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High earnings can counteract increased risks for the banks

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The institutions' earnings are the highest in many years, which increases their current resilience to losses. Higher interest rates and the prospect of subdued growth increase credit risks for the institutions' customers, among which the real estate industry in particular may provide losses. Institutions should exercise prudence in their capital planning due to uncertainties surrounding factors such as future net interest income and impairment charges.

Risk of losses on lending to real estate firms

The banks' credit risks are augmented by higher interest rates for a prolonged period, and a slowdown in the economy. The risk of losses for the banks particularly concerns the commercial real estate industry, which is characterised by significant lending growth and the risk of falling commercial property prices.

Increased earnings strengthen the banks' resilience

The spread between the money market interest rates and the banks' deposit rates has widened significantly during the past year. The income from deposits, among other things, as well as continued low impairment charges indicate that institutions' earnings in 2023 will be the highest in many years. The higher earnings are currently augmenting the institutions' resilience to losses.

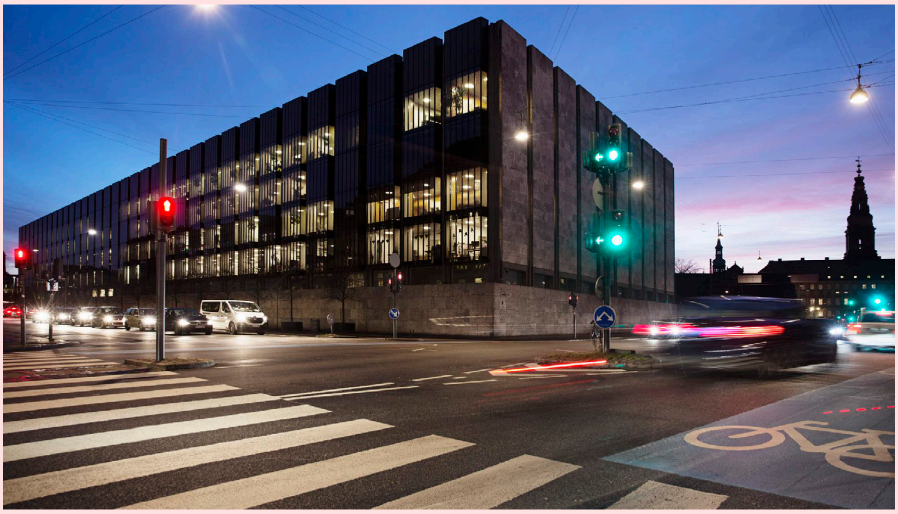
The institutions should exercise prudence in their capital planning

In a severe recession, several institutions' excess capital adequacy might prove to be too low. Uncertainty about future earnings and the impact of phasing-in regulation should cause the institutions to exercise prudence in their capital planning.

Why is it important?

Financial stability is a prerequisite for enabling the financial sector to perform its tasks that are critical to society. Even during a crisis, customers must still be able to borrow money for sound and creditworthy projects and be able to make and receive payments. This requires the financial sector to be robust enough to withstand economic and financial crises and contribute to ensuring a robust economy for Denmark.

Danmarks Nationalbank publishes the biannual analysis *Financial Stability*, which summarises Danmarks Nationalbank's assessments and recommendations regarding financial stability in Denmark. Among other things, the analysis assesses whether conditions related to credit institutions' credit granting, liquidity management and capital planning may lead to vulnerabilities in the financial system. The analysis also presents the results of Danmarks Nationalbank's biannual stress test, which contributes to the assessment of whether the largest credit institutions have sufficient capital to handle an economic recession. The analysis may also focus on other factors of relevance to financial stability. For example, pension and life insurance companies, cyber threats, digitalisation or the impact of climate change on the financial sector.



Keywords

Financial stability | Banking and mortgage lending | The Systemic Risk Council | Financial regulation | Financial stability and financial risks | Financial sector | Financial markets | Households and businesses | Deposits | Macroprudential policy | Interest rates | Stress test | Loans

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Summary and assessment

FINANCIAL MARKETS

Higher interest rates and slowdown in growth

The European Central Bank (ECB) and the Federal Reserve Bank (Fed) have communicated that policy rates will be kept at the upcoming interest rate meetings. The communication from the central banks has further pushed up yields on long-term government bonds in the USA, the euro area and Denmark in 2023 though yields have decreased somewhat in November. In the latest outlook from Danmarks Nationalbank a slowdown in growth is expected. Downside risks to Danish and international economy depends on how fast and effective the monetary policy tightening pass through to growth and inflation.

Inflation is declining, but core inflation remains high

Falling energy prices have lowered inflation, but core inflation remains high. High wage growth in the USA and the euro area may require central banks to either keep interest rates at current levels for a prolonged period, or raise interest rates further, to bring inflation down to its 2 per cent target. Falling energy prices have contributed significantly to reducing inflation. The supply situation in the energy market is still subject to considerable uncertainty and may result in further energy price rises.

FIRM CREDIT

The institutions have significant and concentrated exposures to the real estate industry

Lending to the real estate industry constitutes approximately 38 per cent of the credit institutions' corporate exposures. Lending to the real estate industry has increased in recent years, with lending by the medium-sized banks expanding by around 15 per cent annually, while the systemically important credit institutions' lending has increased by almost 8 per cent annually. The institutions' lending to real estate firms is to a great extent concentrated on their largest customers. Prior to the financial crisis, several of the failing institutions had a large proportion of lending concentrated on a few large businesses.

Risk of further price drops for commercial real estate

The sharp increase in interest rates is expected to exert downward pressure on commercial real estate prices. Compared to previous years, there have been very few real estate transactions in 2023, which may indicate that real estate prices have not yet adjusted to the new interest rate level. Falling commercial real estate prices may result in the collateral pledged for the loans not being sufficient to cover the full exposure. This may lead to losses for the institutions if the case of default of the loans.

Real estate firms are already under pressure from higher interest rates, and more of them will be challenged if earnings drop

The significantly higher interest rates have increased the real estate industry's financing costs. Currently, 9 per cent of lending to the real estate industry is to firms with a solvency ratio below 20 per cent and a debt servicing capacity below 100 per cent. If the economic situation deteriorates, several real estate businesses will have insufficient revenue to meet their financial obligations. If earnings drop 10 per cent, the proportion with low debt servicing capacity and solvency rises to 15 per cent.

CREDIT TO HOUSEHOLDS

Higher interest rates are expected maintain the pressure on homeowners

The interest rate pass-through caused by higher interest rates is expected to continue as homeowners with existing variable-rate loans have to pay more to service their debt when the interest rate is adjusted. In 2023, it is expected that 43,500 more homeowners than in 2021 will have a budget deficit. However, homeowners' finances are strengthened by real wage growth, and in 2024, the number of homeowners with a budget deficit is expected to fall by 19,100 compared to the level in 2023. When a homeowner has a budget deficit, this means that their income is not sufficient to sustain a modest spending level, pay their fixed expenses and also meet their debt obligations.

Increased sensitivity to higher interest rates

Since the beginning of 2022, homeowners have increasingly taken out variable-rate housing loans. Of the total mortgage lending to households of kr. 1,633 billion in October 2023, variable-rate loans now account for 53 per cent. Variable-rate loans in combination with deferred amortisation increase homeowners' interest rate sensitivity, posing a risk to households and banks if interest rates rise further. It is important that homeowners obtaining variable-rate housing loans without amortisation have a sufficient economic buffer and can afford to pay higher debt servicing cost in case of further interest rate increases.

EARNINGS

Increased earnings contribute to strengthened robustness of the institutions

The systemically important credit institutions' profit before tax was kr. 30 billion in the 1st half of 2023 and increased by kr. 8.4 billion compared to the 2nd half of 2022. The increase is driven by sustained positive development in the institutions' core earnings, low loan impairment charges, and positive value adjustment of securities holdings. Earnings are the first safeguard against losses, and the improved performance therefore contributes to strengthening the institutions' resilience.

The increase in net interest income is primarily driven by the deposit margins

The increase in net interest income is primarily driven by the banks significantly increasing their deposit margins in step with the interest rate increases since 2022. This has widened the spread between the banks' deposit rates and the money market interest rates. In all EU countries, the banks have increased their deposit margins since 2022. The banks' incentive to seek to attract deposits by raising deposit rates is limited by several factors, including that a large customer funding surplus reduces the value for the bank of using deposits as a source of funding.

Private customers have a limited interest in alternatives to deposits

Since 2022, the interest rate differential between demand deposits, time deposits and bonds has widened significantly. A few Danish households have begun to react to the interest rate gain from holding time deposits or bonds instead of demand deposits, but overall, the reaction from Danish households has been limited. If customers choose to place their demand deposits as time deposits or bonds, for example, they will be able to achieve an interest rate gain. However, this placement entails a different risk profile, and whether the gain is sufficient depends on the individual customer's time frame and preference.

LIQUIDITY AND FUNDING

The banks' liquidity position is robust

Danish banks continue to have a robust liquidity position and are resilient to severe liquidity stress. The institutions have good excess capacity relative to the regulatory liquidity (LCR) and stable financing (NSFR) requirements. The regulatory requirements help strengthen the individual bank's liquidity position but are not enough in themselves to ensure a resilient liquidity position. Sound liquidity risk management requires adaptation of liquidity positions after adequate liquidity stress testing.

Some mortgage credit institutions' dependence on their affiliated bank increased in autumn 2022

The mortgage credit market becomes more vulnerable if the banks to a greater extent only buy bonds from their affiliated mortgage credit institution. In autumn 2022, some of the banks affiliated with a mortgage credit institution increased the proportion of newly issued bonds they bought from their affiliated mortgage credit institution. It is good for the resilience of the Danish mortgage credit market and thereby financial stability that there are several potential buyers for the mortgage credit institutions' bond issuances.

Pension and life insurance companies have strengthened their access to liquidity

Since the end of June 2023, pension and life insurance companies have been required to settle new interest rate hedging contracts via a central clearing house. This increases their need to raise cash deposits in the event of significant interest rate fluctuations. In 2022, Danmarks Nationalbank recommended that pension and life insurance companies should focus on maintaining or increasing the number of their repo counterparties, from which the companies receive liquidity. Several companies have increased the number of counterparties, thereby strengthening their access to liquidity.

CAPITAL AND STRESS TESTS

The institutions should exercise prudence in their capital planning

In a severe recession, several institutions' excess capital adequacy might prove to be too low. There is considerable uncertainty as to whether the institutions can maintain their current profit levels, partly due to the deposit margin level and impairment charges. There is continued uncertainty surrounding the final effects of the banking package. This uncertainty should cause the institutions to exercise prudence in their capital planning.

Sector-specific systemic risk buffer ensures increased capitalisation for the institutions' lending to real estate businesses

The Systemic Risk Council has recommended that a sector-specific systemic risk buffer of 7 per cent be activated for exposures to real estate businesses. A sector-specific buffer will ensure increased capitalisation of the institutions, so they are better able to absorb impairment charges and losses on their loans to real estate firms, without tightening credit extension to businesses and households. Most institutions' earnings enable them to increase the excess capital adequacy relative to their capital requirements, including the sector-specific systemic risk buffer, and pay dividends.

A few institutions may have problems meeting the MREL requirement in a severe recession

During periods of turmoil in the financial markets, when the refinancing of expiring issues may be difficult, the institutions must still be able to meet the minimum requirement for eligible liabilities, their MREL requirement. In a severe recession scenario with a sharply deteriorating business cycle, some systemically important credit institutions will face difficulties in fulfilling their overall MREL requirements.

CLIMATE

Regulation must enable climate-related risks to be taken into account

The green transition is a central and necessary measure to protect against the future consequences of climate change. Climate change and the green transition can influence the financial sector and therefore require that the sector identifies and manages the risks posed by climate change and the green transition. The EU financial authorities are considering a framework for regulating climate-related financial risks. Danmarks Nationalbank supports the investigative initiatives to adjust the common European rules so that both the institution-specific and systemic climate-related risks identified by institutions and authorities can be included in capital requirements and other requirements imposed on the institutions.

CYBER

Serious cyber attacks may threaten financial stability

For a number of years, the Danish financial sector has targeted work at strengthening cyber resilience. The cyber threat cannot be eliminated, and there is still a need to increase cyber resilience. This is due to the development in the capabilities and methods of cyber criminals. In addition, several states have the capabilities needed to carry out destructive cyber attacks, but currently limited intentions of launching such attacks against Denmark. It is therefore important that the financial sector continues to target work at strengthening cyber resilience and limiting the impacts of cyber attacks. It is also important that the boards of directors and executive management are committed to and take responsibility for the work to enhance cyber security.

02
Financial markets: Higher interest rates and slowdown in growth

The ECB and the Fed have communicated that they will keep policy rates at a restrictive level at the upcoming interest rate meetings, but that they will assess adjustments on an ongoing basis. This communication led to a further increase in long-term government bond yields though yields have decreased somewhat in November, see chart 1. The yields on 10-year US and German government bonds are currently respectively 0.6 per cent and 0.1 per cent higher than at the start of 2023. An intentional aspect of monetary policy is that the increase in long-term yields reduces the profitability of long-term business investments and makes it more expensive for homeowners to obtain fixed-rate loans.

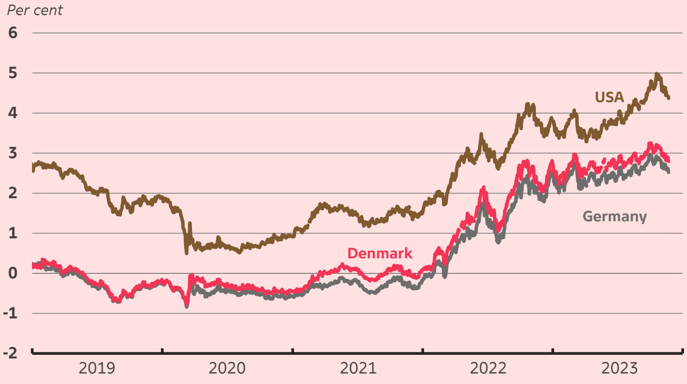
Quantitative tightening could further increase long-term yields

The ECB and the Federal Reserve Bank are expected to continue to reduce their bond holdings through quantitative tightening,[1] and the euro area countries are expected to increase sovereign debt issuance. Both factors could further increase long-term yields. Long-term yields can generally be viewed as an average of the expected future short-term yields, plus a maturity-related risk premium, *the term premium*. Term premiums may increase as a consequence of quantitative tightening, which, all other things being equal, will further increase long-term yields. Since May, the US term premium has increased, which has helped to push long-term yields further up. Conversely, a relatively low term premium in the euro area is dampening the increase in long-term yields, see chart 2. The low term premium means that long-term yields to a greater extent reflect expectations of short-term yields, and thereby monetary policy.

[1] In 2015, the ECB started buying government bonds in the secondary market on a massive scale. The purchases were part of the accommodative monetary policy stance and were intended to ease financial conditions by further reducing long-term interest rates. The ECB has now ended its purchases and has, since March 2023, instead reduced its bond holdings by around 15 billion euro per month. In July, the ECB also ended its reinvestments under one of its asset purchase programmes, increasing the reduction to around 25 billion euro per month.

CHART 1

Increase in long-term government yields in 2023



Note: The chart shows yields on 10-year Danish, German and US government bonds. The most recent observations are from 21 November 2023.
Source: Refinitiv Eikon.

CHART 2

Increase in the term premium may further augment interest rates

Note: Term premium on 10-year zero-coupon government bonds in the USA and Germany. The term premium is estimated using an AFNS model. See Jens Christensen, Francis X. Diebold and Glenn D. Rudebusch, The arbitrage-free class of Nelson-Siegel term structure models, *Journal of Econometrics*, 164.1, pp. 4-20, 2011. The most recent observations are from 17 November 2023.
Source: Refinitiv Eikon, St. Louis Federal Reserve Bank and Danmarks Nationalbank.

Euro area financial market volatility eased in the 2nd half of 2023

Financial market volatility has declined as market expectations of monetary policy have stabilised and the banking turmoil in March 2023 has diminished, see chart 3. This is also supported by corporate bond credit spreads, where yield premiums for riskier businesses have gradually declined since the bank turmoil in March 2023, see chart 4.

Even though financial market volatility has declined since the turmoil in March, both volatility indices and credit spreads are still at a higher level than before monetary policy interest rates were raised in 2022. The banks in the euro area and Denmark also report that credit standards have been tightened for loans to households and firms, and demand for new loans has diminished. In Denmark, the tightening of credit standards has taken place by, among other things, requiring larger disposable incomes as a natural element of the monetary policy transmission to the real economy, and in Denmark there is no indication of any extraordinary contribution from stress in the financial system.[2]

[2] See Danmarks Nationalbank, Monetary policy has been tightened further, *Danmarks Nationalbank Analysis (Monetary and financial trends)*, no. 12, September 2023 (link).

