ANALYSIS

DANMARKS NATIONALBANK

27 MAY 2020 — NO. 8

FINANCIAL STABILITY – 1ST HALF 2020

Credit institutions are facing hard times

- The coronavirus outbreak has influenced banks' results in the 1st quarter of 2020 reflected in the largest impairment charges for the largest banks since the 2008-09 financial crisis. How severely the economy and banks will be affected remains highly uncertain.
- Credit institutions today are both better capitalised and have higher excess liquidity than in the run-up to previous downturns. But it is important for institutions to increase the proportion of eligible liabilities in order to ensure sufficient distance to the requirements.
- It is important to stick to the regulatory framework that has ensured a good starting point for the credit sector. Banks can only ensure continued lending to creditworthy customers as long as their own soundness cannot be called into question.

Countercyclical buffer released

on 12 March with immediate effect

Read more

The liquidity premium rose

in the mortgage market for a short period

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Corporate customers affected

severely by lockdown

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Summary and assessment

Sharp economic slowdown across the world
Economic activity around the world has slowed down sharply and very suddenly. The International Monetary Fund, IMF, expects a strong fall in global GDP in 2020, and the impact on the euro area is expected to be even more severe. Six months ago, the outlook for 2020 was for moderately positive growth rates. The dramatic slowdown in March followed the global outbreak of coronavirus (COVID-19) and the government measures to contain the risk of infection by means of lockdown of large segments of society.

Prices in financial markets can change both very quickly and dramatically
The outbreak of coronavirus has once again shown that prices in the financial markets can change both very quickly and dramatically. Financial market volatility rose to levels last seen during the 2008-09 financial crisis.

In April and May, market volatility has fallen and equity prices in particular have recovered. The increases have coincided with announcements of large fiscal relief packages and very accommodative monetary policy.

Stick to the requirements that have ensured banks a good starting point in this crisis
Banks contribute best to the economy by being well capitalised and having robust liquidity buffers. This is reinforced by suspending dividends and share buybacks.

Now is the time to stick to the regulatory framework that has made the banks well prepared for the current crisis. The regulatory framework builds on the experience of the 2008-09 financial crisis and includes new requirements for banks' capital and liquidity, as well as a new recovery and resolution regime.

Should some banks' business models become unsustainable, the first step is still to seek a market-based solution. The next step is resolution and in some cases restructuring.

The liquidity position is still robust in the largest banks
Throughout the period, Danish banks have maintained a good distance to the short-term liquidity requirement. Systemic banks can withstand significant liquidity outflows according to Danmarks Nationalbank's sensitivity analysis of their liquidity buffers. Since the financial crisis, the sector has turned a customer funding deficit into a customer funding surplus.

The scope for new issuances was limited for some time
During the financial stress peak in March, activity in the markets for new issuances of capital and debt instruments to meet the requirements for eligible liabilities was briefly suspended. Activity returned slowly in early April and has since stabilised at slightly higher interest rate levels. The strong and sudden drop in market activity demonstrates the importance of a diversified maturity profile.

Mortgage market liquidity was briefly challenged
Mortgage bond yields increased sharply for a short period before Easter, with significant expansions of interest rate spreads on both short-term and long-term securities. Despite the market stress, mortgage credit institutions were able to continue issuing without interruption throughout the period, contrary to the situation in many other debt markets. Pricing in well-functioning markets naturally entails notably higher interest rates during a period of investor restraint. Shortly after interest rates had risen quickly, investors returned and relatively large issues were sold in connection with the end of the quarter.

The lockdown may affect many firms with bank credit
Loans to firms in affected industries account for a substantial proportion of bank lending. There is a significant risk that firms in other industries will also be affected by the consequences at a later stage. Many firms do not have adequate liquid funds to cover short-term liabilities. Consequently, many firms will depend on access to additional credit from their banks. Firms with a poor starting point or poor prospects will find it difficult to secure adequate liquidity, possibly resulting in default.

Relief packages can support the quality of institutions' lending
Banks are facing a period of lower credit quality in their lending. In Danmarks Nationalbank's latest lending survey the institutions pointed to

expectations of stronger customer risk assessment in the 2nd quarter. However, a large number of wide-ranging government support schemes and other government measures can temporarily buoy up customers' finances and creditworthiness.

Credit institutions should maintain their credit standards for new exposures.

Corporate customers of medium-sized banks are generally less resilient

Overall, Danish corporate customers have become more resilient in recent years, but the credit quality of medium-sized banks' corporate customers is considerably lower than that of large banks. Thus, more than one in three corporate customers have both low solvency and low liquidity in 4 out of 11 medium-sized banks.

Rising unemployment could eventually increase losses on loans to households

If unemployment growth sticks at a high level for a prolonged period, the risk of losses on loans to households may increase. However, credit institutions' lending to employees and others in the industries where unemployment has increased the most so far, accounts for a small proportion of employees' total borrowing.

Bank earnings fell sharply in the 1st quarter

The coronavirus outbreak has influenced banks' results in the 1st quarter of 2020 reflected in the largest impairment charges for the largest banks since the financial crisis in 2008-09. The drop in earnings should be seen in the light of a significant increase in institutions' loan impairment charges and negative value adjustments.

Larger impairment charges at the prospect of crisis are a key part of recently introduced accounting rules

A significant proportion of impairment charges reflect a downward adjustment of the macroeconomic outlook used to calculate expected credit losses under the recently introduced accounting standard, IFRS 9. The new standard is important in ensuring confidence in banks' financial statements. At the same time, based on management judgement, several institutions have recognised additional impairment charges reflecting the uncertainties associated with the current valuations.

Release of the countercyclical capital buffer provides extra scope to get through the crisis

Danish banks are significantly better capitalised than before the financial crisis in 2008-09. On 12 March 2020, the Minister for Industry, Business and Financial Affairs decided to release the countercyclical capital buffer with immediate effect. This gives banks and mortgage credit institutions extra scope in relation to capital requirements.

Danske Bank, Nykredit, Jyske Bank, Sydbank and Spar Nord have all chosen to cancel dividend payments as well as planned and existing share buyback programmes. Danmarks Nationalbank sees the cancellation of dividend payments and share buybacks as a sign that banks are appropriately prudent in the current situation.

Institutions should ensure sufficient distance to the MREL requirement by issuing eligible debt instruments

In the coming years, several systemic institutions will have to issue new, MREL-eligible debt instruments to continue to meet their minimum requirements for own funds and eligible liabilities, MREL. During periods of financial market turmoil, issuance can be difficult and expensive, as most recently seen in March this year. It is important that institutions have sufficient distance to the MREL requirement to avoid having to limit their activities in order to ensure compliance. Institutions should thus issue MREL-eligible debt instruments in good time to provide a robust distance in relation to the MREL requirement.

Sharp economic slowdown hit financial markets

Economic activity around the world has slowed down sharply and very suddenly. The International Monetary Fund, IMF, expects global economic growth of -4.2 per cent in 2020, see Chart 1. In the euro area, growth of -7.5 per cent is expected in 2020. Six months ago, the IMF's outlook for 2020 was for moderately positive growth rates. The outlook for GDP growth in 2020 is considerably lower than in any year during the 2008-09 financial crisis.

The dramatic economic slowdown followed the global outbreak of coronavirus (COVID-19). Following the outbreak, authorities around the world have taken measures to contain the risk of infection by closing down large segments of society.

The coronavirus outbreak and lockdown affected equity markets

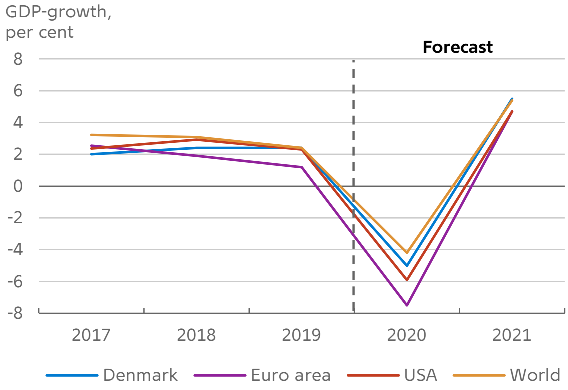
The leading stock indices plummeted in March, but have since recovered some of the losses, see Chart 2. The coronavirus outbreak has triggered extraordinarily high uncertainty about the economic outlook. That led to a sharp fall across most equity markets. On a few days, the leading stock indices fell by more than 10 per cent.

Equity markets have subsequently recovered in April and May. The increases have coincided with announcements of large fiscal relief packages and very accommodative monetary policy. However, the increases have not been broad-based. In the travel and leisure sectors, as well as for banks, equity prices remain about 40 per cent lower than in mid-February, see Chart 3. This also applies to the equity prices for Danish systemic banks, which have fallen almost 35 per cent in the same period. Conversely, equity prices for firms in the health sector have almost returned to the mid-February level.

Diving prices of oil and other commodities

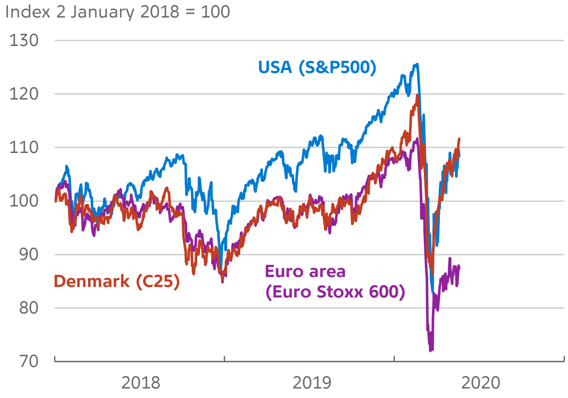
The lockdown in many countries, first China, then Europe and the USA, among others, has resulted in plummeting demand and prices for a number of commodities. On 9 March, oil prices dropped by almost 25 per cent after Russia and the Organization of the Petroleum Exporting Countries, OPEC, failed to agree on limiting the oil supply, see Chart 4. Since then, the market price has remained at a lower level, but with large fluctuations. The coronavirus outbreak

Prospect of sharp decline in economic activity Chart 1



Note: IMF's main scenario for world GDP growth is based on market exchange rates and IMF projections for USA and Euro area. GDP growth in Denmark is Danmarks Nationalbank's central scenario from April 2020.
Source: IMF and Danmarks Nationalbank.

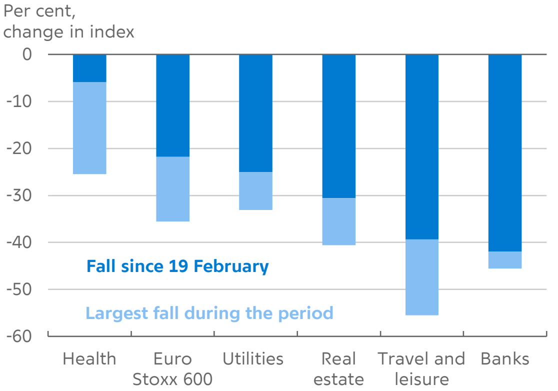
Large and sudden declines in equity markets followed by increases Chart 2



Note: The most recent observations are from 19 May 2020.
Source: Refinitiv Eikon.

Equity prices in the banking, travel and leisure, real estate and utilities sectors are still severely affected

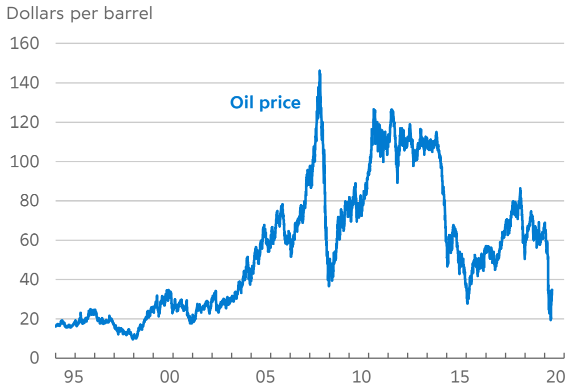
Chart 3



Note: Change in per cent for the selected stock index in the euro area, Euro Stoxx 600 index, since 19 February 2020, the peak of the Euro Stoxx 600 index. The most recent observations are from 19 May 2020.
Source: Refinitiv Eikon.

Oil prices plunged in April to lowest level since 2001

Chart 4



Note: Price of a barrel of brent crude oil. The most recent observation is from 19 May 2020.
Source: Refinitiv Eikon.

has also caused the prices of other commodities, such as metals, to fall.

Many countries are facing high government yield volatility and prospects of a higher debt burden

The negative economic developments also impacted the sovereign debt markets, where government bond yields have fluctuated strongly, see Chart 5. In the USA, government yields have fallen significantly. Conversely, government yields rose in Europe in March and have since stabilised at a slightly higher level than before the virus outbreak. Italian government yields have fluctuated strongly and have increased considerably since mid-February.

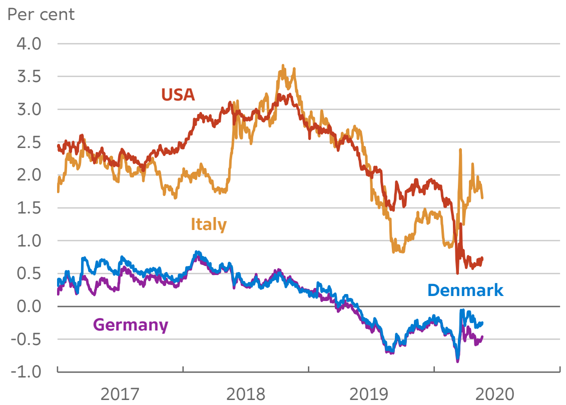
Danish government bond yields have also risen slightly relative to German government yields, but are still below zero.

Many countries are facing a period of substantial demand for new government issuances to finance the economic relief packages implemented in recent months. Large new issuances could prove challenging for countries that already have high debt.

The Danish State is well equipped to finance the extraordinary corona-related expenses, given the low government debt, sound public finances and the very high credit rating. As one of few in the world,

Government bond yields have fallen in the USA since February, but have increased in, inter alia, Italy

Chart 5



Note: 10-year government bond yields. The most recent observations are from 19 May 2020.
Source: Refinitiv Datastream.

the Danish State has retained the highest achievable rating from the largest credit rating agencies.

Strong price fluctuations for equities and bonds
The outbreak of coronavirus has once again shown that prices in the financial markets can change both very quickly and dramatically. This is the highest volatility level since 2008-09 during the financial crisis for both equities, see Chart 6, and bonds.

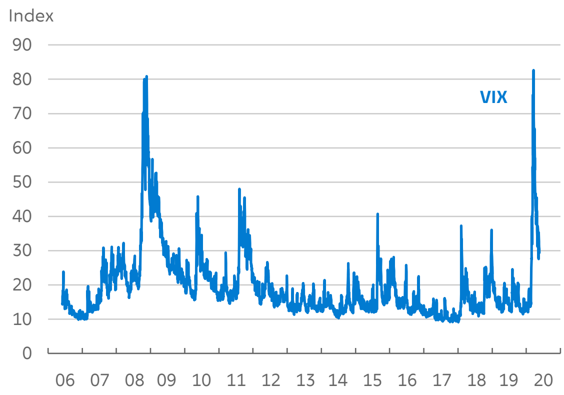
For a few days in March, equity prices dropped, while bond yields rose, see Chart 7. Both bond yields and equity prices have readjusted since then. Price falls for equities and bonds at the same time have occurred previously during periods of high financial market stress.

The insurance and pension sector suffered heavy losses in March
The pension sector holds a large part of private-sector savings in Denmark. Consequently, it was particularly severely affected by the market turmoil in March, see Chart 8. The value of the sector's asset portfolio fell by around kr. 300 billion over one month. But this loss is unrealised and if the financial markets recover from the losses, pension wealth will also return to pre-virus levels. In addition, some companies sold assets during this period, suffering realised losses.

Following the increase in interest rates in mid-March, some insurance and pension companies were met with variation margin calls to cover fluctuations in the value of derivatives portfolios. For some derivative contracts, the variation margin must be in the form of cash deposits.[1] To the extent that companies have experienced high cash variation margin calls or have been nervous about potential calls, this may have limited their performance in the financial markets in mid-March.

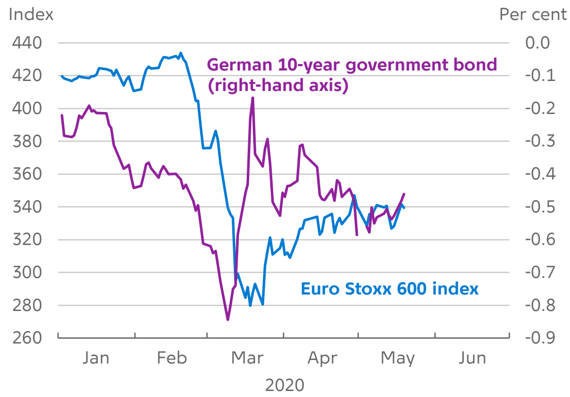
The market turmoil in March underlines the importance of sound liquidity reserves in the companies for compliance with variation margin calls. Thus, the companies must have connection with both Danish and international banks with a view to repo transactions. If reasonable access to liquidity is not possible, it may be necessary to reduce the use of derivatives.

Historically high equity market volatility Chart 6



Note: The most recent observation is from 19 May 2020.
Source: Refinitiv Eikon.

Period with both falling stock prices and rising interest rates Chart 7



Note: Euro Stoxx 600 index and German 10-year government bond yield. The most recent observations are from 19 May 2020.
Source: Refinitiv Eikon.

1 See Danmarks Nationalbank, Pension companies will have large liquidity needs if interest rates rise, *Danmarks Nationalbank Analysis*, No. 23, November 2019 (*link*).

Massive easing and support from central banks
Several central banks have introduced extraordinary measures to support banks' access to liquidity. Over a few days, both the European Central Bank, ECB, and the Federal Reserve, Fed, decided to inject liquidity into the market and initiate significantly larger asset purchases.

The ECB launched a number of initiatives in March in the light of the coronavirus outbreak. On 12 March, the ECB maintained its key interest rate at -0.5 per cent but at the same time announced that it would increase its asset purchases. On 18 March, a new purchase programme amounting to 750 billion euro in total was launched, as a minimum in force until end-2020, comprising corporate debt such as commercial paper.

The ECB has also expanded its facilities to include long-term loans to banks, i.e. Longer-Term Refinancing Operations, LTRO, and launched Pandemic Emergency Longer-Term Refinancing Operations, PELTRO. Both measures give euro area banks access to loans at favourable interest rates. In addition, the ECB has temporarily eased a number of collateral requirements, e.g. lower haircuts on some assets eligible as collateral for central bank loans.

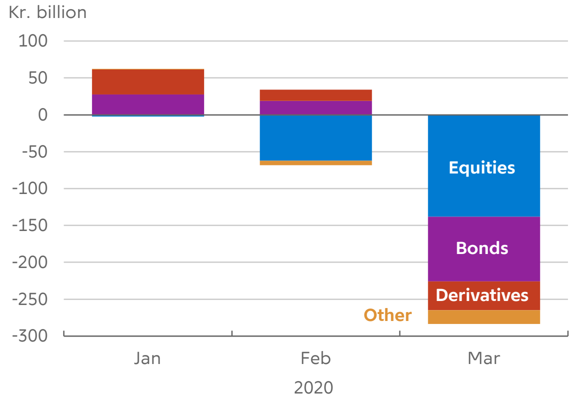
The Fed also launched initiatives in March. On 3 March, the Fed decided to lower its key interest rate to 1-1.25 per cent. On 15 March, this interest rate was lowered again to 0-0.25 per cent and an asset purchase programme was launched. On 17 March, this was extended to include commercial paper. On 23 March, the Fed announced that it would purchase government bonds and covered bonds to the extent necessary, which the market interpreted as an unlimited purchase programme. In addition, the Fed launched targeted purchase programmes to support well-functioning markets and credit.

Danmarks Nationalbank's lending facility and swap agreements have improved banks' access to liquidity
Like other central banks, Danmarks Nationalbank established extraordinary lending facilities for its monetary policy counterparties in March 2020. The new facilities should collectively ensure the banking sector's access to liquidity and longer-term financing in various currencies on favourable terms and support a well-functioning bond market.

From 20 March, the monetary policy counterparties have been able to take out the new one-week loans against collateral, and on 27 March, they also gained access to 3-month loans against collateral. The interest rate on the extraordinary loans is set at -0.35 per cent. The interest rate on the 3-month facility is variable, following the interest rate on extraordinary loans.

On 19 and 20 March, Danmarks Nationalbank announced that it had established a swap agreement with the Fed and reactivated a swap line with the European Central Bank. The agreements guarantee Danish financial institutions access to liquidity in dollars and euro. The swap line with the Fed amounts to 30 billion dollars and runs for at least six months. With the reactivation of the swap line with the European Central Bank, the maximum loan amount was increased from 12 billion euro to 24 billion euro.

Substantial losses in the insurance and pension sector Chart 8



Note: Value adjustments incl. exchange rate adjustments. Reporting to Danmarks Nationalbank's statistics of securities and investment associations concerning insurance and pension companies.
Source: Danmarks Nationalbank.

The financial sector's core tasks continued to operate smoothly

Since the outbreak of coronavirus, financial institutions in Denmark have focused on being able to continue to operate and to service customers – even in the event of a worsening of the crisis or other incidents.

Some of the functions of the sector are critical. For example, clearing and settlement of payments in Danish kroner is important in order to keep society going, see Box 1. On each banking day, payments averaging kr. 618 billion, or just over one fourth of annual Danish GDP, are processed via the Danish payments infrastructure. The critical functions of the sector have so far operated smoothly.

Financial institutions have taken a number of actions to ensure staffing of key critical functions and to reduce employee contagion. A case in point is implementation of split teams, i.e. employees with critical functions are divided into teams to reduce the spread of infection. Meetings have been digital and as many people as possible have worked from home.

Payments constitute a critical function Box 1

The Danish payments infrastructure consists of settlement systems and actors, together ensuring the smooth settlement of the many daily time-critical transactions, see the chart.

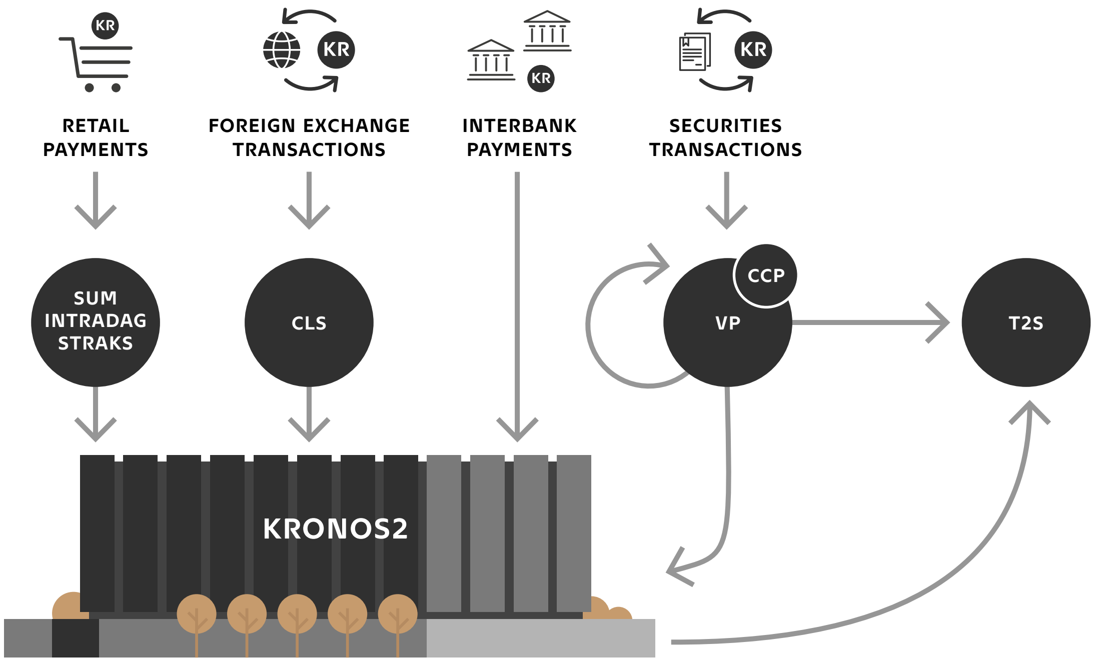
Danmarks Nationalbank's payment system, Kronos2, plays a central role in this infrastructure, both in relation to settlement of large, time-critical payments between banks (interbank payments) and by virtue of Danmarks Nationalbank's role as settlement bank for other payment and settlement systems.

Retail payments are payments between consumers, firms and public authorities, e.g. by Dankort or as credit transfers. Depending on their type, retail payments are cleared and settled through the Sumclearing, the Intradagclearing or the Straksclearing (retail payment systems).

Foreign exchange transactions are settled in CLS, an international system for settlement of foreign exchange transactions. It includes, inter alia, FX spot and FX swap transactions. An FX spot consists of two opposing payments. For example, a transaction in Danish kroner against euro entails a payment in Danish kroner from one party to the other party and a reverse payment in euro. An FX swap is an agreement between two parties to exchange payments in one currency for payments in another currency over a specified period.

Securities transactions in VP comprise transactions in bonds, equities and investment fund shares. Securities settlement predominantly takes place on the pan-European platform Target2-Securities (T2S). The rest is settled on VP's own platform. Some securities transactions, such as equity transactions, are cleared via a central counterparty, CCP.

The Danish payments infrastructure



Source: Danmarks Nationalbank, Oversight of the financial infrastructure, *Danmarks Nationalbank Report*, No. 3, May 2020 (*link*).

Before the partial lockdown, a number of financial institutions were already focusing on changing the infrastructure to minimise physical presence.

In the event of a critical incident, the FSOR emergency response will coordinate

The financial institutions themselves are responsible for ensuring stable operation and operational resilience. In the event of an operational incident that could threaten financial stability, the sector also has a common crisis response. It is organised under the Financial Sector Forum for Operational Resilience, FSOR, which is a forum involving the key financial institutions, interest groups and authorities.[2] Danmarks Nationalbank is chairman and secretariat of the FSOR. The FSOR's crisis response has not been activated in the current situation, but it has coordinated internally within the financial sector and with the national emergency response, NOST.

The crisis response is activated in the event of operational incidents that could potentially threaten financial stability. These can be breakdowns caused by severed cables, significant internal IT problems or cyberattacks. In particular, the risk of cyberattacks has been a focus area in recent years, see Box 2.

Cyberattacks constitute a systemic risk to financial stability

Box 2

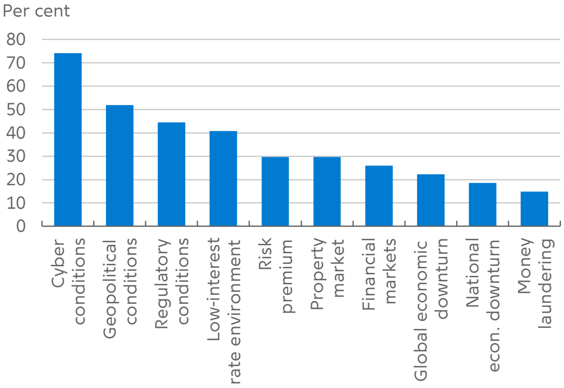
The threat from a cyberattack against the financial sector is very high[1], and among Danish financial enterprises, cyberattacks were the systemic source of risk cited by most as the main source of concern in February 2020, see Chart A, left. At the same time, it is the type of risk that the institutions consider to be the most challenging, see Chart A, right. IT dependencies both within organisations and across the sector are high, and IT criminals are highly skilled, using sophisticated methods. Moreover, the threat is dynamic and new threat variants are constantly evolving.

Across the financial sector, the focus is on strengthening resilience to cyberattacks, and a substantial part of this work is done within the FSOR, Financial Sector Forum for Operational Resilience, whose members are the financial sector's key actors. Many of the major actors in the financial sector also participate in the TIBER-DK cyber tests, where a hacker team by appointment tries to access pre-specified functions and data that are critical both for the actor being tested and for society.

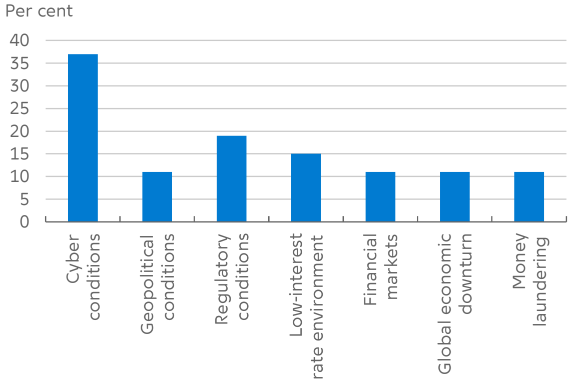
The cyber risk is substantial and difficult to manage

Chart A

Major sources of risk



Most challenging sources of risk



Note: Survey conducted among 27 risk managers in Danish financial enterprises. Left-hand chart: Proportion of respondents listing the individual risk categories in the question: "In your opinion, which risks are likely to have the greatest impact on financial stability in Denmark over the next three years?" Respondents could indicate up to five risks. Right-hand chart: Proportion of respondents listing the individual risk categories in the question: "In your opinion, which risks are likely to be most challenging to address for a firm?". Respondents could indicate up to two risks.

Source: See Danish Financial Supervisory Authority, Systemic Risk – Survey (in Danish only), March 2020 (*link*).

1. See Centre for Cyber Security, The Cyber Threat Against Denmark During the COVID-19 Pandemic, April 2020 (*link*).

Continues

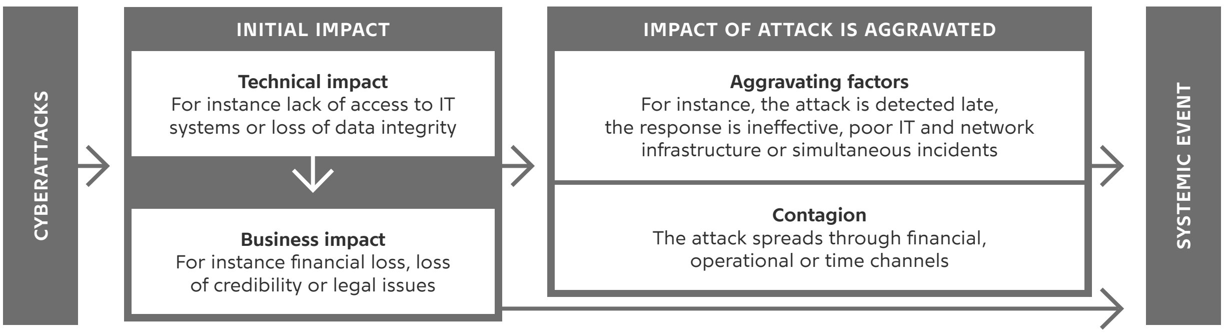
2 Read more about the FSOR here (*link*) and more generally about the financial infrastructure here (*link*).

Cyberattacks constitute a systemic risk to financial stability Box 2
continued

Cyberattacks can hit individual banks, but can also become systemic and generate instability throughout the sector. An attack becomes systemic when it escalates from having a limited technical and business impact to an impact on the sector as a whole, as well as on financial stability and the real economy, see Chart B. This can happen, for example, by an attack impacting critical functions of society, affecting confidence in the financial sector, or the economic losses from an attack reaching an order of magnitude where the financial system is unable to absorb them.

An example of a systemic cyberattack from abroad is the NotPetya attack, which started in Ukraine in June 2017. NotPetya encrypted data and cut off information and communication equipment. The attack did great damage in Ukraine, but also had an impact on some international organisations, including Maersk. NotPetya is estimated to have cost Maersk almost 300 million dollars[2]. The total cost of NotPetya is estimated at between 2 and 10 billion dollars.[3]

From cyberattack to systemic event Chart B



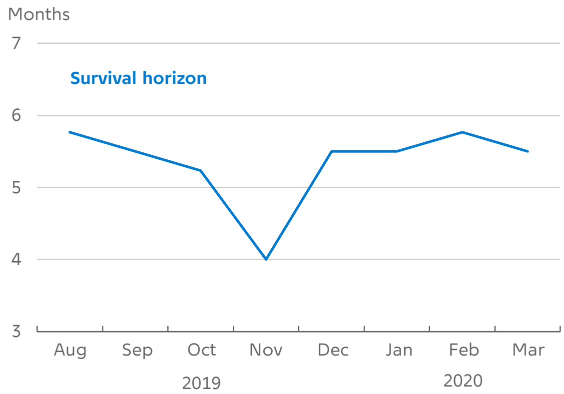
Source: See European Systemic Risk Board, *Systemic cyber risk,* February 2020 (*link*).

2. See A.P. Moeller – Maersk, *2017 Annual Report* (*link*).
3. See L. Kaffenberger and E. Kopp, Cyber Risk Scenarios, the Financial System, and Systemic Risk Assessment, *Cyber Policy Initiative Working Paper Series*, Carnegie Endowment for International Peace, no. 4, September 2019 (*link*).

The liquidity position of the largest banks remains robust

Systemic banks continue to hold solid liquidity reserves. According to Danmarks Nationalbank's sensitivity analysis, banks' liquidity stocks can, overall, cover their liquidity needs in a severe liquidity stress scenario for more than five months, see Chart 9.[3] Danmarks Nationalbank's sensitivity analysis and its scenarios are described in Box 3, which also provides a robustness analysis of the importance of deposits and credit for the liquidity situation of institutions.

Systemic banks can survive five months of liquidity stress Chart 9



Note: Number of months before systemic banks' net liquidity is run down in combined scenario based on reportings end of period each month. The latest observation is from March 2020.
Source: Danmarks Nationalbank.

3 Danmarks Nationalbank's sensitivity analysis looks at the factors that affect the liquidity position of banks and how quickly a bank may encounter liquidity difficulties, thus complementing regulatory liquidity requirements.

Danmarks Nationalbank's sensitivity analysis of banks' liquidity position

Box 3

The projection of the liquidity position in Danmarks Nationalbank's sensitivity analysis is based on calculations of banks' excess liquidity under various assumptions of outflow rates regarding both contractual flows and demand deposits as well as the realisation value of the various assets in the liquidity stock.

Scenarios in the sensitivity analysis

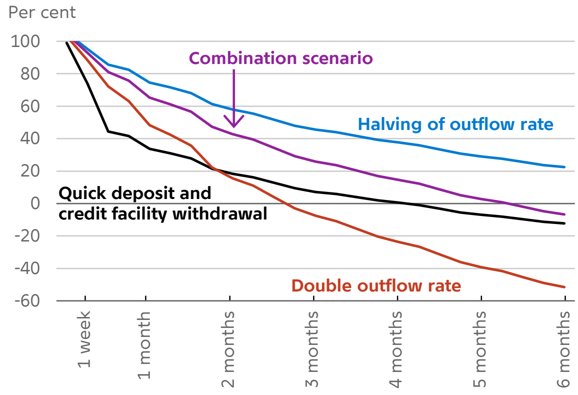
The scenarios have been constructed under the assumption that the liquidity stock is to be sold in the market. This gives an indication of how long the bank is able to manage its own liquidity situation without resorting to Danmarks Nationalbank's facilities.[1]

The *market-specific scenario* simulates general stress in the banking sector with funding markets closing, but with no strong effect on daily customer transactions, e.g. household customers are not withdrawing demand deposits. The *institution-specific scenario* at individual bank level, e.g. due to rumours of difficulties. The *combination scenario* includes for the bank both deposit withdrawals and expanded loans and credits as stress in the financial markets. This scenario thus addresses a number of the issues that may impact banks' liquidity situation in the current situation after the corona-virus outbreak.

Performance robustness under alternative assumption of outflow of deposits and credit expansion

The virus outbreak and the subsequent partial lockdown of Denmark have led to an extraordinary need for temporary liquidity in the affected firms. This could mean increased credit facilities and outflow of bank deposits. The results of the sensitivity analysis are generally influenced by the applied assumptions about the outflow of bank deposits and credit expansions. As a robustness test, it is therefore considered for how long banks remain liquid if the combination scenario assumes a change in the outflow of deposits and credit facilities. In a scenario with a further outflow of deposits for a short period and simultaneously a marked increase in drawings on credit facilities, e.g. due to a severe liquidity crisis for household and corporate customers, the average survival horizon decreases to approximately four months, see the chart. Specifically, the combination scenario has been recalculated here with three times larger deposit withdrawals and expansion of credit facilities for the first 14 days. The pace then drops to half of the combination scenario.

Sensitivity to deposit and credit withdrawal



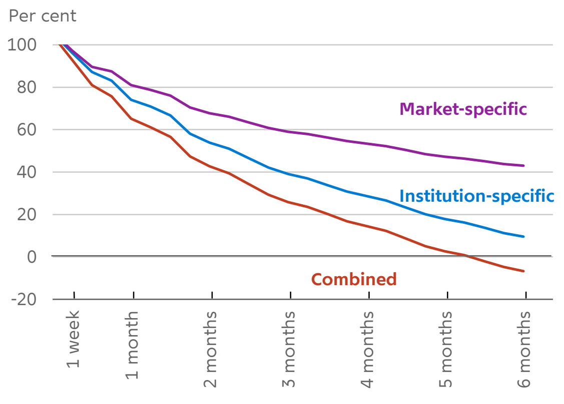
Note: Systemic banks' net liquidity over time in various outflow scenarios. Net liquidity is defined as the liquidity stock adjusted for net outflow over time. Data from end-March 2020.

Source: Danmarks Nationalbank.

1. For a more detailed description of methodology and scenarios, see Box 3 in Danmarks Nationalbank, Lower excess capital adequacy for the banks, *Danmarks Nationalbank Analysis (Financial Stability), No. 25*, November 2019 (*link*).

After a limited decline in the survival horizon in November 2019, banks have subsequently built up their reserves. At the end of March, according to the analysis, banks' survival horizon was still at the same level as earlier this year. Thus, overall, their liquidity situation has not been affected by the coronavirus outbreak in mid-March. But this is no guarantee of liquidity problems not arising anyway. According to the sensitivity analysis, at the end of March the systemic banks were able to withstand liquidity stress for more than five months in the combined scenario and more than six months in both the institution-specific and market-specific scenarios, see Chart 10.

Banks can withstand severe liquidity stress — Chart 10



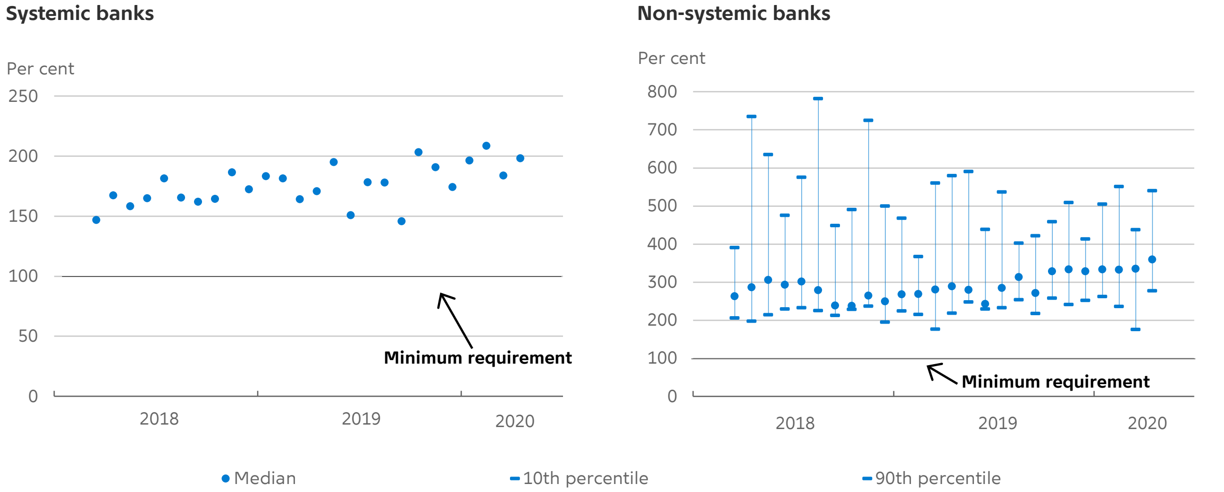
Note: Systemic banks' net liquidity over time in various outflow scenarios. Net liquidity is defined as the liquidity stock adjusted for net outflow over time. Data from end-March 2020.
Source: Danmarks Nationalbank.

In addition, both systemic and non-systemic banks have maintained a good distance to the short-term liquidity requirement, LCR, see Chart 11. Thus, the LCR was still stable at the end of April for both systemic and non-systemic banks. This reflects that the sector as a whole has had a significant customer funding surplus over a number of years, meaning that banks' deposit financing exceeds their lending.

Extraordinary lending facilities to support the money market

Danmarks Nationalbank has established extraordinary lending facilities following the outbreak of coronavirus. On 27 March, in order to increase banks' access to longer-term financing in the cur-

Banks observe the short-term Liquidity Coverage Ratio with a certain margin — Chart 11

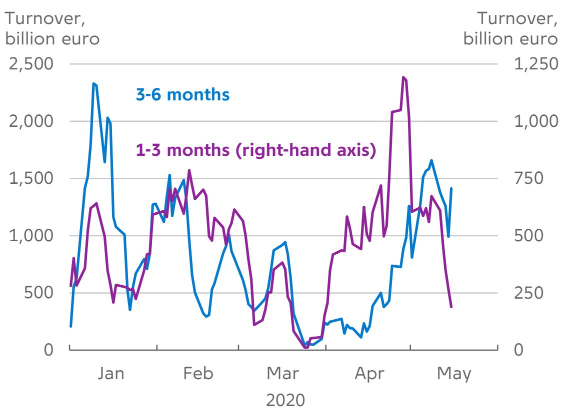


Note: The LCR, which must be higher than 100 per cent, is calculated as the bank's liquid assets divided by outgoing net cash flows over a 30-day stress period. The most recent observations are from end-April 2020.
Source: Danmarks Nationalbank.

rent situation, Danmarks Nationalbank expanded credit access to include 3-month loans. The new longer-term financing facility was also to support a well-functioning bond market. Danmarks Nationalbank has also announced the possibility for Danish institutions to borrow US dollars and euro for three months through Danmarks Nationalbank.

In March, the European money market was characterised by decreasing turnover in money market loans with longer maturities, see Chart 12. The Danish money market also experienced fluctuations, but with increasing turnover in short-term secured loans.

Decline in turnover of money market loans with longer maturities Chart 12



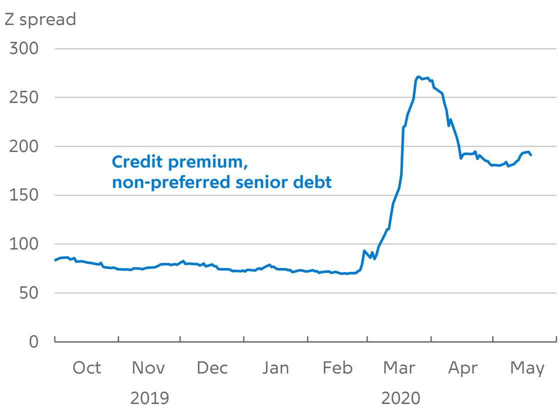
Note: 5-day rolling average of turnover in Euro area money market. Reported to Short-Term European Paper. Latest observations are from 18 May 2020.
Source: ECB, Short Term European Paper.

Period with limited scope for new issuance

In March, activity in the markets for new issuances of senior debt and capital instruments was briefly suspended. Activity returned slowly around Easter, when a few large international banks conducted issuances in the senior debt market. Several Nordic banks have also issued senior debt since then.

The price of MREL-eligible liabilities rose sharply during March. In the market for debt for MREL compliance, prices briefly rose by around 200 basis points, but have since fallen back somewhat, see Chart 13.

Periodically high price of non-preferred senior debt Chart 13



Note: Average z-spread for non-preferred senior debt in euro maturing in 2024 for Danske Bank, Jyske Bank and Nykredit. The z-spread is an expression of the additional cost of financing using the debt instrument in question, where the additional cost is calculated by paralleling a risk-free zero coupon rate structure, so that back discounting using this gives the price of the debt instrument. The most recent observations are from 19 May 2020.
Source: Refinitiv Eikon.

Financial stress period underlines the need for maturity diversification

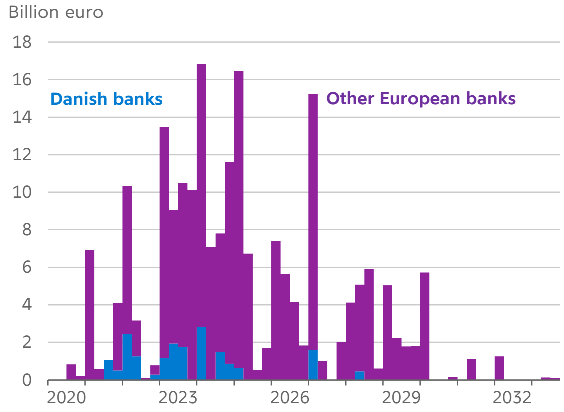
Once again, the period after the outbreak of coronavirus has shown why maturity diversification is important. A sufficiently diversified maturity profile may help an institution to avoid breaching the MREL even in the event of a prolonged period of limited market access. Danmarks Nationalbank's stress test shows that banks may find it difficult to comply with their MREL requirements under stress.[4] Furthermore, insufficient flexibility concerning date of issue may affect banks' financing costs if they are forced to issue in an unfavourable situation with greatly widened credit spreads.

4 See Danmarks Nationalbank, A prolonged recession could squeeze banks, *Danmarks Nationalbank Analysis (Stress test)*, No. 7, May 2020 (*link*).

The MREL can be met using debt instruments with remaining maturities of over one year. Danish banks' issuance of MREL debt has relatively short remaining maturities compared with other European banks, see Chart 14. Danish banks have usually issued MREL debt with maturities of 3-5 years.

MREL debt of Danish banks is relatively shorter than that of other European banks

Chart 14



Note: Maturity profile of MREL debt issued by European banks.
Source: Bloomberg.

Liquidity in the mortgage bond market weakened briefly

Mortgage bond yields rose sharply for a short period from mid-March, see Chart 15. Thus, the option-adjusted yield spread (OAS) increased significantly for both short-term and long-term bonds.

In recent years, foreign investors have acquired a larger share of issued Danish mortgage bonds and have retained their ownership since the coronavirus outbreak.

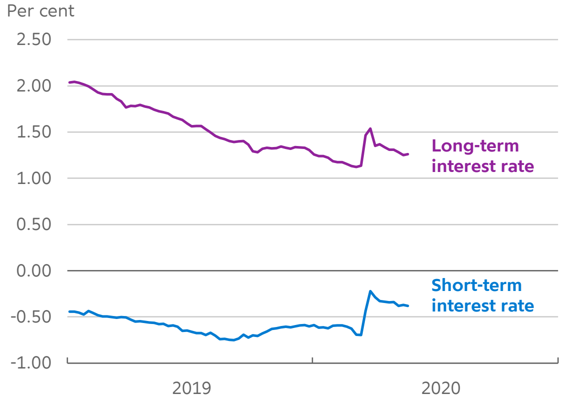
Mortgage credit institutions have been able to sell bonds without interruption

Unlike a number of other debt markets, in the mortgage bond market mortgage credit institutions were able to sell bonds as they found necessary without interruption. Up to the end of a quarter, mortgage credit institutions often have a relatively substantial need for issuance. Transaction reports for individual transactions[5] during the period show that institutions were able to sell the desired bonds towards the end of March, despite the sharply rising market interest rates in the same period.

The tendency for interest rates to rise amid investor restraint is a natural consequence of the structure of the Danish mortgage bond market. In practice, the issuance risk on disbursement of loans and refinancing rests with the individual homeowners, because the price of their loans is determined only when the bonds are issued. This can lead to sharp yield fluctuations, but ensures transparent price

Fluctuations in Danish mortgage bond yields

Chart 15



Note: Average short-term and long-term mortgage bond yields in Danish kroner. Latest observations are from week 20.
Source: Finance Denmark.

5 Read more about transaction reports, data filtering and calculation of liquidity measures in Danmarks Nationalbank, *Financial stability, 2nd Half 2015*, December 2015 (*link*). The reports are a prudential reporting requirement under the MiFIR Regulation, Directive 2014/65/EU of the European Parliament and of the Council of 15 June 2004 on markets in financial instruments and amending Directive 2002/EC and Directive 2011/61/EU.

formation and rapid adjustment towards a new equilibrium.

Increase in the liquidity premium in the mortgage market
The transaction reports show that, on some days in the latter part of March, the liquidity premium on mortgage bonds was significantly higher than normal, see Chart 16. The liquidity premium on mortgage bonds is measured here in relation to how much the price changes in a single transaction. Larger price changes in either direction indicate a higher liquidity premium.

Liquidity premiums subsequently decreased, inter alia as authorities around the world announced a series of extraordinary measures. As an example of such measures, on 27 March Danmarks Nationalbank opened a facility giving monetary policy counterparties access to variable-rate 3-month lending against collateral. However, premiums remain at a high level.

Banks expect weakened credit quality

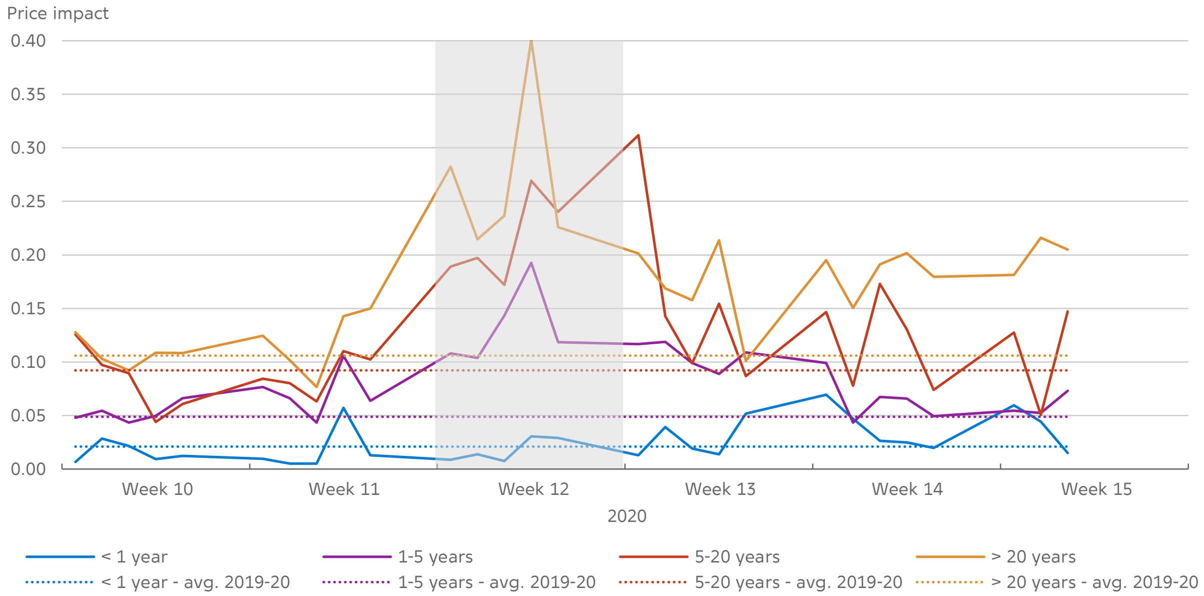
The Danish economy and thus the customers of the institutions have entered the coronacrisis from a good starting point. However, larger loan losses should be expected in step with a more sustained economic downturn.

Banks expect increasing credit risks over the coming period. In Danmarks Nationalbank's latest lending survey, the institutions' credit managers pointed to expectations of stronger customer risk assessment in the 2nd quarter of 2020, see Chart 17. The survey was carried out after the government implemented a series of temporary measures in mid-March to reduce the spread of coronavirus infection.

Subdued lending growth in March and April
In mid-May, the consequences of the outbreak of coronavirus have not materialised in the available statistics on the sector's lending.

Liquidity premiums rose sharply in mid-March and remain high

Chart 16



Note: Daily median of price impact on transactions for each remaining maturity segment. The average for 2019-20 has been calculated for the period from 1 January 2019 until and including 8 March 2020 (end of week 9). For more information about transaction reports, filtering of data and calculation of liquidity measures, see the analysis in Danmarks Nationalbank, *Financial Stability, 2nd half 2015* (*link*). The most recent observations are from 9 April 2020.
Source: Danmarks Nationalbank, MiFIDII transaction reports and own calculations.

According to Danmarks Nationalbank's latest data, lending growth was generally subdued in March and April following the outbreak of coronavirus, see Chart 18. This period is the season for many firms' dividend and tax payments. This year, however, with a temporary Act, the Folketing (Danish Parliament) has made it possible to defer payment of tax. In the first instance, this reduces the seasonal demand from firms for drawing on credit facilities in 2020.

Banks' corporate customers may well have been granted expansion of credit lines, or undrawn credit lines and credit commitments may have been created without being reflected in the statistics.

Creditworthy customers may obtain additional liquidity facilities

Several credit institutions have offered temporary measures to customers to get through the lockdown period that has severely affected the revenue of many firms. For example, some corporate customers have been offered new credits or an increase in existing lines, moratorium or extended loan maturities. In addition, several mortgage credit institutions have offered temporary interest-only periods to household customers.

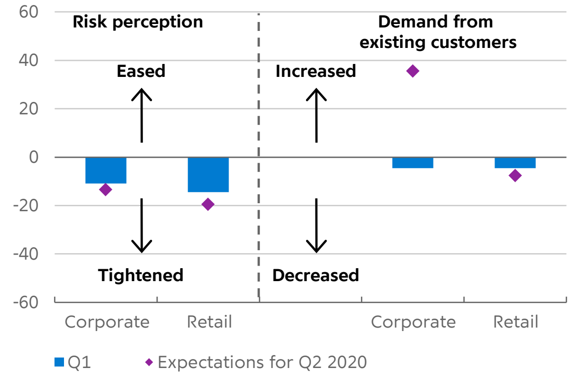
Credit managers at institutions expect to see rising demand for credit from the corporate sector in the 2nd quarter. Several credit managers point out that the reason is an increased need for liquidity during the lockdown.

In assessing new exposures and extensions of existing exposures, credit institutions should maintain their credit standards.

Lockdown could affect a large proportion of corporate lending

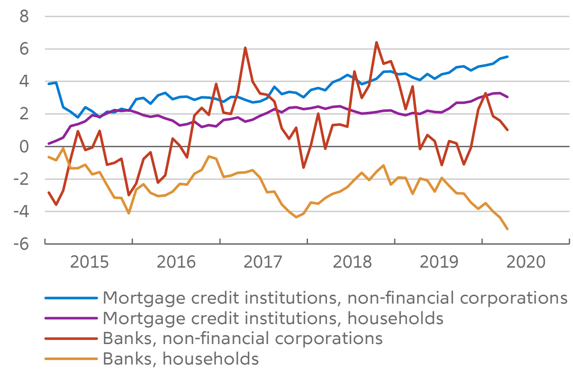
Business activity is being hit hard by the large-scale lockdown and the resulting sharp and sudden slowdown in the Danish and international economy.[6]

Banks expect higher risks and increased demand from corporate customers Chart 17



Note: The term "Retail" includes employees, pensioners, etc., while "Corporate" (total firms) includes private non-financial corporations and sole proprietorships and unincorporated partnerships. Only reports from banks.
Source: Danmarks Nationalbank.

Moderate lending growth in latest months Chart 18



Note: Lending by banks and mortgage credit institutions to Danish households and non-financial corporations. The most recent observations are from end-April 2020.
Source: Danmarks Nationalbank.

6 See Danmarks Nationalbank, Danish and international economy affected by pandemic, *Danmarks Nationalbank Analysis*, No. 4, April 2020 (*link*).

An assessment of the outlook for institutions' credit quality is currently subject to considerable uncertainty. Much will depend on how hard and for how long the lockdown and other government measures affect economies around the world.

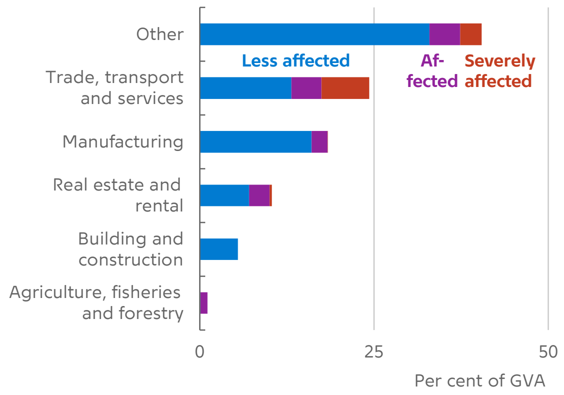
A number of industries are or have been severely affected by the government measures to contain the spread of infection, see Chart 19. The firms most severely affected have been completely or almost completely unable to sustain their activity. This applies, for example, to hotels, restaurants, culture, leisure, travel and passenger transport, parts of the retail sector and the professions. The methodology used to assess the expected impact of the lockdown on bank lending is described in Box 4.

At the same time, many other industries can be significantly affected through other channels. These are industries serving as closely linked subcontractors of goods and services to the most severely affected industries. And the crisis may also hit export-oriented industries, which are negatively affected by similar actions in other countries.

The rest of the economy has been less affected by the lockdown. This applies, for example, to parts of the wholesale and retail sectors, as well as e-commerce, public and private firms that are critical to

Large segments of the Danish corporate sector expected to be affected by the coronavirus outbreak

Chart 19



Note: The distribution of total gross value added, GVA, among main groups and whether industries have been and/or continue to be "severely affected", "affected" or "less affected" by full lockdown and derived effects, see calculations in Danmarks Nationalbank, Danish and international economy hit by pandemic, *Danmarks Nationalbank Analysis*, No. 4, April 2020 (*link*). Industry GVA is from 2016.

Source: Statistics Denmark, Danmarks Nationalbank and own calculations.

Consequences of the lockdown – this is what we did

Box 4

No accurate data is available yet about the economic consequences of the lockdown. That is why an assessment of the consequences for institutions' credit quality is currently subject to considerable uncertainty.

In this analysis, the breakdown of bank lending to vulnerable industries is calculated on the basis of Danmarks Nationalbank's assessment of the initial shock of a full lockdown, see Danmarks Nationalbank, Danish and international economy affected by pandemic, *Danmarks Nationalbank Analysis*, No. 4, April 2020 (*link*).

In the early April assessment, activity under a full lockdown is estimated to fall by almost 80 per cent in a number of exposed service sectors, 45 per cent in the retail sector and 5 per cent in other private sectors, while exports are estimated to be reduced by almost 25 per cent. Input-output calculations enable inclusion of indirect effects on activity in other industries of a shock to output or demand. Recent developments in a number of real-time indicators, such as payment card transactions, indicate that the lockdown for some industries has affected activity to a different degree than expected in early April. A case in point is the retail sector, where the fall in activity should now be assessed as more limited than previously assumed.

In this analysis, industries are described as "severely affected" during full lockdown if the aggregate fall in activity is more than 50 per cent. Industries with an expected aggregate fall of 30-50 per cent are described as "affected". Other industries are grouped in the category "other".

The analysis is based on microdata in the new Danish credit register. The register encompasses bank lending and unused credit facilities to individual firms in the affected industries. This gives an inventory of the proportions of lending that can potentially be hit by the direct and indirect effects of the lockdown. At the same time, the new credit register allows us to assess the robustness of firms in the affected industries, based on their most recent financial statements.

society, parts of manufacturing, construction and subcontractors to these.

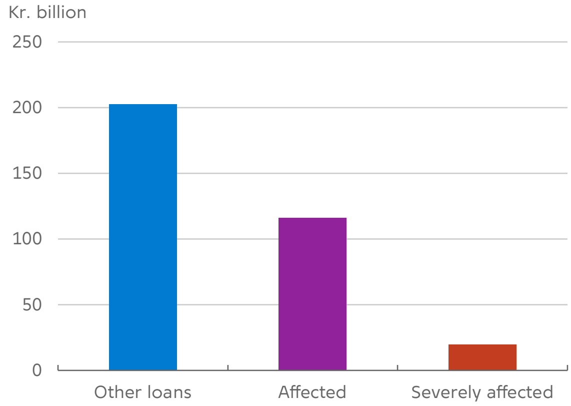
Looking forward, the increase in credit risk for Danish banks is subject to considerable uncertainty. There is a risk that the economy in general will be affected by a downturn in the wake of the lockdown, which could put the exposures of credit institutions under pressure, see Danmarks Nationalbank's most recent stress test.[7]

Loans to severely affected industries account for a substantial portion of bank lending

Some firms will be affected by the lockdown and a subsequent economic downturn to such a degree that they will no longer be able to service their debt and default. This will weaken the credit quality of bank and mortgage lending and cause losses.

Bank lending is more exposed than mortgage lending. Mortgage credit institutions provide credit only against the first part of the collateral in firms' properties. So if a customer defaults, they can take over the properties and recover all or some of their receivables by selling the properties. As regards banks, a smaller part of bank lending is collateralised against firms' assets.

The lockdown is expected to have affected firms accounting for a large share of banks' lending to corporate customers Chart 20



Note: Industries that are expected to be hit by an aggregate drop in activity of more than 50 per cent during the full lockdown are described as "severely affected", while industries that are expected to be affected by an aggregate decline in activity of 30-50 per cent are described as "affected" in the analysis. See Box 4 for more information. The most recent observations are from end-2019.

Source: Bisnode, Statistics Denmark, Danmarks Nationalbank and own calculations.

Bank lending to firms in industries that are or have been most severely affected by the lockdown accounts for 6 per cent of total corporate lending, see Chart 20. Loans to firms in parts of the trade, transport and services sectors account for most of this, at kr. 17 billion, while loans to severely affected firms in other industries account for kr. 2 billion of total lending.

The largest fall in output is seen in industries directly affected by government measures to contain the infection. But the proportion of lending to these industries is smaller than the proportion of lending that is indirectly affected, and which may be impacted by a combination of lower exports and derived effects for other industries of the economy.

Firms in industries that are expected to suffer a decline in activity of between 30 and 50 per cent at full lockdown account for approximately 30 per cent of banks' corporate lending.

Crisis measures support firms and their creditors

Soon after the lockdown began, the authorities launched a series of temporary government support schemes to reduce the negative impacts on affected firms.

These schemes include both liquidity-enhancing and cost-covering measures, see Chart 21. Corporate liquidity is improved by deferring VAT and tax payments and through bank loans partly guaranteed by the government, see below. The cost-covering meas-

7 See Danmarks Nationalbank, A prolonged recession could squeeze banks, *Danmarks Nationalbank Analysis (Stress test)*, No. 7, May 2020 (*link*).

ures comprise a number of compensation schemes to cover, for instance, some corporate payroll and fixed costs.

Banks may extraordinarily provide corona-related loans collateralised by government guarantees
In March, the Folketing (Danish Parliament) adopted a series of government guarantee schemes to facilitate corporate access to credit.

In mid-May, these schemes had been used for lending totalling about kr. 5 billion, see Chart 22. Within the allocated limits, loans totalling approximately kr. 70 billion may be granted.

The schemes have a number of objective requirements regarding the financial position of firms, and the schemes can be used only by firms that have suffered or expect to suffer a revenue loss of at least 30 per cent due to the coronavirus outbreak. However, the credit assessment is to be performed by the individual bank. In this context, it should be noted that banks bear part of the risk of loss when the schemes are applied and must cover 20-30 per cent of any loss.

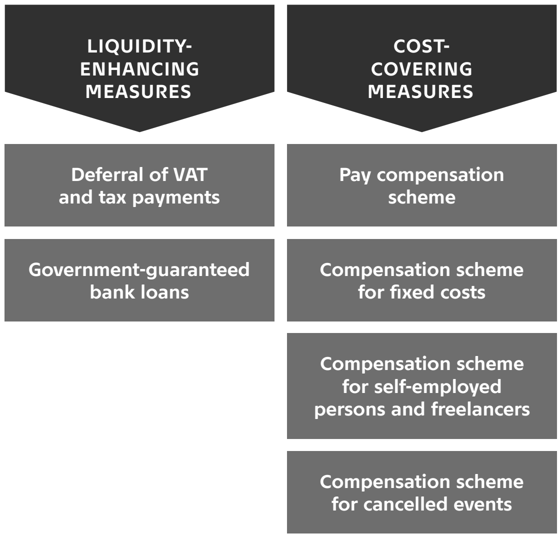
Lending to already financially weak firms could result in losses
Firms that were already financially weak before the virus outbreak are more exposed in the current situation. Healthy key ratios in the most recent financial statements before the virus outbreak will thus contribute to determining the risk that the firm will default on its liabilities in the wake of the lockdown.

Lending to the firms most severely affected by the lockdown, which have low solvency and low liquidity, accounts for 20 per cent, see Chart 23. For other industries affected, the proportion of firms with low solvency and low liquidity is somewhat lower.

In the short term, the lockdown has especially challenged the liquidity position of firms. A firm's liquidity risk can be calculated as its short-term-assets-to-short-term-debt ratio. In the most recent financial statements available, many firms do not have sufficient liquid assets to cover short-term liabilities, see Box 5.

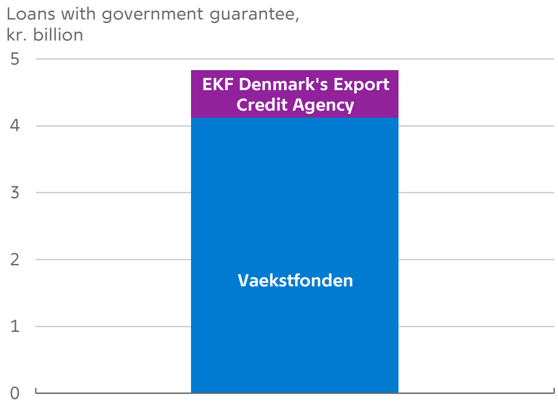
Creditworthy firms generally have high solvency ratios. Firms with a high equity-to-total-assets ratio are better equipped to absorb business losses. About 75 per cent of bank lending to the industries most

Several large, temporary government compensation schemes for severely affected firms Chart 21



Source: Ministry of Industry, Business and Financial Affairs (in Danish only) (*link*).

Loans are collateralised by new and temporary government guarantee schemes Chart 22



Note: Total active guarantees provided by the Danish state's investment fund, Vaekstfonden and EKF Denmark's Export Credit Agency. Observations are from 19 May 2020.
Source: EKF Denmark's Export Credit Agency, Vaekstfonden.

Many firms do not have adequate funds to pay short-term liabilities

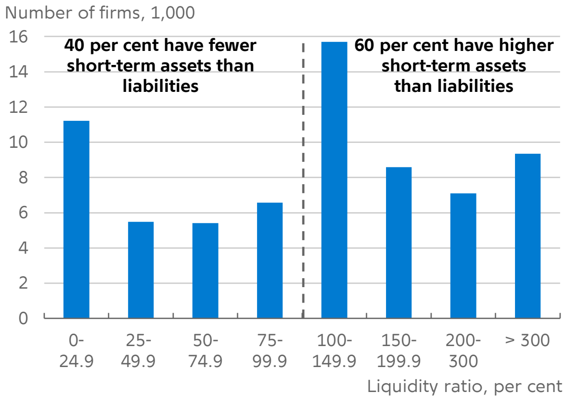
Box 5

Many firms have a business model with a limited amount of directly available liquidity, so they will quickly need access to credit from their banks. Firms with more short-term assets than short-term liabilities, i.e. with a liquidity ratio of more than 100, will be better able to pay their bills and service their debt. Just under half of the firms with debt in Danish banks are unable to cover their short-term liabilities with short-term assets if their regular earnings stop, see Chart A.

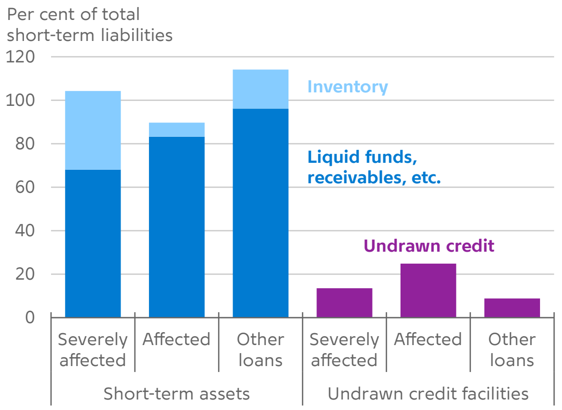
In the current situation, all short-term assets are not necessarily liquid. Short-term assets consist of inventories, liquid funds and receivables, etc. The value of inventories, in particular, depends on the marketability of goods. In the most severely affected industries, inventories account for a substantial portion of short-term assets, see Chart B. If the value of inventories is excluded, the average liquidity ratios of these firms fall below 70 per cent.

If firms do not have sufficient liquid assets available, they need to draw on overdrafts and other facilities through their banks. However, at end-2019, firms that have later been severely affected by the lockdown did have a limited amount of already granted, but undrawn credit facilities with their banks. Overall, the firms affected have a lower liquidity ratio, but are less dependent on the marketability of inventories and have larger undrawn credit facilities with their banks.

A. A large proportion of firms could face difficulties meeting short-term liabilities



B. Inventories constitute a large proportion of the available liquidity of the most severely affected firms



Note: The liquidity ratio is calculated as the short-term-assets-to-short-term debt ratio. Financial information is available for 70,000 large firms with loans in Danish banks. See Box 4 for more information. The most recent financial statements available have been used, while loans are from end-2019.
Source: Bisnode, Danmarks Nationalbank and own calculations.

severely affected by the lockdown has been provided to firms with high solvency ratios in their most recent financial statements available.

Corporate customers of medium-sized banks are generally less resilient

Overall, Danish corporate customers have become more resilient in recent years, but the credit quality of medium-sized banks' corporate customers is considerably lower than that of large banks.

Overall, the proportion of corporate lending to the most financially vulnerable customers accounts for close to 25 per cent in medium-sized banks compared with about 10 per cent in large banks, see Chart 24 (left). Moreover, there are substantial variations between individual medium-sized banks' proportion of corporate customers with low solvency and low liquidity. Thus, more than one in three corporate customers have both low solvency and low liquidity in 4 out of 11 medium-sized banks.

The distribution of vulnerable customers in large and medium-sized banks, respectively, is also reflected in the Danish Financial Supervisory Authority's calculation of bank lending quality. At end-2019, the proportion of corporate lending of normal credit quality was 56 per cent for medium-sized banks – and thus considerably lower than for large banks in which this proportion was 84 per cent.

Higher unemployment could lead to higher losses in the longer term

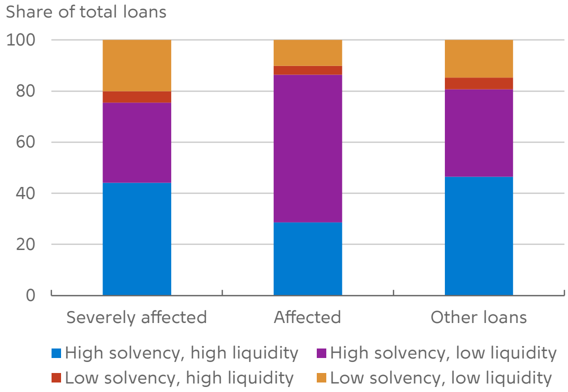
Over a short period of time, unemployment has surged due to the effects of the coronavirus outbreak and the measures implemented to contain the infection, see Chart 25.

If unemployment sticks, this could lead to credit institution losses on lending to households in the longer term. However, most households are resilient to short spells of unemployment, both because of unemployment insurance and accumulation of liquid funds in individual households.

Since 11 March, when the government announced a series of measures to contain the infection, the number of unemployment registrations has increased by approximately 48,000. The increase in per cent of employment is most prominent in industries directly affected by imposed temporary shutdown or travel restrictions, such as the hotel and restaurant industry, transport and travel agencies, etc.

Many corporate customers have limited disposable liquidity in their latest financial statements

Chart 23

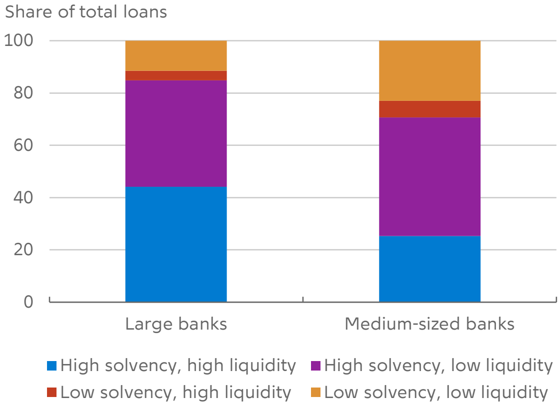


Note: "High solvency" is defined as an equity-to-total-assets ratio of at least 15 per cent. "High liquidity" is defined as a short-term-assets-to-short-term-debt ratio of at least 100 per cent. Financial information is available for 70,000 large firms with loans in Danish banks. See Box 4 for more information. The most recent financial statements available have been used, while loans are from end-2019.
Source: Bisnode, Danmarks Nationalbank and own calculations.

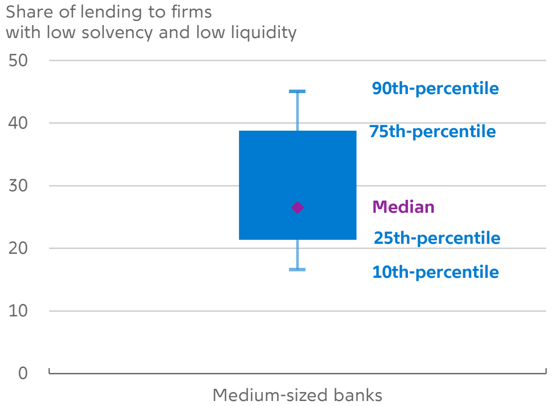
Many vulnerable corporate customers in some medium-sized banks

Chart 24

Larger share of vulnerable corporate customers in medium-sized banks over all



Large dispersion in share of corporate customers with low solvency and low liquidity among medium-sized banks



Note: "Low solvency" is defined as an equity-to-total-assets ratio of less than 15 per cent. "Low liquidity" is defined as a short-term-assets-to-short-term-debt ratio of less than 100 per cent. Financial information is available for 70,000 large firms with loans in Danish banks. See Box 4 for more information. The most recent financial statements available have been used, while loans are from end-2019.
Source: Bisnode, Danmarks Nationalbank and own calculations.

Limited proportion of loans to employees in industries severely affected by unemployment
Credit institution lending to employees in the industries with the highest increase in unemployment accounts for a small proportion of total credit institution lending to employees, see Chart 26.

Among the self-employed, the large majority of loans to sole proprietorships are in agriculture. Bank lending to self-employed borrowers could generally be subject to higher risk than lending to ordinary employees. Agriculture has been less affected by shutdowns and restrictions than other industries.

Highly indebted households are hit hardest in case of unemployment
The risk of losses on lending to the household customers currently affected by unemployment depends on the level of indebtedness of the household, among other factors. The higher the indebtedness, the higher the income required to ensure sufficient disposable income after servicing of debt. So households with a high debt-to-income (DTI) ratio are less resilient to negative shocks to their personal finances.

Households with a shorter education as highest completed education on average have a lower debt-to-income ratio than groups with higher education, see Chart 27. Since early March, new unemployment registrations are primarily people with short education, see Chart 28. This also applied to new unemployment registrations over the same period in 2015-19.[8]

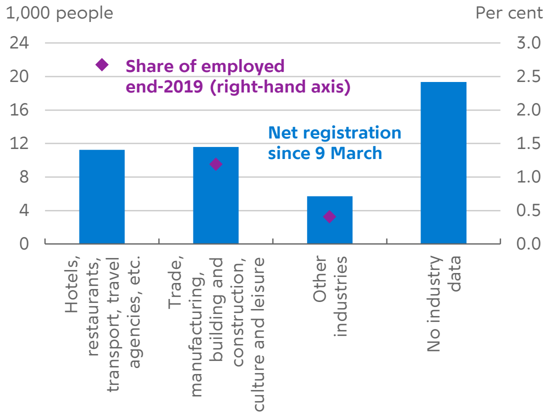
Households in which the longest completed education is primary and secondary school or upper secondary school have a substantially lower debt-to-income ratio than households with longer education.

The second major group of new unemployment registrations are people with vocational training. The average household with vocational training as the longest completed education also has a lower debt-to-income ratio than households with longer education. However, the 10 per cent most indebted households do have a debt-to-income ratio in line with households with longer education.

8 The Danish Agency for Labour Market and Recruitment, *Regional overvågning af situationen på arbejdsmarkedet fordelt på forskellige karakteristika* (in Danish only).

Sharpest increase in unemployment in directly affected industries

Chart 25

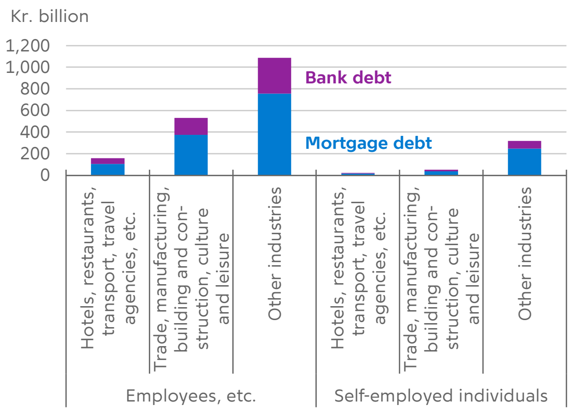


Note: Net registrations from 9 March to 19 May 2020 are calculated as the number of people, not the number of full-time equivalents. Per cent of employment is calculated as the number of net registrations as a percentage of wage-earner employment in number of people in the 4th quarter of 2019. The industry affiliation of new registrations since 9 March is calculated based on the month with the most recent employment data in 2020. New registrations with no employment data in 2020 are indicated as no industry data.

Source: Danish Agency for Labour Market and Recruitment, Statistics Denmark and own calculations.

Limited proportion of loans to employees in industries severely affected by unemployment

Chart 26

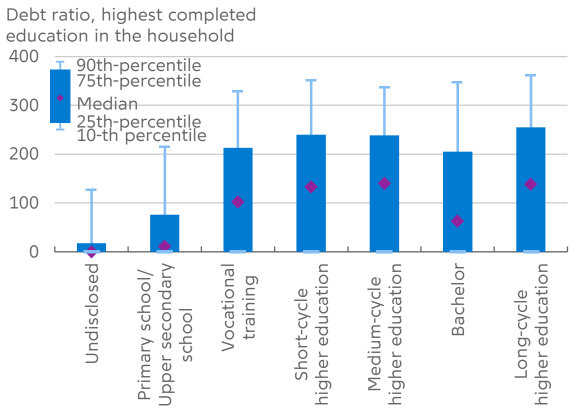


Note: Debt of private individuals at end-2018 broken down by main occupation at end-2017. "Employees, etc." also include unemployed persons and students etc. "Self-employed individuals" include assisting spouses. Old-age pensioners and disability pensioners as well as recipients of voluntary early retirement benefits are not included.

Source: Statistics Denmark and own calculations.

Households with short educations have a lower debt-to-income ratio

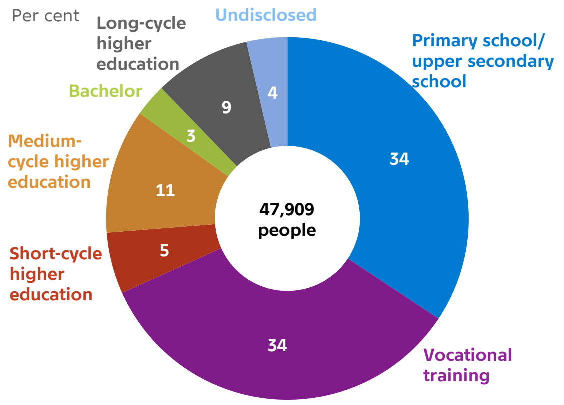
Chart 27



Note: The debt ratio is calculated as the total ratio of debt to income before tax for households classified according to the highest completed education in the household. Households with one or more old-age pensioners or recipients of voluntary early retirement benefits are not included. Data is for end-2018.
Source: Statistics Denmark and own calculations.

New unemployment registrations since the outbreak of corona are mainly people with short education

Chart 28



Note: For net unemployment registrations from 9 March to 19 May 2020 education has been stated as highest completed education as at 1 October 2018. Educations completed after this date are not included in the calculation.
Source: Danish Agency for Labour Market and Recruitment and own calculations.

Period of reduced housing market activity
The lockdown and increased uncertainty have led to reduced housing market activity. Just after the lockdown was imposed in March, the number of houses and owner-occupied flats sold plunged. Since then, sales of houses and owner-occupied flats have returned to the average level of the same period in 2015-19. But the total supply of single-family houses, terraced houses and owner-occupied flats on the market is somewhat lower than last year.

So far, the housing market uncertainty has not been reflected in major price falls. Prices are still higher than last year's level. Most household debt is mortgage debt collateralised by the home of the household, and consequently house prices are significant.

Before the coronacrisis, homeowners had generally been consolidating their debt over a number of years, opting for safer loan types. At the same time, the average mortgage payment has been declining in recent years, reflecting lower market rates and household refinancing of fixed-rate loans at lower interest rates.

Sharp drop in bank earnings

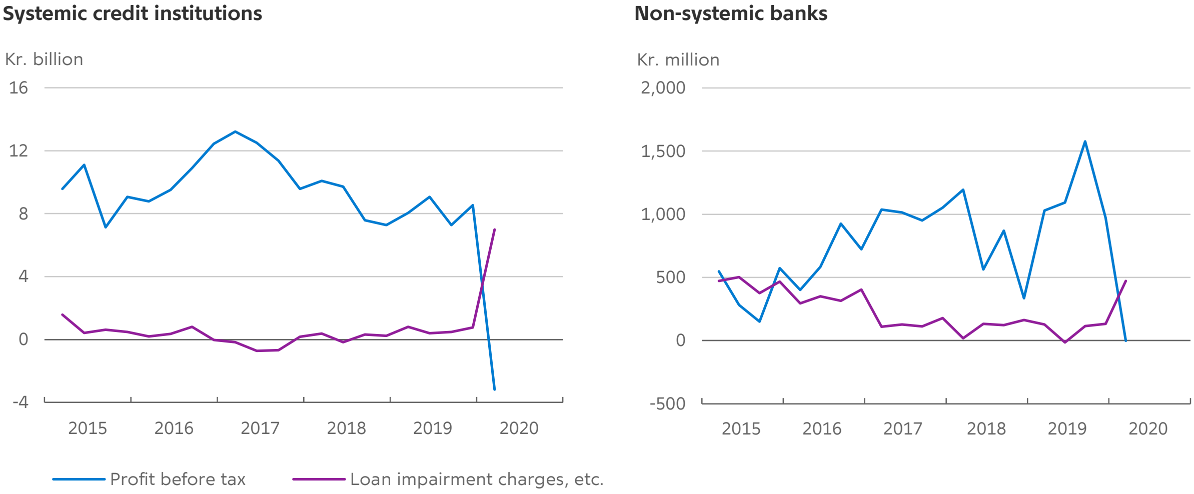
The outbreak of coronavirus has affected bank results in the 1st quarter of 2020, and the systemic credit institutions' earnings are the lowest since the 4th quarter of 2008 during the financial crisis. The drop in earnings should be seen in the light of a significant increase in loan impairment charges, see Chart 29. At the same time, earnings from underlying operations have been decreasing in recent years, also in the 1st quarter of 2020.

A significant proportion of the loan impairment charges reflect a downward adjustment of the macroeconomic outlook used to calculate expected credit losses under the recently introduced accounting standard IFRS 9. At the same time, several institutions have recognised impairment charges, based on management judgement, reflecting the uncertainties associated with the current assessments of the impact of the coronapandemic for the institutions' customers.

In addition to loan impairment charges, the drop in earnings in systemic credit institutions can primarily be attributed to negative value adjustments follow-

Institutions' results for the 1st quarter of 2020 are affected by high impairment charges

Chart 29



Note: Quarterly profit before tax and impairment charges on loans and receivables, etc. for systemic credit institutions and non-systemic banks. For systemic credit institutions, profit before tax has been adjusted for goodwill impairment charges. The most recent observations are from the 1st quarter of 2020.
Source: Danmarks Nationalbank, financial statements and own calculations.

ing a period of price falls and increased volatility in the financial markets, see Chart 30. Value adjustments are negative after several years of positive value adjustments that helped to boost the earnings of the systemic credit institutions.

The level of impairment charges is to reflect the institution's expectations regarding future loan losses

During the 2008-09 financial crisis, financial reporting standards were criticised for resulting in "too little, too late" as far as impairment charges were concerned.

Under IFRS 9, impairment must be recognised for both incurred and expected credit losses as opposed to previously when impairment was not to be recognised in the income statement until there was objective evidence of impairment, OEI. In times of crisis, it is essential that institutions' financial statements can be trusted and that they are still based on all available relevant information. Impairment charges must reflect not just credit losses resulting from events that have already occurred, but also expected future credit losses.

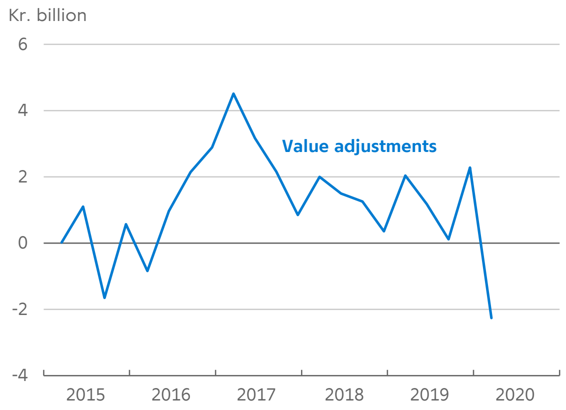
In Danmarks Nationalbank's lending survey for the 1st quarter of 2020[9], banks reported that they expected higher impairment charges and losses on corporate lending in the 2nd quarter, see Chart 31. For household customers, most of the banks also expect higher impairment charges and losses in the 2nd quarter. Credit managers' expectations as regards higher impairment charges and losses may reflect that individual impairment charges and losses are expected to increase in the 2nd quarter, while impairment charges in the 1st quarter primarily reflect general non-attributable impairment charges.

The coronacrisis may lead to further consolidation in the banking sector

Widespread uncertainty about future economic developments means that the impact on the financial sector is still uncertain.

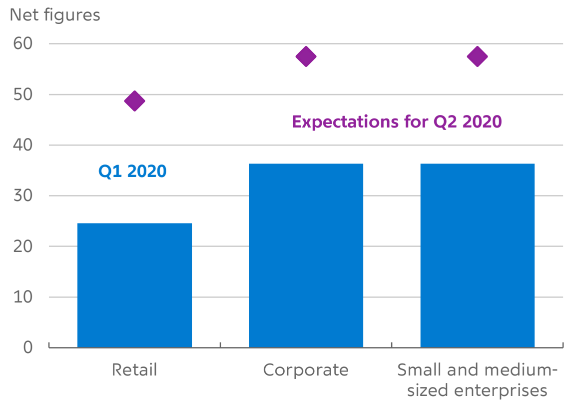
9 See Danmarks Nationalbank, Expect increased losses and demand from NFC, *Danmarks Nationalbank Statistics (Lending Survey)* April 2020 (*link*).

Value adjustments have declined in the 1st quarter of 2020 Chart 30



Note: Quarterly value adjustments for systemic credit institutions. The most recent observation is from the 1st quarter of 2020.
Source: Danmarks Nationalbank and financial statements.

Banks expect higher impairment charges and losses Chart 31



Note: "Retail" includes employees, pensioners, etc., while "Corporate" (total firms) and small and medium-sized enterprises includes private non-financial corporations and sole proprietorships and unincorporated partnerships.
Source: Danmarks Nationalbank.

In their financial statements for the 1st quarter of 2020, systemic credit institutions have provided updated guidance for earnings for the year. The updated guidance primarily reflects substantial downward adjustments from the guidance at the beginning of 2020.

Depending on the size and duration of the downturn, the business models of some banks will potentially come under pressure. An institution with an unsustainable business model should explore the possibilities of a market-based solution, for instance in the form of a merger or acquisition.

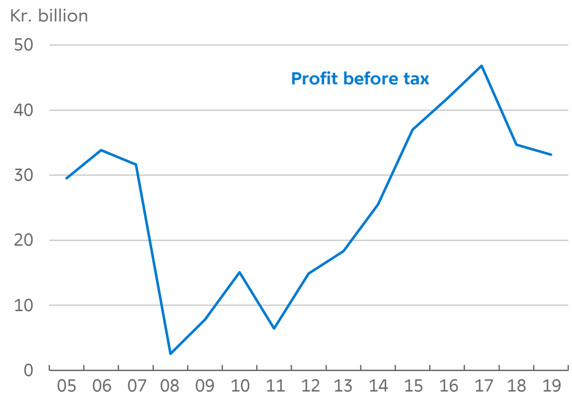
Lower earnings reduce the first line of defence against losses

Systemic credit institutions recorded a decline in earnings in the years leading up to the coronavirus outbreak, albeit from a high level, see Chart 32.

Moreover, in 2019, results of the largest banks were buoyed up by extensive mortgage refinancing. But fee earnings from the waves of refinancing were temporary and cannot be expected to recur to the same extent in 2020.

Since 2017, the cost level of systemic credit institutions has been rising due to higher staff costs and administrative expenses, among other factors, see Chart 33. Part of the increase is attributable to general price and wage adjustments.

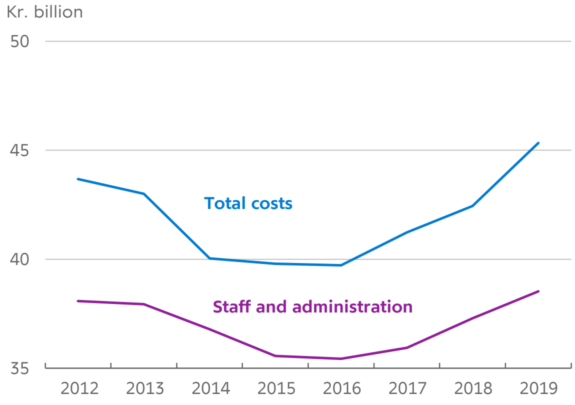
Decline in systemic credit institutions' earnings Chart 32



Note: Annual profit before tax for systemic credit institutions. Profit before tax has been adjusted for goodwill impairment charges and earlier mergers and acquisitions. The most recent observation is from 2019.
Source: Danmarks Nationalbank and own calculations.

Rising staff costs and administrative expenses have increased overall costs since 2017

Chart 33

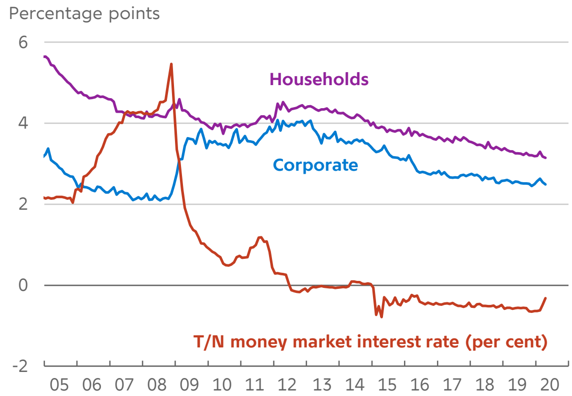


Note: Annual data for systemic credit institutions in nominal prices. Total costs have been adjusted for goodwill impairment charges, while both total costs and staff costs and administrative expenses are adjusted for earlier mergers and acquisitions. Costs are defined as the sum of staff costs and administrative expenses, depreciation and amortisation of tangible and intangible assets and other operating costs. The most recent observations are from 2019.

Source: Danmarks Nationalbank and own calculations.

Systemic banks' interest margins are low

Chart 34



Note: Interest margin of systemic banks' outstanding domestic transactions in Danish kroner. Corporate covers non-financial corporations. Weighted monthly average for the T/N money market interest rate. The most recent observations are from April 2020.

Source: Danmarks Nationalbank, Bloomberg and own calculations.

Despite the focus on cost efficiency, no substantial cost savings have been realised so far, which should be seen, for instance, in the context of higher costs related to regulation and compliance measures and IT investments. Against that backdrop, cost savings in the coming years are doubtful. Investment can only be expected to contribute to efficiency gains in the longer term.

Higher interest margins are a sensible measure when customer finances deteriorate

For several years, interest margins have been squeezed by the low interest rate environment and intensive competition for creditworthy customers, see Chart 34.

An interest margin is the average bank lending rate less the average deposit rate and it constitutes an important part of banks' earnings base. Currently interest margins are low seen over an extended period of time, which is often the case after a boom period.

A bank's lending price is based on an assessment of its risk of loss from lending activities. When the economy is in a weak cyclical phase, banks are exposed to a higher risk that their customers will be unable to repay their loans. If banks fail to take the necessary steps to ensure that their business models remain sustainable, they cannot generate sufficient earnings to continue lending to creditworthy customers.

Negative deposit rates are still prevalent

The downward trend in banks' interest margins reversed in the latter part of 2019, particularly for medium-sized banks, driven primarily by a decline in average corporate deposit rates.

While corporate deposit rates have already been negative for a number of years, banks have been reluctant to introduce negative deposit rates for households. But since the 2nd half of 2019, all systemic banks have announced or introduced negative interest rates on some household deposits.

In February, 3.5 per cent of household deposits paid negative interest rates, equivalent to deposits totalling some kr. 34 billion. This is shown by a survey conducted by Danmarks Nationalbank, covering medium-sized and large Danish banks.[10]

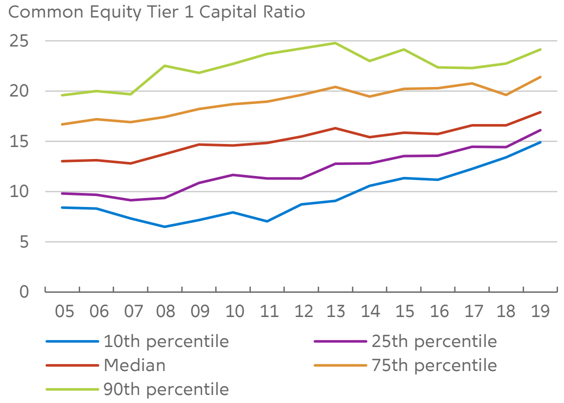
Banks are better capitalised than before the financial crisis

Danish banks are generally better capitalised than before the financial crisis in 2008-09, see Chart 35. This especially applies to the weakest capitalised banks. During the financial crisis, a number of the weakest capitalised banks had to close down. Today, the tenth of banks with the lowest Common Equity Tier 1 ratios are about twice as capitalised as the tenth of banks with the lowest Common Equity Tier 1 ratios in 2007.

Because of lower capitalisation before the financial crisis, a risk materialised during the crisis that banks would not be able to perform their core task of intermediating credit. A credit crunch loomed in which even healthy and creditworthy customers would not be able to raise loans. As private investors were reluctant to provide capital, a scheme was introduced as part of Bank Rescue Package 2, enabling solvent institutions to apply for injections of government Additional Tier 1 capital.

In the current situation, institutions are better capitalised, and the countercyclical capital buffer has been released, see below.[11] And although the capital markets have seen considerable volatility in recent months, there are no current indications that private investors are reluctant to provide capital. However, some small and medium-sized institutions could fail or be likely to fail in the coming period. Should that situation occur, the resolution authorities have the tools necessary to ensure an orderly resolution, see below.[12]

Higher capitalisation, particularly among the weakest capitalised banks Chart 35



Note: Banks in the Danish Financial Supervisory Authority's groups 1-3. For banks that are parent companies of groups, the Common Equity Tier 1 ratio is stated at consolidated level.
Source: The Danish Financial Supervisory Authority and own calculations.

Downward risks for the institutions' capitalisation
The coronavirus outbreak and the temporary lockdown of parts of society pose a number of risks to institutions' capital positions. Loan impairment charges and losses on portfolios of securities and derivatives could reduce institutions' own funds, while higher financial market volatility and decreasing credit quality may increase the risk weights used in the calculation of capital requirements. On the other hand, government relief packages to firms may mitigate developments in both impairment charges and risk weights.[13]

Financial statements for the 1st quarter of 2020 show that, so far, there are only minor changes in the level

10 See Danmarks Nationalbank, Private deposits for kr. 34 billion at a negative rate, *Danmarks Nationalbank Statistics (banking and mortgage lending, interests)*, April 2020 (*link*).

11 Under Bank Rescue Package 2, a total of 43 institutions raised government Additional Tier 1 capital totalling about kr. 46 billion. The release of the countercyclical capital buffer means that the capital requirements on Danish institutions are reduced by approximately kr. 17 billion here and now. Given that already adopted increases of the buffer rate are also cancelled, the aggregate reduction in capital requirements until end-2020 totals about kr. 34 billion.

12 See Danmarks Nationalbank, A prolonged recession could squeeze banks, *Danmarks Nationalbank Analysis (Stress test)*, No. 7, May 2020 (*link*).

13 In April 2020, the European Commission proposed an amendment to the current IFRS 9 transitional arrangements. If adopted, this proposal will enable institutions to recognise a temporary Common Equity Tier 1 add-on during the period 2020-2024, based on the size (increase) of loan impairment charges at stages 1 and 2 since 1 January 2020. Loan impairment charges at stage 3 are not included in the proposal.

of Common Equity Tier 1 in systemic credit institutions, see Chart 36.

The relatively modest changes should be seen in the context of several factors. Despite a generally higher level of impairment charges and negative value adjustments of securities portfolios, only three of the six institutions reported a loss for the 1st quarter. At the same time, there were generally only minor changes in risk-weighted exposures.

Danske Bank, Nykredit, Jyske Bank, Sydbank and Spar Nord have all decided to cancel the dividend payments recommended at their annual general meetings in 2020 and to cancel planned and existing share buyback programmes, see Chart 36. These cancellations have helped to increase institutions' capital ratios. Danmarks Nationalbank sees the cancellation of dividend payments and share buybacks as a sign that banks are appropriately prudent in the current situation.

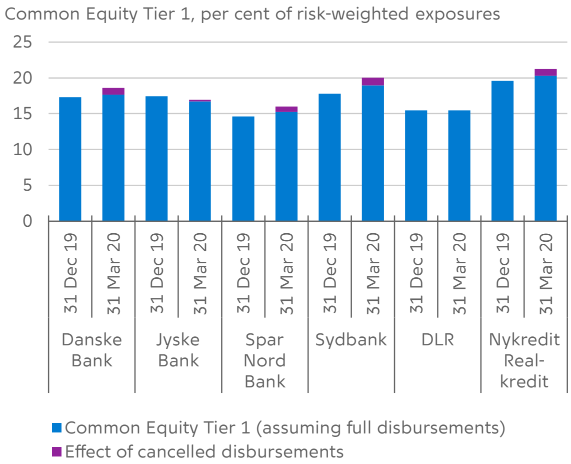
The uncertainty surrounding the macroeconomic outlook will continue to have a spillover effect on bank capital ratios in the coming periods. Several institutions have announced that they expect impairment charges to remain elevated throughout the remainder 2020. At the same time, an increase in risk-weighted exposures is to be expected as several loans either move to lower levels of credit quality in institutions' IRB models or are included in the regulatory definition of "default"[14].

Release of the countercyclical capital buffer provides additional headroom

On 12 March 2020, the Minister for Industry, Business and Financial Affairs decided to release the countercyclical capital buffer with immediate effect in response to the coronavirus outbreak. This gives banks and mortgage credit institutions additional headroom in relation to capital requirements. This means they will have more headroom to handle impairment charges and higher risk weights on existing loans and still be able to lend to creditworthy customers.

Small changes in the level of Common Equity Tier 1 in the 1st quarter of 2020

Chart 36



Note: The sum of the blue and purple bars as at 31 March are equivalent to the actual levels of Common Equity Tier 1 as at 31 March. Cancelled disbursements include both dividends and share buybacks not completed according to plan. Nordea Kredit does not publish quarterly financial statements and has been omitted in the chart.
Source: Annual and quarterly financial statements.

In recent years, the Systemic Risk Council has focused on increasing the resilience of credit institutions through a gradual increase of the countercyclical capital buffer. The aim has been to build a buffer of a size that could make a difference when it became necessary to release it. Hence, it was in line with the Systemic Risk Council's buffer approach that it was released in response to the uncertainty following the coronavirus outbreak.

The efforts to increase the buffer requirement during a period of moderate credit growth should be seen as due care. Due to a relatively long implementation period, the current buffer requirement immediately before the release of the buffer was only 1 per cent. However, further increases of the buffer requirement were underway.[15]

14 Under the Capital Requirements Regulation, an obligor is considered to be in default if the institution considers that the borrower is unlikely to pay its credit obligations without realising security, or if the obligor is more than 90 days past due.

15 In October 2019, the Minister for Industry, Business and Financial Affairs decided to increase the buffer requirement to 2 per cent, effective from end-2020. In December 2019, the Systemic Risk Council announced that it expected to recommend a further increase of the buffer rate from 2.0 to 2.5 per cent in the 1st quarter of 2020.

The Systemic Risk Council's regular recommendations of continuing the build-up of the buffer rate was motivated by continued risk build-up in institutions' lending. Despite moderate credit growth, the Council was concerned that the low interest rate environment provided a basis for build-up of financial vulnerabilities through intensified search for yield.

Still considerable variation in excess capital adequacy

The release of the countercyclical capital buffer does not give institutions more capital, but it increases the distance between actual capital and capital requirements, i.e. excess capital adequacy. Generally, excess capital adequacy has increased over the past six months – also more than can be attributed to the release of the countercyclical capital buffer, see Chart 37.

There is still considerable variation in excess capital adequacy among systemic institutions, reflecting substantial differences in their loss absorbing capacity.

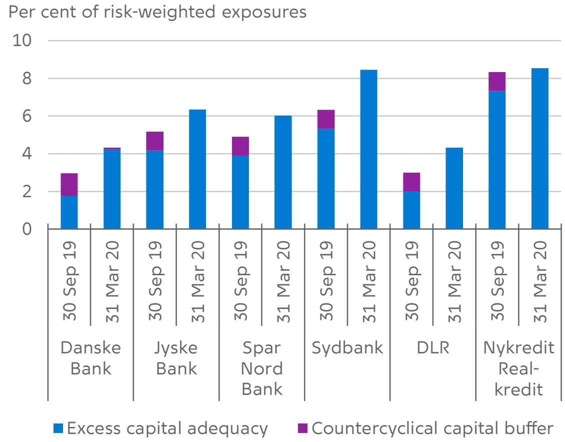
Danmarks Nationalbank has previously recommended that some of the systemic credit institutions should reconsider their capital targets.[16] This recommendation still applies.

A few non-systemic banks are at risk of failing

Danmarks Nationalbank performs a semi-annual stress test of the Danish banking sector. In the most recent stress test, institutions' capital ratios are compared with the current capital requirements in three scenarios: a prolonged recession, a deep 'V' scenario and a combination scenario. Both the prolonged recession scenario and the combination scenario are considerably more severe than the financial crisis.[17]

The stress test shows that institutions are able to withstand a prolonged recession and also a very severe, but temporary, economic downturn, without falling significantly short of the buffer requirements.

Release of the countercyclical capital buffer has contributed to higher excess capital adequacy Chart 37



Note: Excess capital adequacy indicates how much of its Common Equity Tier 1 capital (percentage points) the institution can afford to lose without breaching the combined capital buffer requirement (including fully phased-in SIFI buffer requirement for Spar Nord Bank). Nordea Kredit does not publish quarterly financial statements and has been omitted in the chart.

Source: Danish Financial Supervisory Authority and quarterly financial statements.

But a combination of these scenarios could cause problems, and in this scenario more systemic credit institutions may fall short of the capital buffer requirements.

Several non-systemic banks could face difficulties in case of a prolonged downturn. For instance, more than half of the non-systemic banks will fall short of the buffer requirements in the prolonged recession scenario, and overall they will be around kr. 3 billion short of satisfying the buffer requirements. Breaches of the buffer requirements of this magnitude are not assessed to pose a threat to financial stability. However, a few non-systemic banks are at risk of failing.

16 See Danmarks Nationalbank, Lower excess capital adequacy for the banks, *Danmarks Nationalbank Analysis (Financial stability)*, No. 25, November 2019 (*link*).

17 See Danmarks Nationalbank, A prolonged recession could squeeze banks, *Danmarks Nationalbank Analysis (Stress test)*, No. 7, May 2020 (*link*).

Institutions should ensure sufficient distance to the MREL requirement by issuing eligible debt instruments

Before falling short of their buffer requirements, the institutions in the stress test could fall short of the minimum requirement for own funds and eligible liabilities, MREL. Over the coming years, several systemic credit institutions will need to issue new MREL-eligible debt instruments to continue to meet the requirements. During periods of financial market turmoil, issuance can be difficult and expensive, as most recently seen in March this year, see the section "Period with limited scope for new issuance" above. It is important that institutions have sufficient distance to the MREL requirement to avoid having to limit their activities in order to ensure compliance. Institutions should thus issue eligible debt instruments in good time to provide robust distance to the requirement.

MREL specifies the minimum requirement for own funds and eligible liabilities. It is to ensure that the institution's activities are funded to enable recovery and resolution of the institution, irrespective of its size.

MREL is a key element in credible recovery and resolution

Over a number of years, Denmark has established a credible framework for recovery and resolution of banks. This framework is to enable recovery and resolution of banks without causing a significant adverse effect on financial stability and without use of government funds.

The framework for recovery and resolution complies with the rules established by the EU Bank Recovery and Resolution Directive, BRRD, implemented in 2014.[18] These rules were introduced after the financial crisis when several countries had been forced to use government funds to bail out institutions in crisis.

If the Danish Financial Supervisory Authority assesses that an institution is failing or likely to fail, control of the institution is transferred to the Financial Stability Company, Finansiel Stabilitet.

Finansiel Stabilitet manages failing institutions in accordance with the regulatory resolution objectives, including ensuring the continuation of critical functions and avoiding significant adverse effects on financial stability.

A number of tools and powers have been assigned to Finansiel Stabilitet to enable it to manage failing institutions. The key tool is "bail-in". Applying the bail-in tool, Finansiel Stabilitet can write down debt and capital in order to absorb losses in an institution. If the resolution strategy is to continue the institution, the bail-in tool can also be used to recapitalise the institution. Thus, institutions' MREL constitute a key element in the possible resolution plans and subsequent recapitalisation. Application of the bail-in tool ensures that investors and creditors rather than taxpayers bear the costs of recovery and resolution of a failing institution. Finansiel Stabilitet also has the power to replace the management of the institution.

Finansiel Stabilitet is prepared to manage failing institutions. Each year, resolution plans are prepared for institutions in which a number of key issues have been considered in advance. The only thing missing in the Danish implementation of the BRRD is to ensure that mortgage credit institutions can be subject to recovery and resolution in the same manner as banks.

18 The framework for recovery and resolution complies with the EU rules set out in the BRRD, Directive 2014/59/EU of the European Parliament and of the Council of 15 May 2014 establishing a framework for the recovery and resolution of credit institutions etc. The BRRD has been transposed into Danish law, in part by Act on Restructuring and Resolution of Certain Financial Enterprises (*lov om afvikling og restrukturering af visse finansielle virksomheder, RAL*) and in part by an amendment to the Financial Enterprises Act *(lov om finansielle virksomheder, FIL)*.

Appendix: Data for the analysis

The analysis applies 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.

The analysis of Danish credit institutions' earnings, liquidity and own funds comprises seven systemic credit institutions designated by the Danish Financial Supervisory Authority, most recently in 2019. The analysis also includes the non-systemic banks in the Danish Financial Supervisory Authority's group 2 in 2020. These institutions are listed in Table 1. Unlike in the Danish Financial Supervisory Authority's group 2, Saxo Bank has been omitted from the population due to its business model. The grouping also applies backward in time.

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 the branch Nordea Danmark, while medium-sized banks are the Danish Financial Supervisory Authority's group 2 plus the branches Handelsbanken and Santander Consumer Bank.

Institutions in the analysis by total assets as at 31 December 2019. Table 1

Systemic credit institutions	Kr. million
Danske Bank	3,761,050
Nykredit Realkredit (including Nykredit Bank)	1,610,336
Jyske Bank (including Jyske Realkredit)	649,738
Nordea Kredit	473,277
DLR Kredit	173,444
Sydbank	147,738
Spar Nord	93,113

Systemic banks	
Danske Bank	2,281,873
Jyske Bank	304,100
Nykredit Bank	225,886
Sydbank	149,953
Spar Nord	93,246

Non-systemic banks	
Arbejdernes Landsbank	58,846
Ringkjøbing Landbobank	52,941
Sparekassen Kronjylland	29,868
Sparekassen Sjælland-Fyn A/S	25,435
Sparekassen Vendsyssel	25,399
Lån & Spar Bank	24,686
Vestjysk Bank	22,192
Jutlander Bank	19,564
Den Jyske Sparekasse	15,956
Middelfart Sparekasse	13,494
Alm. Brand Bank	13,386

Mortgage credit institutions	
Nykredit Realkredit	1,524,337
Realkredit Danmark	912,440
Totalkredit	887,315
Nordea Kredit	473,277
Jyske Realkredit	384,899
DLR Kredit	173,444
LR Realkredit	27,510

Note: The balance sheet totals of systemic credit institutions are stated at group level, while the balance sheet totals of systemic banks, non-systemic banks and mortgage credit institutions are stated at institution level.
Source: Danmarks Nationalbank and annual financial statements.

