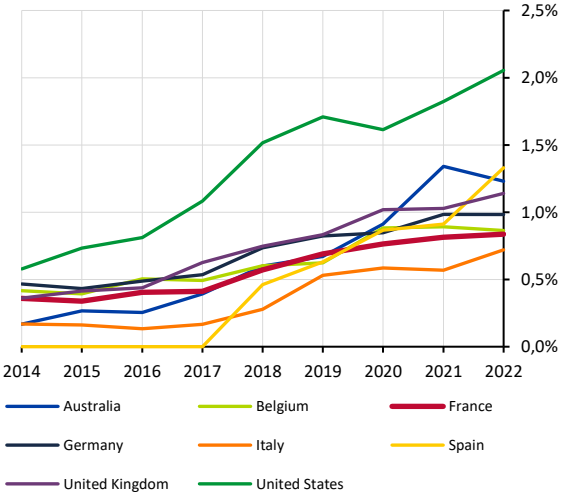


Chart 3.8: Share of artificial intelligence jobs in all job offers

x: time / y: %



Source [left]: Google Trends; [right]: OurWorldInData.
Note: The Google trends shown here are measured as an index which takes the value 100 for the point of highest search interest for the term since 2020.

Automation driven by artificial intelligence could lead to structural economic changes, although the exact scale and nature of these changes remain uncertain [156]. Not all countries or economic sectors are equally exposed to artificial intelligence -driven labour market shifts. Developed economies, with their advanced IT infrastructure and a high proportion of automatable tasks (such as those found in manufacturing, legal, accounting, finance, and IT sectors), are likely to be most affected by the rise of artificial intelligence [157]. However, in the short term, few jobs will be entirely automated by artificial intelligence. Instead, many roles will gradually integrate artificial intelligence components. Artificial intelligence is therefore likely to cause significant sectoral restructurings, which could destabilize the financial sector if they are not adequately anticipated or occur more rapidly than expected. The widespread adoption of artificial intelligence could lead to substantial job shifts between sectors, potentially resulting in high rates of business failures and impacting the solvency of affected companies or households.

Artificial Intelligence is likely to drive significant sectoral restructurings, which could destabilize the financial sector if they are poorly anticipated or occur more rapidly than expected. The deployment of artificial intelligence could lead to substantial job shifts across various economic sectors, consequently resulting in a high number of bankruptcies within certain industries or companies themselves, with potential implications for the solvency of affected businesses or households. Furthermore, in the markets, the growing adoption and enthusiasm surrounding artificial intelligence have propelled valuations of artificial intelligence-related companies due to investor optimism regarding the future benefits of these new technologies (see Box 1.2, Chapter 1) [158] .

The future development of artificial Intelligence will need to consider the constraints imposed by environmental limitations. Training an artificial intelligence model requires significant computational power, which in turn demands a large amount of energy and results in greenhouse gas emissions. According to OpenAI research[159], since 2012, the computational power needed to train artificial intelligence models has doubled every three months. An online search using generative artificial intelligence consumes approximately 4 to 5 times the energy of a traditional online search using a search engine169. Additionally, generative artificial intelligence systems require substantial amounts of water for processor cooling. The development of generative artificial intelligence models by Google and Microsoft has led to annual increases in water consumption of 20% and 34%, respectively,

[156] Innovation by central banks: the sooner the better | Banque de France (banque-france.fr)
[157] Gen-AI: Artificial Intelligence and the Future of Work (imf.org)
[158] Financial Stability Review, November 2023 (europa.eu)
[159] AI and Compute (georgetown.edu)

according to the companies' environmental reports. The environmental consequences of artificial intelligence will therefore pose potential limitations to its deployment.

Box 3.1: The Banque de France's use of artificial intelligence

By Philippe Grad

The rise of artificial intelligence also presents opportunities for the Banque de France to carry out its missions. To make the most of these new technologies while managing their risks, the Banque de France has adopted an experimental approach. This involves testing the potential contribution of a given technological solution on a specific use case, in order to fully understand its advantages and disadvantages and to minimize uncertainties. If the experiment proves successful, the project is put into production.

In this context, about ten applications now integrate artificial intelligence functionalities, including:

- **N-ACSEL:** a partitioning (clustering) model based on economic data that allows for "profiling" territories. This view, provided to local officials, enables them to better understand their strengths and weaknesses and to benchmark themselves against other territories;
- **ScoreIA**: a credit rating model, incorporated into the company rating application to be used as a decision-support tool by analysts;
- **PAI**: a tool for measuring perceptions and inflation expectations, established by analysing a large panel of press articles;
- **BASTID**: a bank fraud detection system;
- **LUCIA**: a tool for combating money laundering (AML/CFT), enabling the analysis of large volumes of banking transactions and used in the context of on-site inspections of institutions;
- **PLUME**: a system for transcribing voice recordings into text, used in particular in the control of commercial practices in the financial sector.

Other, more exploratory work using artificial intelligence and other original sources such as satellite data, for example, is also being conducted on the use of pollution data to monitor industrial activity[160], including with external partners[161], making it possible to cover many countries with standardised methods.

The Banque de France is indeed in a favourable position to deploy artificial intelligence -based solutions: a diverse and abundant dataset, a platform to centralize this data and organize its governance, infrastructures for innovation, and a broad technical expertise, particularly in data scientist and data engineer teams attached to various departments, working in coordination with the Banque de France's innovation LAB.