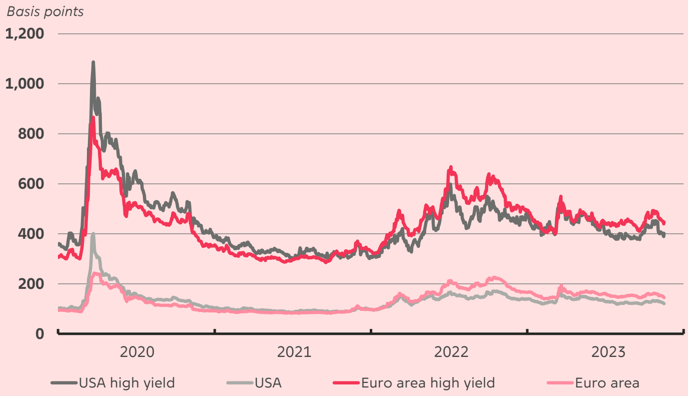
CHART 3

Financial market volatility has eased since the banking turmoil in March 2023, but remains higher than before 2022

Note: The chart shows implicit volatility for 10-year German government bonds and the development in the US MOVE index for US government bonds. The most recent observations are from 20 November 2023.
Source: Refinitiv Eikon, Bloomberg.

CHART 4

Credit spreads remain relatively low across companies



Note: The chart shows credit spreads to 10-year government bonds for high-yield bonds and a broad index of corporate bonds in the USA and the euro area. The most recent observations are from 20 November 2023.
Source: Refinitiv Eikon.

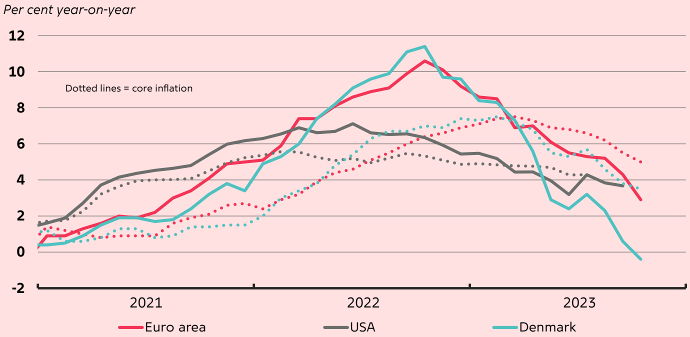
Falling energy prices have pushed down inflation, but core inflation remains high

Inflation continued to decline in the 2nd half of 2023 in Denmark, the euro area and the USA, see chart 5. In particular, falling energy prices and, to a lesser extent, foods have contributed to a significant decline in inflation over the past year, see chart 6. Yet underlying inflation still remains high. Core inflation has declined to a lesser extent than headline inflation, which has helped raise market expectations about the duration where the monetary policy rates will remain at the current levels.

High wage growth in the USA and the euro area can be expected to keep inflation at a high level, which may require central banks to either maintain interest rates at the current level for longer or raise interest rates further to bring inflation down to its 2 per cent target. The drop in energy prices has contributed significantly to falling inflation, but the supply situation in the energy market is still subject to considerable uncertainty and may result in new increases in energy prices and thereby higher inflation.

CHART 5

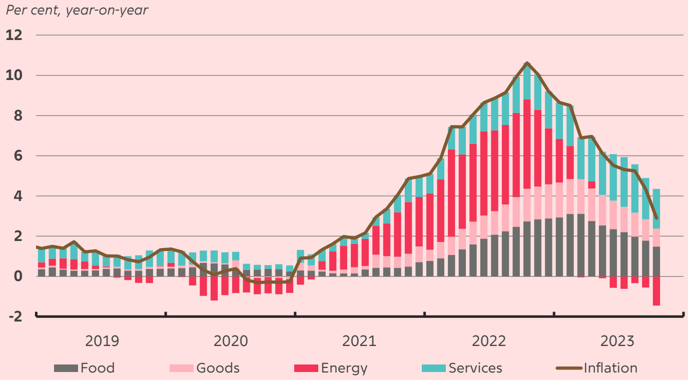
Headline inflation is declining in the euro area and the USA, but core inflation is still high



Note: Inflation in the euro area and Denmark is compiled as the EU Harmonised Index of Consumer Prices (HICP). In the USA, inflation is measured by the Personal Consumption Expenditures (PCE) index. The most recent observations are from October 2023 for Denmark and euro area and September 2023 for USA.
Source: Macrobond.

CHART 6

The decline in headline inflation in the euro area is mainly due to falling energy prices



Note: Contributions to euro area inflation decomposed by source and total inflation. The most recent observations are from October 2023.
Source: Macrobond.

The monetary policy tightening will dampen the economy in the coming quarters

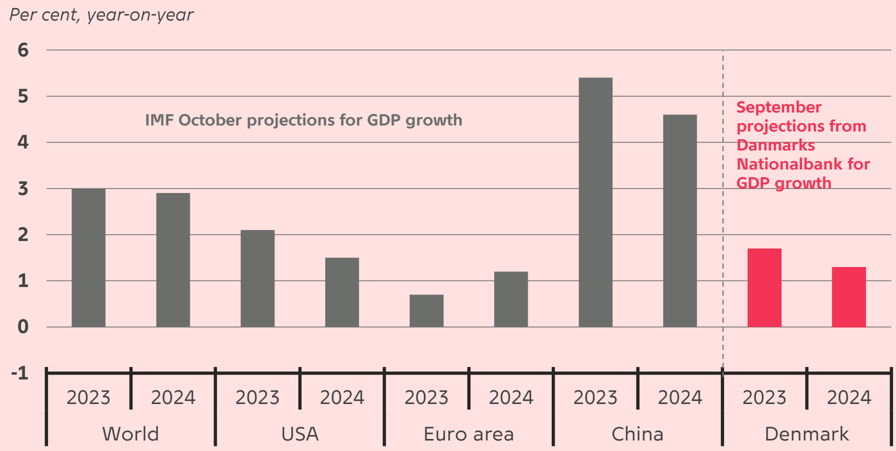
In the latest projection, Danmarks Nationalbank expects a continued slowdown in growth for a while longer, bringing the Danish economy close to a neutral cyclical situation in the course of 2024.[3] Danmarks Nationalbank's projection for the Danish economy assumes that inflation in our trading partner countries will be reduced without significantly lower growth than projected in the latest forecasts from international organisations. The International Monetary Fund (IMF) expects slower growth in the major economies in 2023 and 2024, see chart 7. The US and European economies have been more resilient than the market had expected in the wake of historically high interest rate increases. The increased resilience is reflected, among other things, by continued low unemployment and a modest increase in the level of failed businesses in 2023.

The risk outlook for the Danish and international economies depends on several factors, including how quickly and strongly the monetary policy tightening affects growth and inflation.[4] There is also considerable geopolitical uncertainty, since the war in Ukraine and further escalation of the conflict in Israel/Palestine may affect energy prices and inflation. Finally, risks related to the Chinese real estate sector may affect Danish growth through, among other things, tighter financial conditions.

[3] See Danmarks Nationalbank, Persistently high inflationary pressures call for tight economic policy, *Danmarks Nationalbank Analysis (Outlook for the Danish economy)*, no. 13, September 2023 (*link*).
[4] See Danmarks Nationalbank, Persistently high inflationary pressures call for tight economic policy, *Danmarks Nationalbank Analysis (Outlook for the Danish economy)*, no. 13, September 2023 (*link*).

CHART 7

Expected slowdown in growth in the major economies and in Denmark



Note: IMF estimates are from the October 2023 projections. GDP growth in Denmark is based on Danmarks Nationalbank's projection from September 2023. Projections for China have been revised with IMF's November projections of the Chinese economy.
Source: Danmarks Nationalbank and the IMF.

03
Firm credit: Risk of losses on loans to real estate firms

Lending to the real estate industry has previously inflicted heavy losses on the banks. During both the economic crisis in the 1990s and the financial crisis, lending to the real estate industry was the loan category that led to the highest share of impairment charges.[5]

Higher interest rates, an economic slowdown and falling real estate prices increase the risk of bank losses from the real estate sector. The Systemic Risk Council has recommended that a sector-specific systemic risk buffer of 7 per cent be activated for exposures to real estate firms. See also chapter 7, *Capital and stress tests*.

Institutions have significant and concentrated exposures to real estate firms

The credit institutions have large exposures to the commercial real estate market, which is very heterogeneous, see box 1. Lending to real estate firms amounts to kr. 537 billion, equivalent to approximately 38 per cent of the credit institutions' corporate exposures. Lending to real estate firms has increased in recent years, with medium-sized banks' lending increasing by around 15 per cent annually in the 2nd quarter of 2023, while the systemically important credit institutions' lending increased by almost 8 per cent, see chart 8. Most of the real estate firms' external financing is mortgage loans from the systemically important credit institutions, although the medium-sized banks also have pronounced exposures to real estate firms, see chart 9. Even though the real estate firms are primarily mortgaged through the mortgage credit institutions, the risk of losses is greatest for the banks. The banks typically provide the financing which in the event of default ranks the lowest in respect of the underlying collateral.

[5] See Danmarks Nationalbank, Interest rate hikes affect the banks and their customers, *Danmarks Nationalbank Analysis (Financial stability)*, No. 6, June 2023 (*link*).

BOX 1

The Danish commercial real estate market

The commercial real estate market is very heterogeneous and comprises a number of segments with various characteristics. The real estate categories include residential rental properties, as well as commercial property leases such as office properties, retail (shops and shopping centres), logistics and industrial properties, as well as hotels. The properties also differ from each other in terms of location and condition, and there may be great variation in the yield requirement on, and thereby the value of, properties across the different segments.

Danish real estate firms are financed through the Danish credit institutions
Danish real estate firms are typically financed through Danish banks and mortgage credit institutions. In addition to real estate firms, both Danish pension funds and investment funds invest in the Danish commercial real estate market. A large proportion of the Danish pension funds have independent subsidiaries that invest in real estate. Pension funds typically solely use equity financing in the form of the accumulated pension savings, which are invested in real estate to generate returns on the pension savings. A number of investment funds also have real estate investment as their primary investment strategy.

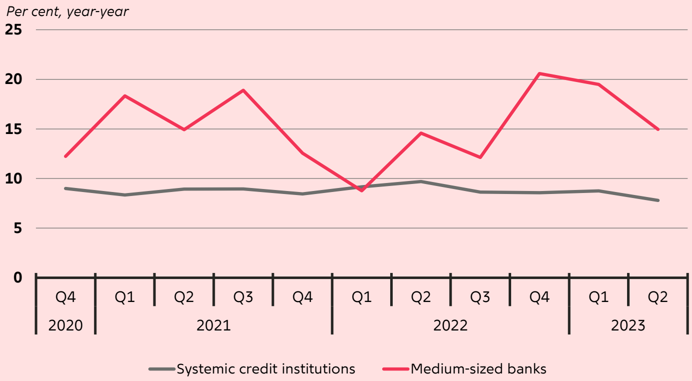
Foreign investors have accounted for almost half of the transactions in the Danish commercial real estate market
In recent years, foreign investors have accounted for almost half of the transactions in the Danish commercial real estate market, measured in Danish kroner, and the proportion has been increasing for a number of years. Several new foreign investors have entered the Danish market in recent years. However, this has not significantly changed the fact that Danish and Swedish firms have accounted for most of the transactions in recent years. The market has also been characterised by Danish investors accounting for most of the smaller transactions, while foreign investors account for most of the larger transactions. In 2023 the transactions have so far on average been of smaller size, and the foreign investors have only accounted for 26 pct. of the transactions.

At the same time, the institutions' lending to real estate firms is to a great extent concentrated on their largest customers, see chart 9 – and also to a greater extent than for customers in other sectors, although there is great variation in concentration across the banks. Prior to the financial crisis, several of the failing institutions also had significant real estate exposures and a large proportion of lending concentrated on a few large firms.[6]

[6] See Ministry of Business and Growth, *The financial crisis in Denmark –causes, consequences and learning* (the Rangvid report), 2013 (*link*).

CHART 8

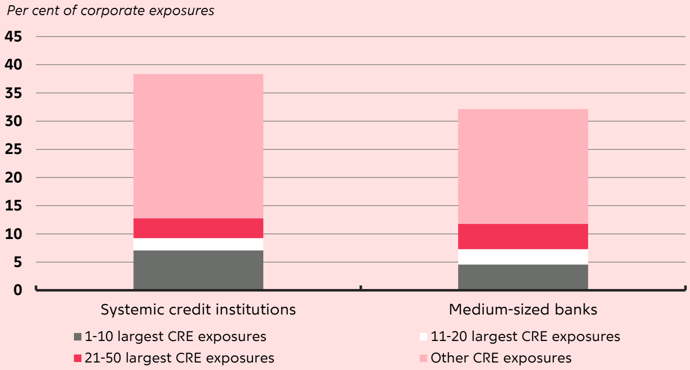
Significant growth in lending to real estate firms from both systemically important credit institutions and medium-sized banks



Note: Year-on-year growth in the institutions' lending to real estate firms. Real estate firms are defined as firms in the sectors *Purchase and sale of own real estate*, *Other residential leases* and *Commercial property leases*.
Source: Danmarks Nationalbank.

CHART 9

The institutions have large and concentrated exposures to real estate firms



Note: Lending to real estate firms (CRE) as a percentage of the institutions' total lending to Danish non-financial corporations. The largest exposures are calculated on a group basis, so that all individual companies in one group are included as one single exposure.
Source: Danmarks Nationalbank, the Danish Business Authority and own calculations.

Risk of further price drops for commercial real estate

The sharp increase in interest rates is expected to exert downward pressure on commercial real estate prices. Compared to previous years, there have been very few commercial real estate transactions in 2023, see chart 10. This may indicate a wide gap between buyers and sellers and that commercial real estate prices have not yet adjusted to the new interest rate level. Market participants report a 10-per-cent decline in prices in 2022 and expect further price drops in 2023 for all categories of real estate.[7] Prices are expected to experience a larger decrease outside the major cities.

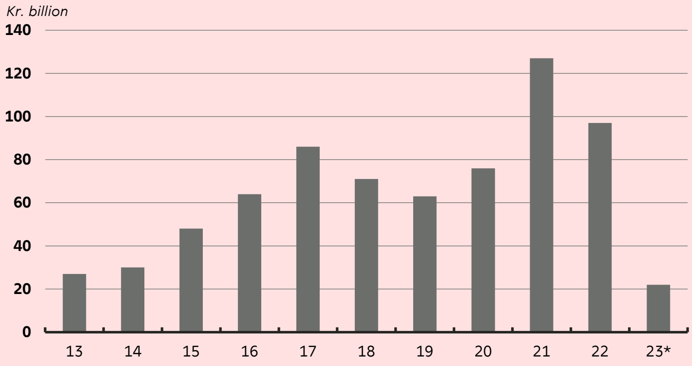
The valuation of commercial properties is related to the interest rate level via the yield requirement, where lower real estate prices will be reflected in a higher required yield.[8] The yield requirement has increased by around 1 percentage point since the beginning of 2022 for all real estate categories except retail, see chart 11. The higher yield requirements should be viewed in the light of the rising interest rates, which augment investors' alternative return options and thereby their required returns from commercial real estate. The 1-percentage-point increase in the yield requirement generally corresponds to the historical correlation between interest rates and yield requirements.[9] Several of the largest real estate firms state in their annual reports that an increase in the yield requirement of 1 percentage point would reduce the value of their properties by

[7] See Colliers, *Puls Key Trends*, Q2 2023 and the Danish Property Federation's market statistics, April 2023.
[8] The value of commercial real estate is most often calculated by discounting rental income less the operating expenses of the property with a yield requirement (the return method or the discounted cash flows method). A higher yield requirement thus reduces the value of the property.
[9] Historically, there has been a correlation between the yield requirement for offices and the 10-year bond yield, such that an increase in bond yields of 1 percentage point has coincided with an increase in the yield requirement of just under 0.5 percentage points. Since the start of 2022, bond yields have risen by approximately 2 percentage points, meaning that the increase in the yield requirement of 1 percentage point has more or less followed the historical correlation with interest rates.

roughly 20 per cent. Therefore, there is a risk of further price drops for commercial properties.[10]

CHART 10

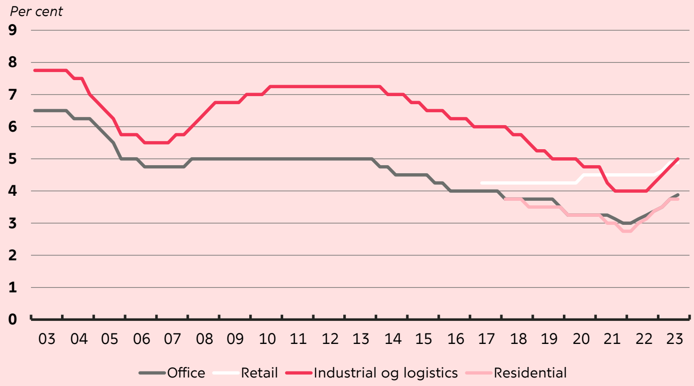
Significant decline in transaction volume indicates that real estate prices have not yet adjusted



Note: Transaction volume for commercial properties in Denmark. 23* includes the first to third quarter of 2023.
Source: Colliers and ReData.