PUBLICATIONS

NEWS

News offers a quick and accessible insight into an Analysis, an Economic Memo, a Working Paper or a Report from Danmarks Nationalbank. News is published continuously.

ANALYSIS

Analysis from Danmarks Nationalbank focuses on economic and financial matter. Some of the analyses are published with a regular frequency e.g. *Outlook for the Danish economy and Financial stability*. Other analyses are published continuously.

REPORT

Report comprises recurring reports and reviews of the functioning of Danmarks Nationalbank. For instance Report includes the *Annual report* and the annual publication *Danish government borrowing and debt.*

ECONOMIC MEMO

Economic Memo is a cross between Analysis and Working Paper and it often shows the ongoing study of the authors. The publication series is primarily targeted at professionals and is solely available in English. Economic Memo is published continuously.

WORKING PAPER

Working Paper presents research projects by economists in Danmarks Nationalbank and their associates. The series is primarily targeted at professionals and people with an interest for academia. Working Paper is published continuously.

The analysis consists of a Danish and an English version. In case of doubt regarding the correctness of the translation the Danish version is considered to be binding.

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ANALYSIS

DANMARKS NATIONALBANK

10 DECEMBER 2020 — NO. 28

FINANCIAL STABILITY – 2ND HALF 2020

Banks should keep their powder dry

Relief packages have contributed to a more stable development this year than feared

During the economic downturn, the authorities have injected extra liquidity and provided financial help to corporations. So far, this has supported both financial markets and bank customers.

More losses on corona-vulnerable customers may emerge in the coming period

In line with the government relief packages being phased out, the credit institutions' losses may increase and the credit quality of their lending may deteriorate. It is important that the credit institutions continuously ensure that they have made sufficient provisions to handle the deteriorated situation.

Credit institutions should remain cautious about dividend payments

So far, the credit institutions have come through the crisis relatively unscathed. However, the situation remains highly uncertain, and the credit institutions should be cautious when planning dividend payments.

CONTENTS

Summary and assessment

FINANCIAL MARKETS

Slump in economic activity worldwide
Global economic activity has declined significantly this year, and the economic downturn has hit countries in all parts of the world. Economic activity has partially recovered in the second half of the year, and international organisations expect a further gradual recovery in the coming years. If the coronavirus pandemic spreads further or if the prospects for better treatment and a vaccine disappoint, this may impact economic development and financial markets. Conversely, the possibility of a rapid roll-out of one or more effective vaccines may improve the prospects.

Extensive monetary policy measures have supported financial markets
Central banks have launched a number of new measures, including asset purchases and extraordinary lending facilities, to ensure continued liquid markets and credit access. The new asset purchase programmes and low interest rates support economic activity, and this may lead to a perception among market participants that credit and liquidity risks on the financial markets are currently low. However, the current risk appetite on financial markets can quickly change if the economic situation deteriorates.

CREDIT

Deferred taxes have temporarily provided a cushion under bank customers
The government measures with deferred payment deadlines for taxes and VAT have temporarily injected liquidity into most of the Danish corporate sector. In some cases, the deferrals will also have contributed to keeping some already not viable corporations going. The credit institutions are well equipped to offer credit to healthy corporations when the relief packages expire. Additional credit should only be granted to viable corporations.

More losses expected when relief packages are phased out
With a number of relief packages, the central government has provided a cushion under the Danish corporate sector. However, credit institutions must prepare for the end of the relief packages. In line with the government relief packages being phased out and payments falling due, the credit institutions will have to expect higher losses and a deterioration in the credit quality of their lending. It is important that the credit institutions continuously ensure that they have made sufficient provisions to handle the prospects of a deteriorated situation.

Deteriorated credit quality on lending to the most coronavirus-vulnerable customers
The credit quality of the part of the banks' lending which is made to the most vulnerable corporations has deteriorated significantly. The probability of default has thus increased on the part of the lending which is made to corporations having received funds under central government compensation schemes. The deteriorated credit quality and expectations of a further deterioration in the future have made banks increase their impairment charges on parts of their lending.

Challenges involving the most vulnerable customers may also impact other customers
There is a risk that the challenges faced by the most vulnerable corporations may impact other customer groups which have so far been less affected. They may, for example, be affected through decreasing asset prices on the underlying lending collateral. For example, property landlords that own buildings used for hotel operations have significantly greater debt to credit institutions than all the corporations in the hotel industry together. However, these landlords are generally regarded as being resilient in the event of non-payments from hotel properties.

Mink industry poses limited risk to credit institutions
The mink production shutdown does not present a challenge to the credit institutions as a whole. However, there are large differences across individual credit institutions and some institutions have large exposures to the mink industry. How credit institutions are affected by the mink production shutdown will depend on the specific compensation model and whether production can ever be reestablished.

House prices have risen rapidly since reopening
Housing market activity increased rapidly following the reopening of the Danish society during the summer, and prices of single-family houses and owner-occupied flats have increased significantly. Several factors currently support the housing market, where long-term mortgage rates have seen a further slight decrease to a historically low level, and household incomes have been cushioned by compensation

schemes. If house prices continue to rise at the current rates of increase, this could enhance the risk of subsequent price falls on the housing market, which has been seen in the past after periods with marked increases. In general, home owners have a robust outset. In recent years, homeowners have increasingly opted for more secure loan types. Concurrently, decreases in the level of interest rates have resulted in lower interest costs and increasing amortisation on household mortgage debt.

LIQUIDITY AND FUNDING

Banks have increased their liquidity reserves

The systemic banks still have a high level of liquidity reserves, which is reflected in a significant margin for the liquidity coverage ratio (LCR). The central government's liquidity support measures for the corporate sector have increased liquidity in Danish kroner, and this liquidity will generally find its way to the banks' balance sheets and increase their customer funding surplus.

Banks' liquidity can handle payments of deferred tax and VAT

Bank deposits have increased significantly in 2020, but they may quickly disappear again once the deferred tax and VAT payments fall due. However, robustness tests of both the credit institutions' survival horizon and their ability to comply with the LCR requirement show that, on the face of it, the banks will be able to handle a situation in which deposits fall back to pre-coronavirus outbreak levels.

Attractive prices again on credit institutions' funding markets

Mortgage bond liquidity is now back to a more normal level after having been under brief pressure in spring, and the mortgage bond market has not seen any significant liquidity fluctuations in recent months. The market for non-preferred senior debt has also normalised, and the surcharge relative to ordinary senior debt is back at 2019 levels.

EARNINGS

Declining bank earnings

There have been large fluctuations in the credit institutions' earnings this year, and the systemic credit institutions' projections for their earnings for the year are generally at a lower level than in recent years. The prospects of lower earnings this year follow declines in profits since 2017. Current earnings still constitute reasonable initial protection against losses. However, further decreases may weaken credit institutions' resilience in the long term.

Costs have increased in the largest credit institutions

Since 2018, rising operating expenses have been the primary reason for the decrease in profit before impairment charges in the systemic credit institutions. Operating expenses in the largest credit institutions have also increased more than in other major Nordic and European banks. While costs have increased, there has generally been a downward trend in the credit institutions' net interest income. The reasons for the decrease include, among other things, lower interest margins due to competition on lending and sluggishness in the reduction of deposit rates.

Several acquired banks have had low earnings

The number of Danish banks has been significantly reduced since the early 1990s, and 2020 has also seen several examples of consolidation in the banking sector. The trend with a declining number of banks is expected to continue in the coming years. Since 2015, the credit institutions that have subsequently been acquired or merged with major banks have been characterised by lower earnings than the rest of the sector.

CAPITAL

Credit institutions should remain cautious about dividend payments

So far, the credit institutions have come through the crisis relatively unscathed. But there is a lot of future uncertainty. The credit institutions should thus be cautious when planning dividend payments in the coming period.

The release of the countercyclical capital buffer earlier this year was intended to give the credit institutions extra leeway in expanding their lending capacity during the coronavirus crisis. Therefore, the release is not targeted at the distribution of dividends or buy-backs of own shares.

Some systemic credit institutions show non-compliance with buffer requirements in stress tests

Danmarks Nationalbank's latest stress test shows that a few systemic credit institutions exceed the requirements for their capital buffers in connection with a severe and early recession. None of the systemic credit institutions fail to comply with their minimum capital adequacy requirements.

Low excess capital adequacy relative to MREL requirement weakens banks' resilience
Before the systemic credit institutions come into conflict with their capital adequacy requirements, they will be in non-compliance with their Minimum Requirement for Eligible Liabilities (MREL). If the credit institutions, in a stress scenario, are unable to issue new MREL instruments for an extended period, they will face major challenges in complying with the requirement.

Accommodative monetary policy cushions financial markets

Slump in economic activity worldwide

Global economic activity has declined significantly this year, and the economic downturn has hit countries throughout the world. After very large drops in activity level in the first half of the year, economic recovery began during the second half of the year. The international organisations expect further gradual recovery in economic activity in the coming years.

The OECD expects global GDP to increase by 4.2 per cent in 2021 and by 3.7 per cent in 2022, following a historical plunge of 4.2 per cent in 2020. In the euro area, activity will remain at a lower level by the end of 2022 relative to 2019, see chart 1.

The coronavirus outbreak and the period with a lockdown of the Danish society have resulted in a major downturn in the Danish economy. However, the decline in GDP has been relatively smaller than in a number of other countries.

Increasing spread of infection has resulted in new restrictions

Coronavirus infection rates have increased in many parts of the world during autumn, including Europe and the United States. As a consequence of an increasing number of infected and hospitalised persons with coronavirus, see chart 2, many European countries have introduced new restrictions on both occupational and social activities, and have encouraged people to work from home to the greatest possible extent. Most restrictions have so far been less rigorous than those seen in spring, and economic activity has been less affected. Several restrictions have also been reintroduced in Denmark, and in some parts of the country restrictions have been tightened even further.

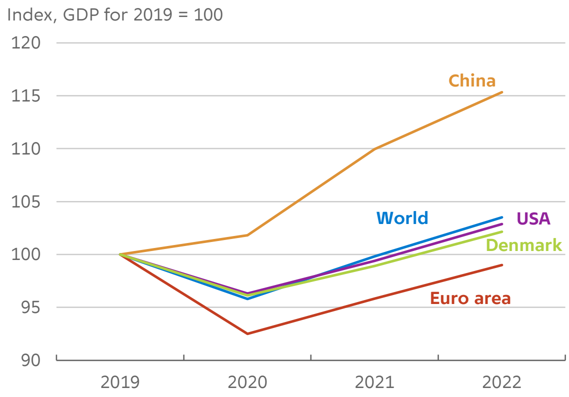
Further spread of infection and disappointing prospects of one or more effective vaccines may continue to impact the economic development and financial markets. Conversely, the possibility of a rapid roll-out of one or more vaccines may improve the prospects. There is still uncertainty about future EU/UK post-Brexit trade relations.

Extensive monetary policy measures have supported financial markets

In the wake of the coronavirus outbreak, the central banks have launched new measures in the form

Expectation of partial economic recovery in 2021

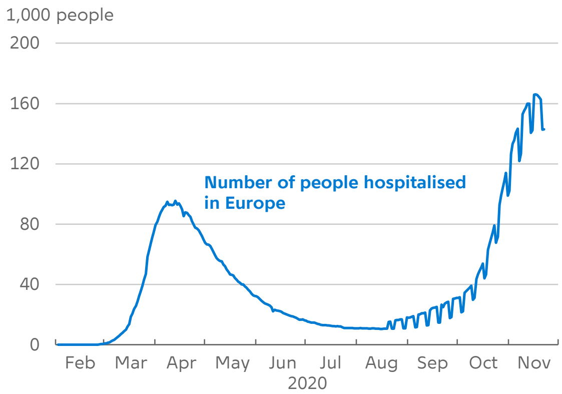
Chart 1



Source: OECD, Danmarks Nationalbank and own calculations.

Increasing number of new coronavirus inpatients in Europe

Chart 2



Note: Number of inpatients infected with coronavirus in Europe. The most recent observations are from 22 November 2020.

Source: European Centre for Disease Prevention and Control.

of, for example, asset purchases and extraordinary lending facilities, to ensure continued liquid markets and credit access. The measures have significantly increased the central banks' balance sheets and have supported the financial markets, see chart 3.

In March, the Federal Reserve cut its key interest rate to 0-0.25 per cent, and, in virtually all advanced economies, monetary policy interest rates are now close to zero. Market participants continue to expect very low interest rates in the coming years.

Many central banks have also introduced extraordinary measures, such as the injection of liquidity into the markets and increasing purchases of government and corporate bonds. The large-scale asset purchase programmes and low interest rates support economic activity and may, in continuation thereof, lead to a perception among the market participants that credit and liquidity risks in financial markets are currently low.

Risk appetite is back on financial markets
Internationally, corporate costs for new debt issuance have decreased and are now generally only slightly above the level at the start of the year. For example, the credit spread for risky corporate bonds is again close to 2019 levels, see chart 4, and share prices have risen significantly, see below.

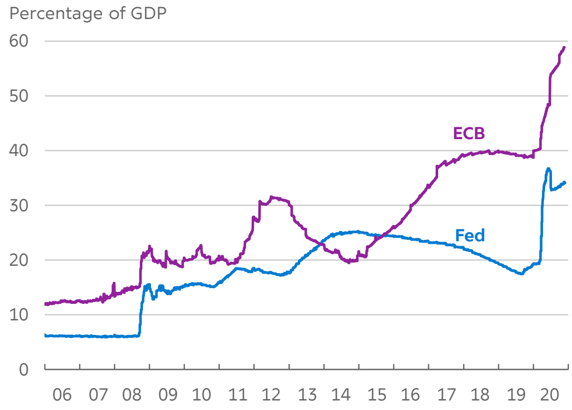
The increasing risk appetite on the financial markets may quickly reverse. If the economic situation deteriorates again, this could create financial market uncertainty, triggering sudden price falls on financial assets.

Prices have soared to new heights on several equity markets
A number of equity markets quickly recovered from the big price drops seen in March. Thus, the equity markets have generally recovered more quickly than in connection with previous crises.

After the IT bubble and the terrorist attack in 2001, and following the 2008-09 financial crisis, the world's equity markets took several years to recover the lost ground. After the coronavirus outbreak, the equity markets took five months to return to pre-coronavirus levels and have generally continued to rise to higher levels since then, see chart 5. A major reason for the rapid recovery is that the coronavirus crisis arose from a pandemic and not as a result of the build-up of economic or financial imbalances in the run-up to the outbreak.

Monetary policy measures have significantly increased the central banks' balance sheets

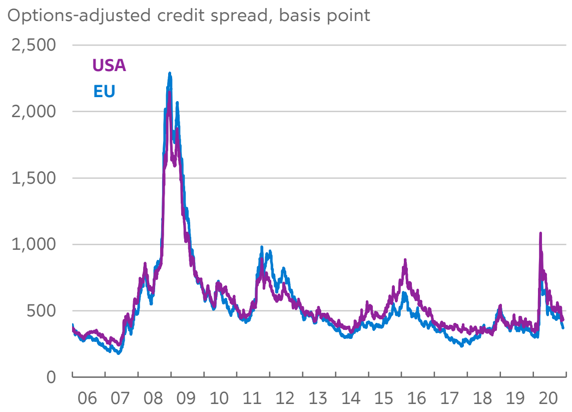
Chart 3



Note: The ECB's balance sheet as a percentage of GDP in the euro area and the Fed's balance sheet as a percentage of US GDP. The most recent observations are from 29 November 2020.
Source: Macrobond.

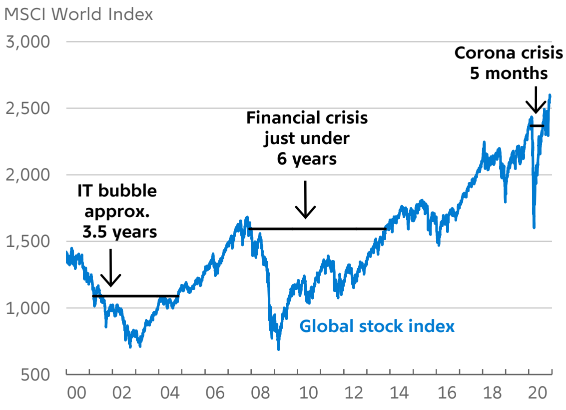
Risk appetite is back on debt markets

Chart 4



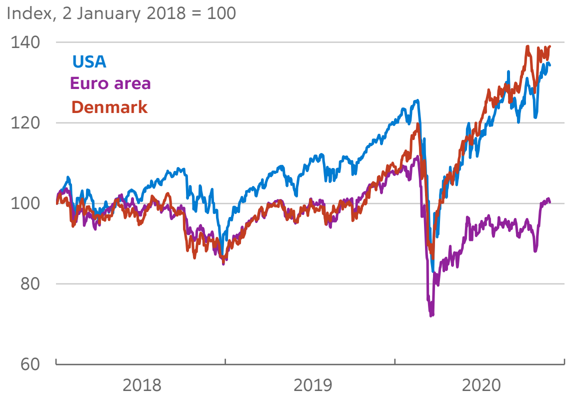
Note: High yield corporate bonds. The most recent observations are from 27 November 2020.
Source: Eikon Refinitiv.

Equity markets have quickly bounced back to pre-coronavirus levels Chart 5



Note: The lines denote the time period after each crisis until the index reaches the pre-crisis level. The most recent observations are from 30 November 2020.
Source: Eikon Refinitiv.

Difference in development across indices Chart 6



Note: 'USA' is the S&P500 index, 'The euro area' is the Euro Stoxx 600 index and 'Denmark' is the C25 index. The most recent observations are from 30 November 2020.
Source: Eikon Refinitiv.

There have been major differences in developments across equity markets. For example, the US and Danish stock indices have risen to higher levels than before the coronavirus outbreak, while, for example, the euro area index remains below the January level, see chart 6. Part of the explanation for the large variation in stock indices is the different composition of sectors in the indices. For example, technology, pharma and health shares have generally performed well, while bank shares and shares in companies in the travel industry have generally performed poorly.

Large fluctuations in future earnings expectations

The equity analysts' expectations for the earnings of Danish corporations in the C25 index have fluctuated significantly during the year. Earnings expectations for 2020 fell sharply towards May, but have since bounced back, see chart 7. The large fluctuations in earnings expectations may have contributed to the development in Danish share prices.

Equity analysts' earnings expectations for 2021 have shown less fluctuations than expectations for this year. If corporate earnings are expected to get back on track quickly, decreases in earnings reductions should have a relatively modest impact on share prices.

Large fluctuations in equity analysts' earnings expectations Chart 7

Note: Earnings expectations for corporations in the C25 index during 2020. The most recent observations are from 30 November 2020.
Source: Bloomberg and Eikon Refinitiv.

Deferred taxes have temporarily provided a cushion under bank customers

Over the next six months, Danish corporations will have to pay previously deferred tax and VAT to the tax authorities. The corporations must also pay tax and VAT for the current periods, which means that there will be double payments in several of the coming months. In spring 2020, deferral of a number of payments of VAT, employees' income tax and labour market contributions constituted some of the main measures of the relief packages launched at the time, see box 1.[1]

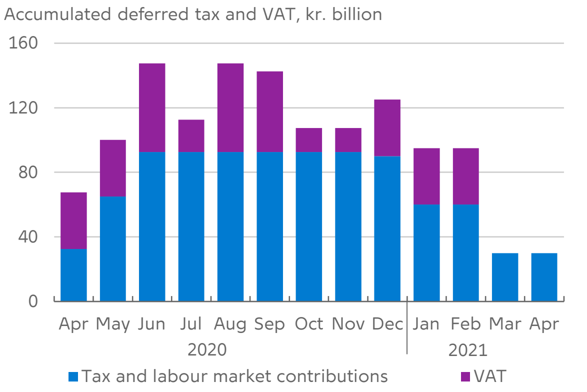
Deferred payment deadlines have provided a large, but temporary, liquidity boost

Box 1

According to the Danish Ministry of Taxation, the deferral of a number of payments of employees' income tax and labour market contributions has resulted in deferred payments of up to approximately kr. 90 billion, see the chart below.[1] In addition, a number of VAT payment deadlines have been postponed. The deferred VAT amount varied considerably from month to month, as corporations settle VAT on a monthly, quarterly and half-year basis, depending on their size. Overall, these deferrals may have added liquidity to corporations amounting to more than kr. 125 billion in December 2020.

Some corporations may have chosen to make advance payments to the tax authorities. The cap on payments into the corporations' tax account has been temporarily suspended as part of the relief packages to the corporate sector. Tax account deposits carries interest at 0 per cent, which, in most cases, is higher than the negative interest rate most often charged on bank deposit accounts for corporations. Hence, the overall liquidity effect may be lower than the total deferred payments. Also, the overall effect also depends on fluctuations in the actual activity level and employment in the corporations during the months in which the payment deadlines were deferred.

Deferred tax and VAT may significantly boost liquidity



Note: Amount for total volume of deferred payments of withholding tax (A-tax), tax not collected at source (B-tax), labour market contributions and VAT. The actual amount will depend on the level of activity and employment.
Source: Danish Ministry of Taxation and own calculations.

Credit institutions' deposits and lending are affected by government relief packages

In connection with the relief packages, the central government has either transferred funds directly to corporations, for example compensation for overheads, and to households, for example frozen holiday pay, or has deferred otherwise expected payments from these groups.

The deferred payment deadlines initially mean that corporations leave the funds that they had expected to have to pay in tax and VAT in a deposit account with their bank. In this case, the funds will contribute to increasing total bank deposits. Alternatively, the corporations can use the funds either to limit their borrowing or to pay current expenses. If the funds are used to limit borrowing, they will contribute to lower lending. If the funds are used to pay expenses, they will be transferred to employees or subcontractors. The funds are thus transferred to another deposit account with a bank, where, again, they can either remain, be used to limit borrowing or be used for payments.

1. See Finansministeriet, Skatteministeriet, *Faktaark*, marts 2020 (Danish Ministry of Finance, Danish Ministry of Taxation, *Fact sheet*, March 2020) (*link*) – in Danish only..

1 In addition, small and medium-sized enterprises also have the possibility to raise interest-free loans for VAT already paid and payroll tax in March and April 2020, respectively.

The deferred payment deadlines have temporarily injected liquidity into large parts of the Danish corporate sector. In some cases, the deferrals will also have contributed to keeping some already not viable corporations going, which should not be offered further credit. More liquidations can thus be expected, and the credit institutions[2] must expect greater credit losses than have been the case this year.

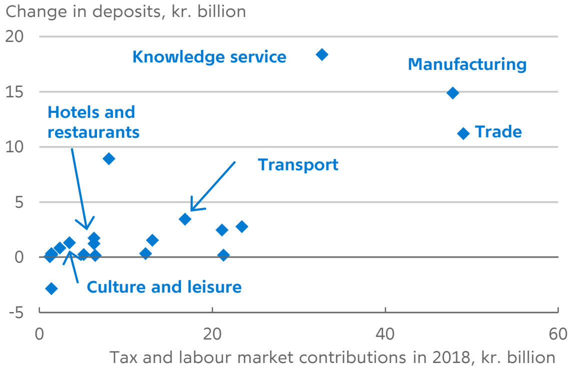
The credit institutions are well equipped to offer credit to healthy corporations when the relief packages expire. Additional credit should, however, only be granted to healthy and viable corporations.

Corporate deposits may decline partially when deferred payments fall due
During 2020, Danish corporations have increased their deposits significantly. Since March, deposits have thus increased by kr. 67 billion, equal to 22 per cent. Just as when the industries have increased their deposits in continuation of the deferred payments, corporate deposits may decrease again when the deferred deadlines fall due.

The deposits have increased the most for those industries for which the liquidity injection from deferred payments is estimated to have been highest, see chart 8. For example, corporations in the trade industry deposited nearly kr. 50 billion in withholding tax and labour market contributions, according to the latest available figures from 2018. Against this background, this sector is also estimated to have received a significant part of the temporary liquidity boost this year. By comparison, the transport sector deposited approximately kr. 17 billion in 2018 and is therefore estimated to have received a relatively small share of the liquidity. It can thus also be seen that corporations in the trade industry have increased their bank deposits by around kr. 11 billion since March, while corporations in the transport sector has increased deposits by around kr. 3.5 billion.

Deposits have risen the most in industries with the highest level of deferred tax payments

Chart 8



Note: The y-axis shows the change in deposits in kr. billion since the end of March 2020 for Danish non-financial corporations. The x-axis shows paid withholding tax and labour market contributions in 2018 in kr. billion for employees, students and self-employed persons in private corporations, broken down by industry for primary employment.
Source: Danmarks Nationalbank, Statistics Denmark and own calculations.

Corporations have increased their credit facilities, but have not yet made use of them
While deposits have increased this year, the demand for credit has been moderate. Shortly after the coronavirus outbreak and lockdown of the Danish society, the banks expected that their corporate customers would need additional borrowing, see chart 9. But this need did not subsequently materialise, and demand even decreased further from the 2nd to the 3rd quarter.[3] For the 4th quarter, the credit institutions again expected moderately increasing demand. The banks' credit managers have reported largely unchanged credit standards in 2020.

Figures for banks' credit commitments to corporations show that the banks have been expanding their credit limits overall since the end of March. Shortly after the coronavirus outbreak, the corporations

2 The analysis applies the term 'banks' when referring specifically to entities engaged in banking activities. The analysis applies the term 'credit institutions' more generally when referring to the activities of both banks and mortgage credit institutions in the financial sector. See appendix for more information about the analysis data basis.

3 See Danmarks Nationalbank, Decreasing demand and increasing impairments, *Danmarks Nationalbank Statistics*, October 2020 (*link*).

secured access to additional liquid funds, but they have not subsequently drawn on these new credit facilities to any significant extent. On this basis, corporate customers' unused credit facilities have increased by approximately kr. 22 billion from the end of March, see chart 10.

The limited draw on credit facilities is in line with developments in bank lending, which has decreased by kr. 24 billion since March. By contrast, mortgage lending has continued the increases seen in recent years, rising to kr. 25 billion since March. The increase has been steady throughout the year, with an annual growth rate of 5 per cent or more in all months of the year. Overall, lending to non-financial corporations has increased by 2.4 per cent year-on-year at the end of October.

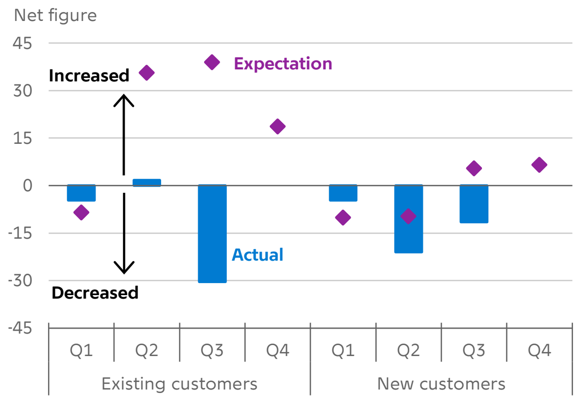
The subdued demand for bank credit by corporations must be seen in the light of the extra liquidity injection from deferred tax payments available to corporations this year. Investment restraint may also have contributed to the development.

More losses expected when relief packages are phased out

With a number of relief packages, the central government has provided a cushion under the Danish corporate sector. While deferred payment deadlines increased the available liquidity, particularly vulnerable corporations have been given the opportunity to apply for compensation for parts of their operating costs. The measures have contributed to a lower number of liquidations this year than in previous years. However, credit institutions must prepare for the end of the relief packages. In line with government relief packages being phased out, the number of liquidations is expected to increase. The credit institutions must then also expect higher losses and a deterioration in the credit quality of their lending.

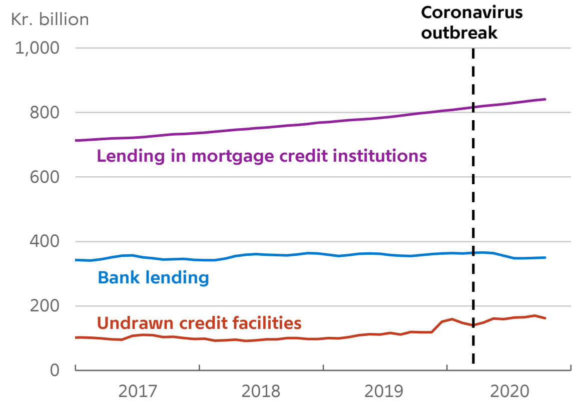
With the latest IFRS 9 accounting standard, credit institutions must make impairment charges on their lending in relation to both incurred losses and losses expected subsequently to incur. It is important that the credit institutions continuously ensure that they have made sufficient provisions to handle the deteriorated prospects.

Large drop in corporate customers' loan demand Chart 9



Note: In Danmarks Nationalbank's lending survey, corporate customers cover 'Private non-financial corporations' and 'Sole proprietorships'. The net figure is the banks' response weighted by their respective market shares. 'Expectation' is the banks' previously reported responses from the quarter before the present quarter. Observations are for quarters in 2020.
Source: Danmarks Nationalbank.

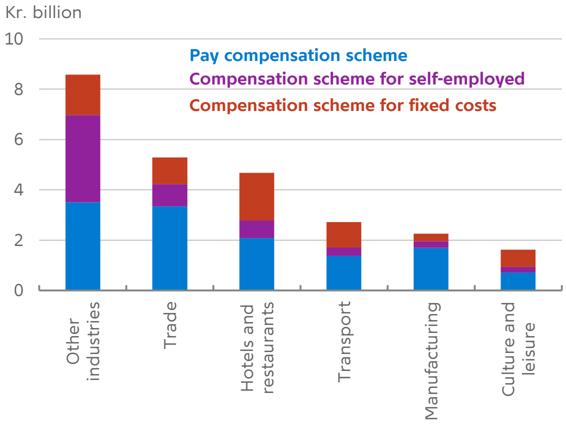
Bank lending to corporate customers has decreased, and unused credit facilities have increased Chart 10



Note: Lending to Danish non-financial corporations from banks and mortgage credit institutions, three-month moving average. 'Undrawn credit facilities' are the undrawn part of confirmed credit and liquidity facilities in Danish kroner to non-financial corporations. The most recent observations are from October 2020.
Source: Danmarks Nationalbank and own calculations.

A few vulnerable industries are the main recipients of government compensation

Chart 11



Note: Government compensation broken down by compensation schemes as at 23 November.
Source: Danish Business Authority and own calculations.

Many corporations in vulnerable industries have received compensation

Since March, payments from compensation schemes have injected funds of around kr. 25 billion into non-financial corporations. Corporations in the trade, hotel and restaurant, and transport industries have received the largest share of the funds, see chart 11.

Corporations that have been able to document that they meet certain requirements for, for example, loss of revenue have been offered compensation for several of their expense items. The corporations that have received compensation are thus still, or have previously been, particularly vulnerable during the current coronavirus crisis, see box 2.

The banks have most lending to customers which have received compensation in the trade, manufacturing and transport industries, see chart 12. In total, corporations constituting 15 per cent of corporate lending have received compensation.

For some particularly vulnerable industries, the lending to corporations that have received compensation constitutes a large proportion of the total lending. For the hotel and restaurant industry and the culture and leisure industry, 81 per cent and 67 per cent, respectively, of the total lending have been made to corporations receiving compensation.

Compensation schemes and particularly vulnerable corporations – how we proceeded

Box 2

The cost-covering measures initiated by the central government comprise a number of schemes to cover, for instance, some corporate payroll costs and overheads. Under this scheme, corporations have received kr. 12.7 billion in pay compensation, kr. 5.9 billion from the scheme for self-employed persons and kr. 5.5 billion in compensation for overheads. In addition, kr. 265 million has been paid in compensation to, for example, free-lancers and for cancelled events.

Several of the previous compensation schemes have been extended, and some schemes have been expanded due to increasing spread of infection in the autumn with the resulting reintroduction of some restrictions. The new schemes currently run until 28 February 2021.

The requirements for receiving compensation identify the particularly vulnerable corporations
The schemes have been targeted at the corporations that were or expected to be particularly severely affected by restrictions and behavioural changes.
To receive pay compensation, at least 30 per cent or more than 50 of the corporation's employees had to be furloughed without working from home. The overheads scheme required an expected decrease in revenue of at least 35 per cent. The self-employed persons scheme required an expected revenue or income loss of at least 30 per cent. The corporations which have received compensation have experienced a significant decrease in activity and are generally regarded as having been particularly vulnerable. Some of the requirements for receiving compensation have been adjusted in connection with the new restrictions introduced in autumn.

Whether a corporation has received compensation is used in this analysis as an indicator for whether the corporation has been particularly exposed. Microdata received from the Danish Business Authority on the compensation received by individual corporations for payroll costs and overheads is combined with information in the Danish credit register on all corporations' loans from credit institutions in Denmark.

1. A number of the new schemes are awaiting approcal by the European Commission under the State aid rules.

Credit quality has deteriorated on lending to the corporate customers which have received compensation

Although the relief packages have supported corporate resilience, the credit quality has deteriorated on the part of the banks' lending made to corporations that have received compensation.

Most large banks calculate a so-called probability of default for each customer as part of their risk and capital management. The probability of default is a quantitative assessment of the risk of non-payment from and/or loss on a given customer within the next 12 months.

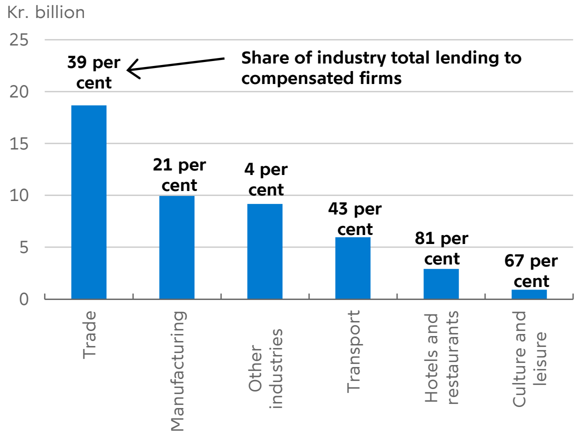
On the part of the lending to the banks' customers that have received compensation, the probability of default has increased significantly. At the end of the 3rd quarter of 2020, the banks thus assessed that 10 per cent of the lending to these customers has a probability of more than 20 per cent of the loan defaulting over the next 12 months, see chart 13. Conversely, the proportion with a probability of default above 20 per cent has actually decreased from the end of 2019 to the end of the 3rd quarter of 2020 for customers who have not received compensation.

Deteriorated credit quality and expectations of a further weakening in the future have made the banks increase their impairment charges on parts of their lending. The large banks thus report that an increased proportion of their lending have a significant increase in credit risk (impairment stage 2) or have already seen a credit risk deterioration (impairment stage 3), see chart 14. This development is seen in connection with lending to corporations that have received compensation, whereas it has overall not been the case for the banks' other lending.

In line with the lending having moved towards impairment stages with deteriorated credit quality, the banks have increased their provisions for impairment charges on these loans. Most of the impairment charges were booked in the financial statements for the 1st quarter of 2020 at a time when there was great uncertainty about the economic development. Some of the impairment charges thus reflect a deterioration in the macroeconomic scenarios used in the models underlying the so-called expected credit losses. At the same time, several credit institutions have booked impairment charges based on management estimates that reflected the uncertainties connected with the possible impact of the coronavirus outbreak on credit quality.

Customers in the trade, manufacturing and transport industries are the main recipients of compensation

Chart 12

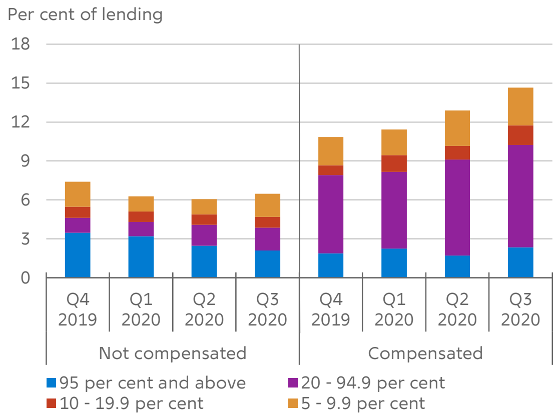


Note: Lending by large and medium-sized banks to Danish non-financial corporations. The blue bar denotes lending to corporate customers which have received pay compensation or compensation for overheads. Data as at the end of the 3rd quarter 2020.

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

Increasing proportion of lending to compensated corporations has high probability of default

Chart 13

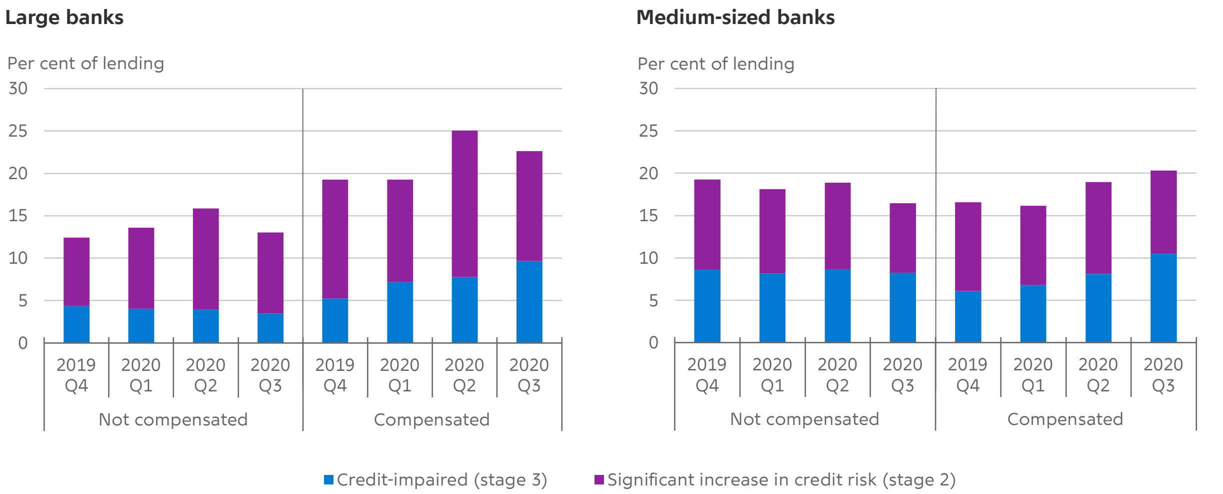


Note: Lending broken down by ranges for probability of default for large and medium-sized banks authorised to use internal models (IRB models) to calculate their capital adequacy requirements. The remaining lending has a low probability of default of up to 4.9 per cent.

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

Deteriorated credit quality of compensated customers

Chart 14



Note: Lending broken down by impairment stages. The remaining lending is in impairment stage 1 without any significant increase in credit risk.
Source: Danmarks Nationalbank, Danish Business Authority and own calculations.

Even before the coronavirus outbreak, the major banks assessed that there was both a higher credit risk and a higher probability of default on the part of the lending granted to the corporations that have subsequently received compensation. This should be seen in the context of the financial statements of the compensated corporations showing signs of weakness before the coronavirus outbreak. Across the banks, the compensated customers thus had less liquid funds available than was the case for the banks' other customers. The banks' lower credit quality assessment is reflected in a higher average interest rate on loans to the compensated corporations – both before and after the coronavirus outbreak.

In general, medium-sized banks have poorer credit quality than large banks on the part of the lending made to customers who have not received compensation. Regarding lending to compensated corporations, the share of credit-impaired loans is roughly the same in both large and medium-sized banks, while the share of loans with significant increase in credit risk is highest in the large banks.

Challenges involving the most vulnerable customers may also impact other customers

Until now, the coronavirus crisis has particularly challenged the credit quality of customers directly affected by it. But the problems among the most vulnerable customers may also impact other customer groups which have until now been less affected. An example is if the asset prices of the collateral behind the lending decrease.

In corporations in several of the most vulnerable industries, such as hotels, restaurants and airlines, services are provided based on large physical assets, for example properties and aircraft. However, in some cases, these assets are not owned by the corporations themselves, but by, for example, pension funds or corporations engaged in corporate leasing, which instead lease the assets to the corporations in the industries in question. The assets may decrease in value in line with the assets no longer securing the same rental income that they previously did. The owners may consequently encounter problems servicing their loans. At the same time, the value of the collateral behind the loans decreases. There are just over 200 property landlords owning one or more buildings used fully or partly for hotel operations. These property landlords overall have significantly more debt to credit institutions than all the corporations in the hotel industry combined, see chart 15. However, a review of the financial statements of the largest of these landlords shows that hotels only make up a minor part of their property portfolios. These landlords are therefore generally regarded as being resilient in the event of non-payments from hotel properties.

Mink industry poses limited risk to credit institutions
The mink production shutdown does not present a challenge to the credit institutions as a whole. However, there are large differences across individual credit institutions and some institutions have large exposures to the mink industry.

Lending related to mink farming etc. can be stated at approximately kr. 820 million for banks and kr. 4.4 billion for mortgage credit institutions, see chart 16, and only constitutes a limited part of the lending to corporations and sole proprietorships. Around kr. 4 billion of the mink-related lending concerns self-employed persons, and these customers are therefore personally liable for the debt.

Even before the mink production shutdown, the banks estimated that more than half the lending was credit-impaired, while only 11 per cent of mortgage lending is assessed as credit-impaired. How credit institutions are affected by the mink industry shutdown will depend on the specific compensation model and whether production can ever be reestablished.

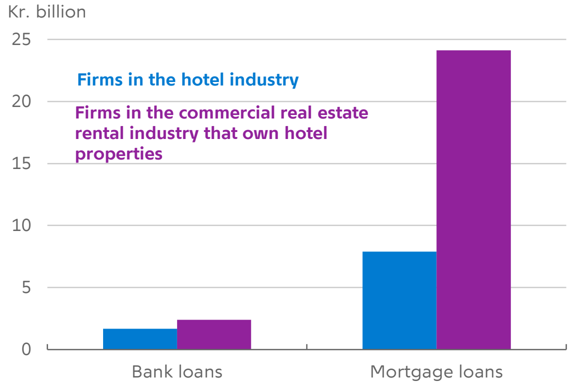
More home buyers opt for less risky loans

High housing market activity and rising mortgage lending
Housing market activity has increased rapidly since spring, see chart 17. Prices of single-family houses have also increased significantly and are now higher than before the lockdown. A similar trend is seen for owner-occupied flats. Several factors currently support the housing market, where long-term mortgage rates have seen a further slight decrease to a historically low level, and household incomes have been supported by compensation schemes. If house prices continue to rise at the current rates of increase, this could enhance the risk of subsequent price falls on the housing market, which has been seen in the past after periods with marked increases.

Rising house prices have led to a decrease in homeowners' total debt in relation to the value of the houses, see chart 18. However, homeowners' mortgage debt has also increased over the period, but at a more moderate pace.

Corporations that do not run hotels themselves may also be impacted by the hotel industry crisis

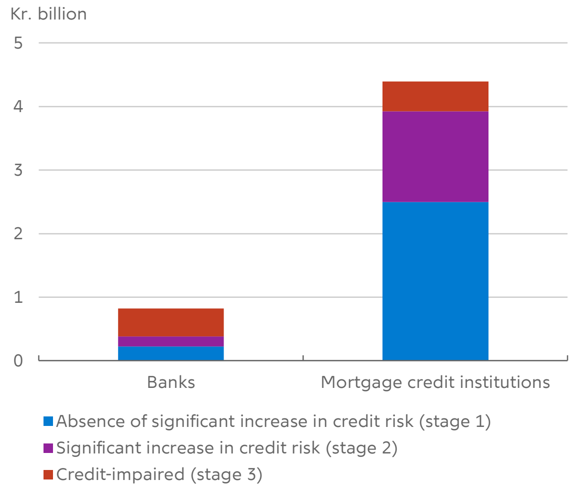
Chart 15



Note: 'Firms in the hotel industry' denotes total lending to the 'Hotel' industry. 'Firms in the commercial real estate rental industry that own hotel properties' denotes total lending to the corporations in the 'Commercial rental property' industry that are registered as owners of one or more buildings used wholly or partially for hotel operations. Data as at the end of 3rd quarter 2020.
Source: Danmarks Nationalbank, Land Registry (*Tingbogen*), Bisnode and own calculations.

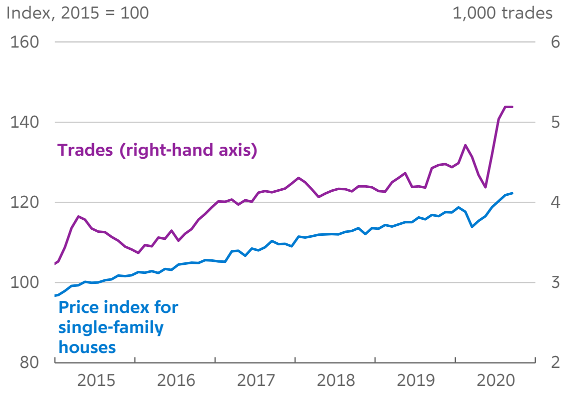
Half of mink-related bank lending is credit-impaired

Chart 16



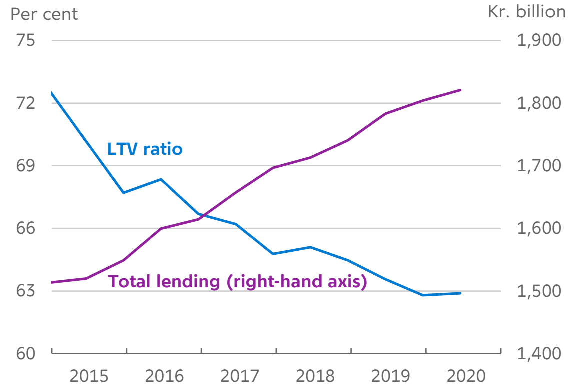
Note: Lending as at the end of the 3rd quarter of 2020, broken down by stages of impairment on corporations in the 'Fur farming etc.' industry as well as lending to corporations that have provided security in the property category 'Fur and deer farms'.
Source: Danmarks Nationalbank, Bisnode and own calculations.

Housing market activity has rebounded Chart 17



Note: Seasonally adjusted. Trades are three-month moving averages. The most recent observations are from September.
Source: Statistics Denmark and own calculations.

Lower loan-to-value ratios of mortgage loans to homeowners Chart 18



Note: Average exposure-weighted loan-to-value ratio on mortgage lending to homeowners and total outstanding mortgage lending with mortgage on owner-occupied dwellings. The most recent observations are from end of the 1st half of 2020.
Source: The Danish Financial Supervisory Authority and own calculations.

Total mortgage lending to employees, pensioners etc. had increased by 4 per cent year-on-year at the end of October, but with a declining growth rate since the coronavirus outbreak. Conversely, their bank lending continues to decline, with negative growth of 3.6 per cent year-on-year at the end of October.

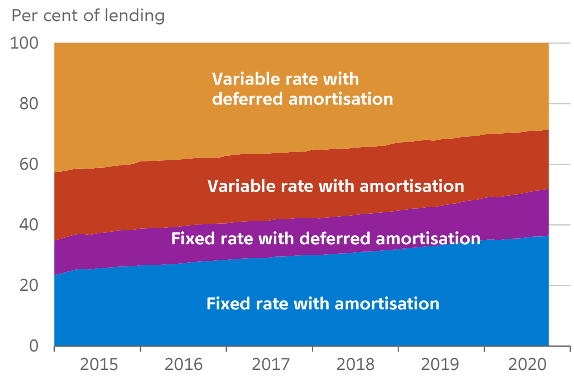
Risky loan types represent a declining proportion of total mortgage lending

The resilience of homeowners is supported by the trend towards both a smaller share of risky loan types among new mortgage loans and higher instalments.

Fixed rate loans now account for more than half of homeowners' mortgages, and mortgage lending growth is driven solely by these. The proportion of interest-only loans has remained fairly constant in the past year, after having previously decreased, see chart 19. Along with very low mortgage rates, the development has pushed repayment rates for homeowners' mortgage debt upwards for both fixed rate and variable rate loans.[4]

The credit institutions must ensure that home buyers also have sufficient income to cope with periods of unemployment. In line with the relief packages being

More and more homeowners are opting for fixed rate mortgage loans Chart 19



Note: Mortgage lending to households with mortgages on owner-occupied homes and holiday homes. The most recent observations are from October 2020.
Source: Danmarks Nationalbank.

4 See Danmarks Nationalbank, Danes repay more on their mortgage loans, *Danmarks Nationalbank Statistics*, October 2020 (*link*).

phased out and deferred VAT and tax payments falling due for payment, more corporate liquidations can be expected. In this connection, some households risk being affected by periods of unemployment.

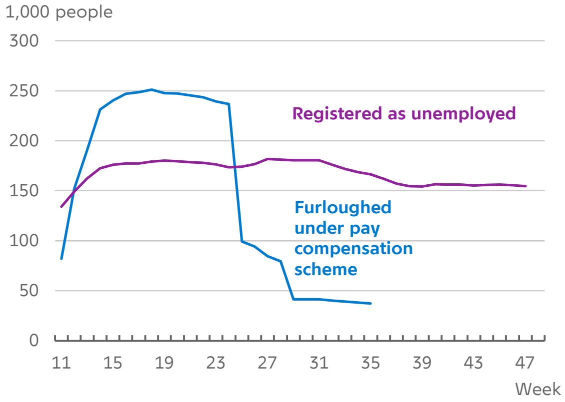
Limited proportion of lending to persons covered by pay compensation

In particular, those employed in industries which are still affected, or have been affected, by restrictions and declines in activity may be at risk of unemployment. If this turns into long-term unemployment, it could result in the credit institutions incurring losses on lending to household customers.

The number of registered unemployed persons has so far stabilised at a level of around 155,000 persons after peaking with 181,000 persons in July, see chart 20. During the lockdown, a further 250,000 persons were covered by the pay compensation scheme, which was subsequently phased out in August. The pay compensation scheme covered the largest number of persons in the trade, hotel and restaurant, and manufacturing industries. Towards the end of November, just over 7,000 persons were covered by the new short-time working scheme, which is expected to apply until the end of February 2021.

Unemployment has stabilised and the pay compensation scheme has been phased out

Chart 20



Note: The X-axis shows weeks in 2020. 'Furloughed under pay compensation scheme' denotes the number of unique persons furloughed in a particular week with an approved application. Registered as unemployed is a seven-day moving average. The most recent observations are from calendar week 47.
Source: Danish Business Authority, Danish Agency for Labour Market and Recruitment and own calculations.

The credit institutions' lending to persons who have been covered by pay compensation for a short or long period represents a minor proportion of the total lending to employees. The debt to persons on pay compensation constitutes 10 per cent and 6 per cent of households' debt to banks and mortgage credit institutions, respectively, and employees in the trade, manufacturing and transport industries account for the largest share of the debt. This is shown by microdata on these persons and their debt to the credit institutions, see box 3.

Household customers and the coronavirus crisis – how we proceeded

Box 3

Under the general pay compensation scheme, corporations could apply for compensation for payroll costs for employees who were furloughed for the whole or parts of the period from 9 March to 29 August. The furloughed employees had to constitute minimum 30 per cent of the total number of employees or more than 50 employees. Under the original scheme, corporations could apply for compensation for 75 per cent of the salaries of furloughed salaried employees and 90 per cent of the wages of other furloughed employees, however, for no more than kr. 30,000 per month for salaried employees and hourly workers.[1]

Whether a person has been covered by pay compensation in the period from 9 March to 29 August is used in the analysis as an indicator for whether the person and his/her job have been particularly vulnerable during the coronavirus crisis. The analysis uses microdata from Statistics Denmark on payments from the pay compensation scheme to individuals combined with information about the persons' main employment as well as their debt and income situation at the end of 2018.

Corporations which were directly covered by the mandatory closure until 30 October could also apply for pay compensation after 29 August. The new short-time working scheme is expected to be in use at least until end of February 2021.

1. See Regeringen, *Trepartsaftale om midlertidig lønkompensation indgået 14. marts,* marts 2020 (The Government, Tripartite agreement on temporary pay compensation concluded 14 March, March 2020) (*link*) – in Danish only. The original agreement was subsequently extended to 29 August.

The debt ratio of a typical person having been covered by pay compensation is at a low level: 32 per cent of the pre-tax income. A quarter of all persons covered by pay compensation have little or no debt. Salaried employees account for the main part of the debt and have slightly higher debt ratios, but they constitute less than half the persons who were furloughed on pay compensation.

Banks have increased their liquidity reserves

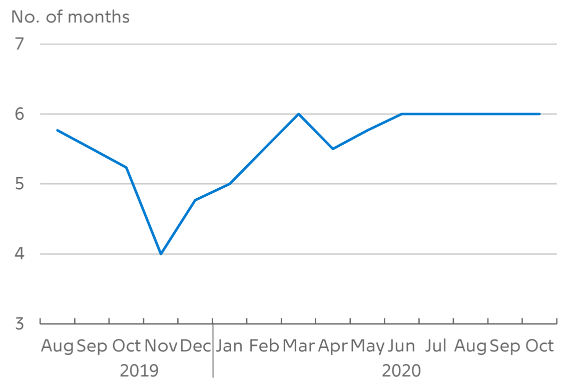
High liquidity in society gives high liquidity ratios in banks
The systemic banks continue to hold large liquidity reserves. Danmarks Nationalbank's sensitivity analysis thus shows that banks can handle severe liquidity stress for at least six months, see chart 21. Danmarks Nationalbank continuously assesses the sensitivity of the banks' liquidity position based on three scenarios: A market-specific scenario, an institution-specific scenario and a hard combined scenario.[5]

The banks' liquidity buffers were already relatively large before the coronavirus outbreak in March, and government liquidity support measures to the corporate sector have contributed to increasing the buffers. Increased liquidity in Danish kroner will generally find its way into the banks' balance sheets and lead to increased customer funding surplus, see box 1. However, there was a small dip in the survival horizon in the months following the lockdown of the Danish society in spring.

Danmarks Nationalbank's sensitivity analysis functions as a supplement to the statutory liquidity coverage ratio (LCR) requirement and the coming Net Stable Funding Ratio (NSFR) requirement. The extra deposit liquidity is also reflected in the LCR, where the systemic banks are well above the minimum requirement, see chart 22.

The non-systemic banks have generally also reported high LCRs in 2020. It is worth noting that even the medium-sized banks with the lowest LCRs have a value above 200 per cent, where the requirement is minimum 100 per cent.

Systemic banks can survive six months of liquidity stress Chart 21



Note: Number of months systemic banks can overall withstand severe combined liquidity stress, according to Danmarks Nationalbank's sensitivity analysis. In the sensitivity analysis, six months is the maximum survival horizon.
Source: Danmarks Nationalbank.

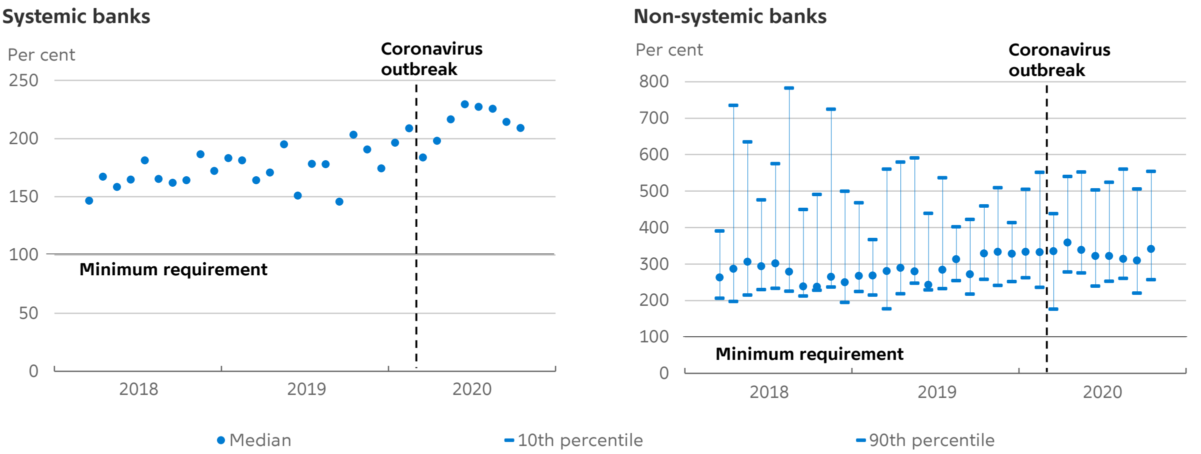
Banks' liquidity can handle payment of deferred tax and VAT
Bank deposits have increased significantly in 2020, but they may quickly disappear again. The increase in deposits is likely to be temporary and to decline significantly as government liquidity support schemes are being phased out in the 1st half of 2021.

Robustness analyses of both the financial institutions' survival horizon and their ability to comply with the regulatory LCR show that, on the face of it, the banks will be able to handle a situation in which deposits fall back to the level seen in the end of March 2020. In the robustness analyses, it is assumed that the observed increase in deposits quickly disappears again and that corporations draw on the increased credit facilities, see box 4. Even with such a considerable draw on liquidity, institutions continue to maintain a survival horizon above four months, see chart 23.

5 For a method description, see page 26 of Danmarks Nationalbank, Lower excess capital adequacy for the banks, *Danmarks Nationalbank Analysis (Financial stability)*, no. 25, November 2019 (*link*).

Banks comply with the short-term LCR requirement with a significant margin

Chart 22

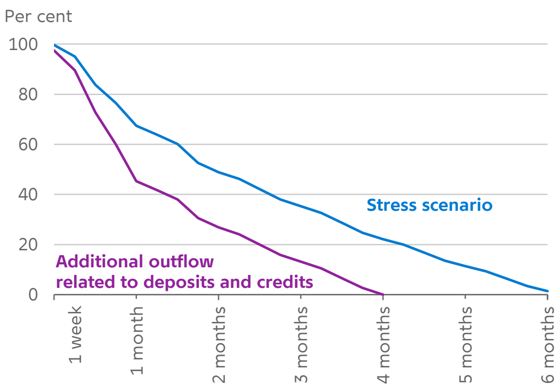


Note: The LCR, which must be higher than 100 per cent, is calculated as the bank's liquid assets divided by net cash outflows over a 30-day stress period. The most recent observations are from the end of October 2020.

Source: Danmarks Nationalbank.

Continued high survival horizon in scenario of further outflow of deposits and credit facilities

Chart 23



Note: Number of months systemic banks can overall withstand severe liquidity stress as well as an extra credit draw and corporate deposit withdrawal (see box 4), according to Danmarks Nationalbank's sensitivity analysis. The most recent observations are from October 2020.

Source: Danmarks Nationalbank.

Increased credit draw and deposit withdrawal when government liquidity support ends

Box 4

The liquidity position of banks will be affected if corporations withdraw their deposits and draw on their new credit facilities in order to pay their deferred tax and VAT next year. The calculations described in this box are used to assess whether banks can maintain a robust survival horizon and comply with the regulatory LCR.

It is assumed that the banks are simultaneously affected by the following two events:

- Additional withdrawals of corporate deposits, which are estimated to be occasioned by the deferral of tax and VAT payments. The effect on deposits from the injection and subsequent reversal of liquidity is assumed to be proportional to the distribution of the increase in deposits in the individual banks since late March.
- An additional draw on unused credit facilities, which has generally increased since the coronavirus outbreak. The credit draw is calculated as the rise in credit facilities in Danish kroner since late March. It is assumed that the entire increase is drawn.

Similarly, a drop in bank deposits as a result of the payment of deferred payments would result in only a limited fall in the systemic banks' excess liquid assets relative to LCR, see chart 24. However, differences exist among the banks. For several banks, the analysis shows that their excess liquidity decreases by up to 40 per cent in case of a simultaneous credit draw and fall in deposit estimated to be occasioned by the deferred tax and VAT payments.

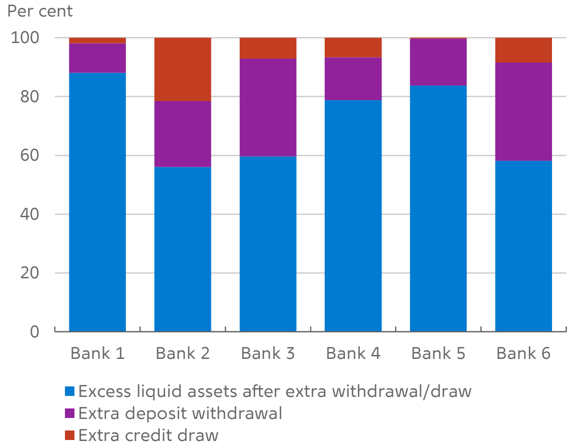
Liquidity premiums in the mortgage bond market are back to normal
Mortgage bond interest rates rose sharply for a brief period from mid-March when there was considerable uncertainty about the development of the coronavirus outbreak and its economic impact. The sharp rise in interest rates was mainly due to brief pressure on mortgage bond liquidity, resulting in higher liquidity premiums, see chart 25.[6] Liquidity premiums remained at a higher than normal level until June. The increase in liquidity premiums were especially pronounced for long-term callable bonds, but short-term bonds were also affected, albeit to a lesser extent. Despite the rising liquidity premiums, mortgage credit institutions were able to continue to issue the necessary mortgage bonds to the market to prevent an impact on lending.

The liquidity premium reflects the portion of, for example, a bond's price which can be attributed to liquidity risk, i.e. the uncertainty associated with how quickly the bond can be sold and what the transaction costs of doing so will be. Liquidity premiums have now returned to more normal levels, and in recent months there have been no large variations in mortgage bond market liquidity.

Again attractive prices on banks' funding markets
In the wake of the market turmoil in March and April, several countries took steps to make it easier for banks to comply with MREL requirements, among other things. Denmark also took steps, with the Danish Financial Supervisory Authority relaxing MREL requirements, citing difficult market conditions and high costs related to the issuance of non-preferred senior debt. Non-preferred senior debt is a type of debt that

LCR compliance not affected by additional credit draw and deposit withdrawal

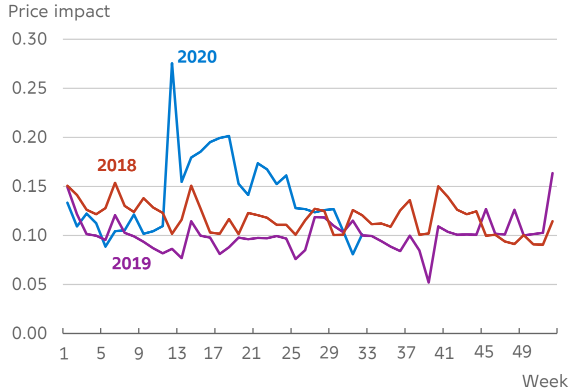
Chart 24



Note: Share of banks' excess liquid assets relative to LCR, which will be obsolete if an additional credit draw and corporate deposit withdrawal is assumed (see box 4). The blue bar denotes how much of the banks' excess liquid assets will remain. As long as the blue bar is above 0, the bank will continue to comply with the regulatory LCR. The most recent observations are from October 2020.
Source: Danmarks Nationalbank.

Liquidity costs were higher than normal from March to June

Chart 25



Note: Liquidity premium for long mortgage bonds calculated weekly in 2018, 2019 and 2020, respectively. Long callable bonds are defined as bonds with more than 20 years to maturity. The most recent observations for 2020 are from calendar week 33.
Source: MiFID II reports and own calculations.

6 See Danmarks Nationalbank, Danish mortgage bond liquidity briefly impacted by covid-19, *Danmarks Nationalbank Analysis*, no. 22, November 2020 (*link*).

absorbs losses before unsecured claims in connection with the resolution and liquidation of an institution.

Subsequently, the prices of non-preferred senior debt once again returned to their normal level compared to ordinary senior debt, and the spread between the prices of the two types of debt has now returned to the 2019 level, see chart 26.

Price of non-preferred senior debt has returned to 2019 level Chart 26

Note: Difference between Z spread for non-preferred senior euro debt and senior euro debt for systemically important European banks. Data is updated up until 30 November 2020.
Source: Bloomberg and own calculations.

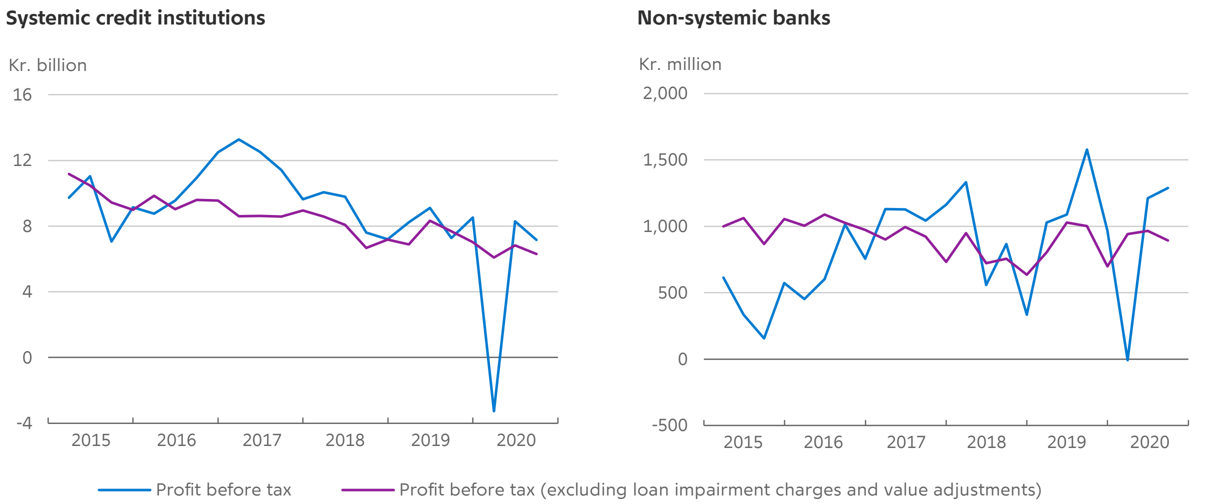
Declining earnings in the credit institutions

Earnings outlook is slightly lower this year
Bank earnings have fluctuated heavily since the coronavirus outbreak in March, see chart 27. In Q1, systemic credit institutions were affected by the downturn in the financial markets, while also making considerable provisions for expected loan losses. In Q2 and Q3, profits were back to their pre-outbreak levels, and institutions thus emerged from the quarters in better shape than feared.

The improvement in profits from the 1st to the 2nd quarter is due to the fact that the majority of the corona-related impairment charges were recorded in the 1st quarter and that the markets recovered from large price falls in March. In fact, the systemic credit institutions' positive value adjustments in the 2nd quarter were larger than the negative value adjustments in the 1st quarter.

In light of the improved profits, several systemic credit institutions raised their 2020 earnings outlook during the 2nd half of 2020. However, this year the

Large variations in credit institution earnings in 2020 Chart 27



Note: Quarterly data for systemic credit institutions and non-systemic banks. Profit before tax of systemic credit institutions has been adjusted for goodwill impairment charges. The most recent observations are from the 3rd quarter of 2020.
Source: The Danish Financial Supervisory Authority and own calculations.

earnings outlook is generally lower than the annual profits realised in recent years.

In the 1st half of 2020, non-systemic banks also recorded impairment charges on loans based on management judgement. Relative to total lending and guarantees, non-systemic banks have made larger provisions than systemic credit institutions. The difference may reflect the fact that systemic credit institutions have a considerable number of mortgage loans on their balance sheets and bank loans with a better credit quality.

Earnings may cover fewer loan losses than in the past

The prospects of lower earnings this year follow declines in profits since 2017. However, earnings fell from a high level and present earnings continue to remain a reasonable initial protection against losses. However, further declines may weaken credit institutions' resilience in the long term.

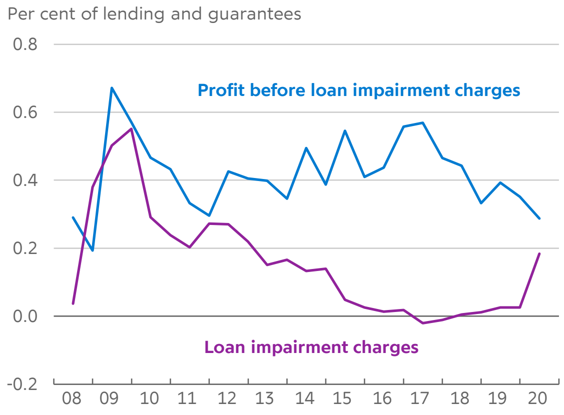
The credit institutions' ongoing earnings must be sufficient to cover both the expected operating losses and returns to the owners. In addition, the capitalisation of the institutions must comply with the capital adequacy requirements imposed by the authorities to ensure that the institutions can also absorb unexpected losses during periods of economic downturn and uncertainty.

In the 1st half of 2020, present earnings could cover impairment charges corresponding to just under 0.3 per cent of lending and guarantees, see chart 28. This reflects a variation of 0.2-0.9 per cent of lending and guarantees among the individual systemic credit institutions. By comparison, total recorded loan impairment charges were just under 0.2 per cent of lending and guarantees. The large impairment charges in the 1st half of 2020 reflect the sizeable loan loss provisions in the 1st quarter, and the level of impairment charges was significantly lower in both the 2nd and 3rd quarters.

In 2021-22, equity analysts generally expect only a partial recovery of the earnings of the largest listed credit institutions measured by return on equity (ROE). However, the low ROE expectations are hardly the only reason why major listed bank shares have traded at low price-to-book ratios this year, see box 5. The price-to-book ratio of a company is the market value of equity relative to the book value of equity.

Earnings can absorb fewer impairment charges and losses than in the past

Chart 28



Note: Half-yearly profit before impairment charges and loan impairment charges as a percentage of total lending and guarantees of systemic credit institutions. Profit before impairment charges has been adjusted for goodwill impairment charges. The most recent observations are from the 1st half of 2020.

Source: The Danish Financial Supervisory Authority and own calculations.

The price-to-book ratio of the credit institutions depends on earnings expectations and rate of return required by shareholders

Box 5

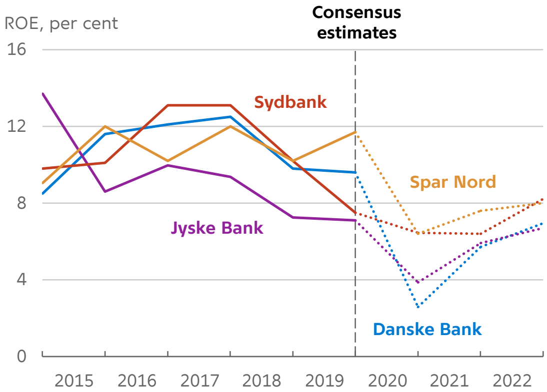
The ROE of the largest listed credit institutions has generally been declining in recent years, see the left-hand chart below. Equity analysts' estimate of the banks' ROE in 2020 is significantly lower than the ROE realised in 2019, and the outlook for 2021-22 shows that analysts generally do not expect a return to the levels of recent years. Consequently, equity analysts expect banks to achieve an ROE in the range of 6-8 per cent between 2021 and 2022. At the same time, the market value of the equity of large listed banks has for several years been trading at levels below the book value of equity in the accounts, see the right-hand chart below.

Simple discounting models show that a corporation's price-to-book ratio depends on the expected ROE and rate of return required by investors, among other things. The current low price/book values of the large listed credit institutions indicate that the rates of return required by investors exceed the expected ROE of the institutions. Thus, the rates of return required on the largest Danish bank shares must also exceed the latest assessment by the Council for Return Expectations, which expects a market-based return of just below 6 per cent on the 'Global shares (developed countries)' asset class over the next 1-5 years.[1]

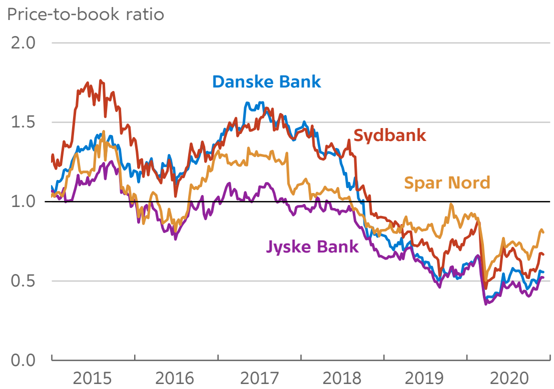
It does not seem sustainable in the long term when one krone of book equity in Danish credit institutions has a market value of as little as kr. 0.50. Higher ROE expectations may help to pull share prices upwards again. As can a lower required rate of return.

Both the ROE and price-to-book ratio of large listed credit institutions have generally been declining

ROE is generally expected to be only partially restored in the coming years



The price-to-book ratio of the largest credit institutions has generally declined in recent years



Note: Left-hand chart: Annual ROE of the largest listed banks and equity analysts' consensus estimate of ROE for 2020-22. Right-hand chart: Weekly price-to-book ratio calculated as the price per share relative to the book value of equity per share for the largest listed banks. The most recent observations are from 30 November 2020.
Source: S&P Global Market Intelligence.

1. See the Council for Return Expectations, *The common return expectations for 1st half 2021*, October 2020 (*link*) – in Danish only.

Costs have increased in the largest banks

Since 2018, higher operating expenses have been the primary driver of the decrease in profits before impairment charges in systemic credit institutions, and compared to other major Nordic and European banks operating expenses have increased the most in the largest Danish institutions, see chart 29. Much of the increase in the operating expenses of systemic credit institutions can be attributed to Danske Bank.

Approximately 80 per cent of the total costs of systemic credit institutions can be attributed to either staff or administration, see chart 30. Higher staff and administrative expenses should be seen in the context of an increase in the number of employees in recent years, among other things. Furthermore, in the period 2013-18, the largest credit institutions saw a rise in the number of compliance and risk management staff. A general focus on compliance and risk management is needed, as the banks must ensure that the functions can live up to their responsibilities. Inadequate management of these areas may potentially cost the institutions and the sector as a whole dearly through, for example, reputational damage and financial losses.

Part of the increase in costs can also be attributed to factors such as general price and wage adjustments in society, IT investments and asset depreciation.

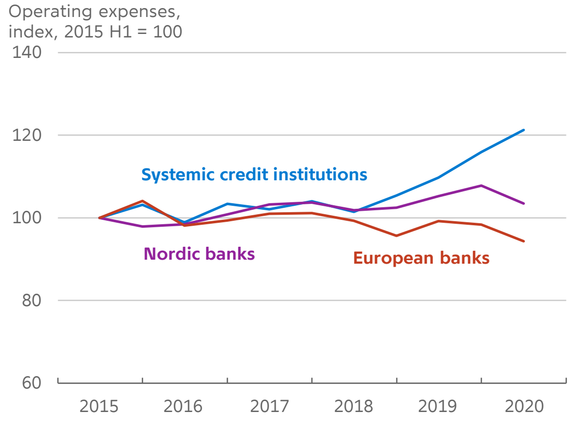
Several institutions have initiated cost-efficiency measures, including staff cuts.

The financial sector is also facing additional taxation.[7] Generally, banks can adapt to the new tax in three ways: They can reduce shareholder dividends, cut costs or raise their prices. The adjustment will be institution-specific and will depend on the competitive situation and their business model. The nature and scale of the proposed tax will not challenge financial stability. But it is essential that the burden on the banking sector is not used or accepted as a reason for relaxing, for example, capital adequacy

7 On 10 October 2020, the government (the Social Democratic Party), the Danish People's Party, the Socialist People's Party and the Red-Green Alliance agreed on a new early retirement scheme (*link*). The agreement is the result of consolidated act *L104 amending the Danish Social Pension Act and various other acts (Introduction of the Right to Early Retirement)* and is proposed to enter into force on 1 January 2021.

The operating expenses of systemic credit institutions have risen more than those of Nordic and European banks

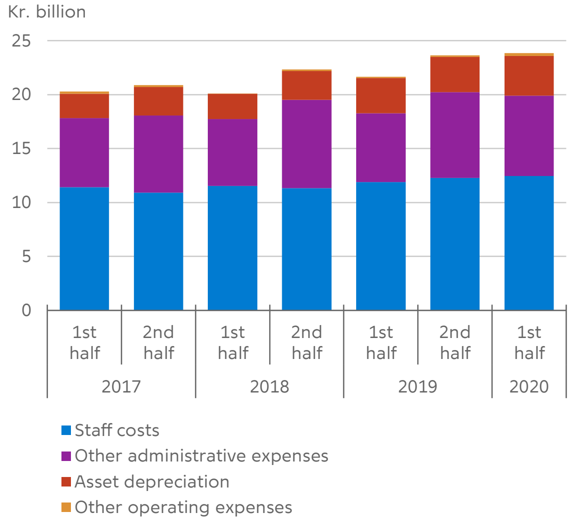
Chart 29



Note: Half-yearly total operating expenses from banking, insurance and asset management. European banks comprise 16 out of 22 banks in the Euro Stoxx Banks index (SX7E), compiled as at 30 November 2020. Nordic banks comprise Nordea Bank, DNB, Skandinaviska Enskilda Banken, Svenska Handelsbanken and Swedbank. For the Nordic banks, the costs have been converted into Danish kroner at fixed exchange rates as at the end of the 1st half of 2020. The most recent observations are from the 1st half of 2020.
Source: S&P Global Market Intelligence and own calculations.

Credit institution costs have increased in recent years

Chart 30



Note: Six-month data for systemic credit institutions. Asset depreciation has been adjusted for goodwill impairment charges.
Source: The Danish Financial Supervisory Authority and own calculations.

requirements, the minimum requirement for own funds and eligible liabilities (MREL) or anti-money laundering efforts.

Earnings from traditional banking have fallen
Since 2015, there has been a general decline in the net interest income of systemic credit institutions, see chart 31. The decline in net interest income should be seen in light of lower interest margins, i.e. the difference between their lending and deposit rates due to, for example, competition for lending customers. At the same time, banks have been reluctant to cut deposit rates for households. This means that, on average, the largest banks pay deposit rates close to zero for households, while placing excess liquidity in the market at negative interest rates. However, the deposit margins of the largest banks have risen since the end of 2019 for both households and corporations, but they remain negative. The deposit margin is the difference between the average deposit rate and the interest rate at which the bank can place the deposit with Danmarks Nationalbank, i.e. the certificate of deposit rate.

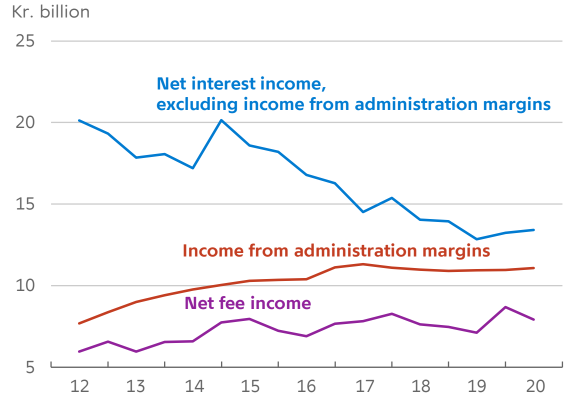
Since the 2nd half of 2019, all systemic banks have introduced negative interest rates on deposits from household customers over a certain limit, and the limit has been lowered several times. The measures have helped to mitigate the decline in banks' net interest income, which has remained roughly unchanged over the past year. The prevalence of negative deposit rates to residential customers still differs among the largest banks, but the difference is narrowing.

For non-systemic banks, net interest income has also declined in recent years, but earnings from traditional banking operations have been sustained by growing net fee income, partly supported by securities trading income and loan fees related to the high conversion activity in 2019.

More secure loans naturally reduce mortgage credit institution earnings
Earnings from administration margins on mortgage loans has remained broadly unchanged since 2017, despite rising mortgage lending to households and corporations.

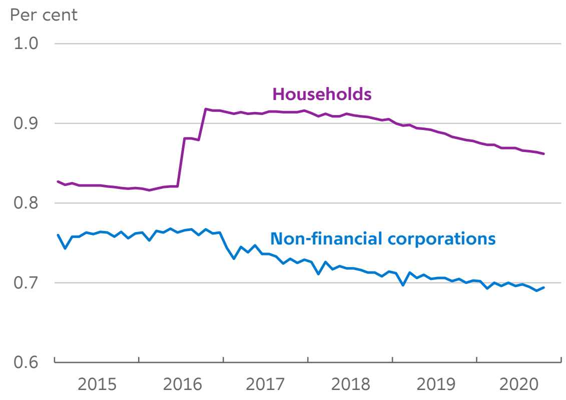
The flattening of earnings from administration margins on mortgage loans should be seen in the context of a decrease in average administration margins, see chart 32. The fall in average administration

Net interest income of systemic credit institutions has declined since 2015 Chart 31



Note: Six-month data for systemic credit institutions. The most recent observations are from the 1st half of 2020.
Source: The Danish Financial Supervisory Authority and own calculations.

Average administration margins have fallen Chart 32



Note: Average administration margins of outstanding domestic mortgage lending in Danish kroner. The most recent observations are from October 2020.
Source: Danmarks Nationalbank.

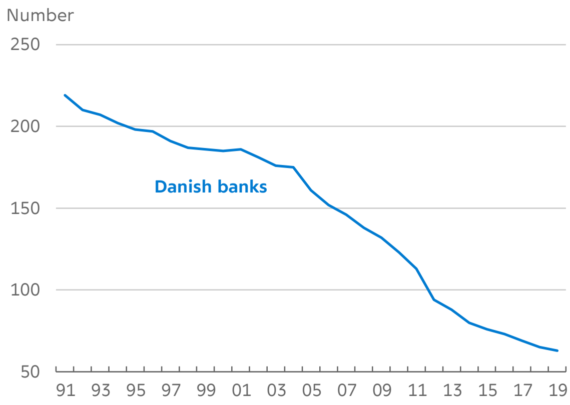
margins reflects the fact that private homeowners continue to opt for more secure types of loans when financing their home. It is only natural for earnings per loan to fall as credit risk declines.

Several acquired banks have had low earnings
Since the early 1990s, the number of Danish banks has fallen from 219 to 63, see chart 33. The development reflects a long-term trend, with the reduction taking place in all years from 2001-2019, but especially in the first years following the 2008-09 financial crisis. In view of the increasing level of complexity, among other things, there are probably economies of scale to be had from operating a credit institution on a larger scale than in the past, and therefore the consolidation in the banking sector is likely to continue in the coming years.

In 2020, there have been several examples of further consolidation. The continuing institution's motivation for a merger has often been to take over assets in order to streamline and increase its earnings capacity through, for example, synergies.

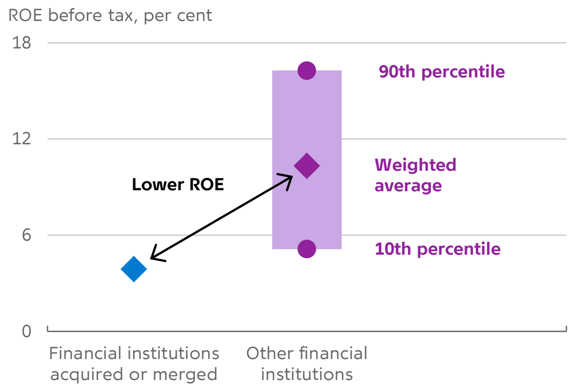
Since 2015, institutions that have subsequently been acquired or merged with major banks have generally had lower earnings measured by ROE than the rest of the sector, see chart 34. For banks with a non-viable business model, it may be sensible to be part of acquisitions or mergers with a major bank.

The number of Danish banks has declined significantly Chart 33



Source: Finance Denmark.

Lower ROE in banks that have subsequently been acquired or merged Chart 34



Note: ROE before tax for financial institutions in the period end of 2014 to end of the 1st half of 2020. 'Financial institutions acquired or merged' are institutions which during the period have been acquired or merged with one of the financial institutions in the analysis, see appendix on analysis data. 'Other financial institutions' are the other financial institutions in the analysis.
Source: The Danish Financial Supervisory Authority and own calculations.

Relaxed capital adequacy requirements have boosted banks' excess capital adequacy

Credit institutions should remain cautious about dividend payments
So far, the credit institutions have come through the crisis relatively unscathed. But there is still a lot of future uncertainty. The expiry of relief packages in the 1st half of 2021 could lead to higher credit losses next year compared to this year, and the economic outlook could deteriorate further. The credit institutions should thus be cautious when planning dividend payments in the coming period.

The excess capital adequacy relative to the credit institutions' capital adequacy requirements has largely increased as a result of the relaxed capital adequacy requirements implemented by the authorities since the coronavirus outbreak, see chart 35. Some of these relaxations are likely to be temporary and reversed when the economy returns to normal following the containment of the coronavirus.

Earlier this year, the Minister for Industry, Business and Financial Affairs released the countercyclical capital buffer and cancelled increases that were already scheduled to come into force later. The release of the buffer was to give institutions additional leeway to expand their lending capacity during the corona crisis. Therefore, the release is not targeted at the distribution of dividends or buy-backs of own shares.

In September, the Systemic Risk Council pointed out that it is important to start rebuilding the buffer as economy activity expects to return to normal in the coming years. The Council also announced that it may recommend an increase in the buffer during 2021. As a general rule, it takes 12 months from a decision is made to raise the buffer until an increase takes effect.

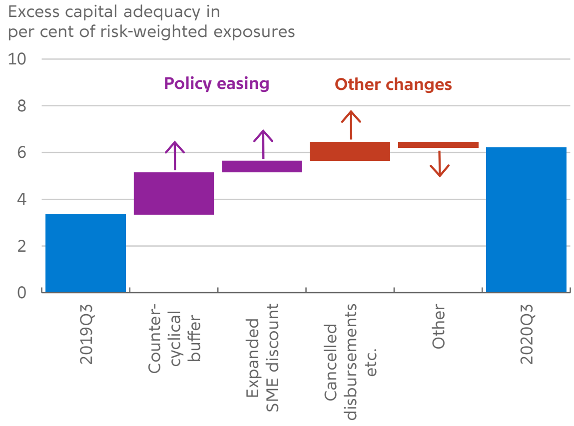
Following the coronavirus outbreak, the European Parliament relaxed the requirements imposed on banks, including advancing a planned increase in the discount granted to banks for the capital they have tied up in loans to small and medium-sized enterprises (SMEs). The discount is extended to cover, for example, all loans to SMEs as described in the section below.

In the spring, Danske Bank, Nykredit, Jyske Bank, Sydbank and Spar Nord decided to cancel the dividend payments recommended at their annual general meetings earlier this year along with the planned and existing share buy-back programmes. This has allowed the institutions to build up additional loss-absorbing capital, which has also contributed to the higher excess capital adequacy in the banking sector compared to last year. Taking a longer-term view, banks are generally better capitalised today than, say, in the run-up to the 2008-09 financial crisis.

Excess capital adequacy still varies considerably across the individual institutions, see chart 36. Danske Bank and DLR Kredit have a more limited excess capital adequacy than the other banks.

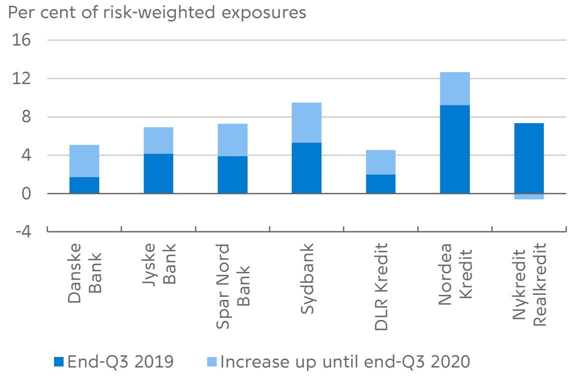
Some systemic institutions show non-compliance with buffer requirements in stress tests
Danmarks Nationalbank's latest stress test shows that individual systemic credit institutions exceed the

Excess capital adequacy relative to risk-based capital adequacy requirement has increased Chart 35



Note: Change in the total excess capital adequacy of systemic credit institutions for fully phased-in requirements. 'Countercyclical buffer' reflects, among other things, the release of the implemented buffer rate and increases in the buffer that were announced but which had not yet come into force. 'Expanded SME discount' indicates the effect on excess capital adequacy reported in Danske Bank's interim report 2020.
Source: Danmarks Nationalbank and own calculations.

Major variations in excess capital adequacy across systemic institutions Chart 36

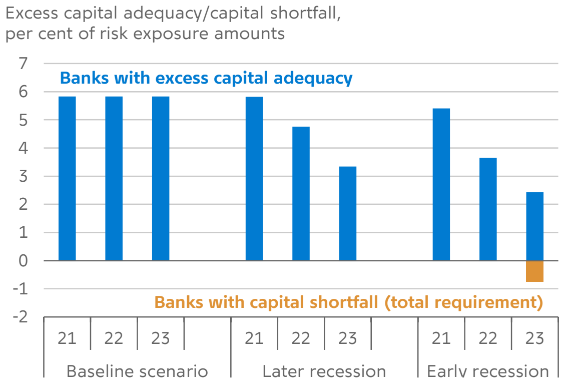


Note: Excess capital adequacy calculated at the capital level (Common Equity Tier 1 capital, Tier 1 capital or total own funds) with the shortest distance to the risk-based capital adequacy requirements for the institution. The risk-based capital adequacy requirements comprise the minimum capital adequacy requirement, the Pillar II add-on, the SIFI buffer, the capital conservation buffer and the countercyclical capital buffer.
Source: Danmarks Nationalbank and own calculations.

requirements for their capital buffers in a severe and early recession, see chart 37.[8] None of the systemic credit institutions fail to comply with their minimum capital adequacy requirements.

In most credit institutions, capitalisation has been strengthened in the past year, both as a result of retained earnings and relaxed requirements. Institutions are thus better equipped to withstand stress. Conversely, the fact that the institutions' earnings have fallen and the first line of defence against losses is weaker than in the past affects the stress test negatively. As a result, some banks have less capital to cushion the effects of a downturn.

Some systemic credit institutions show non-compliance with buffer requirements in stress tests Chart 37



Note: The excess capital adequacy or capital shortfall of systemic credit institutions that either have excess capital adequacy or a capital shortfall as a percentage of their total risk exposure amounts.
Source: The Danish Financial Supervisory Authority and own calculations.

Low excess capital adequacy relative to MREL requirement weakens banks' resilience

Before the institutions in the stress test come into conflict with their capital buffer requirement, they risk being in non-compliance with their MREL requirement. Therefore, the institutions should either increase their level of capital or issue appropriate debt instruments to ensure a more robust excess capital adequacy relative to the requirement. Institutions should keep in mind that issuance can be difficult and expensive during periods of financial market turmoil. Access to the market was weakened for a while earlier this year, and the cost of issuances in the market was at an elevated level.

Credit institutions are subject to a number of different requirements for their capitalisation and composition of liabilities. The institutions must meet a risk-based capital adequacy requirement consisting of a minimum requirement and a buffer requirement. From 1 July 2021, they must also meet a minimum leverage ratio requirement, which measures an institution's capital as a share of its total assets. Banks must also meet an MREL requirement, while mortgage bank institutions must meet a debt buffer requirement. Groups with both a bank and a mortgage bank institution must meet a combined MREL and debt buffer requirement as described below.

Overall, systemic credit institutions will be in non-compliance with the combined MREL and debt buffer requirement already after a decrease in the total own funds of around 4 per cent of their risk exposure amounts, see chart 38. By comparison, systemic credit institutions are in non-compliance with their risk-weighted buffer requirements only after a decrease of around 6 per cent of their risk exposure amounts, while non-compliance with the minimum requirement occurs only after a decrease in their own funds of around 13 per cent.[9]

Non-compliance with MREL or debt buffer requirements is regarded as a severe violation of the Danish Financial Business Act. The Danish Financial

8 See Danmarks Nationalbank, A few banks fall short of capital requirements in stress test, *Danmarks Nationalbank Analysis (Stress test)*, no. 27, December 2020 (*link*).

9 Overall, systemic credit institutions also have less excess capital adequacy relative to the future minimum leverage ratio requirement than to the risk-based capital adequacy requirement. Altogether, the buffers to be complied with on top of the risk-based minimum capital adequacy requirement do not fully constitute actual buffers, see Danmarks Nationalbank, Can capital buffers actually help banks in times of crisis?, *Danmarks Nationalbank Analysis,* no. 25, November 2020 (*link*). According to the upcoming leverage ratio requirement, credit institutions must have sufficient Tier 1 capital to cover 3 per cent of the institution's unweighted exposures.

Supervisory Authority will typically demand that the institution comply with the requirement within a specified deadline. The Danish Financial Supervisory Authority may also impose a number of restrictions on the institution, for example in relation to dividend payments. As a last resort, the Danish Financial Supervisory may transfer control of the institution to Finansiel Stabilitet, if it finds an institution to be failing or likely to fail.

The MREL requirement is to ensure that the institutions' activities are funded to enable recovery and resolution of the institutions, irrespective of their size. The framework for recovery and resolution complies with the rules established by the EU Bank Recovery and Resolution Directive, BRRD, implemented in 2014. These rules were introduced after the financial crisis in 2008-09 when several countries had been forced to use government funds to bail out institutions in crisis. The European Commission has adopted a number of amendments to, among other things, the MREL requirement, see box 6. The Danish authorities have chosen to exempt mortgage credit institutions from the MREL requirement; instead they have to comply with the so-called debt buffer requirement.[10]

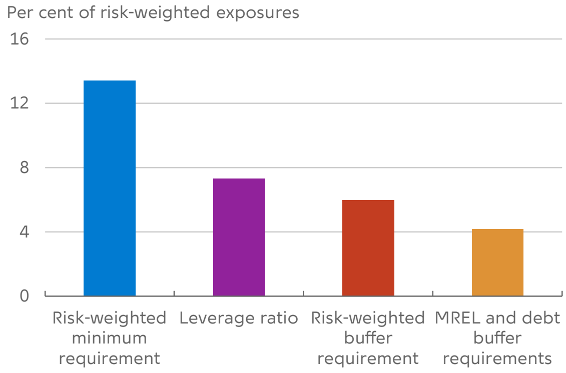
Danish credit institutions have collectively issued non-preferred senior debt of approximately kr. 185 billion since 2018, see chart 39. The MREL requirement has been in force for systemic banks since 1 July 2019, and in 2020 the volume of new issuances has gone down significantly.[11] This should be seen in the context of a period of difficult market conditions following the coronavirus outbreak and the resulting relaxation of the MREL requirements by the Danish Financial Supervisory Authority.

Many countries have temporarily relaxed bank capital requirements

This year, many countries have taken steps to relax bank capital requirements, either in the form of a less strict assessment of risk in the banks or a lower

Systemic credit institutions have lower excess capital adequacy relative to the MREL requirement than to the other capital adequacy requirements

Chart 38

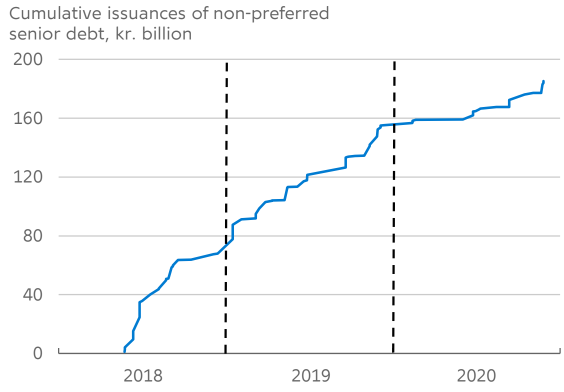


Note: Systemic credit institutions' total excess capital adequacy relative to buffer and minimum capital requirements, the leverage ratio requirement and the combined MREL and debt buffer requirement as a percentage of their total risk exposure amounts, respectively. For the risk-based capital adequacy requirement, the excess capital adequacy is calculated at the capital level (Common Equity Tier 1 capital, Tier 1 capital or total own funds) with the shortest distance to the requirements for the individual group. The leverage ratio becomes a binding minimum requirement from 1 June 2021. Data are for the 1st half of 2020.

Source: Danmarks Nationalbank and own calculations.

Fewer MREL debt issuances in 2020

Chart 39



Note: Cumulative issuances of non-preferred senior debt by Danish credit institutions. The most recent issuance is from 25 November 2020.

Source: Bloomberg and own calculations.

10 The debt buffer requirement represents 2 per cent of the institution's total lending. From 1 January 2022, groups which include a mortgage credit institution are subject to a combined minimum requirement, according to which the sum of capital adequacy, MREL and debt buffer requirements must make up at least 8 per cent of the group's balance sheet.

11 Spar Nord Bank must comply with the institution's fully phased-in capital adequacy requirement from 1 July 2022 onwards.

capital requirement, see chart 40.[12] In addition, the authorities in a number of countries recommended that banks withhold their proposed dividends for the financial year 2019 and cancelled share buy-back programmes.

Following the coronavirus outbreak, many European countries released or reduced the countercyclical capital buffer. For example, the Swedish Financial Supervisory Authority released the buffer, while the Norwegian Minister of Finance lowered the buffer from 2.5 per cent to 1 per cent.

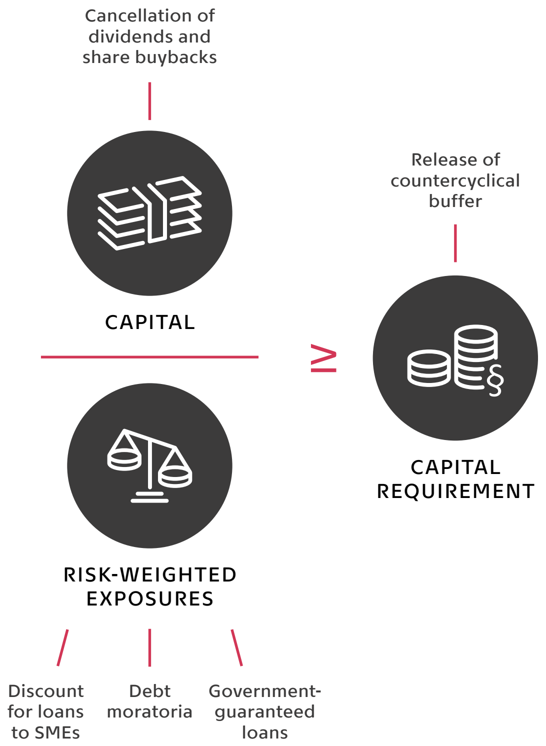
In June, the European Parliament adopted a number of temporary relaxations and clarifications of the provisions of the EU Capital Requirements Regulation, CRR.[13] The relaxations include the advance of a planned increase in the discount granted to banks for the capital they have tied up in loans to SMEs.[14] According to the interim reports of Danske Bank, Nykredit, Sydbank and Spar Nord, the higher capital discount for these loans has, in isolation, increased their capital ratios by 0.5-0.8 percentage points.

Following the coronavirus outbreak, a number of European countries have introduced debt moratoria, which means that borrowers who meet certain criteria can defer their loan payments for, for example, 3-6 months.[15] The package also gave banks wider scope for exempting loans comprised by a debt moratorium from their distressed loans. At the same time, the package widened the scope for lowering the capital requirement for government-backed loans.

The European IFRS 9 transitional arrangement was also postponed for a further two years for impairment charges recorded after 1 January 2020. This means that the standard will not be fully implemented until 2025. Danske Bank, Sydbank and Spar Nord apply the transitional arrangement, while Jyske Bank and Nykredit have already phased in IFRS 9 in full.

Many measures taken to increase banks' excess capital adequacy

Chart 40



Note: The capital ratio comprises capital as a percentage of risk-weighted exposures and must be greater than or equal to the capital adequacy requirement. The measures are presented in relation to whether the measure affects capital, risk-weighted exposures or the capital adequacy requirement, respectively. Broadly speaking, debt moratoria are defined as agreements to defer payment obligations on existing debt.

12 See, for example, chapter 4 'Covid-19 challenges and policy responses' in IMF, *Global Financial Stability Report*, October 2020 (*link*).

13 See Regulation (EU) 2020/873 of the European Parliament and of the Council of 24 June 2020 amending Regulations (EU) No 575/2013 and (EU) 2019/876 as regards certain adjustments in response to the COVID-19 pandemic.

14 The capital discount also applies to financing for certain infrastructure projects. The advance was part of a comprehensive package of relaxations called 'CRR quick fix'. Among other things, the package also included more favourable treatment of some software assets.

15 Se European Banking Authority, First evidence on the use of moratoria and public guarantees in the EU banking sector, *Thematic Note*, no. 31, November 2020 (*link*).

Upcoming changes to MREL requirement with BRRD2

Box 6

In May 2019, the European Parliament and the Council of the European Union adopted a number of amendments to the Bank Recovery and Resolution Directive (BRRD2). The amendments especially concern the MREL requirement and must ensure conformity with the requirements laid down for global systemically important banks. Some parts of the revised BRRD2 have already been implemented in Denmark, while the rest of the amendments are expected to come into force on 1 January 2021.

Two MREL requirements
In future, the MREL requirement must be determined both as a percentage of risk-weighted exposures (the risk-weighted MREL requirement) and as a percentage of total exposures (the non-risk-weighted MREL requirement), see the chart below. The MREL requirement is currently determined only as a percentage of risk-weighted exposures. It is expected that the risk-weighted MREL requirement will be the strictest of the two requirements imposed on the Danish banks and that it will therefore remain a binding requirement for the institutions.

The MREL requirement continues to comprise a loss absorption amount and a recapitalisation amount to reflect the resolution strategy of each institution. The loss absorption amount is the minimum loss that the institution must be able to withstand. The recapitalisation amount must ensure that the institution's capital can be restored to a level where the institution is once again in compliance with the capital adequacy requirements and can maintain sufficient market confidence so that, after recovery and resolution, the institution can continue as a viable operation if that is the resolution strategy of the institution. Resolution authorities may implement loss absorption and recapitalisation by writing down and converting the institution's capital instruments and liabilities, also known as a bail-in.

For the risk-weighted MREL requirement, the assumption is that the loss absorption amount corresponds to the solvency need, while the recapitalisation amount corresponds to the solvency need plus a market confidence buffer. The market confidence buffer is calculated as the combined buffer requirement less the countercyclical capital buffer.

For the non-risk-weighted MREL requirement, the assumption is that both the loss absorption amount and the recapitalisation amount must correspond to the upcoming leverage ratio requirement. The leverage ratio requirement is 3 per cent of the unweighted exposures.

Combined buffer requirement must be met separately
With BRRD2, the overall buffer requirement will no longer be included in the loss absorption amount of the MREL requirement. Instead, it must be met as a separate requirement. The instruments used to meet the combined buffer requirement may not be used concurrently to meet the MREL requirement. The overall requirement imposed on the institutions is therefore unchanged.

Introduction of subordination requirement
Danish institutions are currently subject to the requirement that the entire MREL requirement must be met through liabilities that are subordinated, i.e. liabilities that absorb losses before unsecured creditors[1]. BRRD2 introduces both minimum and maximum limits for the subordination requirement. BRRD2 divides the institutions into four size categories, and the subordination requirement depends on the category of the institution.

For Danish systemic credit institutions, the subordination requirement would normally have to represent 8 per cent of their total liabilities. The subordination requirement can then be adjusted up to a maximum limit or down to a minimum limit if a number of conditions are met. The maximum limit is twice the solvency need plus the combined buffer requirement. The maximum subordination requirement relates both to compliance with the MREL requirement and to compliance with the combined capital buffer requirement. The combined capital buffer requirement must be met through subordinated funds, and therefore subordination can only be required for a share of the MREL requirement. Consequently, subordination cannot be required for an amount equal to the capital conservation buffer and the SIFI buffer. According to the implementation of BRRD2, the Danish Financial Supervisory Authority is expected to adjust the subordination requirement up to the maximum limit for all systemic credit institutions.

Other Danish banks are generally not subject to any subordination requirement. However, a subordination requirement may be introduced for other institutions corresponding to the subordination requirement for systemic credit institutions if it is considered necessary to avoid that creditors covered by a bail-in will be worse off in the event of a resolution than in the event of liquidation.

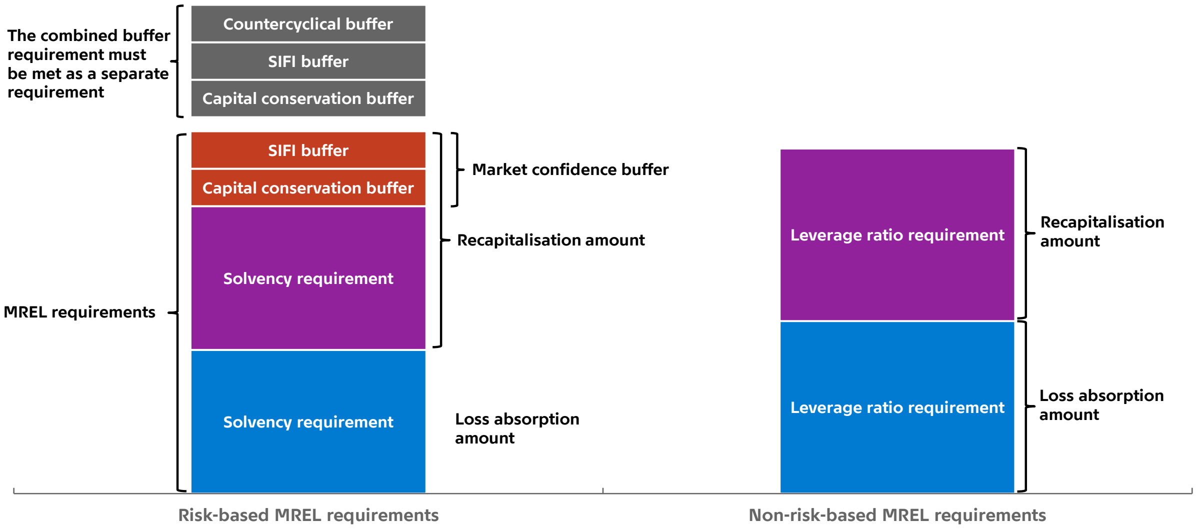
Continues

1. Unsecured creditors comprise, for example, senior debt and deposits from large corporations.

Upcoming changes to MREL requirement with BRRD2
continued

Box 6

MREL requirement in BRRD2



Appendix: Analysis data

The analysis applies 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.

The analysis of Danish credit institutions' earnings, liquidity and own funds comprises seven systemic credit institutions selected by the Danish Financial Supervisory Authority, most recently in 2020. These institutions are listed in table 1. The analysis also includes the non-systemic financial institutions which make up the institutions in group 2 of the Danish Financial Supervisory Authority's most recent size group for 2020. Unlike in the Danish Financial Supervisory Authority's group 2, Saxo Bank has been omitted from the population due to its business model. The grouping applies backward in time.

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. Group 1 of the Danish Financial Supervisory Authority consists of large banks and Nordea Danmark, while group 2 of the Danish Financial Supervisory Authority consists of medium-sized banks plus Handelsbanken and Santander Consumer Bank.

Institutions in the analysis by total assets as at 30 June 2020. Kr. million Table 1

Systemic credit institutions	Amount
Danske Bank	4,061,603
Nykredit Realkredit	1,597,903
Jyske Bank	642,117
Nordea Kredit	455,346
DLR Kredit	173,243
Sydbank	150,402
Spar Nord	95,242
Total systemic groups	7,175,855

Systemic banks	
Danske Bank	2,541,764
Jyske Bank	302,634
Nykredit Bank	194,231
Sydbank	152,577
Spar Nord	95,311
Total systemic banks	3,286,517

Non-systemic banks	
Arbejdernes Landsbank	61,458
Ringkjøbing Landbobank	53,984
Sparekassen Kronjylland	31,189
Sparekassen Sjælland-Fyn A/S	26,427
Sparekassen Vendsyssel	26,412
Lån & Spar Bank	26,045
Vestjysk Bank	21,871
Jutlander Bank	20,060
Den Jyske Sparekasse	16,109
Middelfart Sparekasse	13,799
Alm. Brand Bank	13,147
Total non-systemic banks	310,502

Mortgage credit institutions	
Nykredit Realkredit	1,480,313
Realkredit Danmark	862,396
Nordea Kredit	455,346
Jyske Realkredit	366,986
DLR Kredit	173,243
Total mortgage credit institutions	3,338,284

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. The assets in the financial statements of the mortgage credit institution Nykredit Realkredit also reflect the Nykredit Group's funding of the subsidiary Totalkredit as well as funding of the most recent lending in the subsidiary LR Realkredit.
Source: Danmarks Nationalbank.

PUBLICATIONS

NEWS

News offers a quick and accessible insight into an Analysis, an Economic Memo, a Working Paper or a Report from Danmarks Nationalbank. News is published continuously.

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Analysis from Danmarks Nationalbank focuses on economic and financial matter. Some of the analyses are published with a regular frequency e.g. *Outlook for the Danish economy and Financial stability*. Other analyses are published continuously.

REPORT

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ECONOMIC MEMO

Economic Memo is a cross between Analysis and Working Paper and it often shows the ongoing study of the authors. The publication series is primarily targeted at professionals. Economic Memo is published continuously.

WORKING PAPER

Working Paper presents research projects by economists in Danmarks Nationalbank and their associates. The series is primarily targeted at professionals and people with an interest for academia. Working Paper is published continuously.

The analysis consists of a Danish and an English version. In case of doubt regarding the correctness of the translation the Danish version is considered to be binding.