In parallel with these achievements, the methodological aspect of designing, developing, and using artificial intelligence systems has also been invested in. This work has led to the establishment of a framework that applies to both development teams and users of artificial intelligence systems. This framework, called "trustworthy artificial intelligence ", includes:

- a code of conduct defining the principles and behaviour to be adopted by artificial intelligence developers and users;
- a risk analysis method specific to the technology, its implementation, and its use;
- a toolkit to address risks.

The method is based on seven challenges: i) diversity, non-discrimination, and fairness; ii) security, robustness, and reliability; iii) transparency and explainability; iv) privacy and personal data protection; v) working

[160] Can satellite data on air pollution predict industrial production? - Banque de France - November 2021
[161] Satellites Turn “Concrete”: Tracking Cement with Satellite Data and Neural Networks - Banque de France - June 2023

environment, social and environmental responsibility; vi) human dimension and human oversight; vii) accountability and responsibility.

These challenges, reviewed as part of the artificial intelligence projects, make it possible to identify a hierarchy of risks. Faced with these risks, a toolkit of good practices is applied throughout the lifecycle and is integrated into our internal control organization.

These good practices are organized into three blocks corresponding to the development stages: i) data sourcing; ii) development and validation of the solution; iii) model operation.

3.5. Regulatory pathways for artificial intelligence

The rapid evolution of artificial intelligence and its increasing adoption necessitate a regulatory framework to mitigate the various risks mentioned above.

Within the European Union, The European Parliament and the Council of the European Union adopted, on 13 March and 21 May 2024 respectively, a regulation, known as the Artificial Intelligence Act (AI Act), aimed at fostering innovation and promoting trustworthy artificial intelligence, in compliance with fundamental rights, security and ethical principles,[162] while mitigating the risks potentially presented by the most powerful artificial intelligence models.

This directly applicable regulation distinguishes artificial intelligence systems based on the level of risk they present:

- Artificial intelligence practices posing an unacceptable level of risk to the safety and fundamental rights of citizens, such as subliminal manipulation, social scoring, or predictive policing, will be prohibited by the AI Act (Chapter II).
- High-risk artificial intelligence systems will be regulated. In the financial sector, the two considered use cases are, for banks, the assessment of the solvency of natural persons and, for insurance companies, the assessment of pricing for natural persons in life and health insurance. Before being placed on the market or deployed, these systems will have to be registered and a declaration of conformity will have to be made (covering the following items: risk management processes; high data quality; documentation ensuring traceability and auditability; appropriate degree of transparency and interpretability; measures allowing human oversight; robustness, accuracy, cybersecurity). In France, the ACPR will be the competent authority (market supervisory authority) responsible for overseeing the use of these systems by banks and insurance companies.

Other artificial intelligence systems, sometimes referred to as limited-risk systems and formally grouped under the heading “certain artificial intelligence systems” (Chapter IV, Article 50), will have to comply with transparency requirements, notably by specifying that their content was produced by an artificial intelligence. These requirements will apply particularly to systems that interact directly with human users or that generate content (images, videos, text).

European lawmakers also addressed the specific case of general-purpose artificial intelligence models. These models, defined as those capable of performing a wide range of distinct tasks (Article 3, paragraph 63), and which can be integrated into other systems, are subject to specific requirements (Chapter V). All general-purpose models must therefore comply with documentation and information sharing obligations with deployers. For models presenting a systemic risk, providers must comply with more stringent evaluation and transparency requirements, similar to those imposed on high-risk systems (see above).

[162] The General Data Protection Regulation (GDPR) already states that any person “shall have the right not to be subject to a decision based solely on automated processing, including profiling, which produces legal effects concerning him or her or similarly significantly affects him or her” (Article 22).

The AI Act will generally apply two years after its entry into force. However, the provisions concerning unacceptable risks and those concerning general-purpose models will enter come into application six and twelve months after the entry into force of the regulation, respectively. The articulation between the horizontal rules set out by the AI Act and the vertical regulation specific to the financial sector is not explicitly provided for in the regulation (in particular to give flexibility to supervisors in how to integrate these new missions). This articulation issue will be crucial for financial supervisors, and could be specified in particular in guidelines from the European Banking Authority (EBA) and the European Insurance and Occupational Pensions Authority (EIOPA).

International regulators have begun work on the impact of artificial intelligence on financial stability. The Financial Stability Board (FSB) and the Basel Committee have included artificial intelligence among the priorities of their 2024 work program. On the one hand, the FSB plans to formulate recommendations on taking into account the potential implications of artificial intelligence for financial stability, following an initial report published in November 2017. In a report published in May 2024[163], the Basel Committee presents the implications of the digital transformation of finance, and in particular the use of artificial intelligence for banks and their supervisors. While the deployment of artificial intelligence could lead to greater automation of certain tasks, this report emphasizes the need to maintain human judgment in the governance and risk management of financial institutions.

Effective enforcement of regulations necessitates robust oversight mechanisms. Financial regulators must therefore prepare to audit artificial intelligence systems deployed within the financial sector, prioritizing those posing the greatest risks to key regulatory objectives (financial stability, consumer protection, anti-money laundering/countering the financing of terrorism). This presents a multifaceted challenge, requiring a deep understanding of the technology. Beyond human resource implications, regulators will need to develop a tailored methodology for auditing artificial intelligence systems. A pilot approach, potentially in collaboration with the private sector, can accelerate the learning curve. Mitigating artificial intelligence risks is a collective responsibility, involving all financial system participants.

[163] Digitalisation of finance (bis.org)

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