CHART 11

The yield requirement has increased across real estate categories



Note: Initial return on primary commercial properties in Copenhagen.
Source: Colliers.

Divestment of Swedish firms' Danish real estate portfolios could lead to falling prices for Danish properties

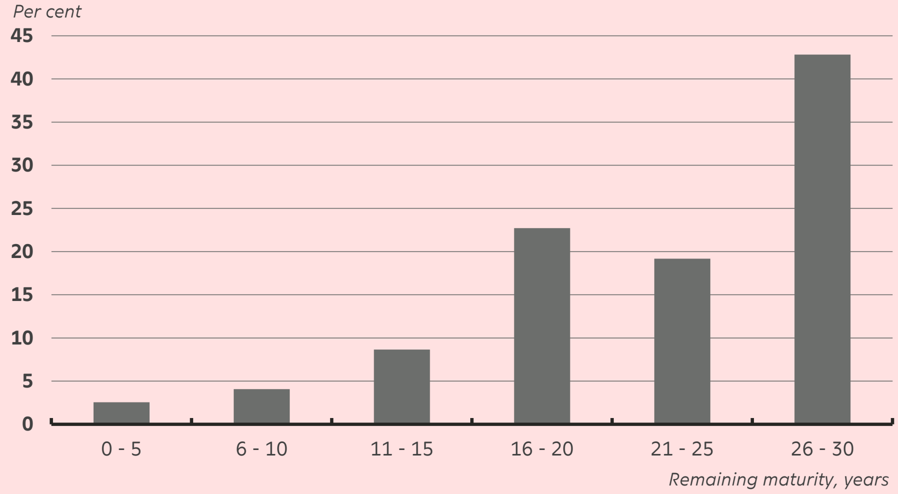
A number of Swedish real estate firms are facing challenges with refinancing their debt, and there is a risk that this may lead to divestment of their Danish real estate portfolios. Several of the Swedish real estate firms have announced that they will sell off their real estate portfolios. Divestment of substantial real estate portfolios could push down prices for equivalent properties and thereby affect the value of Danish commercial properties. Due to the low level of transactions, a price correction related to divestment by the Swedish firms at this point in time would have a relatively great effect. However, the price impact would be limited by the size of the Swedish firms' Danish real estate portfolios as a proportion of the overall Danish market. The largest Swedish firms have properties in Denmark worth kr. 99 billion and debt to Danish credit institutions amounting to kr. 43 billion.[11]

The Danish real estate firms do not face the same refinancing risks as their Swedish counterparts. The Swedish real estate firms are to a great extent financed by corporate bonds with relatively short maturities and thereby have significant debt that will have to be refinanced in the coming years. Unlike the Swedish real estate firms, the Danish firms are predominantly financed by taking out mortgage loans, most of which have long maturities, see chart 12. The Danish real estate firms only issue corporate bonds to a limited extent, and thereby have a limited refinancing risk.

[10] The correlation between the yield requirement and property prices is strongest at the low levels of the required rate of return.
[11] The calculation of the value of the Swedish real estate companies' properties in Denmark has been calculated as at Q1 2023 based on their financial statements. The companies' debt is calculated as at Q2 2023.

CHART 12

Most of the real estate firms' mortgage debt has a long maturity



Note: Mortgage lending to Danish real estate firms by remaining maturity of the loans.
Source: Danmarks Nationalbank.

Falling real estate prices increase institutions' losses in the event of default

Falling commercial real estate prices may result in the collateral pledged for the loans not being sufficient to cover the full exposure. This may lead to losses for the institutions in the case of default of the loans. For the majority of the real estate firms, the value of the properties pledged as collateral exceeds the value of their total debt by a certain margin. However, there are a number of real estate firms whose loan-to-value ratio is already high and for which falling real estate prices will further increase the loan-to-value ratio, see chart 13.

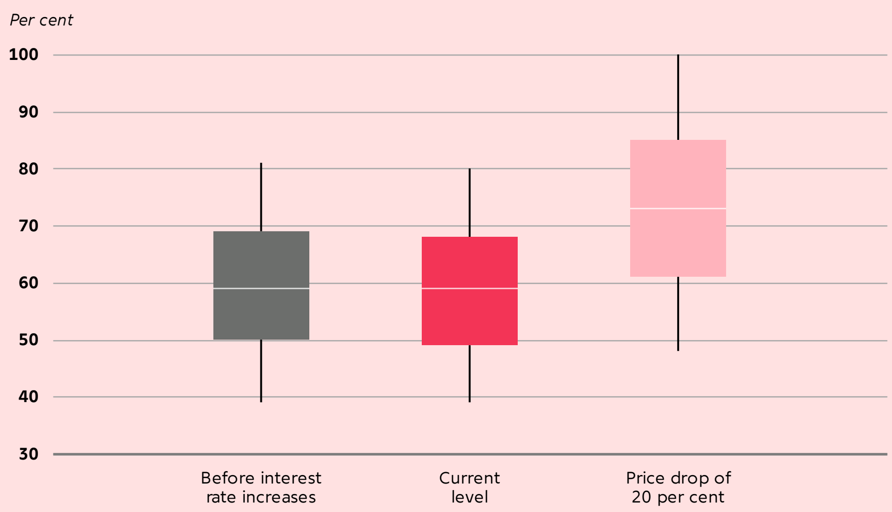
Loan-to-value ratios are at around the same level as at the start of 2022, before the sharp interest rate increases set in. The moderate change in the loan-to-value ratios should be viewed in the light of the very low number of transactions in 2023. Transactions in the commercial real estate market are indicative of the valuation of similar properties. It can therefore be expected that loan-to-value ratios will increase as trading activity increase and prices adjust to the current interest rate level.

In the event of default on a loan, the institutions' losses will depend, among other things, on the loan's ranking and the value of the underlying collateral. As a general rule, the mortgage credit institutions have the highest-ranking mortgages on the properties against which the real estate firms have provided collateral for their loans. For the banks, only around 70 per cent of the lending to real estate firms are therefore covered by mortgaged properties. The remaining lending is covered by other types of collateral, mainly guarantees and surety from other companies that are usually affiliated to the borrower. The value of the sureties and guarantees thereby also depends on the resilience of the guarantors.

CHART 13

Many properties are already highly mortgaged, and falling real estate prices will increase loan-to-value ratios even further

Loan-to-value ratio weighted by outstanding debt



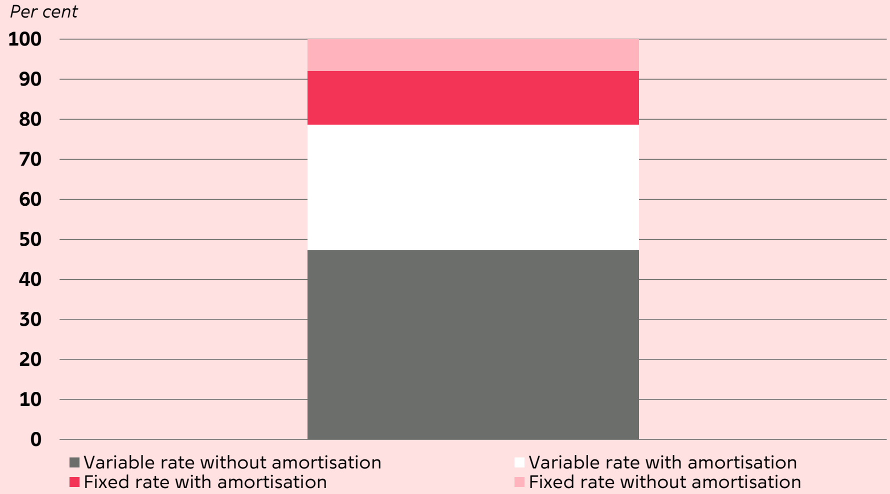
Note: Distribution weighted by outstanding debt (10th, 25th, 50th, 75th and 90th percentiles) of real estate firms' loan-to-value ratios, calculated as total lending as a ratio of the value of mortgaged properties. *Before interest rate increases* indicates the distribution for the 1st quarter of 2022, and *Current level* indicates the distribution for the 2nd quarter of 2023. *Price drop of 20 per cent* is based on a simulation whereby lending is maintained at the current level, while property values are written down by 20 per cent. Loan-to-value ratios are calculated at debtor level and include the debtor's total debt and the value of all properties pledged as collateral for the debtor's loan. The loan-to-value ratios are therefore not to be regarded as actual ratios, but as a statement of total lending in relation to total property mortgages, which for real estate firms constitute by far the largest share of the mortgage pledges.
Source: Danmarks Nationalbank.

Real estate firms are already under pressure from higher interest rates, and more will be challenged if rental income declines

The significantly higher interest rates have increased the real estate firms' financing costs, as almost 80 per cent of the firms' mortgage loans are variable-rate loans. Of the firms' variable-rate mortgage loans, 60 per cent are interest-only, see chart 14.

CHART 14

Most of the real estate firms' mortgage debt is at variable interest rates



Note: Mortgage lending to Danish real estate firms by loan type.
Source: Danmarks Nationalbank.

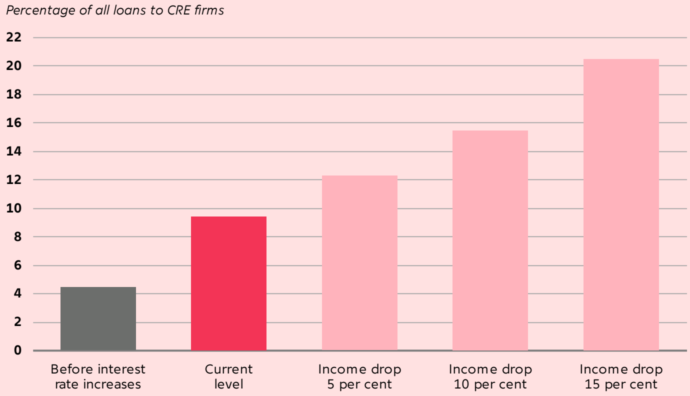
Currently, just over 9 per cent of lending to real estate firms is to firms with a solvency ratio below 20 per cent and a debt servicing capacity below 100 per cent[12], see chart 15. Before the sharp interest rate increases occurred in early 2022, the corresponding number was just over 4 per cent.[13]

In a risk scenario, where the economic conditions deteriorate, the real estate firms' earnings will likely decrease, as demand for residential and particularly commercial properties is determined by the level of economic activity. An economic downturn would affect real estate firms' earnings both through lower rental levels and higher vacancy rates, which would further reduce the firms' debt servicing capacity. This might cause several additional real estate firms not having sufficient revenue to meet their financial obligations. In a scenario where the firms' earnings decline by 5 per cent as a consequence of higher vacancy rates and lower rental income, approximately 12 per cent of lending to real estate firms is to firms that would not have sufficient earnings to service their debt obligations, while also having a solvency ratio below 20 per cent, see chart 15. If earnings declined by 10 per cent, the share of lending to distressed firms would increase to close to 15 per cent. For comparison, the real estate firms' primary operating profit excluding value adjustments fell by approximately 23 per cent from 2008 to 2009. Earnings are closely related to the development in vacancy rates, which increased by around 6 percentage points in the years following the financial crisis. Vacancy rates for office, commercial and residential rental properties remain at a low level, see chart 16. An economic downturn could be expected to push up vacancy rates across the various real estate segments.

[12] Debt service capacity is calculated here as primary income corrected for value adjustments relative to net interest and contribution expenses as well as repayments. As a result, a debt service capacity of 100 per cent or more indicates that the business has sufficient primary income to cover its financial obligations in the short term. See box 2 for more information.
[13] The calculations do not take into account the use of interest rate derivatives. To the extent that companies use interest rate derivatives to hedge interest rate risk, the effect on their debt servicing capacity will be smaller than shown in chart 15.

CHART 15

Several real estate firms will come under pressure if rental income falls

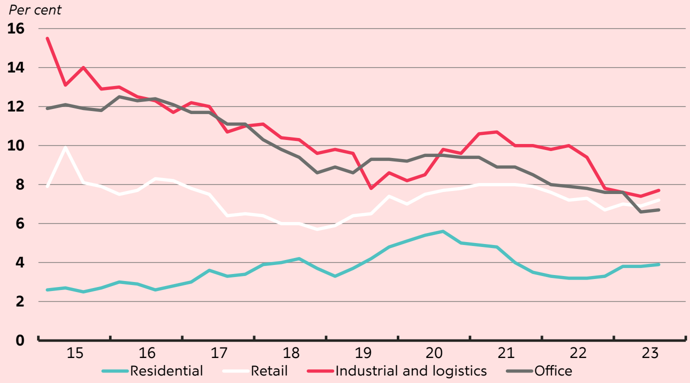


Note: Share of lending to real estate firms with a debt servicing capacity below 100 per cent and a solvency ratio below 20 per cent. *Before interest rate increases* indicates the distribution for the 1st quarter of 2022, and *Current level* indicates the distribution for the 2nd quarter of 2023. See box 2 for further details.

Source: Danmarks Nationalbank, Danish Business Authority and own calculations.

CHART 16

Vacancy rates have not yet increased



Note: Economic vacancy indicates lost rental income due to vacant rental units. Vacancy rates for the whole of Denmark.

Source: EjendomDanmark's market statistics.

BOX 2

Method of calculating real estate firms' resilience to higher interest rates and declining income

Real estate firms' resilience to higher interest rates and declining income is assessed on the basis of the firms' debt servicing capacity and solvency ratio. A business is defined as stressed if it has a debt servicing capacity below 100 per cent and a solvency ratio below 20 per cent.

Debt servicing capacity is calculated as primary income, corrected for value adjustments over net interest and administration margins and amortisation. A debt servicing capacity of 100 per cent or more indicates that the firm has sufficient primary income to cover its financial obligations in the short-term.

The solvency ratio is calculated as equity over total balances. In the simulations with income decreases, declining income is also expected to affect real estate values and thereby equity and the solvency ratio. Specifically, a decrease in income of 1 per cent is assumed to entail an equivalent 1-per-cent decrease in real estate values.[1]

Information on firm income (including financial income) and value adjustments are based on the latest available annual reports (around 70 per cent from 2022, and the remaining 30 per cent from 2021). Information on loan characteristics (i.e., outstanding debt, variable or fixed rate, interest rate reset frequency, interest-only periods etc.) are drawn from the credit register. Accounting data is available for the majority of real estate firms, although not all. Thus, the analysis of firm resilience covers approximately 94 per cent of the total lending to real estate firms.

When possible, debt servicing capacity and solvency ratio are calculated at group level.[2] However, only the debt to the actual real estate firms, see also the definition in chart 8, is included in the calculation in chart 15.

Before interest rate increases is based on credit register data for the 1st quarter of 2022. *Current level* is based on credit register data for the 2nd quarter of 2023. *Current level* takes into account that some loans have not yet been affected by the interest rate increases, by adjusting all variable-rate loans for which the interest rate is due to be set up to and including June 2024 by the current average forward interest rates for F1, F3 and F5 loans over the next 12 months. *Income drop of 5 per cent, Income drop of 10 per cent* and *Income drop of 15 per cent* are simulations based on *Current level,* where the firms' income (specifically, primary operating profit, excluding value adjustments) is reduced by 5, 10 and 15 per cent, respectively.[3]

[1] This correlation is also used in the real estate firms' own sensitivity analyses, see, for example, the 2022 Annual Report for Jeudan A/S.
[2] In a number of cases, there are no consolidated financial statements that can be used. This particularly applies to businesses owned by a foreign parent company.
[3] For comparison, primary income (excluding value adjustments) for real estate firms fell by 23 per cent from 2008 to 2009.

04
Credit to households: Higher interest rates are expected to maintain the pressure on homeowners

There is prospect of interest rates remaining at a higher level, and this is expected to maintain the pressure on homeowners' disposable income. The higher interest rates have not yet had their full impact, and the interest rate pass-through is expected to continue as homeowners with existing variable-rate loans have to pay more to service their debt. This happens when the interest rate is adjusted, and new loans are raised. The higher interest rates increase the risk that some homeowners will not be able to meet their financial obligations.