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ANALYSIS

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FINANCIAL STABILITY – 1ST HALF 2021

Build-up of risks in credit institutions

Booming housing market gives cause for concern

Higher down payment requirement and amortisation requirement for highly indebted homeowners are among the measures that should be considered in order to limit vulnerability in connection with a subsequent drop in house prices.

Banks are ready for the ongoing economic recovery

Bank lending to hard-hit corporations is limited, and provisions have been made to handle losses. It is assessed that banks are well equipped to handle an expiry of government liquidity-supporting measures.

Banks' capital requirements should be rebuilt

Accommodative financial conditions and risk build-up mean that the banks' capital requirements should be re-established by raising the countercyclical capital buffer. Stress tests of the credit institutions show that a few institutions should consider their capitalisation.

CONTENTS

Summary and assessment

FINANCIAL MARKETS

Prospects of higher global economic growth
After a year with the covid-19 pandemic and large declines in economic activity, the global economy is entering an economic upswing with high growth rates. In Denmark, economic activity is expected to pick up sharply during the year in line with the population being vaccinated against covid-19 and the reopening of society. In Denmark and internationally, equity markets have continued the trend with increasing equity prices since April 2020.

Expectation of a higher level of inflation has resulted in higher interest rates
In early 2021, long-term government bond yields increased in the United States and the euro area. One reason for the increase was expectations of rising inflation in step with expected increased global economic growth. Even though long-term mortgage rates have also risen, they remain at a very low level.

Credit premium remains at a low level
The financial markets are still characterised by high risk appetite among investors and low credit premiums even though the long-term interest rates have increased. Many central banks have continued their extraordinary measures initiated at the beginning of the pandemic, such as the injection of liquidity into the markets and purchases of government bonds and corporate bonds.

Rising demand for green financial assets
The markets for green assets are still emerging and are currently seeing rapid development. Joint standards for what is sustainable and green strengthen investors' ability to price the assets. The EU's taxonomy in this area and the requirement for publication of the climate impact of activities are a good starting point.

CREDIT

Booming housing market during the pandemic
During the pandemic, the Danish housing market has been characterised by both high trading activity and rapidly rising prices.

The conditions for continued rising prices are currently present in the housing market. Sharp increases in housing prices increase the risk of subsequent price decreases.

Housing tax agreement may support a better balanced housing market
The design of the tax system does not help to dampen housing market fluctuations. The current housing taxation, in which the nominal property value tax is frozen, means that the effective taxation decreases when prices rise. The housing tax agreement from 2017, aimed at reestablishing the connection between the tax payment and market value of the home, is expected to enter into force in 2024. The Danish tax deduction for interest costs has not been reduced to the same extent as the effective property taxes since the freeze, and the difference in taxation of the value of owning a home and the interest deduction for debt poses a challenge to housing market stability.

Signs of increased risks in institutions' housing lending
Danish homeowners' gross debt in relation to their income is among the highest in the world, and lending to homeowners has increased moderately in recent years. There are also certain signs of increased risk-taking in the lending: In 2020, loans to highly indebted home buyers constituted a higher share of total new lending, especially in the City of Copenhagen and environs.

High refinancing activity increases housing debt
Credit growth may pick up if households choose to mortgage part of their rising home equity. In 2020, about half of homeowners who refinanced their mortgage loans chose to increase their mortgage debt. Additional borrowing in connection with mortgage refinancing has, on average, increased these homeowners' loan-to-value ratios, and they have only repaid other bank debt to a limited extent.

High loan-to-value ratios may weaken credit institutions' resilience
It is important to financial stability in Denmark that there is high credibility of the mortgages underly-

ing housing lending and thus the issued mortgage bonds. The Danish down payment requirement of 5 per cent for home purchases is low relative to the other Nordic countries. In addition, the vast majority of first-time buyers borrow right up to the threshold.

Experience with loan rules shows that they can contribute to more resilient housing lending
Over a number of years, the authorities have introduced borrower-based requirements for credit institutions' housing lending to curtail the riskiest borrowing. For example, in 2020, the thresholds were binding for many first-time buyers in the City of Copenhagen and environs as well as in Aarhus. Experience shows that lending rules can contribute to limiting the extent of risky borrowing.

There is reason to consider tightening lending rules
With rapidly rising housing prices and an existing basis for further price increases, there is reason to look at a tightening of the lending rules to limit vulnerability to a subsequent drop in housing prices. A higher down payment requirement and an amortisation requirement for highly indebted homeowners are among the measures that should be considered. At its next meeting in June, the Systemic Risk Council expects to recommend to the Danish Government that further measures be taken to limit continued risk build-up in the housing market.

So far, banks' corporate customers have weathered pandemic better than feared
The banks continue to report declining loan demand from their corporate customers. Government compensation schemes and liquidity-supporting measures help reduce the need for credit. The banks are well equipped to make loans to viable corporations when the government liquidity support for their customers ends. At the same time, the corporations currently make little use of the government relief packages, and it is assessed that the banks will be able to handle any deterioration in the creditworthiness of their customers on expiry of the relief packages.

Increased digitalisation may push down prices of some commercial properties
Increased working from home and online shopping may result in less demand for office and retail space. There is still a great deal of uncertainty as to where the development is heading, but mortgage credit institutions should take it into their considerations when assessing the risk on parts of their lending against collateral in commercial properties.

EARNINGS

Banks expect rising earnings in 2021
Except for DLR Kredit, the systemic credit institutions expect higher earnings in 2021 than in 2020. In April, several institutions raised their expectations with, among other things, reference to the high activity in the housing market.

Banks have reduced deposit rates
For several years, both household customers and corporate customers have paid less to keep their savings with the banks than what the banks can obtain by placing the deposits in the short-term money market. However, the banks may place a certain proportion of the deposits in assets with a higher rate of return by tying up some of the deposit funds for a longer term or by letting them replace other more long-term sources of financing. Hence, the return depends on multiple factors. Lately, banks have reduced deposit rates for both household customers and corporate customers. In 2020, a reduction in deposit rates has contributed to a decrease in the banks' net interest payments on deposits of approx. kr. 1.4 billion, equal to approximately 10 per cent of the systemic and non-systemic banks' profit before tax in 2020.

CAPITAL

Continued increase in excess capital adequacy
The systemic institutions' capitalisation was generally strengthened during 2020, while there is still a large difference in the level of excess capital adequacy relative to their capital adequacy requirements across the individual systemic institutions.

Seen in the light of the accommodative financial conditions and risk build-up, the requirement for the banks' capital should be re-established by raising the countercyclical capital buffer. If the projected positive economic development materialises, a rapid re-establishment of the buffer may be necessary. Even if there is a rapid re-establishment, the institutions are generally well equipped to meet the requirement. The Systemic Risk Council expects to recommend an increase in the countercyclical capital buffer later this year, with entry into force in 2022.

Dividend payments resumed to a limited extent
Since the outbreak of the pandemic, the payment of dividends by banks has been limited across Europe.

The sudden economic crisis in connection with the pandemic underlines the need for robust banks. However, the Danish banks appear to have gotten through the pandemic relatively unscathed so far, and they have paid moderate dividends to their investors in spring in accordance with the Danish Financial Supervisory Authority's guidelines.

A few systemic institutions fail to meet capital adequacy requirements in stress test
Danmarks Nationalbank's latest stress test shows that a few systemic institutions breach the requirements for their capital buffers in the most severe recession scenario. The future leverage ratio requirement is breached to a very limited extent in the most severe recession scenario. The breach of capital requirements should give rise to a few institutions considering their capitalisation.

New rules for MREL requirement have entered into force
On 28 December 2020, new rules entered into force when the revised Bank Recovery and Resolution Directive was implemented with final effect. The individual institutions should therefore remain focused on building up a sufficient buffer to their minimum requirement for own funds and eligible liabilities (MREL) to ensure flexibility and scope.

LIQUIDITY AND FUNDING

Banks' liquidity ratios have decreased
The systemic banks' liquidity reserves have decreased since the turn of the year, but remain at a high level. The banks' liquidity buffers were already relatively solid before the outbreak of the pandemic last year, but, during the pandemic, government liquidity support measures for the corporate sector have contributed to additional buffers. Danmarks Nationalbank's latest sensitivity analysis of the systemic banks' liquidity reserves shows that the banks can handle severe liquidity stress for at least four months.

Banks' liquidity can absorb increased outflows when government liquidity support ends
The banks should be prepared for a decline in the temporarily increasing liquidity reserves as liquidity support measures are being phased out. A sensitivity calculation shows that the survival horizon of institutions decreases in cases of the deferred tax and VAT payments being repaid and corporations activating their unused credit facilities. The survival horizon still exceeds three months.

Good time to build up a more resilient excess capital adequacy relative to the banks' MREL requirement
The risk premium for non-preferred senior debt has decreased to a lower level than seen in the run-up to the pandemic. The development reflects a large risk appetite among investors in the debt issuance markets. The current market situation is a good time for the banks to build up a more resilient excess capital adequacy relative to their minimum requirement for eligible liabilities (MREL).

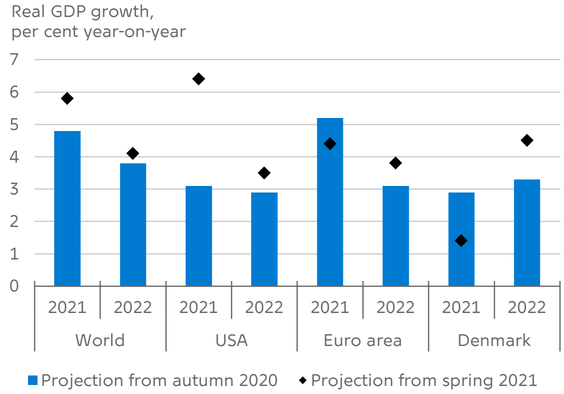
Financial markets are characterised by prospects of rapid recovery

Prospects of higher global economic growth
After a year with the covid-19 pandemic and large declines in economic activity, the global economy is entering an economic upswing with high growth rates. The International Monetary Fund (IMF) has revised its growth estimate further upwards in the past six months, see chart 1. The adjustments are primarily due to growth in the US economy. The economies in the euro area and Denmark have shown a weaker performance during the first part of 2021, thus lowering the outlook for the activity level in 2021. In Danmarks Nationalbank's latest projection, economic activity is expected to pick up sharply during the year as the population is being vaccinated against covid-19 and society reopens.[1]

Equity prices have continued to rise
Equity markets in the United States and the euro area have continued the trend with rising equity prices since April 2020, see chart 2. The roll-out of vaccines and continued monetary and fiscal policy support programmes have contributed to better prospects of growth and higher asset prices. In autumn 2020, the second wave of the pandemic hit economic activity in many countries, but only had a brief negative effect on equity markets. Both the US S&P 500 index and the Danish C25 index have since risen to new record highs. The equity markets in the euro area have developed more moderately and have only reached the pre-pandemic level in spring 2021.

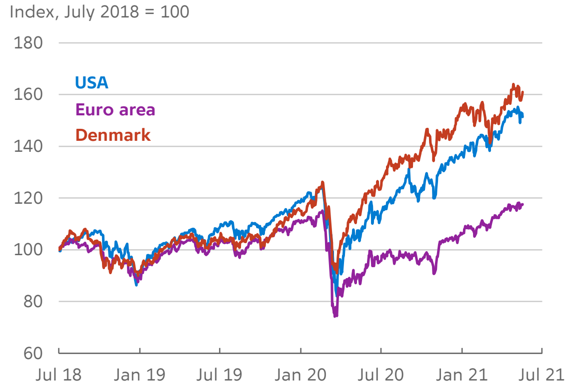
Expectation of higher inflation has resulted in higher interest rates
In early 2021, long-term government bond yields increased in the United States and the euro area, see chart 3. One reason for the increase was expectations of rising inflation mirroring the expected increased global economic growth. Short-term interest rates have not risen to the same extent, which has resulted in a steeper yield curve.

Expectations of a solid global economic upswing Chart 1



Note: IMF estimates for the world, USA and the euro area from April 2021 and October 2020, respectively. GDP growth in Denmark is based on Danmarks Nationalbank's projections from March 2021 and December 2020.
Source: IMF and Danmarks Nationalbank.

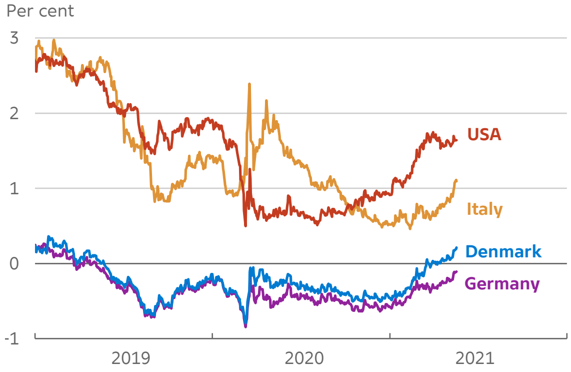
Equity markets have continued to rise Chart 2



Note: The C25 index is shown for Denmark, Eurostoxx 600 for the euro area and S&P 500 for USA. The most recent update is from 18 May 2021.
Source: Refinitiv Eikon.

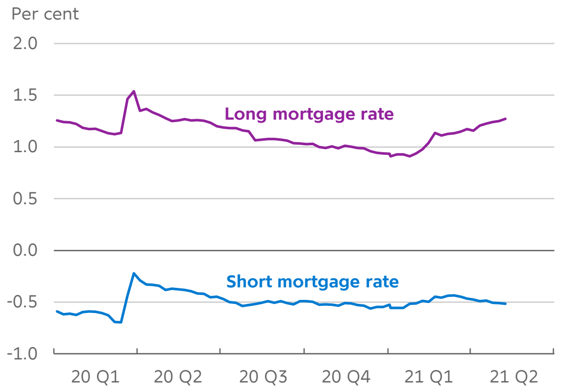
1 See Danmarks Nationalbank, Prospects of a rapid recovery once restrictions are eased, *Danmarks Nationalbank Analysis (Outlook for the Danish economy)*, No. 7, March 2021 (*link*).

Rising government bond yields Chart 3



Note: 10-year government bond yields. The most recent observations are from 18 May 2021.
Source: Refinitiv Eikon.

Moderate increase in long-term mortgage rates Chart 4



Note: Average effective bond yield for both long-term and short-term mortgage bonds. The most recent observations are from week 19 in 2021.
Source: Finance Denmark.

The first months of 2021 were characterised by rising government yields and increased volatility in several markets, for example the equity market. Risks associated with an increase in the level of interest rates are linked to a situation in which interest rates rise unexpectedly and suddenly as a consequence of a change in expectations in the market.

Continued very low mortgage bond yields

Even though long-term Danish mortgage rates have increased, they remain at a very low level, see chart 4. Danish borrowers thus still have access to home financing at very low interest costs. Short-term mortgage rates have remained largely unchanged since early 2021.

The development in the long-term mortgage rate may be due to many factors in addition to rising inflation expectations. For example, the demand for mortgage bonds may be buoyed by some investors' need to reinvest the values of the bond series that mature on an ongoing basis, for example in connection with the April 2021 pay date. Conversely, rising market interest rates may lead to a longer expected maturity of callable mortgage bonds and higher interest rate risk for investors, see box 1. An increase in interest rate risk can thus in itself reduce demand, thus triggering a market dynamic where interest rate increases may become self-reinforcing.

Credit premium is at a low level

Although the level of interest rates has increased, the financial markets are still characterised by high risk appetite among investors, pushing credit premiums downwards, see chart 5. The credit premium reflects investors' willingness to take on the risks of a given debt instrument relative to a risk-free investment.

The central banks' accommodative monetary policy can support risk appetite in the markets. Many central banks have continued their extraordinary measures initiated at the beginning of the pandemic, such as the injection of liquidity into the markets and purchases of government and corporate bonds.

Rising demand for green financial assets

In 2020, equity prices increased heavily for a number of listed corporations engaged in international green energy activities, see chart 6. Some analysts point out that increased interest in investing in green energy is due to several governments having increased focus on the green transition. At the same time, more and more asset managers have been given explicit mandates to invest in green assets. However, the prices of these equities have partly dropped back in 2021.

The markets for green assets are still emerging and are currently seeing rapid development. Well-functioning financial markets play an important role in the transition towards a green economy and enable effective financing of more climate-friendly activities. However, the development entails a risk of signifi-

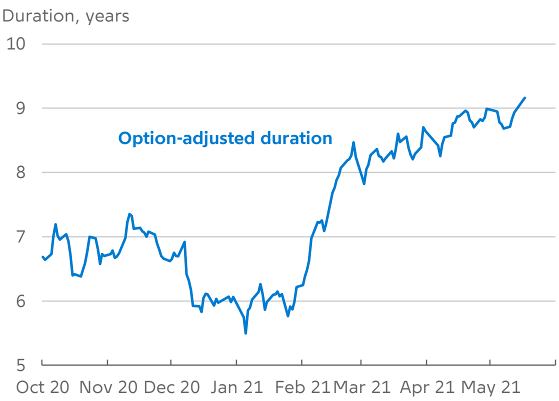
Box 1

Rising interest rates and refinancing may have added effect on mortgage rates

Investors' demand for callable mortgage bonds may be affected by, among other factors, changes in the expected maturity of the bonds, also known as the duration of the bonds. Callable bonds are characterised in that the borrower has an option to buy the bond at price 100 and thus redeem the loan. When interest rates increase, the price on these bonds will fall, making it less likely that the borrower will exercise the buyback option at some point before maturity. This means that the duration of the bond increases and consequently also the investors' interest rate risk.

Low interest rates and high loan refinancing activity in recent years have meant that many outstanding callable mortgage bonds have a coupon rate of 1 per cent.[1] Interest rate increases at the beginning of 2021 have resulted in the duration of these bonds and the investors' interest rate risk having increased, see chart below. An increase in interest rate risk may have a negative impact on bond demand, triggering a further interest rate increase. This may, for example, occur if some investors have a limited mandate to take on interest rate risk and will therefore demand fewer bonds. Other things being equal, this will boost the interest rate increase and have a self-reinforcing market dynamic. During periods with falling interest rates, the likelihood of borrowers choosing to exercise the buy-back option may, conversely, increase, and the same market dynamic may start with and amplify the fall in interest rates.

Higher duration on callable mortgage bonds

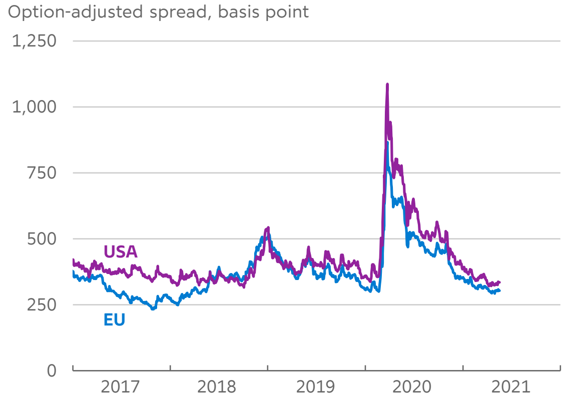


Note: Option-adjusted duration for the callable mortgage bond Nykredit 1 per cent 2053. The most recent observations are from 17 May 2021.
Source: Nykredit.

1. See, for example, Danmarks Nationalbank, Refinancing has boosted the interest rate pass-through to fixed-rate mortgages, *Danmarks Nationalbank Analysis*, No. 8, April 2021 (*link*).

Chart 5

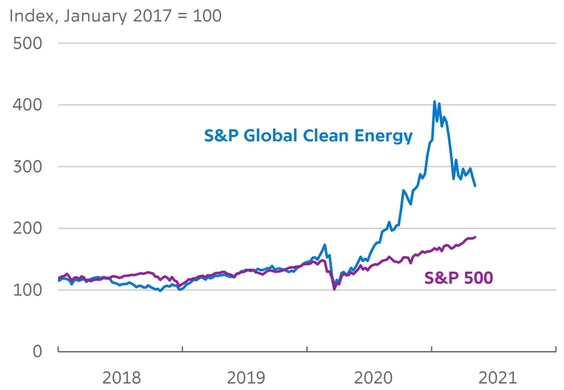
Continued low credit premiums in debt markets



Note: High-yield corporate bonds. The most recent observations are from 17 May 2021.
Source: Refinitiv Eikon.

Chart 6

Investors showed increasing interest in investing in green energy in 2020



Note: S&P Global Clean Energy is an index that follows 30 listed green energy corporations, including both Ørsted and Vestas. The most recent observations are from 14 May 2021.
Source: Bloomberg.

cant volatility in asset prices and sudden changes in market expectations.

Joint standards for what is sustainable and green strengthen investors' ability to price green assets. The EU's taxonomy in this area and the requirement for publication of the climate impact of activities are a good starting point and can contribute to strengthening transparency in relation to price formation.

Danish investors have increased their share of green bonds

In Denmark, bonds that can be categorised as green are especially held by insurance and pension funds. Although investments in green bonds have increased in the past few years, they still account for a modest share of 3 per cent of the sector's total bond holdings, see chart 7. Danish investment funds have also increased their investments in green bonds. One reason for the increase in green bond investments is that the overall bond market is becoming increasingly greener in these years.

Booming housing market during the pandemic

Housing market risks are building up

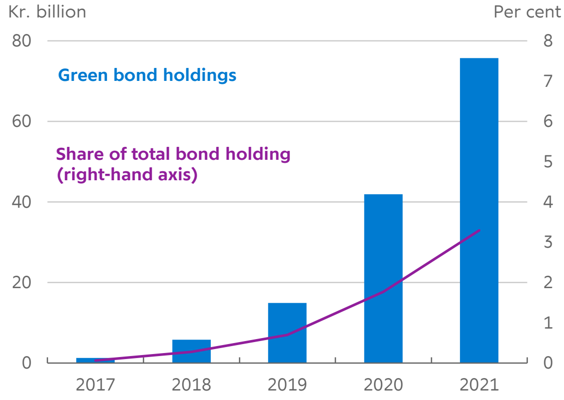
During the pandemic, the Danish housing market has been characterised by high trading activity and rapidly rising prices, see chart 8. Sharp increases in housing prices increase the risk of subsequent price decreases.

After a brief drop during the lockdown in spring 2020, housing market activity has remained at a high level. The number of transactions increased rapidly during the second half of 2020 and has reached a level above the years preceding the latest financial crisis. House prices have increased most in the City of Copenhagen and environs as well as in Aarhus.[2]

Demand is driving the development in house prices in the short term, as the overall housing stock cannot be changed at short notice, see also box 2.

Insurance and pension funds own an increasing volume of green bonds

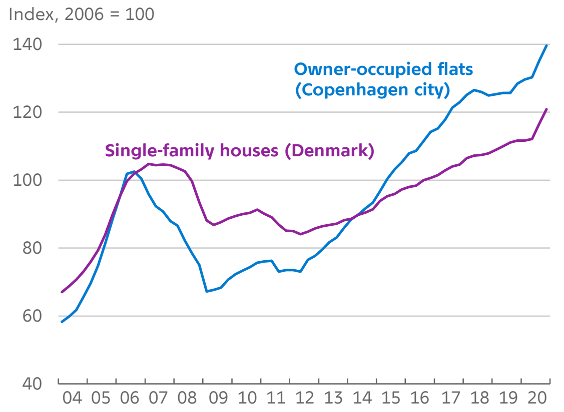
Chart 7



Note: Danish insurance and pension corporations' investments in green bonds. Data is calculated end-February for each year.
Source: Bloomberg and Danmarks Nationalbank.

House prices increased markedly in 2020

Chart 8



Note: The house prices are seasonally adjusted. The most recent observations are from end of Q4 2020.
Source: Statistics Denmark.

2 The City of Copenhagen and environs follow Statistics Denmark's definition of the provinces the City of Copenhagen and Greater Copenhagen.

Large housing price fluctuations linked to changes in housing demand

Box 2

Since the second half of 2020, housing market trading activity has increased markedly, and the supply of homes on the market has decreased, see chart A. Several fundamental factors have supported the high level of activity, for example persistently low interest rates and an economic development in which most households have managed to maintain high incomes despite the pandemic. But the pandemic and lockdowns may also have had a behavioural effect on the housing market. For example, more time spent in your own home and limited opportunities for some other types of consumption may have increased interest in certain housing aspects – for example the number of square metres, garden and natural surroundings – and thus boosted the housing demand.

The price of a home is basically determined by the willingness of home buyers to pay on the one hand and the willingness of homeowners to sell at a given price on the other. In other words, the market price is the price on which buyers and sellers can agree. Price formation in the housing market is influenced by the relatively long period involved in building new homes, which means that, in the short term, housing prices are most often driven by changes in demand. When trading activity is at a high level, housing prices have previously tended to rise as a result thereof, see chart B. In the longer term, initiated construction activity may increase the housing stock. Periods of housing price increases may thus be followed by a period of increasing housing supply.

The current activity in the housing market is higher than in the years leading up to the latest financial crisis. From the peak in house prices in 2006 to the trough in 2009, real prices of owner-occupied flats in the City of Copenhagen fell by more than 35 per cent. At the time, falling housing prices led to a significant increase in loan-to-value ratios. This may have created a need for consolidation among households, which contributed to dampening private consumption and thus aggregate demand and economic activity.

Housing market activity is high, and housing supply is low

Chart A

Increasing trading activity and decreasing number of homes for sale during pandemic

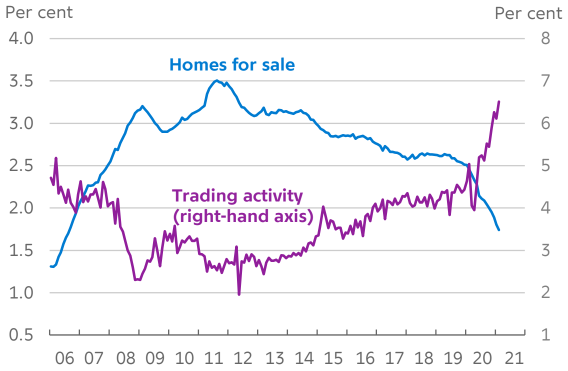
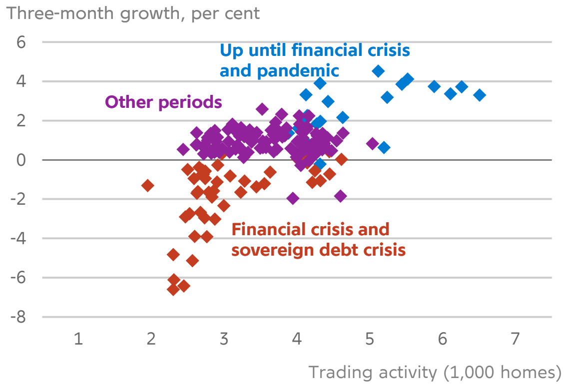


Chart B

Prices and trading activity go hand in hand in housing market



Note: Chart A: Number of single-family houses offered for sale as a percentage of the total housing stock and trading activity defined as the number of registered sales (seasonally adjusted). Chart B: Three-month growth rates in house prices (seasonally adjusted) for single-family houses and trading activity (seasonally adjusted). *Up until financial crisis and pandemic* is from the period May 2006 – April 2007 and from June 2020, *Financial crisis and sovereign debt crisis* is June 2007 – August 2009 and January 2011 – August 2012, and *Other periods* is August 2009 – December 2010 and September 2012 – April 2020. Monthly observations from June 2006 up to and including February 2021.

Source: Statistics Denmark and own calculations.

Housing taxes do not dampen housing market fluctuations

Chart 9

Chart A

Effective tax rates for single-family houses have fallen in recent years

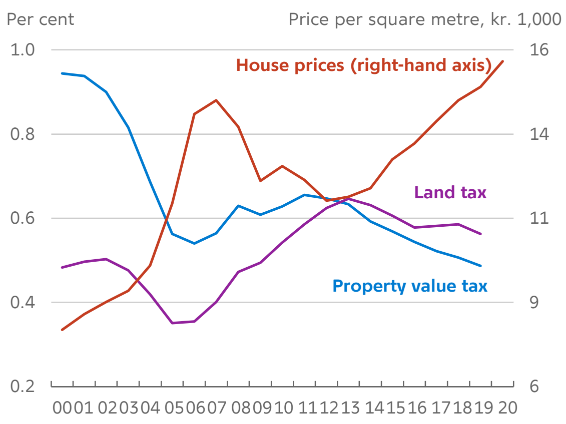
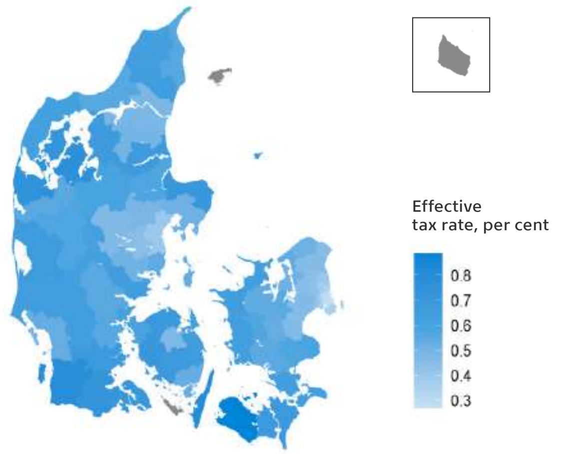


Chart B

Large regional effective tax rate differences



Note: Homeowners' property value tax and land tax as a percentage of total housing value. The tax rate for 2020 has been calculated solely on the basis of the development in house prices. Chart B: Effective tax rates for 2020 across municipalities. There is not a sufficient number of observations for the municipalities marked in grey.

Source: Own calculations based on real property register data from Statistics Denmark and Finance Denmark.

The conditions for further price increases are currently present in the housing market: Interest rates on mortgage loans are very low, and household incomes have been supported by compensation schemes.[3] At the same time, the design of the Danish tax system contributes to reinforcing housing market fluctuations, see the next section.

Housing taxation agreement may support a better balanced housing market

Housing taxes can act as an automatic housing price stabiliser if the current tax payment is proportionate to the value of the home. But the stabilising feature of housing taxes was removed with the tax freeze in 2001, when the nominal property value tax was frozen.[4] Restrictions have also been introduced on the annual rate of increase in the tax base of the land tax.

The nominal property value tax freeze means that the effective taxation decreases when prices rise, see chart 9. This has meant that the effective taxation is currently lowest in the municipalities around the large cities that have seen the highest housing price increases. The freeze has thus led to significant regional differences in taxation.

The implementation of the 2017 housing taxation agreement, the object of which is to re-establish the connection between tax payment and home value, has been postponed for a second time and is now expected to first take effect in 2024. The agreement will contribute to both smaller fluctuations in housing prices and a narrowing of regional price differences. Nonetheless, the size of these effects remains uncertain, one reason being that the new

3 See Bess and Werner, Households' disposable income is supported by compensation schemes for the corporate sector, *Danmarks Nationalbank Economic Memo*, No. 6, June 2020 (*link*).

4 The nominal property value tax freeze means that the tax base has been frozen at the real property value from 2002. However, the tax will be reduced if the real property value decreases to below the value in 2002.

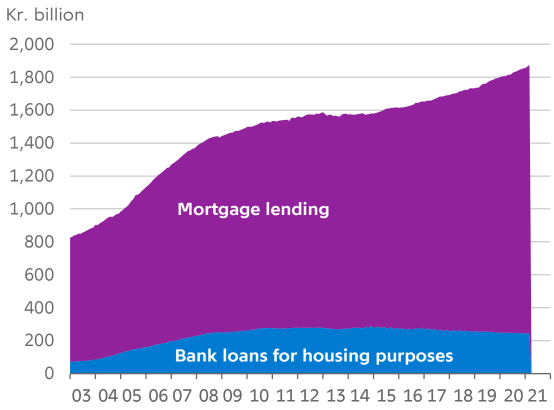
public property valuation system is expected first to be issued to homeowners from the summer of 2021 and onwards.[5]

A certain symmetry is built into the Danish tax system, where homeowners are taxed based on the value of their home through housing taxes and are entitled to a deduction for their interest costs from the interest deduction. However, the interest deduction has not been reduced to the same extent as the effective property taxes since the property value tax freeze. This has affected the symmetry and challenged housing market stability.

The interest deduction in Denmark is at a higher level than in our neighbouring countries. The high level gives Danish households an incentive to build up debt. Together with an accommodative pension return tax, the Danish interest deduction encourages both increased housing debt and greater pension savings.

At the current low level of interest rates, a reduction in the interest deduction will have a relatively modest effect on borrowers' finances.

Mortgage lending increases, while banks reduce lending for housing purposes Chart 10



Note: Mortgage loans and bank loans for housing purposes to employees, pensioners etc. The most recent observations are from March 2021.
Source: Danmarks Nationalbank and own calculations.

Signs of increased risks in institutions' housing lending

Household mortgage lending continues to rise
Danish homeowners' gross debt in relation to their income is among the highest in the world, and the mortgage credit institutions have increased their lending to homeowners by approximately 4 per cent a year in the past few years, see chart 10. The moderate increase in lending has remained roughly unchanged through the pandemic. In Danmarks Nationalbank's lending survey for the first quarter of 2021, several mortgage credit institutions and banks respond that the loan demand has increased, one reason being the high activity level in the housing market.[6]

Credit growth may pick up if households increasingly choose to increase their debt by mortgaging part of their rising home equity.

High refinancing activity increases housing debt
Refinancing was at a high level in 2020, although lower than the record in 2019, see chart 11. The pronounced refinancing in 2019 was due to a number of factors, including the decreasing level of interest rates, which made it possible for many homeowners to refinance their mortgages to mortgage loans with a lower coupon rate and monthly debt service.

In 2020, about half of homeowners who refinanced their mortgage loans chose to increase their outstanding debt, see box 3. The homeowners who

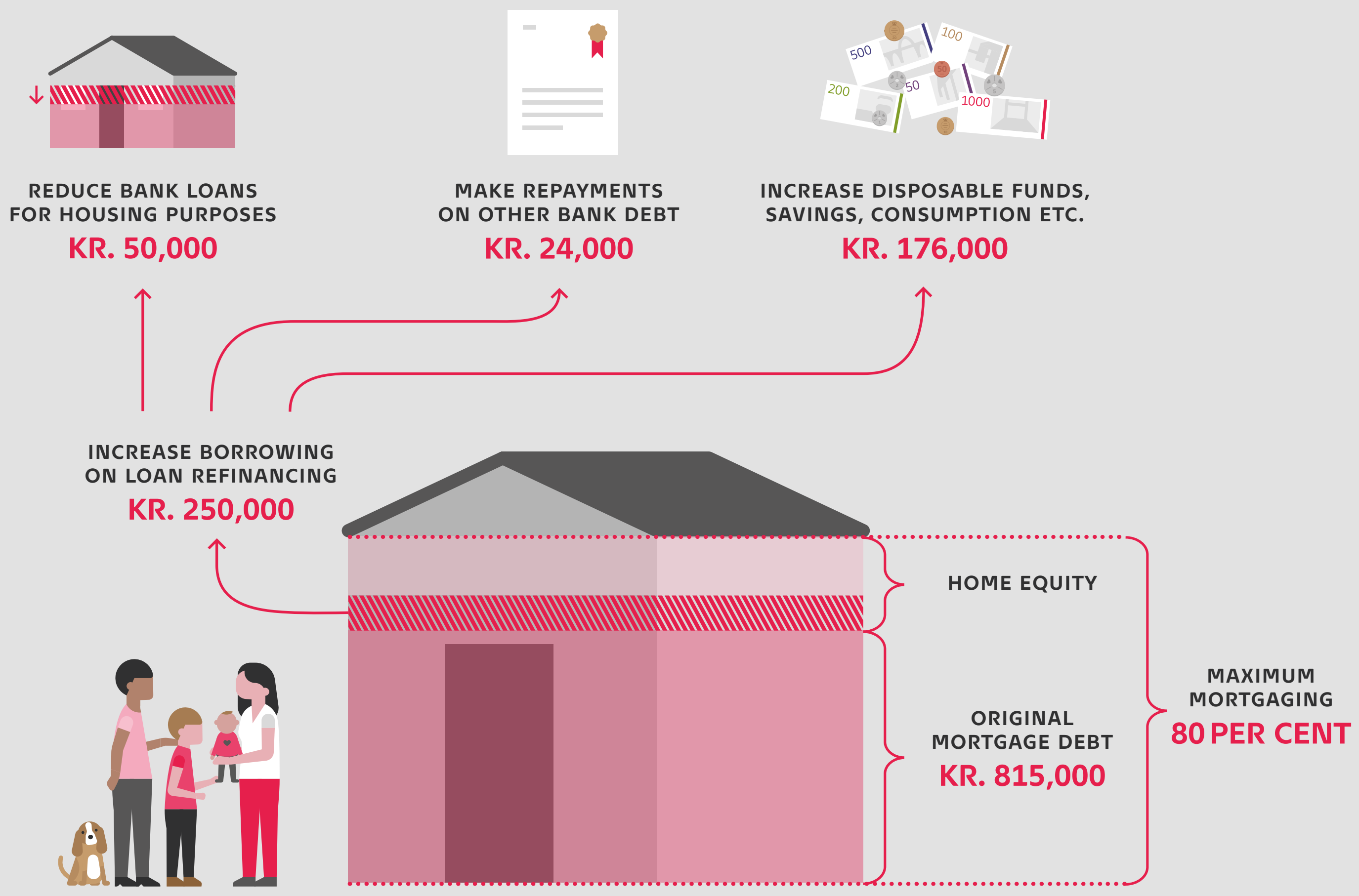
5 See Hviid and Malthe-Thagaard, The impact of the housing taxation agreement on house prices, *Danmarks Nationalbank Analysis*, No. 6, March 2019 (*link*), and Hviid and Kramp, Housing taxation agreement stabilises house prices, *Danmarks Nationalbank Analysis,* No. 14, September 2017 (*link*).

6 See Danmarks Nationalbank, Increased loan demand from private customers, *Danmarks Nationalbank Statistics*, April 2021 (*link*).

Box 3

Homeowners increase debt in connection with refinancing

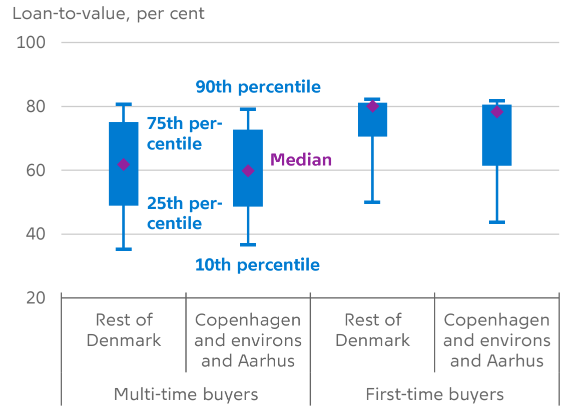
For the average lender engaging in additional borrowing in connection with a refinancing operation in 2020, the original mortgage amount was kr. 815,000, and the mortgage debt was increased by kr. 250,000. The lender at the same time reduced his outstanding bank loans for housing purposes with kr. 50,000 and paid down other bank loans by kr. 24,000. After this, kr. 176,000 was left over from the increased mortgage debt to be used as additional disposable funds, savings and consumption etc.



Early redemptions were at a high level in recent years Chart 11

Note: Early redemptions of mortgage loans for owner-occupied homes and holiday homes for households. 3-month moving average. The most recent observations are from March 2021.
Source: Danmarks Nationalbank.

Many multi-time buyers have home equity, while first-time buyers use full mortgage financing Chart 12



Note: Mortgage credit institutions' total new lending in 2020. Loan-to-value ratio up to and including the lowest ranking mortgage debt in a property. The loan-to-value ratio has been calculated as the mortgage debt secured by a mortgage on a home as a percentage of the value of the home up to the lowest ranking mortgage loan. Loan-to-value ratios above the 80 per cent requirement may occur as a result of, for example, an advance loan or time lags between loan allocation and disbursement time.
Source: Danmarks Nationalbank and own calculations.

refinanced their loans and increased their mortgage debt in 2020 have thus increased their mortgage debt by just over kr. 250,000 on average, equivalent to an increase of approximately 30 per cent. These homeowners' loan-to-value ratios consequently increased, and they have only repaid other bank debt to a limited extent. Experience from previous waves of refinancing shows that a significant part of the additional debt is used for increased consumption, including private consumption and home improvements.[7]

High loan-to-value ratios may weaken mortgage credit institutions' resilience

It is important to financial stability in Denmark that there is high credibility for the mortgages underlying housing lending and thus the issued mortgage bonds. The Danish down payment requirement of 5 per cent in connection with home purchases is low relative to the other Nordic countries. In addition, the vast majority of first-time buyers borrow right up to the threshold limits in the current lending rules, see below. The Danish down payment requirement means that homebuyers' total mortgage and bank debt secured by collateral in the home may constitute up to 95 per cent of the value of the home at the time of purchase.

The rising house prices currently mean that loan-to-value ratios are falling for those homeowners who have already bought a home. By 2020, multi-time buyers had an average loan-to-value ratio of approximately 60 per cent, see chart 12. This is shown by microdata from Danmarks Nationalbank and the Danish Financial Supervisory Authority's credit register of all loans issued by the reporting credit institutions, see box 4.

Most first-time buyers continue to borrow around as much as they can within the requirements. First-time buyers do not have home equity with them from a previous sale, and they therefore have to borrow for

7 See Danmarks Nationalbank, Mortgage refinancing supports private consumption, *Danmarks Nationalbank Analysis*, No. 17, September 2019 (*link*).

New lending and refinancing – how we proceeded

Box 4

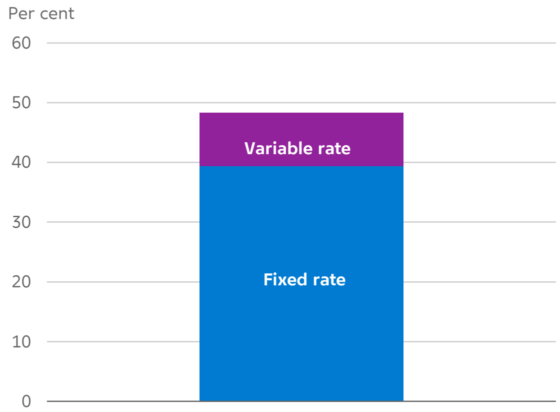
Danmarks Nationalbank and the Danish Financial Supervisory Authority collect a number of data on Danish borrowers' credit conditions from mortgage credit institutions and banks on a quarterly basis. The credit data include information about loans such as outstanding debt, interest rate, loan type, mortgage and collateral for loans, including value of mortgage, location etc.

In the analysis, we have looked into information regarding Danish private individuals' loans secured by a mortgage on real property in Denmark. Based on homeowners' mortgage and loan data and a number of assumptions we have made a new categorisation of the lending based on loan type (new lending or existing lending) and type of borrower (first-time buyer, refinancing and top-up loans as well as other home buyers).

- **New lending** is when the loan did not exist in the previous quarter and the disbursement period is within the latest period.
- **First-time buyers** are homeowners with a new mortgage loan in the current quarter who have not had either a bank loan or a mortgage loan with collateral in real properties since October 2019. The statement thus also includes buyers who have returned to the housing market since October 2019 after a break. The categorisation is subject to uncertainty, including due to the short history and time lags in mortgage ownership.
- **Refinancing and top-up loans** are when there is a change in the homeowner's lending without this involving a change in home ownership. If the homeowner increases the outstanding debt by more than 5 per cent in connection with the refinancing, this is regarded as actual additional borrowing.
- **Multi-time buyers** are all other home buyers who have either changed homes or acquired an extra home.

Just under half of new lending to highly indebted homeowners consists of loans with deferred amortisation

Chart 13



Note: Gross new lending before instalments and early redemptions with deferred amortisation. Mortgage credit institutions' total new lending to homeowners with a debt-to-income above 4 and a loan-to-value ratio above 60 per cent in 2020.
Source: Danmarks Nationalbank.

a larger share of the home purchase. Most first-time buyers entered the housing market in 2020 with a loan-to-value ratio of 80 per cent, which is the maximum allowed percentage for mortgage loans.

Credit institutions grant more home buyers deferred amortisation

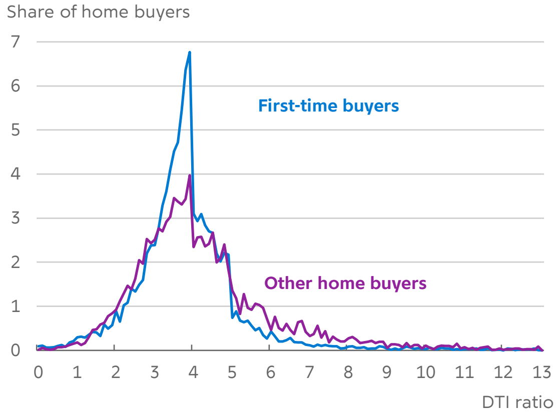
After a number of years with a decline in the share of mortgage loans with deferred amortisation, the trend is again increasing at the end of 2020 and beginning of 2021. Just under half of the Danes' mortgage debt was with deferred amortisation at the end of March 2021. Part of the increase is due to 20 per cent of the homeowners who refinanced their loans in 2020 having chosen to switch to loans with deferred amortisation.

Loans with deferred amortisation are also granted to homeowners who are already highly indebted at the time of the loan disbursement. In 2020, loans with deferred amortisation constituted just under half of all new lending to highly indebted homeowners, see chart 13. The majority of these new loans are fixed-rate loans, which, among other things, reflect restrictions in the rules on mortgage loans. In 2020, new lending with deferred amortisation was most widespread in the City of Copenhagen and environs and Aarhus.

More stringent lending rules have contributed to less risky mortgage loans
Over a number of years, the authorities have introduced borrower-based requirements for the credit institutions' housing lending, and, to a certain extent, they contribute to curtailing the risk build-up in the current period with high housing market activity.

The lending rules for institutions' lending particularly affect first-time buyers, who often get more highly indebted than other home buyers. In 2020, many first-time buyers in the City of Copenhagen and environs as well as in Aarhus borrowed right up to the threshold of 4 for the so-called debt-to-income factor, which determines which types of mortgage loan the home buyers can take out, see chart 14. Only very few have taken out loans with a debt factor above 5. The debt-to-income ratio is calculated as the total debt of households relative to gross income. Experience with loan rules shows that they can contribute to more resilient housing lending. However, it cannot be ruled out that the introduction of explicit lending limits may, in some cases, mean that credit institutions grant loans right up to the thresholds to a greater extent.

In the City of Copenhagen and environs as well as in Aarhus, thresholds laid down in the lending rules restrict first-time buyers' indebtedness Chart 14



Note: The reported debt-to-income ratio is a statement of the household's total debt relative to its gross income. Total new lending in the City of Copenhagen and environs as well as in Aarhus granted in 2020.
Source: Danmarks Nationalbank and own calculations.

The distribution of the home buyers' debt-to-income ratio reflects the threshold values in the so-called growth guidelines[8] from 2016 and the Executive Order on Good Practice for mortgage lending from 2018. For example, the growth guidelines limit access to mortgage loans with deferred amortisation and variable rates for highly indebted home buyers in the City of Copenhagen and environs as well as in Aarhus. In turn, the rules do not, for example, restrict the possibility of deferred amortisation for homeowners with a loan-to-value ratio below 90 per cent and a debt-to-income below 5.

Rising house prices provide opportunities for increased borrowing for multi-time buyers who either change homes or purchase an extra home. In 2020, around 45 per cent of multi-time buyers took on mortgage debt of more than four times the household's gross income. These customers also have a freer rein in their choice of mortgage loans. Many highly indebted homeowners can thus borrow for a home purchase with deferred amortisation even though mostly can only choose fixed-rate loans with deferred amortisation.

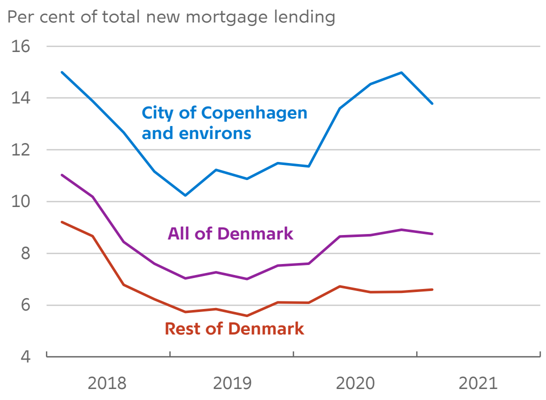
Although the loan rules have laid down some limits for how quickly risks can be built up in the credit institutions' housing lending, the risks are currently increasing. New lending to highly indebted home buyers represents an increasing share of the mortgage credit institutions' total new lending, see chart 15, and this was especially the case in the City of Copenhagen and environs.

With rapidly rising housing prices and an existing basis for further price increases, there is reason to look at a tightening of the lending rules to limit vulnerability to a subsequent drop in housing prices. Higher down payment requirement and amortisation

8 Guidelines on prudent credit assessment when granting housing loans to households with high DTI ratios and insufficient wealth in growth areas.

Higher share of new loans to highly indebted homeowners

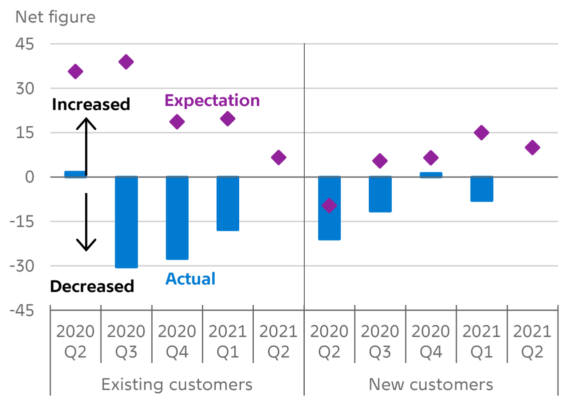
Chart 15



Note: Highly indebted homeowners are defined as homeowners with a debt-to-income ratio above 4 and a loan-to-value ratio above 60 per cent. The latest observations are from Q1 2021.
Source: The Danish Financial Supervisory Authority and own calculations.

Banks expect slightly increasing demand from corporate customers

Chart 16



Note: In Danmarks Nationalbank's lending survey, *corporate customers* cover 'Private non-financial corporations' and 'Sole proprietorships'. *Net figure* is the banks' response weighted by their respective market shares. *Expectation* is the banks' previously reported responses from the quarter before the present quarter.
Source: Danmarks Nationalbank.

requirement for highly indebted homeowners are among the measures that should be considered.

At its next meeting in June, the Systemic Risk Council expects to recommend to the Danish Government that further measures be taken to limit continued risk build-up in the housing market.

Loans with 30 years of deferred amortisation should only be offered to well-consolidated customers with high security for the value of the mortgaged property

The new mortgage loans with deferred amortisation throughout the 30-year maturity of the loan are becoming more widespread in the mortgage credit market. The loan types currently offered by institutions contain terms on, for example, a maximum loan-to-value ratio with deferred amortisation of 60 per cent of the value of the home, and there is generally no access to post-financing against another mortgage on the same property.

The new loan can be a relevant product for a limited customer group. However, as no instalments are made on the loan, it is essential that the mortgaged property maintains its value throughout the loan period. This may be a problem in areas with declining housing demand and in cases in which the building is not adequately maintained.

So far, banks' corporate customers have weathered pandemic better than feared

The government covid-19 schemes currently limit corporate customers' lending activity with the banks

The banks continue to report declining loan demand from existing and new corporate customers, see chart 16. The government compensation schemes and liquidity measures have limited corporations' need for liquidity from the banks.

However, the banks expect slightly increasing demand from both new and existing customers in the second quarter of 2021. At the same time, the banks report approximately unchanged credit standards. The low demand for bank financing is reflected in the development in bank lending to corporations, which has remained virtually unchanged at around kr. 350 billion since June 2020.

Expectations for lending growth may be raised as corporations expect a stronger economy and the pandemic recedes. Despite the second lockdown during winter 2020-21, there has not been a large increase in the share of corporations reporting some or a very high risk that they will have to liquidate their business, see chart 17.

The mortgage credit institutions have experienced increasing loan demand from their corporate customers in the past year. Their corporate lending has also continued to increase, and the annual lending growth has been around 4 per cent since the outbreak of the pandemic.

Banks have capacity to handle expiry of government liquidity schemes

The banks are well equipped to make loans to viable corporations when the deferred payment deadlines and loans fall due. At the same time, the corporations currently make little use of the government covid-19 relief packages. On this basis, it is assessed that the banks will be able to handle any deterioration in the creditworthiness of their customers on expiry of the relief packages.[9]

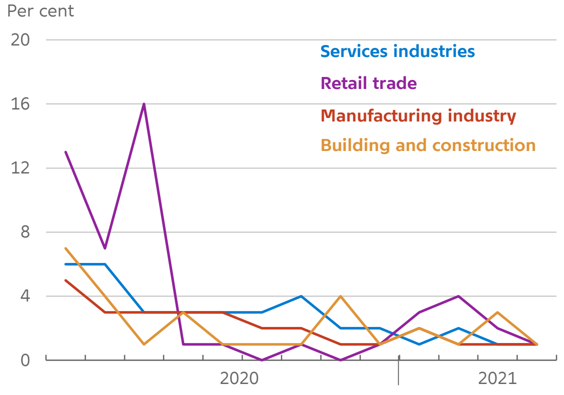
Deferred deadlines for payment of tax and VAT have significantly increased corporate liquidity. In 2021, the deferred payment deadlines were replaced by the option of raising interest-free tax loans equal to the due amounts of ordinary tax and VAT payments as the previously deferred payments fall due.

The credit institutions only have limited exposure to corporations that have raised tax loans. Two thirds of corporations that have made use of the government loan schemes have loans with credit institutions. Loans to these corporations constitute 16 per cent of the banks' corporate loans and 6 per cent of mortgage loans, see chart 18.

Increased digitalisation may push down prices of some commercial properties

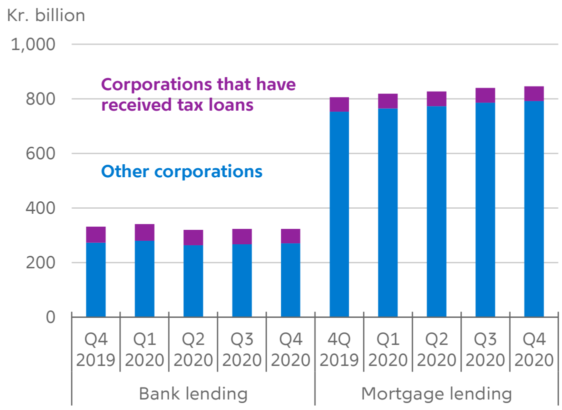
The pandemic has accelerated the general development towards increased digitalisation of society. The increased digitalisation may result in less demand for office and retail space if working from home and online shopping gain further ground. There is still a great deal of uncertainty as to where the development will be heading, but mortgage credit institutions should take it into their considerations when

Corporations see limited risk of liquidation Chart 17



Note: Share of corporations reporting "some" or "very high" risk of liquidation over the next three months as a result of the coronavirus pandemic. The shares are weighted by size based on the number of employees in each corporation.
Source: Statistics Denmark.

Corporations that use government loan schemes constitute a small percentage in mortgage credit institutions' books Chart 18



Note: Lending by large and medium-sized banks to Danish non-financial corporations. Large banks consist of the Danish Financial Supervisory Authority's group 1 and Nordea Danmark, while medium-sized banks consist of the Danish Financial Supervisory Authority's group 2 and Handelsbanken.
Source: The Danish Tax Agency, Danmarks Nationalbank and own calculations.

9 See Danmarks Nationalbank, Banks ready for expiry of government liquidity support, *Danmarks Nationalbank Analysis*, No. 10, May 2021 (*link*).

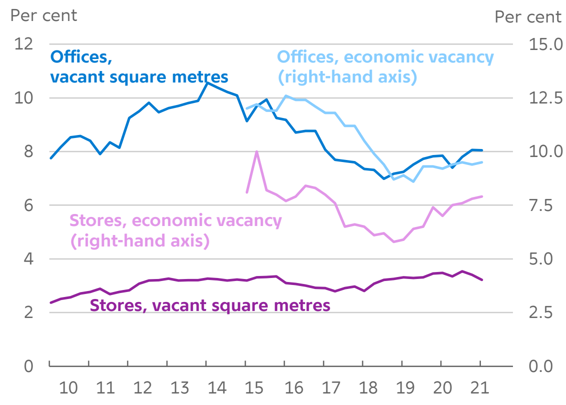
assessing the risk on parts of their lending against collateral in commercial properties.

Online shopping continues to grow and constitutes an increasing share of the total card turnover.[10] Especially online groceries shopping has increased during the pandemic.[11] At the same time, many companies have used working from home in the past year.

The share of vacant office and retail space has increased in recent years, see chart 19, and especially in the City of Copenhagen, there have been more vacant retail space. At the same time, the number of physical stores with retail trade has decreased over an extended number of years.[12] Also for office space, the share of vacant square metres has increased in most of the City of Copenhagen and especially during the pandemic.

If the increase in online shopping continues, it could lead to further declines in the number of retail stores. Moreover, increased digitalisation may result in a smaller need for office space.

More vacant stores and offices Chart 19



Note: *Vacant square metres* are stated as a percentage of estimated building stock. *Economic vacancy* is the rental value of vacant rental premises in relation to the total rental value. The most recent observations are from end of January 2021.
Source: Ejendomstorvet.dk as well as letting corporations Aberdeen Asset Management Denmark, ATP Properties and Newsec.

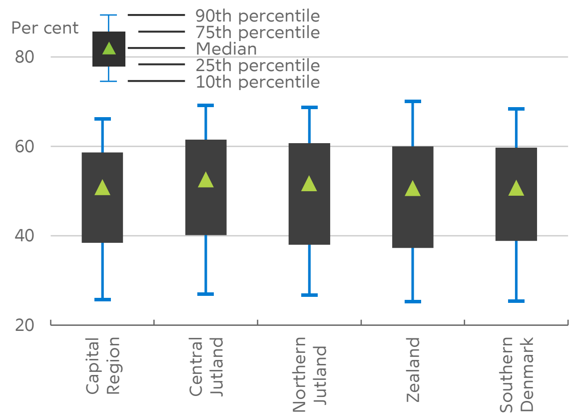
Credit institutions have limited risk in connection with falling prices of retail and office properties

The credit institutions generally have room for a fall in the prices of the retail and office properties on which they have granted loans against collateral in the property.

The majority of the mortgaged properties have loan-to-value ratios that are well below the permitted limit of 60 per cent, see chart 20. The loan-to-value limit may be increased to 70 per cent if the institution provides additional collateral for the part of the loan which exceeds 60 per cent.

The majority of credit institutions' lending with retail and office properties as collateral are to property

The vast majority of properties are mortgaged below the permitted loan limit Chart 20



Note: Debt-to-asset ratio for mortgage lending to Danish non-financial corporations secured by mortgage on office and retail properties. The debt-to-asset ratio is calculated as the outstanding debt of the loan as a percentage of the value of the property. Data calculated year-end 2020.
Source: Danmarks Nationalbank.

10 See Danmarks Nationalbank, Prospects of a rapid recovery once restrictions are eased, *Danmarks Nationalbank Analysis (Outlook for the Danish economy),* No. 7, March 2021 (*link*).

11 See Dansk Erhverv (Danish Chamber of Commerce), *E-handelsanalysen 2020*: *Et usædvanligt rekordår for dansk e-handel* (E-commerce Analysis 2020: An unusual record year for Danish E-commerce), February 2021 (*link – in Danish only*).

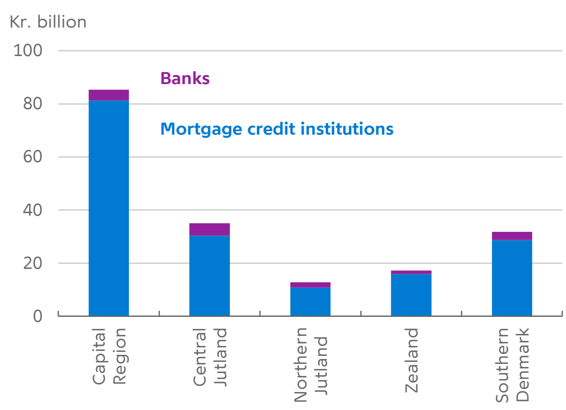
12 See Dansk Erhverv (Danish Chamber of Commerce), *Der er liv efter butiksdøden* (There is life after death of stores), June 2019 (*link – in Danish only*).

companies that let premises to stores and offices. Some of the property companies also let warehouse and production premises as well as rental homes and therefore have rental income from other property types.

The mortgaged retail and office premises used as collateral for the lending are concentrated in the Capital Region of Denmark, see chart 21, and especially around the City of Copenhagen, where the share of vacant square metres has also seen the highest increase. The lending constitutes just under 20 per cent of the mortgage credit institutions' total corporate lending.

Half of the lending to retail and office properties is in the Capital Region of Denmark

Chart 21



Note: Loans to Danish non-financial corporations secured by mortgage on office and retail properties. Data calculated year-end 2020.
Source: Danmarks Nationalbank.

Banks expect rising earnings in 2021

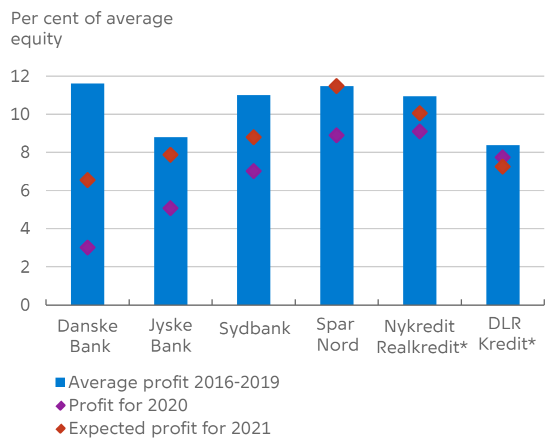
Except for DLR Kredit, the systemic credit institutions expect higher earnings in 2021 than in 2020, see chart 22. The rising expectations are due to a number of factors, including a higher activity level in the trade area and expectations of a lower level of impairment charges in 2021 than in 2020. In addition, several credit institutions have announced plans to reduce costs in 2021.

During April, several institutions raised their earnings expectations in 2021 with reference to the high activity level in the housing market.

The institutions most often announce a range-based estimate of earnings expectations. For most systemic credit institutions, a materialisation of the lower end of the profit expectations will, however, also result in higher earnings than in 2020. At the same time, there are only a few cases in which the institutions' upper profit expectations indicate a full return to the average earnings level in the years leading up to the pandemic.

Several credit institutions expect higher earnings in 2021

Chart 22



Note: The systemic credit institutions except Nordea Kredit. Profit for the year after tax and average of the latest announced expectations for the profit for 2021 as a percentage of the shareholders' average equity for 2016-19. Credit institutions marked with * are calculated before tax.
Source: Financial statements and own calculations.

Institutions' net interest income has been declining over a number of years

The systemic credit institutions' earnings have been declining since 2017, see chart 23. In step with the decline, their earnings have constituted a smaller first protection against losses.

The systemic credit institutions' earnings decreased significantly in 2020. A large part of the decline in 2020 was attributable to increased impairment charges on lending, reflecting, among other things, provisions for expected credit losses due to the pandemic. Adjusted for the increased level of impairment charges in 2020, the decrease in the systemic credit institutions' earnings has been more moderate. Also non-systemic banks' earnings decreased in 2020, one reason being higher posted impairment charges.

The development with declining earnings is partly attributable to net interest income having decreased over a number of years, see chart 24. The development must be seen in the light of lower interest margins, resulting from, among other factors, competition for customers on the lending side. See box 5 for a description of the banks' interest margins. At the same time, deposit rates have not fully mirrored the general decrease in the level of interest rates. In 2020, however, net interest income increased slightly.

Earnings from both net fees and income from administration margins on mortgage loans have remained roughly unchanged since 2017. In addition, over the same period, higher staff costs and administrative expenses have resulted in a further reduction in earnings.

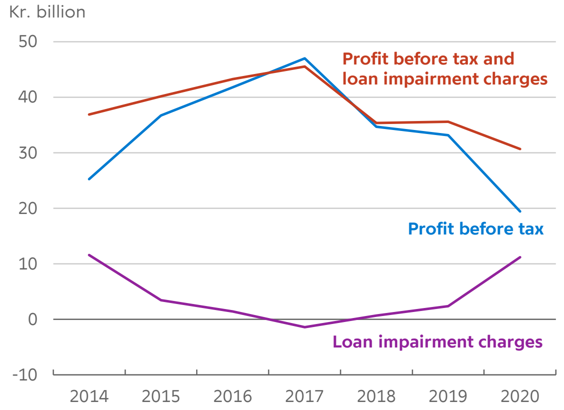
Banks have reduced deposit rates

For several years, the banks maintained their deposit rates close to zero, especially for households, while the money market interest rate was negative. The banks' adjustment towards lower deposit rates has thus been sluggish, and the banks' deposit margin became negative.

It is up to the banks themselves to set a reasonable limit for negative deposit rates. They should take into account that their customers use deposit accounts to make day-to-day payments and that this continues in the existing payment systems which are characterised by a high level of security and efficiency.

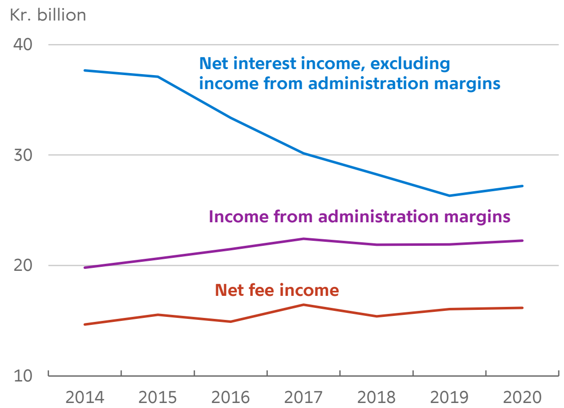
For several years, both private individuals and corporate customers have paid less to keep their savings with the banks than what the banks can obtain by placing the deposits in the short-term money market. However, the banks can place a certain proportion of the deposits in higher-yielding assets by binding some of the deposit funds for a longer term or by letting them replace other more long-term sources of financing, such as senior debt, see box 6.

Systemic credit institutions' earnings have declined since 2017 Chart 23



Note: Annual data for systemic credit institutions. The profit has been adjusted for goodwill impairment charges.
Source: The Danish Financial Supervisory Authority and own calculations.

Net interest income is still lower than earlier Chart 24



Note: Annual data for systemic credit institutions.
Source: The Danish Financial Supervisory Authority and own calculations.

Since the end of 2019, both the systemic and non-systemic banks have introduced negative interest rates on deposits from household customers above a certain threshold, and the trend towards wider use of negative deposit rates for household customers has continued into 2021, see feature page regarding negative deposit rates. In April and May, several credit institutions have announced that they

The banks' interest rates and interest margins have decreased over a number of years

Box 5

The banks' interest rates for households and corporations normally follow the development in Danmarks Nationalbank's interest rates, see charts A and B. One of the factors behind this correlation is that Danmarks Nationalbank's monetary policy instruments and the short-term money market function as a possible marginal source of both placement and financing for the individual bank.

The banks' interest margin has decreased over a number of years. However, it has increased slightly since the beginning of 2021. The interest margin represents the difference between the institutions' lending and deposit rates. The decrease in the banks' interest margin is not only affected by the development in monetary policy interest rates, but also depends on other factors such as credit risks and the competitive situation. As a natural part of their operations, banks assume credit risk when they lend money to households and corporations. The credit risk is the risk that the institution will incur a loss if the borrower defaults on the borrower's payment obligations. This risk depends on economic trends, the borrower's creditworthiness and the value of any underlying collateral, for example mortgage on property. Part of the lending margin can therefore be regarded as a payment for the credit risk that the bank undertakes in granting the loan in question.

The banks' interest margin can be divided into a lending margin and a deposit margin. The lending margin is calculated as the difference between the lending rate and the short-term money market interest rate, while the deposit margin is the difference between the short-term money market interest rate and the deposit rate. The total interest margin is the sum of the lending margin and the deposit margin.

Both the lending margin and the deposit margin have previously been positive. This reflects that the banks' customers pay an interest rate on their loans that is higher than the interest rate that the bank can obtain by placing an extra krone on the short-term money market and that interest is accrued on the customers' deposit accounts at a rate that is lower than the interest rate at which the bank can borrow funds on the money market. But the banks' adjustment of their deposit rates to Danmarks Nationalbank's certificate of deposit rate has been sluggish, and the banks' deposit margin has thus been negative over an extended period of time, see chart B. A negative deposit margin means that the banks have not been able to make a profit by attracting additional deposits and placing liquid funds from these in the money market. However, the banks' adjustment of their deposit rates in recent years has meant that the deposit margin has increased to close to zero, see chart B.

Chart A

The largest banks' lending and deposit rates have been significantly reduced

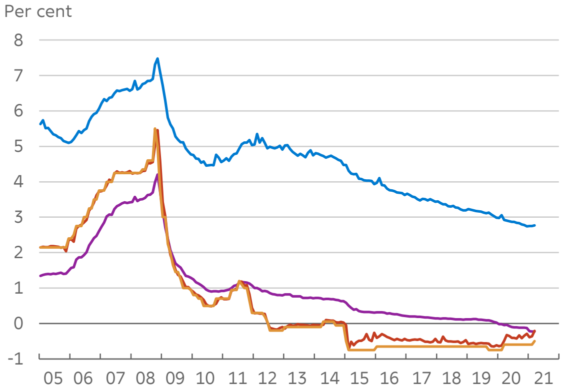
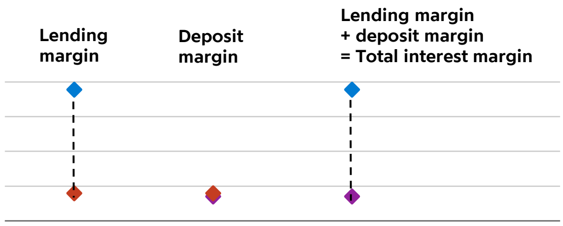


Chart B

The banks' total interest margin consists of both their lending and deposit margins



Lending rate — Deposit rate — Tomorrow-Next rate — Certificates of deposit rate

Note: Average lending and deposit rates for systemic and non-systemic banks' outstanding domestic lending and deposits for households and non-financial corporations. The most recent observations are from March 2021.
Source: Danmarks Nationalbank, Bloomberg and own calculations.

again intend to lower the deposit rate for some household customers and corporate customers.

As average deposit rates were at a significantly lower level in 2020 than in 2017-19, the banks' net interest payments on their customers' deposits decreased by just under kr. 1.4 billion during the year, see chart 25. The reduction in the banks' net interest payments on deposits in 2020 is equal to approximately 10 per cent of the systemic and non-systemic banks' pre-tax profit in 2020.

As mentioned, the average deposit rates have continued to decrease in 2021. If the level of deposits and deposit rates etc. for household customers and corporate customers remains unchanged for the rest of 2021, there will be prospects of a further decrease in the banks' net interest payments on deposits in the order of kr. 1.1 billion relative to 2020.

Banks' income from fees and charges have grown by less than assets under management

Since the recent financial crisis, the systemic banks have managed growing assets on behalf of their customers. The business area contributes revenue to the banks through asset management and administration in the underlying investment management companies that manage one or more investment funds.

The increase in managed assets can be attributed to both ongoing net injection of new funds from customers and generally rising prices of financial assets. The growing assets under management in the systemic banks are not matched by a corresponding increase in earnings from fees and charges. Decreasing earnings from fees and charges per managed krone may be due to multiple factors such as the competitive situation among investment funds and regulation.[13]

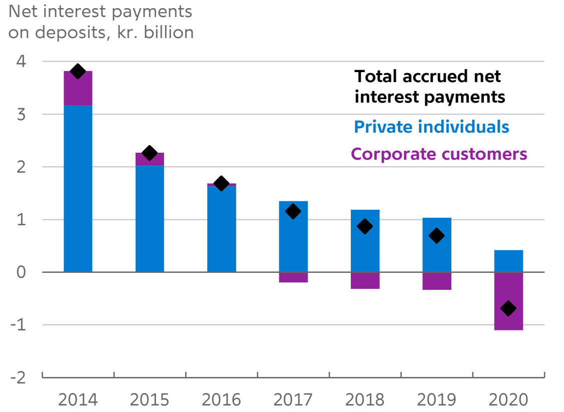
The systemic banks offer a number of investment opportunities to their customers in the form of, for example, purchases of shares in investment funds. In 2020, households made total purchases of approx.

Banks' return on household customer deposits depends on multiple factors Box 6

Household customers' deposits are one of the most stable sources of financing in a bank in most periods. Overall, household customers have relatively identical payment patterns over time, making future changes in deposits fairly predictable for the bank. The vast majority of customers receive the same salary, pay the same overheads and have stable consumption during the month. The predictability of the development in deposits is also reflected in government regulation and credit rating agencies' ratings, where household deposits are regarded as a stable source of financing which can partially replace long-term debt issuances.

As deposits constitute a stable source of financing, the banks can place a certain proportion of these funds in assets with a higher rate of return than that offered by short-term money market interest rates. In specific terms, the total return on deposits will reflect an average of several interest rates on the yield curve with different maturities and the bank's alternative financing costs. Hence, several factors contribute setting the deposit margin in each individual bank, see box 5.

Banks' net interest payments on deposits have fallen Chart 25

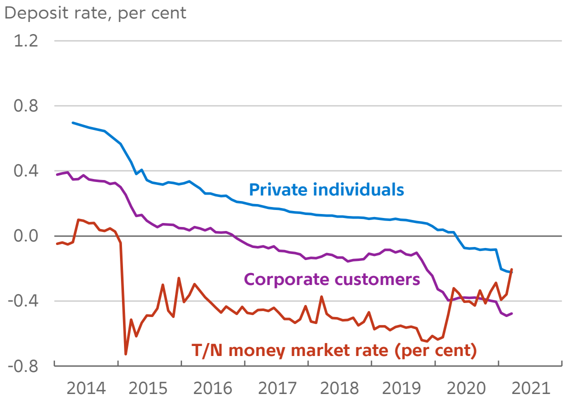


Note: Systemic and non-systemic banks' net interest payments on deposits from domestic household and corporate customers. *Private individuals* are employees, pensioners etc., and *Corporate customers* are non-financial corporations and sole proprietorships. *Net interest payments* are the amount that the banks have paid in interest and interest-like payments on deposits from private individuals and corporate customers.
Source: Danmarks Nationalbank and own calculations.

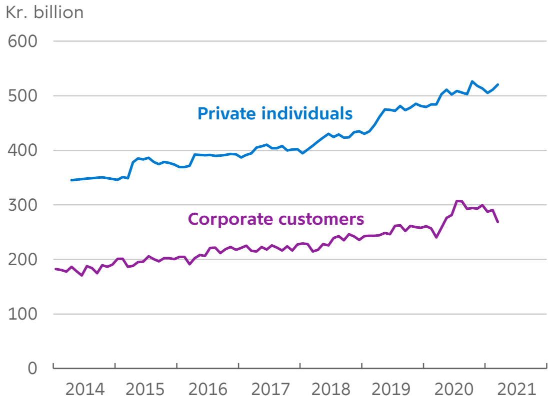
13 For example, in 2017, a partial ban on investment commissions was introduced in the Markets in Financial Instruments Directive (MiFID II), which, among other things, prohibits banks etc. from receiving and retaining commission payments from a third party (for example an investment fund) when they are authorised to make investments on the client's behalf.

Negative deposit rates have become more widespread in Denmark

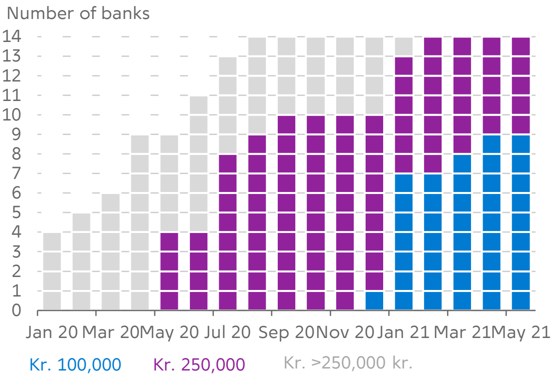
A **Banks' average deposit rates were lower in 2020 than in previous years ...**



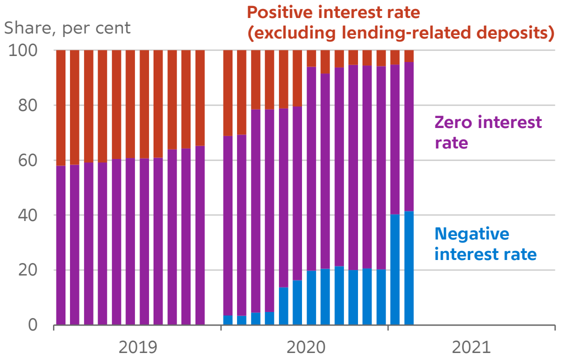
B **... but bank deposits continued to increase in 2020**



C **Many of the largest banks have reduced their thresholds for negative interest rates for household customer deposits ...**



D **... and the share of household customers' deposits that are subject to negative interest has increased significantly in the first months of 2021**



Note: A and B: Systemic and non-systemic banks' deposits and deposit rates for outstanding domestic deposits (excl. lending-related deposits and deposits in pool schemes) to *households* (employees, pensioners etc.) and *corporate customers* (non-financial corporations and sole proprietorships). C: Thresholds for negative deposit rates for household customers, beginning of month. D: The distribution of deposits on yield spread for household customers (employees, pensioners etc.) is based on a changed population of systemic and non-systemic banks over time. Observations for December 2019 are not shown due to confidentiality.

Source: Danmarks Nationalbank, public communication from the banks, Bloomberg and own calculations.

net kr. 25 billion in Danish investment funds. This amount indicates a higher investment appetite among households than in previous years, see chart 26. In recent years, there has been a trend towards investments having increased in the investment funds linked to banks that have announced negative deposit rates. There are consequently indications that some household customers have reacted to the prospects of negative deposit rates by buying investment fund shares.[14]

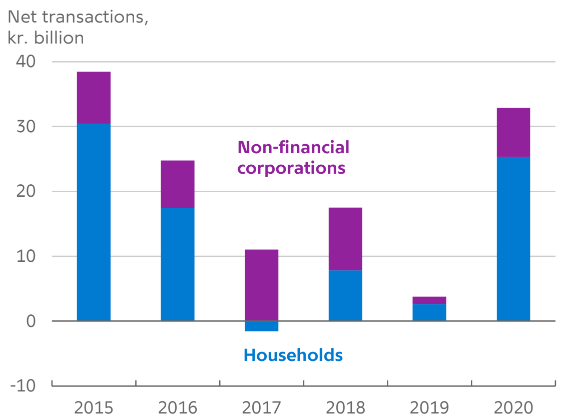
Low dividends strengthen banks' resilience

Continued increase in excess capital
The systemic institutions' capitalisation was strengthened during 2020, see chart 27. The increase in excess capital adequacy during the first half of 2020 was largely driven by eased capital requirements in response to the pandemic and its consequences.[15] In addition, the capital base was supported by the cancellation of dividends for 2019.

In the second half of 2020, the increase in excess capital adequacy was primarily driven by an increase in the capital base, including as a result of moderate dividend payments.

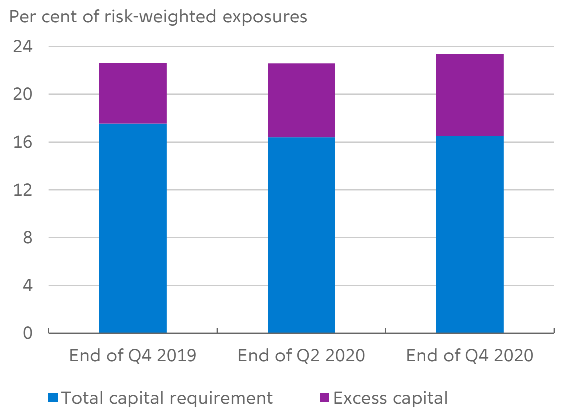
Across the individual systemic institutions, there is still considerable variation in the level of excess capital adequacy, see chart 28, but virtually all institutions have increased the distance to their risk-based capital requirements. The only exception is Sydbank, whose risk-weighted exposures rose after the acquisition of Alm. Brand Bank.

Net household purchases of investment fund shares were high in 2020 Chart 26



Note: Net transactions of households and non-financial corporations in Danish investment funds (UCITS).
Source: Danmarks Nationalbank and own calculations.

Increasing excess capital adequacy for systemic credit institutions Chart 27



Note: The excess capital adequacy is calculated on the basis of the total capital base. The total capital adequacy requirement consists of the solvency need (minimum capital adequacy requirement and Pillar II) and the combined buffer requirement (SIFI buffer, capital conservation buffer and countercyclical buffer).
Source: Danmarks Nationalbank and own calculations.

14 See Danmarks Nationalbank, The response of private customers to negative deposit rates, *Danmarks Nationalbank Analysis*, No. 9, April 2021 *(link)*.

15 See Danmarks Nationalbank, Banks should keep their powder dry, *Danmarks Nationalbank Analysis (Financial stability)*, No. 28, December 2020 *(link)*.

The systemic institutions have also increased their Common Equity Tier 1 (CET1) excess capital compared with the previous two years. The excess capital adequacy also increased during 2020, adjusted for the release of the countercyclical capital buffer in connection with the pandemic, see chart 29. Consequently, the release of the countercyclical buffer has not been used to pay dividends or make share buy-backs.

Seen in the light of the accommodative financial conditions and risk build-up, the capital requirement to the banks' capital should be re-established by increasing the countercyclical capital buffer. If, as expected, economic activity develops positively, a quick rebuild of the buffer may be necessary. Even if there is a rapid economic recovery, the institutions are generally well equipped to meet such a quick rebuild of the buffer.

Later in the year, the Systemic Risk Council expects to recommend an increase in the countercyclical capital buffer, with entry into force in 2022.[16]

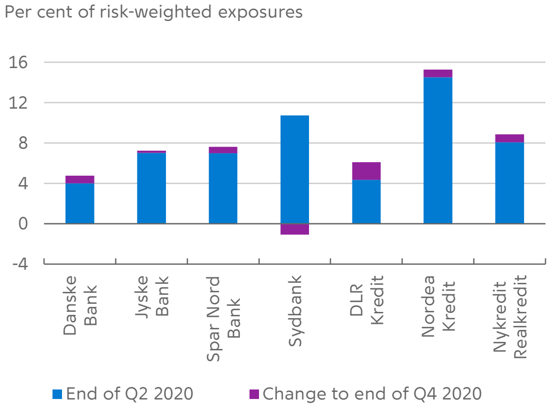
Dividend payments have been resumed to a limited extent

Since the outbreak of the pandemic, the European banks have limited their distribution of dividends at the recommendation of the European Systemic Risk Board (ESRB) and the national supervisory authorities. However, the credit institutions appear to have gotten through the pandemic relatively unscathed so far, and they have begun paying moderate dividends to their investors in spring. These payouts are in line with the ESRB's latest recommendation, see box 7.

The Danish Financial Supervisory Authority's guidelines are reflected in the Danish systemic institutions' distribution of dividends for 2020. Calculated as a percentage of the institutions' accumulated profits for 2019 and 2020, the Danish institutions distributed between 8 per cent and 19 per cent, see chart 30.

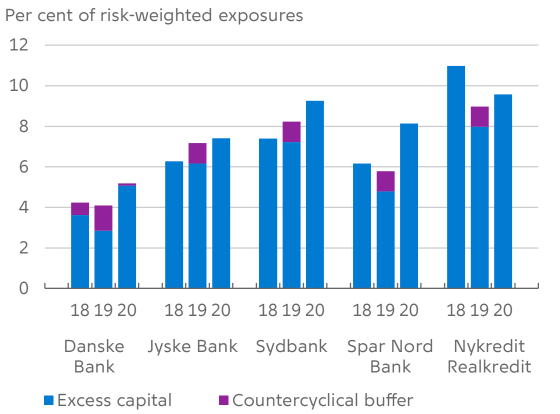
These levels indicate that the Danish Financial Supervisory Authority's approach has been more restrictive than that of the Swedish and Norwegian authorities, but less restrictive than the ECB. The

Continued large variations in excess capital adequacy across institutions Chart 28



Note: The excess capital adequacy is calculated on the basis of the total capital base. The total capital adequacy requirement consists of the solvency need (minimum capital adequacy requirement and Pillar II) and the combined buffer requirement (SIFI buffer, capital conservation buffer and countercyclical buffer).
Source: Danmarks Nationalbank and own calculations.

Excess capital adequacy relative to Common Equity Tier 1 capital has increased since 2019 Chart 29



Note: 2018 excess capital adequacy has been adjusted to reflect fully phased-in SIFI buffer and capital conservation buffer.
Source: Danmarks Nationalbank and own calculations.

16 See press release from the 32nd meeting of the Systemic Risk Council (*link*).

Recommendations for distribution in Scandinavia and Europe

Box 7

The European Systemic Risk Board (ESRB) revised its recommendations on distribution of dividend in December 2020. The main message was still that banks and other financial institutions should refrain from or limit their distribution in the form of both dividends and share buybacks until 30 September 2021. Extreme prudence must be exercised in connection with distribution.

The revised recommendations have been implemented differently by the supervisory authorities across Scandinavia and Europe.

The Danish Financial Supervisory Authority
The overall criterion is that dividends can be paid if the institution has a sufficiently sound excess capital adequacy after any dividend payouts and under severe stress. Furthermore, the Danish Financial Supervisory Authority recommends that any distribution be made solely on the basis of the profit for 2020 and that the total distribution should be lower than in a normal year according to the institution's dividend policy.[1]

The Swedish Financial Supervisory Authority
In December 2020, the Swedish Financial Supervisory Authority recommended that the banks should distribute maximum 25 per cent of their accumulated profits for 2019 and 2020.[2]

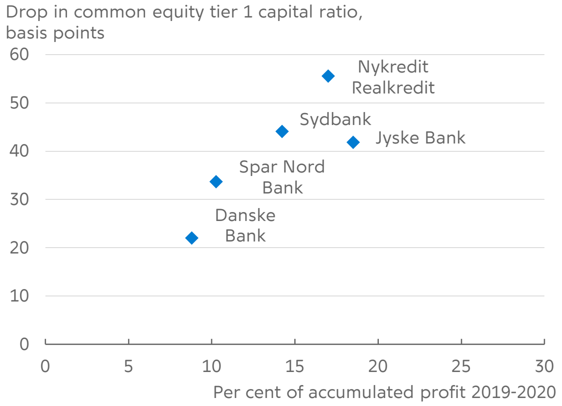
The Norwegian Ministry of Finance
In January 2021, the Norwegian Ministry of Finance called on Norwegian banks to limit their total distribution to maximum 30 per cent of their accumulated profits for 2019 and 2020.[3]

The European Central Bank (ECB)
Two requirements must be met for banks under the Single Supervisory Mechanism: The distribution must be lower than 15 per cent of the accumulated profits for 2019 and 2020 and may not result in a decrease in the institution's Common Equity Tier 1 capital ratio of more than 20 basis points.[4]

1. See the Danish Financial Supervisory Authority, *Finanstilsynet følger opdateret henstilling om kapitalbevarelse (The Danish Financial Supervisory Authority follows updated recommendation on capital preservation)*, press release, 18 December 2020 (*link – in Danish only*).
2. See the Swedish Financial Supervisory Authority, *Finansiella företag ska vara återhållsamma med utdelningar till och med september 2021 (Financial institutions must show restraint in their distributions up to and including September 2021),* press release, 18 December 2020 (*link – in Swedish only*).
3. Norwegian Ministry of Finance, *Bankerne bør være forsiktige med å dele ut utbytte fremover* (Banks should be prudent in distributing future dividends), press release, 18 December 2020 (*link – in Norwegian only*).
4. ECB, *ECB asks banks to refrain from or limit dividends until September 2021*, press release, 15 December 2020 (*link*).

Dividends constitute less than 20 per cent of accumulated profit for 2019-20

Chart 30



Note: Proposed distribution for systemic institutions as a percentage of accumulated profit for 2019-20 and risk-weighted exposures. DLR Kredit is excluded as it does not distribute dividend. Nordea Kredit has also been excluded as it is a subsidiary of Nordea Bank Abp.
Source: Danmarks Nationalbank and own calculations.

more lenient criteria in Scandinavia, including Denmark, may reflect that the banks in these countries are among the highest capitalised banks in Europe.

A few systemic institutions fail to meet capital adequacy requirements in stress test
Danmarks Nationalbank's latest stress test shows that a few systemic institutions breach the requirements for their capital buffers in the severe recession scenario, see chart 31.[17] The future leverage ratio requirement is breached to a very limited extent in the severe recession scenario. However, none of the institutions comes near to breaching their solvency need.

Cancellation of dividends for 2019 and a moderate distribution for 2020 have supported the ability of the institutions to withstand an economic downturn. However, the breach of capital requirements should give rise to a few institutions considering their capitalisation, see the section below.

17 See Danmarks Nationalbank, A few systemic banks lack capital in severe recession scenario, *Danmarks Nationalbank Analysis (Stress test)*, No. 11 May 2021 *(link)*.

The stress test results also show the need for capital build-up in a few institutions. The leverage ratio requirement is a minimum requirement, and breaches of this requirement will generally entail a transfer to Financial Stability. Capital buffer requirement breaches will result in a number of automatic restrictions, such as restrictions on dividend payments and coupon interest on hybrid capital instruments.

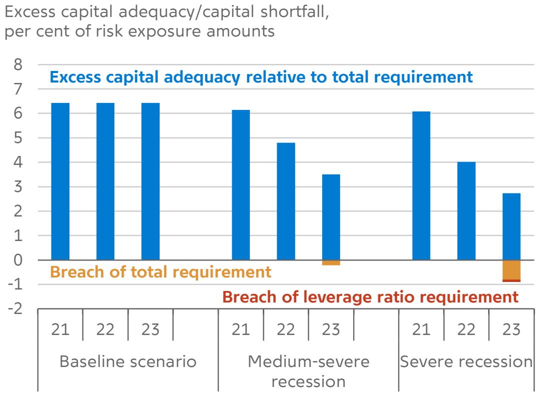
New rules for MREL requirement have entered into force

On 28 December 2020, new rules entered into force with the final implementation of the revised Bank Recovery and Resolution Directive (BRRD2).[18] The implementation introduced a number of measures, including a reduction of the so-called subordination requirement[19], and it is therefore relevant now to look at excess funds relative to both the full MREL requirement and the subordination requirement, see chart 32. At the end of 2020, all systemic institutions were able to meet their MREL requirement with subordinated funds. The individual institutions should remain focused on building up a sufficient buffer to their MREL requirement to ensure flexibility and scope.

The institutions must also be aware that a combined minimum requirement will become effective on 1 January 2022 for groups that comprise a mortgage credit institution. The requirement entails that the sum total of the group's MREL and debt buffer requirements must be minimum 8 per cent of the group's total liabilities. In technical terms, it is the debt buffer requirement for the group's mortgage credit institution that is increased to maintain the minimum requirement.

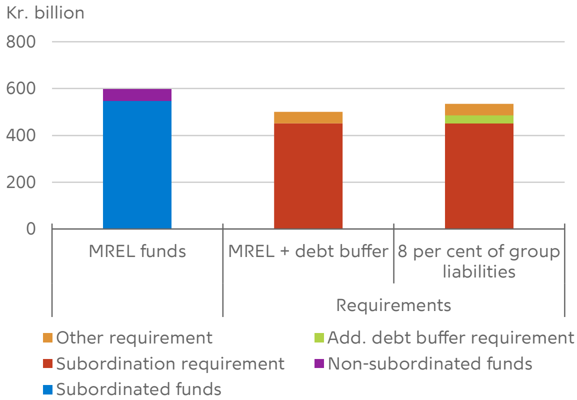
The minimum requirement of 8 per cent is expected only to result in a relatively limited increase in the institutions' total requirements. However, the stricter requirement is concentrated on a few institutions, which should already now assess their need for further issuance of MREL funds during 2021 to ensure sufficient excess funds when the requirement enters into force.

A few systemic institutions breach buffer and leverage ratio requirements Chart 31



Note: Excess capital adequacy or capital need of systemic institutions that either have excess capital adequacy or a capital need as percentages of their total risk-weighted exposures.
Source: Danmarks Nationalbank.

Overall level of MREL funds sufficient to cover future requirement for 8 per cent Chart 32



Note: *MREL funds* are calculated as the sum of funding with a remaining maturity of more than one year. *MREL + debt buffer* is the sum total of the MREL requirement and combined buffer requirement for the bank and (where relevant) total capital adequacy requirement and debt buffer requirement for the mortgage credit institution. The additional debt buffer requirement per 1 January 2022 must be fulfilled with subordinated funds.
Source: Danmarks Nationalbank and own calculations.

18 See Danmarks Nationalbank, Banks should keep their powder dry, *Danmarks Nationalbank Analysis (Financial stability)*, No. 28, December 2020 *(link)*.

19 The subordination requirement must be covered by subordinated liabilities, i.e. liabilities that bear losses before unsecured creditors – for example capital instruments and non-preferred senior debt.

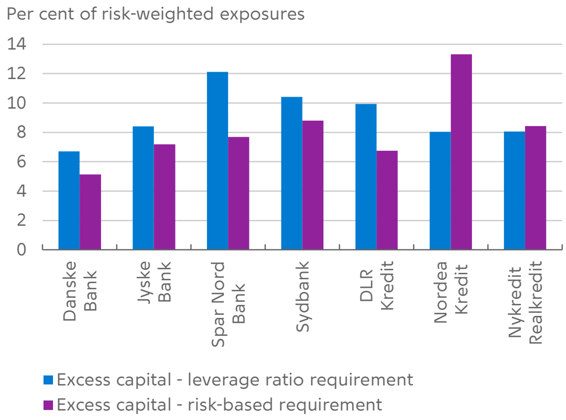
New leverage ratio requirement is generally not binding on systemic institutions
On 28 June 2021, a number of amendments to the Capital Requirements Regulation (CRR) will enter into force. Here, a leverage ratio of minimum 3 per cent is introduced as a requirement for the institutions' Tier 1 capital. The requirement is based on the institutions' non-risk-weighted exposures and is intended to limit the capital benefits of low risk weights. This is consequently a non-risk sensitive floor requirement.

Whether the leverage ratio requirement is binding on the individual institution will depend on the institution's average level of risk weights and the size of the institution-specific Pillar II requirement. For most systemic institutions, the leverage ratio requirement is not the binding capital requirement. Most of the institutions thus have a higher excess capital adequacy relative to the leverage ratio than relative to their risk-based capital requirement, see chart 33. However, the leverage ratio requirement has significant implications for Nordea Kredit, while the requirement becomes only marginally binding for Nykredit.

The leverage ratio requirement for the systemic institutions is significantly higher than the minimum requirement for Tier 1 capital. The institutions should thus be aware that the introduction of the leverage ratio requirement results in a higher minimum requirement for their Tier 1 capital.

For most systemic institutions, excess capital adequacy is higher for the gearing ratio than the capital buffer requirement

Chart 33



Note: The risk-based requirement is calculated on the basis of Tier 1 capital level and consists of the solvency requirement and the combined buffer requirement (SIFI buffer, capital conservation buffer and countercyclical buffer). The leverage ratio requirement has been calculated as 3 per cent of total non-risk-weighted exposures. Data for end-2020.

Source: Danmarks Nationalbank, own calculations and Pillar II reporting for 2020.

Liquidity reserves have been reduced since the year-end

Banks' liquidity ratios have decreased
The systemic banks' liquidity reserves have decreased since the turn of the year, but remain at a high level. The banks' liquidity buffers were already relatively solid before the outbreak of the pandemic last year, but, during the pandemic, government liquidity support measures for the corporate sector have contributed to the buffers.

Danmarks Nationalbank's latest sensitivity analysis of the systemic banks' liquidity reserves shows that the banks can handle a severe liquidity stress for at least four months, see chart 34.[20] The current survival horizon under severe stress is lower than it was during the second half of 2020, but it does not give cause for concern.

The statutory liquidity coverage ratio (LCR) also shows a decrease relative to the second half of 2020, but it still remains at a high level for both systemic and non-systemic banks, see chart 35.

20 For a method description of Danmarks Nationalbank's sensitivity analysis, see page 26 of Danmarks Nationalbank, Lower excess capital adequacy for the banks, *Danmarks Nationalbank Analysis (Financial Stability)*, No. 25, November 2019 (*link*).

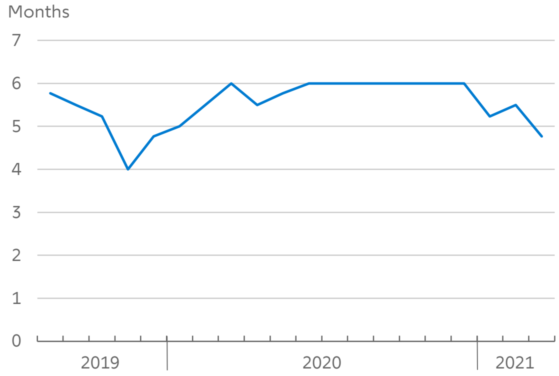
Bank deposits increased significantly as government liquidity support was introduced
Deferred deadlines for payment of tax and VAT as well as tax loans significantly increased corporate liquidity in 2020.

Liquid funds in the corporate sector and household customers' savings most often end up in the banks' balance sheets in the form of either increased deposits or decreased lending. Against this background, bank deposits increased significantly in 2020. An immediate effect of the extra deposit liquidity has been an increase in the institutions' liquidity position.

Especially corporations increased their total deposits in 2020, see chart 36, where deposits predominantly increased in the May-June period, when the payment deadlines for tax and VAT were deferred. When previously deferred payment deadlines fell due in early 2021, this may conversely have contributed to decreasing deposits from the banks' corporate customers. Households have also increased their deposits since the outbreak of the pandemic, partly due to disbursements of previously frozen holiday pay.

Some corporations secured access to liquidity through extended credit facilities with their bank during 2020. These are facilities which the banks have undertaken to be able to disburse and which therefore also contribute to the ongoing requirements for their liquidity reserves. Afterwards, corporate customers have not fully activated the facilities.

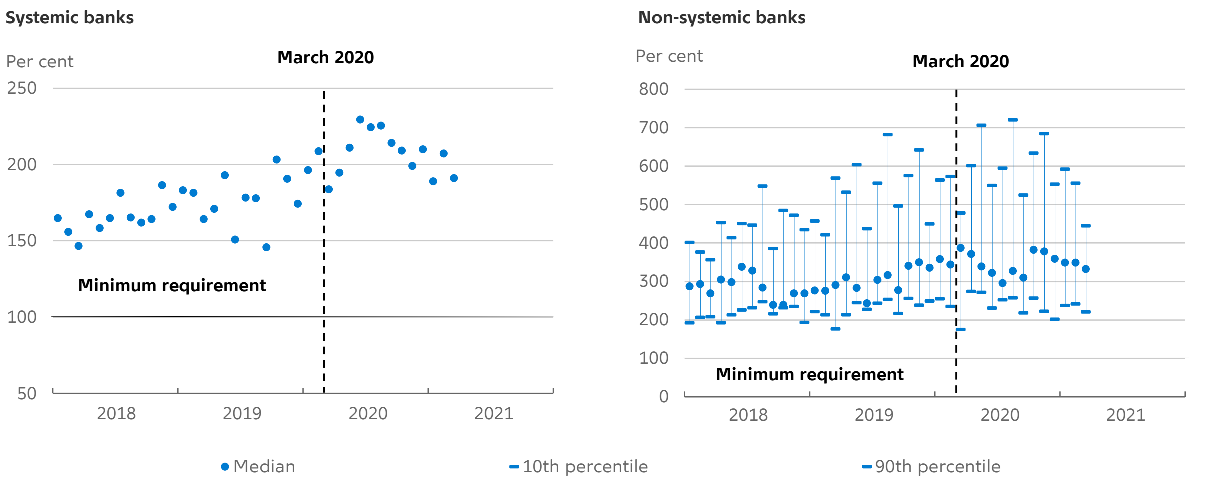
Systemic banks can survive four months of liquidity stress Chart 34



Note: Number of months systemic banks can overall withstand severe combined liquidity stress, according to Danmarks Nationalbank's sensitivity analysis. The maximum survival horizon in the sensitivity analysis is six months. The most recent observations are from end-March 2021.
Source: Danmarks Nationalbank.

Banks' liquidity can absorb increased outflows when government liquidity support is phased out
The banks should be prepared that part of the increase in deposits in the past year is temporary

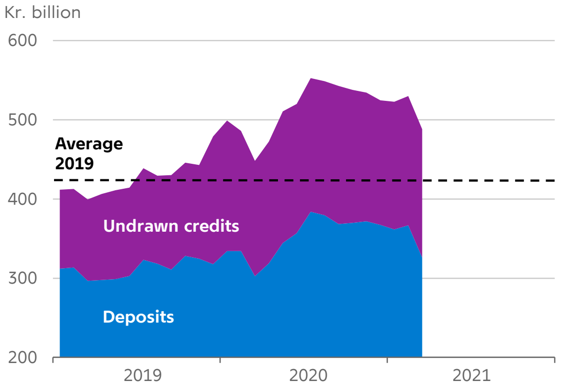
Banks observe short-term liquidity coverage ratio (LCR) with a certain margin Chart 35



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 end-March 2021.
Source: Danmarks Nationalbank.

Corporate deposits and liquidity facilities are at a high level during pandemic

Chart 36



Note: Danish non-financial corporations' deposits and confirmed credit and liquidity facilities to non-financial corporations in Danish kroner. The most recent observations are from end-March 2021.
Source: Danmarks Nationalbank, the Danish Financial Supervisory Authority and own calculations.

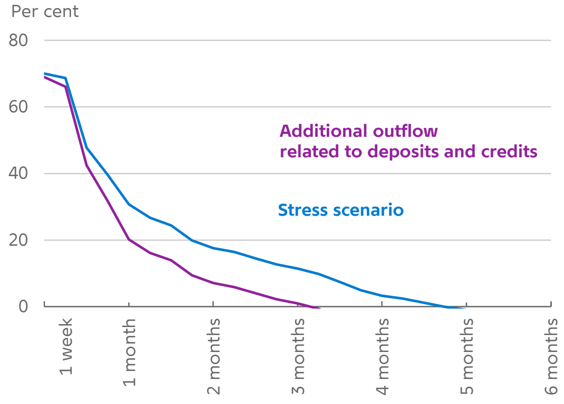
and will decline as liquidity support measures are being phased out.

Danmarks Nationalbank has made a sensitivity calculation of the institutions' survival horizon if the deferred tax and VAT payments are repaid and corporations utilise the increase in credit facilities granted by the banks since March 2020.[21] In such case, the institutions' survival horizon will fall, but it will still exceed three months, see chart 37. While the banks' liquidity buffer has generally been lower than in the second half of 2020, the potential additional draws are also reduced in connection with the phasing out of the liquidity support measures.

Good time to build up more resilient excess capital adequacy relative to banks' MREL requirement
The risk premium for non-preferred senior debt has fallen to a lower level than in the run-up to the pandemic, see chart 38. The downward trend

Sensitivity to further deposit withdrawals and draws on credit facilities

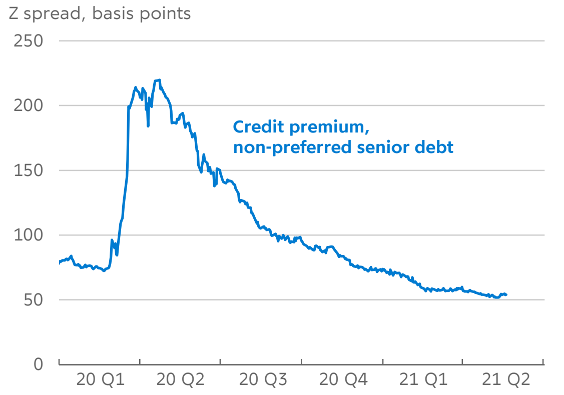
Chart 37



Note: Number of months systemic banks can overall withstand a severe combined liquidity stress and extra draws on credit facilities and corporate deposit withdrawals, according to Danmarks Nationalbank's resilience analysis. Data calculated end-March 2021.
Source: Danmarks Nationalbank.

Credit premium for non-preferred senior debt is back to pre-pandemic level

Chart 38



Note: Average z spread for non-preferred senior debt in euro maturing in 2024 for Danske Bank, Jyske Bank and Nykredit. The *z spread* is an expression of the additional cost of financing using a debt instrument, where the additional cost is calculated by parallel-shifting a risk-free zero coupon rate structure. The most recent observations are from 19 May 2021.
Source: Refinitiv Eikon.

21 For a further description of the resilience scenario, see box 4 in Danmarks Nationalbank, Banks should keep their powder dry, *Danmarks Nationalbank Analysis* (*Financial Stability*), No. 28, December 2020 (*link*).

reflects the large risk appetite among investors in the debt issuance markets.

For an extended period of 2020, the average risk premium for non-preferred senior debt issued by Danish banks was at an increased level. The development in the past year shows that flexibility in terms of the time of issuance may have a great impact on the cost of issuing non-preferred senior debt to meet the MREL requirement.

The current market situation is a good time for the banks to build up a more resilient excess capital adequacy relative to their MREL requirement by issuing new and more long-term non-preferred senior debt.

Appendix
Analysis data

The analysis applies 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.

The analysis of Danish credit institutions' earnings, liquidity and own funds comprises seven systemic credit institutions selected by the Danish Financial Supervisory Authority, most recently in 2020. The analysis also includes the non-systemic banks in the Danish Financial Supervisory Authority's group 2 in 2021. The institutions are shown in Table A. Unlike in the Danish Financial Supervisory Authority's group 2, Saxo Bank has been omitted from the population due to its business model. The grouping used in the analyses 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 consist of group 1 of the Danish Financial Supervisory Authority and Nordea Danmark, while medium-sized banks consist of group 2 of the Danish Financial Supervisory Authority, Handelsbanken and Santander Consumer Bank.

Institutions in the analysis by total assets as at 31 December 2020. Kr. million Table A

Systemic credit institutions	Amount
Danske Bank	4,109,231
Nykredit Realkredit	1,665,767
Jyske Bank	672,648
Nordea Kredit	467,936
DLR Kredit	181,083
Sydbank	165,800
Spar Nord	102,077
Total systemic groups	7,364,542

Systemic banks	
Danske Bank	2,574,837
Jyske Bank	335,402
Nykredit Bank	197,611
Sydbank	168,823
Spar Nord	102,155
Total systemic banks	3,378,828

Non-systemic banks	
Arbejdernes Landsbank	62,704
Ringkjøbing Landbobank	54,862
Sparekassen Kronjylland	33,359
Sparekassen Sjælland-Fyn A/S	27,370
Sparekassen Vendsyssel	31,626
Lån & Spar Bank	27,426
Vestjysk Bank	39,511
Jutlander Bank	20,662
Middelfart Sparekasse	14,730
Total non-systemic banks	312,249

Mortgage credit institutions	
Nykredit Realkredit	1,554,091
Realkredit Danmark	891,194
Nordea Kredit	467,936
Jyske Realkredit	377,132
DLR Kredit	181,083
Total mortgage credit institutions	3,471,436

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. The assets in the financial statements of the mortgage credit institution Nykredit Realkredit also reflect the Nykredit Group's funding of the subsidiary Totalkredit. The assets in the financial statements for Vestjysk Bank include the balance sheet total for Den Jyske Sparekasse, end of 2020, as Den Jyske Sparekasse merged with Vestjysk Bank in January 2021.
Source: Danmarks Nationalbank.

PUBLICATIONS

NEWS

News offers quick and accessible insight into an Analysis, an Economic Memo, a Working Paper or a Report from Danmarks Nationalbank. News is published continuously.

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Analyses from Danmarks Nationalbank focus on economic and financial matters. Some Analyses are published at regular intervals, e.g. *Outlook for the Danish economy* and *Financial stability*. Other Analyses are published continuously.

REPORT

Reports comprise recurring reports and reviews of the functioning of Danmarks Nationalbank and include, for instance, the *Annual report* and the annual publication *Danish government borrowing and debt*.

ECONOMIC MEMO

An Economic Memo is a cross between an Analysis and a Working Paper and often shows the ongoing study of the authors. The publication series is primarily aimed at professionals. Economic Memos are published continuously.

WORKING PAPER

Working Papers present research projects by economists in Danmarks Nationalbank and their associates. The series is primarily targeted at professionals and people with an interest in academia. Working Papers are published continuously.

The analysis consists of a Danish and an English version. In case of doubt regarding the correctness of the translation the Danish version is considered to be binding.

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ANALYSIS

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FINANCIAL STABILITY — 2ND HALF 2021

Increased risks in credit institutions' housing lending

Credit institutions are granting more housing loans to highly indebted homeowners

High loan-to-value ratios may cause vulnerabilities to a subsequent fall in house prices. A general requirement for higher down payments and instalments on loans to homeowners with a high loan-to-value ratio may contribute to a more resilient housing market.