Higher interest rates maintain the pressure on homeowners' finances

When homeowners face rising interest payments, this reduces their resilience. It is expected that 43,500 more homeowners will have a budget deficit in 2023, compared to 2021, see chart 17.[14] This corresponds to approximately 4 per cent of all homeowners in Denmark. When homeowners have budget deficits, their income is not sufficient to sustain a modest spending level, pay their fixed expenses and meet their debt obligations. The total debt of homeowners expected to have a budget deficit was kr. 71 billion by the 2nd quarter of 2023. Of the homeowners expected to have budget deficits, 45 per cent have a loan-to-value ratio above 60 per cent.

Homeowners with budget deficits pose a risk for Danish credit institutions, as they may be under too much pressure to meet their debt obligations. In the event of default, there is a risk that the housing debt will result in losses for the credit institutions. However, the majority of these homeowners' debt is covered by the underlying mortgage. Danmarks Nationalbank has previously estimated[15] that the difference between housing debt and expected realised sales prices for homeowners with budget deficits amounts to kr. 1.8 billion. This is a relatively modest exposure compared to the systemically important credit institutions' profits before taxes of kr. 30 billion in the 1st half of 2023, see chapter 5, *Earnings*.

A homeowner who is expected to have a budget deficit is typically at the lower end of the income distribution and has lower debt and fewer liquid assets compared to other homeowners. This is partly because many of these homeowners live alone, and their household income therefore consists of only one person's income.

[14] Based on Danmarks Nationalbank's expected consumer price and wage growth in autumn 2023 and the market's expected interest rate developments in 2023. This means that an additional 7,500 homeowners are expected to have budget deficits by the end of 2023 compared to expectations in spring 2023. The increase is primarily due to the updated expectations. See Martinello, Meyer and Nissen, Homeowners' budgets and debt servicing capacity projections, *Danmarks Nationalbank Economic Memo,* no. 4, June 2023 (*link*) for a more detailed explanation of the method. The 2021 reference reflects the most recent data available.
[15] This assessment is based on expectations for the 1st half of 2023. See Danmarks Nationalbank, Interest rate hikes affect the banks and their customers, *Danmarks Nationalbank Analysis (Financial stability)*, no. 6, June 2023 (*link*).

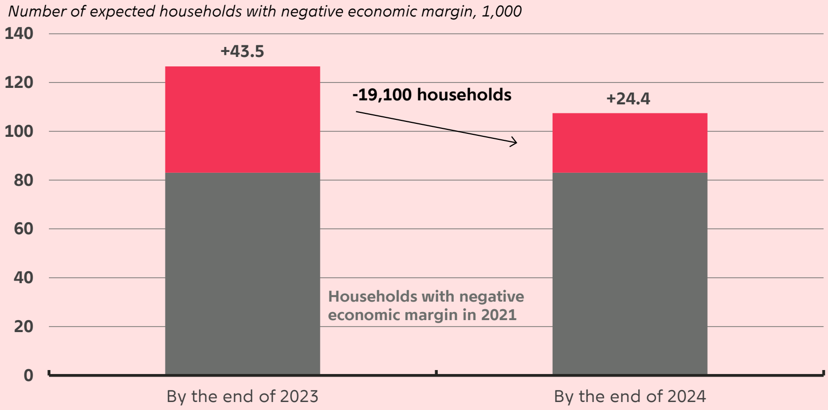
Real wage growth will strengthen homeowners' personal finances in 2024

In contrast to the sustained higher interest rates, real wage growth will strengthen homeowners' personal finances in the coming quarters. Therefore, it is expected that the number of homeowners with budget deficit will decline by 19,100 during 2024, see chart 17.[16] The decreasing number of homeowners with an expected budget deficit makes the credit institutions relatively less exposed to losses, if these homeowners are forced to sell their homes. Despite this decline, the number of homeowners projected to have budget deficits in 2024 remains higher than in 2021. This indicates that the higher interest rates will continue to drain the resilience of some homeowners.

Even if unemployment were to rise significantly, this would only moderately increase the number of homeowners with budget deficits. The moderate increase is due, among other things, to the fact that a significant proportion of the households expected to become unemployed do not have a housing loan. Moreover, the homeowners are, in many cases, supported by unemployment benefits or a partner's unaffected income.[17]

CHART 17

The number of homeowners facing a budget deficit is expected to decrease in 2024 compared to 2023



Note: Homeowners' budget deficits by the end of 2023 are based on credit register data from the 2nd quarter of 2023 and the outlook from the autumn of 2023 to the end of 2023, and end of 2024, respectively. Some homeowners already had an estimated budget deficit in 2021, and the deficit is thereby not due caused by interest rate increases and inflation.
Source: Danmarks Nationalbank, Statistics Denmark and own calculations.

Households have become more sensitive to higher interest rates

Since the beginning of 2022, homeowners have increasingly taken out variable-rate housing loans. Of the total mortgage lending to households of kr. 1,633 billion in October 2023, 53 per cent is at variable interest rates. At the same time, the housing market activity slowed down in the 1st half of 2023, implying that total lending from Danish mortgage credit institutions to households was 2 per

[16] See Danmarks Nationalbank, Persistently high inflationary pressures call for tight economic policy, *Danmarks Nationalbank Analysis (Outlook for the Danish economy)*, no. 13, September 2023 (*link*).
[17] See Martinello, Meyer and Nissen, Homeowners' budgets and debt servicing capacity projections, *Danmarks Nationalbank Economic Memo*, no. 4, June 2023 (*link*).

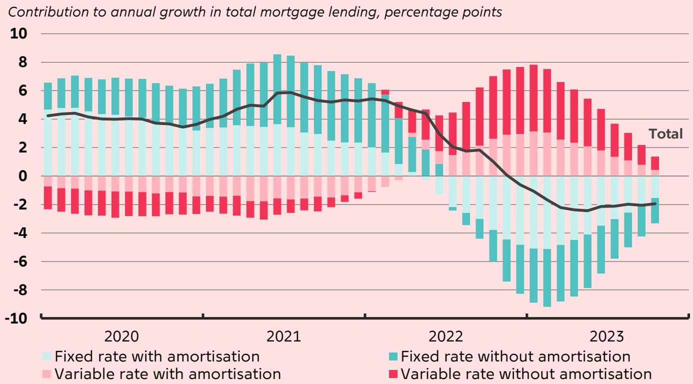
cent lower in October 2023 compared to the year before, despite the increase in the variable-rate loan types, see chart 18.[18]

The interest rate pass-through is gradual, and a significant proportion of the homeowners already has an interest rate reflecting the higher interest rate level. Of the variable-rate mortgage debt of kr. 875 billion in the 2nd quarter of 2023, kr. 600 billion was taken out before the beginning of 2022. Of these 47 per cent corresponding to kr. 283 billion has an interest rate fixated before 2022, where the short-term interest rates started to rise, see chart 19. This housing debt mainly comprises F3 and F5 loans, which will be subject to interest rate adjustment in the coming years. If interest rates remain at a higher level, these homeowners are expected to have higher mortgage payments after the interest rate adjustments.

Variable-rate mortgages combined with deferred amortisation increase homeowners' interest rate sensitivity and may pose a risk to households and banks if interest rates rise further. It is important that homeowners who take out variable-rate loans with deferred amortisation have a sufficient economic buffer to stand against any further interest rate increases.

CHART 18

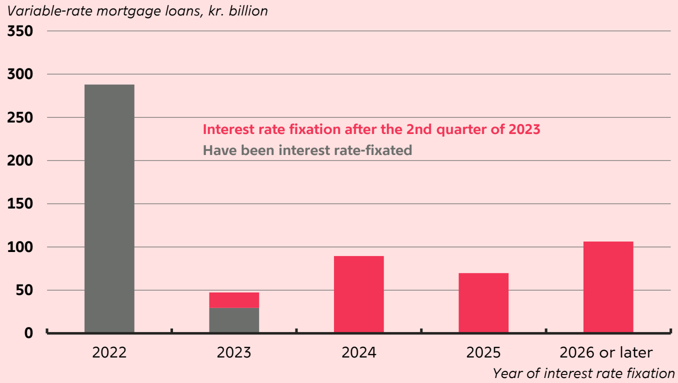
Sustained growth in variable-rate mortgage loans



Note: Year-on-year growth contribution to the total mortgage lending in nominal values to households (excluding self-employed) by loan type. The most recent observations are from August 2023.
Source: Danmarks Nationalbank.

CHART 19

A large part of variable-rate mortgage lending has an interest rate from before 2022



Note: Interest rate fixings since 2022 are based on the loan structure in the 2nd quarter of 2023.
Source: Danmarks Nationalbank.

Higher interest rates increase home buyers' debt service-to-income ratio

Higher interest rates increase home buyers' mortgage payments relative to their disposable income, i.e., the debt service-to-income ratio. The median debt service-to-income ratio for home buyers has increased by more than 6 percentage points since the beginning of 2022, see chart 20.

[18] A significant part of the reduction in households' outstanding mortgage debt can be attributed to the decline in the market value of the underlying mortgage bonds and subsequent loan refinancing, see Andersen, Grenestam, Læssøe, Otte and Steffensen, Refinancing behaviour by homeowners in Denmark when mortgage rates rise, *Danmarks Nationalbank Economic Memo*, no. 2, 2023 (*link*). However, excluding the effect of loan refinancing, the overall growth in mortgage lending to households remains negative, see Danmarks Nationalbank, Monetary policy has been tightened further, Danmarks Nationalbank Analysis (Monetary and financial trends), no. 12, September 2023 (*link*).

Especially the home buyers, who have taken out housing loans with deferred amortisation, have experienced a large increase in the debt service-to-income ratio, as the median has risen 9.5 percentage points during the considered period. The notable increase in the debt service-to-income ratio for loans with deferred amortisation means that the difference in the actual debt service-to-income ratio between loans with and without deferred amortisation has narrowed significantly. The reduced difference is primarily due to the fact that the interest rate pass-through is larger for loans with deferred amortisation. The debt servicing costs consist of interest and administration payments as well as principal payments. The annuity principle implies that part of the interest rate increase will be offset by lower principal payments, whereas the increasing interest rates will pass-through fully for loans with deferred amortisation.[19] On average, home buyers obtaining loans with deferred amortisation have higher debt levels relative to their income, which contributes to a higher pass-through onto their debt service-to-income ratio.

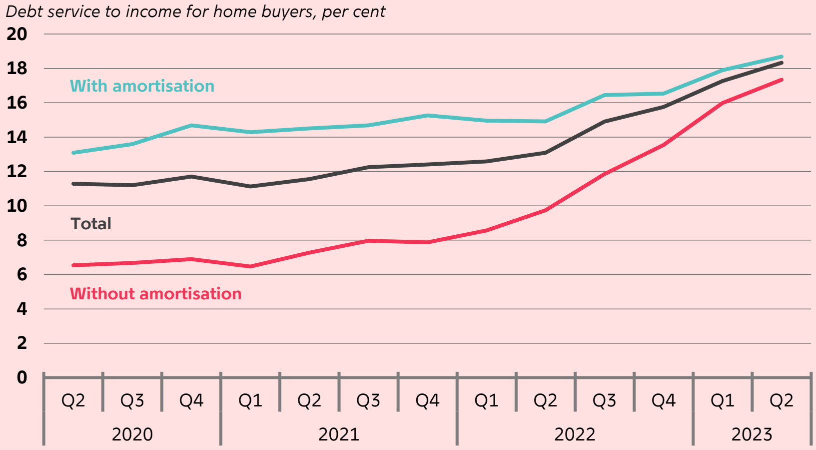
The higher interest rates have caused a decrease in house prices in 2022 and are still eroding home buyers' disposable amounts. However, the decrease in house prices has been somewhat smaller than expected, given the significant interest rate increases and high inflation. The housing market has recovered slightly within the most recent months, and the wage growth is expected to push up nominal house prices. Yet there is still a risk of declining house prices going forward. This risk may materialise if, for example, the supply situation worsens and the home buyers' disposable amounts are reduced further by rising energy prices.[20]

[19]The annuity principle means that the debt service costs remain constant throughout the term of the loan at unchanged interest rate levels. For an explanation of the importance of the annuity principle to the debt service's sensitivity to interest rate changes, see Danmarks Nationalbank, Measuring household interest-rate sensitivity in Denmark, *Danmarks Nationalbank News*, no. 3, November 2021 (*link*).
[20] See Danmarks Nationalbank, Persistently high inflationary pressures call for tight economic policy, *Danmarks Nationalbank Analysis (Outlook for the Danish economy)*, no. 13, September 2023 (*link*).

CHART 20

Increasing debt service-to-income ratio for home buyers

Quarterly median debt service-to-income ratio for home buyers



Note: The chart shows the households' median debt service-to-income ratio for all bank and mortgage lending with security in a newly purchased property. A household's total new borrowing is categorised as deferred amortisation if one or more loan with deferred amortisation have been taken out. A household's debt service-to-income ratio is its average debt service payment relative to its disposable income. Note that the composition of home buyers varies over time, which can affect the development.
Source: Danmarks Nationalbank.

05
Earnings: Increased earnings contribute to strengthened robustness of the institutions

The systemically important credit institutions' profit before tax was kr. 30 billion in the 1st half of 2023 and has increased by kr. 8.4 billion compared to the 2nd half of 2022, see chart 21. The result for the 1st half of the year corresponds to a return on equity of 12 per cent p.a. The increase was driven by sustained positive development in the institutions' core earnings, continued low loan impairment charges, and positive value adjustment of securities portfolios. Earnings are the first safeguard against losses, and the improved performance therefore helps to strengthen the institutions' resilience.

The banks' impairment charges remain low

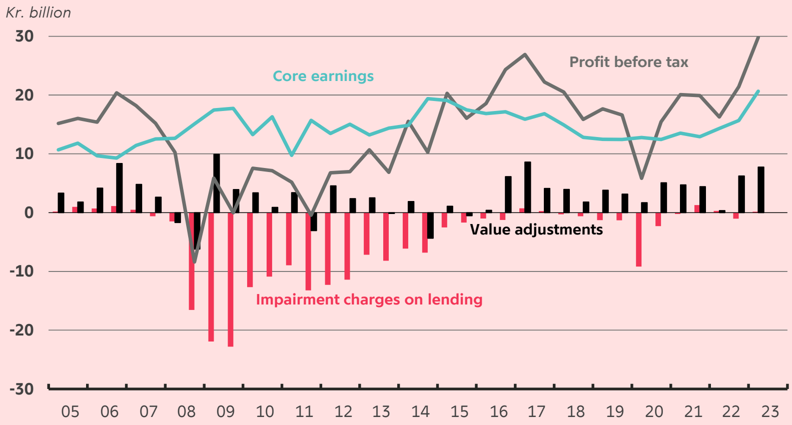
Loan impairment charges remained low in the 1st half of 2023, see chart 21. On determining their impairment requirement, institutions must take expectations of future performance into account. Most institutions have maintained or increased their management estimates as a consequence of the macroeconomic uncertainty. The total amount reserved by the institutions for future loan losses amounted to approximately kr. 40 billion at the end of the 1st half of 2023.[21] For comparison, impairment charges in 2009 amounted to approximately kr. 45 billion; and in the 2008-12 period to a total of kr. 131 billion, which contributed to weak results despite strong core earnings.

The positive earnings effect from higher interest rates will be reduced by increased impairment charges in the event of a significant cyclical downturn.[22]

[21] Management estimates account for approximately 36 per cent of the total.
[22] See Danmarks Nationalbank, Turbulent times call for a focus on risk management, *Danmarks Nationalbank Analysis (Financial stability)*, no. 14, December 2022 (link).

CHART 21

The institutions' results are supported by increased core earnings and low impairment charges



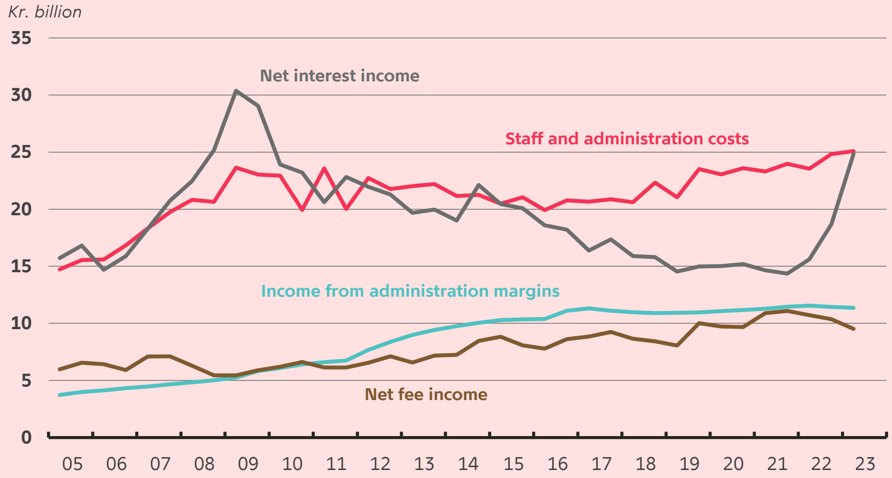
Note: Half-yearly data for the systemically important credit institutions. Profit before tax is adjusted for impairment charges on goodwill and Danske Bank's fine relating to the Estonia case. Core earnings are defined as net interest income, net fee income and income from administration margins, less staff costs and administrative expenses, as well as other operating expenses.
Source: Danmarks Nationalbank.

Higher interest rates increase core earnings

The increase in core earnings in the 1st half of 2023 is primarily driven by higher net interest income, see chart 22. The higher net interest income should be seen in light of the fact that institutions have raised their deposit margins in line with the increases in monetary policy interest rates since 2022 as described in the following section. Conversely, the contribution of net fee income to core earnings declined, mainly as a result of lower loan fees due to lower activity in the housing market and lower fee income from securities transactions and accounts. The gradually increasing staff and administrative costs over a number of years should be seen in light of increased administrative costs, including regulatory and compliance measures as well as IT investments.

CHART 21

The increase in the institutions' core earnings was driven by higher net interest income in the 1st half of 2023



Note: Half-yearly data for systemic credit institutions. *Staff and administration* costs include other operating expenses and have been adjusted for Danske Bank's fine relating to the Estonia case.
Source: Danmarks Nationalbank.

The increase in net interest income is primarily driven by the deposit margin

The increase in net interest income is mainly driven by institutions having significantly increased their deposit margins[23] in line with the interest rate increases since 2022, see chart 23. This means that the difference between banks' deposit rates and the money market interest rate has increased, see box 3. The institutions' deposit margins for households and non-financial businesses are 2.5 and 2.1 percentage points, respectively, the highest level in two decades. From the 1st half of 2022 until the 1st half of 2023, net interest income has increased for the systemic banks by approximately kr. 10 billion. The various contributions are estimated to amount to kr. 10 billion from the deposit margin, kr. -3 billion from the lending margin[24] and kr. 3 billion from other effects[25], respectively. The negative contribution from the lending margin is mainly due to the fact that the institutions' lending margin for households has declined since the 1st half of 2022. The decline is driven by interest rate hikes not having fully passed through to lending rates for households since 2022.

[23] The deposit margin expresses the interest premium that the institutions can earn by placing their costumers' deposits in the money market.
[24] The lending margin expresses the interest premium that the institutions obtain by lending money rather than placing the money in the money market.
[25] The calculations are based on an unchanged balance sheet for six systemic banks since the 1st half of 2022. For individual banks, net interest income is adjusted for interest income on derivatives.

BOX 3

The correlation between Danmarks Nationalbank's interest rates and money market interest rates

The fixed exchange rate policy against the euro means that Danmarks Nationalbank's monetary policy interest rates are reserved for managing the krone exchange rate against the euro.[1] When Danmarks Nationalbank changes its monetary policy interest rates, banks will typically adjust the interest rates used in the money market This is because banks have the option to place excess liquidity with Danmarks Nationalbank as an alternative to the money market, which in that case is settled according to Danmarks Nationalbank's interest rates.

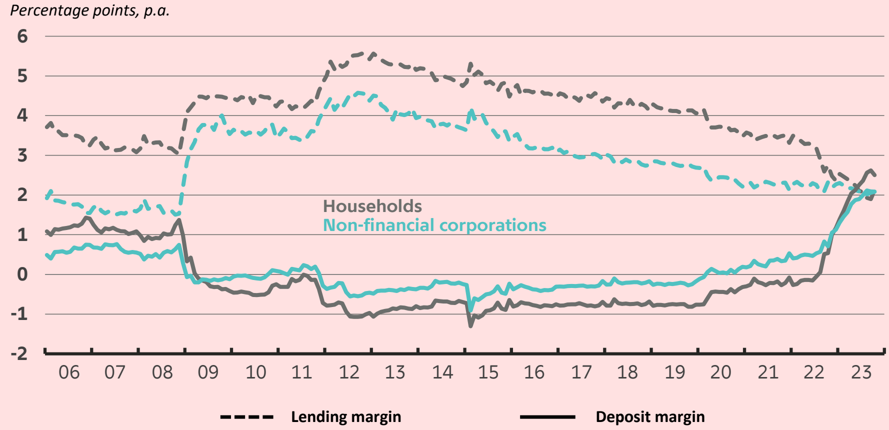
Each institution decides for itself how much of its excess liquidity it wants to place with Danmarks Nationalbank. If an institution increases its deposit with Danmarks Nationalbank, the balance with another monetary policy counterparty is reduced accordingly. This reflects the fact that the net position, which represents the monetary policy counterparties' total net balance with Danmarks Nationalbank, is determined solely by the prevailing monetary and government debt policies.

[1] See Danmarks Nationalbank, Pass-through from Danmarks Nationalbank's interest rates to the banks' interest rates, *Danmarks Nationalbank Quarterly Review*, Q2 2016 (link).

In the 1st half of 2023, institutions' deposit margins were significantly above their 2006-08 levels,[26] averaging 1.1 percentage point for households and 0.6 percentage points for non-financial corporations. In the longer term, institutions may not be able to maintain the current deposit margin levels. With the current balance sheet composition, the impact on earnings would have halved if the deposit margin had been at the average level seen in 2006-08.

CHART 22

The institutions' deposit margins are at the highest level in a long time



Note: Monthly margins are defined as the average interest rate in Danish kroner for households and non-financial corporations relative to the T/N money market interest rate. The *lending margin* is the lending rate less the money market interest rate, while the *deposit margin* is the money market interest rate less the deposit rate. The most recent observations are from October 2023.
Source: Danmarks Nationalbank.

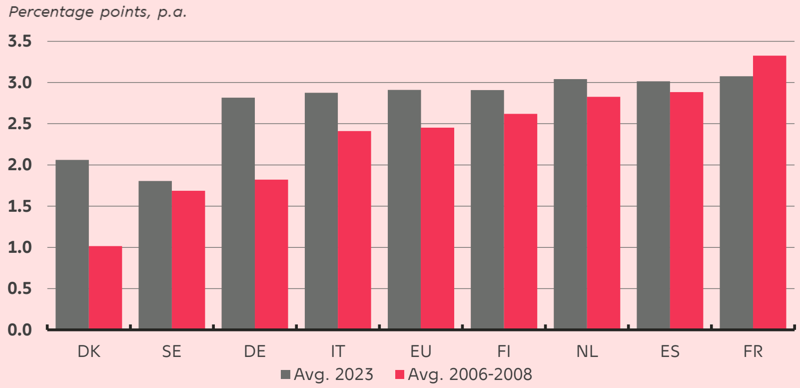
[26] The comparison with 2006-08 is due to the zero-interest rate environment in subsequent years.

Institutions in all EU countries have increased their deposit margins

Institutions in all EU countries have increased their deposit margins since 2022, and in several countries deposit margins have been raised to around 2006-08 levels, see chart 24. The increase in deposit margins should be seen in light of the fact that institutions in most EU countries have maintained their deposit rates as interest rates have risen. In Denmark, however, the deposit margin was higher in 2023 than it was in 2006-08. Despite a higher deposit margin in 2023, the deposit margin in Denmark is still among the lowest in the EU.

CHART 23

Institutions in most EU countries increased their deposit margins in 2023 to close to the average levels in 2006-08



Note: Average deposit margins in the periods 1st half of 2023 and 2006-08. The deposit margin is defined as the average deposit rate of households (including non-profit institutions serving households (NPISH)) in local currency in demand accounts relative to the T/N rate in equivalent currency. The use of different forms of deposit varies across EU countries. For example, time deposits and deposits subject to notice are far more common in many EU countries other than Denmark. The EU is an average of the euro area countries over the period in question. The most recent observations are from June 2023.
Source: ECB and Danmarks Nationalbank.

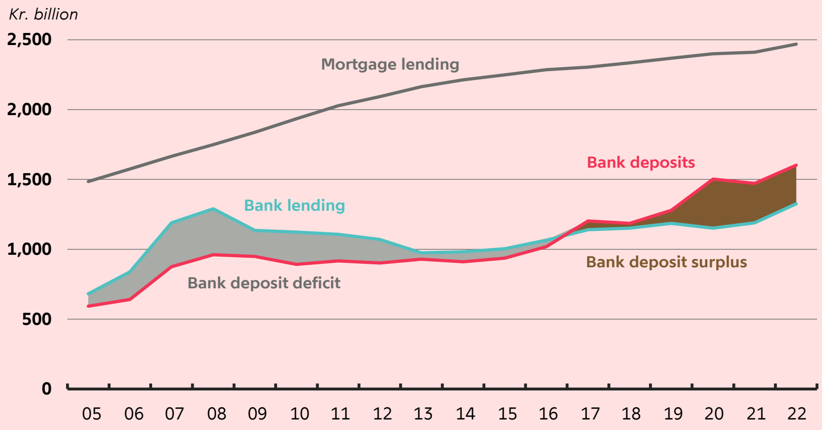
Bank deposit surpluses and legal requirements for bank liabilities have reduced the value of deposits as funding

Deposits constitute an important source of funding for the institutions, as deposits are used as a stable source of loan financing, among other things. In contrast to the years leading up to the financial crisis, banks have since 2017 had a growing deposit surplus, i.e. the difference between their bank deposits and bank lending, see chart 25. The growing bank deposit surplus is due, among other things, to a structural shift in credit from bank lending to mortgage lending, where funding is provided by external bond investors. From 2017 to 2022, deposits as a share of total lending, including mortgage lending, have grown from 35 to 42 per cent. The growing bank deposit surplus has meant that the banks have a reduced need for additional deposits, which, taken in isolation, has reduced the incentive for banks to raise deposit rates.

Furthermore, the value of deposits as a source of financing has decreased due to the regulatory requirements for the composition of the institutions' liabilities introduced after the financial crisis, including requirements for stable funding, the net stable funding ratio[27] (NSFR) and the minimum requirement for eligible liabilities (MREL). The requirements address various risks. MREL implies that a certain amount of the institution's liabilities must be eligible liabilities, which deposits are not.[28] Thereby, eligible liabilities accounts for a larger share of the banks' financing than previously, which, taken in isolation, decrease the need for deposits. NSFR has generally increased the cost of funding, including in relation to deposits, which, however, are relatively less affected than other sources of funding. NSFR requires that the institutions may have a need for a larger amount of deposits than previously, as deposits as a general rule must be placed in short term assets, which typically contributes to a lower return. All else being equal, the two requirements have thus lowered the value of deposits as a source of funding.

CHART 24

Institutions' customer funding surplus are driven by increasing deposits and shifts in their lending from bank credit to mortgage credit



Note: Annual data for the systemic banks and mortgage credit institutions. Mortgage lending is stated at nominal value. *Bank lending* and *bank deposits* are exclusive of repo transactions and pooling schemes. The shaded area is bank deposits less bank lending.
Source: Danmarks Nationalbank.

Households only look for alternatives to deposits to a limited extent

Since 2022, the interest rate differential between demand deposits, time deposits and bonds has increased significantly, see chart 26. Some Danish households have begun to respond to the interest rate gain by holding time deposits or bonds instead of demand deposits, but overall, the response from Danish households has been limited.

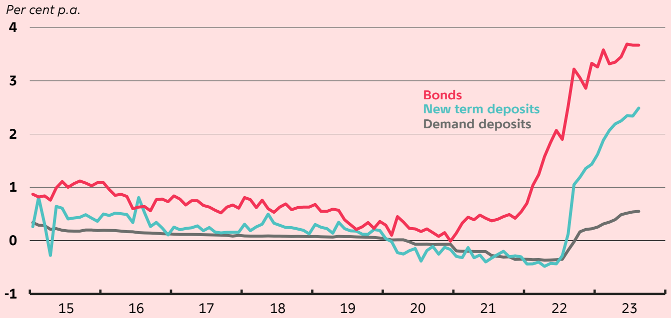
As the interest rate differential increases, it becomes relatively less attractive to have demand deposits with banks. Taken in isolation, bond purchases or debt repayments may prompt customers to reduce their bank deposits. Since the beginning of 2022, Danish households have increased their holdings of time deposits and bonds by kr. 25 billion and kr. 11 billion, respectively, see chart 27. At the end of the 1st half of 2023, Danish households' demand and time deposits

[27] See Danmarks Nationalbank, Increased risks in credit institutions' housing lending, *Danmarks Nationalbank Analysis (Financial stability)*, no. 28, December 2021 (link).
[28] See Danmarks Nationalbank, Crisis management of credit institutions – what is new?, *Danmarks Nationalbank Analysis*, no. 4, March 2021 (link).

amounted to kr. 748 billion and kr. 268 billion, respectively. At the same time, household bond holdings were kr. 34 billion.

CHART 25

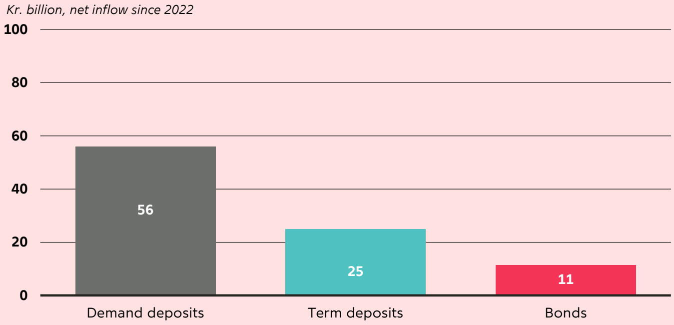
Significant interest rate gains in alternatives to demand deposits



Note: Effective interest rate in Danish kroner as a percentage p.a. for households. *Demand* is adjusted for lending-related deposits. *Bonds* are an average rate of government and mortgage bonds. The most recent observations are from August 2023.
Source: Danmarks Nationalbank and Statistics Denmark.

CHART 26

Households have only to a limited extent responded to the interest rate gain in the period of interest rate hikes



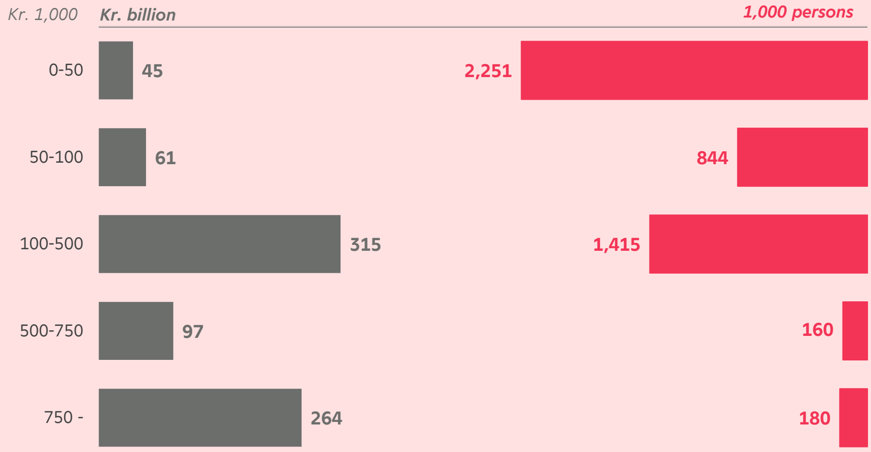
Note: Net household additions since January 2022. *Demand* and *time deposits* are closing balances in Danish kroner. *Bonds* are nominal holdings. The most recent observations are from August 2023.
Source: Danmarks Nationalbank.

There may be several reasons why households have only to a limited extent responded to the interest rate gain. The size of deposits held by households varies considerably. For example, 64 per cent of Danish households have bank deposits below kr. 100,000, see chart 28. Among other things, households hold bank deposits in order to carry out transactions, and the deposits also act as savings. If households choose to place their demand deposits in, for example, time deposits or bonds, they will be able to achieve an interest rate gain. However, this placement implies a different risk profile, and whether the gain is sufficient depends on the time horizon and preference of the individual household. Overall, households' limited response to the interest rate gain shows that direct access to bank deposits without, for example, having to pay a fee is important to households. However, a higher interest rate differential has historically contributed to households buying bonds or paying off debt, which may lead to a decrease in bank deposits.[29]

[29] See Danmarks Nationalbank, Low interest rates boost bank deposits, *Danmarks Nationalbank Analysis*, no. 9, July 2018 (link).

CHART 27

Most Danish households have deposits below kr. 100,000.



Note: Danish households' deposits with Danish banks (excl. self-employed), excl. time deposits. The calculation covers 4.8 million people. Register data from late 2021.
Source: Statistics Denmark and own calculations.