Several institutions should consider whether their capital target is sufficient

The stress test of the institutions shows that several of them need the current excess capital relative to their capital target to be able to withstand stress.

Lending to vulnerable industries is limited

The institutions have limited lending to the industries that have been hardest hit by the pandemic. The institutions have made provisions to cover losses and are well equipped to grant loans to viable companies as the government loan schemes terminate.

CONTENTS

Summary and assessment

FINANCIAL MARKETS

Prospects of higher global economic growth
The global economy is recovering, and the International Monetary Fund (IMF) has raised its outlook for the growth rate for 2022 as vaccination continues in developed economies. In its latest projection for the Danish economy, Danmarks Nationalbank expects continued high growth rates, supported by very accommodative financial conditions and international recovery.

Inflation and interest rates have risen
Pressure on supply chains has contributed to higher inflation, and market participants also expect higher inflation in the longer term. Yields on long government bonds and mortgage bonds have risen since the summer, but are still at a low level.

Equity markets continue to rise, and credit premiums are low
Equity prices have increased in the western economies since April 2020. The financial markets are still characterised by high risk appetite: Credit spreads are low in the corporate bond market.

CREDIT

Increase in new housing loans to highly indebted homeowners
Lending to highly indebted homeowners constitutes an increasing share of mortgage credit institutions' new loans. Especially in Greater Copenhagen and Aarhus, they make up a large share. At the same time, half of new loans to these homeowners are with deferred amortisation. There are thus signs of increased risk-taking in housing lending.

Credit institutions grant more loans with deferred amortisation
The share of new loans with deferred amortisation has increased throughout Denmark, and these loans constitute more than half of new loans to homeowners in 2021. The increase in loans with deferred amortisation is particularly widespread among homeowners who refinance or modify their loans. Loans with deferred amortisation are also granted to homeowners with a high loan-to-value ratio at the time of the loan disbursement: Almost half of loans with deferred amortisation have been granted to homeowners with a high loan-to-value ratio. A general requirement for higher down payments and instalments on loans to homeowners with a high loan-to-value ratio may limit vulnerabilities to a subsequent fall in house prices. A reduction of the tax value of the interest deduction will reduce the incentive to raise debt and will also contribute to strengthen the structures on the housing market.

Some homeowners have a significant exposure to interest rate increases
Among homeowners who spend a large share of their income on servicing their loans, some have a significant exposure to interest rate increases. This applies, in particular, to homeowners with a high loan-to-value ratio who have chosen variable rate loans. Overall, homeowners' interest rate sensitivity is limited and, seen in isolation, it does not pose a threat to financial stability. Homeowners' interest rate sensitivity fell in the period from 2009 to 2019, as homeowners reduced their bank debt and increasingly opted for fixed rate mortgage loans.

Credit institutions' lending to vulnerable industries is limited
Lending to the industries that have been hardest hit by the pandemic only makes up a small part of corporate lending. However, the credit quality of these loans has deteriorated. The probability of default has thus increased on lending to vulnerable industries. The credit quality of the rest of the institutions' corporate lending has improved on average.

Falling pork prices may result in losses
Pork prices have fallen markedly since the summer after a period with high prices. If the current price level continues, it may result in losses being incurred on part of the institutions' lending to pig farmers. Although pig farmers have reduced their debt to some extent in recent years, a large proportion of bank lending to pig farmers is still characterised by impaired credit quality. The credit institutions should continue to focus on their customers in the pork industry improving their solvency during periods with favourable earnings opportunities.

EARNINGS

Banks have raised their earnings expectations for 2021
Several systemic credit institutions have raised their expectations for their profit for the year several

times during 2021. The principal reason for this is that the expected losses in the wake of the covid-19 restrictions have still not materialised. Another reason given by the institutions for their upward adjustments is that customer activity in the housing market and the financial markets in the 1st half of 2021 had a more positive effect than expected going into the year.

Rising costs may put pressure on earnings
Costs for the systemic institutions have increased in recent years. The rising costs are primarily due to higher staff costs. At the same time, revenues from traditional banking operations have been at a stable level. In view of the increasing costs, it is important that the institutions continue to focus on streamlining their operations.

CAPITAL

Stagnant capital ratios after implementation of new regulation
The systemic institutions' excess capital adequacy has been virtually unchanged during 2021. Risk exposure amounts have increased, primarily due to more rigorous regulations.

The countercyclical capital buffer is re-established at 1 per cent from September 2022 following a recommendation from the Systemic Risk Council. In December 2021, the Council expects to recommend increasing the buffer further to 2 per cent. With their current excess capital adequacy, the systemic institutions can meet both already announced and further expected increases.

Some systemic institutions are close to buffer requirements under stress
The latest stress test conducted by Danmarks Nationalbank shows that the systemic institutions have sufficient capital to withstand a severe recession scenario, but a few of the systemic banks are close to their buffer requirements.

Several banks should consider whether their capital adequacy target is sufficient
The large institutions currently hold more capital than their capital adequacy target warrants. But some institutions need their current excess capital adequacy to be able to withstand stress. The stress test shows that several systemic institutions would be in breach of the capital buffer requirements if the stress test had been conducted based on the institutions' capital adequacy targets instead of their current capitalisation.

Declining excess capital adequacy relative to MREL and debt buffer requirements
The total minimum requirement for eligible liabilities (MREL) and debt buffer requirements as well as the subordination requirement for the systemic institutions have increased since the turn of the year due to the increases in the risk-weighted exposures resulting from new regulation. However, the institutions still meet both the total MREL and debt buffer requirements as well as the coming group requirement.

LIQUIDITY AND FUNDING

Banks have increased their liquidity
The systemic banks have increased their liquidity reserves, and this is reflected in a high Liquidity Coverage Ratio (LCR). The increased liquidity is partly due to the central government's liquidity support measures for the corporate sector during the pandemic. The banks' liquidity can handle extra draws as the measures are phased out. Danmarks Nationalbank's latest sensitivity analysis shows that the systemic banks can handle severe liquidity stress for at least six months.

Net Stable Funding Ratio (NSFR) is a new funding requirement and aims to ensure a stable funding of the balance sheet
A new funding requirement, Net Stable Funding Ratio (NSFR), entered into force for the credit institutions in June 2021. The purpose of NSFR is to ensure that the banks have sufficiently stable funding available. The institutions should stress test the funding requirement to understand the factors that affect the requirement. NSFR is sensitive to withdrawals of deposits and lack of access to markets.

Now is a good time to secure a robust maturity profile on non-preferred senior debt
The current market situation is a good time for the banks to ensure a more robust maturity profile for compliance with NSFR and MREL requirements and adequacy buffers to these requirements. The reason for this is that the risk premium for non-preferred senior debt has fallen to a lower level than in the run-up to the pandemic. The lower risk premiums reflect that there is generally large risk appetite among investors in the debt issuance markets.

Interest rate rises will increase the need for liquidity in the financial sector

It is important that pension companies, life insurance companies and banks take potential interest rate rises into account in their risk management, as this may increase their liquidity needs. If interest rates rise, companies which use interest rate derivatives may need liquidity to meet variation margin calls.

Rising inflation affects the markets

Prospects of higher global economic growth
The global economy is recovering, and the expected growth rate for 2022 has increased since the spring. The International Monetary Fund (IMF) expects global economic growth of 4.7 per cent in 2022, see chart 1. Growth of 4.3 per cent is expected in the euro area in 2022 against a previous growth rate of 3.8 per cent. One of the reasons for the adjustments is advanced vaccination programmes in developed economies. In its latest projection for the Danish economy, Danmarks Nationalbank expects continued high growth rates for the Danish economy supported by very accommodative financial conditions and international recovery. However, the course of the pandemic is still a risk factor for the growth prospects.

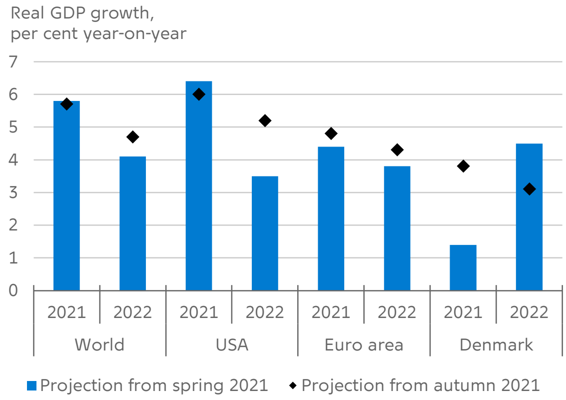
Inflation and interest rates have risen
During 2021, yields on, for example, long government bonds and mortgage bonds have increased, but moderately. Pressure on supply chains has contributed to higher transport, energy and commodity prices, which has contributed to rising inflation, see chart 2. Market participants' long-term inflation expectations have likewise increased.

If an inflation rate above 2 per cent turns out to be of a more permanent nature, it may result in rising interest rates. Interest rate increases may pose a risk if interest rates rise suddenly and unexpectedly because of changing market expectations without a concurrent improvement in the economy. This may affect the value of a number of financial assets and, for example, lead to a great need for liquidity in the event of value fluctuations in derivatives contracts, see the section on liquidity and funding.

Rising long-term mortgage rates
Mortgage rates remain low, although there have been increases in the past couple of months. Danish borrowers thus still have access to home financing at low interest costs. Long-term bond yields have risen, whereas yields on short-term bonds have remained virtually unchanged since the beginning of 2021, see chart 3. An increased spread between long and short interest rates may incentivise some borrowers to choose variable rate loans over fixed rate 30-year loans, as it will be less attractive to hedge the interest rate.

Expectations of higher growth in global economy

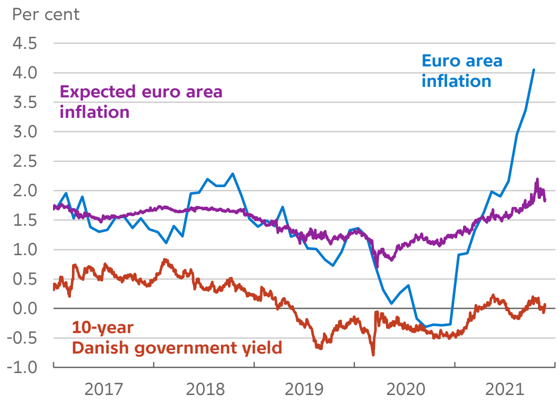
Chart 1



Note: IMF estimates for the world, based on exchange rates, and IMF estimates for the USA and the euro area from April 2021 and October 2021, respectively. GDP growth in Denmark is based on Danmarks Nationalbank's projections from March 2021 and September 2021, respectively.
Source: IMF and Danmarks Nationalbank.

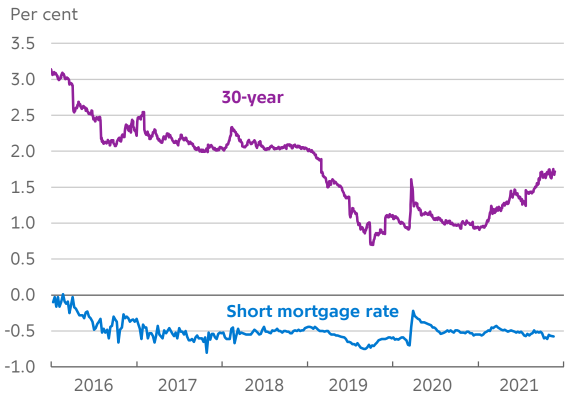
Inflation and inflation expectations have risen

Chart 2



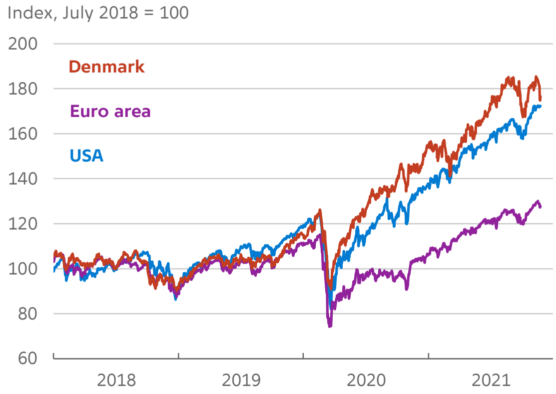
Note: *Inflation* indicates realised inflation figures based on the EU Harmonised Index of Consumer Prices (HICP) for the euro area. *Expected inflation* indicates five-year market-based inflation expectations starting five years from now. For example, the value in October 2021 indicates the expected inflation from October 2026 and five years onwards.
Source: Refinitiv Eikon and own calculations.

Rise in long-term mortgage rates Chart 3



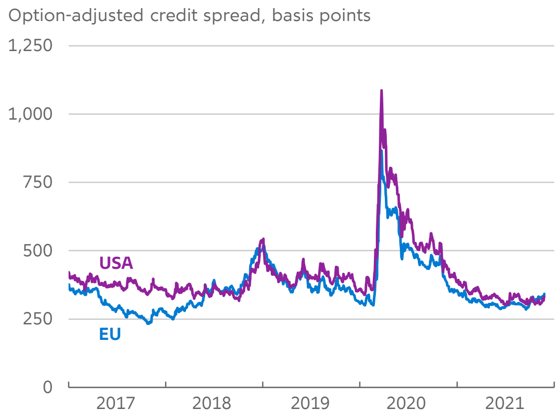
Note: *30-year* shows the yield to maturity for a series of 30-year mortgage bonds based on the leading bond at the end of the month. Average effective bond yield for short-term mortgage bonds.
Source: Finance Denmark, Refinitiv Eikon and own calculations.

Equity markets continue to rise Chart 4



Note: The C25 Index is shown for Denmark, Eurostoxx 600 for the euro area and S&P 500 for the USA. The most recent update is from 25 November 2021.
Source: Refinitiv Eikon.

Still low credit premiums for corporate bonds Chart 5



Note: High-yield corporate bonds. The most recent observations are from 25 November 2021.
Source: Refinitiv Eikon.

Equity prices continue to rise and credit premiums are low

Equity prices have increased in the western economies since April 2020, see chart 4. For Danish equities, prospects of economic recovery and increasing earnings expectations in the short term have caused prices to rise during 2021.[1] Despite a minor price fall for Danish equities after the summer period, the leading Danish index, the C25 Index, has risen by a total of 13 per cent during the first 11 months of 2021. European and American equities have risen by 20 and 27 per cent, respectively. since the beginning of 2021.

The financial markets are still characterised by high risk appetite among investors and low credit premiums. The credit premium reflects investors' willingness to take on the risks of a given debt instrument relative to a risk-free investment. Credit premiums are low in the corporate bond market, see chart 5. The credit premium for risky corporate bonds remains below the average level in 2018 and 2019: just under 25 basis points for euro-denominated issuances.

1 See Danmarks Nationalbank, Accommodative financial conditions strengthen the upswing, *Danmarks Nationalbank Analysis (Monetary and financial trends)*, no. 23, September 2021.

Increase in new housing loans to highly indebted homeowners

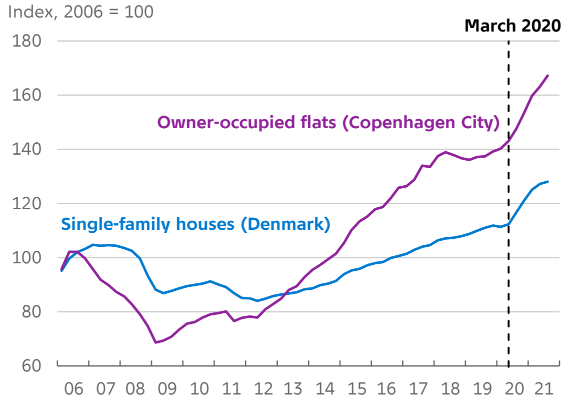
House prices have risen rapidly in the past year
Mortgage lending for owner-occupied homes and holiday homes increased by approx. 5 per cent year-on-year in October 2021. Conversely, total bank lending for housing purposes has decreased. Growth is roughly at the same level as before the outbreak of the covid-19 pandemic. However, the growth rate is moderate relative to the rise in house prices.

House prices have risen rapidly since the outbreak of covid-19, see chart 6. In the 3rd quarter of 2021, the prices of single-family houses and owner-occupied flats were thus 10 per cent and 13 per cent, respectively, higher than in the previous year. However, price increases have abated in recent months. Households' increased appreciation of their homes may help explain the rise in house prices during the pandemic.[2]

The low interest rate level currently supports house prices. However, a large sudden increase in interest rate levels may give a drop in house prices, which will increase homeowners' loan-to-value ratio.

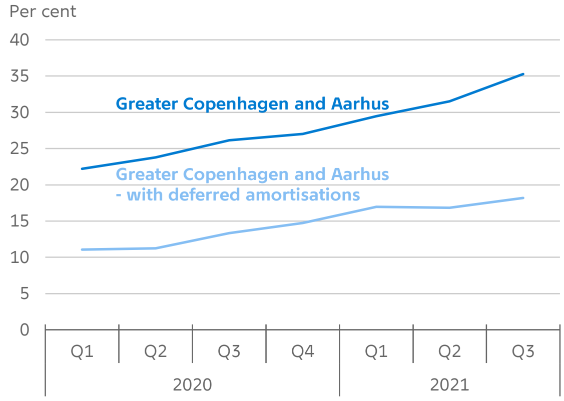
Increase in new housing loans to highly indebted homeowners
New loans to highly indebted homeowners constitute an increasing share of mortgage credit institutions' new loans, see chart 7.[3] About 35 per cent of new loans in Greater Copenhagen and Aarhus in the 3rd quarter of 2021 were thus granted to homeowners with a loan-to-value ratio above 60 per cent and a debt-to-income ratio above 4. This is an increase of 13 percentage points on the 1st quarter of 2020. In the rest of Denmark, more new loans have also been granted to highly indebted homeowners. In the 3rd quarter of 2021, they accounted for 17 per cent of new loans from mortgage credit institutions. At the same time, half of the new loans to highly indebted homeowners are with deferred amortisation. There are thus signs of increased risk-taking in lending.

Significant rise in house prices in the past year Chart 6



Note: Seasonally adjusted house prices. The most recent observations are from the 3rd quarter of 2021.
Source: Statistics Denmark and own calculations.

More new loans to highly indebted homeowners in Greater Copenhagen and Aarhus Chart 7



Note: Share of new mortgage loans to highly indebted owners. New loans have been calculated net, see box 1. Highly indebted homeowners are defined by having a debt-to-income ratio above 4 and a loan-to-value ratio above 60 per cent. The loan-to-value ratio is for the total mortgage and bank debt secured by mortgage on the home.
Source: Danmarks Nationalbank and own calculations.

2 See Adrian Michael Bay Schmith, Jesper Pedersen, Simon Juul Hviid and Simon Thinggaard Hetland, Housing market robustness should be strengthened, *Danmarks Nationalbank Analysis*, no. 16, June 2021.

3 New loans have been calculated as net new loans, see box 1.

New loans from mortgage credit institutions – what we have done

Box 1

Danmarks Nationalbank and the Danish Financial Supervisory Authority collects data on all Danish borrowers' credit conditions from mortgage credit institutions and banks on a quarterly basis. The data collection goes back to the 4th quarter of 2019. The credit data includes information about loans such as outstanding debt, interest rate, loan type, mortgage and collateral for loans, including value of mortgage, location etc.

In the analysis, we have zoomed in on information regarding Danish private individuals' mortgage loans secured on owner-occupied homes in Denmark. Based on a number of assumptions and using the homeowners' mortgage and loan data, we have categorised the lending by loan type (new loans or existing loans) and type of borrower (first-time buyer, other buyers as well as refinancing and top-up loans (existing homeowners)).

- **First-time buyers** are homeowners with a new mortgage loan in the current quarter who have neither had a bank loan nor a mortgage loan with collateral in real properties since October 2019. The statement thus also includes buyers who have returned to the housing market since October 2019 after a break.
- **Other buyers** are all other home buyers who have either changed homes or acquired an extra home and raised a new loan.
- **Existing homeowners** are when the homeowner takes out a new mortgage loan without a concurrent change in home ownership.
- **New loans** have been calculated net in the analysis. New loans are thus equal to the mortgage debt in the current period less the mortgage debt in the previous period. For first-time buyers, the lending will be identical to gross new lending, as, by definition, this buyer segment did not have a housing loan in the previous period.

The calculations are subject to uncertainty due to the short data-collection period and time lags in mortgage ownership.

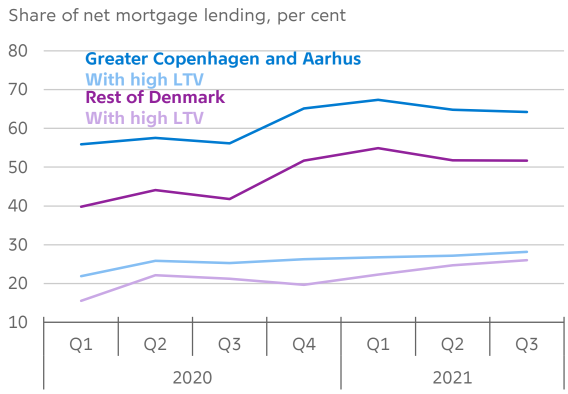
Credit institutions grant more loans with deferred amortisation

Since the end of 2020, the share of mortgage loans with deferred amortisation has increased after having decreased for a number of years. Part of the increase at the end of 2020 is due to some of the homeowners who refinanced or modified their loans having chosen to switch to loans with deferred amortisation.[4] Just under half of the homeowners' mortgage debt was with deferred amortisation at the end of October 2021.

New loans with deferred amortisation are most widely used in Greater Copenhagen and Aarhus, where they constituted 66 per cent of new loans in the first three quarters of 2021, whereas the share was 53 per cent for the rest of Denmark, see chart 8. This corresponds to an increase of about 10 percentage points relative to the first three quarters of 2020. The increase in loans with deferred amortisation primarily occurred in the 4th quarter of 2020, in which the share increased by 9 percentage points in Greater Copenhagen

Share of new loans with deferred amortisation has increased

Chart 8



Note: Share of new mortgage loans with deferred amortisation. New loans have been calculated net, see box 1. Deferred amortisation is defined by the homeowner having minimum one loan with deferred amortisation. *High loan-to-value ratio* includes lending with deferred amortisation and a loan-to-value ratio above 60 per cent. The loan-to-value ratio is for the total mortgage and bank debt secured by mortgage on the home.
Source: Danmarks Nationalbank and own calculations.

4 See Danmarks Nationalbank, Build-up of risks in credit institutions, *Danmarks Nationalbank Analysis (Financial stability)*, May 2021.

and Aarhus and by 10 percentage points in the rest of the Denmark.

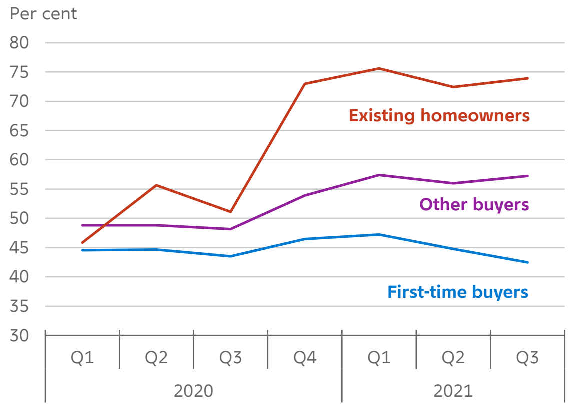
Loans with deferred amortisation are also granted to homeowners with a high loan-to-value ratio at the time of the loan disbursement. Both in Greater Copenhagen and Aarhus and in the rest of Denmark, slightly more than a quarter of the new loans in 2021 were granted to homeowners with deferred amortisation and a loan-to-value ratio above 60 per cent. However, the share of new loans with deferred amortisation is close to the same level as in 2020. The growth in loans with deferred amortisation at the end of 2020 was thus primarily driven by homeowners with a loan-to-value ratio below 60 per cent.

The increase in loans with deferred amortisation is particularly widespread among homeowners who refinance or modify the loans in their existing homes, see chart 9. Among these homeowners, loans with deferred amortisation constitute 74 per cent of their borrowing. First-time buyers have not raised loans with deferred amortisation to the same extent as existing homeowners and home buyers.

Deferred amortisation increases vulnerabilities to a subsequent drop in house prices. Use of deferred amortisation should be limited to the most resilient homeowners. This will strengthen the resilience of the Danish economy[5] and support financial stability. There are currently rules for the institutions' lending which limit the access to mortgage loans with deferred amortisation for some customers. For example, Danish lending rules (Executive Order on Good Practice (in Danish: God skik-bekendtgørelsen)) restricts access to variable rate mortgage loans with deferred amortisation for homeowners with a debt-to-income ratio above 4 and a loan-to-value ratio above 60 per cent. However, the rules do not restrict access to fixed rate mortgage loans with deferred amortisation for homeowners with high debt-to-income and loan-to-value ratios. For homeowners in Greater Copenhagen and Aarhus, the Growth Guidelines (in Danish: Vaekstvejledningen) limit, for example, access to

Growth in loans with deferred amortisation is especially widespread among existing homeowners

Chart 9



Note: Share of new mortgage loans with deferred amortisation. New loans have been calculated net, see box 1. Deferred amortisation is defined by the homeowner having minimum one loan with deferred amortisation.
Source: Danmarks Nationalbank and own calculations.

deferred amortisation for homeowners with negative wealth.[6]

The Danish down payment requirements in connection with real estate purchases are relatively low compared to many other countries, see chart 10. Danish home buyers can finance up to 95 per cent of their home purchase with bank and mortgage debt secured by mortgage on the home. The current loan rules with the option of deferred amortisation, combined with a low down payment requirement, make it possible for homeowners to raise debt with only very limited own financing and low debt service. Many home buyers who currently raise loans with deferred amortisation would have to use a high proportion of their disposable income on debt service payments if they were to pay instalments on the loan, see box 2. A general requirement for higher down payment and instalments on loans to homeowners with a high loan-to-value ratio may contribute to a more resilient housing market. A reduction of the tax value of the interest deduction will reduce

5 See Adrian Michael Bay Schmith, Jesper Pedersen, Simon Juul Hviid and Simon Thinggaard Hetland, Housing market robustness should be strengthened, *Danmarks Nationalbank Analysis*, no. 16, June 2021.

6 For a description of the Growth Guidelines, see Christian Sinding Bentzen, Henrik Yde Andersen and Simon Juul Hviid, Impacts of 2016 guidelines on mortgaging of homes, *Danmarks Nationalbank Analysis*, no. 18, November 2018.

Many home buyers who are granted loans with deferred amortisation would have very high debt-service-to-income ratios if they were to pay instalments on the loans

Box 2

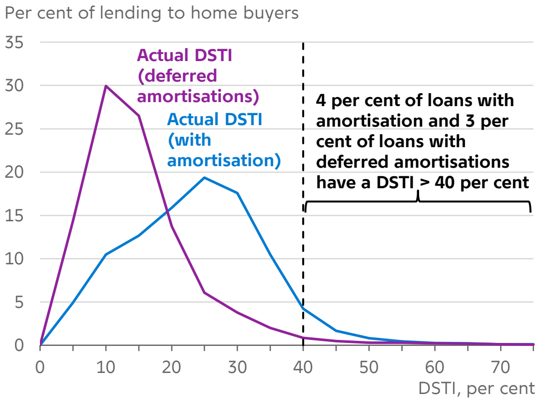
Danmarks Nationalbank and the Danish Financial Supervisory Authority's collection of data makes it possible to check how many home buyers with loans with deferred amortisation would have very high debt-service-to-income (DSTI) ratios if they were to pay instalments on the loans, see chart A. The left-hand part of the chart shows how the actual DSTI ratios are distributed on loans with amortisation and with deferred amortisation, respectively, for home purchases made from and including the 4th quarter of 2019 and up to and including the 1st quarter of 2021. The financing of the home purchase is only regarded as being with deferred amortisation if the total amortisation rate is 0. If instalments are paid on a bank loan or parts of the mortgage financing, the financing is therefore not categorised as deferred amortisation. The y axis shows the proportion of loans to home buyers that fall within each DSTI range (the area under the blue curve adds up to 100 per cent, and the same applies to the purple curve). For example, a DSTI ratio of 30 per cent means that the household spends 30 per cent of its income after tax on interest, administration fees and amortisation. An amortisation rate of 0 entails very low DSTI ratios (the purple curve). The vast majority of home purchases financed with deferred amortisation thus have a DSTI ratio of 15 per cent or less. Of those with amortisation, 4 per cent had a DSTI ratio above 40 per cent, while this was the case for 3 per cent of those with deferred amortisation. There are many factors that have an impact when a household experiences that a very high share of the household income is used for interest and instalments, but, in many countries, the regulation reflects that a DSTI ratio above 40 per cent must be regarded as very high.[1]

The right-hand chart shows the counterfactual example of what the debt-service-to-income ratio would look like if the home buyers with deferred amortisation were to pay instalments. The purple curve shows these counterfactual DSTI ratios. The counterfactual distribution lies further to the right and has a thicker tail than the distribution of actual DSTI ratios for the customers with amortisation. 21 per cent of home buyers with deferred amortisation would thus have a DSTI ratio above 40 per cent if they were to pay instalments on their debt.

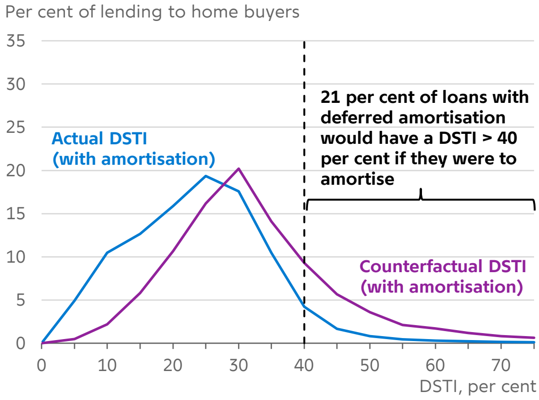
Very high DSTI ratios if homes financed with deferred amortisation were instead financed with amortisation

Chart A

Actual DSTI ratios for home buyers



Counterfactual DSTI ratios if loans with deferred amortisation were instead with amortisation

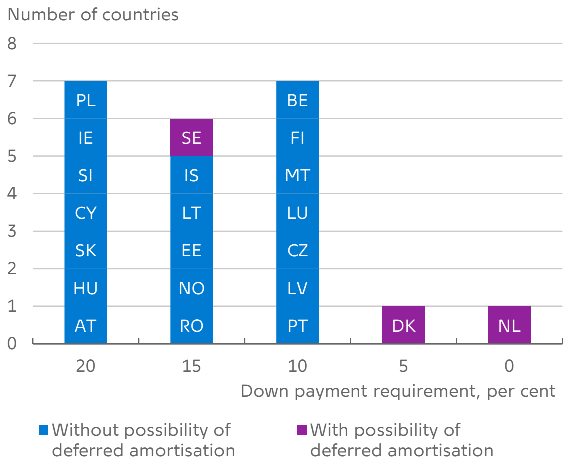


Note: Debt-service-to-income (DSTI) ratios for home buyers from 4th quarter 2019 to 1st quarter 2021. A loan with deferred amortisation is defined across bank and mortgage lending. A customer with a mortgage loan with deferred amortisation, but with instalments on the bank part, will therefore count as a customer with amortisation. The area under each series adds up to 100 per cent. The DSTI ratio is calculated as the sum of interest, administration fees and instalments on bank and mortgage debt as a percentage of income after tax. The income has been estimated as the total housing debt divided by the reported debt-to-income ratio and subsequently adjusted with the average ratio between income before and after tax, calculated on the basis of data from Statistics Denmark's Research Service. In the counterfactual DSTI ratio, the debt service is calculated if the debt was to be repaid as an annuity loan with a maturity of 30 years on mortgage debt and 20 years on bank debt, interest deduction of 33 per cent and the same interest rates as on the actual debt with deferred amortisation. The DSTI ratio is calculated two quarters after the home purchase.

Source: Danmarks Nationalbank and own calculations.

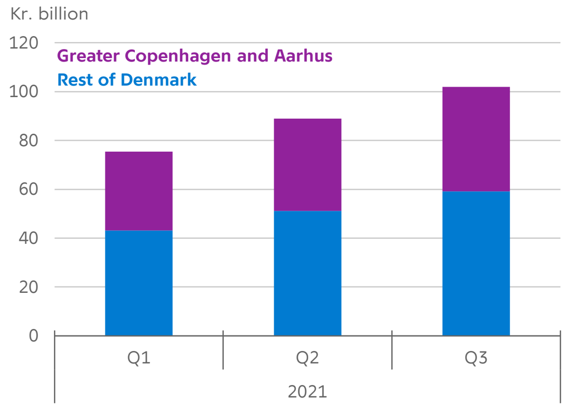
1. See, for example, the European Systemic Risk Board, A Review of Macroprudential Policy in the EU in 2020, July 2021.

Down payment requirement is low in Denmark Chart 10



Note: Down payment requirements for housing financing.
Source: European Mortgage Federation, *Interest-only loans study*, May 2019, and European Systemic Risk Board, *A Review of Macroprudential Policy in the EU in 2020*, July 2021.

Increased use of loans with 30-year deferred amortisation Chart 11



Note: Outstanding debt on active loans with 30-year deferred amortisation.
Source: Danmarks Nationalbank and own calculations.

the incentive to raise debt and will also contribute to strengthen the structures on the housing market.

Increasing use of 30-year deferred amortisation
Mortgage loans with deferred amortisation throughout the maturity of the loan, which were introduced in 2017, are becoming more widespread in the mortgage credit market, see chart 11. The loan types currently offered by the institutions contain terms on, for example, maximum loan-to-value ratio with deferred amortisation of 60 per cent of the value of the property, and there is generally no access to post-financing against another mortgage in the same property.[7] More than one third of the growth in loans with deferred amortisation in 2021 stems from loans with deferred amortisation of up to 30 years.

Mortgage loans with deferred amortisation throughout the maturity of the loan may be a relevant product for a limited customer group. However, as no current instalments are made on the loan, it is essential that the mortgaged property maintains its value throughout the loan period. This may be a problem in areas with declining housing demand and in cases in which the home is not adequately maintained.

Some homeowners have a significant exposure to interest rate increases
Homeowners' interest rate sensitivity on their debt service payments fell in the period from 2009 to 2019, as homeowners reduced their bank debt and increasingly opted for fixed rate mortgage loans.[8] Overall, homeowners' interest rate sensitivity is limited and, seen in isolation, it does not pose a threat to financial stability. At the end of 2019, the typical homeowner would have to use 0.5 per cent more of his or her net income and debt service to pay instalment and interest on their debt in connection with an interest rate increase of one percentage point. However, interest rate sensitivity varies greatly among homeowners: 10 per cent of

7 The loans were offered as variable rate loans in 2017 and have also been offered as fixed rate loans since the end of 2020. These loans may be offered to customers with a loan-to-value ratio of up to 75 per cent, but deferred amortisation is only available with a loan-to-value ratio below 60 per cent.

8 Stine Ludvig Bech, Simon Juul Hviid and Jakob Guldbæk Mikkelsen, Measuring household interest-rate sensitivity in Denmark, *Danmarks Nationalbank Working Paper*, no. 183, November 2021.

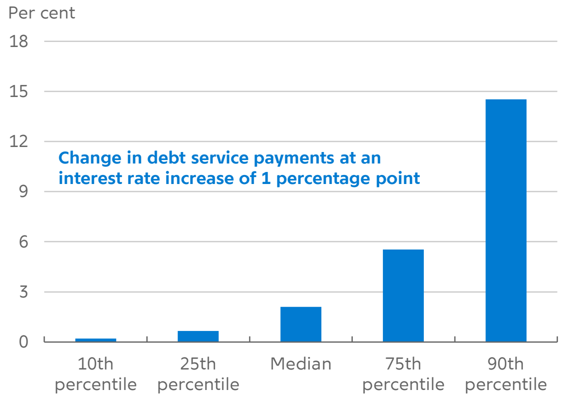
homeowners have an interest rate sensitivity that is more than seven times higher than the typical homeowner.

Among homeowners who spend a large share of their income on servicing their loans, some have a significant exposure to interest rate increases. These are homeowners who already have a high debt-service-to-income ratio, which is the debt service as a percentage of net income. Higher debt servicing may thus be a challenge for these home-owners, as they already spend a large proportion of their income on servicing their loans. In connection with an interest rate increase of 1 percentage point, a quarter of homeowners with a high debt-service-to-income ratio will have to spend an additional 5.5 per cent or more of their income after tax and debt service on servicing their loans. 10 pct. will have to spend an additional 14.5 per cent or more of their income after tax and debt service, see chart 12. Homeowners with a high debt-service-to-income ratio – which means that they spend more than a third of their income after tax on servicing their debt – make up 10 per cent of all homeowners with debt, but have raised 18 per cent of the homeowners' total debt, equal to kr. 324 billion.

Homeowners with variable rate mortgage loans have the highest interest rate sensitivity, as an interest rate increase will affect their entire debt, as opposed to homeowners with fixed rate mortgage loans, who would only have to pay higher interest rates on their bank debt. Lending to homeowners with variable rate mortgage loans constituted just under half of total lending to homeowners at the end of October 2021. The share has been declining since 2014, which reflects the low interest rates on fixed rate loans. The Danish Financial Supervisory Authority's "Supervisory Diamond" for mortgage credit institutions may also have contributed to the decrease in variable rate loans.

However, the interest rate on fixed rate mortgage loans has increased slightly in 2021. An increased spread between long and short interest rates may make more borrowers choose variable rate loans over fixed rate 30-year loans, as it will be less attractive to hedge against interest rate increases.

Some homeowners with a high debt-service-to-income ratio are exposed to interest rate increases Chart 12



Note: Percentiles for debt-service-to-income ratios. A high debt-service-to-income ratio is defined as a debt service ratio above 33 per cent. The debt-service-to-income ratio is measured as the homeowners' interest, contribution and instalment payments as a percentage of income after tax. Change in debt servicing is the change in interest and instalment payments on bank and mortgage debt as a percentage of income after tax and debt service at an interest rate increase of one percentage point. The latest data is from the end of 2019.
Source: Statistics Denmark and own calculations.

Lending to vulnerable industries is limited

Government covid-19 schemes still limit lending demand with banks

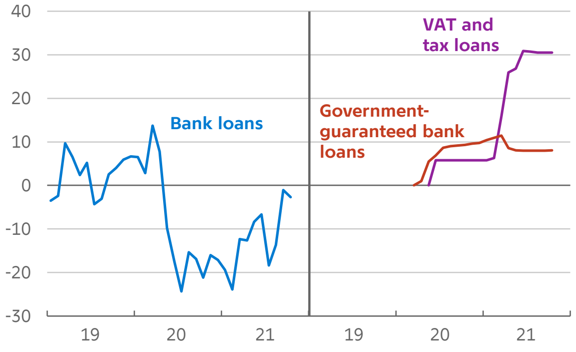
The growth in the credit institutions' lending to Danish corporate customers has increased during the past six months, and the annual lending growth rate was 5.9 per cent in October. However, bank lending has decreased during the pandemic and has only begun to return to the level from the pre-covid-19 years during the 2nd half of 2021, see chart 13.

While the banks' lending has been limited, the central government has provided significant credit to the corporate sector during the pandemic.[9] If the central government credits are included, total bank lending has increased.

9 See Danmarks Nationalbank, Banks ready for expiry of government liquidity support, *Danmarks Nationalbank Analysis*, no. 10, April 2021.

Credit to corporate customers has been driven by government schemes

Chart 13

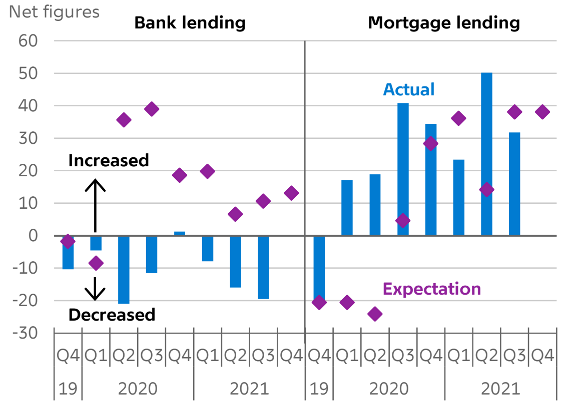


Note: Accumulated loans to non-financial corporations in Denmark since the end of 2018. *Bank loans* are stated less the loans that have been granted with a covid-19-related government guarantee. *Government-guaranteed bank loans* may include loans to financial corporations and self-employed persons. The most recent observations are from October 2021.

Source: Danmarks Nationalbank, the Danish Tax Agency, Denmark's Export Credit Agency (EKF), Vaekstfonden and own calculations.

Corporate customer demand for bank loans is lower than expected

Chart 14



Note: In Danmarks Nationalbank's lending survey, *corporate customers* cover 'private non-financial corporations' and 'sole proprietorships'. *Expectation* is the banks' previously reported responses from the quarter before regarding the present quarter. Net figures are the banks' response weighted by their respective market shares. The figures are for existing customers. The most recent observations are from 3rd quarter 2021 for actual development and 4th quarter 2021 for expected development.

Source: Danmarks Nationalbank.

Central government liquidity support measures and loan schemes have limited corporate demand with the banks.[10] Following the outbreak of covid-19, the banks expected an increased demand for loans, but the demand turned out to be lower than expected, see chart 14. Demand for mortgage loans has, however, been at a higher level than in the years leading up to the pandemic, and growth in mortgage lending was 6.3 per cent year-on-year in October. Both banks and mortgage credit institutions expect increasing demand in the 4th quarter of 2021. Demand for bank loans may increase as government liquidity support schemes expire.

Important to maintain phasing out of government credit allocation to companies

During the pandemic, the Danish parliament (Folketinget) adopted extensive relief packages for the Danish corporate sector. Since the beginning of the pandemic, the central government has granted credit to companies amounting to approx. kr. 35 billion in the form of a government guarantee obtainable for some loans by private banks as well as tax and VAT loans. In addition, the government supported corporate liquidity with deferred deadlines for payment of withholding tax (A-tax) and VAT for an estimated amount of kr. 165 billion in 2020. In 2021, the amount is approximately kr. 55 billion.[11]

The Danish Parliament has decided to phase out these measures. This is sensible and should not be postponed. The credit institutions are well equipped to make loans to viable companies as the deferred payment deadlines and loans fall due. The tax and VAT loans have been granted without a prior credit

10 See Ida Rommedahl Julin, Andreas Kuchler and Alexander Meldgaard Otte, Firm financing and public support measures during the pandemic, *Danmarks Nationalbank Working Paper*, no. 184, November 2021.

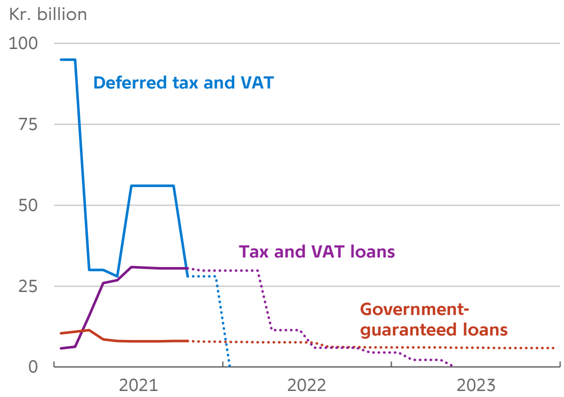
11 The companies were offered to take out interest-free government tax and VAT loans corresponding to their due ordinary tax and VAT payments. The companies had to apply actively for these loans. On the contrary, the deferred payment deadlines comprised all companies, and they did not have to apply for the deferral.

rating of the companies.[12] Credit rating of customers is a core task for the private banks and helps ensure that the financing is allocated to the most efficient parts of the economy.

In September, the government and the parliamentary parties entered into a political agreement to postpone the maturity of some tax and VAT loans until April 2022, see chart 15. A significant part of the total loans thus falls due in April 2022, while the remaining part falls due on an ongoing basis until April 2023. The remaining deferred tax payments fall due for payment at the end of 2021. The end of the year will see the phasing out of the scheme under which companies that have been hit hard during the pandemic have been offered bank loans with a government guarantee.

When VAT and tax loans fall due in April 2022, the companies can establish an instalment plan for repayment over a period of up to two years. During the repayment period, the companies must pay a monthly interest rate of 0.7 per cent.[13] The interest payments requirement will increase companies' incentive to seek financing in the private banking sector.

Government liquidity schemes are set to expire in the coming years Chart 15



Note: Dotted lines indicate estimates based on the most recently available maturity profile. *Deferred tax and VAT* is an estimated amount for the total volume of deferred payments of withholding tax (A-tax), tax not collected at source (B-tax), labour market contributions and VAT. The actual amount will depend on the level of activity and employment. *Tax and VAT loans* are outstanding amounts for loan schemes for VAT and payroll tax, A-tax and labour market contributions for non-financial corporations. *Government-guaranteed loans* are loans guaranteed by Vaekstfonden and Denmark's Export Credit Agency (EKF) from and including March 2020.

Source: The Danish Tax Agency, the Danish Ministry of Taxation, Danmarks Nationalbank and own calculations.

Credit institutions' lending to vulnerable industries is limited

Lending to the industries that have been hardest hit by the pandemic only makes up a small part of total corporate lending. However, the credit quality of lending to these industries has deteriorated. The probability of default has thus increased on lending to vulnerable industries. The credit quality of the rest of the institutions' corporate lending has improved on average.

Most large banks calculate a probability of default for each customer as part of their risk and capital management. The probability of default is a quantitative assessment of the risk of non-payment from and/or loss on a given customer within the subsequent 12 months.

During the pandemic, the probability of default has increased for vulnerable industries, and the development has continued after the reopening of society, see chart 16. In the 3rd quarter of 2021, the institutions estimated that approximately 15 per cent of the lending to vulnerable industries has a probability of default of above 5 per cent. The lending to these industries is, however, limited and only constitutes 1 per cent of total lending to non-financial corporations.

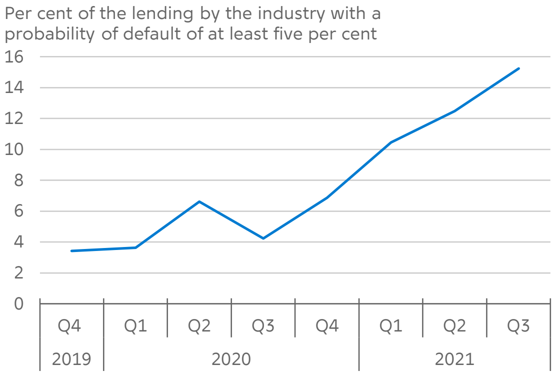
The credit quality is significantly lower among the companies that have used government loan schemes than for the rest of the institutions' corporate cus-

12 Government-guaranteed bank loans are guaranteed by the central government for up to 80 per cent of the loan. The remaining part of the loan is without a government guarantee.

13 Unlike interest payments to credit institutions, interest payments to the central government are not deductible. Therefore, a monthly interest rate of 0.7 per cent to the central government corresponds to an interest rate to the bank of approximately 11 per cent p.a. before tax.

An increasing share of lending to vulnerable industries has a high probability of default

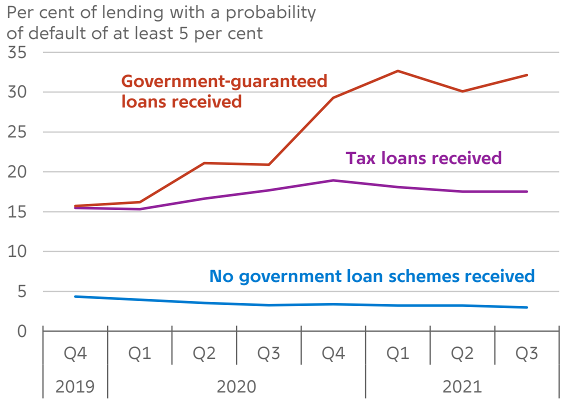
Chart 16



Note: *Vulnerable industries* include hotels, course properties, travel agencies, tour operators and fitness centres. The figures include lending to non-financial corporations from banks and mortgage credit institutions authorised to use internal ratings-based (IRB) models to calculate their capital adequacy requirements. The remaining lending has a probability of default of up to 4.9 per cent.
Source: Danmarks Nationalbank and own calculations.

Higher probability of default on customers using government loan schemes

Chart 17



Note: Share of bank and mortgage credit lending to non-financial corporations with a probability of default of minimum 5 per cent for mortgage credit institutions authorised to use internal ratings-based (IRB) models to calculate their capital adequacy requirements. The remaining lending has a probability of default of up to 4.9 per cent.
Source: Danmarks Nationalbank, the Danish Business Authority and own calculations.

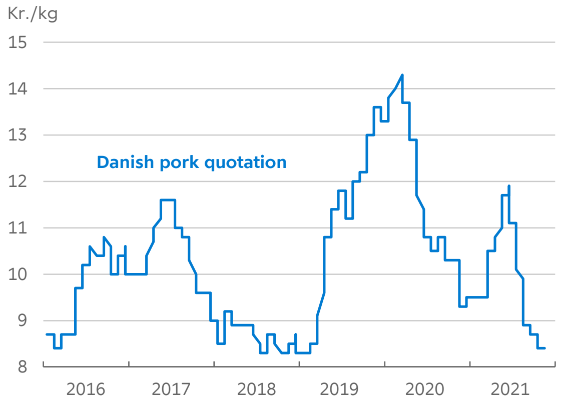
tomers, see chart 17. This also applied before the coronavirus downturn. In the 4th quarter of 2019, 15 per cent of the lending to these companies thus had a probability of default of 5 per cent or more.[14] Correspondingly, the share was less than 5 per cent for companies that have not made use of government loan schemes. After the 4th quarter of 2019, the credit quality has deteriorated for the companies that have used the government loan schemes, while it has improved slightly for the rest of the institutions' corporate customers. Lending to companies that have used the government loan schemes constitutes 10 per cent of total lending to non-financial corporations.

Falling pork prices may result in losses for institutions

Pork prices have fallen markedly since the summer of 2021, see chart 18. If the current price level continues, it may result in losses being incurred on part of the institutions' lending to pig farmers.

Large drop in pork prices

Chart 18



Note: Danish pork quotation for slaughter pigs. The most recent observation is from 25 November 2021.
Source: Danish Crown.

14 There are signs that companies that were already weak before the pandemic have made special use of the government loan schemes, see Ida Rommedahl Julin, Andreas Kuchler and Alexander Meldgaard Otte, Firm financing and public support measures during the pandemic, *Danmarks Nationalbank Working Paper*, no. 184, November 2021.

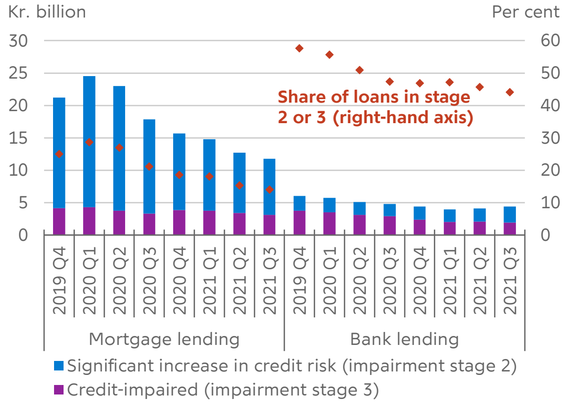
The high prices seen in recent years have resulted in a debt reduction among pig famers. Since the 4th quarter of 2019, total mortgage lending to the pork industry has been reduced by 1.4 per cent to kr. 84 billion, while the bank debt has been reduced by 4 per cent to kr. 10 billion.

In the 3rd quarter of 2021, medium-sized banks' lending to the pork industry amounted to 4.2 per cent of their corporate lending. However, there is great variation in the exposures among medium-sized banks. The exposure is lower for large banks. In the 3rd quarter of 2021, their lending to the pork industry amounted to 1.8 per cent of their corporate lending. In the 3rd quarter of 2021, the pork industry constituted approx. 7 per cent of total mortgage lending and 2 per cent of total corporate lending by the banks.

The quality of the loans to pig farmers has improved since the 4th quarter of 2019, and the proportion of lending with an increase in credit risk (stage 2) or credit deterioration (stage 3) has thus fallen by approximately 10 percentage points for both bank and mortgage lending, see chart 19.

Increased resilience in the pork industry, but continued high proportion of bank lending with impaired credit quality

Chart 19



Note: Mortgage credit institutions as well as large and medium-sized banks' loans to Danish corporate customers (including self-employed persons) secured by mortgage on pig production properties.
Source: Danmarks Nationalbank.

However, bank lending, where the institutions report credit deterioration or a significant increase in credit risk, still accounts for nearly half of total bank lending to pig farmers. There is considerable variation in how much the individual credit institutions have reduced credit-impaired lending and lending with a significant increase in the credit risk to the pork industry. Especially for a number of medium-sized banks, these loans constitute a considerable proportion of their total lending to the pork industry. The credit institutions should thus continue to focus on their customers in the pork industry improving their solvency during periods in which their earnings opportunities are favourable.

Credit institutions expect rising earnings in 2021

Credit institutions have raised their earnings expectations for 2021

Several systemic credit institutions have raised their expectations for their profit for the year several times during 2021. The principal reason for the raised expectations is that the expected losses in the wake of the covid-19 restrictions have still not materialised. Another reason given by the institutions for their adjustments is that customer activity in the housing market and the financial markets in the 1st half of 2021 had a more positive effect than expected going into the year. The systemic credit institutions, with the exception of Danske Bank and DLR Kredit, thus expect a higher profit after tax than the average for the years before covid-19, see chart 20.

Management judgement for expected credit losses from the pandemic are largely intact

In the 1st half of 2020, the credit institutions made provisions for expected losses resulting from the coronavirus restrictions. So far, the customers' financial situation has proved to be better than the banks feared, and the management estimates are largely intact. During 2021, the banks have reported financial improvements in that part of their customer portfolio which has not been hardest hit by the coronavirus lockdowns.

The banks' corporate customers have, for example, had the opportunity to take out tax and VAT loans, see the above section on government liquidity schemes. The majority of these loans fall due in April 2022, and a possible deterioration in the credit quality of these customers can be expected to manifest itself after April. However, the credit institutions only have limited exposure to companies that have raised tax loans.[15]

Credit institutions' earnings are supported by low loan impairment charges

After having fallen from a high level in 2017, the systemic credit institutions' profit relative to their lending and guarantees has been at a stable level, see chart 21. Their current earnings constitute a reasonable initial protection against losses. However, increased costs may weaken credit institution resilience in the long term.

With the exception of the 1st half of 2020, since 2015 earnings have been supported by low impairment charges, which have periodically also been negative due to large reversals. As at the 1st half of 2021, current earnings could cover periodic impairment charges in the systemic credit institutions corresponding to just under 0.4 per cent of total loans and guarantees. In comparison, total periodic impairment charges amounted to 0.005 per cent of total loans and guarantees, and there is only minor variation among the systemic institutions. In the years 2010-2014, average periodic impairment charges constituted more than 0.2 per cent of the lending. It is consequently not many years ago that impairment charges constituted a significant proportion of the profit before impairment charges.

Rising costs may put pressure on earnings

Costs for the systemic institutions have increased in recent years. The rising costs consist primarily of higher staff costs, which are, for example, due to increased costs for implementation of regulatory and compliance requirements. New requirements usually mean that investments must be made in IT solutions.

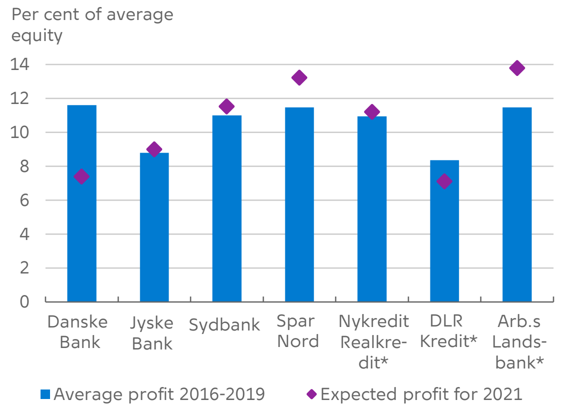
If the development in operating costs is compared with Nordic and European banks, which have similar compliance requirements, the costs have increased significantly since 2018, see chart 22.

In recent years, the systemic credit institutions have had increased focus on their costs. Several of

15 See Danmarks Nationalbank, Banks ready for expiry of government liquidity support, *Danmarks Nationalbank Analysis*, no. 10, April 2021.

Several credit institutions expect higher earnings in 2021

Chart 20

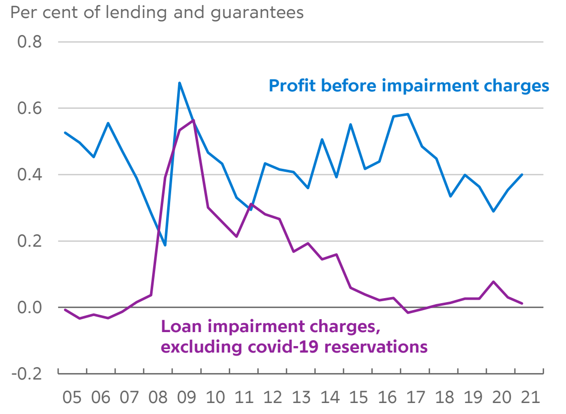


Note: The systemic credit institutions, with the exception of Nordea Kredit, which does not publish a quantitative target for the expected profit for 2021. Arbejdernes Landsbank has been designated as a systemically important institution as from 21 June 2021, as the bank has acquired a majority shareholding in Vestjysk Bank. Vestjysk Bank is consequently included in Arbejdernes Landsbank. Net profit for the year and the average of the latest announced expectations for the profit for 2021 is stated as a percentage of the shareholders' average equity for the respective periods. For 2021, the average from the end of 2020 to the 1st half of 2021 has been used. Profit and profit expectations for the credit institutions marked with an * are calculated before tax.

Source: Financial statements and own calculations.

Systemic credit institutions' earnings have decreased since 2017

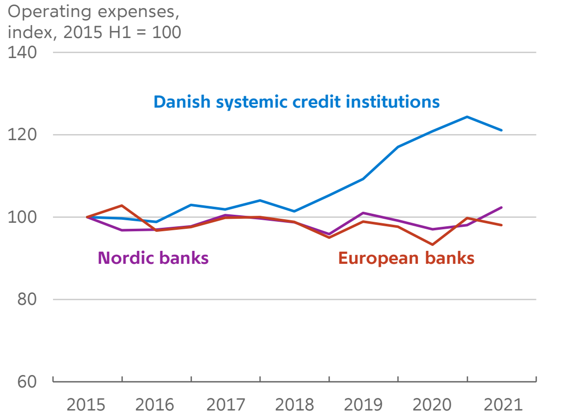
Chart 21



Note: Six-month data for systemic credit institutions. Corrections have been made for goodwill impairment charges and, in as far as possible, covid-19 provisions according to information in the published financial statements.

Source: The Danish Financial Supervisory Authority, published financial statements and own calculations.

Higher increase in costs than in Nordic and European banks — Chart 22



Note: Half-yearly operating costs for banking, insurance and asset management activities. *European banks* comprise 15 out of 22 banks in the Euro Stoxx Banks index (SX7E), compiled as at 31 October 2021. *Nordic banks* comprise Nordea, DNB, Skandinaviska Enskilda Banken, Svenska Handelsbanken and Swedbank. For the foreign banks, the costs have been converted into Danish kroner. The most recent observations are from the 1st half of 2021.
Source: S&P Global Market Intelligence and own calculations.

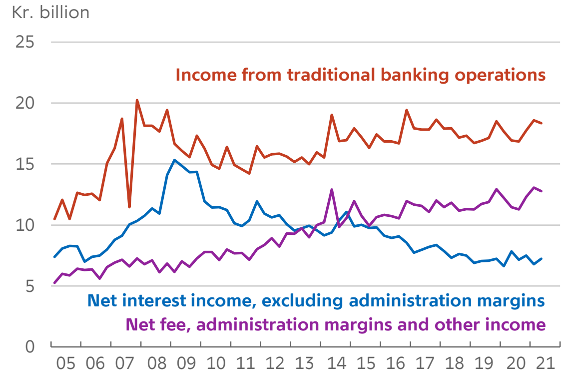
the Danish systemic credit institutions have closed branches and made staff cuts. Despite increased focus on costs, this has not resulted in a decrease in costs. In view of the increasing costs, it is important that the institutions continue to focus on streamlining their operations.

Revenues from conventional banking operations are stable

The institutions' revenues from conventional banking operations have been at a stable level since 2014, see chart 23. Net interest income has decreased over the period, but income from fees and administration margins as well as other revenues have compensated for the decrease in net interest income.

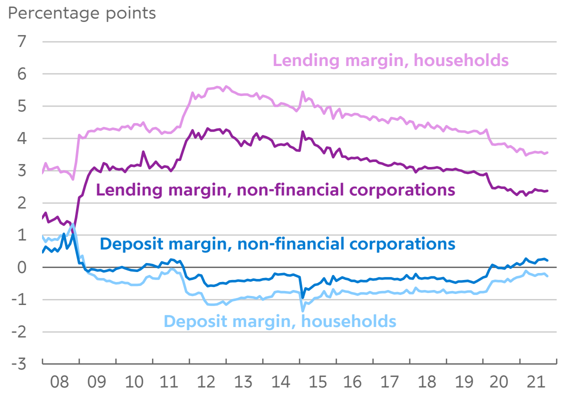
The decrease in net interest income can partly be attributed to competition for customers on the lending side, resulting in declining lending margins, see chart 24. At the same time, the banks were reluctant to introduce negative deposit rates for households. Since 2019, however, the banks have introduced negative interest rates on deposits from private customers above a certain amount, and net interest payments on deposits have thus fallen. Net interest income has thus been at a stable level since 2019.

Net interest income constitutes a lower part of credit institutions' earnings — Chart 23



Note: Selected income items for the systemic institutions with quarterly observations. Conventional banking activities have been calculated as net interest income on lending-related items, net fee income and other income.
Source: The Danish Financial Supervisory Authority and own calculations.

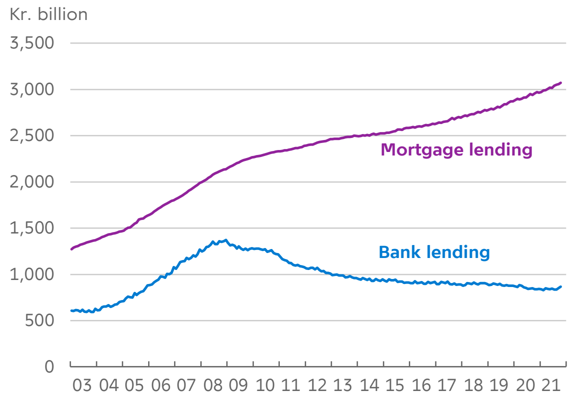
Lending margins have decreased more than deposit margins have increased — Chart 24



Note: Systemic banks' margins on bank loans and deposits to Danish counterparties excluding repo loans and deposits. The margins have been calculated in relation to the T/N rate. The most recent observations are from October 2021.
Source: Danmarks Nationalbank, Bloomberg and own calculations.

The composition of loans helps explain the development in the contributions to earnings from the conventional part of banking operations. Lending consists increasingly of mortgage loans, and bank loans constitute a significantly smaller part of the systemic institutions' total balance sheet compared to before, see chart 25. Revenues from mortgage loans thus constitute a higher proportion of the institutions' earnings than before, one reason being that the mortgage credit institutions raised their administration margins in 2016.

Lending consists increasingly of mortgage loans Chart 25



Note: Lending to households and non-financial corporations by banks and mortgage credit institutions. The most recent observations are from October 2021.
Source: Danmarks Nationalbank.

Several banks should consider whether their capital target is sufficient

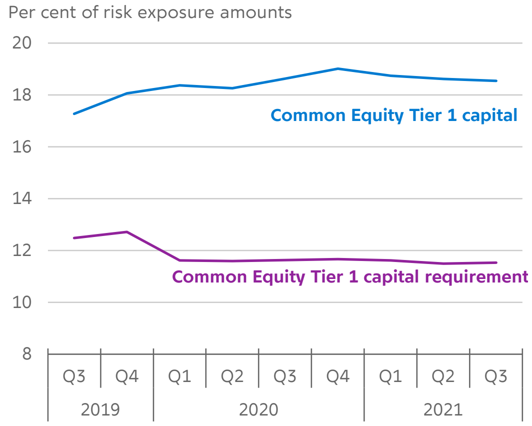
Capital ratios stagnate after implementation of new regulation

The systemic institutions' excess capital has been virtually unchanged during 2021, see chart 26. After 2020, when a number of capital requirements were eased due to the pandemic and dividends for 2019 were withheld, the capital development in 2021 has especially been driven by increases in the institutions' risk exposure amount. In addition, a few credit institutions have proposed extraordinary dividends.

The increase in risk-weighted exposures means that the Common Equity Tier 1 (CET1) capital ratio for the systemic institutions falls marginally overall. The risk-weighted exposures are especially being driven up by guidelines from the European Banking Authority (EBA) on a new default definition[16] and a new standard method for counterparty risk[17].

The reduction in excess CET1 capital has been seen broadly across the systemic institutions, see chart 27. Seven of eight institutions have thus seen stagnant or declining excess capital adequacy during 2021. This also applies to Arbejdernes Landsbank, which was designated as a systemic institution in the 2nd quarter of 2021 following its acquisition of the majority shareholding in Vestjysk Bank.[18]

Gap between systemic institutions' Common Equity Tier 1 capital and capital adequacy requirements virtually unchanged since the end of 2020 Chart 26



Note: Common Equity Tier 1 capital and Common Equity Tier 1 capital requirements have been calculated as a weighted average. The capital adequacy requirement consists of the share of the solvency need that is to be met with Common Equity Tier 1 capital (minimum capital adequacy requirement and Pillar II add-on) and the combined buffer requirement (SIFI buffer, capital conservation buffer and countercyclical buffer). Arbejdernes Landsbank was designated as a systemic institution in the 2nd quarter of 2021 and is included from then with an expected SIFI buffer of 1 per cent.
Source: The Danish Financial Supervisory Authority and own calculations.

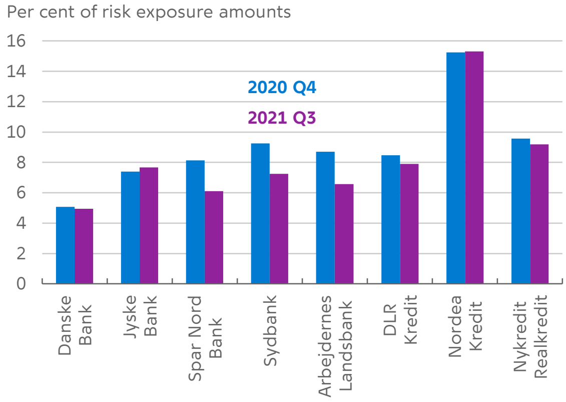
16 See European Banking Authority, *Guidelines on the application of the definition of default (compliance table) (link).*

17 See Regulation (EU) 2019/876 (CRR II) *(link).*

18 See Ministry of Industry, Business and Financial Affairs, *Arbejdernes Landsbank udpeges som SIFI* (Arbejdernes Landsbank designated as SIFI), June 2021 *(link).*

Reduction in excess capital adequacy is seen broadly across systemic institutions

Chart 27



Note: The excess capital adequacy has been calculated on the basis of Common Equity Tier 1 capital. The capital adequacy requirement consists of the share of the solvency need that is to be met with Common Equity Tier 1 capital (minimum capital adequacy requirement and Pillar II add-on) and the combined buffer requirement (SIFI buffer, capital conservation buffer and countercyclical buffer). An expected SIFI buffer of 1 per cent is included for Arbejdernes Landsbank.

Source: The Danish Financial Supervisory Authority and own calculations.

Countercyclical capital buffer in Scandinavia

Box 3

Denmark: The Minister for Industry, Business and Financial Affairs sets the buffer following a recommendation from the Systemic Risk Council. At the end of 2019, the buffer rate was 1 per cent – with planned increases to 2 per cent during 2020. Due to the pandemic, planned increases were cancelled, and the existing buffer was released. In September 2021, the buffer was reactivated at 1 per cent with effect from 30 September 2022.

The Systemic Risk Council has signalled further increases.

Sweden: The Swedish Financial Supervisory Authority sets the buffer. At the end of 2019, the buffer rate was 2.5 per cent. The rate was reduced to 0 per cent in March 2020 due to the pandemic. In September 2021, the rate was increased to 1 per cent with effect from 29 September 2022.

The Swedish Financial Supervisory Authority has signalled that it will gradually increase the countercyclical capital buffer to 2 per cent during 2022.

Norway: The Norwegian Ministry of Finance has historically set the buffer following a recommendation from Norges Bank, the Norwegian central bank. From September 2021, Norges Bank has the authority to set the buffer. At the end of 2019, the buffer rate was 2.5 per cent. The pandemic resulted in a reduction to 1 per cent. In June 2021, the rate was increased to 1.5 per cent with effect from 30 June 2022.

Norges Bank expects that the countercyclical capital buffer increases to 2 per cent with effect from 31 December 2022.

Source: European Systemic Risk Board, *Countercyclical capital buffer* (*link*), Ministry of Industry, Business and Financial Affairs, *Fastsættelse af den kontracykliske kapitalbuffer* (Setting of countercyclical capital buffer), September 2021 *(link)*, Swedish Financial Supervisory Authority, *FI raises the countercyclical buffer rate to 1 per cent*, 29 September 2021 *(link)* and Norges Bank, *Decision on the countercyclical capital buffer 2021 Q3 (link).*

Reintroduction of the countercyclical capital buffer in 2022

The countercyclical capital buffer is reestablished at 1 per cent from September 2022 following a recommendation from the Systemic Risk Council. The buffer was released in March 2020 as an initiative due to the pandemic, see box 3.

The Systemic Risk Council has a strategy that the buffer is gradually to be increased to 2.5 per cent, as long as there is no significant slowdown in risk build-up in the financial sector. As part of this strategy, the Council expects to recommend an increase in the buffer to 2 per cent already in December 2021 – potentially with effect from the end of 2022.[19]

All Danish systemic institutions can meet both the announced increases and further expected increases with their current excess capital adequacy.

19 See press release from the 34th meeting of the Systemic Risk Council (*link*).

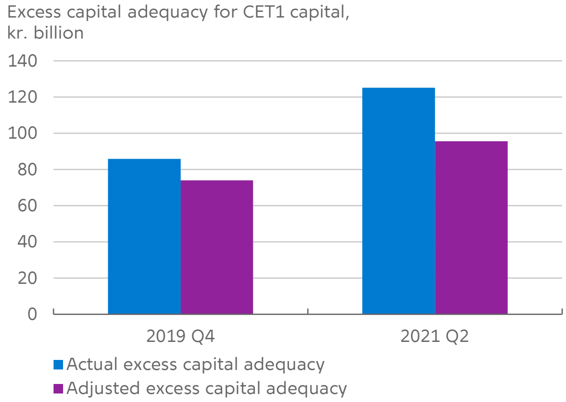
Based on the risk-weighted exposures at the end of June 2021, a buffer rate of 1 per cent in Denmark will increase the total requirement for Common Equity Tier 1 capital by approx. kr. 14 billion for the systemic institutions. In comparison, the excess CET1 capital requirement is approx. kr. 125 billion.

The set countercyclical capital buffers in, in particular, Sweden and Norway are also important for the Danish systemic institutions' total excess capital adequacy – primarily due to Danske Bank's exposure in these countries. If the announced increases in Sweden and Norway are included in combination with a Danish buffer rate of 2 per cent, the excess capital adequacy relative to Common Equity Tier 1 capital will fall by just under kr. 30 billion during 2022, see chart 28.

If the countercyclical capital buffer is increased to 2.5 per cent in all three countries during 2023, this will result in an increase in the combined buffer requirement of just under kr. 40 billion in relation to the actual requirement as at the 2nd quarter of 2021. Even in this case, the excess CET1 capital for the systemic institutions will be higher than the adjusted excess capital adequacy at the end of 2019.

Systemic institutions well equipped for rapid build-up of countercyclical capital buffer

Chart 28



Note: *Actual excess capital adequacy* is based on the current countercyclical buffer rate as at the reporting date. *Adjusted excess capital adequacy* takes into account announced, but not yet applicable, increases in the buffer requirement. To illustrate the ability to meet a rapid build-up of the buffer, the *adjusted excess capital adequacy* is based on an expected buffer rate of 2 per cent in Denmark as well as the announced increases in Sweden and Norway.
Source: Danmarks Nationalbank, own calculations and Pillar III reporting.

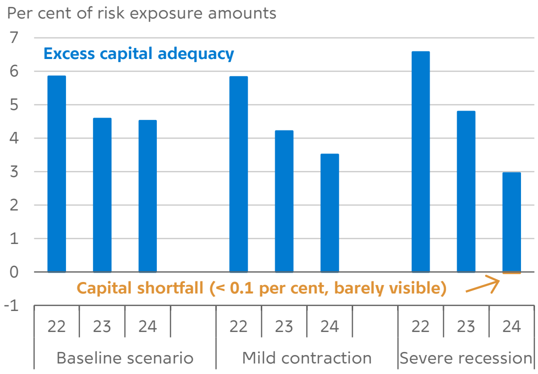
Some systemic institutions are close to buffer requirements under stress

Danmarks Nationalbank's latest stress test shows that the systemic institutions all have sufficient capital to withstand a severe recession scenario. However, some systemic institutions are close to breaching their combined buffer requirements, see chart 29.

A joint feature of the large institutions is that they currently hold more capital than their capital adequacy target warrants. However, the results of the stress test show that some institutions need their current excess capital adequacy to withstand stress.

Some systemic institutions get close to buffer requirements in severe recession scenario

Chart 29



Note: The chart shows the excess capital adequacy or capital shortfall of the systemic banks that either have excess capital adequacy or a capital shortfall as percentages of the total risk exposure amounts of the systemic banks. The reduction of the banks' excess capital adequacy in the baseline scenario and in the scenario with a moderate downturn is due to a number of factors, including that the stress test takes into account expectations for the build-up of the countercyclical capital buffer.
Source: The Danish Financial Supervisory Authority and own calculations.

Several banks should consider whether their capital adequacy target is sufficient

The systemic institutions all meet their capital adequacy targets for the first half of 2021, even excluding withheld capital from 2019, see chart 30. However, several banks should show restraint in reducing their capitalisation simply because it is above their current target.

The stress test shows that several systemic institutions would be in breach of the capital buffer requirements if the stress test had been conducted based on the institutions' capital adequacy targets instead of their current capitalisation. In this case, the systemic institutions will have a total capital adequacy shortfall relative to the buffer requirement of just over kr. 13 billion in 2024.[20]

Following a recommendation from the Danish Financial Supervisory Authority, several systemic institutions chose to retain dividend payments and cancel share buy-backs following the outbreak of the pandemic in spring 2020. The retained capital in the systemic institutions totals approx. kr. 12.4 billion in the first half of 2021.

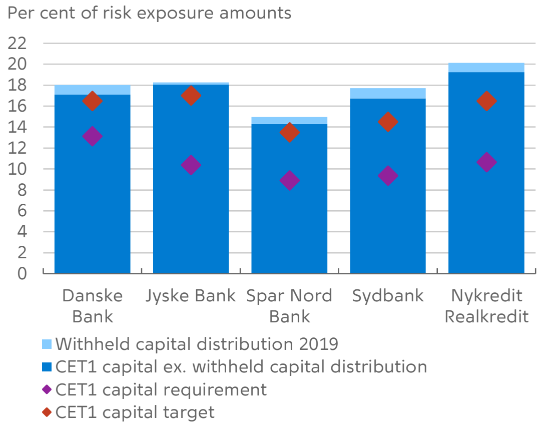
The credit institutions are facing a number of adjustments in relation to the regulatory framework for capitalisation of financial institutions, which generally increases their capital adequacy requirements: Guidelines from the EBA for estimation of risk parameters for use in internal credit models must be complied with from the beginning of 2022,[21] and the newly presented EU implementation of completed Basel III standards is also expected to have a significant impact on the capitalisation of the Danish institutions.[22]

Declining excess capital adequacy relative to existing MREL and debt buffer requirements

The current MREL and debt buffer requirements for the systemic institutions have increased markedly during the 1st half of 2021. The total MREL and debt buffer requirements as well as the subordination requirement have increased since the turn of the year due to the increases in risk-weighted exposures. Despite increased capital, excess funds have decreased to kr. 82 billion against just under kr. 97 billion at the end of 2020. However, the institutions still meet both the total MREL and debt buffer requirements as well as the coming group requirement of 8 per cent of total liabilities, see chart 31.

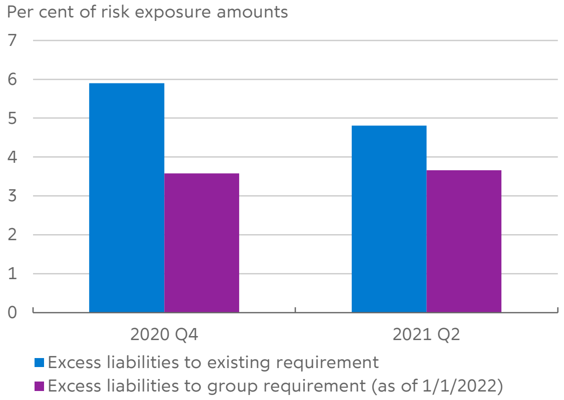
The combined minimum requirement for groups including mortgage credit institutions will enter into

Systemic institutions all meet their current capital adequacy targets Chart 30



Note: Systemic institutions that retained planned dividend for 2019. Jyske Bank is included, as it stopped its ongoing share buy-back programme. For announced capital adequacy target in a range, the highest value has been chosen. 16.5 per cent has been used for Danske Bank.
Source: Danmarks Nationalbank, interim reports and investor material.

Declining excess capital adequacy relative to current MREL and debt buffer requirements Chart 31



Note: MREL and debt buffer requirements are the sum total of the MREL requirement and combined buffer requirement for the bank as well as (where relevant) the total capital adequacy requirement and debt buffer requirement for the mortgage credit institution. For Spar Nord, a fully phased-in MREL requirement has been included. Arbejdernes Landsbank has been omitted, as, being a newly designated SIFI institution, it has not yet had its new MREL requirement set.
Source: Danmarks Nationalbank and own calculations.

20 See Danmarks Nationalbank, Enkelte af de største banker er tæt på bufferkrav under stress, *Danmarks Nationalbank Analyse (Stress test)*, nr. 29, December 2021 (*link*).

21 See European Banking Authority, *Guidelines on PD estimation, LGD estimation and treatment of defaulted assets (compliance table) (link)*.

22 See European Banking Autority, *EBA updates its Basel III impact study following the EU Commission's call for advice (link)*.

force as at 1 January 2022. The affected institutions already meet the coming requirements, and their excess funds are approx. kr. 62 billion. However, there will be a considerable outflow of capital and non-preferred senior debt at the end of 2022 and in the first half of 2023. Combined with continued increases in capital adequacy requirements, this may potentially lead to an undesirably large issuance requirement under adverse conditions in the event of an economic crisis. Therefore, some institutions should seek continuously to build up their excess funds further over the next 12 months.

EU implementation of new rules on capital adequacy requirements is in accordance with Basel standards

On 27 October 2021, the European Commission published its proposed revision of the EU Capital Requirements Regulation (CRR) and the Capital Requirements Directive (CRD) – collectively known as the EU banking package.

The proposal aims to implement the final Basel III Standards adopted by the Basel Committee and published in December 2017[23]. The proposal also contains revised rules on market risk – also called FRTB (fundamental review of the trading book), which the Basel Committee completed in 2019[24]. Finally, the proposal contains a number of adjustments that do not directly follow from Basel recommendations on, for example, supervisory powers and ESG[25] risk.

The proposed Banking package contains a large number of adjustments to current legislation. However, there has especially been focus on the introduction of a new overall output floor for risk-weighted exposures. If lower risks can be documented for use of internal models, a reduction of capital adequacy requirements in relation to standard methods is achieved. The output floor may limit this reduction. In Denmark, there has been focus on the risk that the capital adequacy requirement for mortgage/housing loans and loans to corporate customers would increase significantly without an external rating.[26] Under certain conditions, the proposed output floor permits a temporary lower weighting of housing loans within 80 per cent of the real property value and of corporate loans to companies with high creditworthiness.

The new rules are scheduled to enter into force on 1 January 2025, which postpones the EU implementation by two years compared to the Basel Committee's timeline.[27] Combined with long transitional arrangements, the revised rules will only become fully applicable in up to 10 years.

Danmarks Nationalbank assesses that the presented amendment proposals will ensure a sensible implementation of the Basel standards. The proposal is in accordance with the overall framework in Basel III, but it also contains meaningful adjustments to EU-specific conditions.

Banks should stress test the new funding requirement, Net Stable Funding Ratio (NSFR)

High liquidity in society gives high liquidity coverage ratios in banks

The banks have good liquidity. This means that Liquidity Coverage Ratio (LCR) and Net Stable Funding Ratio (NSFR) are met by a certain margin, see chart 32 and chart 34.

LCR must ensure that credit institutions have a sufficient amount of liquid assets to handle a 30-day severe liquidity stress scenario. LCR has increased since the beginning of 2021, and the systemic banks have a considerable distance to the minimum LCR requirement of 100 per cent, see chart 32. There are large variations between the banks in terms of their excess liquidity buffers to LCR.

23 See Bank for International Settlements, *Basel III: Finalising post-crisis reforms (link).*

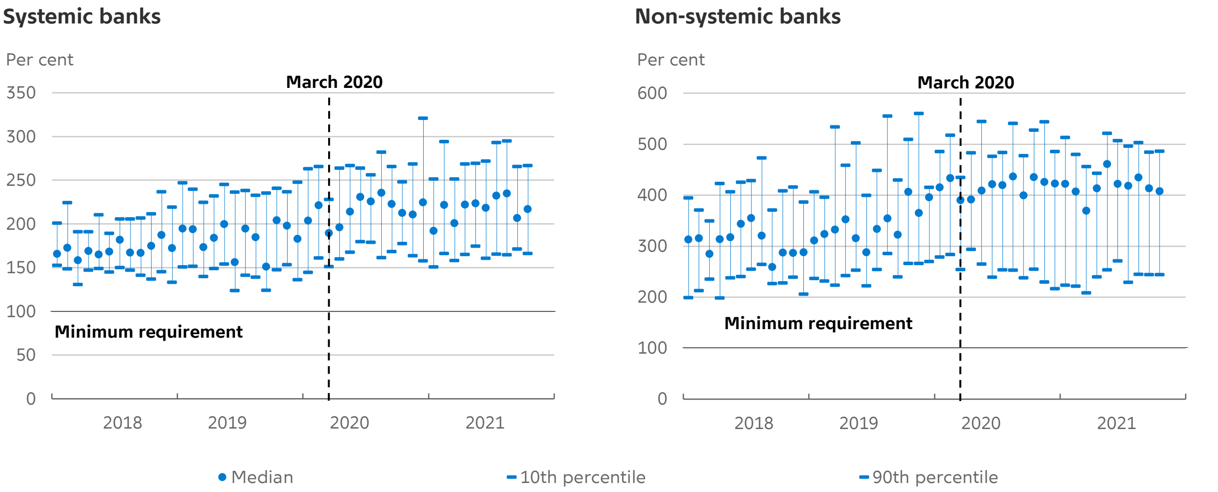
24 See Bank for International Settlements, *Minimum capital requirements for market risk (link).*

25 Environmental, Social and Governance.

26 See Ministry of Industry, Business and Financial Affairs, *Effekter af Baselkomitéens anbefalinger om kapitalkrav til kreditinstitutter* (Effects of the Basel Committee's recommendations on capital adequacy requirements for credit institutions), February 2018 *(link).*

27 *Basel Committee on Banking Supervision, Governors and Heads of Supervision announce deferral of Basel III implementation to increase operational capacity of banks and supervisors to respond to Covid-19 (link).*

Banks observe short-term Liquidity Coverage Ratio (LCR) with a certain margin Chart 32

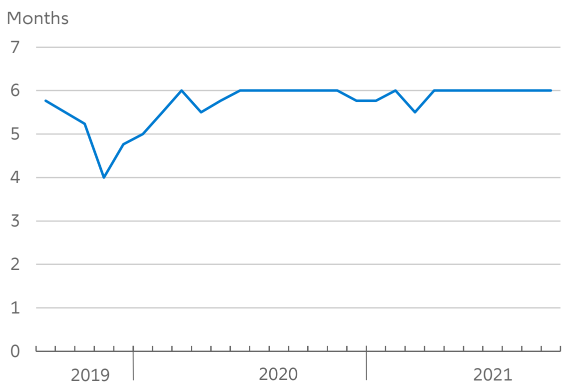


Note: The Liquidity Coverage Ratio (LCR) is calculated as the bank's liquid assets divided by outgoing net cash flows over a 30-day stress period. The most recent observations are from end-October 2021.
Source: Danmarks Nationalbank.

The banks' liquidity buffers were already relatively large before the coronavirus outbreak in March 2020, due to a large deposit surplus. Deposits have increased further, partly as a result of the central government's liquidity support measures for the corporate sector and disbursement of frozen holiday pay.

It can be expected that LCR will fall back to the pre-pandemic level as the liquidity supporting measures are phased out. The banks' liquidity is robust and can handle customers' extra payments for taxes and VAT that fall due in the coming period. Danmarks Nationalbank's sensitivity analysis thus shows that the banks can handle severe liquidity stress for at least six months, see chart 33[28], which indicates that the banks have robust liquidity buffers.

Systemic banks can survive at least six months of liquidity stress Chart 33



Note: Number of months systemic banks can overall withstand severe combined liquidity stress, according to Danmarks Nationalbank's sensitivity analysis. The maximum survival period in the sensitivity analysis is six months. The most recent observations are from end-October 2021.
Source: Danmarks Nationalbank.

The new funding requirement, NSFR, aims to ensure a stable funding of the balance sheet

The new funding requirement, NSFR, entered into force for credit institutions in June 2021. The purpose of NSFR is to reduce the refunding risk by ensuring

28 The method for Danmarks Nationalbank's sensitivity analysis is described on page 26 of Danmarks Nationalbank, Lower excess capital adequacy for the banks, *Danmarks Nationalbank Analysis (Financial stability)*, no. 25, November 2019 (*link*).

Key elements of the European Commission's proposal for the Capital Requirements Regulation and Directive Box 4

New standard methods: The proposal presents new standard methods for credit risk, market risk, operational risk and credit value adjustments (CVA). For credit risk, additional risk sensitivity is introduced through an adjustment of the rules for the individual exposure classes. For market risk, a new standard method is introduced as described in the Basel Committee's 'Fundamental review of the trading book'. For operational risk, a standard method is introduced, which replaces all existing methods. This will make the calculation simpler, and it will be based on the individual institution's business volume For credit value adjustments (CVA), a new standard method and a simpler basic approach are introduced. Existing exemptions for CVA capital requirements are maintained.

Adjustment of internal models and advanced methods: For credit risk, the possibilities of using internal models (IRB models) have been reduced for exposures to institutions and large corporate customers, just as parameter floors for the probability of default have been raised, and new parameter floors are being introduced for loss given default. Furthermore, it is no longer possible to use IRB models for equity exposures. For market risk, the existing approach is replaced by the method described in the Basel Committee's 'Fundamental review of the trading book'. For operational risk, the option of using an advanced method for calculating the capital adequacy requirement is removed. For credit value adjustments, the option of using an advanced method is also removed.

Output floor: For institutions that use internal models, a floor is introduced corresponding to 72.5 per cent of the total risk-weighted exposures calculated under the standard methods. The output floor will be phased in from 2025 and will be fully phased in by 2030. The EU implementation introduces preferential risk weighting of housing loans secured by a mortgage within 80 per cent of the real property value as well as for loans to non-rated corporate customers if a number of conditions have been met. The preferential risk weighting is a temporary provision that will expire in the period 2029-2032, but with the possibility of an extension. Risk-weighted exposures calculated under the output floor are used to determine the minimum capital requirement and all buffer requirements.

Pillar II and buffer requirements: The institutions' individual Pillar II add-on and the systemic risk buffer (not currently used in Denmark) are frozen in absolute terms and must be reassessed to avoid double-counting of risks, if bound by the output floor. The size of the systemic institutions' SIFI buffer must also be reassessed.

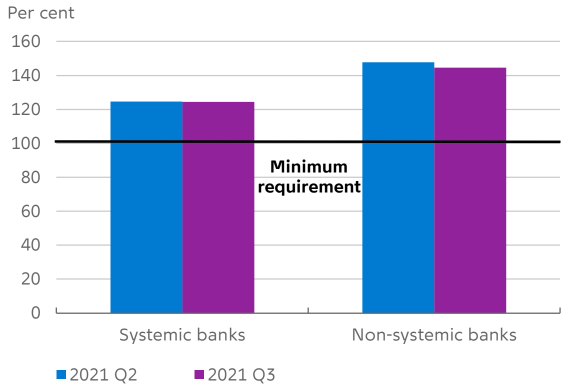
1. The European Commission, *Banking package (link)*.

that the banks have sufficiently stable funding available. NSFR must be minimum 100 per cent, see also box 5.

The banks comply with the NSFR by a certain margin, and the level has not changed much from the 2nd quarter to the 3rd quarter of 2021, see chart 34.

The non-systemic banks have a higher NSFR level overall than the systemic banks. The reason for this is that the deposit surplus is higher and that the non-systemic banks' customers are mainly households and SMEs. In NSFR, sight deposits from households and SME customers are considered as being among the most stable funding sources that a bank can have.

Banks comply with the new funding requirement, Net Stable Funding Ratio (NSFR) Chart 34



Note: The NSFR is calculated as the banks' stable financing divided by the need for stable financing. The NSFR level for systemic banks and non-systemic banks is a weighted average.
Source: Danmarks Nationalbank.

NSFR is sensitive to withdrawals of deposits and lack of access to markets

It is important that the banks have a good understanding of the factors that may affect their NSFR. The understanding can, for example, be obtained by the banks using stress tests actively in their risk management. NSFR stress tests can contribute to an assessment of a suitable buffer to the requirement. Stress tests based on the scenarios from Danmarks Nationalbank's liquidity sensitivity analyses[29] show that NSFR is sensitive to withdrawal of deposits.

The banks are particularly sensitive to withdrawals of sight deposits from households and SME customers. These deposits may, for example, decrease if a bank is hit by institution-specific stress, for example due to negative publicity.

If deposits decrease, the bank will have less stable funding available to meet NSFR. Thus, the bank may need to issue non-preferred senior debt or capital to meet NSFR. Hence, the banks can be sensitive to periods with limited market access.

The banks' need for stable funding stems mainly from their lending activities. When lending increases, the banks' NSFR requirement will thus increase. In the event of lending growth, the banks must ensure that they have sufficient stable funding to continue to meet NSFR.

Credit premium for non-preferred senior debt is lower than pre-pandemic level

Chart 35

Note: Average z spread for non-preferred senior debt in euro with a remaining maturity of between 2.5 and 3.5 years for Danske Bank, Jyske Bank and Nykredit. The *z spread* is an expression of the additional cost of financing using a debt instrument, where the additional cost is calculated by parallel-shifting a risk-free zero coupon rate structure. The most recent observations are from 25 November 2021.

Source: Refinitiv Eikon.

If non-systemic banks lose deposits and have problems meeting NSFR, they do not have the same access to the financial markets as the systemic banks in terms of obtaining long-term stable funding. The non-systemic banks are therefore more dependent on their deposits to meet NSFR.

Good time to secure a robust maturity profile on non-preferred senior debt

The current market situation is a good time for the banks to ensure a suitable maturity profile and adequacy buffer to their NSFR, MREL and debt buffer requirements by issuing more long-term non-preferred senior debt.

During 2021, the risk premium for non-preferred senior debt has fallen and is now at a lower level than before the pandemic, see chart 35. Risk premiums increased in March 2020 and were at a high level in the following months due to great uncertainty. Flexibility in terms of the time of issuance may thus have a great impact on the cost of issuing non-preferred senior debt to meet the NSFR and MREL requirements.

Interest rate rises will increase the need for liquidity in the financial sector

It is important that pension companies, life insurance companies and banks take potential interest rate increases into account in their risk management, as this may increase their liquidity needs. If interest rates rise, companies that use interest rate derivatives have to meet variation margin calls[30] in the form of cash, as the value of the derivatives contract is changed.

Calculating the change in market values based on pension and life insurance companies' open

29 See Danmarks Nationalbank, Lower excess capital adequacy for the banks, *Danmarks Nationalbanks Analysis (Financial stability)*, no. 25, November 2019 (*link*).

30 Movements in the value of derivatives contracts result in the company having to receive or put up a variation margin every day, i.e. put up liquidity corresponding to the market change of the derivatives contract.

interest rate derivatives, a rise in interest rates of 100 basis points will require these companies to post variation margin corresponding to approximately kr. 140 billion, see chart 36. Approximately kr. 30 billion must be in Danish kroner and kr. 110 billion in euros, where approximately half of the euro liquidity and approximately one third of the Danish kroner liquidity having to be in cash.[31] The most recent period with large interest rate changes was in March 2020 as a result of the coronavirus pandemic. There have previously been even larger interest rate changes.

Pension and life insurance companies use derivatives to hedge risks, including interest rate risks on their long-term liabilities. Movements in the value of derivatives contracts require variation margin on an ongoing basis. An interest rate increase will therefore result in a decrease in the value of the derivatives contracts for the companies and require variation margin. In the event of an interest rate increase, the companies must transfer the market value change of the derivatives contract to the counterparty on a day-to-day basis in the form of cash to reduce counterparty risk.[32]

Net Stable Funding Ratio (NSFR)

Box 5

In the wake of the financial crisis, the Basel Committee recommended the introduction of a Liquidity Coverage Ratio (LCR) to ensure that credit institutions have a sufficient amount of liquid assets to handle a 30-day severe liquidity stress scenario. In addition, the Basel Committee recommended the introduction of Net Stable Funding Ratio (NSFR). The purpose of NSFR is to ensure that the credit institutions have a reasonable balance sheet composition. Hence, it is a requirement for how the credit institutions fund their operations.

NSFR is defined as the ratio between the available stable funding and the need for stable funding in a credit institution:

$$\text{NSFR} = \frac{\text{(Available amount of stable funding)}}{\text{(Required amount of stable funding)}} \geq 100 \text{ pct.}$$

Available stable funding stems from the credit institution's liabilities and is the funding that a credit institution can fund their operations with. Deposits are an example of available stable funding. Required stable funding stems from the credit institution's assets, i.e. the operations that a credit institution needs to fund. This is, for example, lending activities. A bank that solely makes loans to household customers and has a deposit funding surplus will have an NSFR above 100 per cent, as deposits from household customers are considered as being among the most stable funding sources that a bank can have when these deposits are covered by the deposit guarantee scheme.

The purpose of NSFR is to ensure that the credit institutions have a sufficient amount of stable funding to reduce their refunding risk. A number of Danish banks had a deposit deficit up to and during the financial crisis, and they thus had more loans than deposits. If NSFR had been in force at the time, the banks would have been forced to secure long-term market funding with a maturity of more than one year or have a sufficiently large equity to make up for the deposit deficit.

The structure of the requirement

NSFR distinguishes between three different maturities for required and available funding:

- Under six months
- Between six months and up to a year
- Over a year.

Each asset and liability are weighted based on maturity and counterparty, where the counterparty can be a household customer, SME, large company, central bank or another financial institution (e.g. other banks, pension funds, insurance companies).

- The lower the weight of an asset, the less stable funding is required, and the higher the NSFR will be.
- The higher the weight of a liability, the more stable funding it contributes, and the higher the NSFR will be.

An example of a bank balance sheet with a large deposit surplus is shown below, illustrated with the given NSFR weights. This bank's balance sheet will result in an NSFR of 180 per cent.

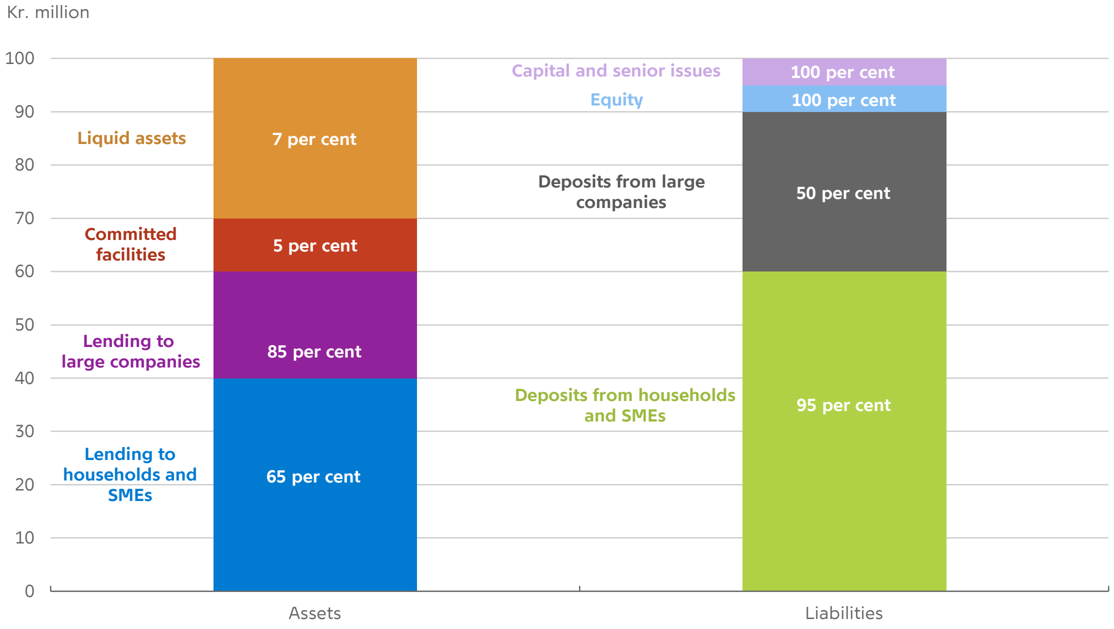
Continues

31 Pension companies are exempt from having to meet the whole amount of variation margin call with cash as a part of the implementation of the EMIR Regulation. The exemption will expire in June 2023 at the latest, after which the full collateral in euros will have to be in cash. Some bilateral agreements allow that variation margin can be in the form of government or covered bonds, but the general requirement is cash, see the EMIR Regulation (*link*).

32 See the European Commission, *Baseline report on solutions for the posting of non-cash collateral to central counterparties by pension scheme arrangements, A report for the European Commission prepared by Europe Economics and Bourse Consult,* The European Union, 2014 (*link*).

Net Stable Funding Ratio (NSFR)
Continued

Box 5



$$\text{NSFR} = \frac{((60*95\text{ pct.})+(30*50\text{ pct.})+(5*100\text{ pct.})+(5*100\text{ pct.}))}{((40*65\text{ pct.})+(20*85\text{ pct.})+(10*5\text{ pct.})+(30*7\text{ pct.}))} = \frac{82}{45.6} = 180\text{ pct.}$$

Source: Danmarks Nationalbank.

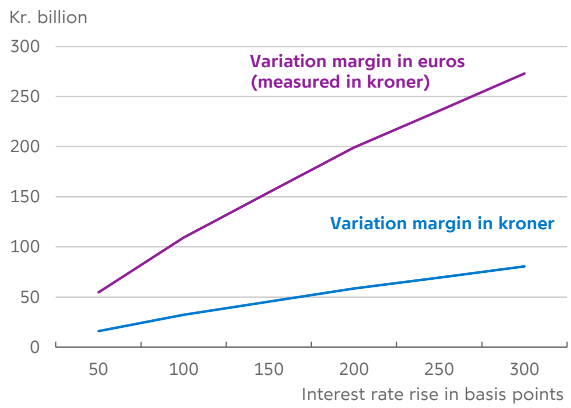
There are large variations between the companies in relation to both the size of their liquidity needs in connection with interest rate increases and the distribution of the need between Danish kroner and euros.

Pension and life insurance companies have practically no bank deposits. An interest rate increase therefore places heavy demands on the companies' ability to obtain liquidity in the market on a day-to-day basis in the form of cash, either through the sale of an asset or through the repo market. A large part of the variation margin must be in euros. It is generally not possible to obtain euro via the Danish krone market.

It is important that the companies have established liquidity reserves, including access to repo connections with both Danish and international banks, and that they have access to centrally cleared repo markets, if necessary, so that they are able to obtain

The need for liquidity increases when interest rates rise

Chart 36



Note: Changes in the value of derivatives contracts as interest rate swaps for selected pension and life insurance companies, and thus the need for variation margin based on data from the end of 2020.
Source: Danmarks Nationalbank.

the necessary liquidity in the event of interest rate increases.[33]

If it is not possible for pension and life insurance companies to obtain reasonable access to liquidity, it may be necessary to reduce the use of interest rate derivatives.

The banks also use interest rate derivatives. They may therefore also need day-to-day liquidity as variation margin in the event of interest rate changes.

It is important that the banks in their liquidity risk management are aware of how large their own liquidity needs may become in the event of interest rate changes. In their risk management, the banks must also assess their willingness and ability to meet the increased demand for liquidity from pension and life insurance companies.

The banks must know the sensitivities in NSFR, LCR and Leverage Ratio requirements in the event of an increased demand for liquidity, as supporting the increasing liquidity needs for pension and life insurance companies may affect the banks' balance sheet composition and thus their compliance with NSFR, LCR and Leverage Ratio requirements.

33 For a further understanding of the pension companies' liquidity need and use of interest rate derivatives, see Danmarks Nationalbank, Pension companies will have large liquidity needs if interest rates rise, *Danmarks Nationalbank Analysis,* no. 23, November 2019 (*link*). There is a difference in the method used for the calculation of liquidity needs in this analysis and in the analysis from November 2019. The big difference between the methods is better data quality, more data sources and the inclusion of more pension companies and life insurance companies.

Appendix: Analysis data

The analysis applies 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 1.

The analysis of Danish credit institutions' earnings, liquidity and own funds comprises eight systemic credit institutions designated by the Danish Financial Supervisory Authority in 2021. In June 2021, Arbejdernes Landsbank was designated as a systemic credit institution by the Danish Financial Supervisory Authority after it had acquired a majority shareholding in Vestjysk Bank. Vestjysk Bank is thus included under Arbejdernes Landsbank in the analysis. 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 2021, with the exception of Saxo Bank and Arbejdernes Landsbank. Saxo Bank has been omitted due to the bank's business model. Arbejdernes Landsbank has been omitted due to its designation as systemically important. 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 consist of Group 1 of the Danish Financial Supervisory Authority and Nordea Danmark, while medium-sized banks consist of group 2 of the Danish Financial Supervisory Authority and Handelsbanken and Santander Consumer Bank.

Institutions in the analysis by total assets as at 30 June 2021, kr. million

Table 1

Systemic credit institutions	Amount
Danske Bank	3,975,032
Nykredit Realkredit	1,654,673
Jyske Bank	656,500
Nordea Kredit	467,399
DLR Kredit	182,524
Sydbank	169,848
Spar Nord	114,562
Arbejdernes Landsbank	105,400
Systemic credit institutions, total	7,325,938

Systemic banks	
Danske Bank	2,437,914
Jyske Bank	327,501
Nykredit Bank	206,805
Sydbank	171,904
Spar Nord	114,645
Arbejdernes Landsbank	105,400
Systemic banks, total	3,364,169

Non-systemic banks	
Ringkjøbing Landbobank	57,123
Sparekassen Kronjylland	35,393
Sparekassen Vendsyssel	33,164
Lån & Spar Bank	29,252
Sparekassen Sjælland-Fyn A/S	28,546
Jutlander Bank	21,662
Middelfart Sparekasse	15,695
Non-systemic banks, total	220,836

Mortgage credit institutions	
Nykredit Realkredit	1,571,084
Realkredit Danmark	868,664
Nordea Kredit	467,399
Jyske Realkredit	366,581
DLR Kredit	182,524
Mortgage credit institutions, total	3,456,253

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 and funding of the most recent lending in the subsidiary LR Realkredit.

Source: Danmarks Nationalbank.

PUBLICATIONS

NEWS

News offers quick and accessible insight into an Analysis, an Economic Memo, a Working Paper or a Report from Danmarks Nationalbank. News is published continuously.

ANALYSIS

Analyses from Danmarks Nationalbank focus on economic and financial matters. Some Analyses are published at regular intervals, e.g. *Outlook for the Danish economy* and *Financial stability*. Other Analyses are published continuously.

REPORT

Reports comprise recurring reports and reviews of the functioning of Danmarks Nationalbank and include, for instance, the *Annual report* and the annual publication *Danish government borrowing and debt*.

ECONOMIC MEMO

An Economic Memo is a cross between an Analysis and a Working Paper and often shows the ongoing study of the authors. The publication series is primarily aimed at professionals. Economic Memos are published continuously.

WORKING PAPER

Working Papers present research projects by economists in Danmarks Nationalbank and their associates. The series is primarily targeted at professionals and people with an interest in academia. Working Papers are published continuously.

The analysis consists of a Danish and an English version. In case of doubt regarding the correctness of the translation the Danish version is considered to be binding.

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FINANCIAL STABILITY — 1ST HALF 2022

Rising interest rates and prices can challenge banks' customers

Increased prevalence of risky loans among homeowners

Housing lending is still driven by loans with deferred amortisation, and variable interest rate have become more prevalent. An amortisation requirement for homeowners with a high loan-to-value ratio may contribute to a more resilient housing market.

Some corporate customers get low debt servicing ability following higher prices and interest rates

The ability of some companies to service their debt is put under pressure by higher energy and commodity prices and an interest rate hike. This can increase liquidity demands in the banks.

A severe recession will strain some institutions' excess capital

Danmarks Nationalbank's semi-annual stress test shows that some systemic credit institutions come close to breaching the combined capital buffer requirement in a severe recession. They therefore need their current excess capital to withstand stress.

CONTENTS

Summary and assessment

FINANCIAL MARKETS

Prospects of lower economic growth
The International Monetary Fund (IMF) has lowered its growth expectations following the Russian invasion of Ukraine and the subsequent sanctions against Russia. Danmarks Nationalbank's latest projection for the Danish economy estimates that the economy will experience a growth pause in 2022.

Expectation of tighter monetary policy in the USA and the euro area
In the wake of the reopening of the economies following the covid-19 restrictions, the financial markets have been highly impacted by rising inflation. Especially prices of natural gas and commodities have risen sharply in 2022, and there are expectations of tighter monetary policy in both the euro area and the USA. High inflation and market expectations of higher monetary policy interest rates have contributed to rising government bond yields in the USA, the euro area and Denmark.

CYBER

Cyber threat remains significant and is affected by the war in Ukraine
For a number of years, the Danish financial sector has targeted work at strengthening resilience against cyberattacks. There is still a need to increase cyber resilience. The reason for this is that the best hackers are continuously becoming more specialised and sophisticated in their methods. At the same time, Russia's attack on Ukraine is changing the threat landscape.

It is important that work is targeted at protection against cyberattacks in the infrastructure in general, but with increased attention being paid to the cyber threats derived from the war in Ukraine.

HOUSING CREDIT

Increased prevalence of risky loans among homeowners
Mortgage lending to private owner-occupied homes continues to rise moderately, with mortgage loans with deferred amortisation driving most of the growth. The high prevalence of loans with deferred amortisation constitutes a structural problem as it increases vulnerabilities to a subsequent fall in housing prices. Use of deferred amortisation should therefore be limited to the most resilient homeowners. A general requirement for a larger down payment and an amortisation requirement for homeowners with a high loan-to-value ratio are both measures that may contribute to a more resilient housing market

At the same time, recent quarters have seen noticeable increases in the use of variable rate mortgage loans. Variable rate loans imply a risk in the event of higher interest rates in the future, as the interest rate on the loan is continuously adjusted to the prevailing market rates.

Deferred amortisation on mortgage loans is only partially used to repay more expensive bank debt for housing purposes
Deferred amortisation on mortgage loans may be a sensible choice if homeowners with a loan-to-value ratio above 80 per cent use the deferred amortisation period to repay more expensive bank loans for housing purposes more quickly. In practice, however, a large part of homeowners with a loan-to-value ratio of 95 per cent only partially use the deferred amortisation for this purpose. Compared to a conventional home financing with mortgage loan amortisation, the overall repayment of the housing debt is relatively slow for a large part of homeowners with a loan-to-value ratio of 95 per cent and deferred amortisation on their mortgage loan.

CORPORATE CREDIT

Some companies get low debt servicing ability following higher prices on energy and commodities and an interest rate hike
Some companies get low debt servicing ability when interest rates, energy and commodity prices increase. Only a small proportion of the companies have low debt servicing ability, relatively few short-term assets and low solidity. This provides the majority of the companies a good opportunity to apply for loan facilities through their bank connection if they have an increased need for liquidity.

While the banks can handle increased demand for loan facilities, they should continue to support corporate customers on the basis of a thorough credit rating.

LIQUIDITY AND FUNDING

The liquidity position of the largest banks remains robust

The systemic banks still have a sound liquidity situation. All the systemic banks have a survival horizon with positive excess liquidity of at least five months in Danmarks Nationalbank's sensitivity analysis, where customer demand for liquidity increases, but the banks cannot issue new financing.