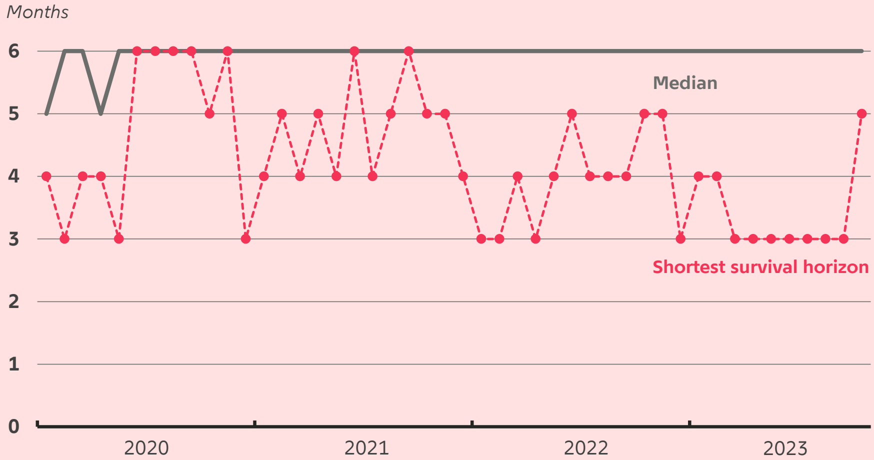
06
Liquidity and funding: Banks have a robust liquidity position

Danish banks continue to have a robust liquidity position, enabling them to withstand severe liquidity stress. It is important that institutions have sound liquidity management, which includes adjusting their liquidity position based on adequate liquidity stress tests, which is also required of banks in the EU.

In Danmarks Nationalbank's most severe liquidity stress test scenario, all systemic banks in Denmark have a survival horizon of at least five months with positive excess liquidity, see chart 29. In the scenario, there is assumed to be no access to funding markets, while customers' drawing on the banks' loan facilities increases, and deposits fall significantly.[30]

CHART 28

Systemic banks can survive at least five months of severe liquidity stress



Note: Number of months systemic banks can withstand severe combined liquidity stress, according to Danmarks Nationalbank's sensitivity analysis. The sensitivity analysis is calculated for a time horizon of six months. A survival horizon of six months indicates that the institution has sufficient liquidity to survive a minimum of six months in the sensitivity analysis. The most recent observations are from late July 2023.
Source: Danmarks Nationalbank.

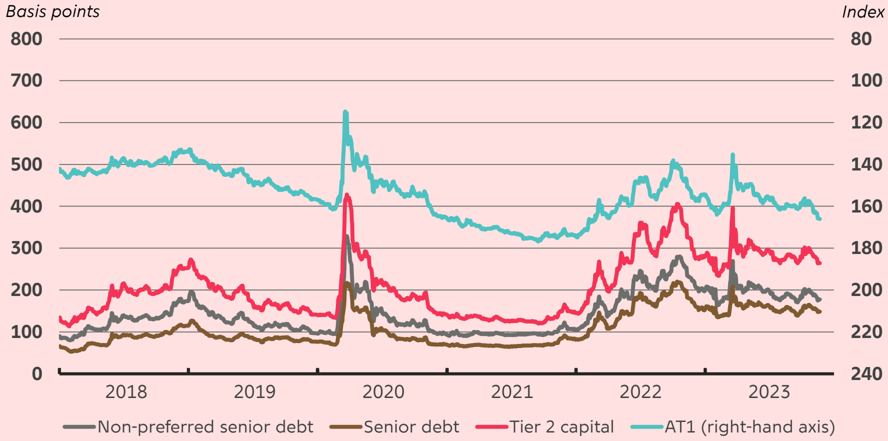
[30] For a method description of Danmarks Nationalbank's sensitivity analysis, see Danmarks Nationalbank, Lower excess capital adequacy for the banks, *Danmarks Nationalbank Analysis (Financial stability)*, no. 25, November 2019 (link).

Credit spreads on European banks' capital and debt instruments have declined since March

Credit spreads across European banks' capital and debt instruments have been declining since the end of March, although they remain higher than before central banks' started tightening monetary policy in early 2022, see chart 30. At the same time, the European Central Bank (ECB) expects to increase the quantitative tightening introduced in March, suggesting that higher credit spreads may be persistent. Both Danish and European banks issued a large amount of debt on the capital markets in 2023, which should be seen in the context of the maturity of a large part of the ECB's lending to banks from their TLTRO loan programme.

CHART 29

Credit spreads across European banks' capital and debt instruments have declined but remain higher than before 2022



Note: Z-spreads for iBoxx index for investment grade euro-denominated issuances for senior debt, non-preferred senior debt and subordinated debt. Index price of iBoxx liquid contingent convertible bonds. Index price of AT1 is not directly comparable to z-spread. The right axis is inverted. The most recent observations are from 21 November 2023.
Source: Refinitiv Eikon.

Banks meet regulatory liquidity and funding requirements with good excess capital adequacy

Both systemic and non-systemic banks meet the regulatory liquidity coverage ratio (LCR) with good excess capacity, see chart 31 and chart 32. The LCR helps to ensure that credit institutions have a sufficient amount of liquid assets to withstand a 30-day severe liquidity stress scenario.

Banks continue to have sufficient liquidity buffers to deal with increased liquidity demand from their customers. Over the past few years, institutions have experienced several periods of considerable uncertainty about the demand for liquidity. However, liquidity demand has materialised only to some extent, and banks have been able to cope with it. Among other things, there has been uncertainty about the liquidity demand from the energy, insurance and pension sectors in connection with the ongoing provision of collateral on derivatives due to large increases in energy prices and interest rates.

CHART 30

Banks' LCR remains high

Systemic banks

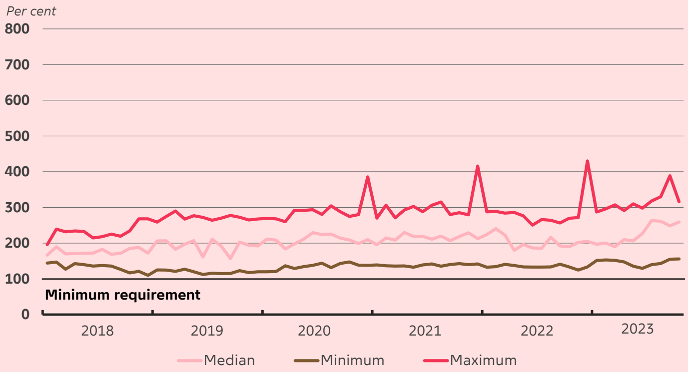
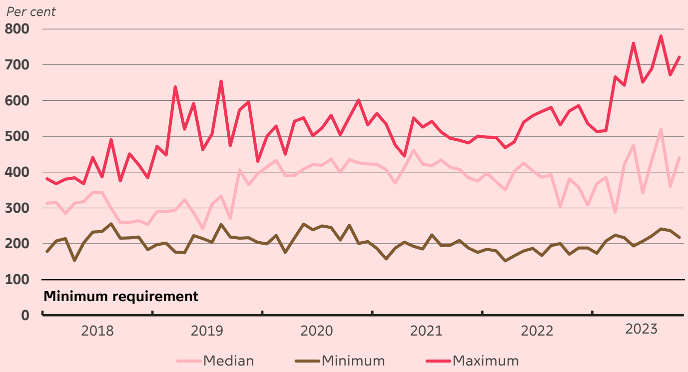


CHART 31

Non-systemic banks



Note: The LCR is calculated as the bank's liquid assets divided by outgoing net cash flows over a 30-day stress period. The most recent observations are from October 2023.
Source: Danmarks Nationalbank.

Both systemic and non-systemic banks also meet the regulatory requirement for stable funding, the net stable funding ratio (NSFR), with good excess capital adequacy, see chart 33 and chart 34. The NSFR requirement ensures that institutions have a sufficient amount of stable funding to finance their assets, thereby reducing the institutions' refinancing risk.

Banks' NSFR has remained stable since the introduction of the requirement in the 2nd quarter of 2021. In particular, this reflects the fact that bank deposits have been stable, which is by far the most important part of the Danish sector's long-term funding. Deposits have remained stable, despite the fact that customers can now achieve better returns on short-term low-risk investments, for example by buying Danish government and mortgage bonds with short maturities or by moving their deposits to banks that offer higher deposit rates, see also chapter 5, *Earnings,* above.

The regulatory LCR and NSFR requirements help strengthen the individual bank's liquidity position but are not enough in themselves to ensure a robust liquidity position; the institutions must also have sound liquidity risk management. The events surrounding specific foreign banks in March showed that withdrawals of deposits can occur very quickly if there is no confidence in the bank in question. It is important that institutions' liquidity risk management reflects the actual circumstances and risks to which they are exposed.

CHART 32

Banks meet the NSFR requirement with good excess capital adequacy

Systemic banks

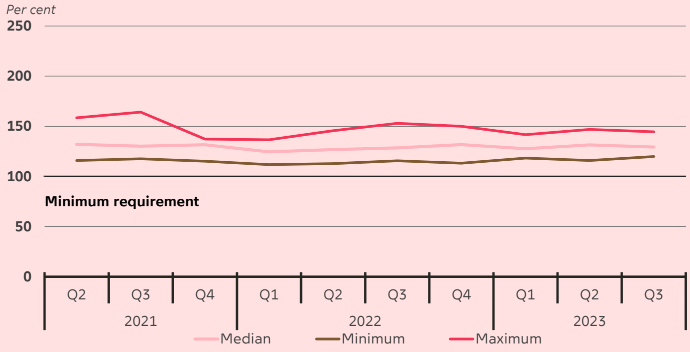
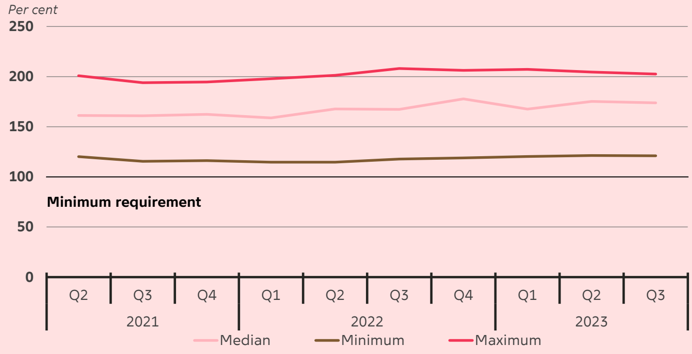


CHART 33

Non-systemic banks



Note: The NSFR is calculated as the banks' stable funding divided by the demand for stable funding. Danish banks were required to comply with the NSFR for the first time in the 2nd quarter of 2021. The most recent observations are from the 3rd quarter of 2023.
Source: Danmarks Nationalbank.

Some mortgage credit institutions' dependence on their affiliated bank increased in autumn 2022

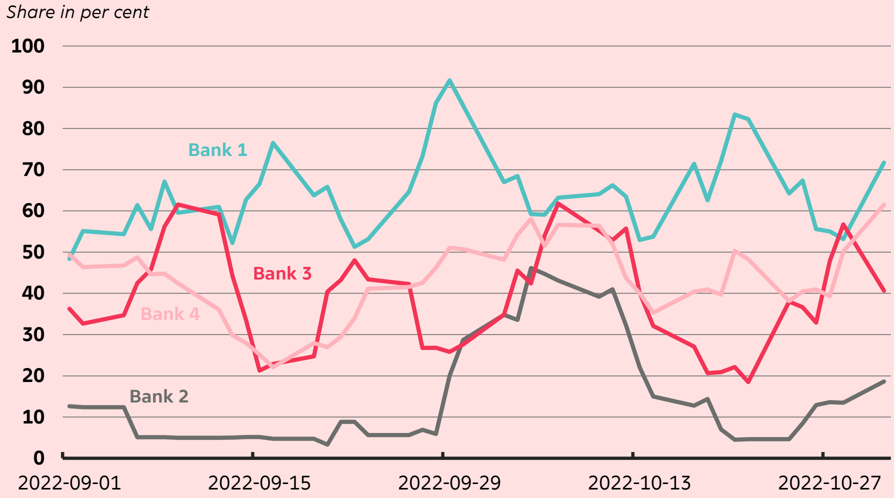
Like the foreign bond markets, the Danish mortgage bond market was also affected by the sharp interest rate hikes and uncertainty about future interest rates in 2022. As a result, purchasing interest decreased and market liquidity deteriorated.

In autumn 2022, some of the banks affiliated with a mortgage credit institution increased the share of newly issued bonds bought from their affiliated mortgage credit institution, see chart 35. In particular one bank bought a large share of bonds from its affiliated mortgage credit institution, while it bought roughly the same or a smaller amount of the other mortgage credit institutions' bonds.

It is good for the robustness of the Danish mortgage bond market and thereby financial stability that there are several potential buyers for the mortgage credit institutions' bonds. If mortgage credit institutions become dependent on selling to only one bank, it can make the Danish mortgage bond market less robust. Therefore, mortgage credit institutions must ensure that they can always sell their bonds and continue to issue new loans if one or more banks are challenged, also during periods of stress.

CHART 34

For a short period in autumn 2022, one bank bought almost exclusively bonds from its affiliated mortgage credit institution



Note: The chart shows the shares of four banks' bond purchases from their affiliated mortgage credit institutions, measured in relation to the bank's total purchases of bonds in the primary market. Five-day centred moving averages have been applied to daily shares.
Source: MiFIR reports and own calculations.

Several pension and life insurance companies have strengthened their access to liquidity

In November 2022, Danmarks Nationalbank recommended that pension and life insurance companies focus on maintaining or increasing the number of counterparties through which they obtain liquidity, the so-called repo counterparties. The companies use the liquidity for the ongoing provision of collateral in the event of fluctuations in the value of their interest rate hedging contracts. Since Danmarks Nationalbank issued its recommendation, several companies have increased the number of repo counterparties, thereby strengthening their access to liquidity. Since the end of June this year, pension and life insurance companies have had to settle new interest rate hedging contracts via a so-called central clearing house. In a central clearing house, ongoing collateral must be provided by means of cash deposits, and therefore the requirement increases the companies' need for cash deposits in the event of large interest rate fluctuations. This underlines the need for companies to continuously focus on their number of repo counterparties. So far, no liquidity challenges associated with the switch to central clearing have been observed.

07

Capital and stress tests: Prudence is needed in institutions' capital planning

During the year, all the large credit institutions[31] significantly raised their full-year earnings outlook. The raised outlook is primarily due to higher net interest income and lower than expected impairment charges, see also chapter 5, *Earnings*. The upward revisions of the full-year earnings outlook illustrate that earnings forecasts, even over a short time horizon, are subject to considerable uncertainty. There is considerable uncertainty as to whether the institutions can maintain their current level of earnings, among other things due to the level of the deposit margin and impairment charges, and institutions should therefore exercise prudence when projecting earnings in their capital planning.[32] Current earnings are the institutions' first line of defence against losses. If earnings are overestimated, the need for capital to cover losses in a crisis becomes underestimated, increasing the risk of breaching capital requirements.

Sector-specific systemic risk buffer ensures increased capitalisation for institutions' lending to real estate firms

One area that demands particular attention is institutions' exposures to real estate firms. The institutions have significant and concentrated exposures to the real estate firms, which means that higher interest rates, economic slowdown and price falls increase the risk of substantial losses for banks in this segment, see chapter 3, *Risk of losses on loans to real estate firms*.

A long period characterised by favourable conditions and low impairment charge ratios may lead to an underestimation of the actual risks for the segment and consequently too low capital reservations. Experience from previous crises shows that negative shocks to the real estate sector may lead to a sudden increase in impairment charges and losses. It is therefore important that institutions reserve capital to cover possible losses in the event of problems in the real estate sector.

The Systemic Risk Council has recommended that a sector-specific systemic risk buffer of 7 per cent be activated for exposures to real estate companies. A sector-specific buffer is a targeted capital requirement intended to address systemic risks related to a particular portfolio, see box 4. The requirement will ensure increased capitalisation of institutions so that they are better able to counter impairment charges and losses on their lending to real estate firms without having to tighten credit lending to firms and households.

The sector-specific buffer means that the institutions must fund a slightly larger share of lending by means of equity. For example, for a loan of kr. 1 million with a risk weight of 20 per cent, this will require the institution to fund a larger share of the loan, kr. 14,000, by means of equity.

[31] For the purposes of this section, large credit institutions include the systemic credit institutions listed in Appendix A1, excluding Nordea Kredit and Saxo Bank.
[32] Based on a stress test, the expected operating earnings are included in the determination of the institutions' capital adequacy target. In a stress test, the time horizon is typically three years.