Hesitant funding markets emphasizes the importance of an even maturity profile

Hesitant funding markets following the Russian invasion of Ukraine underlines why it is important for banks to have ongoing focus on the maturity profile of their issuances. If large parts of the debt fall due at the same time, this increases the risk of breaches of regulatory requirements in situations with limited market access, both for the individual institution and the sector as a whole.

EARNINGS

High profit and stabilisation in core earnings

The earnings of systemic credit institutions showed progress in 2021 after several years of declining profits. For several institutions, the nominal net profit was historically high. Reversals of impairment charges and high value adjustments contributed to this, but core earnings stabilised as well.

The outbreak of the war in Ukraine has not led to downward changes in the institutions' earnings expectations for 2022. Core earnings have shown progress in the 1st quarter of 2022, and several institutions have revised their profit expectations upwards.

CAPITAL AND STRESS TEST

A severe recession strains some institutions' excess capital

The excess capital ratios of systemic credit institutions have evolved differently over the past year, and there are still large differences across the institutions' excess capital ratios. In Danmarks Nationalbank's stress test, some systemic credit institutions come close to breaching the combined capital buffer requirements in a severe recession. They therefore need their current excess capital to withstand stress.

The EU Commission's banking package is estimated to cause less increase in capital requirements than previous assessments

The EU Commission's banking package indicates higher capital requirements for the largest institutions. A rough assessment indicates that the total capital requirement may increase by around kr. 20-40 billion. However, the effect differs widely across the individual credit institutions. The effects are significantly lower than previous assessments of the effect of the Basel Committee's recommendations. One reason for this is that the assessment has been based on risk-weighted exposures after the implementation of new EBA guidelines for estimation of risk parameters for use in internal models.

If the importance of the EU Commission's banking package is looked at in isolation, Danmarks Nationalbank's assessment is that the largest Danish institutions can meet the increase in the capital requirements in the coming years.

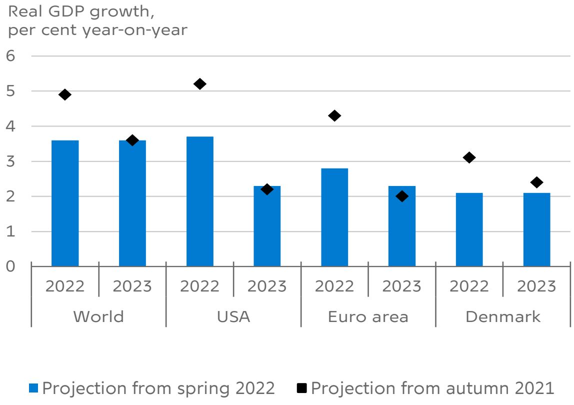
High inflation and prospects of lower growth

Prospects of lower economic growth
Economic growth prospects have been revised downwards following the Russian invasion of Ukraine and the subsequent sanctions against Russia, see chart 1. The International Monetary Fund (IMF) expects world economy growth of 3.6 per cent in 2022 against previously 4.9 per cent, among other things due to disruptions in energy supply, production and trade. Danmarks Nationalbank's latest projection for the Danish economy estimates that the economy will experience a growth pause in 2022. The total growth rate for the year is forecast to be 2.1 per cent. This is a significant slowdown relative to the forecast of 3.1 per cent from September 2021.

Large price increases for commodities and natural gas
In the wake of the reopening of the economies following the covid-19 restrictions, rising inflation have had a deep impact on financial markets. The price increases have continued in 2022, especially after the Russian invasion of Ukraine. For example, prices of natural gas and commodities have increased significantly in 2022, see chart 2.

Price developments for e.g. energy and commodities have contributed to an increase in market participants' expectations of euro area inflation in the medium term. Inflation swaps traded on financial markets indicate an expectation of medium term inflation

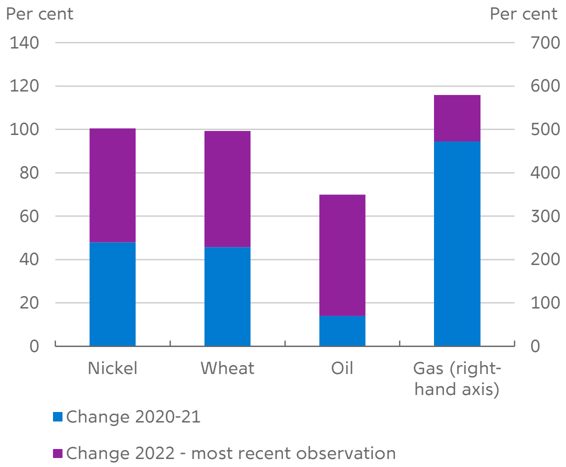
Expected growth in world economy, euro area and Denmark has been revised downwards for 2022 Chart 1



Note: IMF estimates for the world, based on constant exchange rates, and IMF estimates for the USA and the euro area from October 2021 and April 2022, respectively. GDP growth in Denmark is based on Danmarks Nationalbank's projections from September 2021 and March 2022, respectively.
Source: IMF and Danmarks Nationalbank.

Sharp rise in commodity and natural gas prices in recent years

Chart 2

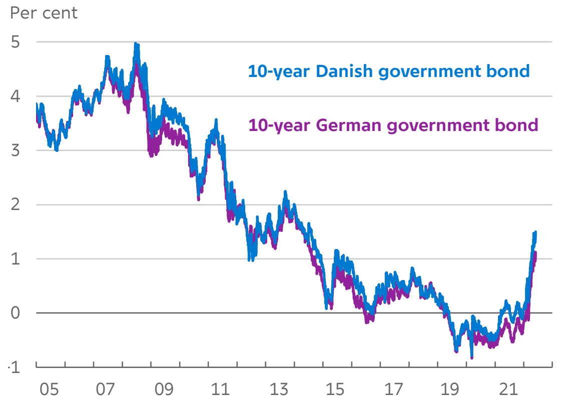


Note: Increase since beginning of 2020, broken down by periods. For nickel, 3-month futures contract on the London Metal Exchange is shown, wheat is for S&P Wheat, oil is Brent and gas is a 3-month Dutch future for natural gas. The most recent observations are from 31 May 2022.

Source: Refinitiv Eikon.

Government yields remain low, but have increased significantly since the beginning of the year

Chart 3



Note: 10-year Danish and German benchmark government bonds. The most recent observations are from 31 May 2022.

Source: Refinitiv Eikon.

around 2 per cent.[1] The European Central Bank (ECB) has an inflation target of 2 per cent in the medium term.

Expectation of tighter monetary policy in the USA and the euro area …

There are prospects of tighter monetary policy in both the USA and the euro area. At the latest monetary policy meeting in April, the ECB expected to stop its net purchases under its asset purchase programme (APP) first and then to raise the key interest rate. The financial markets expect the ECB to raise the key interest rate in 2022 and 2023. If so, this will raise the leading interest rate in the euro area to above 0 per cent for the first time since 2014.

In March, the Federal Reserve (Fed) raised its leading interest rate by 25 basis points and by another 50 basis points in May. The Fed expects to raise interest rates further in 2022, taking the leading interest rate to 2.8 per cent in 2023.

… has contributed to increasing bond yields

High inflation and expectations of higher monetary policy interest rates have contributed to rising government bond yields in the USA, the euro area and Denmark. Since the beginning of 2022, the yield on the 10-year Danish government bond has risen by 142 basis points, see chart 3. However, from a historical perspective, government bond yields remain at a low level.

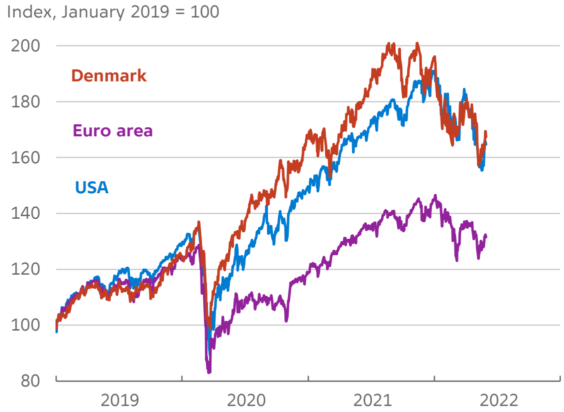
Yields on long-term mortgage bonds have generally been rising since the beginning of 2021, and interest rate increases have further picked up in 2022. Yields on short-term mortgage bonds have seen a more modest increase, see chart 4. For mortgage bonds with 3-year and 5-year maturities, yields have followed the development in long mortgage bond yields to a greater extent. An increased yield spread

1 Based on financial markets expectations for the average yearly inflation over a five-year period, starting in 5 years (5y5y inflation swap). See assistant governor Thomas Harr's speech at AP pension's board and member meeting on 24 May 2022 for a decomposition of interest rates on inflation swaps into inflation expectations and risk premia (*link*).

Sizeable increase in long-term mortgage yields in 2022 Chart 4

Note: '30-year' shows the yield to maturity for a series of 30-year mortgage bonds based on the leading bond at the end of the month. '1-year' is the average yield to maturity for a series of 1-year mortgage bonds in Danish kroner. The most recent observations are from 31 May 2022.
Source: Nordea Analytics and Danmarks Nationalbank.

Equity markets characterised by large fluctuations in 2022 Chart 5



Note: The C25 index is shown for Denmark, Eurostoxx 600 for the euro area and S&P 500 for the USA. The most recent observations are from 31 May 2022.
Source: Refinitiv Eikon.

between long and short mortgage bonds may give borrowers a greater incentive to choose variable rate loans over fixed rate 30-year loans, see the section *Increased prevalence of more risky loans among homeowners*.

Equity markets characterised by large fluctuations in 2022

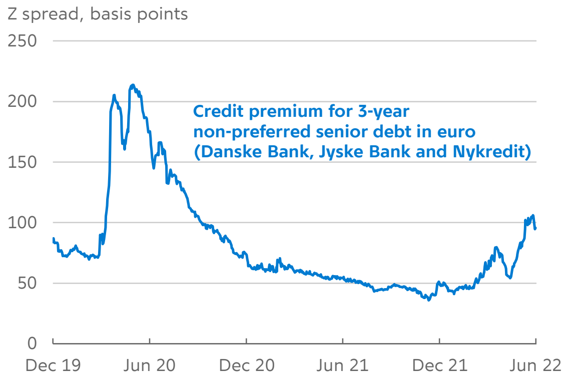
The equity markets have shown large fluctuations in 2022, see chart 5. The development reflects a number of factors, including expectations of monetary policy tightening, inflationary pressures and uncertainty related to the economic fallout from the war in Ukraine. Despite a brief period with rising equity prices in March and early April, the trend has been falling equity prices in 2022. The Danish C25 index is thus trading at a market price that is approximately 14 per cent down year to date.

The credit spreads on corporate bonds with a low rating in the USA and the euro area have increased significantly since the start of 2022, but remain low in a historical context.

Funding markets were hesitant in the wake of the Russian invasion

The credit premium on issuances of non-preferred senior debt increased in the wake of the Russian invasion of Ukraine, see chart 6. At the same time,

Credit premium for non-preferred senior debt has increased in 2022 Chart 6



Note: Average z-spread for non-preferred senior debt in euro with an expected remaining maturity of around three years for Danske Bank, Jyske Bank and Nykredit. The z-spread is an expression of the additional cost of financing using the debt instrument in question, where the additional cost is calculated by parallel-shifting a risk-free zero coupon rate structure, so that back discounting using this basis gives the price of the debt instrument. The most recent observation are from 31 May 2022.
Source: Refinitiv Eikon and Danmarks Nationalbank.

the large banks did not issue senior debt and capital instruments, and the funding markets were thus briefly inactive. As uncertainty decreased, banks resumed issuance of senior debt and capital instruments.

In addition to the market development, the war in Ukraine may also affect banks through other channels, both directly and indirectly. While the largest Danish institutions have very modest direct exposures to counterparties in Russia and Ukraine, the banks must, for example, also handle cyber risks and compliance with sanctions against Russia and Belarus.

Cyber threat remains significant and is affected by the war in Ukraine

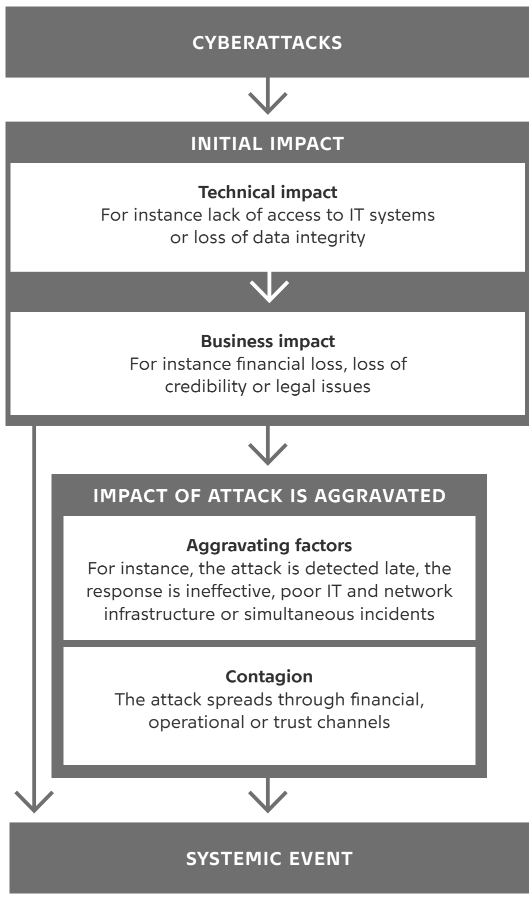
Cyberattacks may threaten financial stability in Denmark in several ways, see chart 7. A cyberattack may, for example, limit societally critical functions performed by one or more institutions or impact confidence in the financial sector.

For a number of years, the Danish financial sector has targeted work at improving operational resilience with particular focus on strengthening cyber resilience. The financial institutions are themselves responsible for ensuring stable operations and operational resilience. Work is being done to achieve this both individually and jointly, including through Danmarks Nationalbank's and the financial sector's initiatives in FSOR and TIBER-DK, see box 1.

There is still a need to increase cyber resilience. The reason for this is that the best hackers are continuously becoming more specialised and sophisticated in their methods. At the same time, Russia's attack on Ukraine is changing the threat landscape.

Despite the Danish financial sector not currently being regarded as a direct target for state-sponsored Russian hacker groups, there may be an increased risk that the sector will be indirectly affected by cyberattacks. This may, for example, happen if Danish companies or authorities use suppliers that link them to Ukraine.

From cyberattack to systemic event Chart 7



Source: Danmarks Nationalbank.

Countering cyber threat must remain a target area
The threat from cyber espionage and cybercrime is still assessed as very high by the Centre for Cyber Security (CFCS)[2]. On the other hand, CFCS assesses that the threat from directly destructive cyberattacks against Danish targets is low.[3]

As a consequence of the war in Ukraine, the threat from cyber activism is assessed as having increased from low to medium.[4] In addition, the nature of the cyber threat may quickly change if there is a further deterioration in the relations between NATO and Russia.[5]

It is important that work is targeted at protection against cyberattacks in the infrastructure in general, but with increased attention being paid to the cyber threats derived from the war in Ukraine. Danmarks Nationalbank is monitoring the situation closely and continuously obtains relevant information from the financial institutions that participate in crisis management arrangements under the auspices of the Financial Sector Forum for Operational Resilience (FSOR). Danmarks Nationalbank is also in continuous communication with Nordic Financial CERT (NFCERT[6]), which plays a major role for financial institutions in relation to knowledge sharing about incidents and threat assessments.

Examples of operational initiatives: FSOR and TIBER-DK

Box 1

FSOR
In 2016, Danmarks Nationalbank and the financial sector established a voluntary, but binding, private/public collaboration forum: Financial Sector Forum for Operational Resilience (FSOR). The purpose is to increase operational resilience in the financial sector, including resilience to cyberattacks.[1] FSOR's work is based on a risk analysis that identifies the greatest risks to the sector. It lays down a direction for the work with joint mitigating measures, including a crisis management team that ensures coordinated action across the sector in the event of a systemic crisis. The participants in FSOR are the most central financial institutions, NFCERT, interest group organisations and authorities, including CFCS. Danmarks Nationalbank chairs FSOR and provides secretariat services. Read more about FSOR on nationalbanken.dk (*link*).

TIBER-DK
Since the beginning of 2019, Danmarks Nationalbank has also coordinated testing of cyber resilience in the financial sector under the TIBER-DK programme. A TIBER test simulates advanced attacks from state-sponsored groups or organised criminal groups in live production environments. Based on intelligence-based threat information, the tests use real tactics, techniques and procedures. The goal is to identify strengths and weaknesses of the cyber defence. Addressing the vulnerabilities increases cyber resilience. Danmarks Nationalbank was one of the first central banks to implement the programme, which today exists in a further 11 European countries. Read more about TIBER-DK on nationalbanken.dk (*link*).

1. Danmarks Nationalbank conducts questionnaires on the level of cyber resilience among key actors in the Danish financial sector using self-evaluation – see Danmarks Nationalbank, Survey on cyber resilience in the financial sector, 2022 (*link*).

2 CFCS was established in 2012 as part of the Danish Defence Intelligence Service. CFCS's mission is to support a high level of information security in infrastructure that is vital to society. Read more on cfcs.dk (*link*).

3 Centre for Cyber Security, The cyber threat against Denmark in light of Russia's invasion of Ukraine, March 2022 (*link*).

4 Centre for Cyber Security, CFCS elevates the threat level of cyber activism against Denmark, May 2022 (only in Danish) (*link*).

5 Centre for Cyber Security, The cyber threat against Denmark in light of Russia's invasion of Ukraine, March 2022 (*link*).

6 NFCERT is a non-profit organisation managed and funded by members in the Nordic financial sector. Read more on nfcert.org (*link*).

Increased prevalence of risky loans among homeowners

High inflation and rising interest rates may dampen housing prices in the coming year
Housing prices have risen sharply since the outbreak of covid-19, see chart 8. From March 2020 to May 2022 the prices have increased by 23 and 30 per cent for single-family homes and apartments, respectively. Housing prices have continued to increase the past year despite rising interest rates and higher gas prices, although at a slower pace.

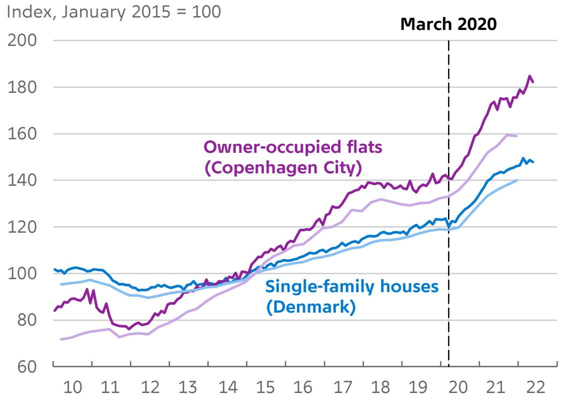
However, the recent increases in inflation as well as the significant increases in long mortgage bond yields are expected to contribute to slowing down housing price increases in the coming year. In total, the downside risks to housing prices have increased since the latest projection from Danmarks Nationalbank in March 2022.

The current inflation has in particular been tied to goods such as food and energy which households may find difficult to avoid consuming. This contributes to reducing the budget for home purchases for potential home buyers. At the same time, increasing nominal interest rates imply more expensive home financing despite interest payment deductibility.

Increasing interest rates also mean that home buyers are eligible for a lower borrowing amount

Housing prices have risen sharply since the covid-19 outbreak

Chart 8



Note: Seasonally adjusted housing prices. The dark-coloured series are numbers from Boligsiden, while the light-coloured series are from Statistics Denmark. The most recent observations are from May 2022 for Boligsiden and 4th quarter 2021 for Statistics Denmark.
Source: Boligsiden, Statistics Denmark and own calculations.

when assessed by credit institutions.[7] These factors suggest a more subdued development for housing prices, in particular in the coming year.

On the other hand, housing prices are currently buoyed by a low supply of homes for sale. In addition, many households have increased their savings further during the pandemic. High inflation may at the same time contribute to rising nominal housing prices if inflation leads to increased wages and incomes. If households expect both rising prices and wages, it will incentivise home buyers to bring forward home purchases since the real value of debt and debt service will fall.

In the longer run, rising costs of construction may contribute to buoy housing prices to the extent that construction activity is held back and the stock of housing is therefore not increased at the same pace. In addition to this, the high housing price level should be viewed in connection with the apparent increase in households' preference for housing due to the pandemic.[8] This led to a high level of trading activity and price increases in 2020 and the first half of 2021 which were higher than e.g. incomes and interest rates would suggest. It is uncertain to which extent the households' increased preference for housing will last in the coming years.

The Danish housing market stands out internationally by having broad access to deferred amortisation, low down payment requirements and a high tax deduction of interest payments. These factors have stimulated housing price increases rather than stabilized developments over many years. Both today and in the longer term, structural improvements will contribute to reducing the probability of large fluctuations in house prices.

All things considered, the uncertainty surrounding the future course of housing prices is elevated. The price developments are tied to both whether households' increased preference for housing remains, but also in particular to the development of interest rates, incomes and inflation going forward.

Higher heating expenses may reduce some households' creditworthiness

Higher heating expenses and lower housing wealth may reduce some households' creditworthiness.[9] Banks and mortgage credit institutions should therefore incorporate the importance of heating types and heating expenses in their customer credit rating. Particular attention should be paid to the institutions' credit rating of households with low disposable income, lower liquid assets or a higher consumption ratio, as these households will be less well equipped to handle an energy price increase.

Natural gas price increases in the wake of the Russian invasion of Ukraine will especially impact the approximately 352,000 households in single-family houses with gas boilers.[10] The importance of gas prices in relation to house prices is greatest in rural districts, where heating expenses typically account for a larger share of the fixed costs for owning a home.

Increased prevalence of risky loans among homeowners

Mortgage lending to private owner-occupied homes continues to rise moderately, and this growth is especially driven by mortgage loans with deferred amortisation, see chart 9 (left). At the same time, the recent quarters have seen an appreciable positive contribution from variable rate loans, see chart 9 (right). Fixed rate loans with deferred amortisation account for approximately 20 per cent of mortgage credit institutions' lending secured by mortgages on owner-occupied homes of kr. 1,641

7 The credit rating of home buyers must as a starting point reflect the ability to service a fixed-rate loan with amortization, irrespective of choosing either a variable interest rate or deferred amortization. In Greater Copenhagen and Aarhus, the interest rate used for the credit rating must be one percentage point higher than the going rate, but no lower than 4 per cent.

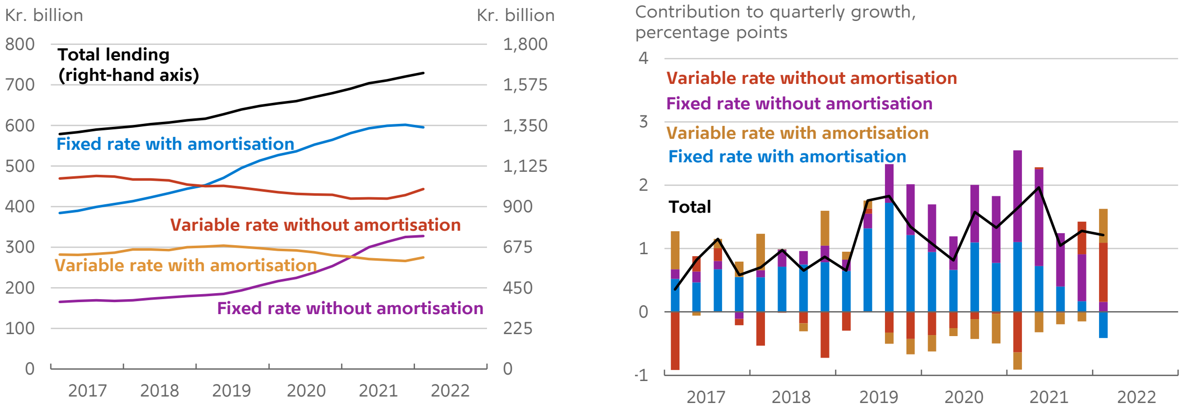
8 See Simon Hviid et al., Housing market robustness should be strengthened, *Danmarks Nationalbank Analysis,* no. 16, June 2021 (*link*).

9 See, for example, Marcus Mølbak Ingholt and Niels Framroze Møller, Higher gas prices can lead to lower house prices in parts of Denmark, *Danmarks Nationalbank Economic Memo*, no. 4, April 2022 (only in Danish) (*link*).

10 A characteristic feature of gas customers is that they have more robust finances than other groups of households seen in relation to, for example, income and liquid assets.

Moderate lending growth and more variable rate loans with deferred amortisation

Chart 9



Note: Total domestic mortgage lending (left) and growth contribution to quarterly growth in total mortgage lending (right) to Danish households with mortgages on owner-occupied homes and holiday homes calculated at nominal value. The most recent observation is 1st quarter 2022.
Source: Danmarks Nationalbank.

billion, while approximately 27 per cent are variable rate loans with deferred amortisation.

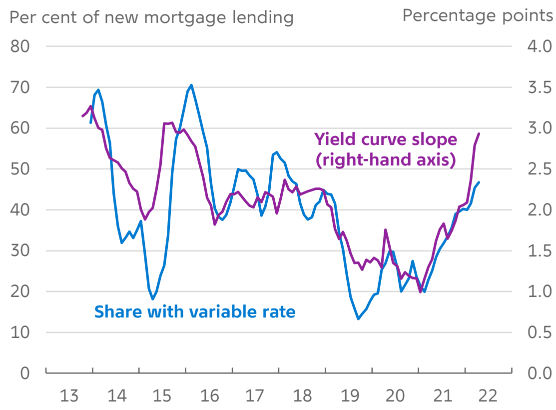
Homeowners can choose variable rate loans when the spread between long-term and short-term interest rates increases

As the spread between long and short mortgage rates increases, it becomes more expensive for borrowers to safeguard themselves against interest rate increases. This may prompt more borrowers to choose variable rate loans, see chart 10, which shows the development in the yield spread between long and short mortgage rates and the share of new loans with variable rates. There has not been a corresponding increase in yield spread between the long mortgage rate and a 3-5-year mortgage rate. Variable rate loans include a risk of higher interest rates in the future, as the interest rate on the loan is continuously adjusted to the prevailing market rates.

The most recent increase in the net raising of variable rate loans in March and April 2022 occurred concurrently with a net reduction of fixed rate loans. One third of the homeowners whom have chosen to convert their mortgage loan during the first quarter of 2022, have restructured their mortgage loan with a fixed rate to a loan with a variable rate. This means that some homeowners have made use of the

More homeowners may choose variable rate loans when the yield curve steepens

Chart 10



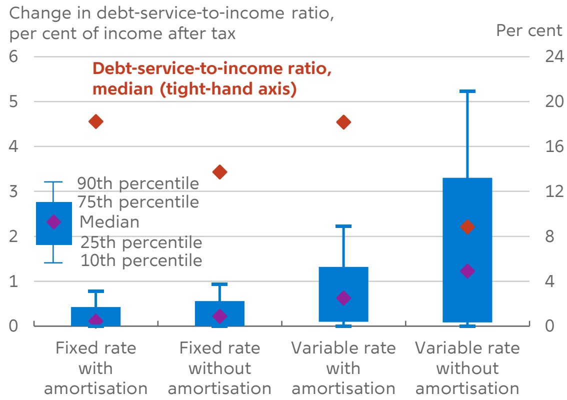
Note: New lending is calculated gross. The slope of the yield curve is defined as the difference between the long mortgage rate excluding administration margins (effective interest rate for new loans with interest rate fixation over ten years) and the short mortgage rate excluding administration margins (effective interest rate for new loans with interest rate fixation up to and including one year). The share with variable rate loans comprises that part of the gross new lending which has an interest rate fixation period of ten years or less, and the share is shown as a 3-month moving average.
Source: Danmarks Nationalbank.

opportunity to change their risk profile by converting to a variable rate mortgage loan.[11]

Homeowners with variable rate loans with deferred amortisation have significantly greater interest rate sensitivity in their debt servicing than homeowners with other loan types. At the end of 2020, 25 per cent of homeowners with variable rate loans with deferred amortisation would have an increase in their debt-service-to income ratio of 3.3 percentage points or more in case of an interest rate increase of 1 percentage point, see chart 11. However, this interest rate sensitivity should be seen in the light of the fact that homeowners with variable rate loans with deferred amortisation have a relatively low debt-service-to-income ratio prior to the interest rate increase. Nevertheless, rising interest rates may lead to significantly higher debt servicing for homeowners who have taken out variable rate loans.

Homeowners' interest rate sensitivity on their debt service payments decreased in the period from 2009 to 2020, as homeowners reduced their bank debt and increasingly opted for fixed rate mortgage loans.[12] Conversely, the increasing borrowing of variable rate loans with deferred amortisation in 2022 will lead to higher interest rate sensitivity among homeowners compared to the end of 2020.

Higher interest rate sensitivity for homeowners with variable rate loans Chart 11



Note: Change in debt-service-to-income ratio in case of an interest rate increase of 1 percentage point. The debt-service-to-income ratio is measured as the homeowners' interest, contribution and instalment payments as a percentage of net income. The latest data is from the end of 2020. Only variable rate mortgage loans with interest rate fixation in the coming year are assumed to have a higher interest rate. For bank loans, it is assumed that all bank loans will have a higher interest rate. See Stine Ludvig Bech, Simon Juul Hviid and Jakob Guldbæk Mikkelsen, Measuring household interest-rate sensitivity in Denmark, *Danmarks Nationalbank Working Paper*, no. 183, November 2021, for a complete method description.
Source: Statistics Denmark and own calculations.

Deferred amortisation increases homeowners' vulnerability to a subsequent drop in housing prices
As previously described, the housing market is characterised by several unfavourable structures that should be improved. Improved structural conditions will make it easier for homeowners to handle future housing market fluctuations. The fact that the Danish economy is in a different place than it was a year ago, does not change the need for structural improvements in the housing market.

Widespread use of deferred amortisation increases homeowners' vulnerabilities to a subsequent drop in housing prices and should therefore be limited to the most resilient homeowners. A general requirement for a larger down payment and a requirement of amortisation on loans for homeowners with a high loan-to-value ratio are both measures that can contribute to a more resilient housing market. More stringent down payment and amortisation requirement for highly indebted homeowners are also among the measures highlighted by the IMF to counteract increased risks in the housing market in Denmark.[13]

Deferred amortisation on mortgage loans is only partially used to repay more expensive bank debt
Deferred amortisation on mortgage loans may be a sensible choice if homeowners with a loan-to-value ratio above 80 per cent use the deferred amortisa

11 See Danmarks Nationalbank, Every third opt out fixed-rate on conversion, *Danmarks Nationalbank Nyt*, May 2022 (*link*).

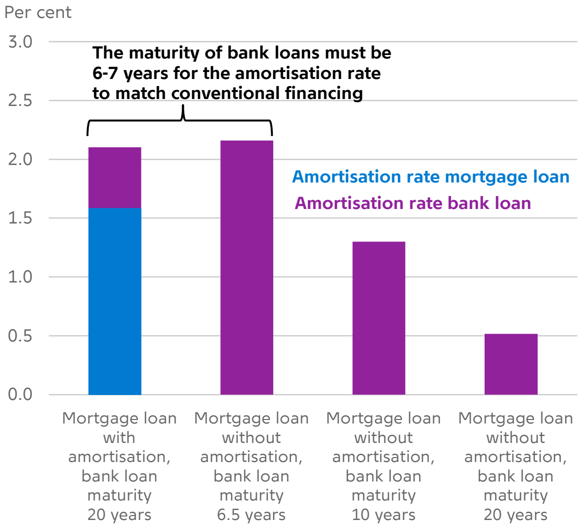
12 Stine Ludvig Bech, Simon Juul Hviid and Jakob Guldbæk Mikkelsen, Measuring household interest-rate sensitivity in Denmark, *Danmarks Nationalbank Working Paper*, no. 183, November 2021 (*link*).

13 See final statement from the IMF following Article IV mission visit 2022 (*link*).

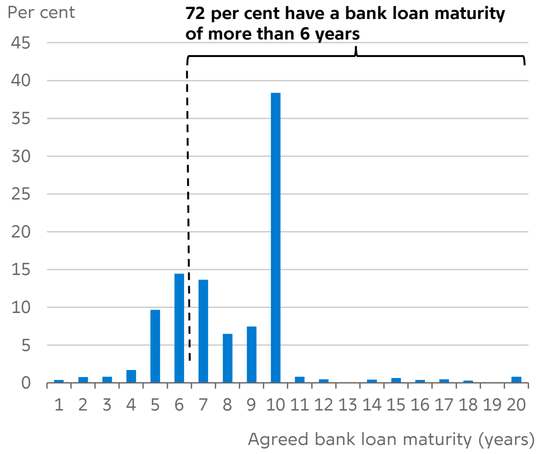
Most homeowners with a fixed rate mortgage loan with deferred amortisation and a loan-to-value ratio of 95 per cent only partially use saved instalments for repayments on supplementary bank debt

Chart 12

First-year amortisation for various financing constructions on LTV 95 per cent mortgaging



Distribution of agreed maturity of housing loan with an LTV of 95 per cent.



Note: Left-hand chart: Example of amortisation rates on the total housing debt for various financing arrangements with a 30-year fixed rate mortgage loan with and without amortisation with an interest rate of 3.7 per cent and a supplementary bank loan with an interest rate of 4.3 per cent, so that the total loan-to-value (LTV) ratio is 95 per cent. Right-hand chart: Actual maturities of bank loans with 95 per cent LTV ratio, where the mortgage loan is with deferred amortisation and a fixed rate.
Source: Danmarks Nationalbank and own calculations.

tion period to reduce more expensive supplementary bank loans more quickly.[14] In practice, however, a large part of homeowners with a loan-to-value ratio of 95 per cent only partially use their deferred amortisation for this purpose, see chart 12. This makes some homeowners with high indebtedness less resilient to a subsequent drop in housing prices.

With the current long-term mortgage rates, approximately 2.4 per cent is amortised on the total housing debt in the first year in connection with conventional housing financing with a fixed rate mortgage loan with amortisation and a supplementary bank loan with a maturity of 20 years. The same amortisation rate applies to a loan structure with a fixed rate mortgage loan with deferred amortisation and a bank loan with a maturity of approximately six years. If, however, the maturity of the bank loan is ten years, only 1.3 per cent is amortised annually, see chart 12 (left).[15]

For 72 per cent of homeowners with fixed rate mortgage loans with deferred amortisation and a loan-to-value ratio of 95 per cent, the agreed maturities of the bank loan are more than six years, see chart 12 (right). Compared with conventional housing financing, the overall settlement of the housing debt

14 Up to 80 per cent of the value of the home can be financed with mortgage loans. The remaining 20 per cent of the value of the home can be financed with supplementary bank loans of 15 per cent and a minimum down payment of 5 per cent.

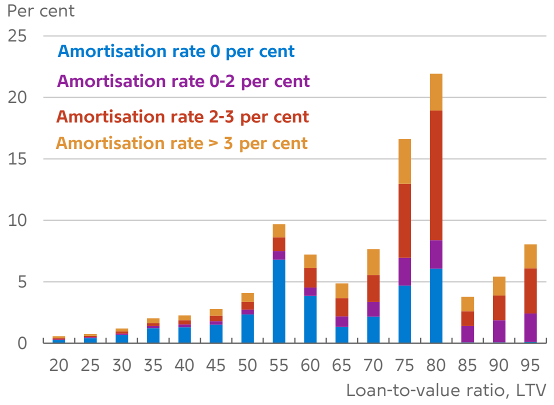
15 The calculation is affected by the level of interest rates and, in particular, by the slope of the yield curve. The calculation is based on a long mortgage rate of 3.7 per cent and an interest rate on the bank loan of 4.3 per cent. If the basis is instead a variable rate mortgage loan with an interest rate of 1 per cent, the maturity of the bank loan must instead be 5-6 years for the amortisation rate to match the conventional financing structure.

is therefore relatively slow for a large part of the most highly indebted homeowners with fixed rate mortgage loans with deferred amortisation.

New lending by banks and mortgage credit institutions to customers where the total loan-to-value ratio amounted to more than 85 per cent of the value of the home constituted just under 20 per cent of the total new lending secured by mortgage on owner-occupied homes in 2020 and 2021, see chart 13. For just under one third of these home purchases, the amortisation rate on the total financing was less than 2 per cent.

Just under 20 per cent of new lending has been with a loan-to-value ratio of 85 per cent or more in recent years

Chart 13



Note: Data for net new lending in 2020 and 2021. The last column shows debt in excess of LTV 95 per cent and thus comprises, for example, home purchases where various costs etc. can be mortgaged in excess of the deposit requirement of 5 per cent. The amortisation rates have been calculated as the actual amortisation on the total debt in the 2nd quarter after the change of ownership.
Source: Danmarks Nationalbank and own calculations.

Revision of macroprudential framework should ensure a legal framework for housing market measures

The current housing market measures aim to strengthen the resilience of homeowners and thereby also the resilience of the balance sheets of financial institutions. Among other things, the measures encourage longer interest rate fixation periods and less use of deferred amortisation for highly indebted homeowners. In Denmark, these measures are typically implemented in consumer protection legislation and other legislation that does not necessarily have financial stability considerations as its primary objective. Therefore, Denmark currently has no actual legal framework for the implementation of borrower-based measures with financial stability as the objective.

As part of its macroprudential review, the European Commission is currently discussing whether a legal framework should be implemented in the EU, for example, borrower-based measures aimed at financial stability, see box 2. Such an EU framework could improve the Danish authorities' ability to address the build-up of systemic risks related to the housing market and thus support financial stability. The lack of a legal framework may reinforce an 'inaction bias', i.e. a tendency not to act, and result in no, or inadequate, measures being taken. It is therefore important that the upcoming revision ensures a minimum set of instruments that the macroprudential authorities can use to address housing market risks.

Revision of macroprudential legislation should ensure a legal framework for housing market measures

Box 2

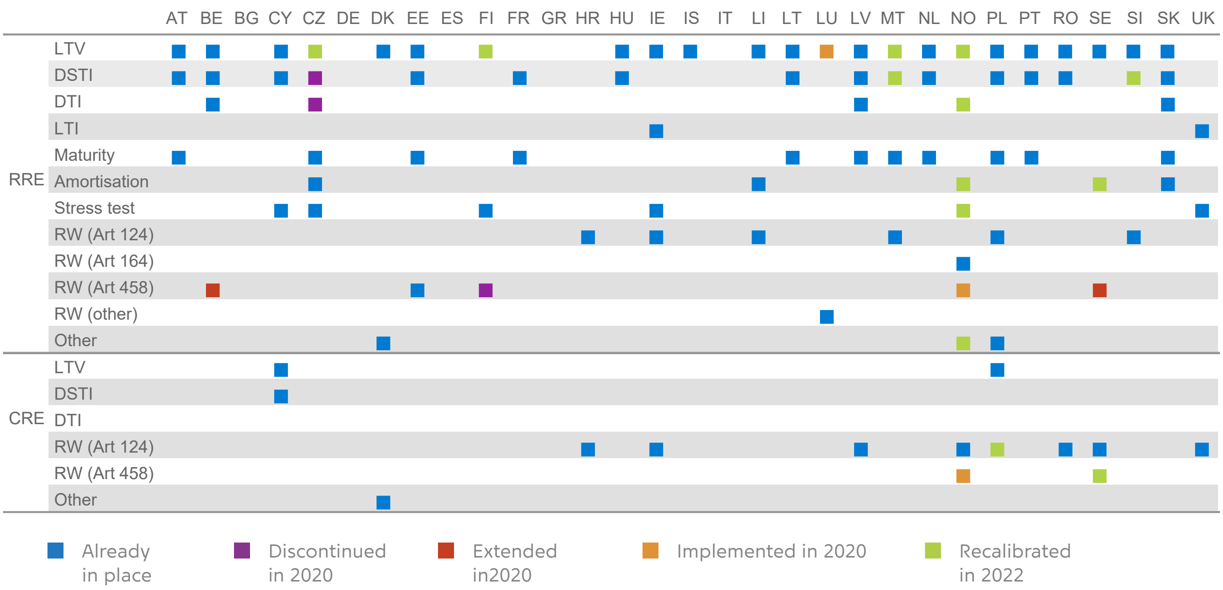
Every five years, the European Commission must assess whether the legal framework for pursuing macroprudential policy in the EU is working as it should. As part of the revision, the European Commission has considered whether there are deficiencies that should be addressed. At the present time, the macroprudential framework in the EU's Capital Requirement Directive V consists primarily of capital instruments, for example different types of capital buffers, and risk weight floors (RWF). There is no equivalent set of macroprudential instruments in European legislation to address systemic housing market risks, the so-called Borrower Based Measures (BBM).

Several countries, including Denmark, do not have a dedicated legal framework for BBM. Nevertheless, most European countries have implemented a number of housing market measures, see chart. However, these housing market measures are often based on legislation that does not have the consideration for financial stability as their primary objective. The lack of a legal framework may reinforce an 'inaction bias', i.e. a tendency not to act, and result in no, or inadequate, measures being taken.

At the same time, there are big differences across the countries in the type of measures taken and the way in which they are implemented. This makes it difficult to compare measures across countries and may prevent recognition of other countries' measures.

It is therefore important that the upcoming revision ensures a minimum set of instruments which the macroprudential authorities can use to address housing market risks. Adjustments in the legal framework must ensure a relatively wide range of instruments that the countries can adapt to the national markets. The following instruments should be included: debt service burden ratio (DTI/DSTI), loan-to-value ratio (LTV), amortisation requirements and maturities.

Overview of housing market measures in the EU



Note: CRE are measures aimed at the commercial real estate market, while RRE are measures aimed at the residential real estate market. The Danish rules God Skik (Good Practices), Vækstvejledningen (Growth Guide) etc. are classified under 'Other'.
Source: Danmarks Nationalbank on the basis of the European Systemic Risk Board (ESRB).

Some corporate customers get low debt servicing ability following higher prices and interest rates

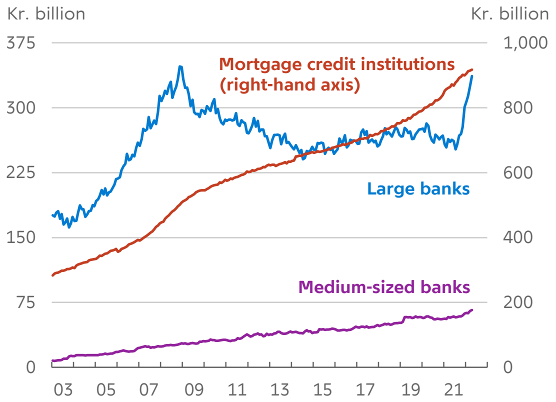
Corporate borrowing from banks has increased significantly
Bank lending to corporate customers has grown by more than 26 per cent in the past year, while mortgage lending to corporate customers has grown more moderately by 6 per cent. Especially large banks have increased their corporate lending, see chart 14. The lending is spread across several industries and should be seen in the light of a number of factors, including the economic expansion.

The limited credit granting by banks during the pandemic reflected that government liquidity measures and loan schemes, to a certain extent, constituted an alternative to debt financing by the banks.[16]

1 April 2022 was the deadline for just under 45,000 companies to repay VAT and A-tax loans of almost kr. 22 billion. As of 19 May 2022, just under kr. 15 billion of the loan amount had been repaid, while payment schemes have been created for just under kr. 6 billion.[17]

Large banks drive lending growth to corporate customers

Chart 14



Note: Nominal lending to non-financial corporations by large and medium-sized banks and mortgage credit institutions.
Source: Danmarks Nationalbank.

16 See Alexander Meldgaard Otte, Andreas Kuchler and Ida Rommedahl Julin, Firm financing and public support measures during the pandemic, *Danmarks Nationalbank Working Paper*, no. 184, November 2021 (*link*).

17 See Danish Tax Agency (Skattestyrelsen) repayment of tax and VAT loans (*link*).

To the extent that companies have used bank financing to pay due VAT and A-tax loans, this may also be a contributing factor for the high credit demand in the banks.

Differences in banks' credit demand expectations going forward

There are differences in the banks' expectations for the credit demand from corporate customers going forward. In Danmarks Nationalbank's lending survey for the 1st quarter of 2022, one half of the banks report that they expect increased demand for loans from existing customers, while the other half expect the same or lower credit demand. Taken together, the banks expect credit demand from corporate customers to increase slightly from the 1st quarter to the 2nd quarter of 2022.[18] Several banks base their expectations of higher credit demand on the repayment of tax and VAT loans on 1 April 2022.

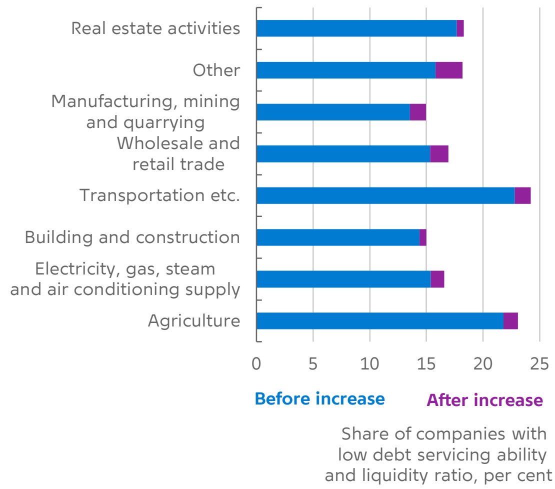
Some companies get low debt servicing ability following higher prices on energy and commodities and interest rate hike

The economic consequences of the war in Ukraine are affecting many Danish companies. Prices of, for example, energy and commodities have risen at a time when inflation was already high. Higher energy and commodity prices, combined with rising interest rates, may impair companies' debt servicing ability.[19] In this connection, some companies will be able to pass on higher costs to their customers by increasing their sales prices.

Higher prices of energy and commodities, combined with a hike in interest rates, will result in an increased share of companies with low debt servicing ability and liquidity ratio, see chart 15. However, the share is estimated to increase by just under 2 percentage points under the given assumptions, which include that firm specific conditions and hedging against e.g. interest rate risk are not taken into account, see box 3.

Although the share of companies with low debt servicing ability and liquidity ratio is only increasing slightly, there are large differences in the impact on profit across business sectors, see box 4.

Some companies get low debt servicing ability in a situation with higher energy prices, commodity prices and interest rates Chart 15



Note: Share of companies in each industry before and after an increase in interest rates, energy and commodity prices where the company's earnings before interest, taxes, depreciation and amortisation (EBITDA) are lower than its expenses for interest and instalments (debt servicing ability below 100 per cent), while short-term assets cannot cover short-term liabilities (liquidity ratio below 100 per cent). Financial information is available for 60,000 companies with loans in Danish banks. Sole proprietorships are not included. See box 3 for more information on the calculations.

Source: Danmarks Nationalbank, Bisnode, Statistics Denmark and own calculations.

Higher energy and commodity prices and an interest rate hike may increase corporate customers' liquidity needs

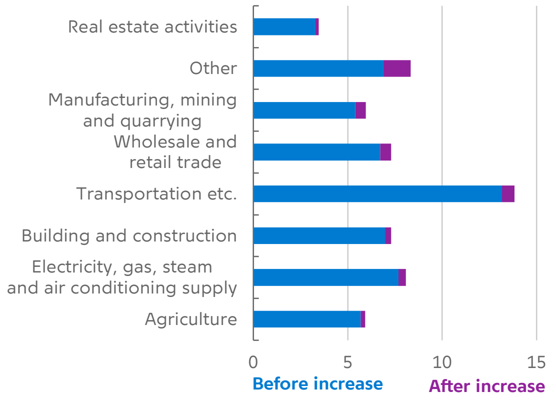
In the short term, increased pressure on companies' ability to meet their debt obligations may lead to increased demand for, for example, bank loan facilities. Less than 10 per cent of the companies have low

18 See Danmarks Nationalbank, A number of banks expect tighter credit standards, *Danmarks Nationalbank Lending Survey*, 1st quarter 2022 (*link*).

19 Over time, some companies are likely to find substitutes for specific forms of energy if prices of these sources of energy remain high in the longer term.

A small proportion of companies with low debt servicing capacity and liquidity ratio also have low solvency

Chart 16



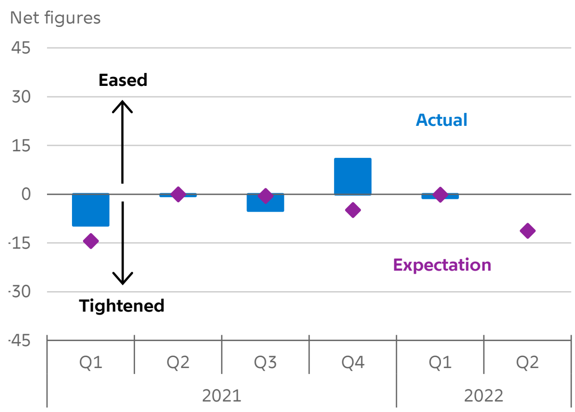
Share of companies with low debt servicing ability, liquidity ratio and solvency, per cent

Note: Share of companies in each industry with low debt servicing capacity and liquidity ratio as well as low solvency before and after an increase in interest rates, energy- and commodity prices. Debt servicing ability is defined as low when the company's earnings before interest, taxes, depreciation and amortisation (EBITDA) are lower than its expenses for interest and instalments (debt servicing ability below 100 per cent). The liquidity ratio is defined as low when the company's current assets cannot cover current liabilities (liquidity ratio below 100 per cent). Low solvency is defined as an equity ratio of total assets below 30 per cent. See box 3 for further information about the calculations.

Source: Danmarks Nationalbank, Bisnode, Statistics Denmark and own calculations.

Banks expect slightly tighter credit standards for corporate customers

Chart 17



Note: In Danmarks Nationalbank's lending survey, corporate customers cover 'Private non-financial corporations' and 'Sole proprietorships'. The net Charte goes from -100 to +100 and is the banks' response weighted by their respective market shares. 'Expectation' is the banks' previously reported responses from the quarter before the present quarter.

Source: Danmarks Nationalbank.

debt servicing ability, liquidity ratio and solvency, see chart 16.[20] This gives a majority of the firms a good basis for applying for loan facilities through their bank connections if they get an increased need for liquidity. At the same time, thebanks have sufficiently high liquidity buffers to meet increased demand for liquidity from corporate customers, see the section *Banks can meet increased demand for liquidity*.

Overall, the outstanding debt to companies with low solvency, debt servicing capacity and liquidity ratio is estimated to account for less than 2 per cent of the institutions' corporate lending both before and after energy and commodity price increases and an interest rate hike. The impact on the banks' resilience is therefore regarded as limited.

Banks should continue to support companies based on a thorough credit rating

Even though the banks are able to meet an increased demand for loan facilities from corporate customers as a result of higher energy and commodity prices and an interest rate hike, the banks should continue to conduct a thorough credit rating. Some companies with weak financial ratios must be expected to go bankrupt as a result of price increases and higher interest rates. It is a natural business dynamic that non-viable companies have to close down and that new companies are started up.

The banks generally expect a slight tightening of credit standards towards corporate customers between the 1st quarter and the 2nd quarter of 2022, see chart 17. Half of the banks surveyed estimate that risk assessment and risk appetite, particularly related to the war in Ukraine and rising interest rates, will pull towards tighter credit standards in the 2nd quarter of 2022.

20 Low solvency is defined as an equity ratio of total assets below 30 per cent.

Effect of rising energy and commodity prices and an interest rate hike – how we proceeded

Box 3

This analysis assesses how severely companies will be affected under a number of basic assumptions about price and interest rate increases in 2022. The companies' earnings before interest, taxes, depreciation and amortisation (EBITDA) in their latest financial statements are reduced by the increase in energy and commodity prices through 2022. Based on the latest numbers for energy consumption and imports of raw materials from Statistics Denmark, the companies' costs are updated by comparing average prices in 2021 and expectations for prices in 2022, the latter being calculated as the average of the prices in the first three months of the year.[1]

In line with estimates in the specialist literature, it is assumed that half of each industry's total cost increase from energy and commodities will be passed on to the customers via higher sales prices during 2022,[2] under the assumption that sales of goods and services are unaffected. Each industry's average change in EBITDA is linked with accounting data at corporate level. Finally, each company's debt servicing ability is recalculated after an upward parallel shift of interest rates of 1 percentage point.

A company is categorised as having a potential liquidity need if the company's debt servicing ability and liquidity ratio are both below 100 per cent. A debt servicing capacity below 100 per cent means that the company's EBITDA is lower than the company's expenses for interest and instalments. A liquidity ratio below 100 per cent means that the company does not have sufficient saleable short-term assets to cover its short-term liabilities in the form of, for example, loans.

The analysis has been made on the basis of Danmarks Nationalbank's credit register. The register comprises bank lending and unused credit facilities for the individual companies. This gives a statement of the proportions of lending that can potentially be affected by price and interest rate increases. Together with the credit register, accounting information from Bisnode is used to assess how resilient companies are to price and interest rate increases based on their most recent financial statements.

There is great uncertainty attached with assessing the impact of price and interest rate shocks on the companies' ability to meet their loan and payment obligations. This means that it has, among other factors, not been taken into account whether the companies have hedged their market and interest rate risk through, for example, derivatives. In addition, energy and commodity consumption is modelled at industry level, and there may consequently be company-specific conditions that are not controlled for in the analysis.

1. For commodity imports, the focus is on companies that import commodities themselves and on commodities where Ukraine and Russia account for more than 15 per cent of global exports.
2. See, for example, L. Dedola, M. S. Kristoffersen & G. Züllig, The extensive and intensive margin of price adjustment to cost shocks: Evidence from Danish multiproduct firms. Mimeo, European Central Bank, 2021 (*link*).

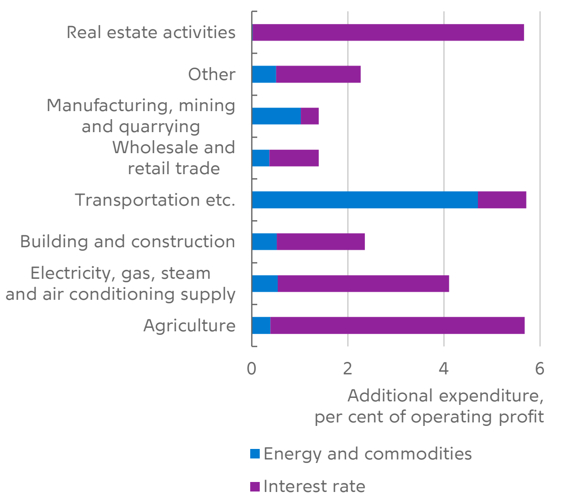
Box 4

Companies' finances are affected differently by rising prices for energy and commodities and an interest rate hike

Higher prices of energy and commodities will, combined with a hike in interest rates, affect expenses differently across the industries, see chart A. For companies in the transport industry, higher energy and commodity prices particularly increase the costs under the given assumptions for price and interest rate increases. Conversely, an interest rate increase of 1 percentage point will have a greater effect on the profit for companies in real property, energy supply and agriculture.

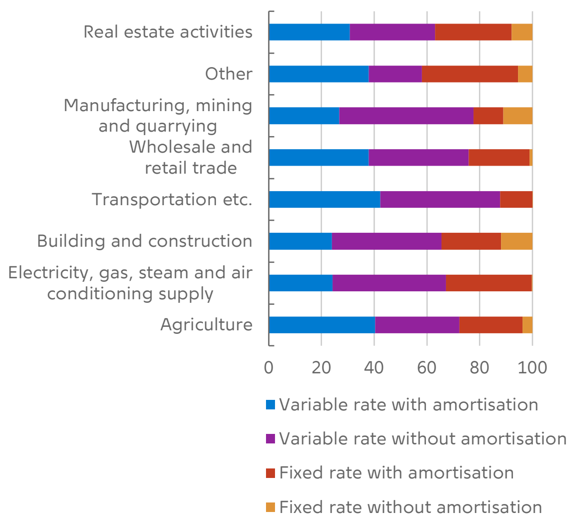
Differences in additional expenses across industries should be seen in the light of industry-specific energy and commodity consumption and the volume of variable rate debt. On average, corporate customers have variable rate mortgage loans of around 65 per cent. Also companies in cyclically-sensitive industries such as agriculture and building and construction have, to a large extent, taken out variable rate mortgage loans, see chart B.

Chart A
Higher energy prices, commodity prices and interest rates have different impacts on companies' finances



Note: Total additional costs distributed on contributions from higher prices of energy and commodities and interest rate hikes as a percentage of total operating profit. Operating profit is earnings before interest, taxes, depreciation and amortisation (EBITDA). Financial information is available for 60,000 companies with loans in Danish banks. Sole proprietorships are not included. See box 3 for more information on the calculations.
Source: Danmarks Nationalbank, Statistics Denmark, Bisnode and own calculations.

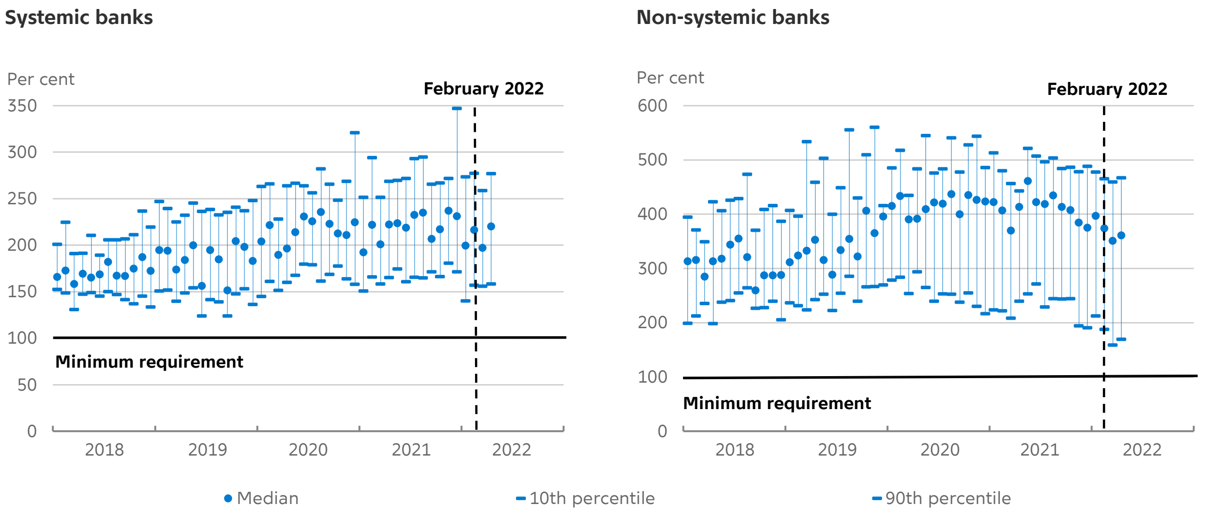
Chart B
Corporate customers use variable rate mortgage loans to a wide extent



Note: Mortgage debt end of 2021, broken down by loan types. The industries are ranked by total outstanding debt, with the highest ranking industry having the largest outstanding debt.
Source: Danmarks Nationalbank.

Banks' short-term liquidity requirement, LCR, remains at a high level

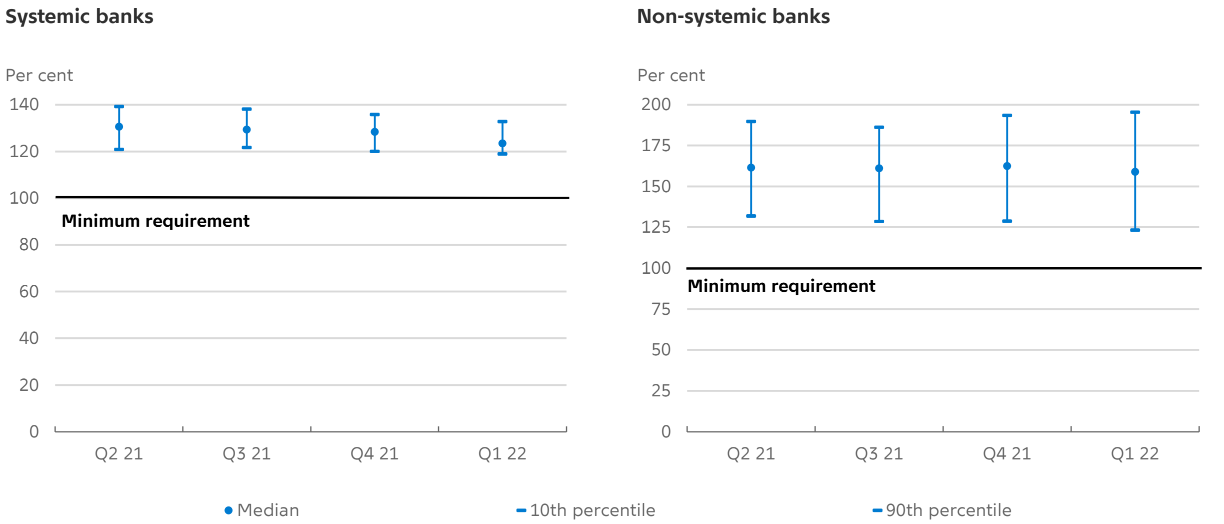
Chart 18



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 end-April 2022.
Source: Danmarks Nationalbank.

Banks meet requirement for Net Stable Funding Ratio (NSFR), with a certain margin

Chart 19



Note: The NSFR is calculated as the banks' stable financing divided by the need for stable financing. The NSFR was to be complied with for the first time for the Danish banks in the 2nd quarter of 2021.
Source: Danmarks Nationalbank.

Banks can meet increased demand for liquidity

The banks meet liquidity coverage ratio and stable funding requirements with a certain margin
The banks meet the requirements for liquidity (Liquidity Coverage Ratio, LCR) and funding (Net Stable Funding Ratio, NSFR[21]) with a certain margin, see chart 18 and chart 19. However, the distance to the minimum requirements varies considerably across the banks.

The liquidity position of the largest banks remains robust
The systemic banks still have a sound liquidity situation. All the systemic banks have a survival horizon with positive excess liquidity of at least five months in Danmarks Nationalbank's sensitivity analysis, where access to the markets is assumed to be closed and the banks thus do not issue new financing. In the scenario, firms and pension and life insurance companies are assumed to have an increased liquidity requirement, which they cover by drawing on their bank facilities.[22]

The liquidity requirement from the banks' customers may, for example, occur as a result of rising interest rates and higher energy and commodity prices.

Danmarks Nationalbank also has a more severe sensitivity analysis, in which deposits fall significantly in addition to access to the markets being closed and facilities to customers increasing. In this scenario, all the systemic banks can handle at least three months of hard stress[23], see chart 20.

It is important, that the banks in their risk management continuously assess their capacity to meet an increasing demand for liquidity from, for example, pension and life insurance companies.[24] Currently, the banks have adequate liquidity buffers to meet an increasing demand for liquidity in the event of interest rate increases.

21 For a more detailed description of the minimum requirement for Net Stable Funding Ratio, NSFR, see box 5 in Danmarks Nationalbank, Increased risks in credit institutions' housing lending, *Danmarks Nationalbank Analysis (Financial Stability)*, no. 28, December 2022 (*link*).

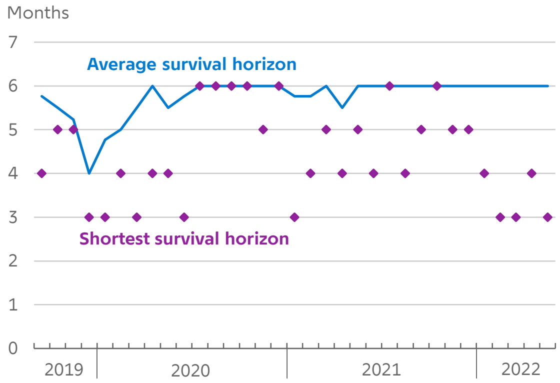
22 Bank facilities are to be understood as credit and liquidity facilities as well as repo facilities.

23 For a method description of Danmarks Nationalbank's sensitivity analysis, see page 26 of Danmarks Nationalbank, Lower excess capital adequacy for the banks, *Danmarks Nationalbank Analysis (Financial Stability)*, no. 25, November 2019 (*link*).

24 The pension and life insurance companies obtain liquidity via, for example, repo lines with Danish and foreign banks as well as centrally cleared repo markets (CCPs).

On average, systemic banks can survive at least six months of hard liquidity stress.

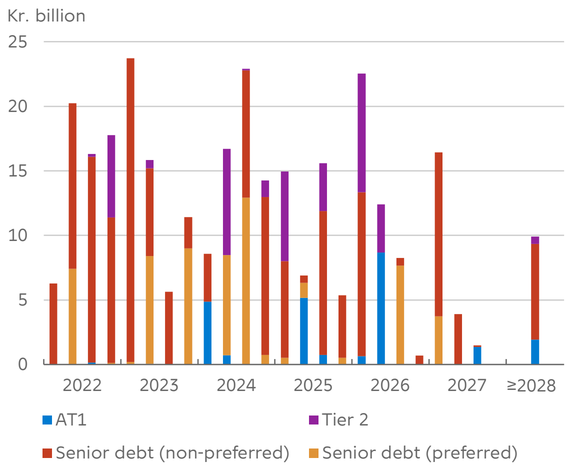
Chart 20



Note: Number of months systemic banks can withstand a hard combined liquidity stress, according to Danmarks Nationalbank's sensitivity analysis. The sensitivity analysis has been prepared based on a 6-month horizon. Not the same bank has the lowest survival horizon every month. The most recent observations are from end-April 2022.
Source: Danmarks Nationalbank.

The banks' maturity profile on capital and debt instruments is evenly distributed in the coming years, and it is important to ensure this going forward

Chart 21



Note: Maturity profile for debt and capital instruments for Danske Bank, DLR, Jyske Bank, Nordea Kredit, Nykredit, Spar Nord, Sydbank and Arbejdernes Landsbank. Debt and capital instruments have been calculated according to when the issuance can no longer count towards compliance with the MREL requirement or debt buffer requirement.
Source: Danmarks Nationalbank.

Hesitant funding markets emphasizes the importance of an even maturity profile

Hesitant funding markets after the Russian invasion of Ukraine underlines why diversification of the banks' debt maturities is important. Large maturity concentrations, both for the individual institution and the sector as a whole, increase the risk of breaches of regulatory requirements in situations with limited market access, where it may be difficult to refinance debt. For the largest institutions, maturities of debt instruments to meet their requirements for eligible liabilities, MREL and buffer requirements[25] are overall evenly distributed in the coming years, see chart 21. However, there are some quarters with large maturities.

It is important that the institutions continue to focus on the maturity profile of their issuances so that they can withstand periods in which access to the markets may be limited.

25 The definition of MREL and buffer requirements is described in more detail in the section *A severe recession will strain some institutions' excess capital*.

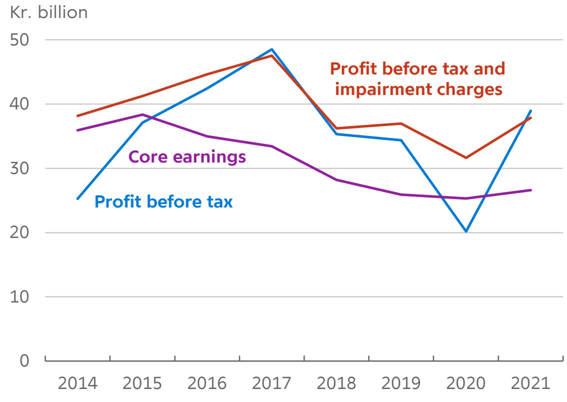
Credit institutions' core earnings have stabilised

High profit and stabilisation in core earnings
The earnings of systemic credit institutions showed progress in 2021 after several years of declining profits, see chart 22. For several institutions, the nominal net profit was historically high. Reversals of impairment charges and high value adjustments contributed to this, but core earnings stabilised as well. Core earnings are a measure of whether the institutions are capable of making a profit on their core business.[26] An increased earnings capacity strengthens the institutions' first line of defence against losses.

The increase in earnings was particularly driven by low impairment charges, and the majority of the institutions booked net reversals og loan impairment charges. The development in impairment charges in 2021 is in contrast with 2020, when the credit institutions booked high impairment charges based on expected losses following the outbreak of covid-19.

Systemic credit institutions' earnings stabilised in 2021

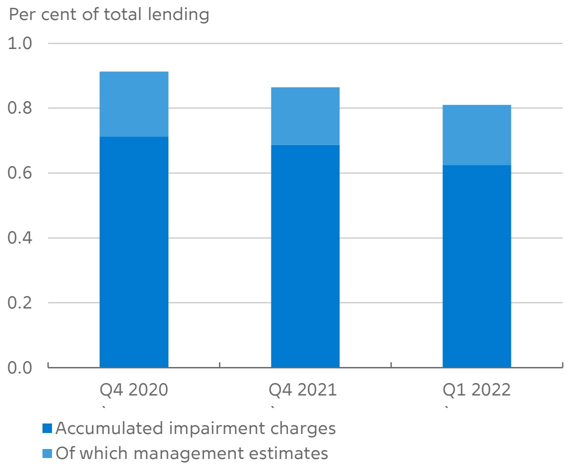
Chart 22



Note: Annual data for systemic credit institutions. Profit before tax has been adjusted for impairments on goodwill.
Source: Danmarks Nationalbank and own calculations.

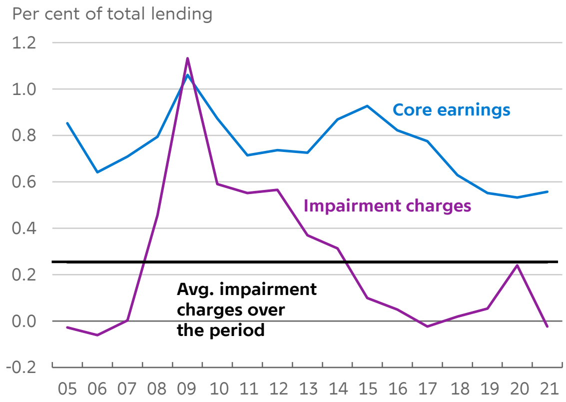
26 Core earnings are here defined as the sum total of net interest income, net fee income and income from administration margins less staff costs and administrative expenses.

Overall management judgements for expected credit losses are unchanged Chart 23



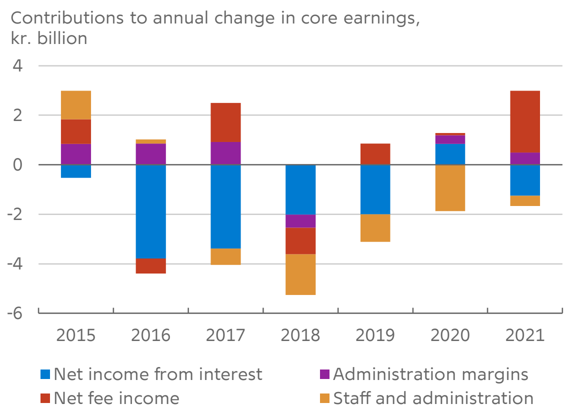
Note: Data for systemic credit institutions, excluding Nordea Kredit and Arbejdernes Landsbank, which do not publish quarterly financial statements. Management judgements related to macroeconomic uncertainties.
Source: Danmarks Nationalbank, published financial statements and own calculations.

Core earnings can absorb higher impairment charges Chart 24



Note: Annual data for systemic credit institutions.
Source: Danmarks Nationalbank and own calculations

Higher net fee income has contributed to stabilisation of core earnings Chart 25



Note: Annual data for systemic credit institutions.
Source: Danmarks Nationalbank and own calculations.

Management judgements for expected credit losses are unchanged overall

The systemic credit institutions' total management judgements for possible credit losses still constitute around 0.2 per cent of total lending, see chart 23. The management judgements provide the institutions with an extra cushion for handling losses on their lending portfolio.

A part of the explanation for the unchanged management judgements in the 1st quarter of 2022 is that previous provisions made due to covid-19 have partially been reversed. Meanwhile, new management judgements have been booked to meet the secondary effects of the war in Ukraine and the high inflation.

Core earnings can absorb higher impairment charges

Seen over an extended number of years, the systemic credit institutions' ability to make money from conventional banking activities has deteriorated. Despite this, core earnings still constitute a sensible first line of defence against losses. This reflects that core earnings continue to exceed the average level of loan impairment charges, see chart 24. In 2021, core earnings could cover loan impairment charges corresponding to just under 0.6 per cent of total lending.

The stabilisation in core earnings is driven by higher fee income

Systemic credit institutions' core earnings stabilised in 2021. The development can primarily be attributed to increased fee income, among other things due to high customer activity related to the housing market, securities trading and asset management, see chart 25.

The decrease in the credit institutions' net interest income continued in 2021, but interest margins in

Denmark show beginning signs of increase.[27] One reason for this is the gradual adjustment of negative deposit rates for household and corporate customers. The adjustment has meant that the deposit margin for corporate customers turned positive in 2021, while it increased to close to zero for household customers. The increasing deposit margin countered a continued decline in lending margin.[28]

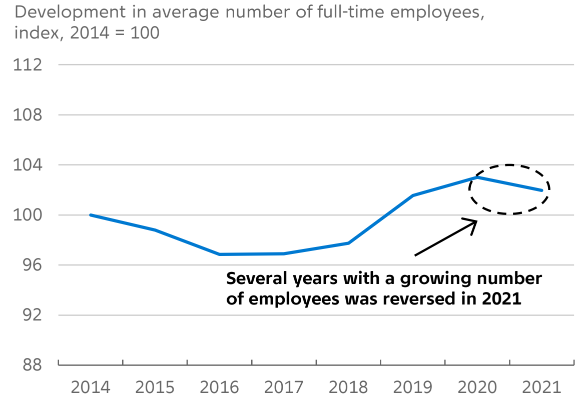
A higher interest rate level may potentially have a positive impact on the institutions' net interest income.[29] A continued growth in bank lending will have the same effect where in particular lending to corporate customers has increased since the 2nd half of 2021.

Despite measures, the level of costs remains high
The systemic credit institutions' staff costs and administrative expenses increased again in 2021. The increase can also be attributed to one-off costs for example large-scale IT projects and restructurings.

Several of the largest banks have initiated cost-cutting initiatives in the form of branch closures and staff cuts in recent years, and a few have completed acquisitions of other banks. Transformation and integration costs may raise the cost level in the short term, while efficiency improvements and synergies may lead to longer term cost savings.

The effect of the cost-cutting measures is reflected in a general decrease in the number of employees in several of the systemic credit institutions in 2021, see chart 26. This contributes to lowering personnel costs. However, the decrease has occurred at varying paces across the institutions.

Number of employees in systemic credit institutions decreased in 2021 Chart 26



Note: Data for systemic credit institutions. Arbejdernes Landsbank is included at institution level, but incl. recognition of Vestjysk Bank.
Source: Danmarks Nationalbank and published financial statements.

Despite cost-cutting initiatives, total costs remain historically high. One explanation for this is increasing compliance and regulatory requirements. A general focus on compliance and risk management is necessary, as the institutions must ensure that the functions can meet their responsibilities. As an example, there is currently a need for ensuring compliance with the sanctions imposed following the war in Ukraine. Inadequate management of these areas may lead to significant costs for the institutions and the sector through, for example, reputational damage and financial losses.

27 Interest margins are defined as the difference between the average lending and deposit rates.

28 The banks' interest margin can be divided into a lending margin and a deposit margin. The lending margin is calculated as the difference between the lending rate and the short-term money market interest rate, while the deposit margin is the difference between the short-term money market interest rate and the deposit rate. The total interest margin is the sum of the lending margin and the deposit margin.

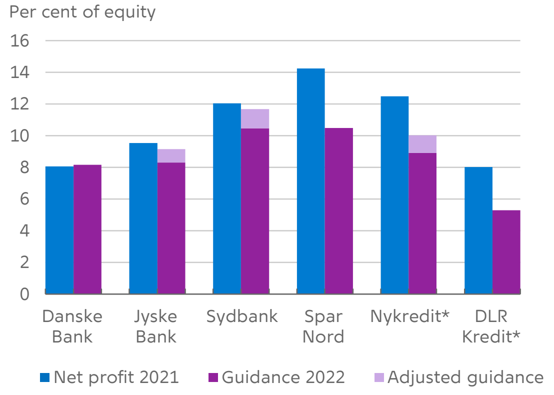
29 See box 4.1, page 46, in Danmarks Nationalbank, Financial Stability 1st half of 2015, *Danmarks Nationalbank Analysis*, June 2015 (*link*) for a detailed description of the correlation between interest rate level, slope of the yield curve and net interest income.

Due to, among other things, increasing regulatory complexity, there are economies of scale in the operation of a bank, and the banks must therefore be expected to explore the possibilities for further consolidation in the coming years.

Several institutions have raised their earnings expectations for 2022

The outbreak of the war in Ukraine has not led to downward changes in the institutions' earnings expectations for 2022. Core earnings of several institutions have shown progress in the 1st quarter of 2022, and several have revised their profit expectations upwards, see chart 27. However, macroeconomic uncertainty has increased the potential outcome of institutions' future earnings.

Several institutions have raised their earnings expectations for 2022 Chart 27



Note: The systemic credit institutions except Nordea Kredit and Arbejdernes Landsbank. Guidance for 2022 is the average of the institutions' expectation range in the financial statements and the latest announcement, respectively. For institutions marked with an *, the net profit for the year and guidance are calculated before tax. The net profit for 2021 and guidance are calculated as a percentage of the shareholders' equity at the end of 2020 and 2021, respectively.

Source: Published financial statements and own calculations.

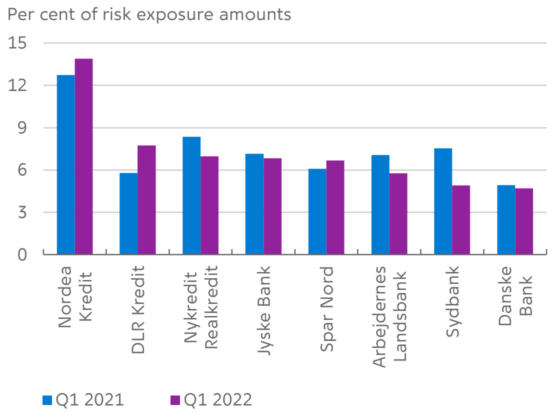
A severe recession will strain some institutions' excess capital

Large differences in excess capital across systemic credit institutions
The excess capital ratios of systemic credit institutions have evolved differently over the past year, and there are still large differences across the institutions' excess capital ratios, see chart 28. The stated excess capital is the distance between the institutions' Common Equity Tier 1, CET1, capital ratio and the share of the total capital requirement that is met by CET1 capital.

For non-systemic banks, the total excess CET1 ratio has been increasing over the past year, and their excess capital is between 7.1 per cent and 9.6 per cent in the beginning of 2022.

The development of the systemic credit institutions' excess capital must be seen in the light of several factors. On the one hand, risk exposure amounts have increased since the end of 2020. Part of the increase is due to the implementation of new EBA guidelines from 2021 on the definition of default[30] as well as new EBA guidelines on the estimation of risk parameters for internal models.[31]

Large spread in excess capital across institutions Chart 28



Note: The excess capital has been calculated as the difference between Common Equity Tier 1 capital and the proportion of the total capital requirement met by Common Equity Tier 1 capital.
Source: Danmarks Nationalbank and own calculations.

30 See European Banking Authority, *Guidelines on the application of the definition of default (link).*

31 See European Banking Authority, *Guidelines on PD estimation, LGD estimation and treatment of defaulted assets (Compliance table) (link).*

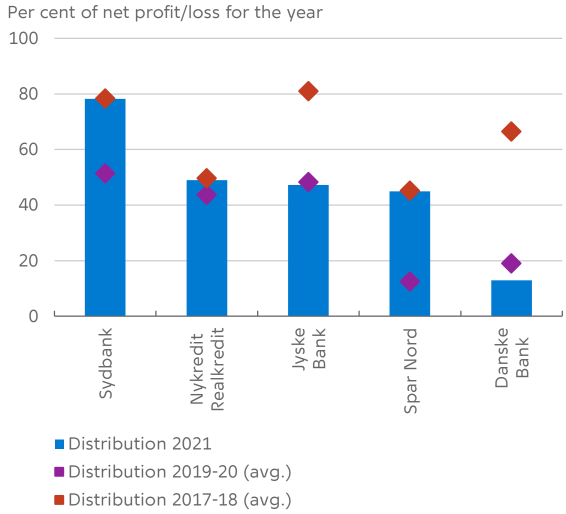
On the other hand, the excess capital has been supported by the reduction in the Pillar II add-on[32] for some systemic credit institutions following the implementation of the new EBA guidelines.

The institutions can improve their capitalisation by issuing more capital instruments or by retaining a larger share of their earnings. In most cases, systemic credit institutions have distributed 50 per cent or less of their profit for 2021 to their shareholders, see chart 29.

It is important that distributions to shareholders in the form of dividends and share buybacks are not made at the expense of a robust capitalisation. The institutions should therefore ensure that they have sufficient capital to withstand macroeconomic stress and meet future capital requirements also after distributions to the shareholders. This also applies in the coming years in which the final capital consequences of new regulation are still unknown, just as there currently is great uncertainty surrounding the extent and duration of the economic consequences of the war in Ukraine.

Total distribution for 2021 generally below 50 per cent

Chart 29



Note: The total distribution consists of ordinary dividend and initiated share buy-back programmes. Nordea Kredit has been excluded as it is a subsidiary of Nordea Bank Abp. DLR Kredit has been excluded as the institution does not distribute dividends.
Source: Annual reports for 2017-2021.

Excess capital for leverage ratio requirement has increased slightly

In parallel with the risk-based capital requirements, all credit institutions must meet a minimum requirement for their Tier 1 capital of 3 per cent of the non-risk-weighted exposures, also called the leverage ratio requirement.[33] Overall, the excess capital for the leverage ratio requirement has been slightly increasing in the past year.

For several systemic credit institutions, the leverage ratio requirement exceeds the risk-based capital requirements. This applies, for example, to Nordea Kredit. For several of the systemic credit institutions, the real excess capital is therefore lower than what the calculations in chart 28 would suggest. When the leverage ratio requirement is higher than the risk-based capital requirement, the usability of capital buffers is limited and they cannot act as a cushion in the event of an economic crisis. The MREL requirement may also limit the actual capital buffer usability.[34] This may potentially limit the expected positive effects of a capital buffer release, see box 5. It is therefore important that a coming revision of the macroprudential legislation addresses this issue and increases buffer usability.

Institutions comply with countercyclical capital buffer requirement

The countercyclical capital buffer is gradually reestablished at 2.5 per cent up to March 2023 following recommendations from the Systemic Risk Council.[35] With their current excess capital, all systemic credit institutions can meet the announced increases in the buffer requirement.

32 The Pillar II add-on covers the risks that are not covered by the minimum requirement of 8 per cent of risk exposure amounts (Pillar I).

33 The leverage ratio requirement came into force in June 2021 and can be seen as a limitation of the capital gain from low risk weights.

34 See Danmarks Nationalbank, Can capital buffers actually help banks in times of crisis?, *Danmarks Nationalbank Analysis*, no. 25, November 2020 (*link*).

35 See press release from the 36th meeting of the Systemic Risk Council (only in Danish) *(link)*.

Revision of macroprudential framework should address key issues

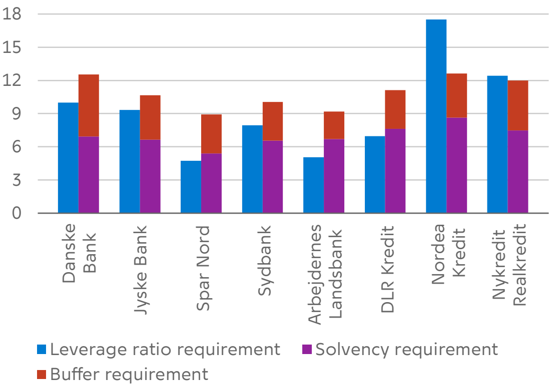
Box 5

As part of the revision of the macroprudential framework, the European Commission has considered whether the existing capital buffer framework is sufficiently effective. Particularly two areas are relevant in a Danish context.

The first area concerns the effective size of capital buffers. Capital buffers must function as a cushion and absorb losses during an economic downturn, so that the institutions can continue lending to the economy. If other requirements, such as the leverage ratio requirement or the MREL requirement, exceed the risk-based capital requirement, the effective size of the buffers is limited, and they cannot act as a cushion. For example, the leverage ratio requirement exceeds that part of the solvency requirement that is met by Common Equity Tier 1 capital for several of the systemic credit institutions, see the chart below. This limits the effective size and usability of the capital buffers. Experience in Denmark from the covid-19 pandemic showed that the release of the countercyclical capital buffer did not result in a corresponding easing of capital requirements for all institutions. This may potentially limit the expected positive effects during a crisis. It is therefore important that a coming revision of the macroprudential framework addresses this issue.

The second area concerns the framework for setting the countercyclical capital buffer. The outbreak of covid-19 in early 2020 was the first time that macroprudential instruments were taken into use during a crisis. The course of events showed that a crisis may occur suddenly and without being related to financial or economic imbalances. It therefore became clear that it is important to have built up a capital buffer of sufficient size that can be released when needed.[1] To ensure this, the countercyclical capital buffer must be built up at an early stage in the financial cycle. It is also important that the build-up of the countercyclical capital buffer is more forward-looking, as systemic risks are difficult to measure, data is often only available with some delay, and systemic risks are therefore not always detected in time. Based on the experience gained during the pandemic, authorities in several countries have revised their method for setting the countercyclical capital buffer. For example, Sweden has announced that, going forward, they will operate with a *positive neutral rate* of 2 per cent for the countercyclical capital buffer. In practice, this means that the activation and build-up of the buffer up to 2 per cent are not directly linked to risk build-up in the financial system.[2] A revision of the macroprudential framework should reflect the lessons learnt from the crisis and the need for early and forward-looking build-up of the countercyclical capital buffer.

Leverage ratio requirement exceeds solvency needs and limits buffer usability for several systemic credit institutions



Note: The chart shows the part of the individual requirements met with Common Equity Tier 1 capital. The combined buffer requirement is the sum of the capital conservation buffer, the O-SII buffer and the countercyclical capital buffer currently in force. The leverage ratio requirement has been converted into a percentage of the risk-weighted exposures, see box 1 in Danmarks Nationalbank, Can capital buffers actually help banks in times of crisis?, *Danmarks Nationalbank Analysis*, no. 25, November 2020 (*link*) for a description of the method.
Source: Credit institutions' risk reports and own calculations.

1. Many countries had not built up a countercyclical capital buffer and therefore had to ease other capital requirements.
2. See memorandum from Finansinspektionen (the Swedish Financial Supervisory Authority): *Finansinspektionen's approach to setting the countercyclical capital buffer* from 22 March 2022 (*link*).

An increase in the countercyclical capital buffer rate in Denmark from 0 per cent to 2.5 per cent will match an increase in the total capital requirement for the systemic credit institutions of approximately kr. 36 billion in 2023.[36] In comparison, the total excess capital of the systemic credit institutions was just over kr. 112 billion at the end of the 1st quarter of 2022.

For the non-systemic banks, the buffer requirement will increase by approximately kr. 3.7 billion as a result of the reestablishment of the countercyclical capital buffer, whereas their total excess capital was approximately kr. 12 billion at the beginning of 2022.

Some systemic credit institutions are close to breaching buffer requirements under stress
To assess the financial sector's current capitalisation and ability to absorb losses, Danmarks Nationalbank conducts a stress test of the systemic credit institutions and non-systemic banks every six months.[37] In the stress test, Danmarks Nationalbank examines whether the institutions keep a sufficient distance to the capital requirements in a baseline scenario, in a scenario with a significant interest rate increase, rising inflation and low economic growth (the interest rate scenario) as well as in a severe recession scenario, see box 6 and appendix 2.

The stress test shows that both systemic credit institutions and non-systemic banks can cope with the interest rate scenario without breaching the risk-based capital buffer requirements. In the interest rate scenario, low economic growth results in greater losses for the institutions than in the baseline scenario, while increasing net interest income due to interest rate increases conversely contributes positively to the institutions' earnings.

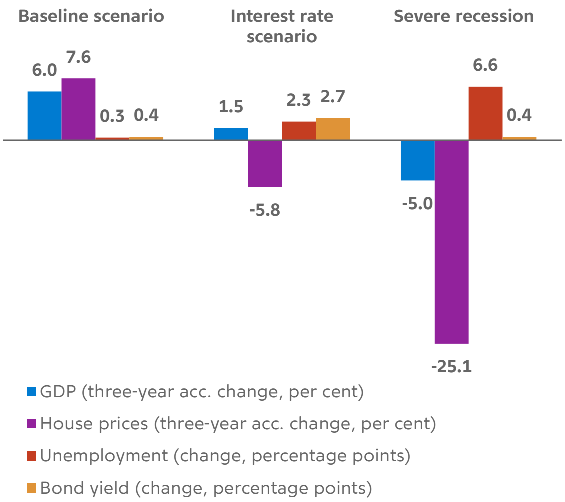
There is a great difference in how systemic credit institutions and non-systemic banks cope with the severe recession scenario. All the non-systemic banks are well above the combined capital buffer requirement in a severe recession scenario. The majority of

Macroeconomic scenarios in the stress test Box 6

The three scenarios of the stress test consist of 1) a baseline scenario that follows Danmarks Nationalbank's latest projection, 2) a scenario with a marked interest rate increase, rising inflation and low economic growth (the interest rate scenario) and 3) a scenario in which the Danish economy is hit by a severe recession. In both the interest rate scenario and the severe recession scenario, the macroeconomic downturn hits the economy in the second half of 2022.

The interest rate scenario reflects a situation with an increase in interest rates abroad and in Denmark of 3 percentage points over the entire yield curve relative to the baseline scenario as well as rising inflation caused by energy price increases, among other factors. The interest rate increase dampens growth in both Denmark and abroad. The lower demand abroad reduces Danish exports. The accumulated GDP growth is reduced to 1.5 per cent over a three-year period compared with 6 per cent in the baseline scenario.

In the severe recession scenario, a global crisis hits the world economy, and the Danish economy experiences a severe economic downturn. GDP drops by 5 per cent over a three-year period, while the unemployment rate increases by 6.6 percentage points from 2022 to 2024. Finally, house prices fall by over 25 per cent over three years. See appendix 2 for a further description of the scenarios.



Note: The change in the bond yield indicates the change in the average bond yield (per cent p.a.). The numbers have been calculated based on the annual average.
Source: MONA and own calculations.

36 Also taking into account the most recently announced increases in the Norwegian and Swedish countercyclical buffer rate to 2.5 per cent and 1 per cent, respectively, as announced by Norges Bank *(link)*, the total capital requirement for the systemic institutions will increase by approximately kr. 39 billion in 2023.

37 See appendix 1 for an overview of the institutions that constitute the stress test population.

the systemic credit institutions also have sufficient capital to withstand the severe recession scenario, but, unlike the non-systemic banks, some come close to breaching the combined capital buffer requirement, see chart 30. Institutions that come close to breaching the combined capital buffer requirement in a severe recession should take this into account when determining their distribution of dividends.

The results are roughly similar to the results in the latest stress test. This is largely due to the institutions' excess capital being virtually unchanged in the 2nd half of 2021 and to the hardness of the scenarios in this stress test not differing significantly from the stress test conducted in the autumn.

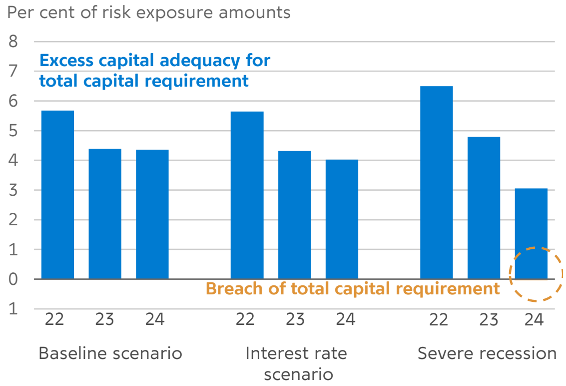
If an institution fails to meet its combined capital buffer requirement, a number of restrictions will be imposed, for example in relation to dividend payments and payment of coupon rates on hybrid capital instruments.[38] The institution must also submit a capital conservation plan to the Danish Financial Supervisory Authority and take capital buffer restoration measures. This could make it difficult for the institution to acquire external financing in the financial markets at a time when obtaining financing is already difficult.

Some institutions have low excess capital relative to MREL and buffer requirements

Concurrently with the capital buffer requirements, the institutions must also meet an aggregate requirement for their eligible liabilities, MREL and buffer requirements.[39] The excess capital relative to the MREL and buffer requirements is on average over 3 per cent of the risk exposure amounts for the systemic credit institutions in the 1st quarter of 2022, see chart 31.

Some systemic institutions come close to buffer requirements in severe recession scenario

Chart 30

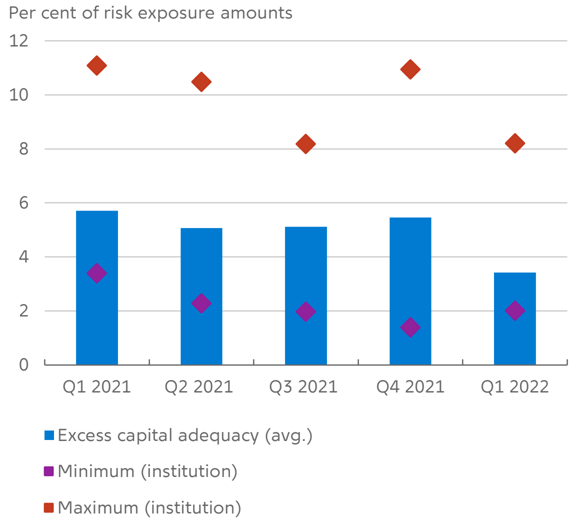


Note: The chart shows the excess capital or capital shortfall of the systemic credit institutions that either have excess capital or a capital shortfall as a percentage of their total risk exposure amounts. The reduction of the institutions' excess capital in the baseline scenario is due to a number of factors, including that the stress test takes into account expectations for the build-up of the countercyclical capital buffer. The countercyclical capital buffer is assumed to be released in the severe recession scenario.

Source: Danmarks Nationalbank and own calculations.

Some institutions have low excess capital relative to total MREL and buffer requirements

Chart 31



Note: The chart shows the average excess capital relative to total MREL and buffer requirements in each quarter as well as the excess capital of the institution with the lowest and highest excess capital.

Source: Danmarks Nationalbank and own calculations.

38 Hybrid capital instruments are money that the bank has borrowed from other investors on special terms. For example, the loan does not have an expiry date, and the owners of the capital (the investors) may risk losing the investment in full or in part if the bank is in a situation in which it does not meet the capital requirements.

39 The MREL and buffer requirements cover the bank's MREL and buffer requirements together with the mortgage credit institution's capital and debt buffer requirements. From 1 January 2022, a possible increase in the debt buffer requirement as a result of the 8 per cent requirement for groups with mortgage credit institutions will also be included. The MREL and buffer requirement is a requirement for the institution's eligible liabilities aimed at ensuring that the institution has sufficient funds to absorb losses and recapitalise the institution, if necessary, in a crisis situation. See also Danmarks Nationalbank, Banks should keep their powder dry, *Danmarks Nationalbank Analysis (Financial Stability)*, no. 28, December 2020 (*link*), for further information on MREL and capital requirements.

The variation in excess capital ratios across institutions remains significant, and some institutions have an excess capital ratio of only 2 per cent. From 1 January 2022, groups with mortgage credit institutions must also meet the minimum requirement of 8 per cent of the group's liabilities. The total excess capital decreased by approximately kr. 16 billion as a result of the new requirement.

The requirements for the total MREL funds will increase towards the beginning of 2023 in connection with the rapid reestablishment of the countercyclical buffer.

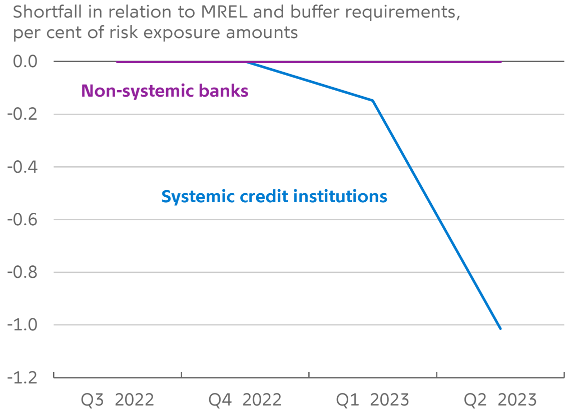
Some institutions cannot meet MREL and buffer requirements during a period with market turbulence

During periods with uncertainty in the financial markets where refinancing of expired issuances may be difficult, the institutions must still be able to meet their MREL and buffer requirements.

The stress test of the institutions' ability to meet the MREL and buffer requirement shows that some systemic credit institutions cannot meet the MREL and buffer requirement during a one-year period with stress and limited possibility of issuing new debt instruments, see chart 32.[40] The results underline how important it is that the institutions ensure during good times, that they have a robust excess capital relative to the MREL and buffer requirement, as well as an even maturity profile and long maturity on their issuances.

If an institution breaches the MREL and buffer requirement, the Danish Financial Supervisory Authority will, as a general rule, require the institution to implement measures to ensure that the institution can again meet the MREL and buffer requirement. The necessary measures will depend on the nature of the breach, but they may include the injection of new capital, divestment of assets or seeking out potential buyers with a view to a merger. Measures that may be both difficult and costly in times of market turbulence. In the worst-case scenario, control of the institution may be transferred to Finansiel Stabilitet for resolution.[41]

Some systemic credit institutions are challenged by MREL and buffer requirements under stress Chart 32



Note: The shortfall in relation to the MREL and buffer requirements is defined as the amount by which the institutions (systemic and non-systemic, respectively) fall short of meeting the MREL and buffer requirements, divided by their total risk exposure amounts. The shortfall reflects both the maturity of existing issuances and capital loss due to stress. The institutions' MREL funds and their maturity profile have been estimated on the basis of data provided by the Danish Financial Supervisory Authority.

Source: The Danish Financial Supervisory Authority and own calculations.

The non-systemic banks mainly meet their MREL requirement with equity and can therefore better withstand a one-year period with limited market access. If the period with limited market access is extended to 2024, the non-systemic banks may have difficulties meeting the MREL requirement in the severe recession scenario as their equity is reduced by losses.

The EU Commission's banking package is estimated to cause less increase in capital requirements than previous assessments

An important part of the institutions' capital planning consists in ensuring enough capital headroom

40 The institutions are not assumed to be able to issue new debt instruments in the period from the 2nd half of 2022 up to and including the 1st half of 2023.

41 For further information about the consequences of a breach of MREL and buffer requirements, see memo from the Danish Financial Supervisory Authority '*Reaction pattern following breach of MREL' (link)* of 30 October 2017.

to cover future capital requirements. In the coming years, especially the banking package published by the European Commission in October 2021 will have an impact on the institutions' capital planning. The banking package proposes a revision of the European Capital Requirements Regulation (CRR) and the Capital Requirements Directive (CRD).[42]

The overall aim of the banking package is the implementation of the final Basel III standards. The proposed amendments have not been finally adopted and the consequences of the banking package therefore remain uncertain.

The banking package contains a large number of adjustments to the current legislation. There has especially been focus on the introduction of an output floor requirement for risk-weighted exposures. If lower risks can be documented by use of internal models, a reduction of capital requirements in relation to the standardised approach is achieved. The output floor requirement may limit this reduction.[43]

The EU implementation allows for lower risk weighting of housing loans as well as of loans to non-rated corporates if a number of conditions have been met. The more lenient risk weighting is a temporary provision that will be phased out gradually in the period 2029-2032, but with the possibility of an extension.

The Commission's proposal contains also measures aimed at increasing the credibility of the institutions' internal models by e.g. limiting the use of the banks' own statistical methods to calculate capital requirements for portfolios with an insufficient data basis. The Commission's proposal also includes changes to the standardised approach to calculating capital requirements. The changes increase the risk sensitivity of a bank's risk-weighted exposures, as a more granular approach is used in the determination of risk weights for different types of exposures.

Although higher capital requirements for European institutions are not a goal of the banking package, the proposed rules appear to indicate an increase for the largest Danish credit institutions. A rough assessment indicates that risk-weighted exposures may increase between kr. 160-330 billion when the output floor is fully phased in, depending on whether the transitional provisions expire or are extended.

Overall, the CET1 capital requirement is assessed to increase by kr. 20-40 billion. The outputfloor alone is assessed to lead to an increase in requirements of kr. 5-25 billion.

However, the effects differs widely across the individual credit institutions. The effect will depend on the specific portfolio composition and on how large the differences are between the risk weights based on the internal models and the new standardised approach.

It should be noted that the estimated effects are based on a number of assumptions, see also box 7. For example, any Pillar II add-ons to address model risks are not taken into account. In practice, the Pillar II add-on may be revised downwards after the implementation of the banking package. This will entail a lower effect than the estimates presented here.

The effects are significantly lower than previous assessments of the effect of the Basel Committee's recommendations.[44] This is due to a number of factors.

The current assessment is based on the institutions' risk-weighted exposures in the first quarter of 2022 after implementation of the new EBA guidelines for estimation of risk parameters for use in internal models. The implementation of the guidelines means an increase in the risk-weighted exposures and thus a lower effect of the banking package.

42 The European Commission, *Banking package* (*link*).

43 For credit institutions using internal models, an output floor is introduced corresponding to 72.5 per cent of the total risk-weighted exposures calculated under the standard methods. See Danmarks Nationalbank, Increased risks in credit institutions' housing lending, *Danmarks Nationalbank Analysis (Financial Stability),* no. 28, December 2021 (*link*) for a more detailed description of the main elements in the European Commission's proposal for the Capital Requirements Scheme and Directive, including the overall output floor requirement.

44 See, for example, *Effects of the Basel Committee's recommendations for capital requirements for credit institutions*, February 2018 (only in Danish) (*link*), Copenhagen Economics, *Impact of final Basel III in Denmark*, 31 May 2021 (*link*) and Copenhagen Economics, *The final Basel III standard and the Danish mortgage sector*, 25 January 2022 (*link*).

The current implementation proposal envisages an overall output floor requirement for risk-weighted exposures at the group level. The assessment is therefore based on group considerations and not the effects on individual institutions or portfolios. This is of particular importance to the expected effect on groups comprising both a bank and a mortgage credit institution. The average risk weights of banks are generally higher than those of mortgage credit institutions. If the assessment is based on the effects for mortgage credit institutions in isolation, it will disregard that the banks' balance sheets will pull towards higher risk weights and hence a lower effect of the output floor requirement. The effect of the banking package will therefore be overestimated.

Taking only the effects of the banking package into account, Danmarks Nationalbank's assessment is that the largest Danish institutions can meet the increase in the capital requirements in the coming years.

Danmarks Nationalbank assesses that the presented amendment proposals will ensure a reasonable implementation of the Basel standards. The proposal is in accordance with the overall framework in Basel III, but it also contains meaningful adjustments to EU-specific conditions.

Some elements of the Commission's proposal may potentially be inexpedient from a Danish perspective. One example is the upcoming rules on market risk (Fundamental Review of the Trading Book (FRTB)), where foreign banks' exposures in Danish kroner are treated harder than similar exposures in euro. In addition, foreign banks will have to hold more capital for an investment in Danish bonds than a corresponding investment by Danish banks. This could potentially lead to foreign banks reducing their exposures in Danish bonds with a resulting deterioration in market liquidity in especially the Danish bond market.

Effects of banking package on credit institutions' risk-based capital requirements – how we proceeded Box 7

Danmarks Nationalbank has assessed the effects of the banking package for the capital requirements of Danish banks, based on the Danish institutions' own estimates of the increases in risk-weighted exposures, as reported to the EBA based on data for the end of 2020. The data reported to EBA does not take into account the transitional provisions proposed by the Commission allowing lower risk weighting of housing loans and loans to unrated corporates. The effect of these EU-specific provisions is assessed based on data from the credit registry.

The assessment is based on the fully phased-in banking package as well as the expiry of the EU-specific transitional provisions for housing loans and unrated corporates by the end of 2022. This is then compared to the size of the institutions' risk-weighted exposures and capital requirements in the 1st quarter of 2022.

It is assumed that the nominal value of the banks' Pillar II add-on will remain unchanged. In addition, a fully phased-in countercyclical capital buffer of 2.5 per cent is assumed throughout the period.

The estimates are based solely on the risk-based capital requirements. Any interaction with other parallel requirements, such as the leverage ratio requirement and the MREL requirement, has thus not been taken into account, see also box 5.

Appendix 1: Analysis data

The analysis applies the term ‘credit institutions’ when referring to the activities of both banks and mortgage credit institutions at the group level. The term ‘bank’ refers specifically to entities carrying out banking activities. These institutions are listed in table 1.

The analysis of Danish credit institutions’ earnings, liquidity and own funds as well as the stress test comprise eight systemic credit institutions designated by the Danish Financial Supervisory Authority in 2021. In June 2021, Arbejdernes Landsbank was designated as a systemic credit institution by the Danish Financial Supervisory Authority after it had acquired a majority shareholding in Vestjysk Bank. Vestjysk Bank is therefore included under Arbejdernes Landsbank in the analysis. The analysis and stress test also include the non-systemic banks. This group consists of the institutions in group 2 defined by the Danish Financial Supervisory Authority for 2021, with the exception of Saxo Bank and Arbejdernes Landsbank. Saxo Bank has been omitted due to the bank’s business model. Arbejdernes Landsbank has been omitted due to its designation as systemically important. 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 Handelsbanken and Santander Consumer Bank.

Institutions in the analysis by total assets as at 31 December 2021. kr. million Table 1

Systemic credit institutions	Kr. million
Danske Bank	3,935,834
Nykredit Realkredit	1,673,473
Jyske Bank	647,122
Nordea Kredit	481,015
DLR Kredit	183,871
Sydbank	168,185
Spar Nord	116,535
Arbejdernes Landsbank	107,461
Total systemic credit institutions	7,313,497

Systemic banks	
Danske Bank	2,363,271
Jyske Bank	314,880
Nykredit Bank	214,714
Sydbank	170,257
Spar Nord	116,626
Arbejdernes Landsbank	107,461
Total systemic banks	3,287,209

Non-systemic banks	
Ringkjøbing Landbobank	60,357
Sparekassen Danmark	55,179
Sparekassen Kronjylland	35,525
Sparekassen Sjælland-Fyn A/S	28,076
Lån & Spar Bank	27,741
Middelfart Sparekasse	17,282
Total non-systemic banks	224,160

Mortgage credit institutions	
Nykredit Realkredit	1,590,464
Realkredit Danmark	876,959
Nordea Kredit	481,015
Jyske Realkredit	369,035
DLR Kredit	183,871
Total mortgage credit institutions	3,501,344

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.

Appendix 2: Stress test scenarios

The stress test is based on three scenarios for the macroeconomic development in Denmark over the period 2022-2024. The three scenarios consist of 1) a baseline scenario that follows Danmarks Nationalbank's latest projection[45], 2) a scenario with rising interest rates and inflation as well as low economic growth (the interest rate scenario) and 3) a severe recession scenario in which the Danish economy is hit by a downturn in the 3rd quarter of 2022. See table below for selected key figures for the three scenarios.

In the interest rate scenario, Denmark and foreign countries experience an interest rate increase of 3 percentage points over the entire yield curve relative to the baseline scenario. The dampening effect of the interest rate increase on growth in the Danish economy is reinforced by interest rate increases abroad reducing Danish export market growth. Overall, GDP is reduced by 4.3 per cent relative to the baseline scenario. At the same time, the unemployment rate increases by 2.3 percentage points over three years.

The severe recession is based on a global downturn in which Danish export market growth falls, which reduces GDP and increases unemployment. In the recession scenario, GDP falls by approximately 5 per cent and is just over 10 per cent lower in 2024 than in the baseline scenario. Concurrently, the unemployment rate rises by 6.6 percentage points over a three-year period. In addition, housing prices fall sharply by over 25 per cent and are on a par with housing prices in 2015 at the end of the recession.

Danmarks Nationalbank's method for preparing the severe recession scenario is based on the previous macroeconomic development. For example, this means that there is harder stress after a period with marked growth in the economy. The method focuses especially on the development in GDP, unemployment and housing prices. For each of these variables, a systematic approach is applied to determine their rate of increase (unemployment) or decrease (GDP growth and housing prices) over the timeframe covered by the scenarios.[46] How much the individual variables are to increase or decrease is known as benchmarks in the stress test.

The benchmarks for the three variables are calculated independently of each other. However, it is possible that the actual development in the key variables deviates slightly from the benchmarks, as the relation of the variables is determined by Danmarks Nationalbank's economic model, MONA. In the scenarios, the variables therefore cannot just follow any development, but must evolve consistently with their interrelationship in MONA.