BOX 4

A sector-specific systemic risk buffer allows for targeted actions

A systemic risk buffer is a so-called macroprudential requirement that aims to limit systemic risks in the financial system as a whole. The buffer can be used to address both general systemic risks or systemic risks related to a subset of institutions' exposures, i.e. sector-specific exposures. A sector-specific systemic risk buffer can be used to address systemic risks related to specific exposures, for example systemic risks related to lending to a specific sector or geographic area.

The sector-specific buffer for real estate exposures makes institutions better able to counter impairment charges in a segment that has previously resulted in significant losses for credit institutions
The primary purpose of a sector-specific buffer for real estate exposures is to strengthen the resilience of institutions so that they are better able to withstand impairment charges and losses on their lending to real estate firms. This should help mitigate the downturn in the real economy that would otherwise follow if households' and firms' access to credit were unduly tightened in a period of large unexpected losses on institutions' real estate exposures.

The sector-specific systemic risk buffer is targeted and risk-sensitive
A sector-specific systemic risk buffer has several advantages. First, it is a targeted requirement so that authorities have the opportunity to address risks where they arise. As a result, it is only a requirement for institutions with exposures to a particular sector. The size of the requirement will depend on the size of the institution's exposures. Second, it is a risk-based capital requirement where the buffer is measured as a percentage of the institutions' risk-weighted exposures. This means that the underlying risk allocation of the loan portfolio is preserved: Loans with lower credit risk – and thus a lower risk weighting – will have a lower nominal requirement. Several countries in the EU, such as Belgium, France and Liechtenstein, use a sector-specific systemic risk buffer to address systemic risks in specific segments.[2]

[1] See Danmarks Nationalbank's website for an explanation of systemic risks and macroprudential policy (*link*).
[2] See the European Systemic Risk Board (ESRB) (*link*).

Room for both the systemic risk buffer, consolidation and dividends

Several of the large credit institutions have a policy of paying out a percentage of their annual profits as dividends. As an alternative or supplement to dividend payments, some institutions choose to buy back shares. The expected earnings in 2023, together with moderate loan growth, leave room for most institutions to increase the excess capital adequacy relative to their capital requirement, including the sector-specific systemic risk buffer, and possibly pay dividends.[33]

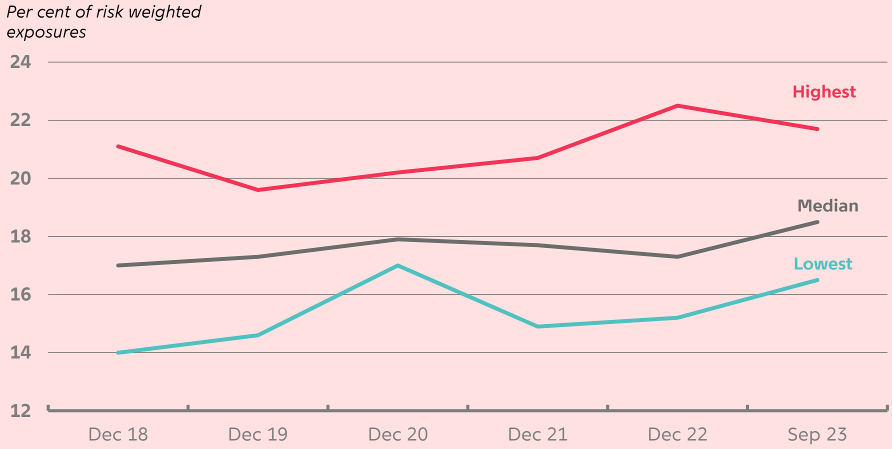
Stable development in institutions' capital ratios

The Common Equity Tier 1 capital ratios of large credit institutions have remained relatively stable over the past five years, see chart 36. Despite this, credit institutions improved their capitalisation over the period. This is due to regulatory tightening[34] of the risk-weighted exposure requirements based on which capital ratios are calculated.

[33] Excess capital adequacy is defined as the difference between the CET1 percentage and the CET1 solvency requirement and buffers, including the systemic risk buffer and minus the countercyclical capital buffer.
[34] See Danmarks Nationalbank, Interest rate hikes affect the banks and their customers, *Danmarks Nationalbank Analysis (Financial stability)*, no. 6, June 2023 (*link*).

CHART 35

Stable development in capital ratios of large credit institutions



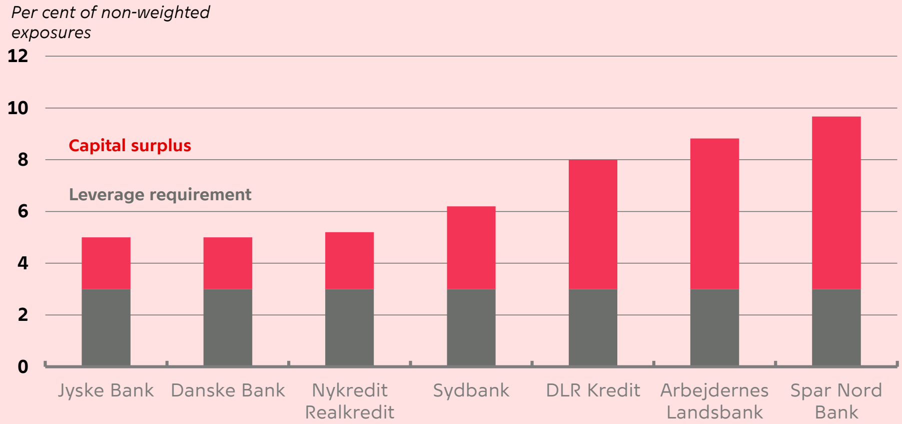
Note: The chart shows the Common Equity Tier 1 capital ratio of large credit institutions, measured at the highest and lowest levels, as well as the median.
Source: Danmarks Nationalbank.

In parallel to the risk-based capital requirement, institutions must comply with a minimum requirement for their non-risk-weighted exposures, the so-called leverage requirement. The requirement means that the institutions' Tier 1 capital must make up at least 3 per cent of their non-risk-weighted exposures. In the 3rd quarter of 2023, all large credit institutions had excess capital adequacy relative to the leverage requirement of at least 1 percentage point, see chart 37. The leverage requirement is intended to hedge risks in cases where the institutions' risk weighting is too low.[35] A breach of the leverage requirement will generate the same regulatory response as a breach of the minimum capital requirement.[36] The interaction between the risk-based capital requirement and the leverage requirement means that, all else being equal, institutions with a low risk weighting have lower excess capital adequacy relative to the leverage requirement. This applies, for example, to institutions with a high share of loans secured on owner-occupied homes, where the risk weighting is relatively low.

[35] See Danmarks Nationalbank, Can capital buffers actually help banks in times of crisis?, *Danmarks Nationalbank Analysis*, No. 25, November 2020 (link).
[36] See memo from the Danish Financial Supervisory Authority, *Reaction pattern following breach of MREL*, June 2023 (link).

CHART 36

All large credit institutions had excess capital adequacy relative to the leverage requirement of more than 1 percentage point in the 3rd quarter of 2023



Note: As of 3rd quarter of 2023 except for Arbejdernes Landsbank and DLR Kredit, where the excess capital adequacy is of 2nd quarter 2023.
Source: The institutions' own reports.

Some systemic credit institutions come close to the combined buffer requirement in a severe recession scenario

Danmarks Nationalbank stress test the financial sector every six months.[37] The purpose of the stress test is to assess whether credit institutions hold sufficient capital to comply with capital requirements in three scenarios, see box 5 for a description of the scenarios and Appendix A2 for key figures from the scenarios.

The stress test shows that all credit institutions would be resilient to a severe recession scenario. The scenario represents a drastically worsening business cycle, where the Danish economy is hit by a severe economic downturn and the countercyclical capital buffer is released.[38] However, some systemic credit institutions come close to the capital conservation buffer, while the remaining systemic credit institutions have a reasonable level of excess capital, see chart 38, the right-most panel.

In addition to the capital effect of a severe recession scenario, the individual institutions must also hold sufficient capital to meet future capital requirements. This entails that individual credit institutions should ensure that they can cope with severe stress while meeting future regulatory requirements before making dividend payments.

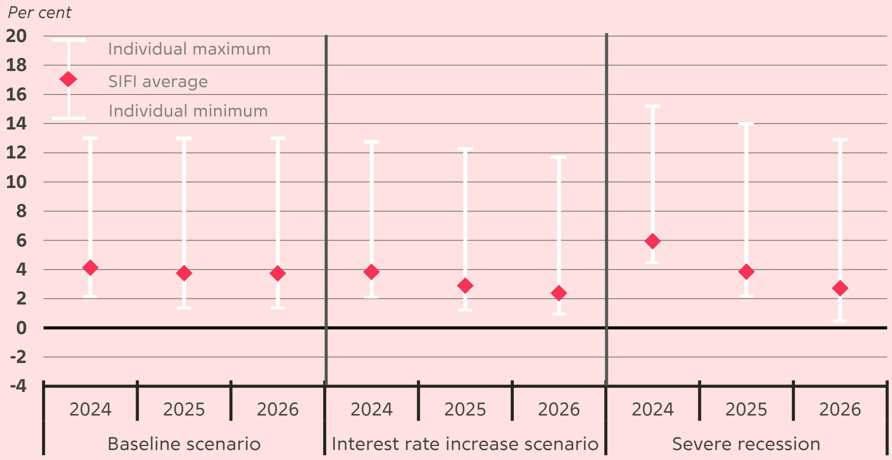
[37] The stress test includes systemic credit institutions and non-systemic banks, see Appendix A1. Saxo Bank A/S is not included in the stress test population.
[38] The credit institutions cannot assume that the countercyclical capital buffer will be released in an institution-specific stress scenario. The institutions can expect the countercyclical capital buffer to be released in a scenario of severe overall stress corresponding to the severe recession in Danmarks Nationalbank's stress test, see the Danish Financial Supervisory Authority, *Expectations for capital plans and targets*, November 2018 (link).

The stress test takes into account the expected effects of The European Commission's banking package.[39] The total capital requirement for the systemic institutions, in a severe recession, is estimated to increase by kr. 6 billion in 2025 and to remain at this level in 2026. The final impact of the banking package remains uncertain. Consequently, it is important to be prudent in capital planning. The sector-specific systemic risk buffer for real estate firms proposed by the Systemic Risk Council[40] has also been taken into account and will be included from the 2nd half of 2024.

In the interest rate increase scenario that represents a worsening business cycle and is characterised by further interest rate hikes, all credit institutions are resilient with a reasonable level of excess capital relative, see chart 38, centre panel. The interest rate hikes contribute positively to the institutions' earnings, despite the negative economic growth and a significant fall in house prices compared to the baseline scenario.

CHART 37

Some systemic credit institutions come close to the capital buffer requirement in a severe recession scenario



Note: The chart shows the total excess capital of systemic credit institutions, marked in red, and the individual minimum and maximum excess capital, marked in white. Excess capital is calculated as a percentage of the systemic credit institutions' total or individual risk-weighted exposures, respectively. The stress test takes into account the expected effects of the banking package and a sector-specific systemic risk buffer for real estate companies. It is assumed that the countercyclical capital buffer will be released in the severe recession scenario, which is why the excess capital in this scenario starts from a higher level in 2024.
Source: Danmarks Nationalbank.

[39] The European Commission's banking package is expected to enter into force on 1 January 2025. The banking package proposes a revision of the European Capital Requirements Regulation (CRR) and the Capital Requirements Directive (CRD). The expectation is that the first effects on Danish credit institutions will primarily result from the revised market risk rules, see Danmarks Nationalbank, Turbulent times call for a focus on risk management, *Danmarks Nationalbank Analysis (Financial stability)*, no. 14, November 2022 (*link*).
[40] See recommendation from the Systemic Risk Council, *Activation of a sector-specific systemic risk buffer for corporate exposures to real estate companies*, October 2023 (*link*).

The choice of scenarios and the variables included in them reflect the macroeconomic situation and the uncertainty surrounding the macroeconomic outlook. The stress scenarios in this stress test are broadly in line with those in the financial stability analysis for the 1st half of 2023,[41] see box 5 for a description of the scenarios and Appendix A2 for key figures from the scenarios.

BOX 5

Macroeconomic scenarios in the stress test

The stress test is based on three scenarios for the macroeconomic development in Denmark over the 2024-26 period.[1]

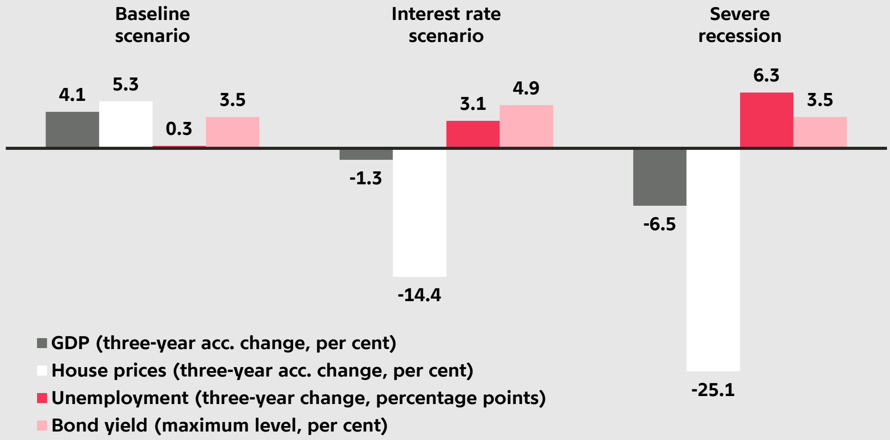
A baseline scenario that follows Danmarks Nationalbank's latest forecast[2] and represents the expected business cycle.

An interest rate increase scenario that represents a worsening business cycle and is characterised by further interest rate increases of around 1.5 percentage points across the yield curve compared to the baseline scenario, which are felt in Denmark and abroad from the 2nd half of 2024. The dampening effect of the interest rate increase on growth in the Danish economy is reinforced by the interest rate increase abroad reducing Danish export market growth. Moreover, the scenario is characterised by declining consumer and business confidence, resulting in negative shocks to private consumption, private investment and house prices. In the scenario, accumulated GDP growth is reduced by 1.3 per cent compared with an increase of 4.1 per cent over the baseline scenario, see chart.

A severe recession scenario representing a drastically worsening business cycle, where the Danish economy is hit by a severe economic downturn. The downturn follows declining consumer and business confidence, as in the interest rate increase scenario. At the same time, Danish export market growth is declining, further reducing GDP and increasing unemployment. The increase in the unemployment rate in the scenario is 6.3 percentage points over a three-year period. In addition, house prices and GDP are falling sharply. The cumulative fall in house prices is 25.1 per cent, while GDP falls by 6.5 per cent. The interest rate development in the scenario follows the development in the baseline scenario.

See Appendix A2 for key figures from the scenarios.

Macroeconomic scenarios
The Danish economy in the period 2024-26



Note: The figures have been calculated based on annual averages. The bond yield indicates the average bond yield (per cent p.a.).
Source: MONA, Danmarks Nationalbank's macroeconomic model and own calculations.

[1] The approach used to generate the scenarios is described in detail in Danmarks Nationalbank, The largest banks satisfy capital requirements in stress test, *Danmarks Nationalbank Analysis (Stress test)*, no. 21, November 2018) (*link*).
[2] See Danmarks Nationalbank, Persistently high inflationary pressures call for tight economic policy, *Danmarks Nationalbank Analysis (Outlook for the Danish economy),* no. 13, September 2023 (*link*).

[41] See Danmarks Nationalbank, Interest rate hikes affect the banks and their customers, *Danmarks Nationalbank Analysis (Financial stability)*, no. 6, June 2023 (*link*).

Some institutions may find it difficult to meet their MREL requirement under stress

Concurrently with the capital requirements, the credit institutions must meet an aggregate minimum requirement for their eligible liabilities, the total risk-based MREL. The MREL requirement is intended to ensure that the institutions can be restructured or liquidated without causing significant negative effects on financial stability.[42]

During times of turmoil in the financial markets where the refinancing of expiring issuances may be difficult, the institutions must still be able to meet their MREL requirement. Danmarks Nationalbank's stress test shows that some systemic credit institutions will not be able to continue to meet their total MREL requirement (incl. the combined buffer requirement) during a one-year period with limited options for issuing new debt instruments.[43] Overall, in a severe recession the systemic credit institutions need an additional kr. 27 billion in the 2nd quarter of 2025.

Results of the 2023 EBA stress test reflect restrictive assumptions and severe macroeconomic scenarios

On 28 July 2023, the European Banking Authority (EBA) published the results of the EU-wide stress test. The results for the Danish credit institutions reflect more restrictive assumptions, including relatively conservative earnings restrictions, in addition the macroeconomic scenario for Denmark is significantly harder than the most severe scenario in Danmarks Nationalbank's stress test.[44] The purpose of the EBA stress test is to assess the capitalisation and capacity of the European banking sector to absorb losses. Danish institutions included Danske Bank, Nykredit, Jyske Bank and Sydbank. Danske Bank and Jyske Bank break with the capital conservation buffer at the end of the stress test.