The benchmarks in this stress test are generally on a par with or slightly above the benchmarks in the stress test conducted in the autumn. The reason for this is that the basis for the Danish economy and thus the basic assumptions for the calculation of the benchmarks have improved since the latest stress test. In the severe recession scenario, the development in GDP and unemployment follow the benchmarks.[47]

The decrease in housing prices has increased relative to the benchmark to reflect the significant uncertainty in the housing market in the stress test scenarios.

45 Danmarks Nationalbank, War in Ukraine dampens growth and increases inflation, *Danmarks Nationalbank Analysis (Outlook for the Danish economy),* no. 5, March 2022 (*link*).

46 The scenarios are developed in cooperation with the Danish Financial Supervisory Authority. 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*).

47 The impact of the coronavirus pandemic on GDP in the 2nd quarter of 2020 has been taken into account in the calculation of the GDP benchmark. The correction reduces the size of the benchmark, and thus indicates a lower drop in GDP.

Selected key figures in Danmarks Nationalbank's stress test scenarios Table 2

	Baseline scenario	Interest rate scenario	Severe recession
2022			
GDP, per cent year-on-year	2.1	1.5	1.2
Private consumption, per cent year-on-year	2.3	0.9	1.1
Export market growth, per cent year-on-year	3.8	3.0	2.1
Housing prices, per cent year-on-year	3.6	5.1	-1.1
Gross unemployment, per cent of labour force	2.1	2.3	2.4
Average bond yield, per cent p.a.	1.0	1.7	1.0
2023			
GDP, per cent year-on-year	2.1	-0.1	-5.8
Private consumption, per cent year-on-year	1.9	-2.9	-9.0
Export market growth, per cent year-on-year	3.9	-0.4	-10.1
Housing prices, per cent year-on-year	1.7	-0.9	-20.3
Gross unemployment, per cent of labour force	2.3	3.3	5.7
Average bond yield, per cent p.a.	1.2	4.2	1.2
2024			
GDP, per cent year-on-year	1.7	0.1	-0.4
Private consumption, per cent year-on-year	1.8	-2.6	-2.3
Export market growth, per cent year-on-year	3.2	1.2	-3.3
Housing prices, per cent year-on-year	2.1	-9.6	-5.0
Gross unemployment, per cent of labour force	2.4	4.6	9.0
Average bond yield, per cent p.a.	1.4	4.4	1.4
Accumulated change			
GDP, three-year cumulative change per cent	6.0	1.5	-5.0
Housing prices, three-year cumulative change per cent	7.6	-5.8	-25.1

Note: Annual averages. House prices are cash prices of single-family houses. It should be noted that rounding may mean that the stated accumulated growth does not necessarily correspond to the cumulative growth that can be calculated based on the numbers in the table.

PUBLICATIONS

NEWS

News offers quick and accessible insight into an Analysis, an Economic Memo, a Working Paper or a Report from Danmarks Nationalbank. News is published continuously.

ANALYSIS

Analyses from Danmarks Nationalbank focus on economic and financial matters. Some Analyses are published at regular intervals, e.g. *Outlook for the Danish economy* and *Financial stability*. Other Analyses are published continuously.

REPORT

Reports comprise recurring reports and reviews of the functioning of Danmarks Nationalbank and include, for instance, the *Annual report* and the annual publication *Danish government borrowing and debt*.

ECONOMIC MEMO

An Economic Memo is a cross between an Analysis and a Working Paper and often shows the ongoing study of the authors. The publication series is primarily aimed at professionals. Economic Memos are published continuously.

WORKING PAPER

Working Papers present research projects by economists in Danmarks Nationalbank and their associates. The series is primarily targeted at professionals and people with an interest in academia. Working Papers are published continuously.

The analysis consists of a Danish and an English version. In case of doubt regarding the correctness of the translation the Danish version is considered to be binding.

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FINANCIAL STABILITY – 2ND HALF 2022

Turbulent times call for a focus on risk management

Large fluctuations in financial markets

The financial markets are characterised by high inflation, higher interest rates and considerable volatility. This has deteriorated market liquidity and requires a stronger focus on liquidity management throughout the financial sector.

Expectation of higher credit losses in the coming time

Higher interest rates and inflation, as well as the prevalence of risky loan types, increase the risk of defaulting loans. Combined with declining property prices, this will lead to credit losses in banks.

Severe recession will challenge some institutions' excess capital adequacy

Danmarks Nationalbank's stress test shows that some systemically important credit institutions will come close to breaching the capital buffer requirements in a severe recession. The weakened economic outlook underlines the need for prudence in the institutions' capital planning.

CONTENTS

Summary and assessment

FINANCIAL MARKETS

Prospects of reduced economic growth and higher inflation and interest rates
After a long period of low interest rates and solid global economic growth, there are signs of an economic dampening, both globally and in Denmark. Supply chain disruptions, rising energy prices and demand pressures have led to high inflation, prompting central banks worldwide to tighten monetary policy.

Financial stress across submarkets
Financial markets have seen increased stress levels. Interest rate hikes and increased volatility have caused extensive losses in the bond markets and have increased collateral requirements in derivatives markets. This was felt, in particular, in the UK in September, where parts of the British pension sector faced major challenges. Danish pension companies have a sufficient amount of highly liquid assets to handle a larger interest rate hike. It is less likely that we will see a similar scenario in the Danish pension sector.

HOUSING CREDIT

Declining house prices increase risk of technical insolvency
With the expected decline in house prices in Danmarks Nationalbank's latest projection, one in ten homeowners who bought their home since the beginning of 2021 will end up with a housing debt that exceeds the value of their home in 2023. First-time buyers are at greatest risk of becoming technically insolvent.

Risky loan types are on the rise
More homeowners are taking out variable-rate mortgage loans, and an increasing proportion of those are with deferred amortisation. Highly indebted homeowners with this type of loan are particularly vulnerable to house price falls and higher interest rates. It is therefore of the essence that these homeowners have a robust economy to withstand interest rate increases. In this context, it is important that the credit institutions continue to perform thorough credit evaluations.

Rising costs challenge some homeowners
Low-income homeowners are particularly challenged by higher heating costs and interest expenses, but lending to this segment represents a small part of total lending. Rising prices of other consumer goods, including electricity, are adding further to homeowners' expenses. This makes homeowners vulnerable to unemployment and increases the risk of loan defaults. Combined with declining house prices, more loan defaults will lead to credit losses for the banks.

CORPORATE CREDIT

Small businesses less resilient and more exposed to rising prices and interest rates
As a result of rising consumer prices, households are expected to reduce their consumption. This can put pressure on cyclically sensitive businesses, which are already struggling with rising costs. Particularly at risk are small businesses, which are generally less robust. This will likely result in losses for medium-sized banks that have pronounced exposures to this segment.

Letting businesses have caused significant losses in the past
Just as it was the case in the period leading up to the financial crisis, credit institutions have pronounced exposures to letting businesses whose main activity is the letting of residential and business properties. However, lending growth has not reached the same high level, and letting businesses appear more resilient to losses. However, higher interest rates and falling earnings will significantly diminish the debt service capacity of some of them.

LIQUIDITY AND FUNDING

Raising liquidity is more expensive
Currently, banks have reasonable liquidity buffers, but raising liquidity via the market has become more expensive. This follows a long period of liquidity being readily available and with lower prices. The situation in the financial markets and the real economy shows that the demand for liquidity from banks' customers can change rapidly. The changed market conditions for obtaining liquidity mean that

banks now need to be more prepared for increasing liquidity needs and loan demand from their customers than they used to.

Pension and life insurance companies need to focus on number of repo counterparties
Due to volatile markets and higher interest rates, pension and life insurance companies have seen increasing needs for liquidity to pay variation margins on their derivatives contracts. They have only limited cash holdings, and some have only one or a few repo counterparties to provide liquidity. It is important that these companies focus on securing a sufficient number of repo counterparties.

EARNINGS

Higher interest rates increase net interest income
The profit before tax decreased for systemic credit institutions in 2022. Negative value adjustments contributed to the decline. On the other hand, there are early signs of increases in core earnings, resulting from, among other things, higher net interest income. Higher interest rates are expected to further increase net interest income, strengthening the institutions' resilience against credit losses.

Weakened macroeconomic conditions may increase impairment charges
Low impairment charges continue to support earnings. Higher interest rates, high inflation and the prospect of an economic dampening are expected to worsen some customers' debt service capacity, creating a risk that institutions will have to recognise further impairment charges. Part of the effect may already be reflected in existing impairment charges, including management estimates.

CAPITAL AND STRESS TESTS

Important for credit institutions to ensure sufficient excess capital adequacy relative to total MREL
The maturity of senior debt over the coming quarters will reduce the banks' excess capital adequacy relative to the MREL. It is problematic if, in order to meet the requirement, banks depend on market access within a short period of time. This should be avoided by building up sufficient excess capital relative to the requirement and ensuring a sufficiently long maturity profile on senior issuances.

Severe recession will challenge some institutions' excess capital adequacy
The weakened economic outlook requires banks to exercise further caution in their capital planning. In Danmarks Nationalbank's stress test, some systemic credit institutions come close to breaching the capital buffer requirements in a severe recession. They therefore need their current excess capital to withstand stress. The uncertainties surrounding the European Commission's banking package underline the need for banks to exercise further caution.

CLIMATE

Institutions must address climate-related risks
Climate change and the consequences of the green transition have the potential to affect financial stability. Climate-related financial risks need to be addressed in line with other risks. Therefore, institutions must develop capacity to identify and analyse possible risks and their potential consequences.

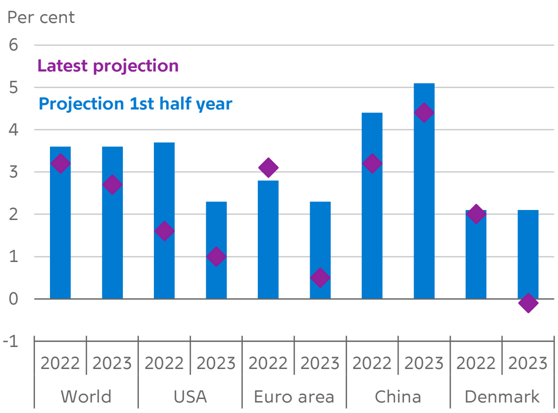
Homeowners will often be able to improve their energy label with profitable renovations
The EU Commission has proposed new energy renovations for the least energy efficient properties. In Denmark, homeowners will often be able to improve their energy label by means of profitable renovations. Homeowners' focus on housing energy consumption may lead to energy efficiency becoming a more integrated part of housing market pricing.

Large fluctuations in financial markets

Prospects of global economic dampening
After a long period of low interest rates and sizeable economic growth, there are signs of an economic dampening, both globally and in Denmark. Accordingly, the growth outlook has been revised downwards in the latest forecasts from the International Monetary Fund (the IMF) and Danmarks Nationalbank, see chart 1. In Denmark, the economic dampening comes after a strong economic recovery last year, which sent Denmark into an economic boom.

High inflation has weakened consumers' purchasing power
Inflation has been rising sharply for much of 2021 and throughout 2022, and core inflation[1] in the euro area and Denmark has picked up in the past year, see chart 2. This shows that price pressures are driven not only by higher energy and food prices, as a consequence of supply disruptions in the wake of the pandemic and the war in Ukraine, but also by strong demand pressures. The European Central Bank (ECB) expects inflation in the euro area to decline in 2023 and to fall to levels around the inflation target of 2 per cent in 2024. Wages in Europe have not risen at the same rate as inflation, which has reduced the purchasing power of consumers.

Growth prospects have been revised downwards in global economy and in Denmark Chart 1

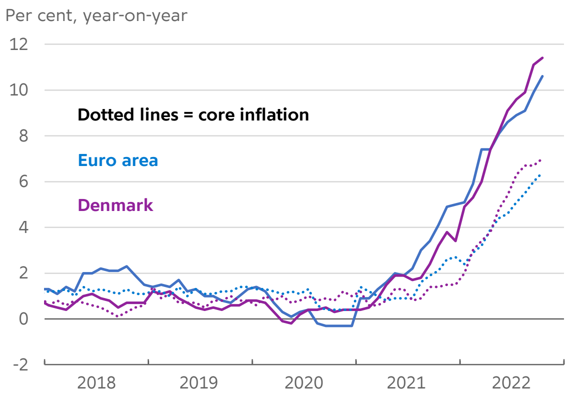


Note: The IMF's estimate for the world is based on exchange rates. The IMF's estimates are from April and October 2022. GDP growth in Denmark is based on Danmarks Nationalbank's projections from March and September 2022.
Source: IMF and Danmarks Nationalbank.

1 For the euro area and Denmark, core inflation is calculated as consumer prices excluding energy and unprocessed food.

Inflation has increased to a very high level

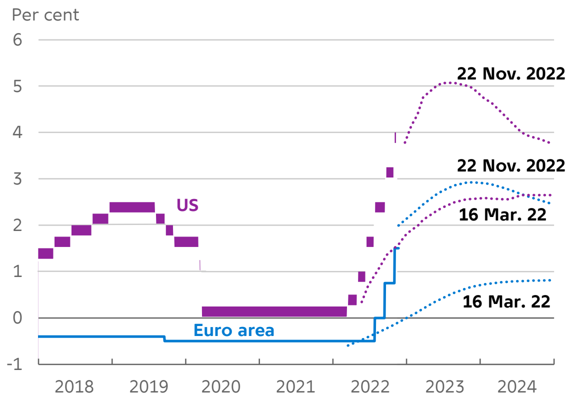
Chart 2



Note: Development in inflation and core inflation in the euro area and Denmark. The most recent observations are from 1 October 2022.
Source: Macrobond.

Prospect of further interest rate increases

Chart 3



Note: Dashed lines indicate market-implicit expectations for money market interest rates in the USA and the euro area on the indicated date.
Source: Macrobond, Scanrate Rio and Danmarks Nationalbank.

Central banks are tightening monetary policy considerably

The high inflation rate has led central banks around the world to significantly increase their key interest rates. The tightening of monetary policy has resulted in major movements in financial markets. In addition, the ECB has tightened monetary policy by halting net purchases of government bonds under their asset purchase programmes. Market participants expect the Federal Reserve (the Fed) and ECB key interest rates to peak at 5.1 per cent in August 2023 and 2.9 per cent in October 2023, respectively, see chart 3, after which monetary policy is gradually expected to ease again.

Financial stress across markets

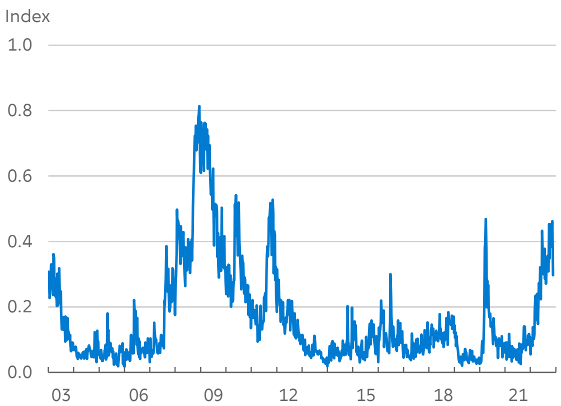
Financial markets have seen increased stress levels. Danmarks Nationalbank's financial stress indicator for Denmark has thus been increasing in 2022 and was on a par with the first corona lockdown in certain periods, but lower than during the financial crisis, see chart 4. The increased stress has been evident across submarkets, where substantial equity and bond market losses have gone hand in hand with high volatility in interest rate, currency and energy markets volatility.

Sharp increases in interest rates and volatility resulted in large bond market losses

Government bonds in particular have previously served as a safe haven in situations of high market volatility and falling prices on equity markets. However, increased interest rates have led to heavy losses

Market stress has been on par with first corona lockdown

Chart 4



Note: The financial stress indicator for Denmark aggregates the level of stress in five key financial submarkets. The stress level in each submarket is measured using three market indicators, each of which captures market stress elements. The calculation of the final stress indicator takes account of the fact that simultaneous stress in several submarkets is a greater challenge to the financial system than periods of stress in individual submarkets. See, moreover, Danmarks Nationalbank, Financial Stability, 2nd half 2014. The most recent observations are from 20 November 2022.
Source: Bloomberg, Nordea Analytics and own calculations.

on government bonds, where the price of a Danish 10-year government bond up to November had fallen by about 20 per cent since the turn of the year. The large fluctuations in bond prices, see chart 5, and the resulting losses have coincided with volatility in other markets. This was felt, in particular, in the UK, where the price of government bonds fell sharply following the UK government's announcement of fiscal easing on 23 September.

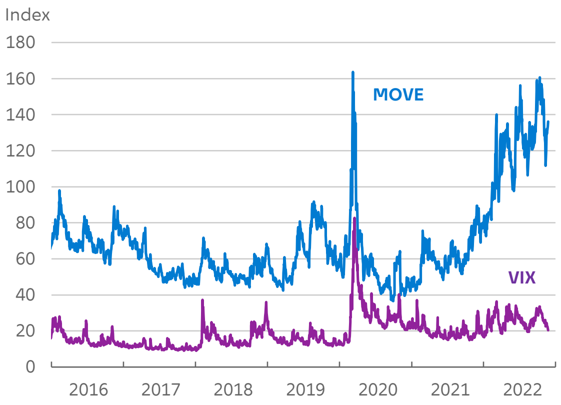
Increased collateral requirements in derivatives markets

The large movements across assets have increased collateral requirements in the derivatives markets for interest rates, currency and commodities. This has amplified the liquidity need of market participants in the derivatives markets, which has increased the demand for loan facilities in banks, as explained in the section on liquidity and funding.

In the UK, the increase in interest rates following the monetary policy interest rate hike and the announcement of possible fiscal easing posed major challenges for a subset of the UK pension sector, which experienced variation margin calls on interest rate derivatives, see box 1 and losses on underlying assets in their repo financing[2]. This spurred concern in the markets over a potential fire sale of bonds, where companies sell off bonds to obtain liquidity. Fears over a negative price spiral prompted the Bank of England to intervene in the market to prevent "severe disruption of core funding markets and consequent widespread financial instability".[3]

Danish pension and life insurance companies have enough highly liquid assets to meet margin calls on their interest rate derivatives to cover an interest rate increase of at least 300 basis points, which makes a similar scenario less likely to happen in Denmark[4]. The pension sector's ability to meet margin calls presupposes that the companies have enough

Bond market volatility is high Chart 5



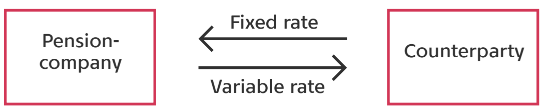
Note: Implied volatility for S&P 500 stock index (CBOE Market Volatility Index) and US Treasury bonds (ICE BofAML MOVE index). The most recent observations are from 24 November 2022.
Source: Macrobond.

How an interest rate swap works Box 1

A typical interest rate swap is a contract in which two parties swap payment flows. One party pays a variable rate, while the other party pays a fixed rate. The variable rate depends on a predetermined reference rate, and the fixed rate is determined at the time of conclusion.

The market value of the interest rate swap at the conclusion of the contract is usually zero. If the variable rate increases, the value of the contract decreases for the recipient of the fixed rate. This means that the market value becomes negative for the recipient of the fixed rate, and therefore collateral for the movement (variation margin) is required with the counterparty, which increases the liquidity need for the recipient of the fixed rate.

Pension companies typically use interest rate swaps, where they receive the fixed rate in exchange for paying the variable rate.



2 A repo agreement, or repurchase agreement, is a transaction in which a party sells an asset to another party, and at the same time, the parties make an agreement to repurchase the asset at a later date at a set price.

3 See letter from the Governor of the Bank of England, Sir Jon Cunliffe, to the Parliament of 5 October 2022 (*link*).

4 See Danmarks Nationalbank, The pension sector's alternative investments, *Danmarks Nationalbank Analysis*, No. 22, September 2021 (*link*).

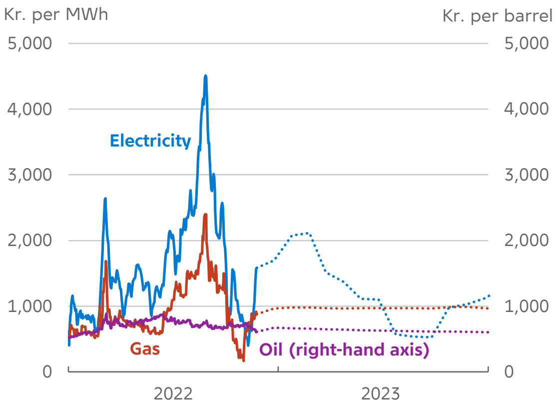
repo counterparties, as described in the section on liquidity and funding.[5]

State guarantee furnished to support liquidity of energy companies
Substantial increases and fluctuations in energy prices in 2022 have also increased margin requirements for energy companies. As in a number of other countries, the Danish state has furnished a state guarantee to support energy and gas companies' liquidity. The guarantee of kr. 125 billion can be used by an electricity or gas company's bank if it provides liquidity to the company. In that case, the state assumes 80 per cent of the risk.

Energy prices were at their highest in August, but have since fallen, see chart 6. This happened at the same time as European gas storage facilities were filling up and consumers adapted their consumption. However, prices remain at a significantly higher level than before 2021, and market participants expect energy prices to remain high in the coming years.

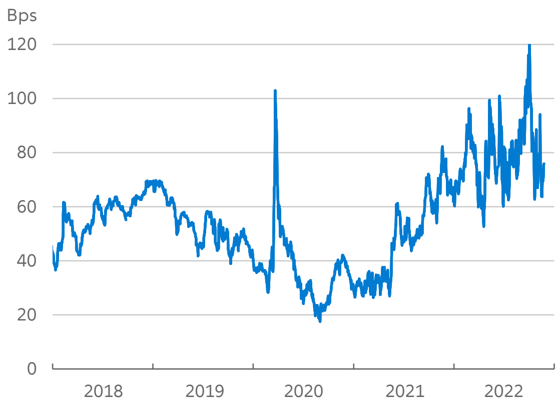
Falling prices of Danish mortgage bonds
Mortgage rates have increased sharply in 2022. The increase is partly explained by the tightening of monetary policy in the euro area. The option-adjusted spread to Danish government bonds has also widened, see chart 7. The option-adjusted spread is a measure of the credit and liquidity premium on callable bonds.[6] The increase in the option-adjusted spread has followed in the wake of a significant increase in the duration of callable mortgage bonds, just as there have been greater fluctuations in interest rates[7]. In spite of deteriorating market liquidity, mortgage credit institutions have been issuing throughout the period.

Highly volatile energy markets Chart 6



Note: The electricity price refers to the average Nordpool price measured as a 14-day moving average. The gas price is the price of TTF natural gas, and the oil price is the price of a barrel of Brent oil. Dotted lines indicate futures prices. The most recent observations are from 24 November 2022.
Source: Macrobond.

Substantial fluctuations in mortgage bond yield spread Chart 7



Note: The OAS spread for Nykredit's total index to a Danish ten-year government bond. The most recent observation is from 24 November 2022.
Source: Nykredit Markets.

5 For a further understanding of the pension companies' liquidity need and use of interest rate derivatives, see Danmarks Nationalbank, Pension companies will have large liquidity needs if interest rates rise, *Danmarks Nationalbank Analysis,* No. 23, November 2019 (*link*).

6 The Danish bond market differs from the bond markets of other comparable countries by the wide spread use of callable mortgage bonds. These bonds have the special feature that they can always be redeemed at a rate of 100 (par). This option has implications for the bonds' interest rate risk (duration), which increases in case of interest rate increases.

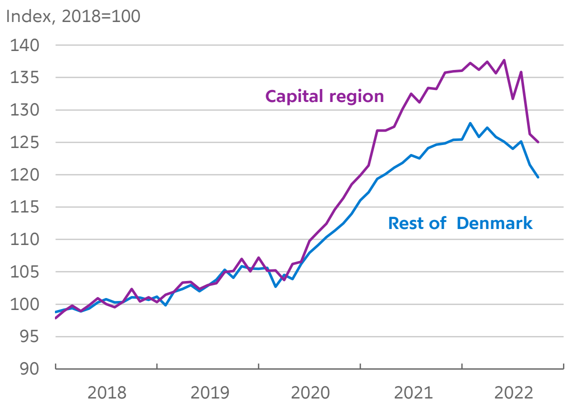
7 Duration is an expression of the interest rate risk of the bonds, i.e. the change in price resulting from a change in the yield to maturity.

Higher heating costs and interest rates will challenge some homeowners

Prospect of continued declines in house prices
Higher interest rates and lower real wages are impacting the housing market, where activity has slowed down significantly. This has led to a fall in house prices, especially in the Greater Copenhagen area, see chart 8. The fall follows two years of high activity levels and major house price increases.

The prices are predicted to fall even further in the coming time. In Danmarks Nationalbank's latest projection house prices are expected to decrease by 5.6 per cent in 2023, corresponding to a price decline of approx. 9 per cent from the peak in the 2nd quarter of 2022. There is considerable uncertainty about house price developments, and house price drops can be more severe.[8]

House prices have gone down in the Greater Copenhagen area in particular Chart 8



Note: Seasonally adjusted house prices for single-family houses from Boligsiden. The most recent observations are from October 2022.
Source: Boligsiden and own calculations.

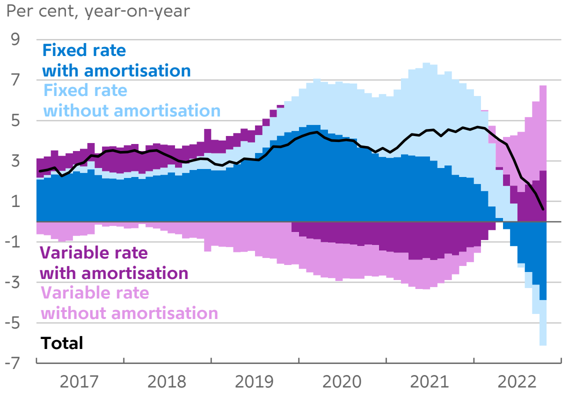
Declining house prices increase risk of technical insolvency
There are no signs that homeowners have been extracting home equity extensively through borrowing following the property price hikes seen in recent years. This has reduced the risk of technical insolvency for homeowners who bought their homes several years ago. The risk is greatest for highly mortgaged

8 Danmarks Nationalbank, The pressure on the economy should be eased, *Danmarks Nationalbank Analysis (Outlook for the Danish economy)*, No. 11, September 2022.

homeowners who bought their property recently. With the expected decline in house prices in Danmarks Nationalbank's latest projection, one in ten homeowners who bought a home after the beginning of 2021 will end up with a housing debt that exceeds the value of their home at the end of 2023. First-time buyers will be hit relatively harder, with one in seven (14 per cent) becoming technically insolvent.

Highly mortgaged homeowners who have taken out variable-rate mortgages with deferred amortisation are particularly vulnerable to interest rate hikes and house price declines. This is first and foremost due to the fact that they are not paying off their debt. Additionally, homeowners with variable-rate loans do not have the same home equity protection as homeowners with fixed-rate loans, since those with variable-rate loans cannot utilise the declining market value of the debt when interest rates rise.

Increase in variable-rate mortgage loans with deferred amortisation Chart 9



Note: Growth contribution to annual growth in total mortgage lending calculated at nominal value. The most recent observations are from October 2022.
Source: Danmarks Nationalbank.

Growing prevalence of variable-rate loans with deferred amortisation

An increasing number of households are taking out variable-rate mortgage loans, of which an increasing proportion is with deferred amortisation, see chart 9. The development has led the Systemic Risk Council to issue an observation that, if interest rates rise, homeowners risk significantly higher debt service costs. This would result in substantially reduced disposable incomes and an increased risk of loan default.[9]

The increase in variable-rate mortgage loans is mainly due to interest rate increases, where long-term interest rates have risen more than short-term rates. Among other things, this has led to the refinancing of mortgage loans worth kr. 173 billion in the first three quarters of the year, of which around 40 per cent have been converted from fixed to variable interest rates.

It is crucial that homeowners who opt for variable interest rates and deferred amortisation are sufficiently bolstered to withstand interest rate increases. It is important that banks continue to perform a thorough credit rating.

Households with interest rate fixing in 2023 can expect a significant increase in expenditure

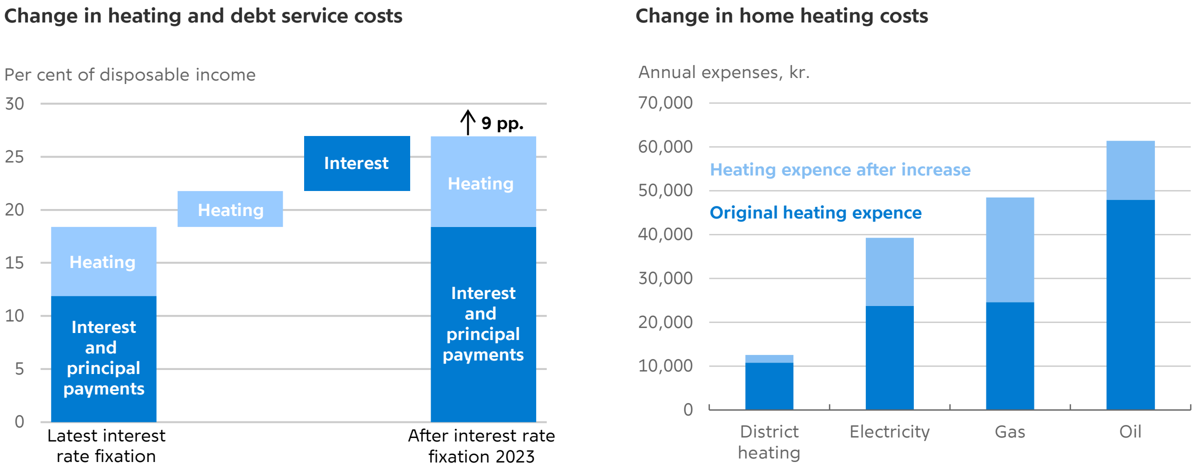
A number of homeowners with variable-rate mortgage loans are looking at an interest rate increase in connection with the fixing of new interest rates in 2023. Combined with rising heating costs, this may lead to a significant increase in costs for the individual homeowner. Danmarks Nationalbank has calculated how households with variable mortgage loans are affected by the combination of higher heating and interest costs. The calculation is based on the 220,000 households for whom a new and higher interest rate on their mortgage debt will be fixed in 2023. This corresponds to approximately 40 per cent of all variable-rate mortgage debt and 20 per cent of the total mortgage debt of 1,697 billion kr. in the 3rd quarter of 2022.

Heating and debt service[10] costs for these households will increase from 18 to 27 per cent of disposable income when the higher interest rates and heating prices as of October 2022 is taken into account, see chart 11, left. The change is calculated as the difference between costs relative to disposable

9 The Systemic Risk Council, The growing prevalence of variable-rate mortgages with deferred amortisation contributes to the build-up of risk, *Observation*, September 2022.

10 Debt servicing includes the payment of interest, contributions and repayments on loans.

Homeowners with variable-rate mortgage loans are looking at significant increases in costs due to higher heating prices and interest rates Chart 10



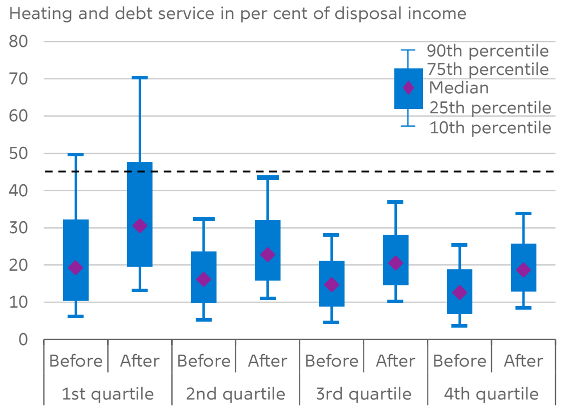
Note: Left-hand chart: Development in average heating costs and debt service relative to disposable income due to higher heating prices and interest rates, see box 3. The focus is on households with variable-rate loans for which the interest rate is due to be fixed in 2023. The chart has been calculated on the basis of the latest interest rate fixing and projected to the next interest rate fixing in 2023. Right-hand chart: Average cost of residential heating broken down by different heat sources, calculated as the median cost. The cost has been calculated on the basis of heating prices at the latest interest rate fixing and October 2022.
Source: Danmarks Nationalbank, Statistics Denmark and own calculations.

income at the last interest rate fixing and the upcoming interest rate fixing in 2023.[11] It does not take into account that many households will reduce their heat consumption. Moreover, the calculation does not take account of price increases for other consumer goods, including electricity. The analysis is described in detail in box 2.

The effect is significantly greater for households with deferred-amortisation loans, as they only pay interest, and any increase in interest rates will be reflected in full in their debt service payments.[12] As a rule, however, homeowners with variable-rate loans with deferred amortisation have a lower debt service ratio than homeowners with other types of loans.

Higher heating costs and debt service account for 3 and 5 percentage points, respectively, of the

Especially low-income homeowners will find it harder to service their debt in a situation with rising interest expenses and heating costs Chart 11



Note: Heating costs and debt service as a percentage of disposable income before and after increase in interest and heating costs by income quartiles. The income quartiles are defined by households with interest rate fixing in 2023. The dotted line indicates when the percentage of total heating and debt service costs relative to disposable income is considered high.
Source: Danmarks Nationalbank, Statistics Denmark and own calculations.

11 This means that some homeowners who have fixed their interest rate during 2022 have already felt the impact of both higher heating prices and interest rates to some degree.

12 See Danmarks Nationalbank, Rising interest rates and prices can challenge banks' customers, *Danmarks Nationalbank Analysis (Financial Stability)*, No. 7, June 2022.

increase. This corresponds to an average annual increase in heating costs and debt service of kr. 12,000 and kr. 23,000, respectively. Households with gas heating, in particular, will be affected by heating bill increases, see chart 10, right. For these households, the average annual expense will increase by kr. 24,000.

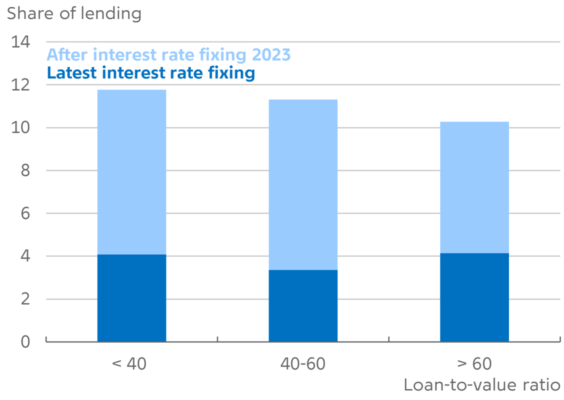
Low-income homeowners hit hardest by rising heating and interest costs

There is a substantial difference in how much heating costs and debt service will increase across income groups in the projection, see chart 11. Whether a household start having problems servicing their debt depends on a number of factors. In many countries, the regulation reflects that a debt service ratio above 40 per cent is considered to be very high.[13] Historically, households have spent just below 5 per cent of their disposable income on heating costs, which is why total heating and debt service costs relative to disposable income of more than 45 per cent may be considered high.[14]

The number of households with interest rate fixing in 2023 who gets heating costs and debt service to disposable income of more than 45 per cent will increase from approx. 9,000 to 24,000 as a result of the higher interest and heating costs. 15,000 households are in the lowest income quartile.

Households with both low income and limited liquid funds may find it particularly difficult to cover the increasing expenditures. The majority of homeowners in the lowest income quartile are over the age of 65 and typically have larger savings than younger homeowners. However, almost one in five in the lowest income quartile has available liquid funds of less than kr. 50,000 in the form of deposits including overdraft facilities.

Limited number of vulnerable homeowners are highly mortgaged Chart 12



Note: Share of loans with interest rate fixing in 2023 which will have high heating and debt service costs relative to disposable income ratios (more than 45 per cent) broken down by loan-to-value ratios.
Source: Danmarks Nationalbank, Statistics Denmark and own calculations.

Homeowners' response to rising costs could have a spillover effect on businesses

In addition to rising heating costs and interest payments, households are also affected by rising prices of other consumer goods. Wages have not risen at the same rate as prices, which erode the households' real income. The most affected households are likely to cut back significantly on heat consumption and other consumption in order to avoid defaulting on their debt. This is confirmed by the latest data, which show an approx. 20 per cent reduction in gas consumption in Denmark in August and September compared to the average of the last 6 years.[15]

13 See, for example, the European Systemic Risk Board, A Review of Macroprudential Policy in the EU in 2020, July 2021.

14 It is associated with great uncertainty to determine an average historical heat consumption, which i.a. depends on the home's heat source and energy efficiency, behaviour, energy prices and the temperature in the individual year. Based on the National Accounts statement of households' consumption of gas, liquid fuel and district heating etc. the average level since 1971 has been approx. 4 per cent of disposable household income excl. Electricity consumption for heating.

15 Calculated on the basis of monthly domestic consumption of natural gas from Eurostat (*link*).

Effect of higher interest rates and heating prices on households – how we proceeded Box 2

The analysis is based on data from Danmarks Nationalbank's credit register and Statistics Denmark. The population is selected on the basis of data on loans from the credit register in the 2nd quarter of 2022, while the latest available data for personal income are based on the 2020 income year. The population consists of households with variable-rate housing loans for which the interest rate is due to be fixed in 2023. Households using only bank loans are not included. The population only includes households that own one home with a mortgage loan (holiday homes are excluded). Only households where the entire household is fully tax liable are included. Disposable income is calculated as the household's total personal income corrected for tax payments and interest deductions. Households' deposits are calculated for 2021 using account-specific data from the Danish tax authorities.

The effect of higher interest rates is estimated by increasing interest rates on mortgage loans for which the interest rate is due to be fixed in 2023 and on bank loans with variable interest rates. The calculations are based on an increase in interest rates on mortgage loans to 3 and 4 per cent for loans with interest rate fixing less or more than every two years, while the interest rate on mortgage loans with interest rate fixing every ten years is increased to 4.5 per cent. For bank loans, the existing interest rate is increased by 3 percentage points, which corresponds to the expected change in the ECB's interest rate[1]. Deferred amortisation, debt service type and, if applicable, interest rate ceiling are checked in the calculation of the debt service.

The effect of higher heating costs is estimated based on information in the Building and Housing Register (BBR), estimated heat consumption and the price development of heat sources[2]. Heat consumption is estimated based on the median of the calculated heat consumption (per square metre) from energy label reports for similar properties.[3] It is assumed that households' heat consumption remains unchanged. Households are expected to turn down the heating to some extent, which will result in an overestimate of the impact of higher heating prices. In addition, households will also be affected by higher prices of other consumer goods, including electricity. It is assumed that households service their debt and pay heating bills before paying for other goods and services, for which reason the effect of generally higher consumer prices is not reflected in the analysis.

1. See Danmarks Nationalbank, Tighter monetary policy has made financing more expensive, Danmarks Nationalbank Analysis (Monetary and financial trends), No. 10, September 2022 (*link*).
2. The price development is based on the latest available data for heating prices from the Danish Utility Regulator in combination with the development in the consumer price index from Statistics Denmark, where the most recent observations are from October 2022.
3. 'Similar properties' refers to properties that are of the same type (e.g. detached single-family houses), that have the same primary heat source and were built in the same period.

Limited number of vulnerable homeowners are highly mortgaged

Households with high heating and debt service costs relative to disposable income and a high loan-to-value ratio are particularly likely to cause losses for credit institutions. However, most households in the projection whose heating and debt service costs will account for more than 45 per cent of their disposable income generally have a relatively low loan-to-value ratio. It is thus 10 per cent of the households with a loan-to-value ratio above 60 that get high heating and debt service costs, corresponding to 15 kr. billion, see chart 12.

Economic circumstances may deteriorate further than assumed in the projection, e.g. in case of higher unemployment. Danmarks Nationalbank's stress test sheds light on credit losses in the event of a recession, as described further in the sections on capital and stress tests.

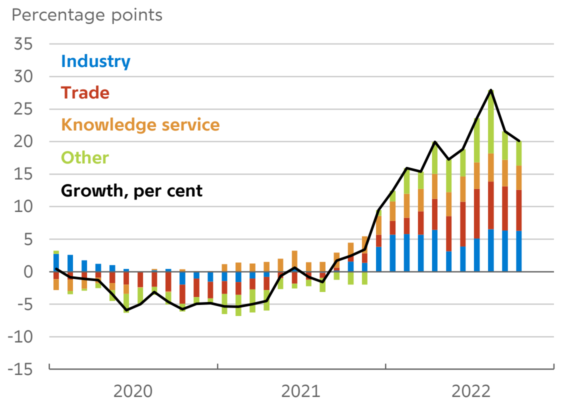
Especially medium-sized banks are expected to incur losses from vulnerable businesses

Supply problems and inflation have increased credit demand

Bank lending to the corporate sector has risen by 20 per cent over the last year, see chart 13. High lending growth may be a sign of accommodative credit standards and a build-up of risks. Several major banks have received a risk information from the Danish Financial Supervisory Authority for breaking the guideline in the Supervisory Diamond of an annual lending growth of 20 per cent.[16]

Growth is broadly distributed across industries and reflects, among other things, that corporate customers have needed additional financing on an ongoing basis due to challenges in supply chains and rising commodity and energy prices. Some of the financing has been spent on stockpiling. Currently, there are signs of high inventory levels in retail.[17] Slowing consumer demand increases the risk that some corporate customers will be left with excessive inventories.

High growth in bank lending Chart 13



Note: Lending to Danish non-financial undertakings and self-employed persons, year-on-year growth contribution. The most recent observations are from October 2022.
Source: Danmarks Nationalbank and own calculations.

16 Sew the Danish Financial Supervisory Authority for further information (*link*).

17 See Statistics Denmark, confidence indicators, valuation of inventories in the retail sector.

Credit institutions are tightening credit standards
In Danmarks Nationalbank's lending survey, the banks report tighter credit standards in the 3rd quarter of 2022 and expect continued tightening of credit standards in the 4th quarter, see chart 14. Banks estimate that the risk assessment of corporate customers, in particular, will lead to tighter credit standards. This should be seen in the light of an expectation of slower economic growth and an increase in corporate customers' costs due to high energy and commodity prices as well as higher interest rates.

Slowing consumer demand may result in greater losses on lending to corporate customers
Slowing consumer demand will further impair the debt service capacity of corporate customers.[18] This will put pressure on businesses that are already challenged by rising costs, and it may give rise to more defaults and higher loan losses.

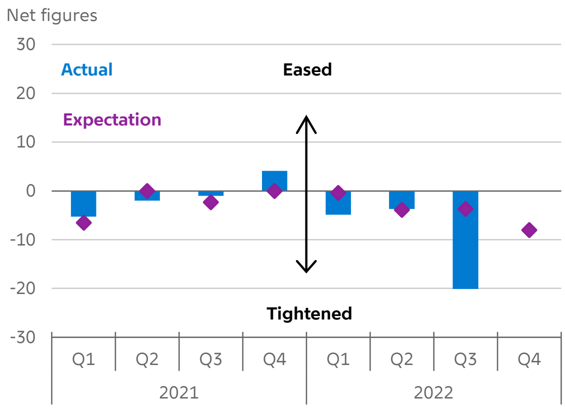
Some weak businesses must be expected to default as a result of a general decline in economic activity. It is part of the natural business dynamics that non-viable companies close down and new one emerge. The banks' own credit quality data do not yet show clear signs that corporate customers are increasingly defaulting on their debt.

Small businesses less resilient and more exposed to rising prices and interest rates
Higher energy prices, combined with the current interest rate increases, are estimated to lead to an increased share of especially small businesses with low debt service capacity and low liquidity and solvency ratios, see chart 15.[19] However, the share only

18 The debt service capacity reflects the extent to which earnings before interest, taxes, depreciation and amortisation (EBITDA) are sufficient to cover their interest and principal payments. A debt service capacity below 100 per cent means that the business' EBITDA is lower than its expenses for interest and principal payments. In this analysis, debt service capacity is therefore defined as low if it is below 100 per cent.

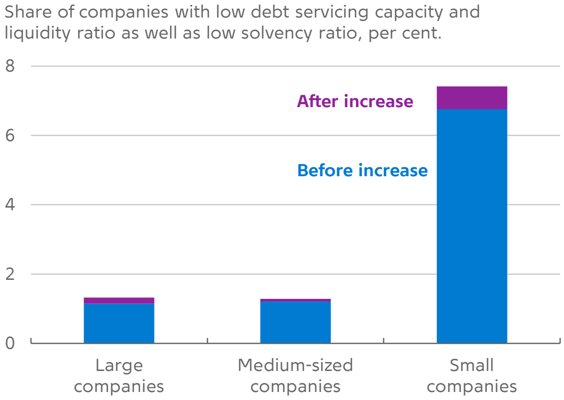
19 The analysis is based on an interest rate increase of 3 percentage points compared to the interest rate level at the end of 2021 and a reduction in the businesses' EBITDA in the latest financial statements due to the increase in energy monthly domestic consumption of natural gas prices throughout 2022. Businesses are assumed to be able to pass on half of the cost increase from energy and commodities to customers via higher sales prices.

Banks expect tighter credit standards Chart 14



Note: In Danmarks Nationalbank's lending survey, corporate customers cover 'Private non-financial corporations' and 'Sole proprietorships'. 'Expectation' is the banks' previously reported responses from the quarter before the present quarter. Net Chartes are the banks' responses weighted by their respective market shares. The most recent observations are from the 3rd quarter of 2022 for actual development and the 4th quarter of 2022 for expected development.
Source: Danmarks Nationalbank.

More small companies at risk as a result of rising energy and as well as interest rate hikes Chart 15

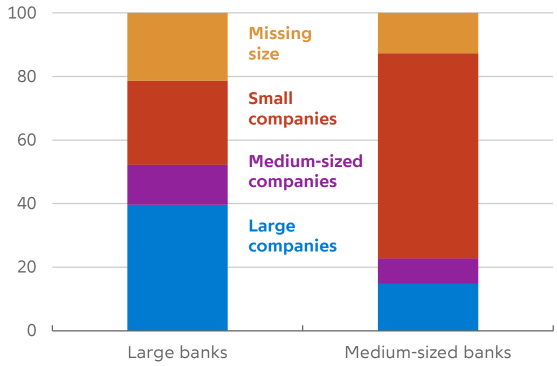


Note: Share of companies, excluding sole proprietorships, with low debt service capacity, liquidity ratio and solvency ratio before and after an increase in interest rates and energy prices broken down by company size according to the Danish Business Authority's accounting classes. The liquidity ratio is defined as low when the company's current assets cannot cover current liabilities (liquidity ratio below 100 per cent). Low solvency is defined as an equity-to-total-assets ratio below 30 per cent. See box 3 in Danmarks Nationalbank, Rising interest rates and prices may challenge banks' customers, *Danmarks Nationalbank Analysis (Financial Stability)*, No. 7, June 2022, for further information about the calculations.
Source: Danmarks Nationalbank, Bisnode, Statistics Denmark and own calculations.

increases by less than 1 percentage point under the given assumptions.[20] Small businesses generally have lower liquidity and solvency ratios than the banks' other corporate customers and are thus generally less robust.

Lending to corporate customers with low debt service capacity and low solvency and liquidity ratios account for 2 per cent of banks' corporate lending. Banks are expected to be able to accommodate the potential loan losses due to the current increases in interest rates and prices. Losses are expected to affect medium-sized banks in particular, as lending to small businesses accounts for 65 per cent of their total corporate lending, see chart 16.

Small businesses account for a large share of lending by medium-sized banks Chart 16



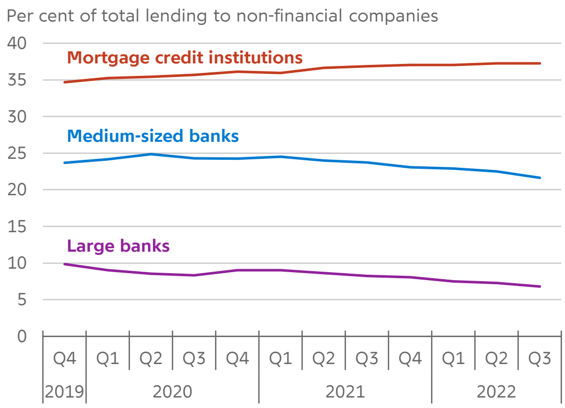
Note: Lending to Danish non-financial corporations by large and medium-sized banks in the 2nd quarter of 2022 broken down by company size according to the Danish Business Authority's accounting classes. For 21 per cent and 13 per cent of the lending by large and medium-sized banks, respectively, the financial statements do not disclose accounting class. Lending by large and medium-sized banks constitute 92 per cent of bank lending to Danish non-financial undertakings.
Source: Danmarks Nationalbank, Experian and own calculations.

Exposures to letting companies have caused major losses in the past

With the prospect of weakened economic activity, cyclical businesses are particularly at risk. Historically, letting companies, whose main activity is the letting of properties for residential or commercial purposes, have been a cyclically sensitive industry. During the crisis in the 1990s and the financial crisis, the industry caused significant losses for Danish credit institutions and contributed to worsened downturns.[21]

Credit institutions still have pronounced exposures to letting companies, see chart 17. Although letting companies are primarily mortgaged through mortgage credit institutions, the risk of credit loss is greatest for banks. This is because banks usually provide the financing which in the event of default ranks lowest in respect of the underlying collateral. Similar to the situation leading up to the financial crisis, medium-sized banks are more exposed to letting companies than large banks. Unlike then, banks have not experienced a similarly high growth in their lending to letting companies.

Credit institutions have high exposure to letting companies Chart 17



Note: Lending to letting companies as a proportion of total lending to non-financial undertakings and self-employed persons. Letting companies are defined as companies that are either part of the DB07 activities 682030 Other renting of real estate and 682040 Renting of non-residential buildings or that have loans secured by mortgages on properties classified as letting properties and where this debt constitutes at least half of the company's total debt to banks and mortgage credit institutions.
Source: Danmarks Nationalbank and own calculations.

20 Assessing the impact of price and interest rate shocks is subject to great uncertainty, and there may be business-specific conditions for which the analysis does not take into account. Among other things, account is not taken of whether businesses have hedged their market and interest rate risk via, for example, derivatives, while energy consumption is modelled at industry level.

21 See Ministry of Business and Growth, The financial crisis in Denmark. causes, consequences and lessons (Rangvid report), 2013 (*link*).

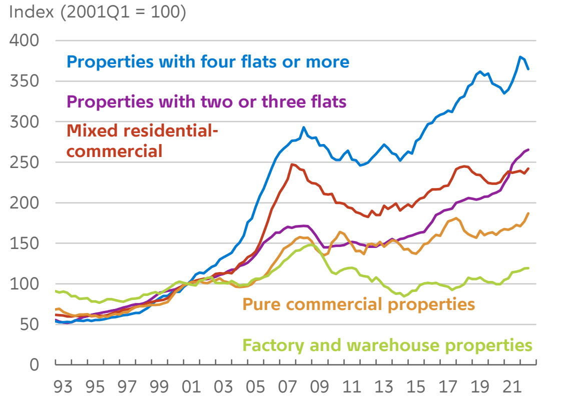
Price drops on letting properties can lead to credit losses in banks
Price developments for letting properties are generally cyclical, and in recent years, economic growth and low financing costs have contributed to significant price increases, see chart 18. Currently, market participants expect substantial price declines.[22]

Falling prices can be a challenge for banks, where a significant proportion of lending to letting companies has high loan-to-value ratios. Just over a quarter of lending in the 3rd quarter of 2022 had a loan-to-value ratio of more than 80 per cent.[23] Price falls may therefore mean that the collateral is not sufficient to cover the entire exposure in the event of default. The institutions may therefore risk realising losses.

Interest rate increase and income decline will reduce letting companies' debt service capacity
In terms of the degree of own financing, letting companies today appear to be more resilient to losses than in the run-up to the financial crisis. Thus, the median solvency ratio for the letting companies was 41 in 2006, while it was 47 in 2021, see chart 19. However, a considerable number of companies still have a low solvency ratio and/or debt service capacity. These companies may face difficulties.

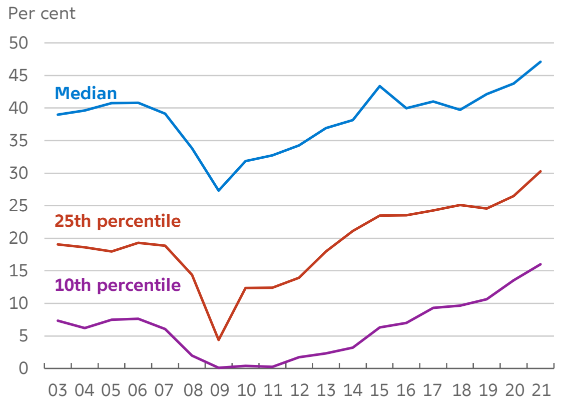
Danmarks Nationalbank has performed a sensitivity analysis of debt service capacity, in which letting companies' income is reduced by 10 per cent, and interest expenses are adjusted upwards to current interest rate levels. The analysis shows that the debt service capacity of some letting companies will be significantly reduced, see chart 20. However, these are mainly the ones that already have a high debt service capacity. Overall, the share of letting companies with a debt service capacity below 100 per cent increases from 24 to 43 per cent (weighted according to outstanding debt).

Prices of commercial real estate are cyclical and have risen considerably Chart 18



Note: Quarterly frequency. Four-quarter moving average. There are breaks in the series for properties with flats (two to three and four or more) in 2006 due to shifts in the categorisation. The new categorisation has been revised backwards in time by joint weighting of previously available series. The most recent observations are from the 2nd quarter of 2022.
Source: Statistics Denmark.

Letting companies have become more resilient Chart 19



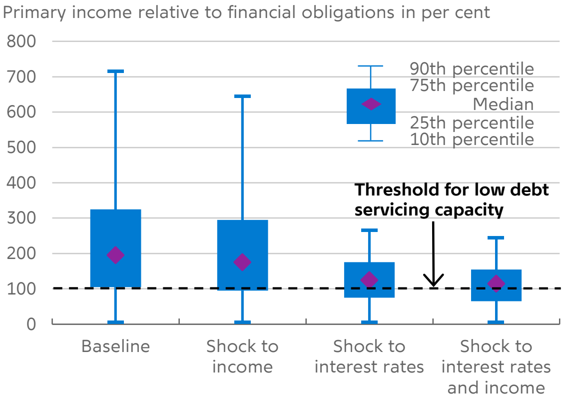
Note: Solvency ratios for letting companies, balance sheet-weighted. Solvency ratio has been calculated as equity to balance sheet total. The chart only comprises companies under the activity codes 682030 Other renting of real estate and 682040 Renting of non-residential buildings and includes approx. 22,000 companies in 2021, equal to approx. 60 per cent of the population of letting companies.
Source: Experian, Bisnode and own calculations.

22 See the Danish Property Federation's Market Statistics – Consensus Forecast, October 2022 (*link*) (in Danish).

23 Weighted according to outstanding debt, incl. mortgage lending. Other security may have been furnished for the loans in addition to the properties included in the calculation, and the loan-to-value ratios mentioned should therefore be regarded as upper limits.

Debt service capacity is significantly reduced in a scenario with higher interest rates and declining earnings

Chart 20



Note: Breakdown of the letting companies' debt service capacity in the event of a shock to income and interest expenses. See box 3 for further details. The companies have been weighted based on their share of the total outstanding debt.
Source: Danmarks Nationalbank, Bisnode and own calculations.

The sensitivity analysis does not take account of the use of interest rate derivatives. If letting companies use interest rate derivatives to hedge interest rate risk, the pass-through will be lower. See box 3 for further details on the underlying assumptions.

Sensitivity analysis of the debt service capacity of letting companies – how we proceeded

Box 3

The analysis assesses the robustness of letting companies' debt service capacity by shocking their debt service obligations and primary income. For debt service obligations, the same methodology and interest rates are used as described in box 2 of the household section. Only the interest rate level for variable-rate loans for which the interest rate is due to be fixed in 2023 or before is shocked. Primary income is shocked by reducing the letting companies' EBITDA (less value adjustments) by 10 per cent. In comparison, primary income for the real estate and letting industry decreased by 18 per cent from 2008 to 2009.

Information on primary income and value adjustments is deducted from the letting companies' financial statements. The most recent available financial statements are used, which for the most part are for 2021. Data on debt service obligations are linked to primary income data to cover the same financial period. Specifically, for each letting company, credit register data are used for the same quarter as the start date of the financial statements.

Debt service capacity is calculated here as the ratio of primary income less value adjustments, interest and principal payments. Thus, a debt service capacity of 100 per cent or more indicates that the letting company has sufficient primary income to cover its financial obligations in the short-term.

Accounting data on self-employed are not available, and these are thus not included in the analysis. A total of about 22,300 letting companies are included in the analysis. This corresponds to 62 per cent of letting companies and 82 per cent of total lending to letting companies.

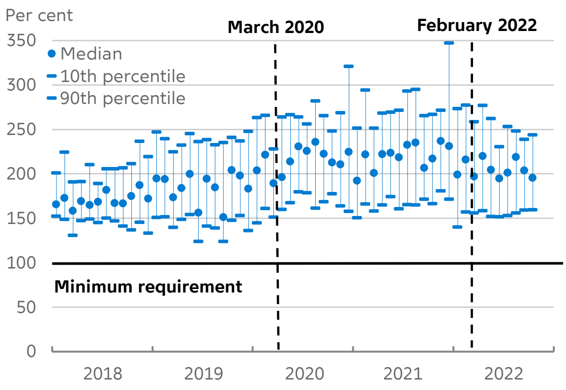
Large fluctuations require more focus on liquidity management

Liquidity position remains robust
The systemic banks still have a sound liquidity position. All the systemic banks have a survival horizon with positive excess liquidity of at least five months in the most severe scenario in Danmarks Nationalbank's sensitivity analysis. This corresponds to the survival horizon in Danmarks Nationalbank's latest biannual analysis of financial stability. In the scenario, access to markets is assumed to be closed, while deposits fall significantly and loan facilities to customers increase.[24]

Both the systemic and the non-systemic banks meet the statutory requirement for liquidity (Liquidity Coverage Ratio (LCR)) and financing (Net Stable Funding Ratio (NSFR[25])) with a certain margin. Although still high, the banks' LCR has declined due to higher liquidity needs of customers and higher market volatility, see chart 21.

Systemic banks' LCR remains at a high level

Chart 21



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 end-October 2022.
Source: Danmarks Nationalbank.

24 For a method description of Danmarks Nationalbank's sensitivity analysis, see page 26 of Danmarks Nationalbank, Lower excess capital adequacy for the banks, *Danmarks Nationalbank Analysis*, No. 25, November 2019 (*link*).

25 See box 5 in Danmarks Nationalbank, Increased risks in credit institutions' housing lending, *Danmarks Nationalbank Analysis (Financial Stability)*, No. 28, December 2021 (*link*).

Raising liquidity has become more expensive
Banks currently have adequate liquidity buffers to handle market turmoil and meet an increasing demand for liquidity. However, raising liquidity has become more expensive. This comes after a long period of liquidity being readily available and with lower prices. This means, among other things, that banks are left to obtain financing in markets where both volatility and interest rates are noticeably higher than just 10 months ago, as explained in the section on the financial markets.

The changed market conditions for obtaining liquidity mean that banks need to be more prepared than in the past for increasing liquidity needs and loan demand from their customers. So far, although the risk of higher funding costs is present, banks have had access to liquidity via the markets. Ultimately, increased costs may translate into increased costs for customers.

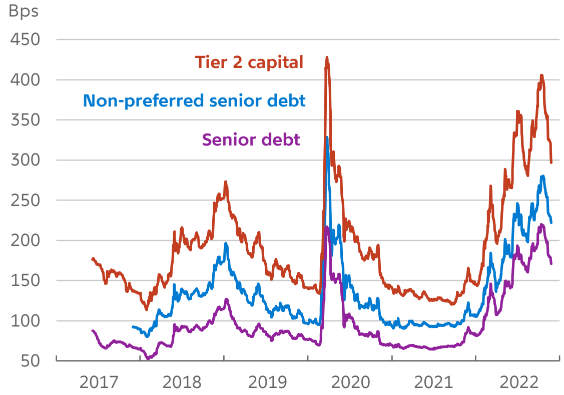
Credit institutions cannot expect current market conditions to be temporary
It is important that the banks focus on the duration and maturity profile of their debt issuances so that they have adequate buffers to withstand periods with limited access to the markets.

The price of banks' debt issuances is rising and subject to high volatility, see chart 22. This has affected the banks' behaviour in the markets, where the length of new issuances in 2022 has generally been shorter than in recent years. Banks are thus putting themselves in a more vulnerable position.

Increased liquidity needs for mortgage credit institutions in the event of a decrease in property prices
With the prospect of a continued fall in property prices, it is particularly important that mortgage credit institutions focus on maintaining a sufficient liquidity buffer to meet the supplementary collateral requirement.

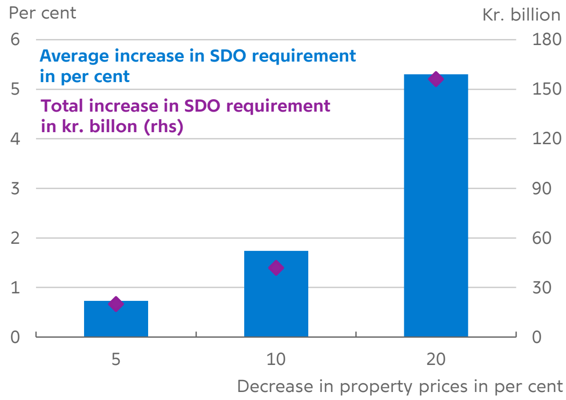
All mortgage credit institutions are obliged to provide supplementary collateral for the issued bonds when property prices fall,[26] see chart 23. If this requirement

Increased prices of banks' debt issuances Chart 22



Note: Z-spread for iBoxx index for investment grade euro-denominated issuances for senior debt, non-preferred senior debt and supplementary capital (so-called Tier-2 capital). The most recent data are from 24 November 2022. This is based on euro issuances. A similar pattern is seen for issues in Danish kroner. According to the hierarchy of creditors in debt issuances, senior debt is ranked highest, while Tier-2 capital is ranked lowest.
Source: Refintiv Eikon.

The supplementary collateral requirement is increased when property prices fall Chart 23



Note: The chart shows how much the mortgage credit institutions' SDO requirement will increase on average as a percentage of their total balance sheet and the overall increase for mortgage credit institutions in kr. billion. Data are as of 31 December 2021.
Source: Danmarks Nationalbank, the mortgage credit institutions' ICAAP/ILAAP reports and own calculations.

26 The value of the mortgage which the mortgage bond investors' have protection in, will be reduced when property prices decrease. Mortgage credit institutions must therefore provide supplementary collateral to maintain the mortgage value when loan-to-value is lower than 60 or 80 for corporate or household properties.

is not met, the bonds will lose their status as covered bonds complying with Article 129 of CRR (SDOs).[27] It can have major negative consequences for the confidence in the Danish mortgage bonds system if one or more mortgage credit institutions lose their SDO status.

All mortgage credit institutions have liquidity and other assets to withstand a property price decrease of 20 per cent and at the same time meet all the other liquidity requirements.[28] However, in order to meet the increased supplementary collateral requirement (SDO requirement), it is necessary for mortgage credit institutions to also use other assets than LCR-defined liquid assets. The other assets consist of holdings of own covered bonds, guarantees and loans from group banks.

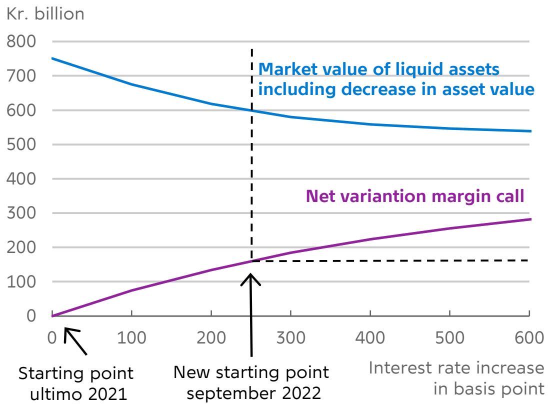
Liquidity needs of pension and life insurance companies influenced by volatile markets and higher interest rates

It is important that pension and life insurance companies focus on maintaining or expanding the number of repo counterparties, as this is where companies access liquidity for payments of variation margins from their derivatives contracts.

As the past year has shown, interest rates can rise sharply over a short period of time. As a result, pension and life insurance companies have had considerable increases in their liquidity needs in 2022. Companies may face a continued increase in liquidity needs if interest rates rise further, see chart 24. Danmarks Nationalbank has previously analysed the importance of pension and life insurance companies being able to handle the liquidity needs associated with variation margin calls from their derivative contracts.[29]

Continued robust liquidity coverage in the event of further interest rate increases

Chart 24



Note: The pension and life insurance companies ' aggregate variation margin call (VM) based on Solvency II data. The blue line indicates the market value of the liquid assets held by the institutions, defined as Danish and German government bonds, Danish mortgage bonds and cash. From the end of 2021, interest rates have increased by around 250 basis points. Calculations are based on data from the end of 2021, but has been corrected based on a new starting point at the end of the third quarter of 2022.

Source: Danmarks Nationalbank, the Danish Financial Supervisory Authority, Refinitiv and own calculations.

Pension and life insurance companies need to focus on number of repo counterparties

To date, Pension and life insurance companies have been exempt from the requirement to provide cash for the variation margin calls as part of the implementation of the European Market Infrastructure Regulation (EMIR). This exemption expires in June 2023, after which all new interest rate swaps denominated in euro must be cleared centrally. After that

27 The covered bonds are instead classified as covered bonds complying with the Covered Bond Directive (ROs). ROs do not have the same status as they are subject to softer regulatory requirements and are therefore considered as less liquid.

28 The liquidity requirements of mortgage credit institutions are the OC requirement, the supplementary collateral requirement, the LCR and the Pillar II liquidity requirement. These requirements must be stacked, meaning that the same assets cannot be used to meet several of the requirements.

29 See Danmarks Nationalbank, Pension companies will have large liquidity needs if interest rates rise, *Danmarks Nationalbank Analysis*, No. 23, November 2019 (*link*).

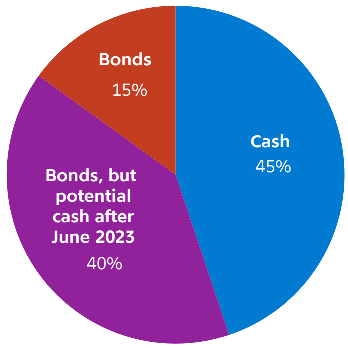
date, it will only be allowed to provide variation margin calls in cash for new agreements, whereas bonds can still be used as collateral for existing agreements going forward. Over a period of years, the old agreements will gradually be replaced by new agreements, which will lead to an increased need for cash from June 2023, see chart 28.

Companies have only limited cash holdings, for which reason it is essential that they secure access to liquidity via repo markets to meet variation margin calls. Despite the fact that it has been known for several years that the EMIR will be implemented, some companies still have only one or few repo counterparties as providers for access to liquidity.

Several banks are working to develop a setup that allows pension and life insurance companies to access centrally cleared repo transactions via the banks. In these cases, the companies will be indirect participants without the operational obligations arising from direct participation, such as tests of contingency plans and sharing of the risk of loss with third parties.

If it is not possible for pension and life insurance companies to obtain reasonable access to liquidity, it may be necessary to reduce their use of derivatives.

Liquidity needs will gradually increase from June 2023 as new interest swap agreements in Euros are purchased Chart 25



Note: The distribution of assets used by pension and life insurance companies for clearing interest derivatives calculated end of 2022. From June 2023, 40 per cent of the companies' interest derivatives will gradually be cleared with cash rather than bonds. It will take about 5-15 years.
Source: Danmarks Nationalbank, the Danish Financial Supervisory Authority, Refinitiv and own calculations.

Higher impairment charges will reduce impact of rising net interest income

The profit before tax decreased for systemic credit institutions in the 1st half of 2022, see chart 26. The result for the first half of the year corresponds to an annual return on equity of 6.6 per cent. Negative value adjustments have contributed to the decline and should be seen in the light of large fluctuations in the financial markets and price declines.

On the other hand, the result is supported by early signs of increasing core earnings. The increase in core earnings reflects that the institutions are once again able to make more money from their core business. This has contributed to several institutions raising their earnings guidance for 2022 despite negative value adjustments.

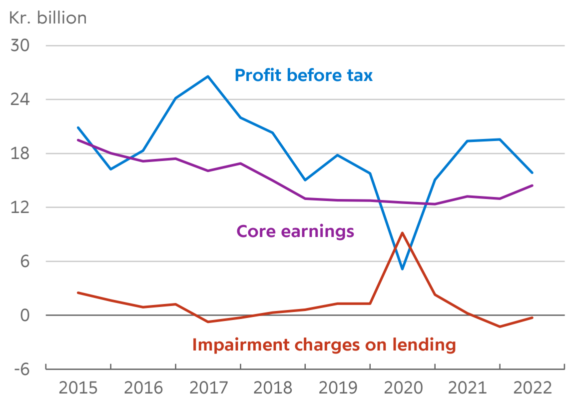
Core earnings have benefitted from, among other things, increased net interest income. Several of the systemic credit institutions have raised deposit and lending rates in the wake of Danmarks Nationalbank's interest rate hikes in July, September and October. Following this, the deposit rate for a number of private and corporate customers is now no longer negative. However, deposit rates have generally risen less than money market interest rates, thereby increasing deposit margins.

Higher interest rates add to net interest income

The higher interest rates increase net interest income; however, not necessarily with a full pass-through to earnings, as higher interest rates and

Decline in credit institutions' profits in 1st half of 2022

Chart 26



Note: Half-yearly data for systemic credit institutions. Profit before tax has been adjusted for goodwill impairment charges. 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. The most recent observations are from the 1st half of 2022.

Source: Danmarks Nationalbank and own calculations.

weaker economic growth can also lead to higher impairment charges.[30]

A simple projection of the net interest income of five systemic credit institutions[31] shows that annual net interest income may increase by kr. 16 and 17 billion, respectively, in 2023 and 2024 if the money market interest rate increases by 2.6 percentage points, see chart 27.[32] In the years leading up to the financial crisis, when money market interest rates rose by around 3 percentage points, net interest income increased by the same order of magnitude.

The increase in net interest income in 2023 and 2024 can mainly be attributed to the institutions having more interest-bearing assets than liabilities. See box 4 for a more detailed description of method and drivers.

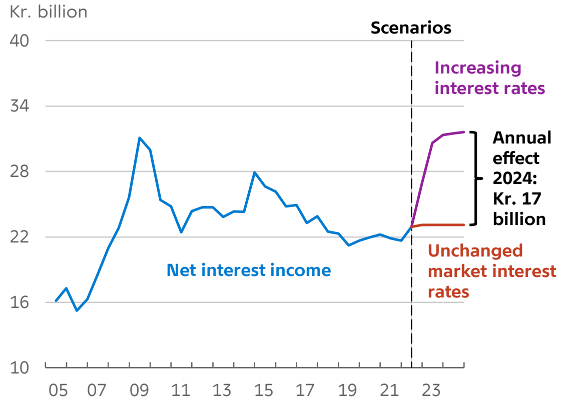
Low impairment charges continue to support earnings

Since the end of 2020, the institutions' total impairment charges and provisions on loans and guarantees have remained largely unchanged, see chart 28. This covers, among other things, reversals of impairment charges for the coronavirus crisis on the one hand and new impairment charges for macroeconomic and geopolitical risks on the other.

Institutions must take into account expectations for future developments when determining their impairment needs.[33] The institutions may apply

Higher interest rates expected to increase net interest income

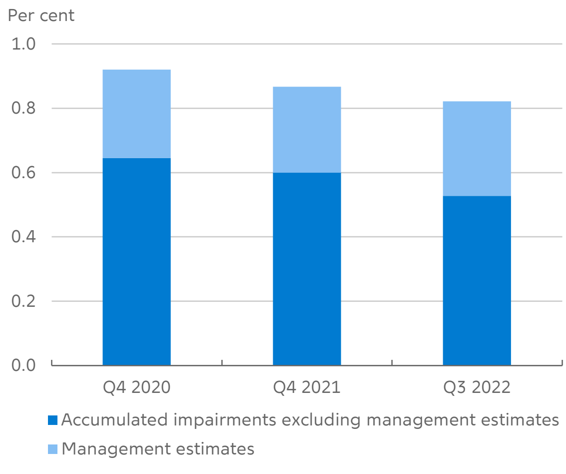
Chart 27



Note: Half-yearly data for Danske Bank, Nykredit Realkredit, Jyske Bank, Sydbank and Spar Nord. See box 4 for a more detailed description of the calculation method. The most recent observations are from the 1st half of 2022.
Source: Danmarks Nationalbank and own calculations.

Institutions' total impairment charges are roughly unchanged

Chart 28



Note: Total impairment charges and provisions on loans and guarantees etc. as a percentage of loans and guarantees (gross) for the systemic credit institutions, excluding Nordea Kredit and Arbejdernes Landsbank. Management estimates include adjustments to impairment models.
Source: Banks' financial statements and own calculations.

30 The effect on banks' earnings of higher interest rates has previously been the focus of international studies. Borio et al. (2017) have, for example, found a positive correlation between higher interest rates and a steeper yield curve on the one hand and banks' profitability on the other. The effect is most pronounced in a situation with low interest rates and a flat yield curve. See Borio, C., Gambacorta, L., Hofmann, B., The influence of monetary policy on bank profitability, *International Finance*, 2017; 20: 48-63 (*link*). The ECB has also found that higher interest rates will have a positive impact on banks' net interest income over a period of several years. See ECB, Sensitivity Analysis of IRRBB – Stress test 2017 (*link*).

31 Danske Bank, Nykredit Realkredit, Jyske Bank, Sydbank and Spar Nord.

32 The short-term money market interest rate is expected to rise from around -0.4 per cent in the first half of 2022 to 2.2 per cent in 2024. The market rate in 2023 is based on the forward curve in Danmarks Nationalbank's latest projection from September 2022, after which the market rate will remain unchanged in 2024.

33 See Danmarks Nationalbank, Financial Stability 2nd half 2014, *Danmarks Nationalbank Analysis*, December 2014 (*link*), for a description of the accounting treatment of financial instruments, IFRS which came into force in 2018.

management estimates if expected credit losses are not captured by the impairment models, due to, for example, increased macroeconomic risks.

Despite impairment charges related to macroeconomic and geopolitical risks, the earnings of systemic credit institutions have overall been propped up by net reversals in the 1st half of 2022, see chart 26.

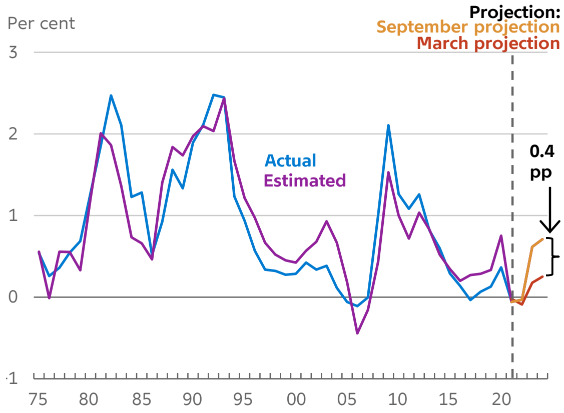
However, higher interest rates, high inflation and the prospect of an economic dampening are expected to reduce some customers' debt service capacity, as described in previous sections on credit to households and businesses. This entails a risk that the institutions will have to recognise further impairment charges. In Danmarks Nationalbank's lending survey, banks also indicated that they expect a certain increase in the share of impairment charges and losses on private and business lending in the 4th quarter of 2022.[34]

Deteriorating macroeconomic conditions may increase institutions' impairment charges

In Danmarks Nationalbank's latest projection, the growth estimate for the Danish economy was revised downwards compared to the projection from March 2022.[35] Based on a simple estimate, reduced economic growth of that magnitude is estimated in isolation to increase the annual impairment charge ratio on bank loans by just over 0.4 percentage points in both 2023 and 2024, see chart 29. For five systemic credit institutions,[36] this corresponds to an annual increase in impairment charges of almost kr. 7 billion in 2023 and 2024. A similar estimate for mortgage lending shows an annual increase in the five institutions' impairment charges of kr. 3 billion over the same period.[37]

Weakened outlook for Danish economy may increase impairment charges on bank lending

Chart 29



Note: Annual impairment charges on banks' loans as a percentage of loans and guarantees taken to income statement. The estimated relation for the impairment ratio includes GDP, unemployment rate and house prices as explanatory variables. The estimation period is 1975-2019. The deteriorated macroeconomic outlook is based on differences between Danmarks Nationalbank's September and March 2022 projections. The latest observation for the historical development is 2021.

Source: Danmarks Nationalbank and own calculations.

34 See Danmarks Nationalbank, Stricter requirements for private customers' economy, *Danmarks Nationalbank Lending Survey*, 3rd quarter 2022 (*link*), for further information on results regarding private customers.

35 See Danmarks Nationalbank, The pressure on the economy should be eased, *Danmarks Nationalbank Analysis (Outlook for the Danish economy)*, No. 11, September 2022 (*link*), for a more detailed description of Danmarks Nationalbank's projection for the Danish economy.

36 Danske Bank, Nykredit Realkredit, Jyske Bank, Sydbank and Spar-Nord. Institution-specific conditions are not taken into account in the calculation of the impairment level.

37 Adjustments have been made for mortgage-like lending on the bank balance sheet. Bank lending includes loans to households, non-financial undertakings and the public sector.

However, the earnings impact may be smaller, as some of the impairment charges may already be included in management estimates or in the institutions' existing impairment scenarios.

Larger losses may dampen positive earnings effect from higher interest rates
A significant deterioration in the business cycle situation, combined with falling asset prices, will increase impairment charges and losses. In the long term, this may dampen the positive earnings effect from higher interest rates. The cyclical position may also affect other components of the institutions' earnings, such as net fee and commission income. Danmarks Nationalbank's stress test sheds light on how severe macroeconomic stress with higher interest rates affects banks' capitalisation.

Effect of higher interest rates on net interest income – how we proceeded

Box 4

In addition to the stress test model, Danmarks Nationalbank uses individual banking models for five systemic credit institutions, where the level of detail is greater than in the stress test. These models allow Danmarks Nationalbank to project the balance sheet and income statement. Based on this model framework, the effect of higher interest rates on institutions' net interest income is quantified. The scenario is based on an increasing money market interest rate, which is assumed to increase from around -0.4 per cent in the 1st half of 2022 to 2.2 per cent in 2024. The calculations are based on a static balance sheet and should not be confused with an actual projection.

The following is assumed about the pass-through from the money market interest rate to the other interest rates in the model:

- The deposit margin for households is increased to 1 percentage point in line with the increase in monetary policy interest rates. This corresponds to the average margin from 2003-2008, see chart A.
- The deposit margin for businesses is set to 0.5 percentage points, which was the level from 2003-2008, and which is not far from the current level, see chart A.
- The pass-through to lending rates is assumed to be 90 per cent and 78 per cent, respectively, for households and businesses.[1]
- Full pass-through to the other interest-bearing assets and liabilities, which includes a simplistic assumption that all the institutions' funding issuances have been swapped to a short-term interest rate.

The scenario is compared with an alternative scenario where the money market interest rate is maintained at the level from the 1st half of 2022. In chart B, the total effect of approx. kr. 17 billion is decomposed into the following three channels: The direct effect of the rising money market interest rate, which is primarily attributable to the fact that institutions have more interest-bearing assets than liabilities, the effect of a normalisation of the deposit margin and the effect of the lower lending margin.

Chart A
Banks' deposit margins are estimated to increase, while lending margins will fall slightly

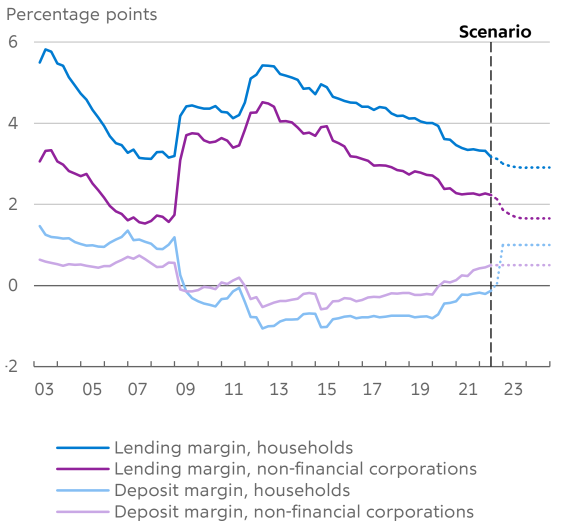
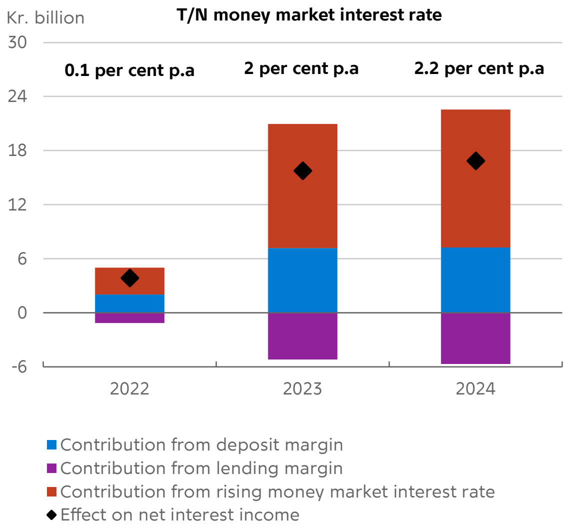


Chart B
Rising market interest rates contribute significantly to higher net interest income



Note: Chart A: Quarterly data for Danske Bank, Jyske Bank, Nykredit Bank, Sydbank and Spar Nord. The lending margin is defined as the difference between the average lending rate on loans denominated in Danish kroner to domestic households and non-financial corporations respectively and the T/N money market interest rate. Similarly, the deposit margin is calculated as the difference between the T/N money market interest rate and the deposit rates on deposits denominated in Danish kroner but with opposite sign. The most recent observations are from 1st half 2022. Chart B: Decomposition of change in net interest income for Danske Bank, Nykredit Realkredit, Jyske Bank, Sydbank and Spar Nord at consolidated level.

Source: Danmarks Nationalbank and own calculations.

1. See Danmarks Nationalbank, How does monetary policy work in Denmark?, *Danmarks Nationalbank Quarterly Review*, 2nd Quarter, Part 2, 2011 (*link*).

Some systemic institutions will be challenged by a severe recession

The capital position of credit institutions has generally been strengthened following adjustments of regulatory requirements since the financial crisis. Adjustments of both the quality and quantity of capital requirements have strengthened banks' ability to absorb losses, thereby contributing to the resilience of the banking system. However, the weaker economic outlook and high volatility in financial markets require banks to exercise caution in their capital planning in the period ahead.

Institutions have capital to build up countercyclical capital buffer
The countercyclical capital buffer is an important instrument to ensure sufficient resilience in the financial sector in the event of the materialization of risk and losses. The buffer differs from other capital requirements in that it varies in line with the development of cyclical systemic risks. The buffer aims to mitigate the negative impact on the real economy of stress in the financial system. This improves the ability of banks to maintain an adequate level of credit granting. However, to achieve this, the buffer must be built up before the systemic risks materialise.

The countercyclical capital buffer in Denmark will gradually be rebuilt to 2.5 per cent between now and March 2023.[38] The current excess capital of all systemic banks relative to the capital requirement is sufficient to meet the fully phased-in countercyclical capital buffer, see chart 30.

Important for institutions to ensure sufficient excess capital relative to risk-based MREL
In addition to the capital requirements, the institutions must meet an aggregate requirement for their eligible liabilities, the risk-based MREL.[39] The excess capital to the their risk-based MREL is generally lower than for their capital requirements, with an average excess capital of just over 4 per cent, see chart 31.

The maturity of senior debt over the coming quarters will further reduce banks' excess funds relative to the risk-based MREL. Some institutions are thus

38 See press release from the 36th meeting of the Systemic Risk Council (*link*) (in Danish).

39 The risk-based MREL covers the bank's MREL calculated on the basis of its solvency requirements and capital buffer requirements plus the mortgage credit institution's total capital requirements and debt buffer requirements.

dependent on debt issuances or significant accumulation of capital in order to accommodate the increase in the countercyclical capital buffer between now and March 2023.

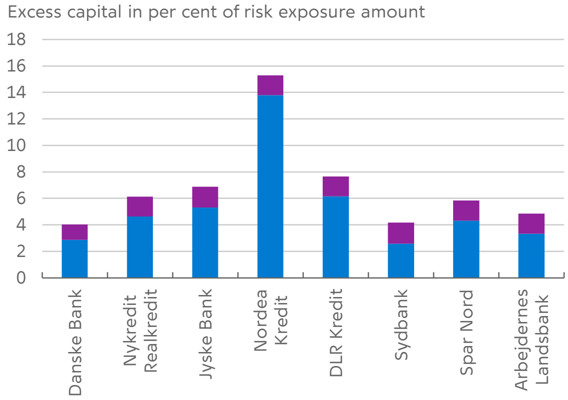
It is particularly problematic if banks depend on market access within a short period of time to meet their risk-based MREL.[40] This should be avoided by building up sufficient excess capital relative to the requirement and ensuring a sufficiently long maturity profile on senior issuances.

Weakened macroeconomic outlook reflected in stress scenarios

To assess the robustness of the financial sector's capitalisation and ability to absorb losses, Danmarks Nationalbank conducts a stress test of the Danish banking sector every six months.[41] The stress test examines whether the institutions are sufficiently capitalised in different scenarios. This stress test contains three scenarios consisting of 1) a baseline scenario that follows Danmarks Nationalbank's latest projection[42], 2) a scenario with a larger economic downturn than in the baseline scenario and a significant interest rate increase from the first half of 2023 (recession), and 3) a scenario where the Danish economy is hit by a severe economic downturn and some interest rate increases in the second half of 2023 (severe recession), see chart 32.[43]

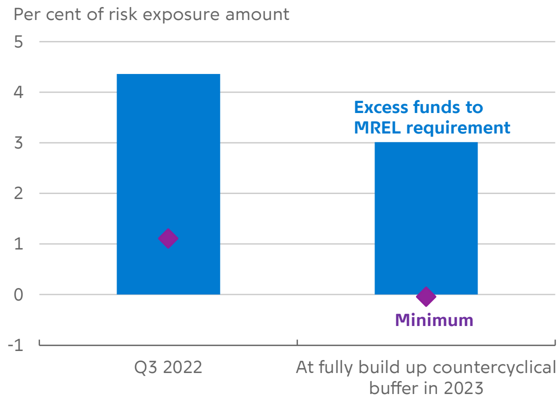
The choice of scenarios and the calibration of individual variables generally reflect the uncertainty surrounding the macroeconomic outlook. For example, the fall in house prices in the severe recession has been increased slightly compared to the June 2022 stress test to address the uncertainty surrounding the impact of higher interest rates on the housing market.

Excess capital adequacy is sufficient to meet build-up of countercyclical buffer Chart 30



Note: The excess capital is calculated as the difference between CET1 capital and the CET1 capital requirement with a fully phased-in countercyclical buffer per 30 September 2022 and fully phased-in buffer rate respectively. The CET1 capital need is the CET1 capital requirement plus the part of the Additional Tier 1 capital and T2 supplementary capital requirements which are met by CET1 capital.
Source: Danmarks Nationalbank and own calculations.

A number of institutions have limited excess capital relative to the risk-based MREL following build-up of countercyclical buffer Chart 31



Note: The excess capital is calculated as the difference between the institutions' total MREL-funds as of 3rd quarter 2022 and their risk-based MREL based on the Danish Financial Supervisory Authority's MREL-decisions for 2022 plus the combined buffer requirement. The excess capital in case of a fully built-up countercyclical buffer therefore does not take into account any adjustments to the institution-specific MREL-requirements for 2023.
Source: Danmarks Nationalbank and own calculations.

40 If an institution fails to meet the MREL, the Danish Financial Supervisory Authority will, as a general rule, require the institution to implement measures to ensure that the institution can again meet the MREL. For example, through the injection of new capital or selling off assets. In the worst-case scenario, control may be transferred to Finansiel Stabilitet for winding-up.

41 See Appendix 1 for an overview of the institutions that constitute the stress test population.

42 Danmarks Nationalbank, The pressure on the economy should be eased, *Danmarks Nationalbank Analysis (Outlook for the Danish economy)*, No. 11, September 2022 *(link)*.

43 See Appendix 2 for a detailed description of the stress test scenarios.

Severe recession will challenge some systemic credit institutions

The stress test shows that all institutions are prepared for a recession with significant excess capital relative to the risk-based capital buffer requirements if the countercyclical capital buffer is released. A severe recession also leaves excess capital for systemic credit institutions, see chart 33. However, some of the institutions will be challenged and come close to the applicable capital buffer requirements.[44]

In the stress test scenarios, the capitalisation of individual banks is supported by the expected positive effect of higher interest rates. Their earnings will therefore be higher and provide a stronger defence against losses.

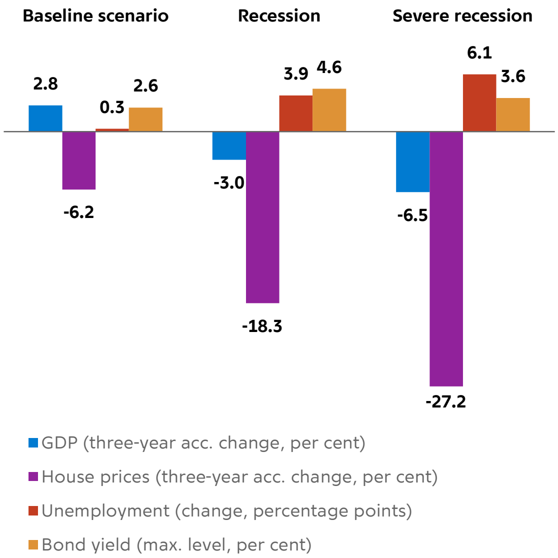
Stress test shows the importance of an effective countercyclical buffer

The effect of the countercyclical capital buffer being released is clearly seen in both recession scenarios, see chart 34. In the severe recession scenario, a release would ensure that no institution fails to meet their capital requirements. If the buffer is not released, the shortfall for the systemic credit institutions will be around kr. 10 billion.[45] Releasing the countercyclical capital buffer will therefore ensure that banks have more room to absorb losses and maintain an adequate excess capital relative to the capital requirements.

A key assumption in the stress test is that the release of the countercyclical capital buffer results in a corresponding decrease in the binding capital requirements of the individual institutions. In practice, the effect of releasing the countercyclical capital buffer in Denmark may be limited due to the interaction with other parallel requirements, such as the leverage ratio requirement.

Macroeconomic scenarios in stress test

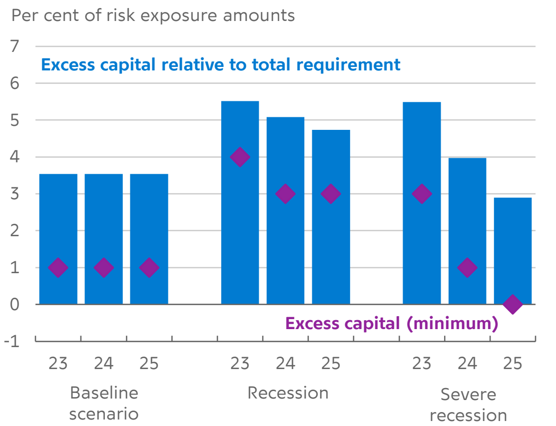
Chart 32



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

Some systemic credit institutions come close to buffer requirements in severe recession scenario

Chart 33



Note: The chart shows the excess capital adequacy or capital shortfall of the systemic credit institutions that either have excess capital adequacy or a capital shortfall as a percentage of their total risk exposure amounts. The minimum value indicates the excess capital adequacy of the institution having the lowest one at the end of each year. Thus, these are not necessarily observations for the same institute. The excess capital adequacy in 2024 is higher in the recession scenarios than in the baseline scenario because the countercyclical capital buffer is presumed to have been released in both recession scenarios.
Source: Danmarks Nationalbank and own calculations.

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44 Failure to meet capital buffer requirements is not in itself critical to the institution's survival going forward. If a bank's capital ratio falls below the buffer requirement, a number of restrictions will be imposed, e.g. in relation to dividend payments and interest payments on hybrid capital instruments. For further information on the consequences of a breach of capital requirements, see the memo from the Danish Financial Supervisory Authority on its expectations for capital plans and targets (*link*) (in Danish).

45 Releasing the countercyclical capital buffer requires a concrete overall assessment of the economic situation and the expected impact on the financial sector.

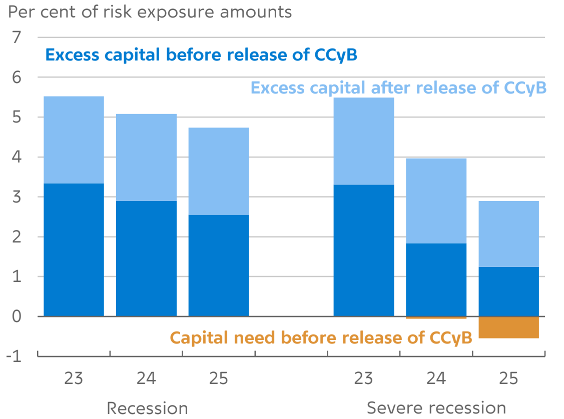
The results of the stress test clearly show the importance of an effective countercyclical buffer which, when released, provides the intended capital relief. Capital buffers are an important tool for dealing with crises, and regulatory adjustments should aim at achieving more effective buffers in general.[46]

Banking package introduces additional capitalisation requirements in 2025
In addition to the capital effect of a severe recession scenario, individual institutions must also have sufficient capacity to meet future regulatory requirements. The European Commission's banking package is expected to enter into force on 1 January 2025 and will have an immediate capital impact with the introduction of new standard and internal methodologies for the individual risk types.

In particular, it appears that the revised market risk framework will increase Danish institutions' capital requirements in 2025. The total increase in the capital requirement in 2025 for systemic institutions is estimated at nearly kr. 6 billion.[47] For individual institutions, the effect of the banking package in combination with a severe recession will make it difficult for them to meet their combined buffer requirements – even if the countercyclical capital buffer is released, see chart 35. In addition, some of the other institutions will come close to their capital requirements.

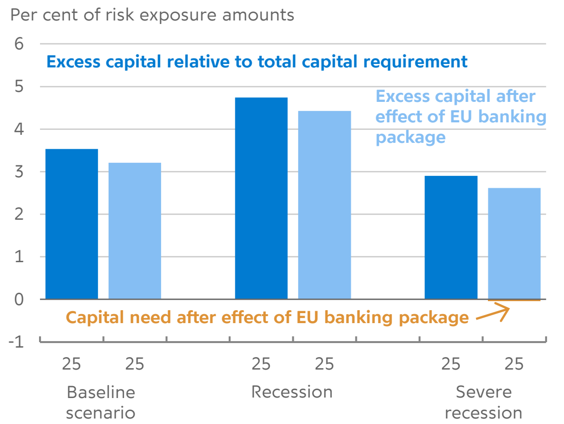
The uncertainties surrounding the final effects of the package therefore underline the need for banks in general to exercise caution in their capital planning and for some institutions to increase their capital. Given the weaker economic outlook, institutions should be cautious when it comes to large dividend payments and share buy-backs. Intact buffers give individual institutions more flexibility to support credit granting through a recession.

Release of the countercyclical capital buffer (CCyB) increases excess capital adequacy relative to capital requirements and reduces capital needs in a severe recession Chart 34



Note: The chart shows the excess capital adequacy or capital shortfall of the systemic credit institutions that either have excess capital adequacy or a capital shortfall as a percentage of their total risk exposure amounts. The stress test takes into account expectations for the build-up of the countercyclical capital buffer (CCyB).
Source: Danmarks Nationalbank and own calculations.

Impact of banking package in 2025 will lead to breach of capital requirements in severe recession Chart 35



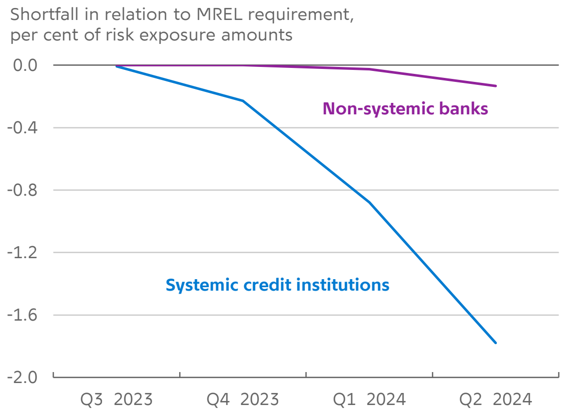
Note: The chart shows the excess capital or capital shortfall of systemic credit institutions in 2025, which includes, in addition to the capital effect of a severe recession scenario, the effects of the banking package. The countercyclical capital buffer is assumed to have been released in both recession scenarios.
Source: Danmarks Nationalbank and own calculations.

46 For a further discussion of this, see Danmarks Nationalbank, Regulatory adjustments are to contribute to more effective capital buffers, *Danmarks Nationalbank Analysis*, No. 9, August 2022 *(link)*.

47 Assuming that the countercyclical capital buffer rate is 0 per cent.

Several institutions cannot meet total MREL during a period with stress and market turbulence
During periods with severe fluctuations in the financial markets where refinancing expired issuances may be difficult, the institutions must still be able to meet their total MREL.[48] The stress test shows that several systemic credit institutions and some of the non-systemic banks will not be able to meet their total MREL during a one-year period with stress and limited possibility of issuing new debt instruments, see chart 36.[49] However, this is only a breach of the buffer requirement in addition to the MREL.[50] In the severe recession scenario, the systemic credit institutions will have a shortfall in relation to the buffer requirement in addition to the MREL of approx. kr. 33 billion in the 2nd half of 2024.

Several systemic credit institutions challenged by MREL Chart 36



Note: The shortfall in relation to the total MREL is defined as the amount by which the institutions (systemic and non-systemic) fall short of meeting the total MREL, divided by their total risk exposure amounts. The shortfall reflects both the maturity of existing issuances and capital loss due to stress.
Source: Danmarks Nationalbank and own calculations.

48 The total MREL covers the risk-based MREL as well as any adjustment required to meet the 8 per cent requirement for groups with mortgage credit institutions.

49 The institutions are not assumed to be able to issue new debt instruments in the period from the 2nd half of 2023 up to and including the 1st half of 2024.

50 If an institution only breaches the buffer requirement, the consequences will to a large extent be similar to the consequences of a breach of the buffer requirement in addition to the capital requirement.

Financial institutions need to address climate-related risks

Climate change and the consequences of the green transition have the potential to influence financial stability. It is important for the individual financial institution to manage the climate-related risks that are significant to their business. Therefore, they need to develop capacity to identify and analyse possible risks and their potential consequences. Many financial institutions are in the process of identifying which climate-related risks are relevant to them, but there is still a lot to be done in terms of managing these risks.

Climate-related risks must be managed as part of the ongoing risk management procedures

Managing significant risks of loss is part of the ongoing risk management in banks. This could, for example, take the form of well-known measures such as limiting the exposure to a risk and increasing provisions for losses or including the risk in the calculations forming the basis of risk weights to increase capital adequacy. Climate-related financial risks need to be addressed in line with other risks.

As such, climate-related risks are not new. Financial institutions have previously suffered losses as a result of natural disasters and have for example felt the consequences of rapidly rising energy prices earlier this year. But climate change differs from conventional risks in that the scale and frequency of climate-related events are expected to grow to unprecedented levels. As a result, management of climate-related risks cannot be based on previous experience and data alone. For the same reason, investors' uncertainty about future developments may lead to sudden changes in expectations and price corrections in the financial markets.

In 2020, Danmarks Nationalbank assessed that banks were well-prepared for transition risks in the short and medium term, and the ECB has subsequently described how the green transition as a whole poses a limited risk for banks in the euro area.[51] The ECB also assesses that the long-term financial risks from climate change are substantially greater than the risks stemming from the green transition.

51 See Danmarks Nationalbank, A gradual green transition supports financial stability, *Danmarks Nationalbank Analysis*, November 2020 (*link*) and ECB/ESRB Project Team on climate risk monitoring, Climate-related risk and financial stability, 2021 (*link*).

Danmarks Nationalbank has initiated work to identify the climate-related financial risks that are deemed to potentially be significant for the financial system in Denmark. Box 6 shows the climate-related financial risks that are currently identified to be the most important risks. The overview is based on an assessment of the likelihood of:

- A climate-related event happening.
- The event can imply challenges for parts of the economy.
- These challenges can have significant financial implications.

All three probabilities must be greater than zero for there to be a risk to the financial sector.

Some businesses may be affected by higher costs of greenhouse gas emissions

As a result of the green transition, the cost of greenhouse gas emissions is expected to rise significantly. Thus, emission-intensive businesses will have to change their behaviour and employ new technologies in the future. For those that fail to adjust their production processes, rising costs may put pressure on their profitability. The value of physical assets in emission-intensive production could also decline significantly – also reffered to as stranded assets. This will be the case if the transition means that these assets cannot be used profitably or resold for other purposes.

Credit institutions lend to businesses in the emission-intensive industries, such as maritime transport, aviation, agriculture and horticulture, concrete and bricks, electricity supply and land transport. Some institutions also help fund oil and gas extraction activities.

In addition, rising emission costs may cause price of financial assets to drop

Institutional investors such as pension and insurance companies as well as investment funds have invested in financial assets issued, among other things, in the above-mentioned emission-intensive industries, especially abroad. The price of financial assets may

Five significant climate-related risks for the Danish financial sector Box 5

Risk	Description	Type of climate risk	Type of financial risk	Timeframe
Higher cost of emissions	Declining corporate earnings due to higher greenhouse gas emission costs	Transition	Credit risks	Short
Price decline on financial assets	Declining corporate earnings due to higher costs of emissions and climate change and green abroad	Transition	Market risks	Short
Global climate change and transition	Corporate losses due to disruptions in international value chains caused by climate change and green transition abroad	Climate change/ transition	Credit risks	Long/ short
Vulnerability towards multiple interacting risks	For example, declining earnings in agriculture due to the materialisation of climate risks, such as drought, extreme rain, higher costs of emissions and more volatile energy prices	Climate change/ transition	Credit risks	Medium
Energy requirements for buildings	Decrease in the value of real estate due to stricter energy source and efficiency requirements in buildings	Transition	Credit risks	Medium

Note: Risks are listed in non-priority order.

fall as a result of declining corporate earnings. The mere expectation that it may not be possible in future to use the capital stock profitably could cause the value of the relevant financial assets to plummet.

Consequences of global climate change may have an impact on the financial sector in Denmark

Denmark is a small open economy with large international capital movements. The dependence of the Danish economy on conditions abroad increases vulnerability towards climate-related risks in other countries. For example, insurance and pension companies' investments abroad accounted for 54 per cent of their total portfolio at the end of June 2022. The value of these assets is sensitive to climate change and the green transition in the respective countries.

In addition, Danish companies can, via global value chains, be affected by climate-related events, which for example may affect a foreign subcontractor or a buyer of Danish-produced intermediate products. Many Danish businesses take part in the international trade in goods and services, and financial institutions are exposed to them (e.g. by way of loans, credits, equities, corporate bonds). In addition, there may be risks associated with a green transition that is not coordinated internationally. If Denmark implements climate policy before and/or to a greater extent than our trading partners, this could worsen the conditions for Danish companies.

Materialisation of multiple simultaneous climate-related risks can impact agriculture

Several physical climate events and/or events associated with the transition may occur at the same time. Agriculture is particularly exposed to simultaneous risks. For example, periods of extensive drought can reduce harvest yields. At the same time, agriculture is relatively energy- and emission intensive and is thus vulnerable to increasing costs via these channels. This summer have shown how drought can also contribute to increasing electricity prices. In addition, this industry can be affected by a possible taxation of greenhouse gas emissions and other climate measures. Agriculture is already highly indebted, and some credit institutions have a significant credit risk as a result of their lending to this industry.[52]

Energy-efficient buildings targets will require major energy renovation efforts

Energy consumption associated with the use of buildings represents a significant share of total greenhouse gas emissions. Against this background, the EU has a goal of keeping the building stock close to energy-neutral and fossil-free by 2050.[53] Reducing emissions from buildings can be achieved, among other things, by tightening the regulations for new construction and encouraging massive energy renovations of the existing building stock. At the same time, green and efficient energy sources could be installed.

Real estate constitutes the security behind the majority of credit institutions' lending. Investments in energy renovations are usually profitable in the long term, but require access to financing and a sufficient debt servicing capacity. If the energy renovations are not carried out, the mortgage values behind some loans can decrease and thereby increase the risk of loss if the borrower cannot repay the loan. For more information about possible consequences for credit institutions, see box 6.

52 See, for example, Danmarks Nationalbank's latest assessment of the financial situation for agriculture in Danmarks Nationalbank, Low interest rates and ample lending capacity put pressure on loan standards, *Danmarks Nationalbank Analysis*, November 2018 *(link)*.

53 See more about the EU's climate targets for the building stock and proposed amendments to the EPBD (*link*).

Box 6

EU energy efficiency proposals could reduce the mortgage value behind some housing loans

The European Commission has proposed new energy improvements to the least energy-efficient part of the building stock.[1] The proposal means that the energy labels of these buildings must have improved by one class on the label scale by 2030 and by another class by 2033. The proposal is being negotiated currently with the European Parliament and the Council of Ministers. Only after a final adoption, the political negotiations in Denmark about the implementation can start. If the EU Commission's proposal is adopted, the credit institutes should, in their risk assessment, take into account, that the mortgage value behind some mortgage loans may drop as a result. This may, for example, be the case if the energy label cannot be increased by carrying out profitable energy renovations, or if the home owner is not considered to have access to the necessary financing.

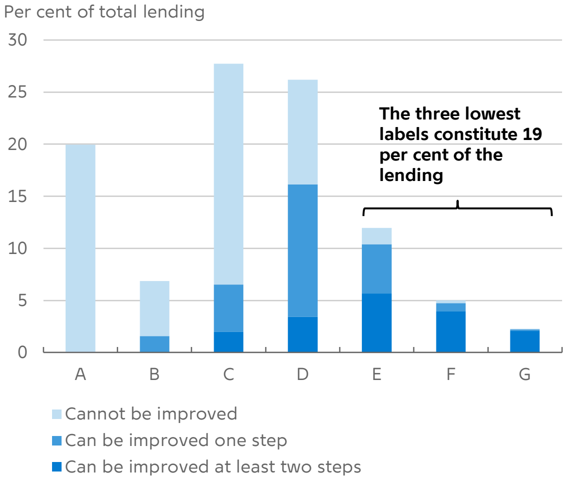
Based on the energy reports for homes, Danmarks Nationalbank estimates that the homeowners behind approx. 79 per cent of the lending in the three lowest energy classes, E-G, can improve their energy label by at least one class through profitable renovations, see chart to the right. About 61 per cent of homeowners can improve their energy label by two classes.

A study of sales of single-family homes in the 2014-2020 period shows that pricing in the housing market has often not taken into account the energy efficiency of a house.[2] Most energy renovations have thus increased the sales price by less than the renovation cost. This is particularly so in certain rural areas, e.g. on Lolland, Falster and in parts of southern and western Jutland, where the price per square metre is significantly lower. At the same time, relatively many single-family houses in these areas have a low energy rating and therefore a significant potential for energy renovations that can lower ongoing costs.

Homeowners' focus on energy consumption in the home is expected to increase as a result of rising energy prices. Against this background, energy renovations can also become a more integrated part of pricing in the housing market in future. Energy reports are based on current energy prices at the time when each report was prepared, which is why most have been prepared on the assumption of energy prices being significantly lower than today. If energy prices remain high, even more homeowners will have a financial incentive to energy-renovate. This can support those households that are significantly impacted by rising heating bills, see the section on households.

The analysis is based on microdata comprising all valid energy reports from sparenergi.dk, as well as all housing loans from Danmarks Nationalbank's credit register. The complete dataset contains information on 348,985 single-family homes. According to the Danish Energy Agency, at the last count, there were a total of 406,180 valid energy reports, whereas there are a total of 1,177,486 single-family houses in Denmark in 2022. There is no information available on the energy efficiency of the approximately 65 per cent of single-family houses that do not have valid energy reports.

The majority of the most energy-inefficient homes have potential for profitable energy savings



Anm.: Lending secured by mortgages on detached single-family houses with valid energy labels broken down by current energy label, equal to 35 per cent of lending. The categories show how many steps a home can advance on the energy label scale through profitable renovations, according to the energy report. A profitable renovation is when the home-owner's total savings over the life cycle of the installation equal or exceed the cost of the renovation. Energy label data were collected in 2021, and data on lending are as at the end of the 2nd quarter of 2022.

Kilde: Spareenergi.dk, Danmarks Nationalbank and own calculations.