Several institutions should consider increasing their capital target

The credit institutions' capital target contributes to ensuring that the institution is adequately capitalised. Generally, the institutions must have a capital target that is sufficiently high to enable them to cope with both institution-specific and macroeconomic stress without breaching the combined buffer requirement.[45]

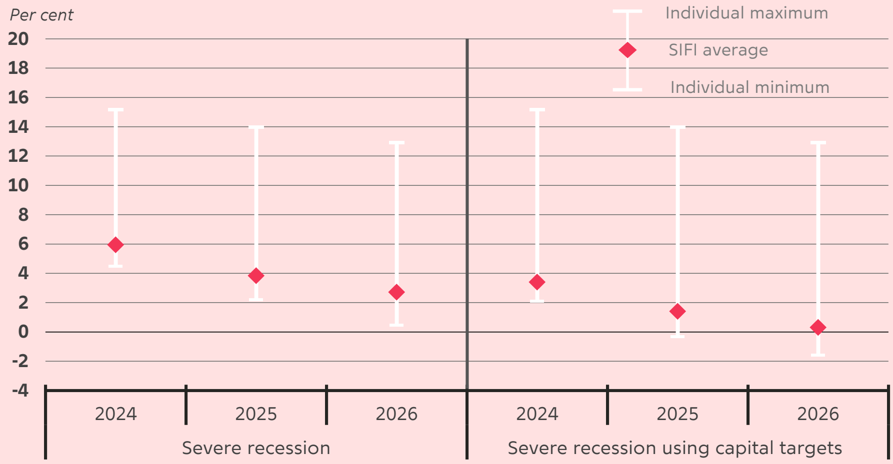
Danmarks Nationalbank has carried out an additional stress test calculation in the severe recession scenario, assuming that the institutions at the beginning of the stress test have a capital ratio corresponding to their capital target.[46] Danmarks Nationalbank's stress test of the institutions' capital targets shows that several systemic banks would not be sufficiently capitalised to withstand a severe recession if their initial capital ratio was on a par with their capital target, see

[42] See more about crisis management of banks and MREL requirements in box 5 in Danmarks Nationalbank, Interest rate hikes affect the banks and their customers, *Danmarks Nationalbank Analysis (Financial stability)*, no. 6, June 2023 (*link*).
[43] The institutions are not assumed to be able to issue new debt instruments in the period from the 2nd half of 2024 up to and including the 1st half of 2025.
[44] See Danmarks Nationalbank, Interest rate hikes affect the banks and their customers, *Danmarks Nationalbank Analysis (Financial stability)*, no. 6, June 2023 (*link*).
[45] In addition to the above factors, the capital adequacy target should take into account known future changes in the requirements. The institutions' determination of their capital adequacy target is done in a dialogue with the Danish Financial Supervisory Authority, which, based on European rules, has laid down guidelines for how the capital adequacy target is to be determined. See Retsinformation, *Vejledning om tilstrækkeligt kapitalgrundlag og solvensbehov for kreditinstitutter* (*link*), and the Danish Financial Supervisory Authority, *the Danish Financial Supervisory Authority's expectations for capital plans and targets,* November 2018 (*link*).
[46] The stress test is conducted under the worst-case scenario, the only change being the credit institutions' excess capital adequacy at the start of the stress test. For systemic institutions that state a range for their capital adequacy target, the midpoint of the range is used, while, for institutions that set a minimum, this minimum is used. For Nordea Kredit, it is assumed that its capital adequacy target is equal to its observed capital ratio at the end of the 2nd quarter of 2023. All other input is the same as in the regular stress test. This means that it is implicitly assumed that the size of the balance sheet remains unchanged, but that the composition of the liabilities has changed. To isolate the effect of changed capital ratios, it is assumed that the reduced equity is matched by a corresponding increase in another liability.

chart 39, right panel. Overall, the institutions would have a capital shortfall relative to the buffer requirements of approximately kr. 14 billion by the end of 2026. This indicates that several institutions should consider increasing their capital target.

CHART 38

The capital target of several systemic credit institutions is too low to cope with a severe recession



Note: The chart shows the total excess capital of systemic credit institutions, marked in red, and the individual minimum and maximum excess capital, marked in white. Excess capital adequacy calculated as a percentage of the systemic credit institutions' total or individual risk-weighted exposures, respectively. The stress test takes into account the expected effects of the banking package and a sector-specific systemic risk buffer for real estate companies. It is assumed that the countercyclical capital buffer will be released in the severe recession scenario, which is why the excess capital in this scenario starts from a higher level in 2024.
Source: Danmarks Nationalbank.

08
Climate: Regulation must enable climate-related risks to be taken into account

The green transition is a central and necessary measure to protect against the future consequences of climate change. But it is inevitable that climate change and the green transition will have negative financial consequences for some of the credit institutions' customers. This can have a spill over effect on the financial sector and therefore requires the financial sector to identify and manage the risks posed by climate change and the green transition. One consequence of the green transition may, for example, be an increasing level of costs in the businesses whose activities continue to emit large amounts of greenhouse gases. This may lead to lower lending quality in institutions where these businesses are customers.

EU financial authorities are considering the framework for regulating climate-related financial risks, see box 6. It is suitable that both micro- and macroprudential regulation include the possibility to address climate-related risks. Danmarks Nationalbank thus supports the investigative initiatives to adjust the common European rules so that both the institution-specific and systemic climate-related risks identified by institutions and authorities can be included in capital requirements and other requirements imposed on the institutions.

Across countries, authorities and institutions are building skills and data to assess the magnitude of climate-related financial risks. Danmarks Nationalbank is also working to identify the climate-related financial risks that are deemed to potentially be significant for the financial system in Denmark.[47]

[47] See chapter 8 of Danmarks Nationalbank, Turbulent times call for a focus on risk management, *Danmarks Nationalbank Analysis (Financial stability)*, no. 14, December 2022 (link).

BOX 6

EU financial authorities consider the regulatory framework for climate-related financial risks

The EBA finds that climate-related risks must be addressed, but minimum requirements should remain risk-based
The calculation of the institutions' risk-weighted assets, REA, is based on historical data, which makes it difficult for more forward-looking risks such as climate-related risks to be reflected in the institutions' risk-weighted minimum requirements (Pillar 1). For now, the European Banking Authority, EBA, recommends that environmental risks, including climate-related risks, are addressed according to the existing method for calculating RVE rather than by a separate risk weighting. However, EBA recommends a number of targeted adjustments,[1] including that institutions' account for climate-related factors in the valuation of immovable property collateral. The EBA points out that the calculation of REA already contains elements that may reflect climate-related risks. For example, institutions that use internal models to measure credit risks are recommended to introduce margin of conservativism to the extent sufficient information is available.

The EBA points out that the more forward-looking elements of climate-related risks for each institution, including the impact on its business model, is warranted in the stress tests that form the basis for the institutions' capital planning and in the process for evaluating the institution-specific requirements (Pillar 2). The banking package is expected to give supervisory authorities more powers to include ESG risks in stress tests and in the process for setting the Pillar 2 requirement. Against this background, it will be up to individual national authorities to determine the practice of national regulation, taking into account forthcoming guidance from the EBA.

The ESRB finds that macroprudential instruments may be needed
The European Systemic Risk Board, ESRB, finds that climate-related risks may also involve systemic risks, for example due to lending concentrations towards emission-intensive businesses, which may result in increasing and simultaneous losses in credit institutions as the price of emissions grows.

According to the ESRB, macroprudential instruments[2] may therefore be needed to complement individual requirements. Microprudential regulation in relation to the resilience of an individual institution is not sufficient to ensure financial stability. In order to ensure the resilience of the financial system and the economy as a whole, it is therefore possible to impose a number of additional requirements on institutions within the framework of macroprudential policy framework.

The EBA and ESRB find that systemic risk buffers are the most suitable capital measure to address systemic climate-related risks
Both the EBA and the ESRB find that the macroprudential framework can already be used to address climate-related risks, although targeted adjustments are needed. Both highlight a systemic risk buffer as the most suitable capital measure to increase the sector's resilience to, for example, climate-related lending concentrations. The systemic risk buffer can be applied to all exposures (general systemic risk buffer) and to a subset of the exposures (sector-specific systemic risk buffer). The EBA and the ESRB recommend to revise the guidelines for defining the sector-specific systemic risk buffer in order to reflect sectors that are particularly exposed to climate-related risks.

In addition to capital measures, the ESRB identifies borrower-based measures as a possible instrument to limit risk-building caused by climate-related events. Borrower-based measures include limits on the loan-to-value ratio (LTV) or debt-to-income ratio (DTI) with the aim of limiting risk for the individual household and for the institutions. This could, for example, be lower loan-to-value ratio limits for homes with low energy efficiency or homes with a high flood risk.

[1] The EBA's report from October 2023 (*link*) on the role of environmental, including climate-related, and social risks in the Pillar 1 framework contains 38 recommendations. Of these, 13 are initiatives that are estimated to be able to be implemented under the existing framework within three years. Most of the recommendations are related to environmental risks. Several of the long-term recommendations require further investigation or international coordination.
[2] See the ECB's macroprudential policy strategy (*link*).

09
Cyber: Serious cyber attacks may threaten financial stability

In the worst case, serious cyber attacks may threaten the stability of the financial sector. Financial stability may for instance be threatened, if a cyber attack limits societally critical functions performed by one or more institutions or if the confidence in the financial sector is affected.

The cyber threat remains significant

The Centre for Cyber Security, CFCS, still assesses the threat from cyber espionage and cyber crime as very high, whereas the threat from destructive cyber attacks[48] against Danish targets is assessed as low. However, the CFCS assesses it as likely that state-sponsored hacker groups are developing the capability to launch destructive cyber attacks against critical infrastructure in Denmark, including via cyber espionage. As a result of the war in Ukraine, the CFCS also assesses that the threat posed by cyber activism has increased to high. The nature of the cyber threat can quickly change if the political situation were to escalate.[49]

Continued focus on increasing cyber resilience

For a number of years, the Danish financial sector has targeted work at strengthening its resilience to cyber attacks, both through individual and joint measures.[50] The individual financial institution is itself responsible for ensuring stable operations and operational resilience.

The cyber threat cannot be eliminated, and there is still a need to increase cyber resilience. This is due to the development in the capabilities and methods of cyber criminals. In addition, several states have the capabilities needed to carry out destructive cyber attacks, but currently limited intentions of launching such attacks against Denmark. The threat could change with little or no warning. It is therefore important that the financial sector continues to target work at strengthening cyber resilience and limiting the impacts of cyber attacks.

Management commitment makes a difference

It is important that the board of directors and the executive management are committed to and assume responsibility for the work on cyber security, as it is a prerequisite for an organisation to have the right focus on the importance of cyber resilience in line with other types of risks.

Danmarks Nationalbank's surveys on cyber resilience in the financial sector indicate that organisations in which responsibility for cyber security is well anchored in the board of directors and executive management also have a

[48] Descriptions of threats and types of attacks can be found in the CFCS's threat assessment. Read more on the CFCS's website (link).
[49] See Centre for Cyber Security, *the Cyber Threat against Denmark,* 22 May 2023 (link).
[50] Read more about Danmarks Nationalbank's and the financial sector's initiatives to strengthen cyber resilience on Danmarks Nationalbank's website (link).

higher maturity level in terms of protecting themselves against cyber attacks and their potential consequences.[51]

[51] See Danmarks Nationalbank's latest survey of cyber resilience in the financial sector in Danmarks Nationalbank, Improved cyber maturity in the financial sector, *Danmarks Nationalbank Analysis*, no. 9, August 2023 (*link*).

10
Appendix A1 : Analysis data basis

Analysis data basis

The analysis uses the term 'credit institutions' when referring to the activities of both banks and mortgage credit institutions. The term 'bank' refers specifically to entities carrying out banking activities. These institutions are listed in table A1.

The analysis of Danish credit institutions' earnings, liquidity and own funds comprises nine systemic credit institutions selected by the Danish Financial Supervisory Authority in 2023. The analysis also includes the non-systemic banks. This group consists of the institutions in group 2 defined by the Danish Financial Supervisory Authority for 2023, with the exception of Danish Ship Finance, which has been omitted due to its business model. The grouping applies retrospectively.

In the analysis and assessment of lending activity, focus is on the grouping of large and medium-sized banks in Danmarks Nationalbank's lending survey. Large banks are the Danish Financial Supervisory Authority's group 1 plus Nordea Danmark, while medium-sized banks are the Danish Financial Supervisory Authority's group 2 plus Santander Consumer Bank.

TABLE A1

Institutions in the analysis by balance sheet total as at 30 June 2023, kr. million

Systemic credit institutions	Amount
Danske Bank (incl. Danica)	3,731,608
Nykredit Realkredit	1,606,247
Jyske Bank	766,633
Nordea Kredit	426,805
DLR Kredit	185,948
Sydbank	179,286
Spar Nord	126,952
Arbejdernes Landsbank	111,683
Saxo Bank	87,746
Total systemic credit institutions	**7,222,908**

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Systemic banks	
Danske Bank	2,324,659
Jyske Bank	439,342
Nykredit Bank	222,543
Sydbank	181,324
Spar Nord	127,143
Arbejdernes Landsbank	111,683
Saxo Bank	64,266
Total systemic banks	**3,470,961**

Non-systemic banks	
Ringkjøbing Landbobank	71,012
Sparekassen Danmark	61,038
Sparekassen Kronjylland	40,114
Lån & Spar Bank	31,599
Sparekassen Sjælland-Fyn A/S	30,788
Middelfart Sparekasse	19,579
Total non-systemic banks	**254,130**

Mortgage credit institutions	
Nykredit Realkredit	1,518,917
Realkredit Danmark	781,127
Nordea Kredit	426,805
Jyske Realkredit	366,756
DLR Kredit	185,948
Total mortgage credit institutions	**3,279,554**

Note: The balance sheet total for the systemic credit institutions is stated at group level. The credit institutions have thus been stated inclusive of assets in their subsidiaries in the form of, for example, mortgage credit institutions. The balance sheet total for systemic banks, non-systemic banks and mortgage credit institutions is stated at institution level. Exceptionally, Arbejdernes Landsbank has been included at group level to reflect the consolidation with Vestjysk Bank. The assets in the financial statements of the mortgage credit institution Nykredit Realkredit also reflect the Nykredit Group's funding of the subsidiary Totalkredit.
Source: Danmarks Nationalbank.

11
Appendix A2: Stress test scenarios

TABLE A2

Selected key figures in Danmarks Nationalbank's stress test

	Baseline scenario	Interest rate increase scenario	Severe recession
2024			
GDP, per cent year-on-year	1.3	0.4	-0.2
Private consumption, per cent year-on-year	1.3	1.0	0.7
Export market growth, per cent year-on-year	3.0	2.4	-0.9
House prices, per cent year-on-year	0.7	-2.9	-5.6
Gross unemployment, per cent of labour force	2.9	3.1	3.2
Average bond yield, per cent p.a.	3.5	4.1	3.5
2025			
GDP, per cent year-on-year	1.3	-2.8	-6.0
Private consumption, per cent year-on-year	1.0	-3.1	-4.2
Export market growth, per cent year-on-year	3.1	0.3	-11.6
House prices, per cent year-on-year	2.1	-10.0	-19.3
Gross unemployment, per cent of labour force	3.2	5.1	6.7
Average bond yield, per cent p.a.	3.4	4.9	3.4
2026			
GDP, per cent year-on-year	1.4	1.1	-0.2
Private consumption, per cent year-on-year	1.0	-0.9	-1.7
Export market growth, per cent year-on-year	3.0	0.8	-1.4
House prices, per cent year-on-year	2.4	-2.1	-1.7
Gross unemployment, per cent of labour force	3.2	6.2	9.5
Average bond yield, per cent p.a.	3.3	4.8	3.3
Cumulative change			
GDP, three-year cumulative change per cent	4.1	-1.3	-6.5
House prices, three-year cumulative change per cent	5.3	-14.4	-25.1

Note: Annual averages. House prices are cash prices of single-family houses. The baseline scenario follows Danmarks Nationalbank's projection up to 2025, while the development in 2026 is a technical projection. It should be noted that rounding may mean that the stated cumulative growth does not necessarily correspond to the cumulative growth that can be calculated based on the figures in the table.

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Working Paper presents research work by both Danmarks Nationalbank's employees and our partners. Working Paper is primarily targeted at professionals and people with an interest in central banking research as well as economics and finance in a broader sense.

The analysis consists of a Danish and an English version. In case of doubt as to the correctness of the translation, the Danish version will prevail.

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DANMARKS NATIONALBANK