1. See proposal for a Directive of the European Parliament and of the Council on the energy performance of buildings, Celex no. 52021PC0802 (*link*). It is currently being negotiated how the energy label scale may be revised, and how large a part of the housing stock must improve the energy class. Hence, great uncertainty remains about the extent to which the proposal may end up affecting Danish home owners.
2. See Danmarks Nationalbank, Energy renovations of houses will pay for themselves by the heating bill – not by the sales price, *Danmarks Nationalbank Economic Memo*, No. 10, September 2022 (*link*) and Danmarks Nationalbank, Opportunities and risks in the residential sector during a green transition: House prices, energy renovations and rising energy prices, *Danmarks Nationalbank Working Paper*, No. 190, September 2022 (*link*).

Appendix 1
Analysis data

The analysis applies 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 1.

The analysis of Danish credit institutions' earnings, liquidity and own funds as well as the stress test comprise the eight systemic credit institutions designated by the Danish Financial Supervisory Authority in 2021. In June 2021, Arbejdernes Landsbank was designated as a systemic credit institution by the Danish Financial Supervisory Authority after it had acquired a majority shareholding in Vestjysk Bank. Vestjysk Bank is therefore included under Arbejdernes Landsbank in the analysis. The analysis and stress test also include the non-systemic banks. This group consists of the institutions in group 2 defined by the Danish Financial Supervisory Authority for 2021, with the exception of Saxo Bank and Arbejdernes Landsbank (incl. Vestjysk Bank). Saxo Bank has been omitted due to the bank's business model. Arbejdernes Landsbank has been omitted due to its designation as systemically important. 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 Handelsbanken and Santander Consumer Bank.

Institutions in the analysis by total assets as at 30 June 2022, kr. million

Table 1

Systemic credit institutions	Amount
Danske Bank (incl. Danica)	4,073,992
Nykredit Realkredit	1,588,434
Jyske Bank	667,143
Nordea Kredit	444,410
DLR Kredit	179,807
Sydbank	169,080

Continues …

Institutions in the analysis by total assets as of 30 June 2022, kr. million

… continued

Systemic credit institutions	Amount
Spar Nord	118,845
Arbejdernes Landsbank	106,087
Total systemic credit institutions	7,347,798
Systemic banks	
Danske Bank	2,524,000
Jyske Bank	357,075
Nykredit Bank	220,331
Sydbank	171,046
Spar Nord	118,936
Arbejdernes Landsbank	106,087
Total systemic banks	3,497,475
Non-systemic banks	
Ringkjøbing Landbobank	65,226
Sparekassen Danmark	57,218
Sparekassen Kronjylland	38,329
Lån & Spar Bank	29,372
Sparekassen Sjælland-Fyn A/S	28,442
Middelfart Sparekasse	17,566
Total non-systemic banks	236,152
Mortgage credit institutions	
Nykredit Realkredit	1,493,525
Realkredit Danmark	793,533
Nordea Kredit	444,410
Jyske Realkredit	341,825
DLR Kredit	179,807
Total mortgage credit institutions	3,253,100

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.

Appendix 2
Stress test scenarios

The stress test is based on three scenarios for the macroeconomic development in Denmark over the 2023-2025 period. The three scenarios consist of a baseline scenario that follows Danmarks Nationalbank's latest projection[54], as well as two recession scenarios, where the downturn in one starts at the beginning of 2023 (recession) and in the other six months later (severe recession).[55]

Recession reflects a situation where it will require further interest rate hikes from central banks to bring inflation under control. Interest rates abroad and in Denmark continue to rise in 2023, and are thus 2 percentage points higher over the entire yield curve compared to the baseline scenario. This coincides with the Danish and international economy being impacted by declining confidence among businesses and consumers. Both factors put a damper on economic growth and reduce Danish export market growth, whereby GDP and house prices fall and unemployment rises. The accumulated GDP growth is reduced to -3.0 per cent over a three-year period compared with 2.8 per cent in the baseline scenario. In addition, house prices fall by over 18 per cent over three years.

In the severe recession scenario, a global crisis hits the world economy in the 2nd half of 2023, and the Danish economy experiences a severe downturn. This is combined with an interest rate increase of 1 percentage point over the entire yield curve relative to the baseline scenario. The severe downturn and the dampening effect of the interest rate increase on growth in both Denmark and abroad reduce Danish exports. GDP drops by 6.5 per cent over a three-year period, while the unemployment rate increases by 6.1 percentage points from 2023 to 2025. Finally, house prices fall by over 27 per cent over three years.

Danmarks Nationalbank's method for preparing the severe recession scenario is based on the previous macroeconomic development. For example, this means that there stress is more pronounced after a period with marked growth in the economy. The method focuses on the development in GDP, unemployment and house prices. For each of these variables, a systematic approach is applied to determine benchmarks for their rate of increase (unemployment) or decrease (GDP growth and house prices) over the timeframe covered by the scenarios.[56]

The benchmarks for the three variables are calculated independently of each other. It is possible that the actual development in the key variables deviates slightly from the benchmarks, as the relation of the variables is determined by Danmarks Nationalbank's economic model, MONA. In the scenarios, the variables therefore cannot follow just any development, but must evolve consistently with their interrelationship in MONA.

In this stress test, the GDP benchmark is above the level of the benchmark in the stress test conducted in the spring.[57] This is because the starting point has improved since the last stress test, as there was positive growth in the 1st half of 2022. In the severe recession scenario, the development in GDP and unemployment largely follows the benchmarks. The fall in house prices in the severe recession scenario has been increased relative to the latest stress test to reflect uncertainty about house price developments.[58] Therefore, the fall in house prices deviates from the benchmark in this scenario.

54 Danmarks Nationalbank, The pressure on the economy should be eased, *Danmarks Nationalbank Analysis (Outlook for the Danish economy)*, No. 11, September 2022 (*link*).

55 See table 2 for selected key chartes for the three scenarios.

56 The scenarios are developed in cooperation with the Danish Financial Supervisory Authority. 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*).

57 The impact of the coronavirus pandemic on GDP in the 2nd quarter of 2020 has been taken into account in the calculation of the GDP benchmark.

58 See page 34 of Danmarks Nationalbank, The pressure on the economy should be eased, *Danmarks Nationalbank Analysis (Outlook for the Danish economy)*, No. 11, September 2022 (*link*).

Selected key figures in Danmarks Nationalbank's stress test scenarios

Table 2

	Baseline scenario	Recession	Severe recession
2023			
GDP, per cent year-on-year	-0.1	-1.7	-0.7
Private consumption, per cent year-on-year	0.4	-1.2	-0.2
Export market growth, per cent year-on-year	2.5	-1.3	0.7
House prices, per cent year-on-year	-5.6	-10.7	-8.8
Gross unemployment, per cent of labour force	2.7	3.2	2.9
Average bond yield, per cent p.a.	2.4	3.9	2.6
2024			
GDP, per cent year-on-year	1.2	-2.8	-5.1
Private consumption, per cent year-on-year	1.1	-4.2	-5.4
Export market growth, per cent year-on-year	2.9	-4.0	-10.0
House prices, per cent year-on-year	-1.8	-9.1	-19.7
Gross unemployment, per cent of labour force	3.0	5.7	5.7
Average bond yield, per cent p.a.	2.4	4.4	3.4
2025			
GDP, per cent year-on-year	1.7	1.5	-0.7
Private consumption, per cent year-on-year	1.7	0.2	-2.3
Export market growth, per cent year-on-year	2.6	1.5	-3.6
House prices, per cent year-on-year	1.2	0.5	-0.7
Gross unemployment, per cent of labour force	3.0	7.1	9.0
Average bond yield, per cent p.a.	2.6	4.6	3.6
Cumulative change			
GDP, three-year cumulative change per cent	2.8	-3.0	-6.5
House prices, three-year cumulative change per cent	-6.2	-18.3	-27.2

Note: Annual averages. House prices are cash prices of single-family houses. The baseline scenario follows Danmarks Nationalbank's projection up to 2024, while the development in 2025 is a technical projection. It should be noted that rounding may mean that the stated accumulated growth does not necessarily correspond to the cumulative growth that can be calculated based on the chartes in the table.

PUBLICATIONS

NEWS

News offers quick and accessible insight into an Analysis, an Economic Memo, a Working Paper or a Report from Danmarks Nationalbank. News is published continuously.

ANALYSIS

Analyses from Danmarks Nationalbank focus on economic and financial matters. Some Analyses are published at regular intervals, e.g. *Outlook for the Danish economy* and *Financial stability*. Other Analyses are published continuously.

REPORT

Reports comprise recurring reports and reviews of the functioning of Danmarks Nationalbank and include, for instance, the *Annual report* and the annual publication *Danish government borrowing and debt*.

ECONOMIC MEMO

An Economic Memo is a cross between an Analysis and a Working Paper and often shows the ongoing study of the authors. The publication series is primarily aimed at professionals. Economic Memos are published continuously.

WORKING PAPER

Working Papers present research projects by economists in Danmarks Nationalbank and their associates. The series is primarily targeted at professionals and people with an interest in academia. Working Papers are published continuously.

The analysis consists of a Danish and an English version. In case of doubt regarding the correctness of the translation the Danish version is considered to be binding.

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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.

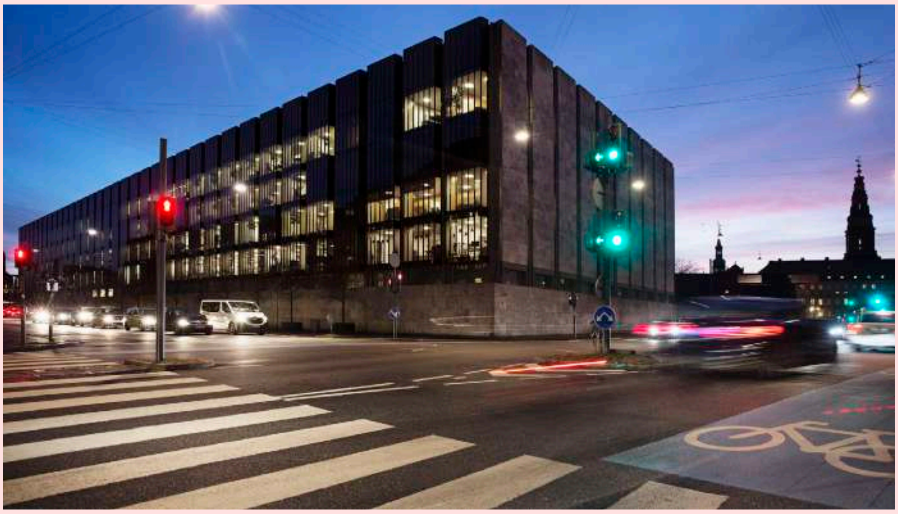
The institutions should exercise prudence in their capital planning

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.

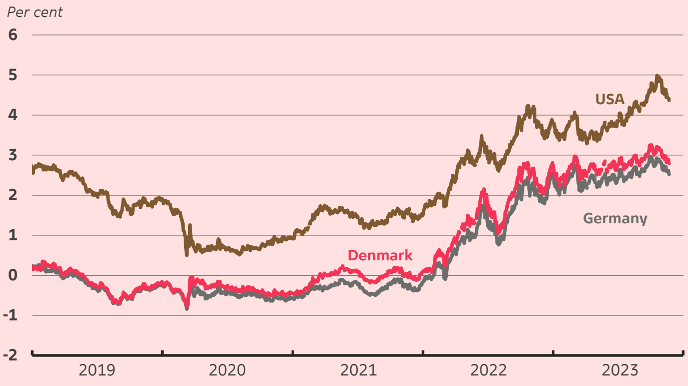
Quantitative tightening could further increase long-term yields

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*).

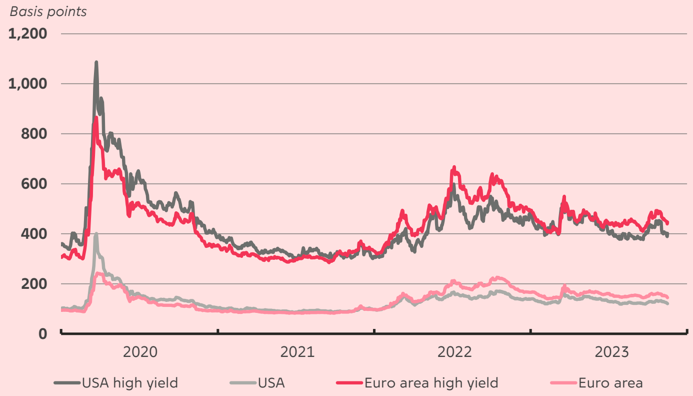
CHART 3

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.

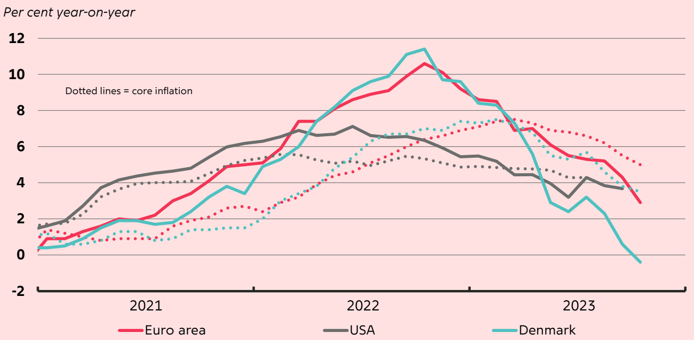
Falling energy prices have pushed down inflation, but core inflation remains high

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

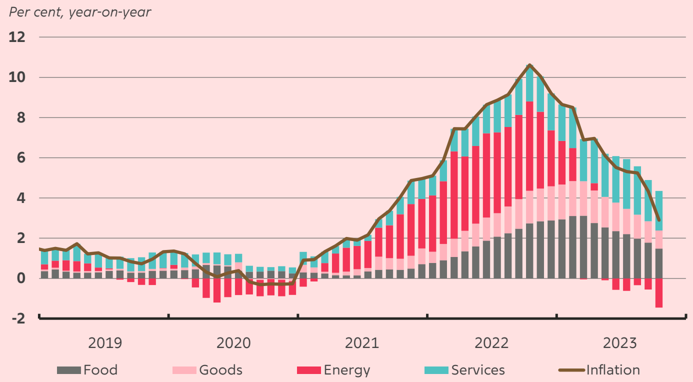
Headline inflation is declining in the euro area and the USA, but core inflation is still high



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

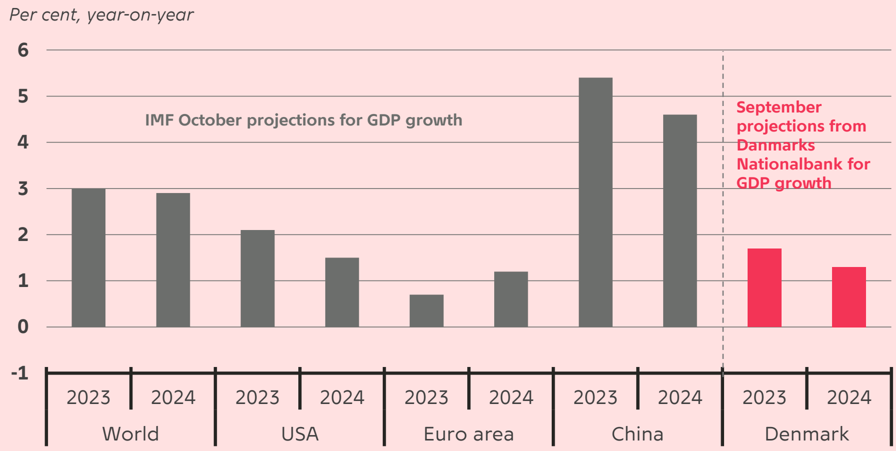
In the latest projection, Danmarks Nationalbank expects a continued slowdown in growth for a while longer, bringing the Danish economy close to a neutral cyclical situation in the course of 2024.[3] Danmarks Nationalbank's projection for the Danish economy assumes that inflation in our trading partner 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.

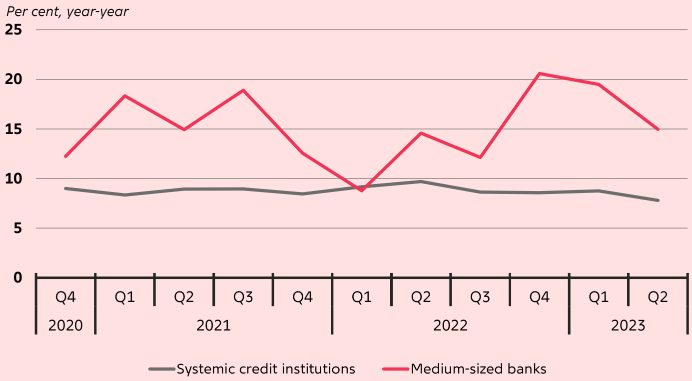
Foreign investors have accounted for almost half of the transactions in the Danish commercial real estate market
In recent years, foreign investors have accounted for almost half of the transactions in the Danish commercial real estate market, measured in Danish kroner, and the proportion has been increasing 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

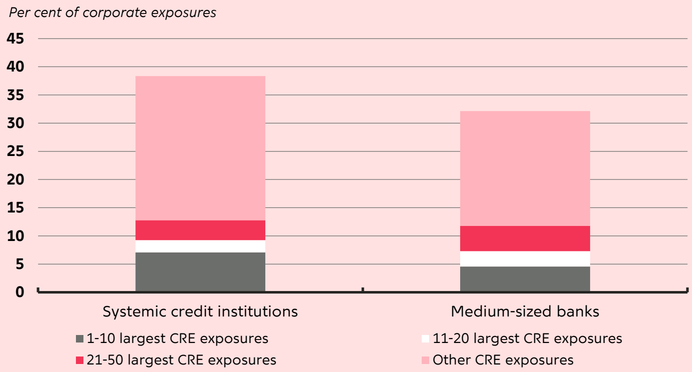
Significant growth in lending to real estate firms from both systemically important credit institutions and medium-sized banks



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.

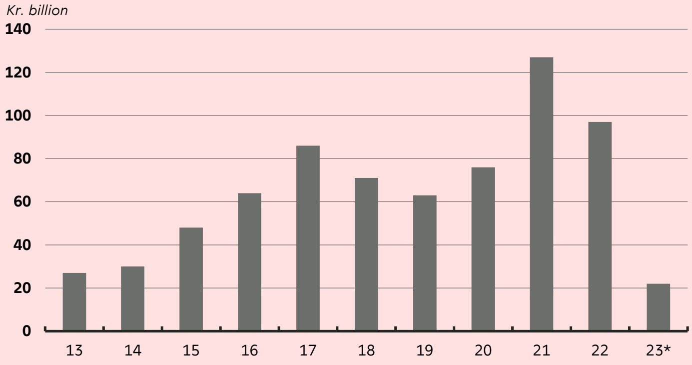
The valuation of commercial properties is related to the interest rate level via the yield requirement, where lower real estate prices will be reflected in a higher required yield.[8] The yield requirement has increased by around 1 percentage point since the beginning of 2022 for all real estate categories 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

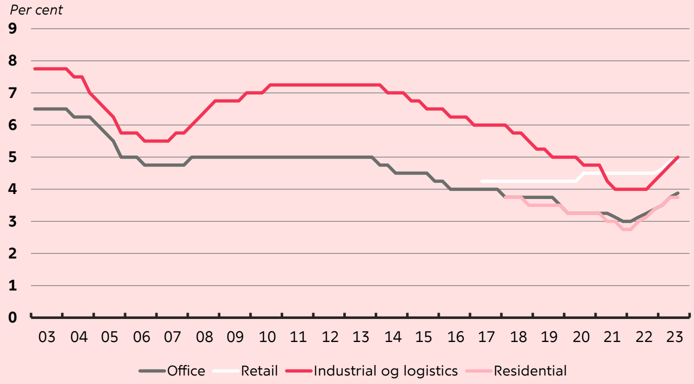
Significant decline in transaction volume indicates that real estate prices have not yet adjusted



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

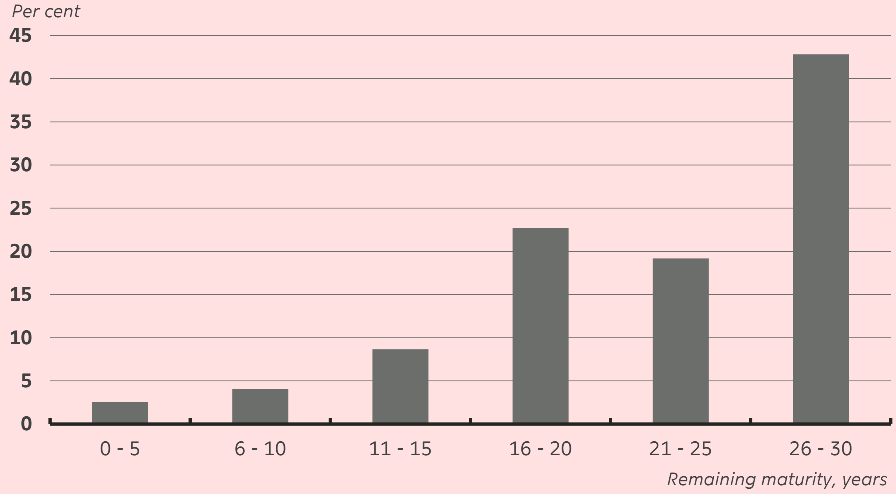
A number of Swedish real estate firms are facing challenges with refinancing their debt, and there is a risk that this may lead to divestment of their Danish real estate portfolios. Several of the Swedish real estate firms have announced that they will sell off their real estate portfolios. Divestment 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.

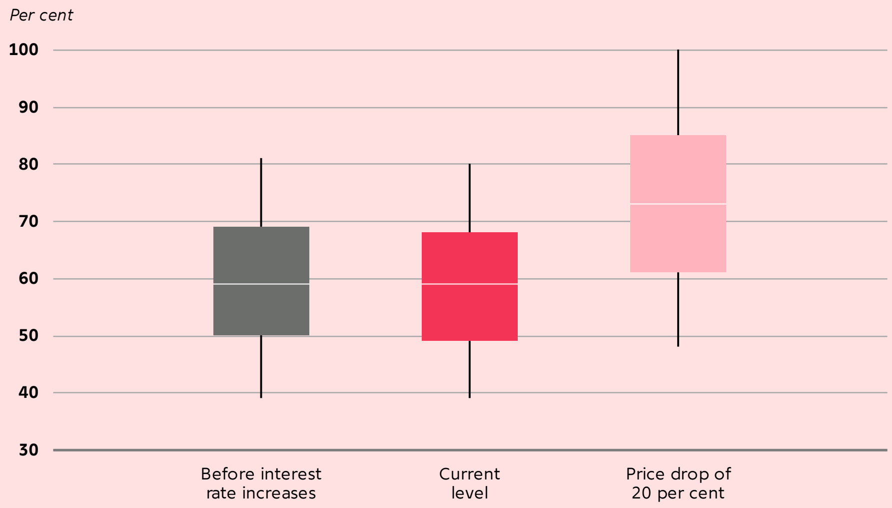
Loan-to-value ratios are at around the same level as at the start of 2022, before the sharp interest rate increases set in. The moderate change in the loan-to-value ratios should be viewed in the light of the very low number of transactions in 2023. Transactions in the commercial real estate market are 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



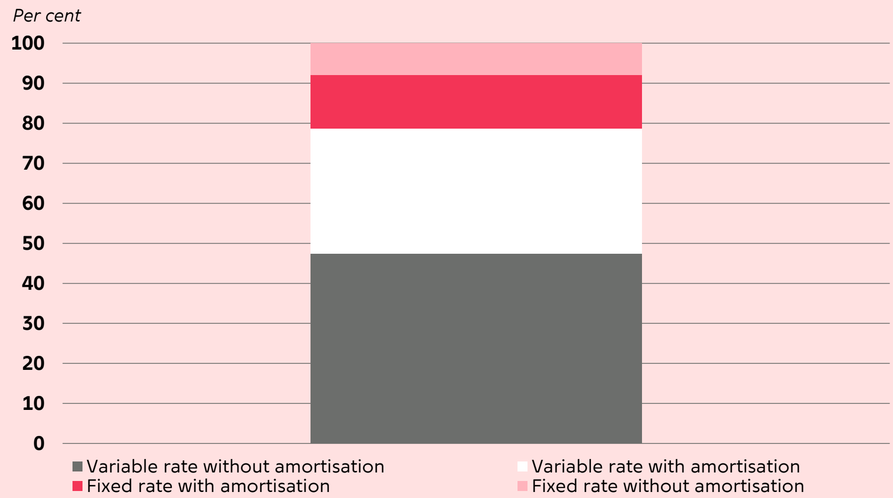
Note: Distribution weighted by outstanding debt (10th, 25th, 50th, 75th and 90th percentiles) of real estate firms' loan-to-value ratios, calculated as total lending as a ratio of the value of mortgaged properties. *Before interest rate increases* indicates the distribution for the 1st quarter of 2022, 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.

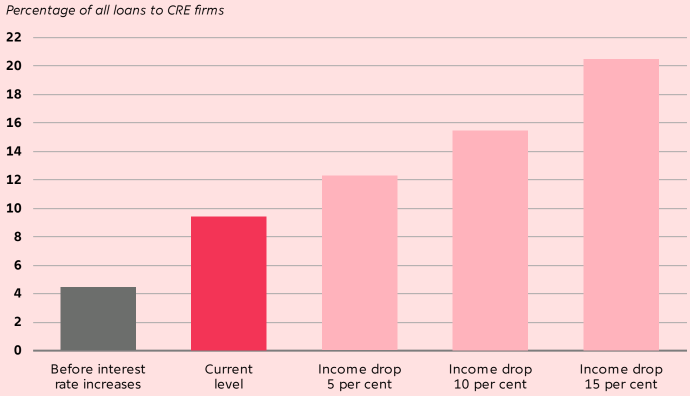
Currently, just over 9 per cent of lending to real estate firms is to firms with a solvency ratio below 20 per cent and a debt servicing capacity below 100 per cent[12], see chart 15. Before the sharp interest rate increases occurred in early 2022, the corresponding number was just over 4 per cent.[13]

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

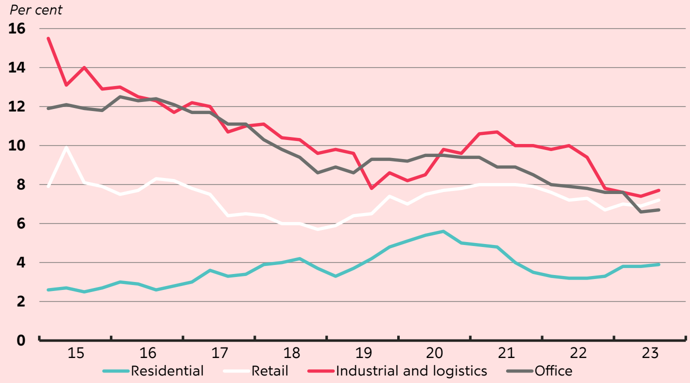
Several real estate firms will come under pressure if rental income falls



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*).

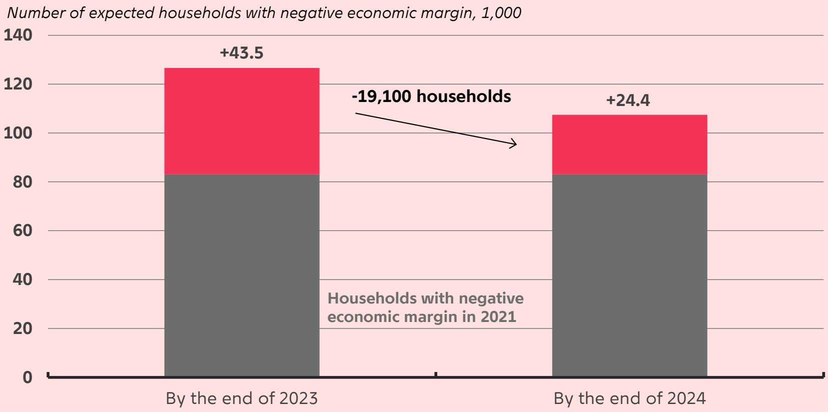
Real wage growth will strengthen homeowners' personal finances in 2024

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).

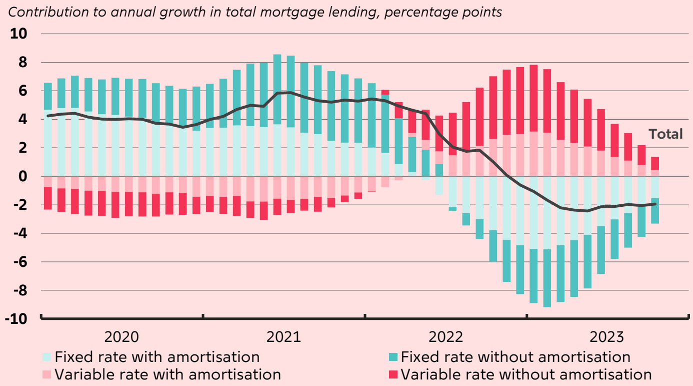
cent lower in October 2023 compared to the year before, despite the increase in the variable-rate loan types, see chart 18.[18]

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

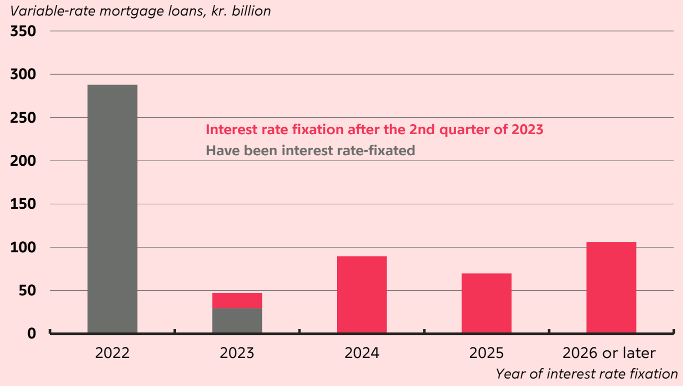
Sustained growth in variable-rate mortgage loans



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.

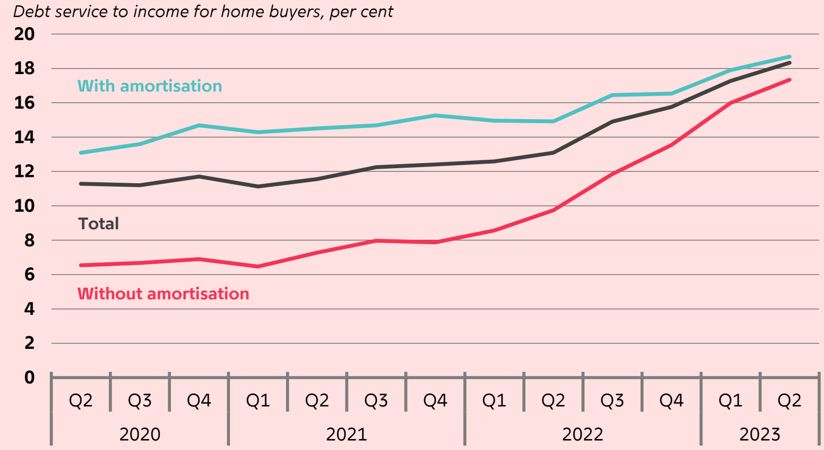
The higher interest rates have caused a decrease in house prices in 2022 and are still eroding home buyers' disposable amounts. However, the decrease in house prices has been somewhat smaller than expected, given the significant interest rate increases and high inflation. The housing market has recovered 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

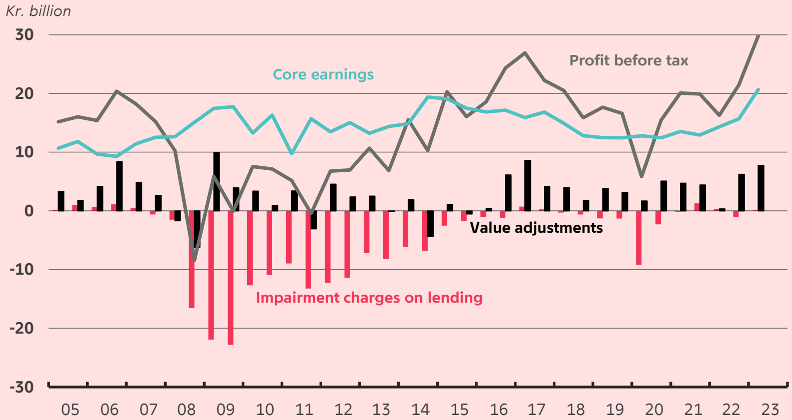
Loan impairment charges remained low in the 1st half of 2023, see chart 21. On determining their impairment requirement, institutions must take expectations of future performance into account. Most institutions have maintained or increased their management estimates as a consequence of the macroeconomic 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



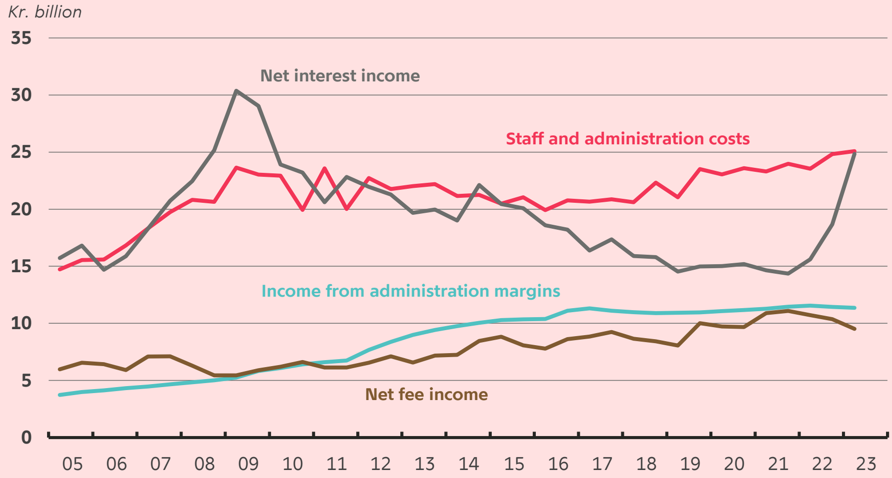
Note: Half-yearly data for the systemically important credit institutions. Profit before tax is adjusted for impairment charges on goodwill and Danske Bank's fine relating to the Estonia case. Core earnings are defined as net interest income, net fee income and income from administration margins, less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

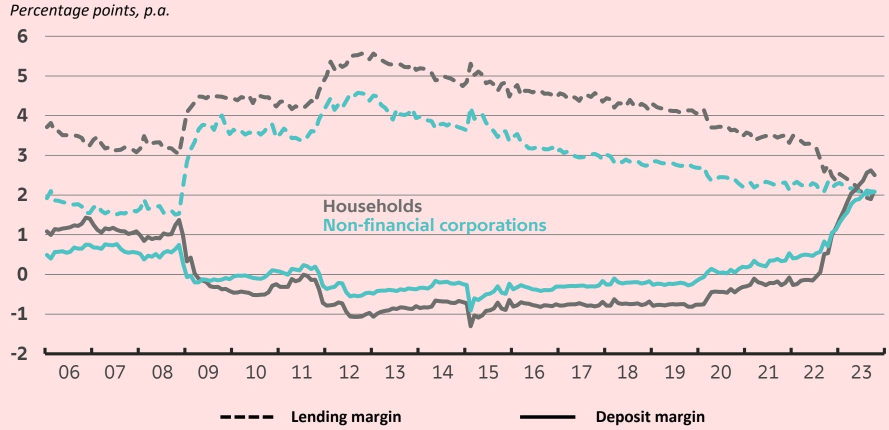
Each institution decides for itself how much of its excess liquidity it wants to place with Danmarks Nationalbank. If an institution increases its deposit with Danmarks Nationalbank, the balance with another monetary policy counterparty is reduced accordingly. This reflects the fact that the net position, 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.

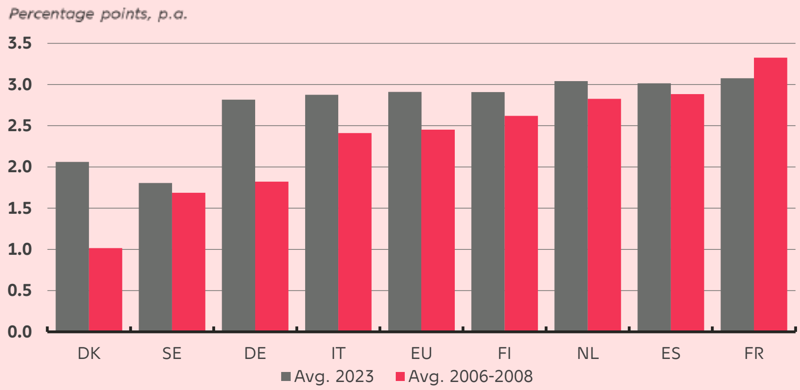
[26] The comparison with 2006-08 is due to the zero-interest rate environment in subsequent years.

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.

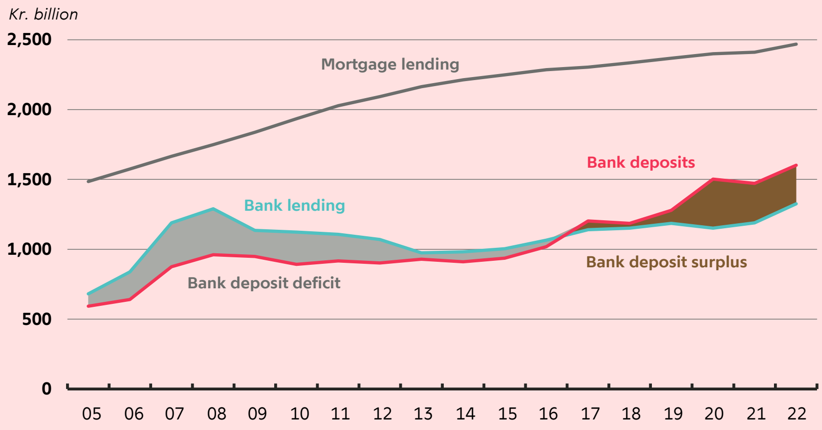
Bank deposit surpluses and legal requirements for bank liabilities have reduced the value of deposits as funding

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.

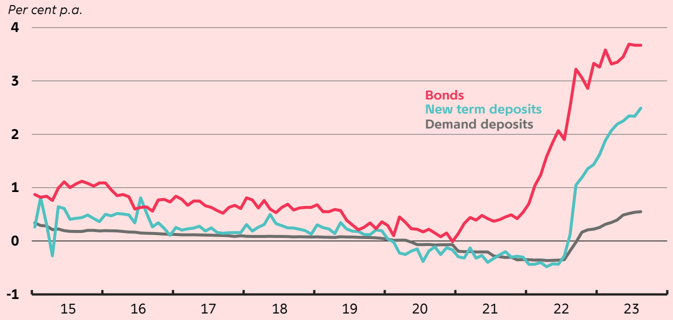
As the interest rate differential increases, it becomes relatively less attractive to have demand deposits with banks. Taken in isolation, bond purchases or debt repayments may prompt customers to reduce their bank deposits. Since the beginning of 2022, Danish households have increased their holdings 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

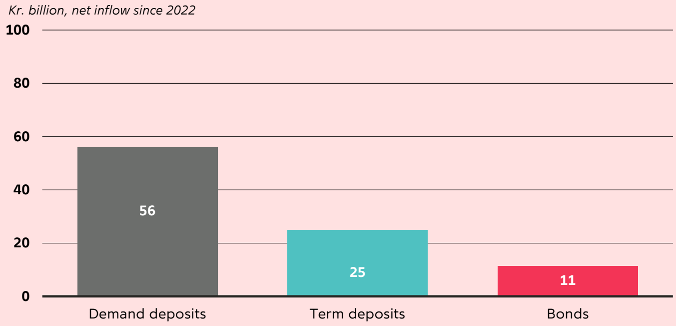
Significant interest rate gains in alternatives to demand deposits



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



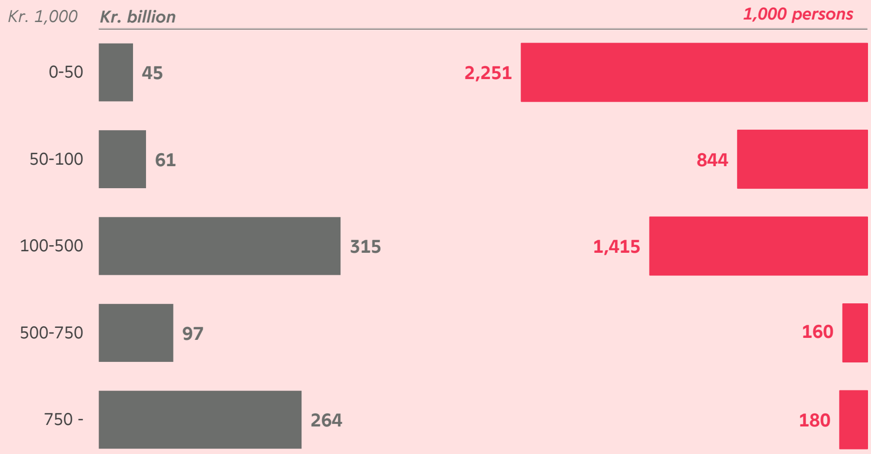
Note: Net household additions since January 2022. *Demand* and *time deposits* are closing balances in Danish kroner. *Bonds* are nominal holdings. The most recent observations are from August 2023.
Source: Danmarks Nationalbank.

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.

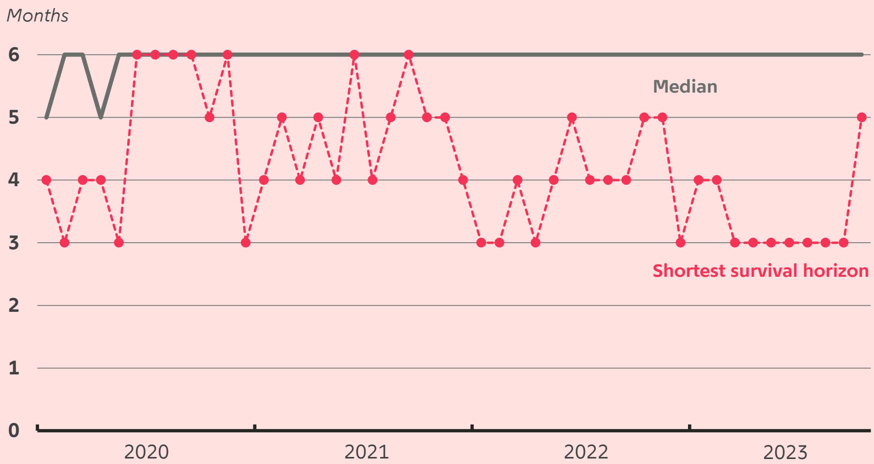
06
Liquidity and funding: Banks have a robust liquidity position

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.

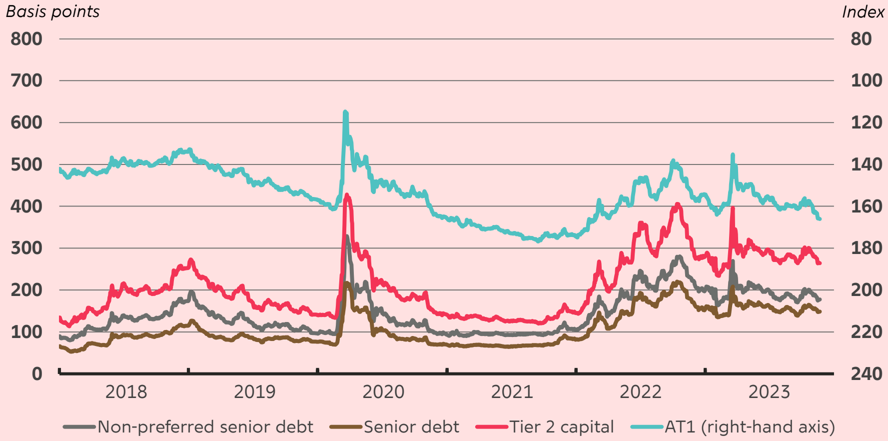
[30] For a method description of Danmarks Nationalbank's sensitivity analysis, see Danmarks Nationalbank, Lower excess capital adequacy for the banks, *Danmarks Nationalbank Analysis (Financial stability)*, no. 25, November 2019 (*link*).

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

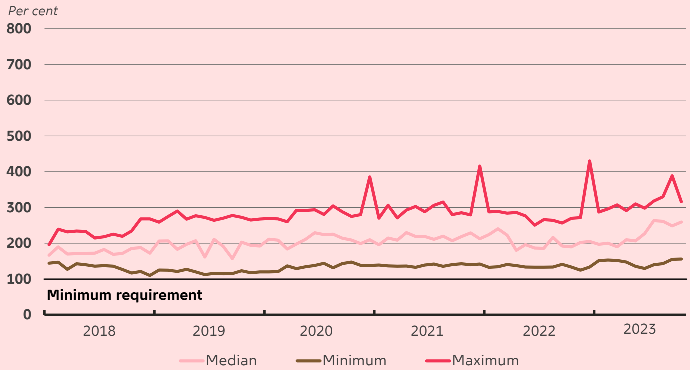
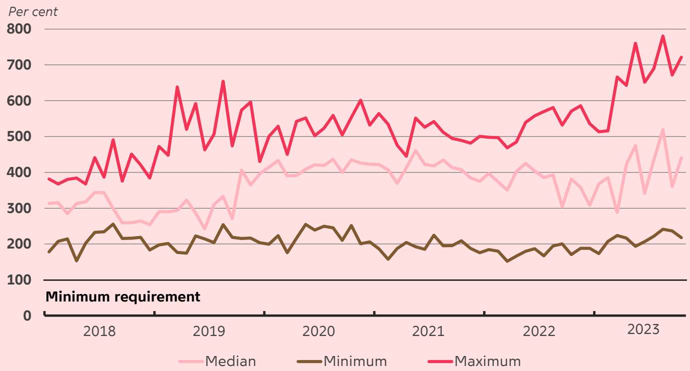


CHART 31

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.

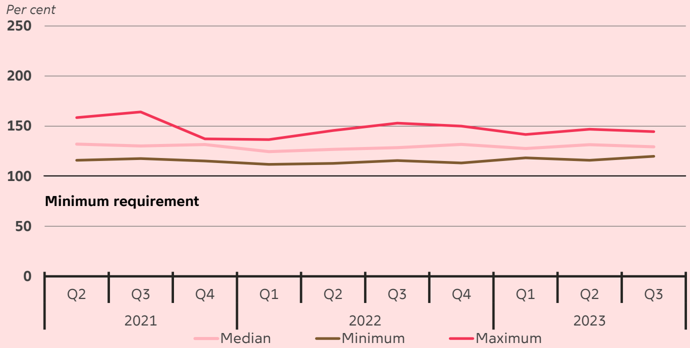
The regulatory LCR and NSFR requirements help strengthen the individual bank's liquidity position but are not enough in themselves to ensure a robust liquidity position; the institutions must also have sound liquidity risk management. The events surrounding specific foreign banks in March showed that 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

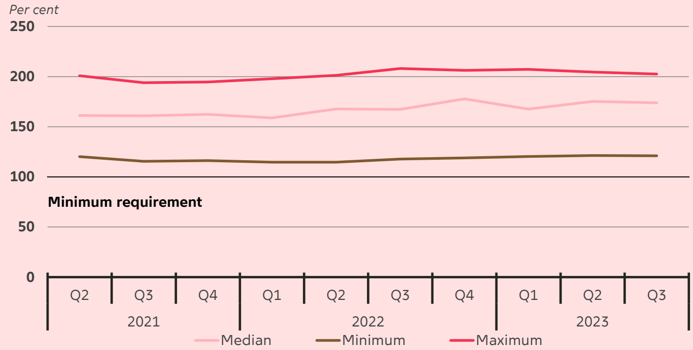
CHART 33

Banks meet the NSFR requirement with good excess capital adequacy

Systemic banks



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

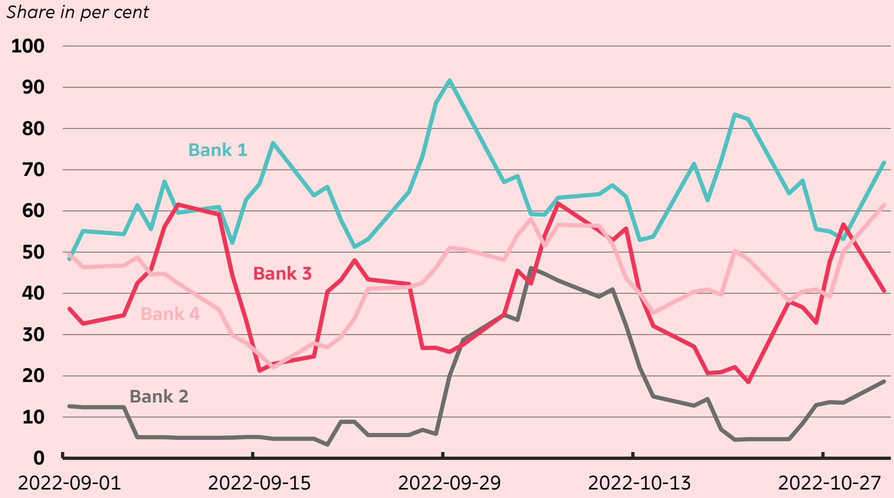
Like the foreign bond markets, the Danish mortgage bond market was also affected by the sharp interest rate hikes and uncertainty about future interest rates in 2022. As a result, purchasing interest decreased and market liquidity deteriorated.

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]

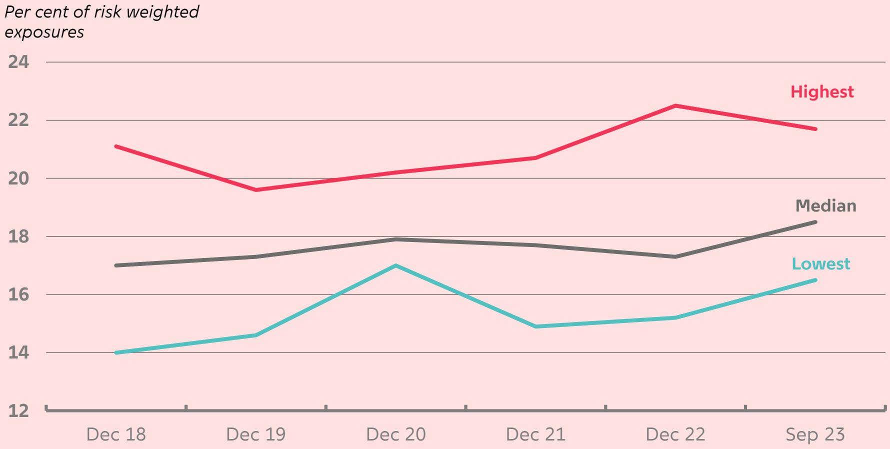
Stable development in institutions' capital ratios

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



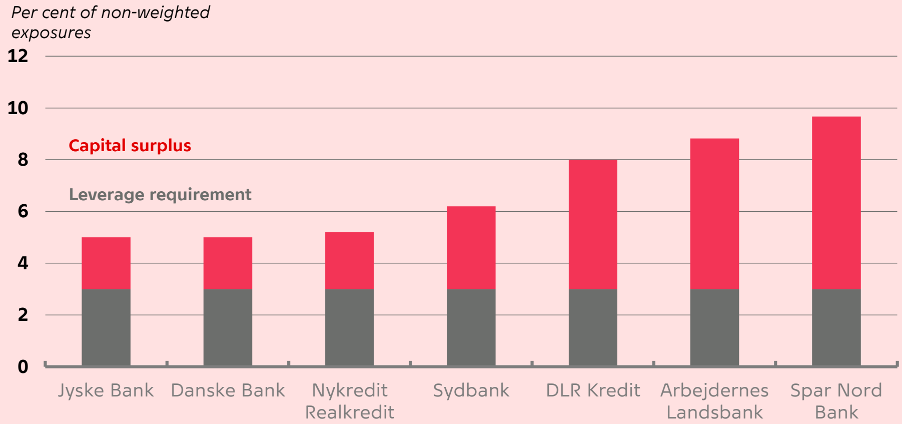
Note: The chart shows the Common Equity Tier 1 capital ratio of large credit institutions, measured at the highest and lowest levels, as well as the median.
Source: Danmarks Nationalbank.

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.

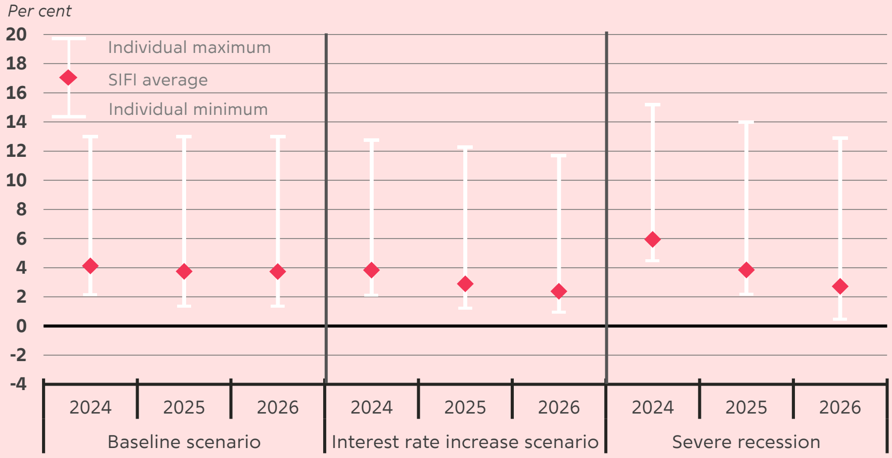
[37] The stress test includes systemic credit institutions and non-systemic banks, see Appendix A1. Saxo Bank A/S is not included in the stress test population.
[38] The credit institutions cannot assume that the countercyclical capital buffer will be released in an institution-specific stress scenario. 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]

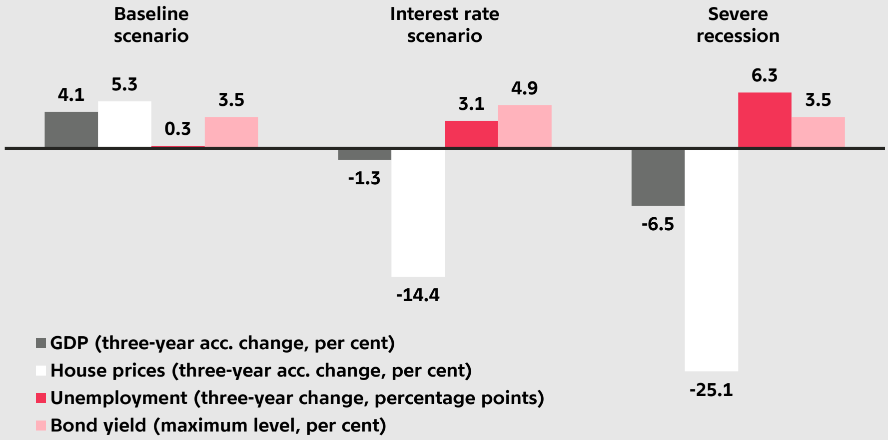
A baseline scenario that follows Danmarks Nationalbank's latest forecast[2] and represents the expected business cycle.

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]

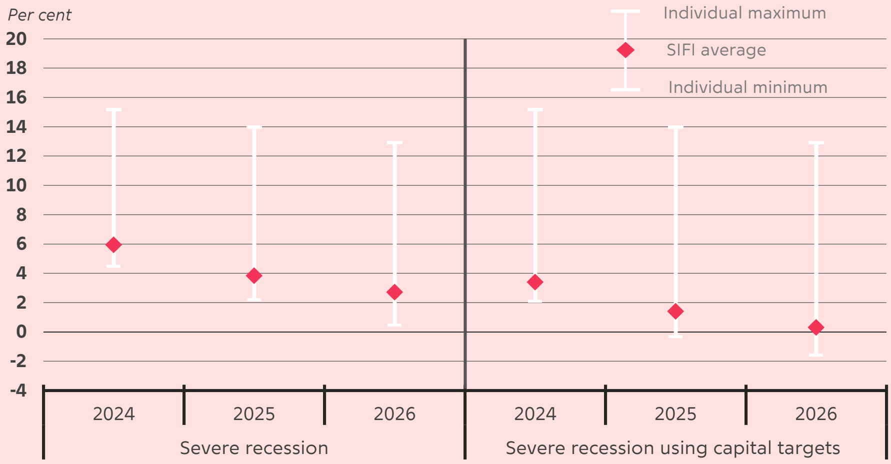
Danmarks Nationalbank has carried out an additional stress test calculation in the severe recession scenario, assuming that the institutions at the beginning of the stress test have a capital ratio corresponding to their capital target.[46] Danmarks Nationalbank's stress test of the institutions' capital 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**

Continues…

...continued

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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NEWS

News is an appetiser offering quick insight into one of Danmarks Nationalbank's more extensive publications. News is targeted at people looking for a quick overview and who like a clear angle.

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Reports comprise recurring reports on Danmarks Nationalbank's areas of work and activities. Here you will find Danmarks Nationalbank's annual report, among other documents. Reports is targeted at people who need a status and update on the past period.

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Analyses focus on current issues of particular relevance to Danmarks Nationalbank and its objectives. Analyses can also include recommendations from Danmarks Nationalbank. They include our projections for the Danish economy and our assessment of financial stability. Analyses are targeted at people with a broad interest in economic and financial matters.

ECONOMIC MEMO

Economic Memo provides insight into the analysis work being performed by Danmarks Nationalbank's employees. For example, Economic Memo contains background analyses and method descriptions. Economic Memo is primarily targeted at people who already have a knowledge of economic and financial analyses.

WORKING PAPER

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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Digital euro – potential implications for payments, fixed exchange rate policy and financial stability in Denmark

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22 pages

The European Central Bank and the European Commission are working on the development of a digital euro and the accompanying regulatory framework. A potential future decision on issuing a digital euro is still pending, and a number of design choices and rules have yet to be clarified. Denmark is closely linked to the euro area through, for example, the fixed exchange rate policy, payment systems and financial conditions. If a digital euro becomes a reality, it may therefore have implications for Denmark. This analysis describes the potential implications a digital euro can pose to safe and efficient payments, the fixed exchange rate policy and financial stability in Denmark.

A digital euro could potentially lead to cheaper payments for Danish citizens visiting the euro area

Danish citizens visiting the euro area can access a digital euro for use within the euro area. A digital euro could potentially serve as a cheaper alternative to existing solutions. This is among other things because the European Central Bank itself will cover certain operational costs of the payment system.

A possible agreement on the use of the digital euro within Denmark is expected to lead to limited use

The use of a potential digital euro in Denmark requires a voluntary agreement. If such an agreement is reached, it is expected to result in very limited use of digital euros for domestic payments. This is among other things due to exchange costs as well as the role and function of the Danish krone in Denmark.

A digital euro with low holding limits is not expected to have significant consequences for the fixed exchange rate policy or financial stability in Denmark

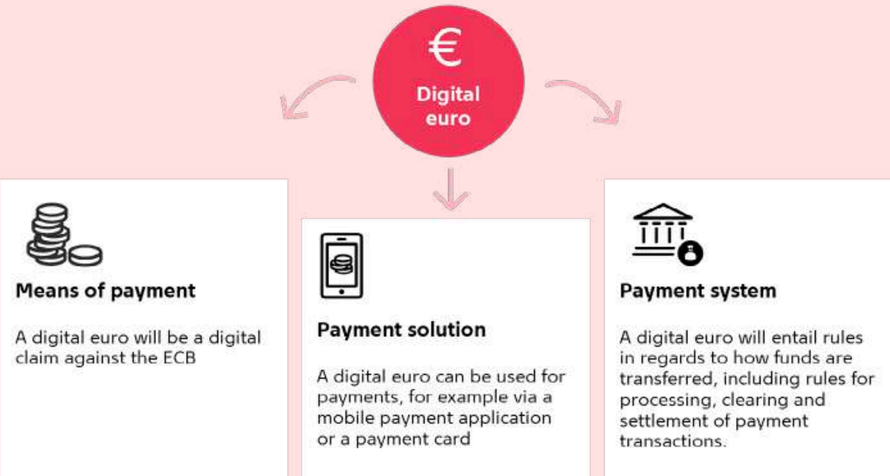
Even in the case of a potential agreement on the use of a digital euro in Denmark, a digital euro with low holding limits is not expected to have significant consequences for the fixed exchange rate policy or financial stability in Denmark.

Why is this important?

Digitalisation is transforming both our society and the financial sector. Many central banks are investigating issuance of central bank digital currencies and associated questions. Under the auspices of the European Central Bank, work is being done in relation to the introduction of a central bank digital currency for individuals and businesses in the euro area– a so-called 'digital euro'. At Danmarks Nationalbank, we are monitoring technological developments, including other countries' work with new types of assets and payment solutions.

A digital euro is not expected to have significant consequences for the fixed exchange rate policy or financial stability in Denmark if it is introduced with low holding limits

Main chart: A digital Euro will be a means of payment, a payment solution and a payment system



Note: Functionalities that a digital euro is likely to possess.
Source: Danmarks Nationalbank. The chart is based on material from the European Commission and the European Central Bank.

Topics

Digitalisation | Payments | Fixed exchange rate policy | Financial stability

01
Introduction and summary

The European Central Bank (the 'ECB') and the European Commission (the 'EU Commission') are working to develop a so-called *digital euro*, i.e. a central bank digital currency in euro for individuals and businesses.[1]

A possible digital euro may have an effect on the situation in Denmark. The financial system in Denmark is closely linked to the euro area in a number of areas. The fixed exchange rate policy, common payment systems, trade and tourism are some of the factors that increase Denmark's financial links to the euro area. [2] New initiatives, such as a digital euro, are consequently important to analyse in order to identify potential consequences for Denmark.

This analysis describes a digital euro, and what implications a potential launch of a digital euro may pose to the fixed exchange rate policy, financial stability and safe and efficient payments in Denmark.[3] The analysis is based on material from the ECB and the EU Commission's proposal for a regulation on the establishment of a digital euro.[4] The descriptions and assessments provided in the analysis are subject to a number of reservations, as the content of the legal framework that will regulate the digital euro have not yet been finalised, and a number of important design choices for a possible digital euro are also still uncertain.

A digital euro will only be usable in the euro area. The use of a digital euro in Denmark will require a request from the Danish Government to the EU Commission, the other EU member states and the ECB. An agreement will then be concluded between the ECB and Danmarks Nationalbank. This analysis does not assess whether such an agreement would be expedient.[5]

Since 2017, Danmarks Nationalbank has dealt with central bank digital currencies and has continuously assessed the pros and cons of issuing these, including the relevant operational, economic, legal and financial risks.[6] Danmarks Nationalbank's overall assessment is that it is not clear how a central bank digital currency in kroner for Danish citizens will create significant added value relative to the existing solutions in Denmark. The background for this assessment is described in Danmarks Nationalbank's analysis *New types of digital money*.[7]

Potential consequences for Danish citizens and Denmark as a result of a digital euro

A digital euro is expected to be a new means of payment, a new payment solution and a new payment system.

A digital euro will, as a starting point, only be usable in the euro area, and Danish citizens staying in the euro area will be able to access and use a digital euro within the euro area. Danish citizens already have access to the euro in

[1]For a more detailed description of central bank digital currencies see Danmarks Nationalbank, *New types of digital money*, 2022, (link).
[2] Danmarks Nationalbank conducts monetary policy within the framework of the fixed exchange rate policy. In other words, the sole purpose of Denmark's monetary policy interest rates is to keep the krone stable against the euro.
[3] Financial stability means that the financial sector is sufficiently resilient to withstand economic or financial crises.
[4]See the EU Commission, *Proposal for a regulation on the establishment of the digital euro*, 2023, (link).
[5] Danmarks Nationalbank are providing its opinion to the EU Commissions regulatory proposal on the establishment of the digital euro in its response to the consultation, 2023, (link).
[6]See Danmarks Nationalbank, *Central bank digital currency in Denmark?*, 2017, (link).
[7] Danmarks Nationalbank, *New types of digital money*, 2022, (link).

digital form via bank deposits in euro. Some Danish banks offer Danish citizens euro accounts and the possibility to pay in euro via linked payment cards. The access to euro in digital form is thereby not new however, a digital euro could potentially give Danish citizens visiting the euro area a cheaper digital means of payment. This is among other things due to fees will be regulated and that the European Central Bank will incur costs for operating of the system.

If an agreement on the use of a digital euro is concluded in Denmark, it is expected that a digital euro will only have a minor effect on domestic retail payments. This is among other things because payments with a digital euro will be associated with exchange costs and thereby be more expensive compared to current solutions. In addition, Danish citizens are predominantly satisfied with the domestic payment solutions currently available.

Furthermore, the dominant role of the Danish krone in Denmark will limit the use of digital euro for domestic payments. For example, salaries are paid in kroner, as is the case for all payments to and from the public sector. Moreover, since there is great trust in kroner, the risk of co-called currency substitution, where a foreign currency takes over the role of the national currency is minimal in a Danish context.

A digital euro is not deemed to have significant consequences for the fixed exchange rate policy or financial stability in Denmark if low holding limits are implemented.[8] If an agreement on the use of a digital euro in Denmark is concluded, it may lead to the need for a monetary policy response by Danmarks Nationalbank. If, contrary to expectations, Danish citizens should find it very attractive to hold digital euro, this could however lead to a decrease in the demand for kroner, which can be handled with the existing monetary policy instruments. If holding limits for the digital euro are implemented on a par with what has previously been communicated by the ECB, and even if this holding limit is fully utilised, it is neither expected to affect Danish banks' ability to comply with their funding and liquidity requirements.[9]

If the holding limits become significantly higher than expected, this may be of importance to the conclusions drawn in the section of the analysis on fixed exchange rate policy and financial stability. Chart 1 summarises the analysis conclusions.

[8] The ECB has previously communicated a holding limit of 3,000 euro for individuals and zero euro for businesses. See European Central Bank, *Fabio Panetta: Interview with Les Echos*, 2023, (link), European Central Bank, *Fabio Panetta: Interview with Der Spiegel, 2021 (link),* European Central Bank, *Fabio Panetta, Evolution or revolution? The impact of a digital euro on the financial system*, 2021, (link) and European Central Bank, *Progress on the investigation phase of a digital euro – third report*, 2023, (link).
[9] See reference in footnote 8 of this analysis.

CHART 1

Summary of analysis conclusions

Scenarios	Safe and efficient payments	Fixed exchange rate policy	Financial stability
A digital euro which solely can be used within the euro area	A digital euro could potentially lead to cheaper payments within the EU for both consumers and merchants. This is among other things because, the ECB itself will cover certain operational costs of the payment system. Danish citizens visiting the euro area will get access to a potential cheaper digital means of payment.	A digital euro with low holding limits is not expected to have significant consequences for the fixed exchange rate policy in Denmark. This is among other things because a digital euro solely can be used by Danish citizens visiting the euro area.	A digital euro with low holding limits is not expected to have significant consequences for the financial stability in Denmark. This is among other things because a digital euro solely can be used by Danish citizens visiting the euro area.
A digital euro which can be used in Denmark	A possible agreement on the use of the digital euro in Denmark is expected to lead to a very limited use of digital euro for domestic payments, due to, among other things, the exchange costs. A possible agreement would primarily affect Danish merchants, who would be able to accept digital euro from euro area tourists.	A possible agreement on the use of the digital euro in Denmark Is not expected to have significant consequences for the fixed exchange rate policy in Denmark, if the holding limits are low. Large and rapid conversions of kroner to euro, whether this is a conversion to digital euro, euro-deposits or euro-cash, may potentially lead to a monetary policy response from Danmarks Nationalbank.	A possible agreement on the use of the digital euro in Denmark Is not expected to have significant consequences for the financial stability in Denmark, if the holding limits are low. Danish citizens' access to digital euro with low holding limits are furthermore not expected be of significance for Danish Banks' ability to comply with funding- and liquidity requirements.

02
A digital euro – process and design

The ECB has worked with a digital euro since 2020 and in November 2023, the ECB commenced a so-called 'preparation phase' for the digital euro project. During this phase, the ECB will test specific digital euro solutions.[10] The preparation phase does not necessarily mean that a decision will be made to issue a digital euro. Such a decision also requires that the regulatory basis has been implemented.[11]

In July 2023, the EU Commission published a proposal for a regulation on the establishment of the digital euro, which will provide the legal framework for a possible digital euro.[12] The legal framework is, of course, not final, and several design choices regarding payments with, and storage of, digital euro are still unresolved. This analysis should therefore be read subject to the possibility of changes to descriptions and conclusions.

According to the ECB and the EU Commission, the purpose of a digital euro is:

- To ensure citizens' access to a central bank digital currency;
- To provide a digital payment solution for citizens in euro area member states that can be used across euro area member states;
- To give citizens in euro area member states access to a payment solution that protects their privacy. Including an offline functionality that can provide similar privacy protection as cash;
- To ensure financial inclusion in the euro area;
- To strengthen strategic autonomy and the resilience of the European market infrastructure and
- To strengthen innovation and competition in the European payment market.

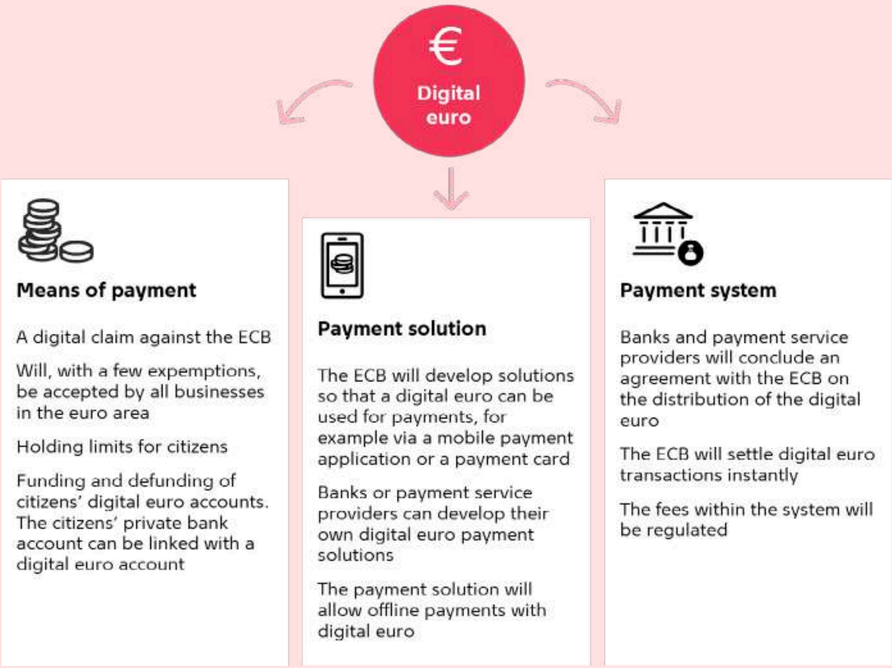
According to the ECB and the EU Commission, the purpose of a digital euro is not to replace but to complement cash, as well as to provide more payment options for citizens in the euro area.[13]

Based on the current information from the ECB and the EU Commission, a digital euro will be a new means of payment, a new payment solution and a new payment system. Chart 2 summarizes the probable functionalities of a digital euro.

[10] See European Central Bank, *Eurosystem proceeds to next phase of the digital euro project*, 2023, (link) and The European Centralbank, *Report on a digital euro*, 2020, (link).
[11] See European Central Bank, *Request to postpone the decision on the digital euro "realisation phase"*, 2023, (link).
[12] See EU Commission, *Proposal for a regulation on the establishment of the digital euro*, 2023, (link).
[13] See European Central Bank, *A stocktake on the digital euro*, 2023, (link).

CHART 2

A digital euro will be a means of payment, a payment solution and a payment system



Note: Functionalities that a digital euro is likely to possess.
Source: Danmarks Nationalbank. The overview is based on material from the ECB and the EU Commission.

A digital euro – a new means of payment

A digital euro will be a new digital means of payment in the euro area. Today, bank deposits and cash are used to pay for goods and services, and a digital euro will constitute a new alternative to these means of payment.

A digital euro will be a digital claim against the ECB. Until now, it has only been possible for citizens to have a physical claim against the ECB in the form of euro cash and digital claims against private banks in the form of bank deposits.[14] However, a digital euro will also allow citizens to have a digital claim against the ECB.

Restrictions on individuals' and businesses' digital euro holdings

Citizens will be able to hold digital euro, but the option will be limited, among things for the sake of financial stability.[15]

According to the EU Commission's proposal for a regulation, the ECB will be given the competence to implement measures to limit individuals' and businesses' holdings of digital euro.[16] The holding limits have not yet been set,

[14] Depositors' and investors' deposits in private banks are covered by the deposit guarantee scheme (the Guarantee Fund) for up to approximately kr. 750,000 in the event of a bank failure. The purpose of the deposit guarantee is to provide cover for depositors as well as investors, and the guarantee is financed by the banks.
[15] See European Central Bank, *A stocktake on the digital euro*, 2023 (link).
[16] See EU Commission, *Proposal for a regulation on the establishment of the digital euro*, article 16, 2023 (link).

but the ECB has mentioned a holding limit of 3,000 euro for individuals and zero euro for businesses.[17] In practice, a holding limit of zero euro for businesses would mean that received digital euro amounts would automatically be converted into bank deposits and that the businesses' bank deposits would automatically be converted into digital euro if they wanted to make a payment in digital euro.[18]

It also follows from the proposal for a regulation that individuals' holdings of digital euro, like cash, will bear interest at 0 per cent per annum.[19]

Automatic account debits may increase usability of a digital euro

To prevent frictions in individuals' payments with digital euro due to holding limits, the ECB finds that mechanisms could be introduced to ensure that individuals and businesses can use digital euro for payments that exceed any holding limit. This can be done by linking a digital euro account to a bank account. This ensures that payments are not rejected because the amount exceeds the holding limit.[20]

A digital euro – a new payment solution

A digital euro will be a new payment solution, i.e. a user-oriented solution that can be used by citizens residing or staying in the euro area. According to the EU Commission's proposal for a regulation, it will, for example, be possible to use a new mobile payment application developed by the ECB as well as alternative solutions offered by payment service providers such as banks.[21]

Payment service providers, such as banks, are expected to be responsible for distributing digital euro to the citizens. Under the proposal for a regulation, distributors must provide customers with access to the user-oriented solution developed by the ECB and may also choose to offer their own user-oriented solution, such as a mobile payment application or a payment card.[22] The payment solution must be usable for making person-to-person transfers and for processing payments in both physical and online payment environments. Furthermore, according to the proposal for a regulation, the payment solution must also be usable offline, i.e. without an Internet connection.

A digital euro is expected to be free of charge for citizens

According to the EU Commission's proposal for a regulation, citizens in the euro area will be able to use the digital euro free of charge. This means that distributors cannot charge citizens a fee for their access to, or payment with, digital euro. Correspondingly, businesses will not be allowed to charge citizens a fee when paying with digital euro.

Distributors of a digital euro must also offer certain basic services free of charge. These services include onboarding of customers, initiation and authentication of payments, validation, settlement activities as well as automatic or manual debits on the citizen's digital euro account. The activities also require the distributors to

[17] See European Central Bank, *Fabio Panetta: Interview with Les Echos*, 2023 (link), European Central Bank, *Fabio Panetta: Interview with Der Spiegel,* 2021 (link), European Central Bank, *Fabio Panetta, Evolution or revolution? The impact of a digital euro on the financial system*, 2021 (link) and European Central Bank, *Progress on the investigation phase of a digital euro – third report*, 2023 (link).
[18] See European Central Bank, *A stocktake on the digital euro*, 2023 (link).
[19] See EU Commission, *Proposal for a Regulation on the establishment of the digital euro*, article 16, 2023 (link).
[20] See EU Commission, *Proposal for a regulation on the establishment of the digital euro*, article 14, annex II, 2023 (link) and European Central Bank, *A stocktake on the digital euro*, 2023 (link).
[21] See EU Commission, *Proposal for a regulation on the establishment of the digital euro*, article 28, 2023 (link).
[22] See EU Commission, *Proposal for a regulation on the establishment of the digital euro*, article 28, 2023 (link).

implement know-your-customer procedures as well as relevant checks in relation to preventing money laundering and terrorist financing.[23]

Euro area merchants expected to be required to receive digital euro

A digital euro will be usable in physical as well as online stores, and merchants in the euro area will generally be obliged to accept the new payment solution if they already receive digital payments such as a payment card. According to the proposed regulation, a digital euro will have the status of legal tender, which means that, with some exceptions, it will be mandatory for stores to accept digital euro.[24]

This legal tender status will also mean that the digital euro will not have to be programmable, for example that its use is limited to the purchase of selected goods and services. According to the proposal for a regulation, a digital euro must be fully exchangeable for euro cash and bank deposits, which means that no restrictions can be imposed on its ability to meet a payment obligation.[25]

A digital euro – a new payment system

A digital euro will be a new payment system in the euro area.[26] A payment system is a system for transferring funds with common rules for processing, clearing and settling payment transactions. These procedures are known from, for example, the credit card companies Mastercard and Visa.

The ECB will be responsible for the development and operation of the payment system

The ECB will be responsible for the development and operation of the system that will support payments with digital euro. Development and operation include laying down technical standards and rules for the use of a digital euro as well as developing the infrastructure that supports the use of a digital euro. In addition, the ECB will handle the final settlement of all digital euro payments.

According to the EU Commission's regulatory proposal, digital euro transactions must be settled immediately, and it will be up to the ECB to decide on the most expedient infrastructure for this.[27] The ECB has not yet decided on which technology is most expedient for supporting digital euro payments.[28]

The ECB will bear the costs for developing and operating the digital euro payment system

The ECB will not charge the consumer's and the merchant's bank any fee, and the costs for developing and operating the digital euro payment system will thus be borne by the ECB.[29] This will represent a significant difference from existing payment systems, where the consumer's and merchant's bank typically pay licence fees to the credit card companies.

[23] See EU Commission, *Proposal for a regulation on the establishment of the digital euro*, article 14, Annex II, 2023 (link).
[24] See EU Commission, *Proposal for a regulation on the establishment of the digital euro*, article 15 and Article 17, 2023 (link).
[25] See EU Commission, *Proposal for a regulation on the establishment of the digital euro*, article 24, 2023 (link).
[26] See European Central Bank, *A stocktake on the digital euro*, 2023 (link).
[27] See EU Commission, *Proposal for a regulation on the establishment of the digital euro*, article 30, 2023 (link).
[28] See European Central Bank, *Digital euro – Prototype summary and lessons learned,* 2023 (link).
[29] The ECB is owned by all the central banks in the EU member states. The respective central banks all pay an amount to the ECB. The amount depends on the size of each country's population and economy. The costs for developing and operating the digital euro will thus be paid indirectly by the national central banks. See European Central Bank, *Who owns the ECB?*, 2023 (link).

A digital euro is expected to be associated with certain fees

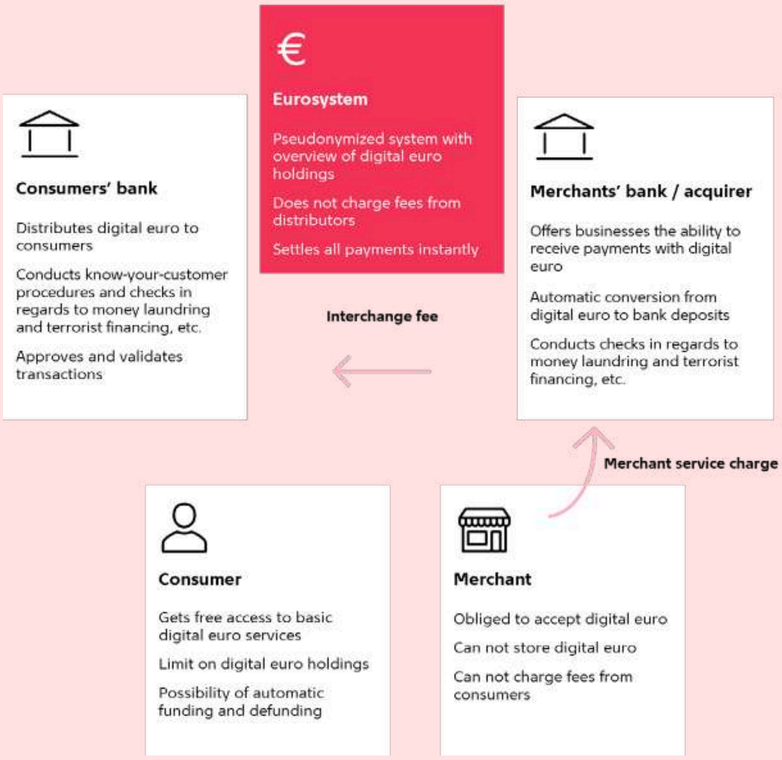
According to the EU Commission's proposal for a regulation, there may be a need to compensate distributors of a digital euro for the costs associated with distribution. As it will not be permitted to charge fees to the consumer, the distributors' revenues will consist of so-called interchange fees. The interchange fee is a fee that the consumer's bank receives from the merchant's bank or acquirer, see chart 3.

Similarly, the merchant's bank or acquirer may charge a so-called merchant service charge payable by the merchant. Receiving digital euro will therefore be associated with costs for the merchants.

The ECB will be mandated to set limits on the size of the merchant service charges and the interchange fees. These fees must, for example, be fixed so that they cover the distributors' costs, including a reasonable profit, for the distribution of a digital euro. In addition, the fees must not be higher than the fees charged for comparable digital means of payment, such as payments by debit card or instant payments.[30]

CHART 3

A digital euro will be associated with certain fees



Note: Overview of the payment system that will support payments with a digital euro as well as the roles and responsibilities of key players.
Source: Danmarks Nationalbank. The overview is based on material from the ECB and the EU Commission.

[30] See EU Commission, *Proposal for a regulation on the establishment of the digital euro*, article 17, 2023 (link).

Danish citizens' access to and use of a digital euro

Danish citizens will be able to use a digital euro when visiting the euro area. Use of a digital euro in Denmark is not possible without concluding an agreement.

A digital euro is expected to be usable by Danish citizens in the euro area

The primary purpose of a digital euro is to meet the needs of citizens in the euro area. Therefore, according to the EU Commission's proposal for a regulation, a digital euro will only be distributable to persons residing or staying in the euro area.

Specifically, a digital euro can be distributed to the following natural and legal persons: 1) Natural and legal persons residing or established in the Member States whose currency is the euro; 2) natural and legal persons who opened a digital euro account at the time they resided or were established in the Member States whose currency is the euro, but no longer reside or are established in such Member States; and 3) visitors.[31]

There is consequently nothing to prevent Danish citizens travelling in the euro area from accessing a digital euro. How this access can be achieved in practice is still unclear. Like foreign banks and payment service providers, Danish banks and payment service providers will have the opportunity to distribute a digital euro both in the euro area and to Danish citizens visiting a euro area member state.[32]

It should be noted in this context that Danish citizens already today have access to the euro in digital form via bank deposits in euro. Some Danish banks offer Danish citizens euro accounts, and it is possible to pay in euro via linked payment cards. At the same time, today there is basically nothing to prevent Danish citizens from opening euro accounts with other European banks.

However, access to the digital euro may be more useful than bank deposits in euro when it comes to payments. The reason for this is that euro area merchants will generally be required to accept digital euro, as opposed to solutions based on bank deposits, for example international payment cards, which merchants can refuse to accept.

A digital euro is expected to be usable in Denmark, if an agreement is concluded

The use of a digital euro by citizens and merchants in Denmark is subject to a political desire for it, as well as a subsequent agreement between the ECB and Danmarks Nationalbank. According to the proposed regulation, it is stated that the non-euro member state must request access to the use of a digital euro from the European Commission, the other EU member states, and the ECB. Following this, an agreement must be reached between the ECB and the central bank of the respective member state, including the terms for the use of a potential digital euro.

Currently, the terms for the use of a digital euro in non-euro member states are not determined. It is unclear to what extent an agreed-upon use of a digital euro in non-euro member states will be subject to the same regulations that govern usage in the euro area. The proposal for regulation states that the member state

[31] See EU Commission, *Proposal for a regulation on the establishment of the digital euro*, article 13, 2023 (link).
[32] See EU Commission, *Proposal for a regulation on the provision of digital euro services by payment service providers incorporated in Member States whose currency is not the euro*, 2023 (link).

must adopt national legislation ensuring compliance with the relevant requirements in the regulation, but it is not explicitly specified which provisions are considered relevant regarding the use of a digital euro in a non-euro country. For example, the proposed regulation includes a provision obliging merchants in the euro area to accept payments with digital euros, which is not considered a relevant requirement for the use of a digital euro in a non-euro member state. In this analysis, it is assumed that a potential use of a digital euro in Denmark will not entail such an obligation.[33]

[33] See EU Commission, *Proposal for a regulation on the establishment of the digital euro*, article 18, 2023 (link).

03

A digital euro - impact on safe and efficient payments

An establishment of a digital euro could potentially lead to cheaper cross-border payments for Danish citizens visiting a euro area member state.

If an agreement on the use of a digital euro in Denmark is concluded, Danish citizens will have the opportunity to use a digital euro in Danish stores that choose to accept a digital euro. However, the assessment is that a digital euro will be used to a lesser extent by Danish citizens in Denmark. The primary reason for this that the use of a digital euro for payments in Denmark will be connected with exchange costs, making payments with digital euro more expensive than payments made in Danish kroner. Furthermore, Danish citizens are very satisfied with the digital payment solutions available today.

If use of a digital euro becomes widespread in the euro area, it may be attractive for Danish merchants to accept digital euro to accommodate that tourists from the euro area may prefer paying with a digital euro.

Importance of a digital euro for Danish citizens in the euro area

Payment cards are currently the most widely used digital payment solutions in the EU. A digital euro will be an alternative to current digital payment solutions – also for Danish citizens staying in the euro area.

A digital euro could lead to cheaper payments for Danish citizens in the euro area

According to the EU Commission's proposal for a regulation, Danish citizens visiting a euro area member area will have access to and be able to use a digital euro. Payments with digital euro may potentially be cheaper than the current digital payment solutions. A digital euro can therefore provide an alternative to the international payment cards and cash that Danish citizens typically use when visiting the euro area.[34]

One reason why a digital euro can potentially be an attractive alternative to international payment cards in particular is that the ECB itself bears the costs for developing and operating the payment system. The ECB will not charge any fees from the banks and payment service providers that distribute digital euro. The fees mentioned are the so-called licence fees charged by payment card providers to card issuers and card acquirers.

In addition, according to the EU Commission's regulatory proposal, the interchange fee and merchant service charge will be determined by the ECB and will be the lower of either: 1) the costs associated with offering digital euro

[34]There is also widespread use of payment cards in Denmark. In Denmark, approximately 9 in 10 payments are made using solutions based on payment cards. The most popular payment cards are the national payment card, *Dankort*, as well as the international payment cards Visa and Mastercard. For more information, see Danmarks Nationalbank, *Denmark is among the most digitalised countries when it comes to payments*, 2022 (link).

services or 2) the fees charged for comparable payment solutions.[35] It is therefore to be expected that fees for digital euro will be on a par with, or lower than, the fees charged for international debit cards or instant payments.

Every time a Danish citizen uses an international payment card in a euro area member state, the citizen's bank typically charges a currency conversion fee of up to 1.0 per cent and 1.5 per cent of the transaction amount.[36] This fee is significantly higher than the fee charged for an ordinary currency exchange with a bank, for example a SEPA credit transfer, where fees of approximately 0.3 per cent can be observed.[37] In the case of, for example, a SEPA credit transfer in connection with the use of a digital euro, the currency conversion fee for a digital euro may therefore turn out to be lower than the fees observed for international payment cards.

Importance of a digital euro for payments in Denmark

If an agreement on the use of a digital euro in Denmark is concluded, Danish citizens will be able to use a digital euro, and merchants will be able to receive digital euro.[38] Danish citizens and foreign tourists will therefore be able to use digital euro in Danish stores that choose to accept it. However, a possible agreement on the use of a digital euro in Denmark is deemed to have only a minor impact on Danish retail payments. Although Danish citizens will probably not use a digital euro in Denmark, it may still potentially be attractive for certain Danish merchants to accept digital euro. This applies, in particular, to Danish merchants with many customers from the euro area. In addition, a digital euro may potentially strengthen the resilience of the European payments infrastructure, which may also be of importance to Denmark.

Danish citizens are expected to use digital euro for payments in Denmark to only a very limited extent

A digital euro that can be used in Denmark will not immediately be more attractive than existing solutions, as payment with digital euro in Denmark will involve an exchange from Danish kroner to digital euro. This exchange is associated with costs which, other things equal, will make it more expensive to use a digital euro for payments for goods priced in Danish kroner.

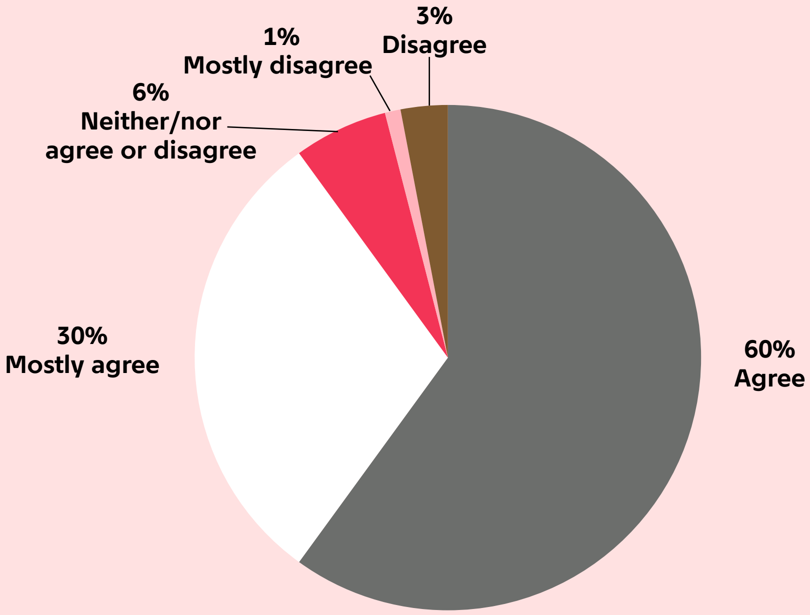
Furthermore, a digital euro is not expected to meet a payment need that is not already covered by existing payment solutions. In Danmarks Nationalbank's latest household survey from 2023, only 4 per cent of the Danish population stated that existing digital payment solutions do not meet their needs, see chart 4.[39]

If an agreement is concluded on its use in Denmark, a digital euro is expected to be used in physical stores, in e-commerce and for payments between private individuals. But existing digital payment solutions in Denmark are today also used in these situations.[40] It is therefore difficult to see what need a digital euro meets for Danish citizens' payments in Denmark.

[35] See EU Commission, *Proposal for a regulation on the establishment of the digital euro*, article 17, 2023 (link)
[36] See, for example, the Danish Competition and Consumer Authority, *Konkurrencerådet griber ind over for bankers valutatillæg* (The Danish Competition Council intervenes against the banks' currency surcharge), 2022 (link).
[37] See, for example, Danske Bank, *exchange rates* (link).
[38] To be able to accept digital euro, the Danish merchant will need to enter into an agreement with an acquirer or a bank that distributes digital euro. This acquirer or bank may be Danish or have its origin in another EU member state.
[39] Danmarks Nationalbank's Household Survey 2023 was conducted in April and May. A total of 2,737 representatively selected citizens completed the survey.
[40] See European Central Bank, *Progress on the investigation phase of a digital euro*, 2023 (link).

CHART 4

Existing digital payment solutions largely meet the needs of Danish citizens



Note: The respondents were asked the following question: To what extent do you agree with the following statement: *"The current digital payment methods that exists today meet my needs."*
Source: Danmarks Nationalbank's Household Survey 2023.

A digital euro may be attractive for Danish merchants with customers from the euro area

If use of a digital euro becomes widespread in the euro area, it is likely that tourists from the euro area will want to use the digital euro when visiting Denmark.

Today, several Danish merchants accept euro cash as a means of payment to accommodate tourists' preferences. If use of a digital euro becomes widespread in the euro area, Danish business may want to be able to receive digital euro from tourists. At the same time, the merchant will expectedly achieve a cost reduction by receiving digital euro compared to euro cash payments, as handling euro cash is associated with several costs such as collection, counting and exchange.

Danish merchants may also find it advantageous to offer tourists payment with a digital euro if it becomes cheaper to accept payments with it compared to international payment cards.

A digital euro and the resilience of the retail payments infrastructure

Depending on its actual design, a digital euro could potentially strengthen the resilience of the retail payments infrastructure. However, this is contingent on the digital euro being structured in a way that makes it operationally independent of existing systems, for example, by involving other actors and alternative infrastructure. The more integrated a payment solution is with existing systems, the less it can be used as a contingency measure in the event of disruptions to the existing systems.

The considerations above will also apply if an agreement is reached on the use of a digital euro in Denmark and if a digital euro becomes widespread among Danish businesses and citizens. However, it is still unclear how a digital euro will be designed in practice, making it challenging to assess the actual impact it may have on the resilience of the retail payment infrastructure.

04
A digital euro – impact on the fixed exchange rate policy in Denmark

A digital euro is not expected to have significant consequences for the fixed exchange rate policy in Denmark. This is primarily because a digital euro is only expected to have a modest effect on the demand for Danish kroner. This is expected to remain the case even if an agreement on the use of a digital euro is concluded in Denmark, where the maximum demand is limited by the implementation of a low holding limit. If, contrary to expectations, the holding limit is set very high and a situation arises in which a digital euro is regarded as attractive for Danish citizens, then this may influence the conclusions drawn in this section.

A digital euro is not expected to give rise to a monetary policy response

If an agreement on the use of a digital euro in Denmark is concluded, Danish citizens will be able to exchange Danish bank deposits in kroner for digital euro. Access to a store of value in euro, via a digital euro, could potentially be more accessible than existing options. It could therefore, despite not being interest bearing, become potentially more attractive than euro denominated deposits with private banks, which Danish citizens already have access to today. This could, for example, be the case during financial turmoil.

If, contrary to expectations, Danish citizens should find it very attractive to hold digital euro rather than bank deposits in kroner, it will, all things being equal, lead to a decrease in krone demand. The speed at which citizens transfer deposits in Danish kroner from Danish banks to digital euro, as well as the size of the transferred amounts, are decisive for any monetary policy response. If Danish citizens gain access to a digital euro with low holding limits, for example 3,000 euro as previously indicated by the ECB, and the conversion from Danish kroner to digital euro is done gradually, the reduced demand for Danish kroner is expected to be offset by other private market players.[41] In such a situation, there will most likely be no need for intervention from Danmarks Nationalbank. In more extreme cases, where all Danish citizens suddenly exchange Danish kroner for digital euro, the situation is envisaged to be manageable with existing monetary policy tools. For an elaboration on the significance of a digital euro on the demand for Danish kroner, bank deposits and Danmarks Nationalbank's possible response, see box 1.

A digital euro is not expected to lead to increased movements in the krone exchange rate

In the event that, to a greater extent than today, citizens use access to a digital euro to move money back and forth between euro and Danish kroner, this could create greater fluctuations in the demand for Danish kroner. This may be the case, for example, if citizens transfer deposits in Danish banks to digital euro in connection with holidays abroad and transfer them back again at the end of their holiday. However, these seasonal fluctuations in connection with citizens' retail payments in euro are already seen today and have a very limited impact

[41] The ECB has repeatedly communicated a holding limit of 3,000 euro for individuals and a zero limit for businesses. These are deemed low holding limits.

on the demand for Danish kroner. A digital euro with low holding limits is therefore not expected to lead to an increased need for intervention during holiday periods when the demand for euro may be higher.

BOX 1

The impact of a digital euro on the demand for kroner, bank deposits and Danmarks Nationalbank's possible response

The distribution and use of a digital euro in Denmark may affect the financial balances of citizens, banks and Danmarks Nationalbank. If a citizen exchanges deposits in Danish kroner for digital euro, this happens via the citizen's bank. In this connection, the citizen's bank, which is a monetary policy counterparty to Danmarks Nationalbank, writes down the citizen's deposits in Danish kroner against transferring euro to the ECB. The transfer can be done by the citizen's bank itself if the bank has an account with the ECB. Otherwise, it takes place via a foreign correspondent bank. It is not of decisive importance whether the transfer happens one way or the other.

The citizen's potential conversion from Danish kroner to digital euro involves a currency exchange. Therefore, a digital euro will not only affect the banks' deposit base, but also their currency risk. Banks are limited in their ability to hold large mismatches in their currency exposures on their balance sheets. In the event of large changes in the banks' foreign exchange exposures, the banks will try to offset them in the foreign exchange market. This is done by selling Danish kroner against foreign currency to other market players, for example the insurance and pension sector.

A study conducted by the Bank for International Settlements shows that the global turnover in the spot and forward markets in Danish kroner was approximately kr. 100 billion per banking day in 2022.[1] If a digital euro with a threshold of 3,000 euro applies in Denmark, and Danes fully utilize this limit within one banking day, the total amount converted will be roughly of the same magnitude as average daily turnover on the spot and forward markets in Danish kroner (. A gradual conversion over an extended period, however, will constitute a smaller share of the daily turnover in the krone market and can therefore be expected to be handled without intervention in the foreign exchange market by Danmarks Nationalbank.

If other market players do not wish to assume this exchange rate risk, Danmarks Nationalbank may need to intervene in the foreign exchange market as a result of the fixed exchange rate policy to ensure that the Danish krone is not weakened. In such a case, intervention will involve the purchase of Danish kroner against the sale of euro, which, in the short term, will reduce Danmarks Nationalbank's balance sheet. On the assets side of the balance sheet, the foreign exchange reserve will fall and, on the liabilities side, the net position – the banks' net deposits with Danmarks Nationalbank – will decrease.

[1] See Danmarks Nationalbank, *Significantly higher turnover in kroner and larger Danish foreign exchange market*, 2022 (link).

05
A digital euro – impact on financial stability in Denmark

A digital euro is not expected to have significant consequences for financial stability in Denmark if it is introduced with low holding limits.[42] This also applies even if an agreement on the use of a digital euro is concluded in Denmark, where the maximum demand is limited by implementation of a low holding limit.

Any impact on financial stability will depend on the speed and magnitude that Danish citizens move deposits from Danish banks to a digital euro. In a situation where Danish banks lose a significant amount of deposits from Danish citizens, this may impact the banks' assets and funding. This may potentially lead to greater dependence on other funding sources.

Conversely, if against expectations, the holding limits are set high, or omitted altogether, this may potentially increase the risk of so-called *bank runs*, i.e. a situation in which an unusually large number of customers withdraw their deposits with the bank within a short space of time.[43] If a situation arises in which a digital euro is regarded as attractive for Danish citizens and the holding limits are set high, then this may also have an effect on the conclusions drawn in this section.

Banks may potentially become more dependent on market funding

A possible agreement on the use of a digital euro without low holding limits in Denmark could potentially impact the banks' balance sheets. A reduction in the banks' deposit base may be due to financial turmoil or other factors.
In a scenario in which banks experience a slight reduction in their deposit base, as well as greater deposit base fluctuations, the banks can adjust their funding with, for example, market-based funding. The individual banks may potentially become more dependent on other funding sources than deposits if a digital euro is introduced without low holding limits.

Dependence on market funding has previously affected financial stability. This was the case during the financial crisis in 2007-2013, when banks, as a whole, had built up large deposit deficits during parts of the period. These were largely financed by short-term market funding and loans from foreign credit institutions. Short-term funding via international money and capital markets is usually less stable and more sensitive to changes in the institutions' own creditworthiness than deposits and long-term market funding.[44]

Moreover, if banks become more dependent on market funding, it may be more difficult for small institutions to fund their assets, and, in times of uncertainty and

[42] The ECB has repeatedly communicated a holding limit of 3,000 euro for individuals and a zero limit for businesses, these are deemed as low holding limits.
[43] For a more detailed description of central bank digital currencies and the risk of bank runs, see Danmarks Nationalbank's Analysis *Central bank digital currency in Denmark?*, 2017 (link).
[44] See pages 21-22 in Kim Abildgren, *Monetary History of Denmark 2005-2020*, Danmarks Nationalbank, 2023 (link).

low investment appetite among investors, these institutions will also be more exposed to a lack of market access relative to large institutions.[45]

A digital euro is not expected to have a major impact on Danish banks' compliance with funding and liquidity requirements

A digital euro without low holding limits may potentially increase the requirements for the banks' management of liquidity and funding risk if their deposit base becomes less stable. The stability of banks' deposits depends on various factors, including the type of deposits, customer groups, and whether the deposits are covered by deposit insurance. For systemic banks in Denmark, deposits are characterized by a lower degree of stability compared to deposits in smaller non-systemic banks. This difference is among others due to a slightly larger proportion of demand deposits in systemic banks, i.e., deposits that customers can immediately withdraw. Additionally, there is a significantly lower proportion of deposits covered by deposit insurance in systemic banks compared to non-systemic banks. In practice, this places higher demands on liquidity risk management in systemic banks. Deposits from large corporations and financial customers are generally less stable than deposits from retail customers and typically react quickly to a loss of confidence in a bank's financial situation.[46]

If banks lose deposits due to the introduction of a digital euro, it can impact their compliance with funding and liquidity requirements. If the deposits cannot be replaced by other long-term funding sources, it could potentially lead to lack of compliance with the funding requirement.[47] Failure to meet the liquidity requirement occurs when banks do not have sufficient liquid assets to cover, among other things, the decrease in deposits.[48] However, if a digital euro becomes a reality, banks are expected to take it into account in their risk management of liquidity and funding. A digital euro with low holding limits is not deemed to be of significance to the banks' deposit base and consequently to their compliance with the funding and liquidity requirements.

[45] See the Danish Financial Supervisory Authority's note 'Limited market access for Danish O-SIIs and non-O-SIIs under a severe stress scenario', juni 2021 (*link*).
[46] See Danmarks Nationalbank, Interest rate hikes affect the banks and their customers, *Danmarks Nationalbank Analysis (Financial stability),* no 6, june 2023, (link).
[47] For example, the net stable funding ratio (NSFR) requirement For a more detailed description of NFSR, see Danmarks Nationalbank's Financial Stability report for the first half of 2023, *Interest rate hikes affect the banks and their customers*, 2023 (link).
[48] For example, the liquidity coverage ratio (LCR) requirement. For a more detailed description of LCR, see Danmarks Nationalbank's Financial Stability report for the first half of 2023, *Interest rate hikes affect the banks and their customers*, 2023 (link).

Publications

NEWS

News is an appetiser offering quick insights into one of Danmarks Nationalbank's more extensive publications. News is targeted at people who need an easy overview and like a clear angle.

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Statistical news focuses on the latest figures and trends in Danmarks Nationalbank's statistics. Statistical news is targeted at people who want quick insights into current financial data.

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Analyses focus on current issues of particular relevance to Danmarks Nationalbank's objectives. Analyses may also contain Danmarks Nationalbank's recommendations. They include our projections for the Danish economy and our assessment of financial stability. Analyses are targeted at people with a broad interest in economic and financial matters.

ECONOMIC MEMO

Economic Memo provides an insight into the analysis work being performed by Danmarks Nationalbank's employees. For example, Economic Memo contains background analyses and method descriptions. Economic Memo is primarily targeted at people who already possess some knowledge of economic and financial analyses.

WORKING PAPER

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

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ANALYSIS | Financial stability and financial risks
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Crypto-assets: Risks, regulation and usage in Denmark

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Interest in crypto-assets has increased significantly in recent years, and the focus on blockchain technology entails both new opportunities and risks. Only a small share of the Danish population has so far used crypto-assets for payments and investments, and the interconnections between the traditional financial sector and the crypto-assets market is limited. Thus, at present, crypto-assets do not pose any significant threat to financial stability in Denmark. However, this may change in the future. Therefore, the coming European regulation that is currently being implemented is an important step towards addressing risks that may threaten financial stability.

Unbacked crypto-assets are speculative assets that exposes investors to high risk

The use of crypto-assets comes with significant risks for investors. Unbacked crypto-assets are not backed by real, productive assets or payment flows, resulting in large price fluctuations. Further, these assets are traded on trading platforms characterised by high complexity and low transparency.

At present, crypto-assets do not pose a threat to financial stability, but the situation might change in the future

Crypto-assets are not widely held by households or financial institutions in Denmark. A survey from Danmarks Nationalbank shows that less than 4 per cent of Danish households own crypto-assets. If the market growth of crypto-assets continues, it could potentially impact financial stability in Denmark in the future.

Coming EU regulation addresses a number of risks and supports financial innovation

The new EU Markets in Crypto-Assets Regulation addresses a number of significant risks that crypto-assets may pose to financial stability. The regulation also supports financial innovation by creating level playing field for financial service providers, regardless of the underlying technology.

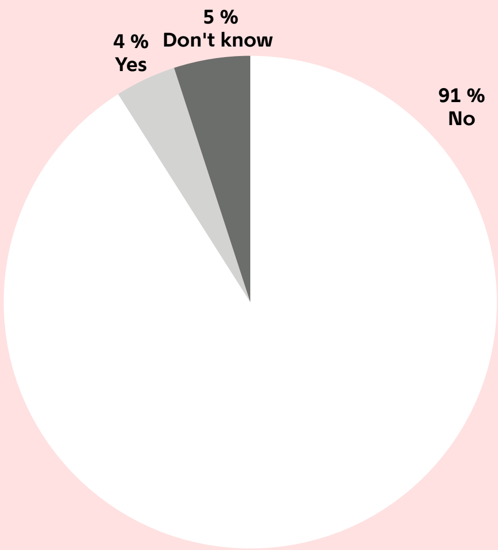
Why is this important?

In recent years, crypto-assets have seen a significant increase in both interest and market value. However, the assets contain several vulnerabilities that expose investors to large and sudden losses. New regulation in the EU is an important step towards addressing risks that may threaten financial stability in the long term.

At present, crypto-assets do not pose a threat to financial stability in Denmark.

Main chart: Danmarks Nationalbank's household survey indicates that few Danes use crypto-assets

Share of Danes indicating that they own crypto-assets



Note: Danmarks Nationalbank's household survey from 2023 included questions regarding household ownership of crypto-assets. In the survey, the respondents were asked to indicate whether they had savings/holdings of crypto-assets and to estimate the total value of their holdings.
Source: Danmarks Nationalbank.

Topics

Financial stability | Digitalisation

01
Introduction and summary

Technological advances have paved the way for new financial products and new ways of providing financial services. One of the driving elements in this development is distributed ledger technology (DLT), including blockchain, which has supported the emergence of crypto-assets. The use of blockchain technology has the potential to increase efficiency and reduce costs of financial services, and to foster financial innovation.[1]

However, the new technologies and crypto-assets are associated with a number of risks. Some types of crypto-assets, namely unbacked crypto-assets and stablecoins, are used for financial activities and this report examines how associated risks can have an impact on the traditional financial system.

Hence, the objective of this report is to identify vulnerabilities which are associated with crypto-assets and to assess if these vulnerabilities affect financial stability in Denmark.

Unbacked crypto-assets are not anchored by any underlying assets and are subject to large price fluctuations, which expose investors to significant market risks. The lack of a clear economic anchor makes them particularly vulnerable to shifts in market sentiment. These market risks may spill over to the traditional financial sector in the form of both direct and indirect losses.

Stablecoins are crypto-assets, which are typically anchored to economic or financial assets and aim to maintain a stable value towards these. Stablecoins are also subject to vulnerabilities that may impact the financial system. Stablecoins hold traditional, financial assets, e.g. government bonds, in their reserves. A run on a stablecoin issuer may trigger a fire sale of these assets, which can result in losses for the issuer and spill-overs to other investors in the form of losses on their holdings.

There is a significant risk of fraud and market abuse in crypto-asset trading, which hampers market integrity. Opaque markets and limited access to high quality data makes it difficult for investors to distinguish between high- and low-quality service providers. New European regulation targeting crypto-assets will provide regulatory requirements to increase resilience of crypto-asset service providers and increase market transparency.

The identified risks associated with crypto-assets do not currently pose a threat to financial stability in Denmark, as crypto-asset holdings among Danish households and businesses are still limited. In addition, the Danish financial sector has so far taken a cautious approach to crypto-assets, resulting in very limited interlinkages between the financial sector and the crypto-asset markets. This might change in the future, if there is an increasing use of crypto-assets or a rising interconnectedness between crypto-assets and the traditional financial sector.

In Europe, new regulation will help safeguard financial stability against several identified risks stemming from crypto-assets. The EU Markets in Crypto-Assets Regulation (MiCA) regulation provides a comprehensive regulatory framework for issuers of crypto-assets and providers of crypto-related services aimed at

[1] See Danmarks Nationalbank (2022) for a thorough description of blockchain technology and its potential.

minimising potential risks. Additionally, the implementation of the so-called Basel standards, which set requirements for the banks' prudential treatment of crypto-asset exposures, will increase the banks' resilience to sudden drops in crypto-assets market value.

There is a need for a recurrent evaluation of the impact of the new regulation as well as further analysis of vulnerabilities in some areas that are currently not covered by the forthcoming regulatory measures. This includes risks linked to decentralised financial (DeFi) services as well as centralised crypto-asset service providers with complex business models, that supplies several of financial activities within the same entity.

02
Developments in the crypto-assets markets

In recent years, investors, financial institutions and central banks have increased their interest in new digital assets based on new technology. One of the inventions that has received most attention is crypto-assets.[2] The spark in interest has been supported by a sharp increase in market value and their usage for financial services similar to those provided by the traditional financial system. Crypto-assets are supported by blockchain technology, which can provide benefits for society, see box 1.

Crypto-assets[3] can be defined as a digital representation of a value or a right that that can be stored and transferred electronically using DLT or similar technology.[4] In this report, the term crypto-assets is used as a broad term covering both unbacked crypto-assets and stablecoins. Unbacked crypto-assets (e.g. bitcoin) are crypto-assets that are not supported by other assets. In contrast, stablecoins aims at maintaining a peg to one or several reference assets. Other types of digital assets that are not used for financial purposes[5], as well as digital central bank money (CBDC), are out of scope of this report.

BOX 1

Blockchain technology can have real economic benefits

Crypto-assets rely on blockchain technology, which offers numerous applications. It may prove suitable for financial services as it enables decentralised, programmable and composable digital assets. This may lead to benefits for society, as it can potentially result in lower costs, more efficient processes and innovation.

Blockchain technology can potentially reduce costs by making intermediaries superfluous. Through cryptography, blockchains enable decentralised registration and validation of transactions, i.e. without the need for a trusted third party to ensure integrity of the system. The lack of trusted third parties reduces the number of intermediaries and may lead to reduced costs in the provision of financial services, especially in services currently characterised by a large number of intermediaries, such as cross-border payments.

Processes can be streamlined using blockchain technology through so-called smart contracts that can execute actions automatically according to predetermined terms in a contract. Smart contracts make crypto-assets programmable and can thus facilitate financial services, such as secured loans, where both the disposal of the asset and the service itself are based on a set of predetermined criteria and without a trusted third party handling the processes.

Further, blockchain technology can foster innovation, as many blockchains are open networks. Developers can code new applications that freely use and links with elements in other existing applications. This entails composability in the applications, where new products are created. This is particularly widespread among decentralised financial services (DeFi-services), often referred to as financial LEGO blocks.[1] This can be seen in so-called DeFi aggregators, a type of trading platform that links to several trading protocols and automatically executes trades at the best available prices.

[1] Schär (2021).

[2] See Danmarks Nationalbank (2022) for a detailed review of crypto-assets and stablecoins.
[3] Crypto-assets are often referred to as cryptocurrencies. However, not all crypto-assets have the characteristic features of money, and they consequently cannot be equated with currencies. For this reason, these assets are referred to as crypto-assets in this report.
[4] European Commission (2023), *Markets in crypto-assets*
[5] This includes, among other things, non-fungible tokens (NFTs) and tokens that are solely used to provide access to a good or service, so-called utility tokens.

The market for crypto-assets have seen large fluctuations in recent years

The market for crypto-assets has developed dramatically in recent years, see chart 1. The aggregate value of the crypto-asset market has seen a nearly eightfold increase since 2019, but the market has been characterised by high volatility during this period. Most recently, several major players collapsed in 2022, causing a widespread market downturn, see box 2.

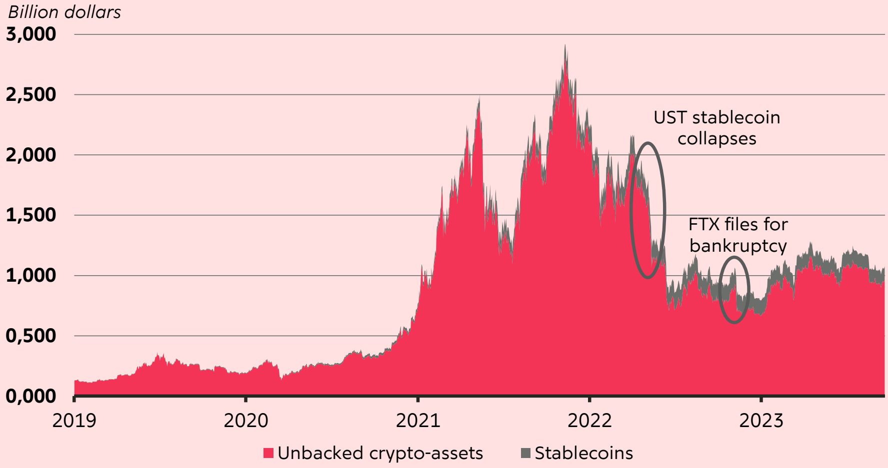
The market value peaked in November 2021 at more than 2,500 billion dollars. Since then, it has declined to below 1,000 billion dollars in September 2023. This measure excludes crypto-related derivative products, which enable increased exposure and speculation in the crypto-asset market. Some factors indicate a growing trading volume among crypto-derivatives, but the size of the market is unknown because of data limitations.[6]

The market has seen a large growth in market value since 2019, which has been driven by the large price increases in dominant crypto-assets, e.g. bitcoin. However, growth in aggregate market value has also been driven by an increase in the amount of issued crypto-assets that has grown rapidly in correspondence with the increasing interest in crypto-assets. In October 2023, there were around 9,000 unique crypto-assets.[7]

Despite the large increase, the crypto-asset market remains small relative to the traditional financial markets. When the total market value of crypto-assets peaked in November 2021, it accounted for less than 1 per cent of the global share and bond markets.[8]

CHART 1

The market value of crypto-assets has grown substantially since 2019



Note: The chart shows the total market capitalisation of unbacked crypto-assets and stablecoins. Unbacked crypto-assets are stated as the market value of all crypto-assets less the market value of the three largest stablecoins in terms of market capitalisation, in particular Tether, USDC and BUSD.
Source: Macrobond

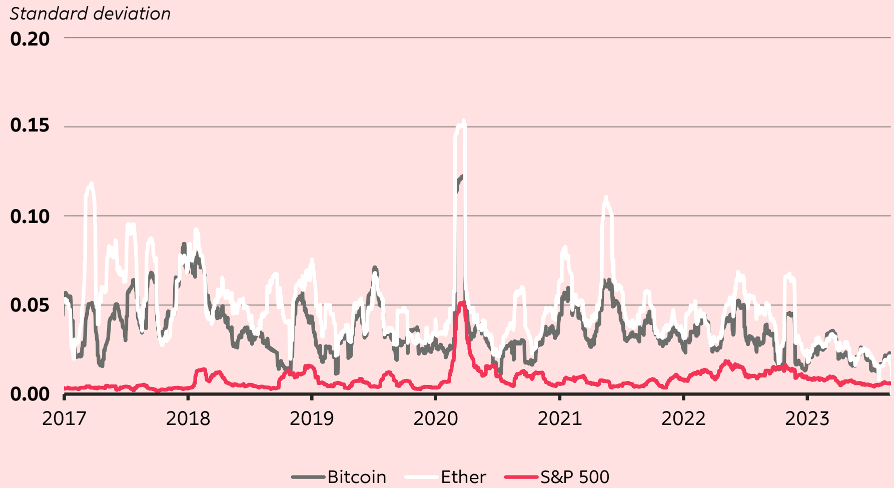
[6] See European Central Bank (2022a).
[7] See Coinmarketcap.com (link)
[8] See European Systemic Risk Council (2023).

The prices of crypto-assets are characterised by high volatility and recurrent price corrections. Bitcoin and ether prices dropped by 39 per cent and 51 per cent, respectively, from April to May 2022 due to the uncertainty following the collapse of the terraUSD stablecoin, see box 2.

Volatility is higher among crypto-assets than other, traditional asset classes. Compared to the US S&P 500 index, price volatility has been higher for crypto-assets in virtually every period since 2017, see chart 2. Likewise, the volatility of crypto-assets is higher than for most real or financial assets, including gold, oil and high-yield bonds.[9]

CHART 2

Crypto-assets are more volatile than traditional stock indices



Note: The volatility is computed as 30-day rolling standard deviations.
Source: Macrobond and own calculations.

[9] See Financial Stability Oversight Council (2022).

BOX 2

Several crypto-asset actors collapsed in 2022

A number of events in 2022 caused risks to materialise in the crypto-asset markets. The collapse of the algorithmic stablecoin terraUSD (UST) and the bankruptcy proceedings involving the FTX trading platform illustrates how vulnerabilities in one or a few players can have severe impact on the entire crypto-asset market.

UST stablecoin lost its peg to the US dollar
UST was a stablecoin that applied an algorithm to maintain price stability, a so-called algorithmic stablecoin. UST lost its peg to the dollar in May 2022, implying that the value of a UST went from 1 to 0.1 dollar in just a few days. Until its collapse, UST was the third largest stablecoin with a market value of more than 18 billion dollars, corresponding to a market share of 10 per cent[1] in the market for stablecoins.

The breakdown of UST had implications for other crypto-assets and crypto-asset service providers. The collapse caused Tether, the most widely used stablecoin, to briefly break its peg to the dollar, as uncertainty surrounding UST led to redemptions of more than 7 billion dollars in Tether.[2] Tether did not have UST in its reserve, but a lack of transparency and credibility regarding the reserve composition resulted in increased market uncertainty. The UST collapse led to problems for crypto-asset service providers, with providers such as BlockFi and Genesis filing for bankruptcy. The lending platform Celsius and the crypto-asset investment company Three Arrows Capital also incurred significant losses on their investments in UST.

The trading platform FTX went bankrupt
FTX was one of the leading crypto-asset trading platforms, with a market share of around 10 per cent, prior to filing for bankruptcy on 11 November 2022, following revelations of fraud with client funds. The bankruptcy was filed following revelations of FTX's close ties to the investment company Alameda Research. Among the revelations were that most of Alameda Research's balance sheet total consisted of a crypto-asset called FTT issued by FTX itself.[3] These tokens could be freely issued by FTX and were used by Alameda Research as collateral for so-called margin trades[4] on FTX's trading platform.

The uncertainty surrounding the link between FTX and Alameda Research's activities and the solvency of both companies caused a run on FTX and large sell-offs – with resulting price declines – in FTT, which further weakened the balance sheet of FTX and Alameda Research. A series of allegations of mismanagement were subsequently made, including the allegation that FTX had transferred client funds to Alameda Research to cover liabilities and as additional collateral on margin trading in connection with capital losses. The collapse of FTX also led to price declines in other crypto-assets and losses among other investors with FTT exposures.

[1] Macrobond.
[2] See OECD (2022a).
[3] FTT is a token issued by FTX on the Ethereum blockchain. FTT is an unbacked crypto-asset and is therefore not pegged to the value of a reserve or anchored in another asset.
[4] A margin trade is a trade in which an investor buys assets with borrowed money while providing collateral to the lender to hedge the latter's credit risk.

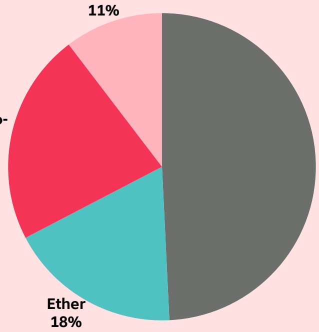
Few crypto-assets and players dominate the crypto-asset market

The concentration in the crypto-asset market is high, see chart 3, left. Two crypto-assets, bitcoin and ether, make up around two-thirds of the total market capitalisation of crypto-assets.

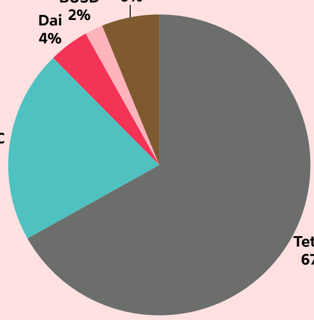
CHART 3

High concentration on the market for crypto-assets

Crypto-assets, percentage share of market value



Stablecoins, percentage share of market value



Note: The charts show the market shares of unbacked crypto-assets and stablecoins in terms of market value. The market value is computed as the market price multiplied by the volume in circulation on 20 September 2023.
Source: Macrobond.

Likewise, the market for stablecoins is dominated by a few major issuers. The high concentration creates a risk that bankruptcy or stress among one or a few large players may have systemic consequences. The two largest stablecoins, Tether and USD Coin, account for almost 90 per cent of the total market value of stablecoins in circulation, see chart 3, right. Other stablecoins with significant market shares include Binance USD, True USD and the algorithmic stablecoin Dai.

Although stablecoins have a relatively low market value, they are traded in significant volumes as they form one leg of many transactions with unbacked crypto-assets. For example, Tether formed part of more than 60 per cent of the total trading volume in September 2023.[10] In the same month, Tether also had an average daily trading volume of around 21 billion dollars, which is significantly higher than bitcoin's trading volume of slightly more than 11 billion dollars.[11]

The concentration is also seen among trading platforms, see chart 4. Financial services related to crypto-assets are primarily provided on a small number of platforms. Binance, a trading platform providing a wide range of financial

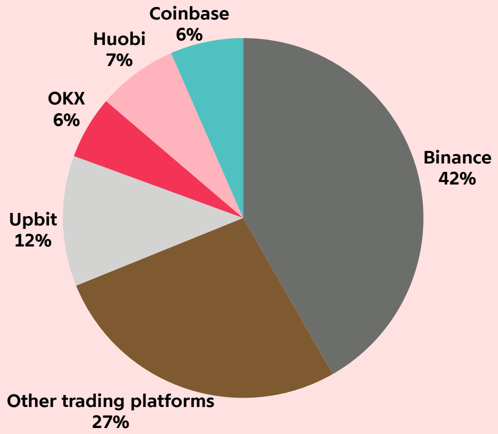
[10] See www.theblock.co (link).
[11] See www.coinmarketcap.com (link) and (link).

services related to crypto-assets, accounted for more than 42 per cent of the total trading volume of crypto-assets in September 2023.

CHART 4

High concentration on the market for trading platforms

Trading platforms, percentage share of trading volume for trading platforms.



Note.: The chart shows the market share of trading platforms measured in terms of trading volume. Computed for September 2023.
Source: www.theblock.co (link)

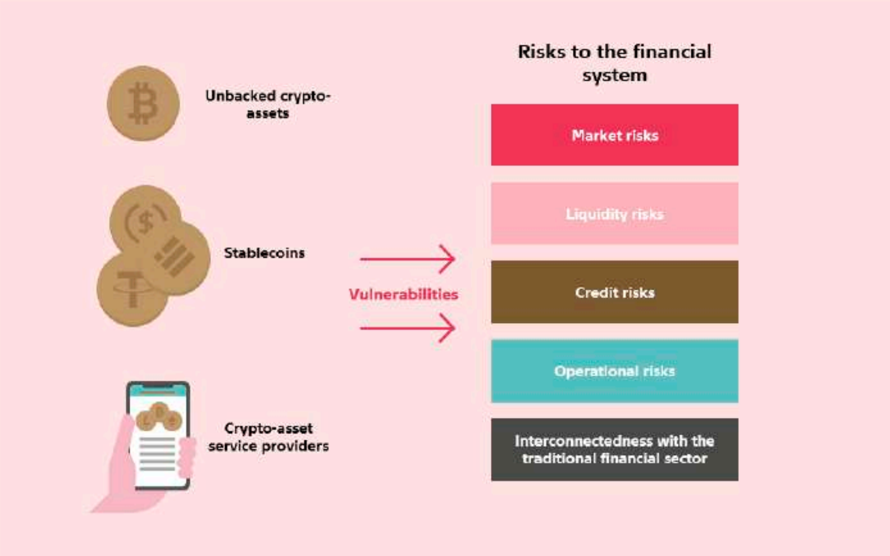
03
Crypto-assets entail risks that may affect financial stability

The crypto-asset market is associated with a number of vulnerabilities that can pose risks to the financial system. One reason being the highly volatile nature of the crypto-asset market, but also its high market concentration and the internal interconnectedness of the market players.

This report makes a distinction between vulnerabilities arising from the use of unbacked crypto-assets, stablecoins and crypto-asset service providers, respectively. The vulnerabilities in the crypto-asset market may lead to types of risks that are well-known to the traditional financial sector, see chart 5.

CHART 5

Vulnerabilities in the market for crypto-assets may pose risks to the financial system



This chapter describes the specific vulnerabilities for unbacked crypto-assets, stablecoins and crypto-asset service providers, respectively, and how these vulnerabilities may affect financial stability.

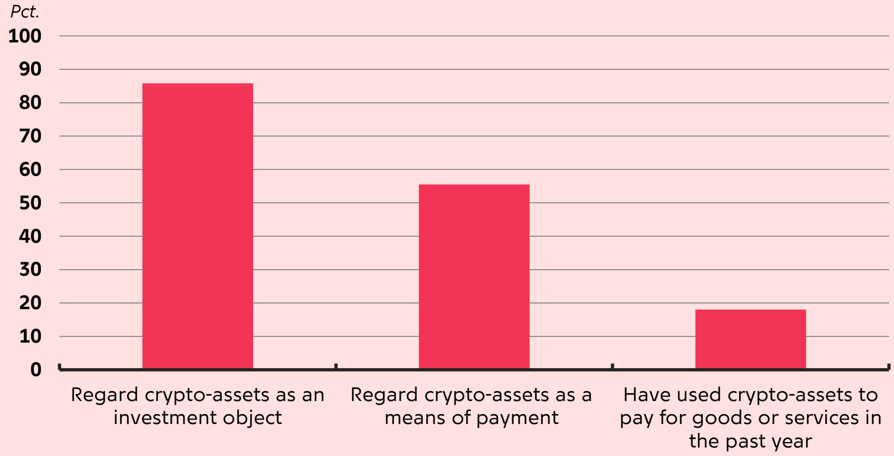
Risks of unbacked crypto-assets as investment objects

Only few Danish households hold crypto-assets and owners of crypto-assets primarily regard them as investment objects.[12] Danmarks Nationalbank's household survey from 2023 shows that only 4 per cent of the respondents hold crypto-assets. Of those 4 per cent, 86 per cent regard crypto-assets as investment objects, while 56 per cent regard crypto-assets as a means of payment, see chart 6. 18 per cent of the respondents who hold crypto-assets indicate that they have used crypto-assets to pay for goods or services in the past year.

According to the survey, few citizens in Denmark regard crypto-assets as a means of payment or money. Danmarks Nationalbank's assessment is that unbacked crypto-assets do not function well as money due to their sharp price fluctuations and associated risks, among other reasons.[13] Whether stablecoins can function well as a means of payment depends on trust and stability, including the impact of the implementation of MiCA.

CHART 6

The 4 per cent of Danish households that own crypto-assets predominantly regard them as investment objects



Note: Danmarks Nationalbank's household survey from 2023 included questions about household ownership of crypto-assets. Here, the respondents were asked to state whether they had savings/holdings of crypto-assets and to answer the questions "Do you regard crypto-assets as an investment object?", "Do you regard crypto-assets as a means of payment?" and "Have you paid for a product or service with crypto-assets in the past year?". The chart shows the answers from the respondents who stated that they had savings/holdings of crypto-assets.
Source: Danmarks Nationalbank.

Results from surveys conducted in other countries show similar trends. In the euro area, almost 90 per cent of crypto-asset owners regard them as investment objects.[14] Among Dutch households with crypto-assets, 54 per cent state that they own them for the purpose of gambling[15], and US studies[16] also indicate that households owning crypto-assets are looking for a speculative investment

[12] See Box 3 for a description of Danmarks Nationalbank's Household Survey
[13] See Nationalbanken (2022).
[14] See European Central Bank (2022b).
[15] See De Nederlandsche Bank (2022).
[16] See Auer and Tercero-Lucas (2022).

object rather than an alternative to money or services provided by traditional financial players. In addition, investors who trade in crypto-assets typically have a higher risk appetite than other investors and are more likely to use leveraged investments, see Hackethal et al. (2022).

BOX 3

Danmarks Nationalbank surveys Danish households' ownership and use of crypto-assets

As a result of the growing interest in crypto-assets, Danmarks Nationalbank has looked into Danish households' ownership and use of crypto-assets as part of the assessment of potential risks to financial stability in Denmark.

Every other year since 2017, Danmarks Nationalbank has conducted a survey on the payment habits and preferences of Danish households, including their use of cash. In 2023, the survey was conducted by the research firm Epinion and included questions about crypto-assets. Respondents answered questions on, for example, household ownership of crypto-assets, how they regard the usage of crypto-assets and the size of potential holdings.

The analysis is based on responses from a representative selection of 2,737 citizens aged 15+ years. The invitations to participate in the survey were sent by digital and regular mail to ensure representativeness across the whole population.[1]

[1] The survey is associated with a +/- 1.9 percentage point uncertainty for questions covering the entire group of respondents. The uncertainty is greater in connection with breakdowns by, for example, age groups and sub-questions.

In the following, risks from unbacked crypto-assets are thus discussed through their role as investment objects.

The price of unbacked crypto-assets is not supported by real or financial assets

Unbacked crypto-assets are speculative assets characterised by large market price fluctuations. Unlike many other types of assets, their value is not anchored to an underlying payment flow or a physically productive value. Hence, the value of unbacked crypto-assets is thus not supported by any assets, liquidity or capital. The absence of a clear financial anchor to support the price of crypto-assets also means that it is not possible to use conventional analytical methods to value the assets, e.g. determining the present value of a crypto-asset.

The market price of an asset that lack a clear financial anchor may be greatly influenced by market expectations of future price movements. These expectations are closely linked to the general discourse of the asset, i.e. market sentiment. Changes in the perception of how the market is developing or in the general market confidence may therefore lead to significant revaluations of crypto-asset prices.

Lack of a clear anchor leads to market risks

Large fluctuations expose investor to market risks and may result in large and sudden losses. For this reason, Danish and European financial authorities have warned private investors on the risks of investing in crypto-assets.[17]

Solely, these market risks pose only a limited threat to financial stability as long as the crypto-asset market is not of a systemic size, i.e. large enough to influence the traditional financial system. However, in combination with other vulnerabilities in the crypto-asset market, such as use of leverage and high

[17] See Finanstilsynet, Advarsel – Markedet for kryptovaluta er et Eldorado for svindlerne, March 2022 (link); The European Banking Authority, EU financial regulators warn consumers on the risks of cryptoassets, March 2022 (link); The European Central Bank, Decrypting financial stabililty risks in crypto-asset markets, May 2022 (link).

interconnectedness, the large fluctuations in market value may pose risks, especially if demand for crypto-assets continues to grow in the future.

There is a close correlation between investor interest in crypto-assets and the development in market price. BIS (2022) shows that rising market prices have self-reinforcing effects, as more investors enter the market, supporting further price increases.

Market risks are amplified by access to leveraged investments

The fluctuations in crypto-asset prices are amplified by an easy access to leverage in the crypto-asset market. There are currently no restrictions on the possibility of using leverage to increase investor exposure. The lack of restrictions increases investors' vulnerability to adverse market developments, thus reinforcing the market risks. Investors increase their exposure up to 125 times on certain trading platforms.[18] The actual prevalence of leverage is not known, but the ECB estimates that the use of leverage in the crypto-asset market has increased since 2020.[19]

Price movements in the crypto-asset market are closely linked. An increase or a decrease in the price of one crypto-asset will consequently do lead to similar movements in the price of other crypto-assets. The close interconnectedness increases the risk that a sharp devaluation in one crypto-assets will result in contagion and create uncertainty in large parts of the market. Ferroni (2022) shows that most of the fluctuations in crypto-asset market prices can be attributed to the general development in the crypto-asset market rather than the special characteristics, ie. use cases, of individual crypto-assets.

Single events may weaken confidence in the crypto-asset market

The lack of a clear anchor increases the risk that single events may weaken confidence in the market and lead to large, sudden devaluations of crypto-assets. A decline in market confidence may be triggered by operational failures, manipulation and fraud or by generally declining confidence in the future prospects of the market.

The use of new technology poses risk of operational challenges

The crypto-asset market is operationally dependent on blockchain technology as infrastructure for registration and validation of transactions, and even though blockchain technology may provide operational gains, market participants will be exposed to risks related to the use of this technology.

Although blockchains are generally considered to be decentralised, they typically rely on actors that validate transactions and maintain the blockchain, so-called miners. On public blockchains, all market participants can participate in the validation, but the process is often concentrated among a specialised few. This exposes the infrastructure to concentration risks, for example if these players periodically choose to cease their activities or to benefit systematically from their ability to determine the order in which transactions in the new blocks are executed, so-called front-running.

In addition, transactions on blockchains are irreversible and cannot be changed or cancelled if operational errors, such as keying errors, have occurred.

Software developers play a key role in maintaining and developing the blockchain and in implementing changes to the software. Changes must typically be adopted by voting among the actors validating the blockchain. The efficient

[18] For example, Binance offers so-called *leveraged tokens* with leverage of up to 125 times. Leveraged tokens are a type of futures contract without a fixed settlement date (*link*).
[19] See European Central Bank (2022a).

functioning of the infrastructure thus requires that these actors have an incentive to vote in favour of important changes, that the proposed adjustments contribute positively to the infrastructure and that the software developers correctly implement the changes accepted.

The crypto-asset market is vulnerable to manipulative behaviour and fraud

Lack of regulation makes crypto-asset markets vulnerable to market manipulation. Manipulative behaviour inhibits the integrity of the market, as the market participants make trading decisions based on market information that does not accurately reflect the state of the market. By artificially raising the price or liquidity for a period of time, manipulators can signal to other markets participants that demand is greater than what is actually the case.[20] The risk of manipulation is further increased by market complexity and the pseudonymity of market participants are. Combined with the absence of a trusted third party to ensure market security and integrity, manipulation may create a risk that less sophisticated market participants trade based on manipulated market information.[21]

The risk of experiencing fraud in the crypto-asset market is high. It is estimated that theft of and fraud amounted to more than 10 billion dollars in 2022, corresponding to approx. 0.1 per cent of the total transaction volume in 2022.[22] There are currently no or few safeguards against fraud in the crypto-asset market unlike in the traditional financial markets.

Correlation indicates interconnectedness with the traditional financial sector

Until recently, crypto-asset returns have been uncorrelated with traditional assets, but the correlation has increased in recent years.[23] A correlation between traditional assets and crypto-assets may provide an indication of the interconnectedness of the two markets. A high correlation can express that the assets respond to the same underlying factors or that the participants in both markets share a common risk premium.[24] The higher correlation may be due to a number of factors, including that the crypto-asset market has matured and increasing interest from professional investors.[25]

Other things being equal, a high correlation between crypto-assets and other securities reduces the potential diversification gains that investors can achieve by adding crypto-assets to a portfolio consisting of a broad market index. This also reduces the usefulness of crypto-assets as an instrument for hedging the development in other assets.

Risks of stablecoins

Stablecoins are backed crypto-assets, with a purpose of maintaining a stable value against one or several other assets, for example a currency. The stability is typically ensured by the issuer by managing a reserve of assets linked to the reference asset.[26] Several stablecoins have faced challenges maintaining a stable value, especially the so-called algorithmic stablecoins. This was illustrated by the collapse of the stablecoin terraUSD in early May 2022, see box 2. Stablecoins also share several risks with unbacked crypto-assets, especially in terms of operational risks.

[20] See Eigelshoven et al. (2021).
[21] See De Nederlandsche Bank (2022).
[22] See Chainalysis (2023).
[23] See Roshan (2022).
[24] See Financial Stability Oversight Council (2022).
[25] See OECD (2022b).
[26] See Danmarks Nationalbank (2022) for a further description of blockchain technology and its applications.

Stablecoins play a prominent role in digital asset trading as they seek to solve the issue of high price volatility associated with unbacked crypto-assets. Stablecoins are used as a secure investment of funds for investors in the digital ecosystem when they temporarily want to reduce their exposure against unbacked crypto-assets. It allows investors to stay within the blockchain-based systems, saving them expensive on/off ramping between bank deposits and crypto-assets.

Reserve-based stablecoins are connected to the traditional financial sector

The inclusion of traditional assets in the reserve holdings of stablecoin issuers creates a clear link between reserve-based stablecoins and the traditional financial markets. The funds generated through issuance are placed in a reserve to support the peg against that asset. The composition of the reserve may affect traditional financial markets by contributing to changes in the demand for the reserve assets. Furthermore, reserve-based stablecoins require a central actor, such as a commercial company or a bank, to manage their reserve.

A well-functioning peg will ensure stablecoins owners are able to always redeem their stablecoins and to a price close to the price of the reference asset.[27] For stablecoin owners to be able to redeem that stablecoin into the pegged currency at any time, the reserve must be sufficiently liquid. Reserve assets often consist of highly liquid assets such as cash or money market instruments, but other less liquid assets, such as corporate bonds or other crypto-assets, are also used in some stablecoin reserves. There are currently no requirements for the composition or management of reserve assets, but the MiCA Regulation will change this for stablecoins that are issued in the EU or that are directed at citizens in the EU (see also Chapter 5, *New regulation of crypto-assets in the EU).*

Liquidity mismatch exposes investors to liquidity risks

A so-called liquidity mismatch occurs because stablecoins, which are a direct claim against the issuer, are typically more liquid than the assets in the reserve. The liquidity mismatch on the issuer's balance sheet implies the issuer may risk being unable to meet its obligations of redemption. This issue is well-known from the financial sector and applies also to, for example, banks and money market funds.

In the traditional system, these risks are addressed through financial regulation, including adequate capitalisation and liquidity management requirements. Until MiCA enters into force, corresponding legislation does not apply to stablecoins issued in Europe.

A large volume of sudden redemptions may trigger a fire sale of reserve assets

Reserve-based stablecoins are vulnerable to a situation where many customers want to redeem their holdings of stablecoins at the same time. A large volume of sudden redemptions may trigger a fire sale of the reserve assets. This may result in large losses for the issuer and spill over to other investors through losses on their holdings. The implications for the traditional financial sector will e.g. depend on the volume and liquidity of the assets that are being sold off.

In less liquid markets, a fire sale risks causing significant market movements. For example, issuances among dominant stablecoins may have contributed to boosting demand for and reducing yields on short-term US corporate bonds.[28]

[27] Many stablecoins are associated with limited redemption rights for investors. For example, Tether imposes a lower redemption limit of 100,000 dollars. Investors with smaller holdings must sell their USDT on market terms. See Gorton & Zhang (2023) for an overview of redemption rights for a number of stablecoins.
[28] See Kim (2022).

Low transparency may create uncertainty and increase risks of sudden redemptions

A secure and well-managed reserve is essential for creating trust among holders of a stablecoin. However, many stablecoins are characterised by low transparency, e.g. in relation to the composition of their reserve. Uncertainty about whether a stablecoin issuer can meet its obligations, especially during periods of stress, may lead to a self-reinforcing process in which the sale of reserve assets, potentially with a discount, will worsen the outlook of the issuer and lead to further redemption requests.

Information on the composition and liquidity of the reserve is key for the public, including the owners, to assess the risk connected with owning a stablecoin.

A well-managed reserve is necessary to maintain confidence in the stability of the stablecoin and will reduce the risk of sudden redemptions. However, there are differences in how the dominant stablecoins manage the reserve. Available data for the two dominant stablecoins, Tether and USD Coin, shows that the majority of their reserves consist of market-based instruments, in particular short-term US Treasury bonds. However, Tether states that a significant fraction of its reserve is placed in other assets, including gold, other crypto-assets and secured loans. Tether does not specify what type of collateral that support the value of the secured loans.[29]

Stablecoin issuers are currently not subject to disclosure, auditing or reserve requirements. Hence, financial authorities have no insight into the quality and composition of the issuers' reserves and no possibility of validating the information provided. There are some examples of misleading information being provided by stablecoin issuers.[30] In addition, the lack of common disclosure standards reduces the possibility for investors of comparing risks across issuers.

Widespread use of stablecoins may affect credit supply

If the use of stablecoins becomes widespread, this may affect the supply of credit by traditional banks, as some of the funds placed in stablecoins stem from traditional bank deposits. However, it is not clear to what extent such an exchange will affect the credit supply.

The reserve composition plays a key role in the potential impact of increased use of stablecoins on credit supply. Different types of reserve assets will imply a trade-off between lower risk of a stablecoin run and greater risk of a reduction in credit supply. A scenario where bank deposits are being substituted for stablecoins will reduce deposit funding under the assumption that the stablecoin issuers do not replace their reserves as deposits in the banks. A reduced access to financing through deposits will, all things equal, increase financing costs and reduce credit supply. A reduction in credit supply may affect the banks' earnings capacity and have real economic consequences, as households and businesses could face tighter credit standards. For this to have a significant effect on credit supply, there must be a significant substitution from bank deposits to stablecoins and stablecoin issuers' reserves must consist of significant holdings in other assets than bank deposits.

[29] See www.tether.io (link)
[30] In 2021, Tether was ordered by the US Commodity Futures Trading Commission to pay fines of 41 million dollars for misleading clients about the composition of their reserve (*link*).

Risks posed by crypto-asset service providers

Crypto-asset service providers provide a wide range of financial services to clients. For the vast majority, trading services are the primary activity, but they also offer other services including custody and lending. At the same time, crypto-asset service providers play a vital role for the functioning of the market through market making, clearing and settlement of transactions. Finally, a large number of service providers issue their own tokens to support liquidity on their trading platforms.

The supply of many financial services under one entity makes it difficult to assess risk. In combination with high concentration and interconnectedness, this makes the crypto-asset market vulnerable, and it may increase the implications of a crypto-asset service provider running into financial or operational issues.

Crypto-asset service providers are currently not subject to the same kind of regulation as traditional financial institutions providing corresponding services. The fact that similar activities can be carried out under different regulatory frameworks allows for so-called regulatory arbitrage, which have several implications.

First, regulatory arbitrage gives crypto-asset service providers a competitive advantage compared to traditional financial institutions when they have to comply to less stringent rules. One cannot rule out that this has supported the rise in activity among crypto-asset service providers.

Secondly, financial stability risks are left unaddressed. The objective of financial regulation is, among others, to safeguard the financial system by mitigating the effects of a financial institute facing financial or operational challenges. The of sound regulation increases counterparty risks to investors. for instance, there have been several cases in which crypto-asset service providers have frozen clients' funds in connection with financial challenges. However, from the end of 2023, crypto-asset service providers in Europe will be covered by the MiCA Regulation (see also Chapter 5, *New regulation of crypto-assets in the EU)*.

Crypto-asset service providers have complex risk profiles

Some crypto-asset service providers supply a wide range of financial services alongside their primary function as a trading platform. The large number of financial functions for an individual provider implies that the provider's risk profile becomes complex and difficult to assess. This may raise concerns related to the providers' ability to manage risk and in potential implications for financial stability. Inadequate risk management may mean that losses on parts of a crypto-asset service provider's business spill-over to the crypto-asset service provider's other activities.

If, for instance, a trading platform also issues a crypto-asset to support other business activities within the entity, e.g. as collateral in margin trading, it entails a risk that issues in one part of the business can rapidly spread to the others. This was the case during the collapse of FTX, and it illustrates the vulnerabilities that arise when a crypto-asset service provider provides multiple financial services. Therefore, international organisations, including the Financial Stability Board (FSB) and the European Systemic Risk Council (ESRB), have special focus on the largest crypto-asset service providers, which they refer to as *financial conglomerates*.[31]

When crypto-asset service providers offer a range of activities, it can also give rise to potential conflicts of interest that may hamper the market integrity and the investor protection. Crypto-asset service providers can exploit their position

[31] See Financial Stability Board (2022).

in the ecosystem to achieve benefits in transactions that, in turn, can negatively impact their clients. A platform that acts in a combined role of exchange, credit provider, broker, custodian and investment company may, for example, can benefit from assigning the most advantageous trades to its investment business or using disproportionately large debt financing.

High interconnectedness and concentration among crypto-asset service providers

There is great interdependence and high interconnectedness between crypto-asset service providers. Many crypto-asset service providers have significant holdings of crypto-assets issued by other crypto-asset service providers. For example, the trading platform Binance owned just under 14 per cent of the FTX-issued token, FTT, when FTX went bankrupt in November 2022. Others are dependent on credit or direct investments from other crypto-asset service providers.[32] The two companies Voyager and Celsius, both of which went bankrupt in 2022, were involved in credit intermediation to other crypto-asset service providers and left their counterparties with large financial outstanding amounts. Celsius had 1.7 million clients at the time of its bankruptcy.[33]

Challenges faced by individual actors may also have a negative impact on market liquidity. If a crypto-asset service provider has a supporting market liquidity role as a market-maker or in facilitating margin trading, its discontinuation of such support will have negative liquidity and market consequences.

The concentration in the crypto-asset market is also high among trading platforms, where a limited number of actors account for the vast majority of the total trading volume (see also Chapter 2, *Development in the crypto-asset market)*. The high concentration among the trading platforms implies that the market is exposed to concentration risks. Problems among crypto-asset service providers of a significant size may impact other crypto-asset service providers and their ability to service users of crypto-assets.

Lack of regulation and supervision increases credit risks for crypto-asset service providers

At present, there is neither a regulatory framework nor a supervisory authority laying down requirements and overseeing the financial resilience of the crypto-asset service providers. In combination with a low level of information from crypto-asset service providers, it exposes users to credit risk, i.e. the risk that the service provider as a counterparty does not meet the agreed obligations related to the use of their services. There have been examples of crypto companies having placed clients' assets in their own accounts or having frozen assets in case of uncertainty about the provider's operations. This happened to both clients with assets placed with FTX and with Celsius in connection with their respective bankruptcies, see box 2.

Fragmented markets can lead to low liquidity

A large number of trading platforms contributes to fragmenting the crypto-asset market, which may affect market liquidity and lead to adverse market outcomes. When liquidity is low, market depth is poor, and only few investors want to engage in a trade. Low market liquidity thus leads to price slippage, due to a spread between buying and selling prices and higher volatility. It may become challenging to execute trades if they are made during periods of high uncertainty and stress. Here, investors wishing to sell may be forced to sell at a significantly lower price than would be the case in a liquid market.

[32] See Financial Stability Oversight Council (2022) for a review of FTX's corporate structure.
[33] See www.reuters.com (link)

Market fragmentation also means that the platforms will generally be characterised by a more sluggish price formation process, as price signals come from few transactions between few market participants. As a result, the participants take longer to form a consensus on the actual value of the traded asset, known as *price discovery*, and this provides arbitrage opportunities for investors willing to exploit them.[34]

The market fragmentation creates a tendency for investors to utilise the platforms with the better liquidity conditions. On the one hand, these network effects contribute to better liquidity, and thus trading outcomes, for the individual investor. In turn, it can tend to increase market concentration, with the vulnerabilities that this entails.

Limited data access and quality

On public blockchains, there is public access to transaction data of the crypto-market, but, despite this, access to data on crypto-asset market actors is scarce. This complicates the identification and assessment of risks and their potential implications for financial stability. Data on prices, trades and market depth are reported by the crypto-asset service providers without having public authorities validating the credibility of these data. ESRB (2023) stresses that there is great uncertainty about the quality of available market data and that so-called *wash-trading* is widespread. Wash-trading is the practice of engaging in transactions that have the sole purpose to increase the available measures of liquidity in the crypto-asset market. On some platforms, it is estimated that more than half of the total transaction volume is wash-trading.[35]

The absence of a regulatory framework for the crypto-asset market means that insufficient information is provided about the crypto-asset service providers' activities and management of risks. Additionally, it prevents verification of the correctness of the available information and its comparability across crypto-asset service providers.

[34] See Makarov & Schoar (2020)
[35] See Cong, Li, Tang and Yang (2022)

04
Usage of crypto-assets in Denmark

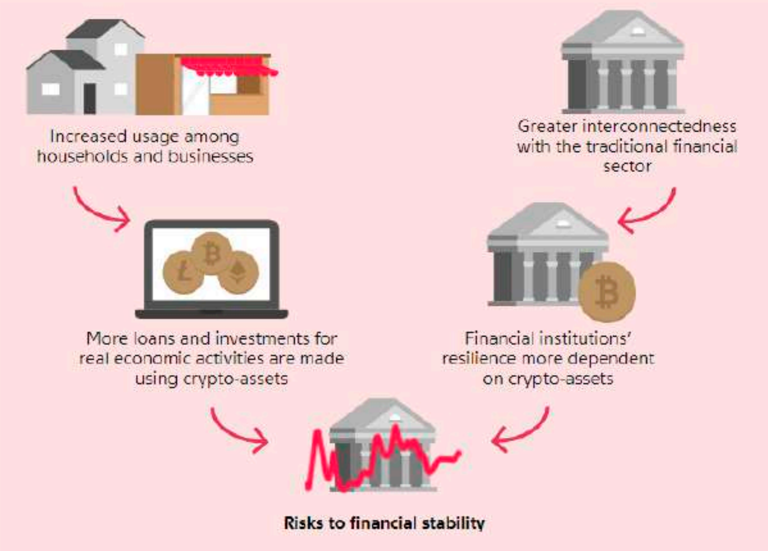
There are currently no indications that financial stability in Denmark is threatened by the risks associated with crypto-assets. The reason is that Danish households and businesses only have limited exposure to crypto-assets.

However, risks from the use of crypto-assets can be channelled through international financial markets. For example, crypto-assets had on impact on the liquidation of some American banks in spring 2023. These risks are assessed as a more pronounced, but still limited, threat to financial stability in Denmark.[36]

Should crypto-assets become a potential threat to financial stability in Denmark in the future, this may occur through two channels: increased use of crypto-assets among households and businesses and greater interconnectedness between crypto-assets and the traditional financial sector, see chart 7.

CHART 7

Risks associated with crypto-assets can be transmitted to financial stability through two channels



Source: Danmarks Nationalbank.

An increase in the use of crypto-assets to a significant level could increase several of the risks identified in Chapter 3. If more investments in crypto-assets by households and businesses lead to more financial services being provided through crypto-assets, this may, impact financial sector earnings and the

[36] However, this assessment is subject to reservations for insufficient data on the geographical distribution of ownership on public blockchains. Pseudonymisation of market participants means that their physical identity cannot be determined. Therefore, there is no clear view of how widespread the use of crypto-assets is among Danish households and businesses.

monetary transmission mechanism. However, the potential risk for financial stability will also be impacted by the coming regulatory framework and its mitigating effects.

Usage of crypto-assets by households in Denmark

In 2023, Danish households had very little exposure to crypto-assets, and there are currently no indications that crypto-assets are of systemic importance in Denmark. However, the supply of investments products that tracks the development of crypto-assets and blockchain-based companies is growing and may provide households and investors with easier access to crypto-assets.

Only few Danish households own crypto-assets

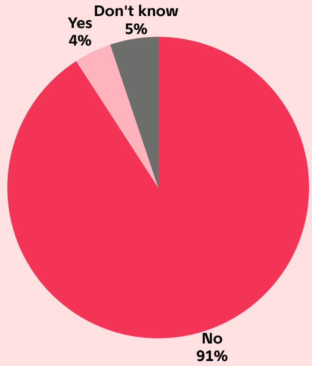
Danmarks Nationalbank's household survey shows that the uptake of crypto-assets among Danish households is low. In the survey, 4 per cent of households in Denmark respond that they own at least one type of crypto-asset, see chart 8, left.

For the majority of households, exposure is low. Around 65 per cent respond that the total value of their investments in crypto-assets amounts to less than kr. 10,000, while 90 per cent estimate that their holdings have a value of less than kr. 50,000, see chart 8, right.

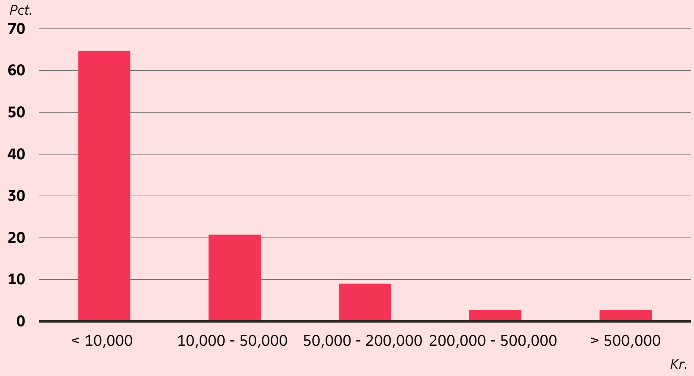
CHART 8

Danmarks Nationalbank's household survey indicates that few Danes use crypto-assets

Share of Danish households stating that they own crypto-assets



Owners of crypto-assets estimated value of holdings



Note: Danmarks Nationalbank's household survey from 2023 included questions about household ownership of crypto-assets. In the survey, the respondents were asked to state whether they had savings/holdings of crypto-assets and to estimate the total value of their holdings.
Source: Danmarks Nationalbank.

Compared to surveys conducted in other European countries, Danish households are equally or less exposed to crypto-assets. For example, ECB (2022b) finds that 4 per cent of euro area citizens own crypto-assets.[37] Other surveys, including the ECB's Consumer Expectation Survey, national

[37] The data collection for the SPACE survey took place from October to December 2021.

questionnaire surveys and surveys based on web-traffic, indicate lower use in Denmark than in other European countries.[38]

Assets traded on the regulated market increase both direct exposures and interconnectedness

Danish households' *indirect* exposure to crypto-assets is also low. Funds and asset traded on regulated markets may increase interconnectedness with the crypto-asset market. The emergence of exchange-traded investment funds (ETFs) and exchange-traded products (ETPs) that follows the development of crypto-assets and blockchain-based companies is becoming increasingly pronounced and may provide investors with easier access to exposures against crypto-assets as they are traded on traditional and, regulated markets. In this way, investors can expose themselves against crypto-asset market developments without holding crypto-assets.

Especially in the United States, several significant investment funds have applied to the financial authorities for permission to set up funds linked to crypto-assets. These funds will offer traded products that seek to follow the price of single or multiple crypto-assets. The purpose of a bitcoin ETF will thus be to follow the price of bitcoin. It may be, but does not require, that the issuer has an actual holding of bitcoins, as they also can follow the market by using futures or derivatives.

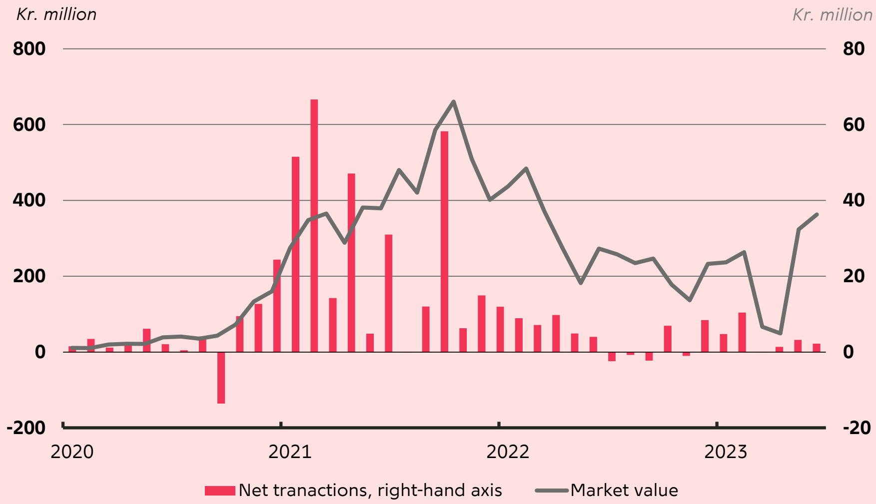
There are also several exchange traded companies that are directly connected to the crypto-asset market, including trading platforms and companies which balance sheet consists mainly of crypto-asset holdings.

Danish households are indirectly exposed to crypto-assets for kr. 360 million in August 2023, see chart 9. This corresponds to just 0.03 per cent of Danish households' total investments in registered securities.

[38] See European Central Bank (2022a) and De Nederlandsche Bank (2022) and Chainalysis (2022), among other surveys.

CHART 9

Danish households are only to a very limited extent exposed to securities that follows the development in crypto-assets



Note: The grey line indicates the market value of Danish households' investments in registered securities linked to crypto-assets, see box 4. The red columns indicate households' net transactions for the same securities.
Source Danmarks Nationalbank.

There is a positive correlation between the interest in crypto-assets and the price development on the assets. The monthly net transactions in chart 9 give an indication of Danish households' interest in crypto-assets. Especially in 2021, which saw sharp price increases, net transactions increased significantly. Interest in investing in crypto-assets has subsequently declined during 2022-2023, resulting in decreases in the prices of crypto-assets. However, only a few months have reported net sales.

The market risk of indirect exposures to the crypto-asset market is not necessarily lower than for direct ownership. Even though the investor does not formally own a crypto-asset, the investor will be equally exposed to the market development.

Danish financial institutions and institutional investors' exposure to crypto-assets

The Danish financial sector has so far been reluctant to invest in crypto-assets and offer related services, which has contributed to financial stability. In addition, banks have low exposure from crypto-assets through Danish households' crypto-asset holdings as they are very low. It reduces their overall exposure to the related risks mentioned in the previous section.

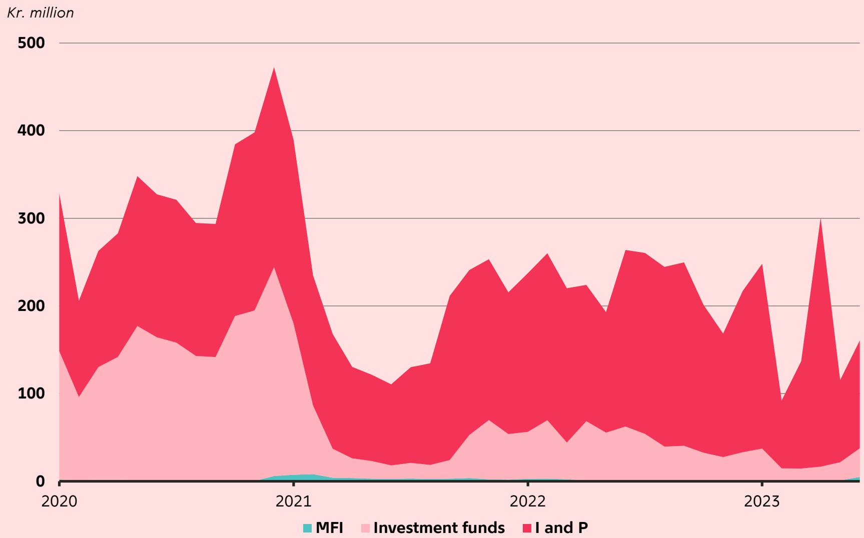
The banks' exposure to crypto-assets will become more transparent. Danish banks are currently not required to report their direct exposures to crypto-assets, but this will change with the implementation of the Basel standards for banks' crypto exposures in EU legislation. Since 2021, the Basel Committee has continuously monitored the exposures of a number of global banks to crypto-assets. At the end of 2022, 17 out of 181 banks reported that they had exposures to crypto-assets of just under 3 billion euro, corresponding to a weighted average of 0.013 per cent of the total exposures for the reporting banks.

Danmarks Nationalbank has examined the Danish banking sector's indirect exposure to crypto-assets, see Box 4box 4. The study showed that the Danish MFI sector[39] does not have any significant holdings of financial instruments that expose them to the development in the crypto-asset market. In July 2023, the market value of the MFI sector's holdings of shares, ETFs and ETPs that follows the development of the crypto-asset market was only kr. 5 million, see chart 10 chart 10.

Financial institutions can be exposed through a number of the services that they provide to their customers, see BCBS (2022). These include loans to players exposed to crypto-assets, exchange service between crypto-assets and fiat money, custody services, clearing of crypto-derivatives or the use of crypto-assets for interbank transfers.

CHART 10

Indirect crypto-exposures in the Danish financial sector are very limited



Note.: The investment funds *category also includes holding companies. MFI comprises monetary and financial institutions, including banks, mortgage credit institutions and Danmarks Nationalbank. I and P includes insurance and pension companies as well as investment funds owned by pension companies.*

Source: Danmarks Nationalbank.

Pension and insurance companies, as well as investment funds owned by pension funds (the I and P sector), also have very limited exposure to the market risk through indirect investments in crypto-assets. In August 2023, the I and P sector had holdings of kr. 123 million in securities and financial instruments related to crypto-assets. This corresponds to 0.003 per cent of the I and P sector's total managed investments of more than kr. 4,000 billion.[40]

The I and P sector's reluctancy to invest in crypto-assets is a trend also seen across Europe. A survey conducted by Fidelity in 2021 shows that only 3 per cent

[39] The MFI sector in Denmark consists of banks, mortgage credit institutions and Danmarks Nationalbank.
[40] See Danmarks Nationalbank's StatBank, table DNFPINVL (link)

of European pension funds and insurance companies had included crypto-assets in their portfolio.[41]

BOX 4

Identification of indirect exposures to crypto-assets

Danmarks Nationalbank has examined Danish investors' indirect exposure to crypto-assets. Indirect exposures cover a wide range of securities (shares, ETPs and ETFs) that fully or partially follow the development in a crypto-asset or more generally in the blockchain-based markets. Overall, 109 crypto-related securities have been identified in the securities statistics where Danish ownership has been registered between 2020 and 2023. The list of crypto-related securities has been generated based on securities registered on the Danish central securities depository, Euronext Securities.

For investment funds and ETPs, a search has been made on name or ticker search for the 15 most widely used crypto-assets, such as 'Bitcoin' and 'BTC'. In addition, a number of other crypto and blockchain-related keywords have been used to capture crypto-related ETFs that follows the development in a broader basket of crypto-assets. The securities have then been checked to verify that they actually represent an exposure to one or more crypto-assets or blockchain companies.

Shares are included for companies with business models that depend on the development in the crypto-asset market or blockchain technology. It includes companies with large holdings of crypto-assets, trading platforms and companies specialising in mining of crypto-assets. A total of 23 listed companies are identified.[1]

The statement should be seen as a lower estimate of Danes' indirect exposures to crypto-assets. It is generally difficult to identify crypto-related securities, and the statement is subject to the reservation that not all crypto-related securities have been identified. In addition, new investment funds are continuously being established and new financial products are introduced on the market, which means that the identified list may already be outdated.

[1] See Morgan Stanley (2022).

No significant stablecoins are pegged to the Danish krone

Danmarks Nationalbank is not aware of any significant stablecoins that follow the value of the Danish krone. There are currently no indications that there may be a fire sale of Danish or European securities caused by a run on a stablecoin, as the market for stablecoins linked to the Danish krone or European currencies is very small. And although more stablecoins pegged to the euro have emerged in recent years, it is also a market that is very limited in size.[42]

Most stablecoins are pegged to the US dollar, one reason being network effects. Therefore, stablecoins which have a large number of users are more attractive as there are more users to interact with. The importance of network effects for stablecoins reduces the likelihood that a sufficiently large scale – and thus business volume – can be achieved in a stablecoin anchored to a smaller currency such as the Danish krone, as the number of users is limited.[43] The spread of global stablecoins pegged to the US dollar also means that Danish users are likely to be more inclined to look to where liquidity is already high.

Risks can be transmitted through global financial markets

Developments in the crypto-asset market may affect the financial system in Denmark through the global financial markets. Denmark is a small open economy with a financial sector that is closely connected to the global financial system. If risks in the crypto-asset market affect the financial sector in one of our trading partner countries or a financial epicentre such as the United States, the Danish financial sector can import risks from the crypto-asset market.

[41] See Fidelity (2021).
[42] See European Systemic Risk Council (2023) for an overview of stablecoins pegged to the euro.
[43] See Danmarks Nationalbank (2022) for a description of why network effects are relevant to players providing services using blockchain technology

In spring 2023, the development in the crypto-asset markets had consequences for two US banks, Signature Bank and Silvergate Bank, both of which specialised in crypto-assets. The banks were wound up and went into voluntary liquidation, respectively, after a rapid decline in deposits triggered by turbulence in the crypto-asset market and the resulting uncertainty about the banks' ability to continue as going concerns. If a similar event occurs for a bank of a significant size, this may have even greater consequences for the US banking market and risk impacting the Danish financial sector.

A fire sale of large stablecoins can, under certain conditions, affect financial stability in Denmark. The vast majority of all stablecoins are pegged to the US dollar and are primarily supported by assets issued in the US financial sector. A fire sale of reserve assets among these issuers can have an impact on the less liquid assets in the reserves, such as corporate bonds and crypto-assets. To the extent that the reserves are placed as deposits with banks and money market funds, sudden redemptions will also give rise to stress. It could potentially create a similar run on the assets held by banks and money market funds.

It is difficult to determine when a stablecoin has reached a size that can cause the above effects, as the increasing risk is a product of many factors. As previously stated, the risk of a run on a stablecoin depends on the composition of reserve assets and general confidence in the market, among other factors. However, the market for stablecoins is, for now, still small relative to traditional markets, and the implications of a fire sale on a stablecoin are likely to be very limited, especially in Denmark.

05
New regulation of crypto-assets in the EU

New regulation will address a number of the vulnerabilities in the crypto-asset market that may threaten financial stability in the long term. Companies that issue crypto-assets or provide financial services connected with them must, like other financial institutions, comply with the rules that support an efficient and secure financial system. It is important that risks are addressed while the use of crypto-assets remains limited and before they can have implications for financial stability in Denmark and Europe.

From 2025, there will be a comprehensive regulatory framework covering crypto-assets in the EU. By then, all provisions in MiCA[44] will be applicable and the Basel Committee's proposed standards for capital treatment of crypto-assets are expected to be implemented in European legislation. EU Member States have previously had to deal with crypto-assets within national legislation, resulting in an absence of regulation in many places.

New regulation fences off risks posed by crypto-assets

The new regulation will, for example, help reduce the risks to financial stability in the EU posed by crypto-assets, see table 1. A significant part of the identified risks that may threaten financial stability will be addressed in the new regulation.

[44] Regulation (EU) 2023/1114 of the European Parliament and of the Council of 31 May 2023 on markets in crypto-assets and amending Regulations (EU) No 1093/2010 and (EU) No 1095/2010 and Directives 2013/36/EU and (EU) 2019/1937

TABLE 1

New European regulation will address a number of risks that crypto-assets pose for financial stability

Financial stability risks	Vulnerability	Regulatory response	Addressed by MiCA	Addressed by Basel
Market risks	Lack of anchoring in tangible assets	-		
	Lack of clarity on reserves for stablecoins	Requirements for the reserve composition	X	
	Low market transparency	Disclosure requirements	X	
	Prone to fraud and scams	Consumer protection requirements	X	
	Regulatory arbitrage	International coordination		
Liquidity risks	Liquidity mismatch in stablecoin reserves	Liquidity management requirements	X	
	High concentration of liquidity on platforms	Disclosure requirements	X	
Credit risks	Financial connections with affiliated entities	Disclosure requirements	X	
	Excessive use of debt in the crypto-asset market	Loan-based tools		
	No control of governance	Management requirements	X	
	Limited information about business models	Disclosure requirements	X	
Operational risks	High technological dependency	Operational requirements	X	
	Cyber security risks	Contingency response plans for critical incidents	X	
Interconnectedness with the traditional financial sector	Direct exposures in banks	Capital and liquidity requirements		X
	Direct exposures among other financial corporations	Capital and liquidity requirements		
	Traditional financial institutions' supply of financial products related to crypto-assets	-		
	Traditional financial services provided to crypto-companies	-		

Source: BIS (2023) and Danmarks Nationalbank

The purpose of the new regulation is multifaceted. The European Commission wants to increase consumer protection and market integrity and continue to ensure financial resilience and stability. Under MiCA, persons and legal entities operating with crypto-assets must comply with standards for, for example, own funds, liquidity management, governance, authorisation for and supervision of the companies operating with crypto-assets, see box 5.

MiCA harmonises reporting of business information across EU member states. This gives supervisory authorities and central banks access to data that enable them to better identify and assess the potential risks to financial stability.

BOX 5

Main elements of MiCA

With the MiCA Regulation, the EU is the first major jurisdiction to adopt a regulatory framework dedicated to markets for crypto-assets. The requirements in the Regulation are based on those contained in the existing financial legislation, including the regulation of financial instruments and capital requirements contained in the Markets in Financial Instruments Directive (MiFID), the Capital Requirements Regulation (CRR) and the Capital Requirements Directive (CRD). However, MiCA does not cover activities with digital assets regulated under MiFID, non-fungible tokens (NFTs), central bank digital currencies (CBDCs) or activities provided by fully decentralised service providers (so-called DeFi services).

MiCA formally entered into force on 30 June 2023, but the provisions of the Regulation concerning issuers of crypto-assets and crypto-asset service providers will become applicable after an implementation period of 12 and 18 months, respectively. For crypto-assets service providers registered within the EU before the implementation of MiCA, a grandfathering period on 18 months applies. The national financial authorities do have the competence the reduce or remove this option.

Regulation of crypto-assets and stablecoins
MiCA distinguishes between three types of digital assets: Asset-referenced tokens (ART), e-money tokens (EMT and other crypto-assets. ARTs and EMTs can both be characterised as stablecoins, as they comprise assets tha seek to maintain a stable value against one or more reference assets. Only credit institutions and e-money institutions registered within the EU will be able to issue EMTs, as these follow the exchange rate of an official currency and are regarded as electronic money, whereas all legal entities will be able to issue an ART.

The Regulation imposes relatively few requirements on issuers of crypto-assets, while there are significantly more provisions for issuers of ARTs and EMTs. Issuers of both ARTs and EMTs must be authorised and supervised by the national competent authorities. If an ART or EMT is assessed to be significant (see the criteria for this described later in this box), the supervisory authority will pass to the European Banking Authority (EBA) in the case of ARTs, or be shared between the national supervisory authority and the EBA in the case of EMTs.

Key elements of MiCA include requirements for own funds, reserve management and redemption rights among holders of issued tokens. Adequate capitalisation among issuers of ARTs and EMTs is to ensure that they are sufficiently resilient to limit any contagion effects on the established financial system. At the same time, issuers of ARTs and EMTs must clearly specify the redemption rights to which holders are entitled and ensure that the reserve in question is sufficient to meet redemption requests. This involves requirements for the composition, management and storage of the reserve. EMTs must always be redeemable at par, while ARTs must be redeemable at the market price of the assets that the price of the issued tokens follows.

In contrast to the regulation of ARTs and EMTs, MiCA imposes few requirements on issuers of crypto-assets that are not asset-referenced tokens or e-money tokens. These requirements primarily concern the preparation of a so-called white paper, i.e. a disclosure document containing information about, for example, the issuer, rights and obligations as well as possible risks of the asset.

Under MiCA, the national central banks have the possibility of limiting the issuance of crypto-assets that may pose a threat to those parts of the financial system that fall under the central banks' mandate. In practice, this means that Danmarks Nationalbank can veto the issuance of an ART that follows the Danish krone in Denmark if it is deemed to pose a risk to payment security, financial stability, monetary policy transmission or monetary sovereignty.

The box continues on the next page

BOX 5 (continued)

Regulation of crypto-asset service providers
MiCA contains three categories of regulation aimed at crypto-asset service providers: A set of general requirements aimed at all crypto-asset service providers, a set of specific requirements targeting providers of specific financial services and, finally, more stringent requirements for so-called significant crypto-asset service providers.

The general requirements include requirements for capitalisation, organisational structure, competence requirements for governance, storage of customer funds and protection of the customers, which contain great similarities with the requirements of the Danish Financial Business Act (*Lov om finansiel virksomhed*). Among other requirements, crypto-asset service providers must be authorised by a competent authority in an EU member state, have clear governance and organisational structures and effective procedures for identification and management of risks. In addition, they are covered by the standards for combating money laundering and terrorist financing.

MiCA sets stricter requirements for so-called significant crypto-asset service providers. A crypto-asset service provider is regarded as significant when it has more than 15 million active users in EU member states. A significant crypto-asset service provider must be authorised and national authorities must share supervisory information with the European Securities and Markets Authority (ESMA) on an ongoing basis.

Source: European Commission (2023), *Markets in crypto-assets*

Financial stability is further supported by the Basel Committee on Banking Supervision (BCBS) having finalised its standards for the treatment of credit institutions' exposures to crypto-assets, see box 6. This includes requirements for the credit institutions' own funds and liquidity management. In practice, this implies that credit institutions must finance investments in crypto-assets exclusively with equity.[45] In addition, the standards impose a cap at maximum 2 per cent of the total Tier 1 capital for credit institutions' possible exposures to crypto-assets, with the aim of limiting the interconnectedness of the traditional financial sector and the crypto-asset market.

Once implemented in European law, the Basel standards will improve the credit institutions' resilience to absorbing losses from materialisation of risks on their exposures to crypto-assets. This applies to both direct investments in crypto-assets and indirect exposures in exchange-traded products that follow the development in the crypto-asset market.

[45] Based on the assumption of a capital requirement of 8 per cent, corresponding to the Pillar I minimum requirement. However, banks will often have a higher capital requirement as a result of additional capital requirements.

BOX 6

Basel standards for treatment of credit institutions' exposures to crypto-assets

In December 2022, the Basel Committee on Banking Supervision (BCBS) presented its proposal for a set of regulatory standards for credit institutions' treatment of exposures to crypto-assets. This includes capital adequacy and liquidity risk management standards designed to ensure that credit institutions holding crypto-assets are resilient and thus capable of absorbing any losses on their holdings.

The regulation must create a level playing field for the treatment of assets. The standards have been prepared on the basis of a principle of 'same activity, same risk, same regulation'. Thus, for example, the capital adequacy requirement for exposures to crypto-assets will be equated with other types of assets if they involve the same risk. The Basel standards are not automatically applicable in Europe but must be implemented in the regulation that lays down capital requirements for credit institutions and systemic investment firms, among other requirements.

Two risk groups
The Basel standards classify crypto-assets into two risk groups, group 1 and group 2, each of which imposes on the banks' different own funds and liquidity requirements.

Group 1 includes both tokenised assets, i.e. digital representations of traditional assets such as equities and bonds issued by means of DLT or similar technology as well as crypto-assets with an effective stabilisation mechanism. Provided they meet a number of classification criteria, these assets will be treated as traditional assets in the existing Basel standards. In order to address observed weaknesses in the DLT infrastructure, it is envisaged that authorities can activate a capital add-on to the risk-weighted assets.

Group 2 includes all crypto-assets that do not meet the classification criteria of group 1. This applies to tokenised assets, stablecoins and unbacked crypto-assets. These assets are associated with higher risks than other assets and are therefore subject to more conservative regulation. Holdings of group 2 assets will be subject to a risk weight of 1250 per cent. This means that banks must fully finance their holdings of crypto-assets with equity. In addition, the standards set an exposure limit of 1 per cent of the bank's core capital, which aims to prevent the spreading of shocks from the crypto-asset market to the banking sector.

Difference between classification of crypto-assets in the Basel standards and MiCA
The classification of crypto-assets is not fully harmonised between the Basel standards and MiCA, and expectations are therefore that we will see an alignment of the standards with European legislation. Asset-referenced tokens can be placed in both group 1 and group 2, depending on the effectiveness of the stabilisation mechanism. E-money tokens will always be classified as group 1, while other crypto-assets will always be classified as group 2.

[1] An effective stabilisation mechanism is defined by the BCBS as one that meets the following five criteria: (1) the asset must be designed to be redeemable at a predefined value against a reference asset, (2) the stabilisation mechanism minimises fluctuations in the market value of the crypto-asset relative to the peg value of the reference asset, (3) the stabilisation mechanism enables risk management similar to the risk management of traditional assets, (4) there must be sufficient information for banks to verify the ownership rights to the reserve assets upon which the crypto-asset is dependent, and (5) the crypto-asset's reserve is sufficient to ensure redemption, even in periods of stress, and the issuer is regulated by a financial authority and subject to capital and liquidity requirements.

Source: BCBS (2022), Prudential treatment of crypto-asset exposures

Regulation of crypto-assets supports financial innovation

The coming regulation will increase the credibility and integrity of the crypto-asset market. MiCA creates clarity about the regulatory landscape, making it easier for businesses to navigate the crypto-asset market. At the same time, MiCA entitles owners of crypto-assets to basic rights. It benefits market integrity when businesses that develop financial solutions based on blockchain technology must meet the same requirements as financial companies that use other technology. This results in competition that is value-based rather than based on the absence of regulatory requirements, which supports financial innovation.

Several examples have been seen of how crypto-asset service providers characterised by a lack of risk management and careless handling of customer funds have created distrust in the crypto-asset market and increased uncertainty about possible societal gains from blockchain technology.

Regulation of crypto-assets is revised on an ongoing basis

With MiCA and the expected implementation of the Basel standards for treatment of exposure to crypto-assets in European law, there will, for the first time, be a framework covering the use of new technology in the financial area. Therefore, the European Commission is proposing to evaluate the regulatory framework on an ongoing basis. Periodic evaluations have thus been incorporated in the application of the Regulation in MiCA. This will result in two reports to be submitted in mid-2025 and mid-2027, respectively.

The application of MiCA may lead to some activities moving to areas or platforms that are less regulated. MiCA exempts fully decentralised services, so-called DeFi services. The reason being that the services are not offered by a trusted third party, but by automated software through so-called *smart contracts*. The absence of a identifiable legal entity hinders a secure and efficient enforcement since there is not counterparty that can be held accountable for any breaches of the regulation. When MiCA regulates centralised crypto-asset service providers but not DeFi services, this can lead to higher activity levels among decentralised crypto-asset service providers. For this reason, the European Commission will focus on further examining DeFi services in their two evaluations of MiCA.

In addition, international organisations such as the ESRB and FSB recommend an examination of the risks associated with the fact that some crypto-asset service providers offer a combination of many financial services under the same legal entity. This increases the complexity of the providers' business activities, making it difficult to identify risks that are building up. MiCA currently does not contain any rules limiting the possibility that the same business can provide different services. ESRB (2023) recommends that such an analysis be included in the coming evaluations of MiCA in 2025 and 2027.

Access to data is necessary for effective monitoring

Data concerning crypto-assets and the activities of service providers are vital for the financial authorities' ability effectively to oversee and assess potential risks to financial stability. With the new regulation of the crypto-asset market, financial authorities will have access to more and better information about credit institutions' exposures to crypto-assets and the build-up of risks among crypto-asset market players.

In some areas, however, the data available to the authorities will still be limited. The Basel standards lay down requirements for credit institutions, but financial institutions such as investment funds and insurance and pension companies are currently not required to report exposures to crypto-assets. Furthermore, MiCA will primarily impose requirements on the crypto-asset service providers that provide trading services, while no reporting requirements will be imposed on providers of other types of services, for example custody activities.

Global harmonisation can limit regulatory arbitrage

The crypto-asset market is not limited to Europe, but is global, and global harmonisation of rules is therefore an expedient way to regulate the market. There is important ongoing work, including in the FSB, which, since 2018, has issued global policy recommendations for crypto-assets, stablecoins and crypto-asset service providers.[46] This work is to support convergence of the rules across borders, as a higher degree of cross-border harmonisation reduces the risk of regulatory arbitrage. It is therefore important to continue the work

[46] See FSB (2018) and FSB (2020)

internationally to promote global coordination and harmonisation in the regulation of crypto-assets.

Danmarks Nationalbank monitors the development closely and participates actively in international working groups and forums that focus on new technology and on the opportunities, risks and costs associated with crypto-assets.

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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

ANALYSIS

DANMARKS NATIONALBANK

1 JUNE 2023 — NO. 6

FINANCIAL STABILITY — 1ST HALF 2023

Interest rate hikes affect the banks and their customers

Rising interest rates and consumer prices are draining the resilience of homeowners

Rising interest rates and consumer prices mean that 36,000 more homeowners are expected to have expenses that exceed their incomes in 2023. However, the wealth accumulated by homeowners can help limit the banks' direct losses.

Prospects of higher bank earnings

The banks have raised interest rates more on loans than on deposits, which contributes to increased earnings in 2023. The earnings may counter the effect from higher impairment charges, which can be the result of the higher interest rates in the long term.

Some institutions should increase their excess eligible liabilities relative to MREL requirement

The need for sound risk management was underlined in March 2023 when a few foreign banks' problems weakened confidence internationally. A necessary part of sound risk management in banks is to have sufficient eligible liabilities relative to the regulatory requirements.

CONTENTS

ABOUT THIS ANALYSIS

Danmarks Nationalbank publishes the biannual analysis *Financial stability*, which summarises Danmarks Nationalbank's assessments and recommendations regarding financial stability in Denmark.

One of Danmarks Nationalbank's overall objectives is to contribute to a stable financial system, which is a prerequisite for enabling the financial sector to perform its tasks that are critical to society. These tasks include supporting financing and savings as well as handling secure and efficient payments and contributing to ensuring that Denmark has a robust economy.

The analysis assesses whether conditions related to credit institutions' credit lending, 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 such as pension and life insurance companies, digitalisation in the financial sector, cyber threats, or the impact of climate change on the financial sector.

Summary and assessment

FINANCIAL MARKETS

Declining but still high inflation
Inflation remains high, but has been falling in the United States, the euro area and Denmark in the past six months. The decrease is especially due to lower energy prices, and core inflation is now higher than overall inflation in Denmark. High inflation has resulted in declining purchasing power for consumers. Subsequently, wage growth has increased in the United States, the euro area and Denmark.

Higher interest rates and growth slowdown
Monetary policy tightening in 2022 has continued into 2023, and the key interest rates of the Federal Reserve Bank and the European Central Bank (ECB) have risen significantly. With the central banks' interest rate increases, yields have also risen significantly on both long-term and short-term government, corporate and mortgage bonds since the start of 2022. The monetary policy tightening is expected to result in a slowdown in growth in the Danish economy in the course of 2023.

Problems in a few foreign banks briefly affected risk perception of the banking sector
In March 2023, a few regional US banks faced problems due to inadequate risk management. These problems meant that investors perceived the banking sector as more risky, resulting in falling prices of banks' equities and debt issuances. The problems for the specific banks did not trigger systemic stress in the financial sector, and market prices have risen again since April.

LIQUIDITY AND FUNDING

The banks meet regulatory requirements for liquidity and funding, and their liquidity situation is robust
The systemic banks continue to have a solid liquidity situation and comply with the regulatory requirements for liquidity coverage ratio (LCR) and net stable funding ratio (NSFR) by some margin. All Danish banks will be able to comply with the LCR in a very hard scenario where 80 per cent of their deposits above the deposit guarantee from large corporates is deducted.

Spillover effects underline the need for sound risk management
The turbulence in the financial markets in March 2023 led to very low issuance volumes in the following weeks, stressing that uncertainty about one bank can quickly spread across the whole sector and across borders. It is therefore important that the institutions focus on sound risk management, including ensuring sufficient buffers to regulatory requirements, to enable them to withstand situations in which the debt markets are fully or partially closed.

Parts of systemic banks' deposits are less stable
Unlike the situation during the financial crisis, the banks have had a deposit-to-loan surplus since 2013. Seen in isolation, the banks' deposit funding surplus makes them less vulnerable to closed funding markets. However, to ensure a robust liquidity position, it is important that the individual bank knows the stability of its deposits and ensures that this is taken into account in its liquidity management. The stability of the deposits is generally lower among systemic banks, which places higher demands on these institutions' liquidity management.

HOUSING CREDIT

Rising interest rates and consumer prices are draining the resilience of household customers
Since the beginning of 2022, homeowners have been hit by significant increases in consumer prices and interest rates. Danmarks Nationalbank expects that from 2021 to 2023, 36,000 more homeowners will have a budget deficit, i.e. their expected income is insufficient to maintain a modest consumption and to service their debt. These homeowners' loans correspond to only just under 3 per cent of the total housing debt, which limits the institutions' total credit risks from homeowners with a budget deficit. Households that reduce their consumption will instead reduce the revenue of the institutions' corporate customers.

Falling house prices have reduced homeowners' home equity and increased the number of technically insolvent homeowners
Housing market activity slowed significantly in 2022, and house prices have dropped markedly after

peaking in February 2022. The drop in house prices increases the number of technically insolvent homeowners and homeowners with high loan-to-value ratios. Especially these homeowners may result in the institutions incurring losses if they come under financial pressure and have difficulties paying their debt.

BUSINESS CREDIT

Declining turnover may reduce retail and service industries' ability to pay
The large increases in consumer prices and interest rates are currently eroding consumer purchasing power and dampening private consumption growth. This is reflected in real turnover, which has decreased in large parts of the retail and service industries. Other things being equal, declining turnover makes it harder for retail and service businesses to meet their liabilities. The banks' direct exposure to the retail and service industries is relatively limited, but the development may spread to other types of businesses.

Commercial real estate has previously resulted in large losses
Lending to the commercial real estate industry has previously resulted in banks incurring large losses. The rising interest rates are currently increasing the return requirement for commercial real estate, and this may lead to sharp price falls. Falling prices may result in the collateral pledged on the loans not being sufficient to cover the full exposure. This may lead to losses in the institutions in the event of default on the loans. At the same time, rising interest rates and economic downturn increase the risk that businesses in the real estate industry will not be able to service their debt.

EARNINGS

Higher interest rates increase the institutions' core earnings
Systemic credit institutions' core earnings increased in 2022. The increase is a result of higher interest rates and an increase in interest margins, which overall increase the institutions' net interest income. In 2023, net interest income will increase due to a full financial year with a higher level of interest rates.

Loan impairment charges are still low
The systemic credit institutions' impairment charge ratio remained low in 2022. Relative to 2021, the majority of the institutions have maintained or increased their additional impairment charges from management estimates.

CAPITAL AND STRESS TESTS

Some institutions should increase their excess eligible liabilities relative to MREL requirement
Danmarks Nationalbank's stress test shows that some systemic credit institutions will not be able to meet their total minimum requirement for eligible liabilities (MREL) during a one-year period with limited possibility of issuing new debt instruments. The institutions should avoid this vulnerability by building up sufficient excess liabilities relative to the requirement and ensuring a sufficiently even and long maturity profile for their debt issuances. All the systemic institutions had excess liabilities relative to their MREL requirement at the end of the 1st quarter of 2023.

In Denmark and the rest of the EU, there are rules for crisis management of failing institutions
One of the objectives of the rules for crisis management of failing institutions is to ensure that failing credit institutions can be handled without significant negative effects on financial stability. For all Danish systemic credit institutions, the crisis management strategy is that the whole group must be recapitalised and continued, so that critical functions can be upheld. The credit institutions' obligation to meet the minimum requirement for eligible liabilities (MREL) forms part of the crisis management framework.

Some institutions should increase their capital towards the phasing-in of the banking package
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). Some systemic institutions do not have sufficient excess capital relative to their capital buffer requirements to comply with increases from the revised regulation in a severe recession scenario.

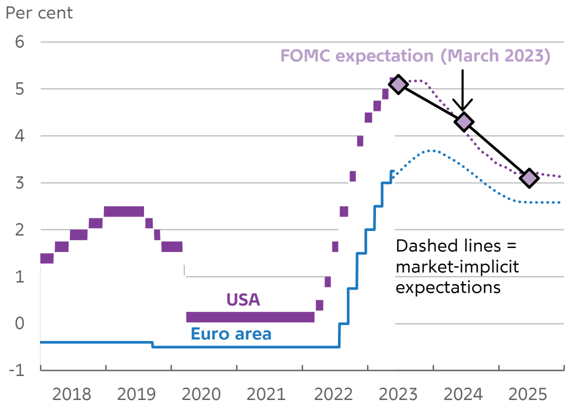
CYBER THREAT

The cyber threat remains significant
For a number of years, the Danish financial sector has targeted work at strengthening resilience against cyberattacks. The cyber threat cannot be eliminated, and there is still a need to increase cyber resilience. The reason for this is that the best hackers are continuously becoming more specialised and sophisticated in their methods. At the same time, the war in Ukraine is changing the threat landscape. It is important that the financial sector continues to target work at increasing cyber resilience and limiting the impacts of cyberattacks.

Large interest rate increases and prospects of growth slowdown

High inflation and accompanying sharp monetary policy tightening in 2022 have continued into 2023. The key interest rates of the Federal Reserve Bank (Fed) and the European Central Bank (ECB) have been hiked by 5.0 and 3.75 percentage points, respectively, see chart 1. The markets expect the ECB to raise interest rates further in 2023. While the market expectation is that the Fed will lower interest rates towards the end of 2023, the Fed's own expectations indicate that interest rates will remain around the current 5 per cent on average for 2023.[1] With the large interest rate increases by the central banks, yields have also risen significantly on both long-term and short-term government, corporate and mortgage bonds since the start of 2022.

Markets expect key interest rates to be very close to peaking Chart 1



Note: Dotted lines indicate market-implicit expectations for money market interest rates in the USA and the euro area as of 23 May 2023. Market-implicit expectations for the Fed interest rate are based on US fed funds futures. The expected ECB interest rate is derived from the EUROIS yield curve.
Source: Scanrate RIO, Macrobond.

Prospects of low growth
The global economy is set for a growth slowdown in 2023. In the spring forecasts from the OECD and the IMF, growth is projected to be significantly lower in 2023 than in 2022, especially in the euro area, see chart 2. In Denmark, Danmarks Nationalbank also expects lower future growth as the impact of the central banks' raising of interest rates increases. Among other effects, the interest rate increases are expected to dampen growth in Denmark's export

1 See the economic projections of Federal Reserve Board and Federal Open Market Committee from March 21-22 FOMC meeting (*link*).

markets, which is projected to lead to a slowdown in growth in 2023 from a high level of economic activity.[2]

Inflation is declining but remains high

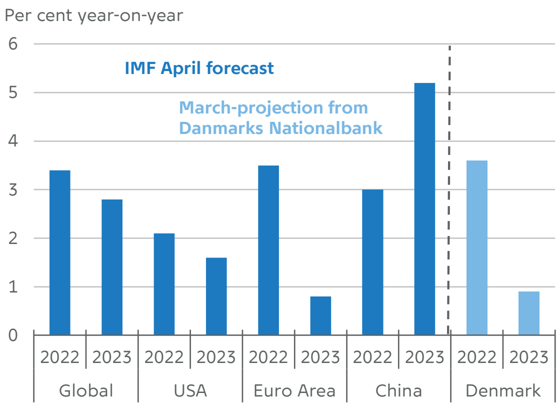
Inflation is still high, but has been declining in the United States, the euro area and Denmark over the past six months, see chart 3. The decline has especially been driven by falling energy prices. The rate of inflation[3] in the euro area and Denmark was thus 7.0 per cent and 5.6 per cent, respectively, year-on-year in April. Core inflation[4] is now higher than the overall inflation in the euro area and was 7.3 per cent year-on-year in April. High inflation has resulted in declining purchasing power for consumers. Subsequently, wage growth has increased in the United States, the euro area and Denmark.[5]

High market volatility may further increase funding costs

Market expectations for future interest rates have been characterised by large fluctuations during the period in which monetary policy has been tightened. Positive economic indicators and high inflation have helped raise expectations for the key interest rates in early 2023. Conversely, the turbulence in the banking sector in March resulted in a significant lowering of expectations, see the next section.

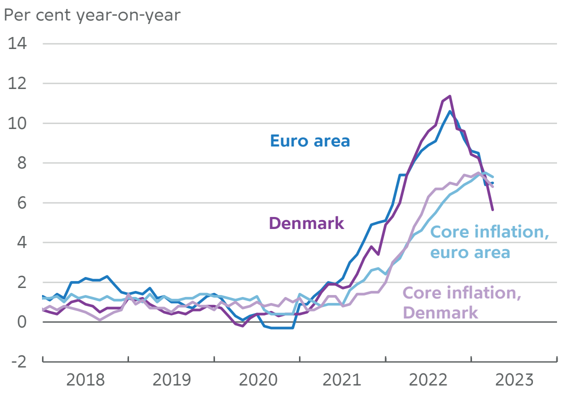
The widely changing expectations for the central banks' key interest rates have also resulted in large fluctuations in government and mortgage bond yields. The day-to-day changes in yields for German government bonds have thus been significantly higher than in the years before 2022, see chart 4. The yield on Danish variable-rate mortgage bonds has seen large day-to-day changes of up to 0.4 percentage points in a single day.[6]

Prospects of low growth in 2023 Chart 2



Note: IMF estimates are from the April 2023 forecast. GDP growth in Denmark is based on Danmarks Nationalbank's projection of 15 March 2023.
Source: IMF and Danmarks Nationalbank.

Inflation is declining but remains high Chart 3



Note: Core inflation is defined as HICP, i.e. inflation excluding energy and unprocessed foods. The most recent observations are from April 2023.
Source: Macrobond.

2 See Danmarks Nationalbank, Declining but still high inflation, *Danmarks Nationalbank Analysis (Outlook for the Danish economy)*, no. 4, March 2023 (*link*).

3 Measured using the EU harmonised index of consumer prices (HICP).

4 Core inflation is defined as HICP, i.e. inflation excluding energy and unprocessed foods.

5 In Denmark, wage growth in industry is expected to be 4.7 per cent in 2023. See Danmarks Nationalbank, Declining but still high inflation, *Danmarks Nationalbank Analysis (Outlook for the Danish economy)*, no. 4, March 2023 (*link*).

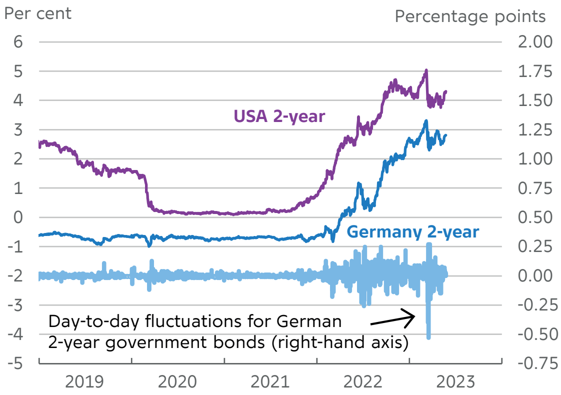
6 Since 2021, the average day-to-day change in absolute values has been 0.02 percentage points.

High volatility in the markets may in itself increase financing costs for businesses and households. For example, it can contribute to increasing the term premium[7], thus raising the interest rate on debt with a long fixed-interest period or fixed interest rate. At the same time, it may be more difficult for institutions to obtain market financing, see also the section on liquidity.

Problems in a few foreign banks briefly affected risk perception of the European banking sector
In March 2023, a few regional US banks faced problems due to inadequate risk management. These problems were enhanced by a lack of confidence in the banks' viability, which led to rapid withdrawals of deposits from the banks. For Silicon Valley Bank, the problems were triggered by the bank being forced to realise losses on its "hold-to-maturity"-holdings of long-term government bonds, see also the section on capital and stress tests. Signature Bank and Silvergate Bank experienced problems derived from the banks' pronounced exposures to failed companies engaged in crypto-asset activities. These incidents have demonstrated how crypto markets can impact traditional financial markets. Danmarks Nationalbank assesses that crypto-assets do not currently pose a risk to financial stability in Denmark, see box 1.

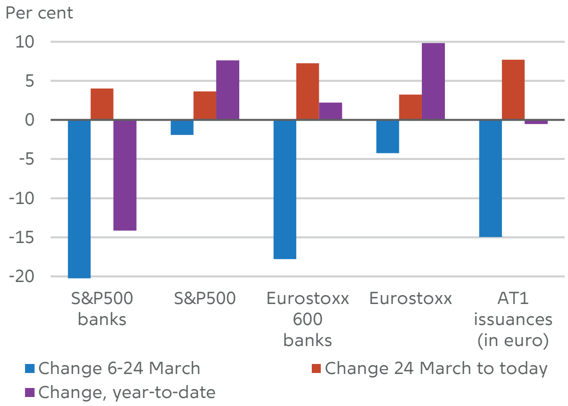
The problems in the US banks spread to the banking system in Europe and the United States. The markets' risk perception of the banking sector increased, resulting in rising costs of market financing and falling prices of the banks' equities and debt issuances, see chart 5 and the section on liquidity. Especially prices of the banks' AT1 issuances[8] fell markedly after the Swiss bank Credit Suisse's issued AT1 debt was written down. The write-down was part of the Swiss authorities' intervention and the acquisition of Credit Suisse by the bank UBS. Since April, however, prices have increased again, reflecting the rapid shifts in risk perception.

Government bond yields have increased significantly and seen large day-to-day fluctuations Chart 4



Note: The yield on 2-year US and German benchmark government bonds. Day-to-day fluctuations are stated in percentage points. The most recent observations are from 24 May 2023.
Source: Macrobond.

Problems in individual banks resulted in significant price falls on banks' equity and capital issuances in March Chart 5



Note: AT1 issuances refer to the price of the Markit iBoxx EUR Contingent Convertible AT1 index, covering all euro AT1 issuances with an outstanding volume above EUR 150 million and a remaining maturity of more than one year. The most recent observations are from 24 May 2023.
Source: Bloomberg.

7 See speech by Philip Lane, ECB, *The Transmission of Monetary Policy*, October 2022 (*link*).

8 AT1 issuances are converted into Common Equity Tier 1 capital if the CET1 capital ratio falls below a predetermined level. This makes AT1 a possible supplement to Common Equity Tier 1 capital. See Danmarks Nationalbank, *Financial stability 1st half 2014*, June 2014 (*link*).

Market conditions for the non-financial sector were only affected to a limited extent by the banking sector turmoil and saw only minor price falls in broader equity indices and limited widening of credit spreads, see chart 5 and chart 6.

Problems in a few foreign banks have not led to systemic stress in financial sector

The turmoil in the banking sector enhanced existing challenges in the Swiss bank Credit Suisse, with declining deposits and loss of market confidence, but there have been no signs of systemic stress in the European financial sector as a whole, see chart 7. The other European banks have not had liquidity problems, and although the banks' market financing costs increased markedly during the turmoil in March, they are back below autumn 2022 levels, see the section on liquidity and funding.

Interest rate increases will gradually be passed through to households

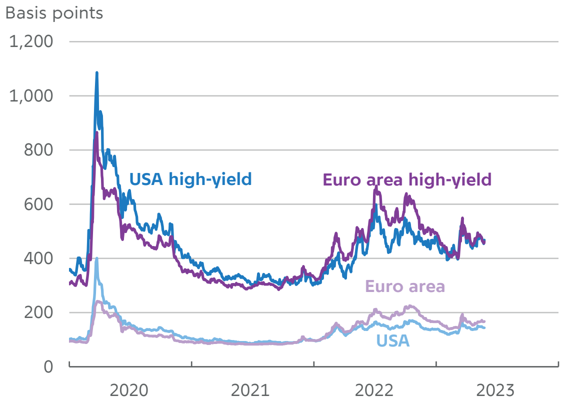
The pass-through from higher market rates to borrowers' interest payments is gradual due to fixed interest periods for adjustable-rate loans and fixed-rate loans. As more households adjust the interest rate on their loans and new homeowners take out mortgages, average interest costs will rise.[9] Even if underlying bond yields were to fall again, the fixed interest period for adjustable-rate loans means that it will take time for households' interest costs to decrease again.

In Denmark, mortgage loans account for almost 80 per cent of lending to households and businesses. The tightening of financial conditions is therefore especially passed through mortgage rates. Yields on both fixed-rate and variable-rate mortgage bonds have increased by more than 3.5 percentage points since the start of 2021, see chart 8.

For businesses, which generally have shorter fixed interest periods than households, the average interest rate has increased by 1.2 percentage points since 2021. Over the same period, the average interest rate on households' outstanding mortgage loans has increased by approximately 1 percentage point.

Limited widening of corporate bond credit spreads following turmoil in the banking sector

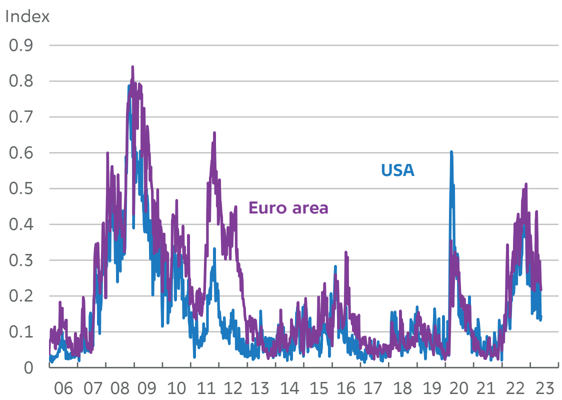
Chart 6



Note: The chart shows the options-adjusted corporate bond spread against a spot yield curve for US and euro-denominated government bonds, respectively. The most recent observations are from 25 May 2023.
Source: Refinitiv Eikon.

Composite indicator of systemic stress in euro area and the US

Chart 7



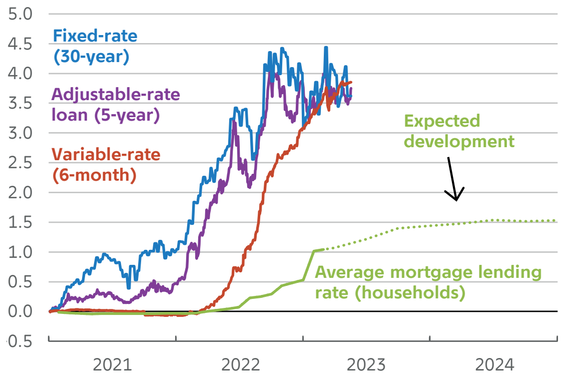
Note: The financial stress indicator aggregates the level of stress in the money, foreign exchange, stock and bond submarkets as well as in the banking sector. The level of stress for each submarket is measured on the basis of various indicators such as volatility and liquidity. The calculation of the overall stress indicator takes account of the fact that simultaneous stress in several submarkets is a greater challenge to the financial system than periods of stress in individual submarkets. The most recent observations are from 19 May 2023.
Source: Macrobond.

9 See Danmarks Nationalbank, Monetary policy will cool down the economy, *Danmarks Nationalbank Analysis (Monetary and financial trends)*, no. 3, March 2023 (*link*).

Although the average interest rate only rises moderately, the individual household may experience a large increase in relation to forthcoming interest rate adjustments. Households that have to adjust interest rates in the coming quarters can still expect the interest rate on their mortgage loans to rise by several percentage points.

Interest rate increases are gradually passed through to households Chart 8

Change since 4 January, percentage points



Note: The long mortgage bond rate is an average rate on issuances. The interest rates on adjustable-rate loans are estimated par rates. The change in the variable interest rate is calculated on the basis of the change in the reference rate (CIBOR 6m) assuming a constant interest rate spread between the variable interest rate on the mortgage bond and CIBOR 6m. Interest rates on outstanding mortgage lending are calculated as an average of interest rates paid by households and are only available on a monthly basis. The expected development in mortgage lending rates is calculated based on the assumption that the current forward rates from 19 May 2023 apply on future pay dates. The most recent observations are from 19 May 2023.

Source: Refinitiv Eikon, Nordea Analytics, Danmarks Nationalbank and own calculations.

Financial stability in Denmark is currently not threatened by crypto-assets

Box 1

There are currently no indications that developments in the crypto-asset market have had spill-over effects on the financial sector or on the real economy in Denmark. However, that may change in the future. Crypto-assets can threaten financial stability in Denmark if the market reaches a significant size or if the assets become closely linked to the traditional financial sector. Therefore, the upcoming pan-European regulation is an important first step towards curtailing risks in the crypto-asset market.

Most recently, the development in the crypto-asset market has had consequences for the so-called cryptobanks[1] Signature Bank and Silvergate Bank in the United States, which were shut down by federal regulators and voluntarily liquidated, respectively, in spring 2023. Both failures were triggered by turbulence in the crypto-asset market, which led to a growing concern about the banks' financial outlook. A run on the banks resulted in large realised losses on the banks' securities holdings in 4th quarter 2022 to obtain liquidity to cover the withdrawals.

Crypto-assets are associated with risks

The use of crypto-assets is associated with risks that can impact financial stability. Some risks are well known and stem from the use of crypto-assets for non-regulated financial purposes. In addition, fluctuations in the market price of crypto-assets expose investors to market risks, which is amplified by the fact that, unlike traditional financial assets, the value of crypto-assets is not supported by an underlying income flow or a productive value. Getting access to make highly leveraged investment products is relatively easy on many crypto trading platforms[2]. In addition, sudden withdrawals of deposits in reserve-based stablecoins[3] may cause fire sales of the underlying reserve assets, such as government bonds. Risks are pronounced by a lack of reliable data on the market participants' exposures and standards for risk management.

Overall, these are among the risks that could pose a potential threat to financial stability if the crypto-asset market grows to a significant size, integration with the traditional financial sector increases or appropriate regulatory measures are not implemented and enforced.

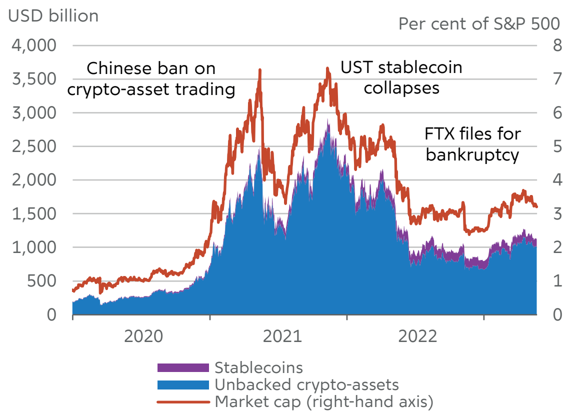
The global crypto-asset market is still small and interconnectedness with the Danish financial sector is limited

The size of the global crypto-asset market is currently limited. The market capitalisation of crypto-assets has declined significantly since the end of 2021, see chart. The decline should be seen in the context of several failures of significant entities in 2022 such as the stablecoin TerraUSD (UST) and the crypto trading platform FTX. The total market capitalisation for crypto-assets, including stablecoins, was around 1,120 billion dollars in May 2023, equal to around 3 per cent of the market value of the US S&P 500 index. This is 61 per cent below the historical peak from November 2021.

There are indications that the uptake of crypto-assets is small in Denmark relative to other European countries.[4] The interconnection between the crypto-asset market and the financial sector in Denmark is similarly to be very limited. This is among others reflected in the fact that the largest Danish banks abstain from offering crypto trading to their clients.[5] However, this does not prevent risks from the crypto-asset markets from spreading to Denmark, as the Danish financial sector is closely interlinked with the global financial markets. If risks from the crypto-asset markets materialise and affect financial markets abroad, for example through fire sales of assets, this may impact the financial system in Denmark.

Continues ...

The market value of the global crypto-asset market is characterised by considerable fluctuations



Note: The chart shows the total market capitalisation of unbacked crypto-assets and stablecoins. Unbacked crypto-assets represent the market value of all crypto-assets less the market value of Tether, USDC and BUSD and can be seen as a measure of the value of unbacked crypto-assets. Tether, USDC and BUSD are listed as the three largest stablecoins measured by market capitalisation. The most recent data in the chart are from 21 May 2023.
Source: Macrobond and own calculations.

Financial stability in Denmark is currently not threatened by crypto-assets

Box 1

... continued

Risks must be addressed through regulation and international cooperation
International cooperation and coordination are necessary to ensure effective regulation that can address the financial stability risks of crypto-assets. In the EU, the Markets in Crypto-assets Regulation (the MiCA Regulation) will formally enter into force in July 2023. However, provisions on stablecoins and crypto-assets service providers will start applying from 2024 and 2025, respectively. The object of the MiCA Regulation is to regulate businesses that issue and provide services related to crypto-assets. In addition, the Basel Committee has published a global standard for the capital treatment of banks' exposure to crypto-assets. These requirements aim to ensure that banks are sufficiently cushioned to absorb losses from holdings of crypto-assets. Danmarks Nationalbank is monitoring the development closely, including the implementation of the MiCA Regulation and the Basel standards in European law.

1. Crypto banks are traditional financial institutions specialising in providing financial services to companies engaged in crypto activities.
2. The crypto trading platform Binance offers certificates with a leverage ratio of up to 125 times the fluctuations of the underlying asset, see ECB, Decrypting financial stability risks in crypto-asset markets, *Financial Stability Review*, May 2022 (*link*).
3. A reserve-based stablecoin is a claim against a central player, such as a commercial undertaking, where the funds generated by issuance are placed in the assets the value of which the stablecoin follows.
4. See, for example, *The Chainalysis 2022 Geography of Cryptocurrency Report (link)*. It should be noted that there is significant uncertainty associated with calculating the geographical distribution of activity in the crypto market.
5. See, for example, Danske Bank, *Danske Bank's position on cryptocurrencies*, June 2021 (*link*).

Interest rate increases and spillover effects require extra focus on liquidity management

Danish banks have a solid liquidity position, and most banks can handle even a very hard risk scenario.

Banking is based on lending to customers. Banks finance this lending through equity, market funding or deposits. If funding from these sources disappears to a sufficiently large extent, the bank will not be able to continue its operations. It may, for example, pose a significant risk to the bank's continued operations if its customers quickly make large withdrawals, for example due to a lack of confidence. It is therefore important that institutions have sufficient 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 hardest stress scenario, all the systemic banks have a survival horizon with positive excess liquidity of at least three months. In the scenario, access to funding markets is assumed to be closed, while loan facilities for customers increase and deposits fall significantly.[10]

The LCR Regulation[11] assumes that 40 per cent of deposits from large corporate customers are withdrawn from the bank within a 30-day hard liquidity stress scenario, if the deposits are not covered by the deposit guarantee scheme. All Danish banks will be able to withstand twice this percentage, i.e. withdrawals of 80 per cent of these deposits, and still comply with LCR.[12] Few banks will have problems complying with LCR if all their large corporate

10 For a method description of Danmarks Nationalbank's sensitivity analysis, see page 26 of Danmarks Nationalbank, Lower excess capital for the banks, *Danmarks Nationalbank Analysis (Financial Stability)*, no. 25, November 2019 (*link*).

11 See the LCR Regulation (*link*).

12 In the event of a liquidity withdrawal from a Danish bank, the liquidity will remain in the Danish system, as the Danish banking system is a closed system. If deposits are withdrawn from one bank, they will be placed with another bank. Deposits and liquidity can be moved between the banks, but they cannot disappear from the system. If a bank has large excess liquidity, it can, for example, choose to lend the liquidity to another bank or customers, buy bonds or place the liquidity with Danmarks Nationalbank.

customers withdraw their entire deposits that are not covered by the deposit guarantee scheme. However, such a large liquidity withdrawal has not been observed before, and would therefore be a very hard scenario.

The events surrounding specific foreign banks in recent months have shown that withdrawals of deposits can occur very quickly if the customers lose confidence in the bank. It is important that liquidity management and regulation reflect the actual circumstances and risks that may affect the institutions.

Spillover effects across banks and national borders underline the need for sufficient liquidity management

The institutions generally issued debt with shorter maturities in 2022 relative to the previous years. This has increased the concentration in the institutions' maturity profiles and thus the dependence on open funding markets when they need refinancing. The liquidity situation in the Danish institutions is generally assessed to be robust, but some institutions may, however, face challenges in maintaining sufficient eligible liabilities relative to the MREL requirement if the funding markets close or the institution cannot make issuances for other reasons, see the section on capital and stress tests.

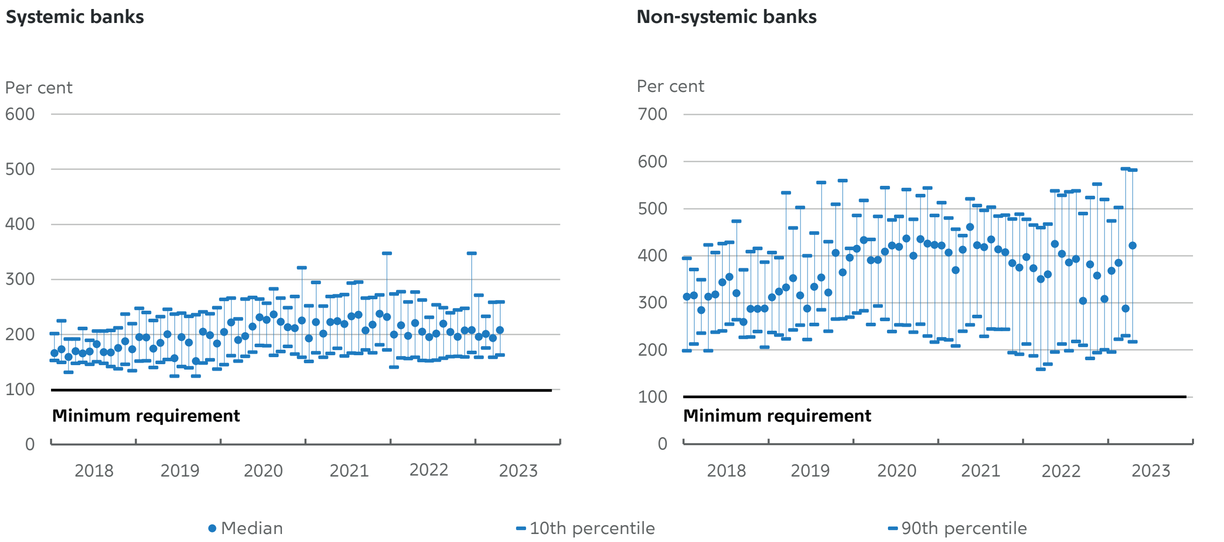
The turmoil in the financial markets in March 2023 led to very low issuance volumes in the following weeks, underlining that uncertainty about one bank can quickly spread across the whole sector and across borders. It is therefore important that the institutions focus on sufficient risk management, including ensuring adequate buffers to regulatory requirements to enable them to withstand situations where the debt markets are fully or partially closed – also as a result of events beyond their own control.

Banks meet regulatory liquidity and funding requirements

Both the systemic and the non-systemic banks meet the regulatory minimum requirement for liquidity (Liquidity Coverage Ratio (LCR)), see chart 9, and funding (Net Stable Funding Ratio (NSFR)) by some margin. The introduction of the LCR and NSFR after the financial crisis has contributed to making banks better equipped to manage liquidity and funding risks, see box 2.

The regulatory requirements LCR and NSFR help strengthen the individual bank's liquidity position, but cannot stand alone in ensuring a resilient liquidity position. This also requires that the institutions have good liquidity management.

Banks' LCR remains at a high level Chart 9



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 end-April 2023.
Source: Danmarks Nationalbank.

The majority of Danish banks have deposits surpluses

The Danish banks' primary source of funding is deposits. Since 2013, the banks have had an overall deposit surplus, unlike during the financial crisis, when the Danish banks had a large deposit deficit, see chart 10. Only a few banks still have a deposit deficit. If a bank has a large deposit surplus, it can choose to lend the liquidity to another bank or to customers, buy bonds or place the liquidity with Danmarks Nationalbank.

Parts of systemic banks' deposits are less stable

Seen in isolation, the banks' deposit surplus makes them less vulnerable to closed funding markets. However, to ensure a robust liquidity position, it is important that the individual bank knows the stability of its deposits and ensures that this is taken into account in its liquidity management. The stability of the deposits depends on several interdependent factors, including deposit type and customer group, as well as whether the deposits are covered by the deposit guarantee scheme[13]. This is reflected in the LCR Regulation, where the stability of deposits is defined according to the three conditions[14]. The deposit composition in the systemic bank makes them more vulnerable to deposit outflow, which sets higher demands on liquidity risk management in these institutions.

Just under 90 per cent of systemic banks' deposits and 80 per cent of non-systemic banks' deposits are demand deposits, i.e. deposits that the customer can withdraw immediately, see chart 11. In the event of a lack of confidence in the bank, these loans will, all else equal, become less stable than if the deposits had been tied up for an agreed period, as they can be withdrawn within one day[15]. Approximately 45 per cent of the banks' time deposits are tied up for less than 30 days.

LCR and NSFR Box 2

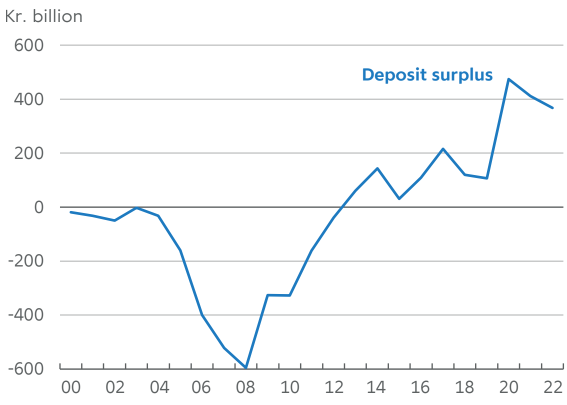
The LCR, Liquidity Coverage Ratio, ensures that credit institutions have a sufficient amount of liquid assets to handle a 30-day hard liquidity stress scenario[1]. The LCR was introduced in 2015 when it became clear during the financial crisis that many banks did not hold sufficient assets that could quickly be converted into liquidity in a crisis situation.

The NSFR, Net Stable Funding Ratio, ensures that credit institutions have a sufficient amount of stable funding to finance their assets, which reduces the institutions' refinancing risk. The NSFR was introduced in 2021 as result of banks deposit deficits during the financial crisis and e.g., used short term unstable market funding to finance their lending.

Source: Danmarks Nationalbank.

1. The 30-day liquidity stress test entails that the institutions do not have access to new market financing. This means that all market financing, derivatives and repo transactions fall due and are not renewed. It is also assumed that deposits are withdrawn from the bank. The draw on the various deposits depends on the stability. In addition, it is assumed that there are increased draws on credit and liquidity facilities as well as haircuts in liquidation of liquid assets.

Since 2013, banks have had a deposit surplus Chart 10



Note: Banks in the Danish Financial Supervisory Authority's groups 1-3. Since 2017: Excluding Nordea. The most recent observations are from end-December 2022.
Source: Danmarks Nationalbank.

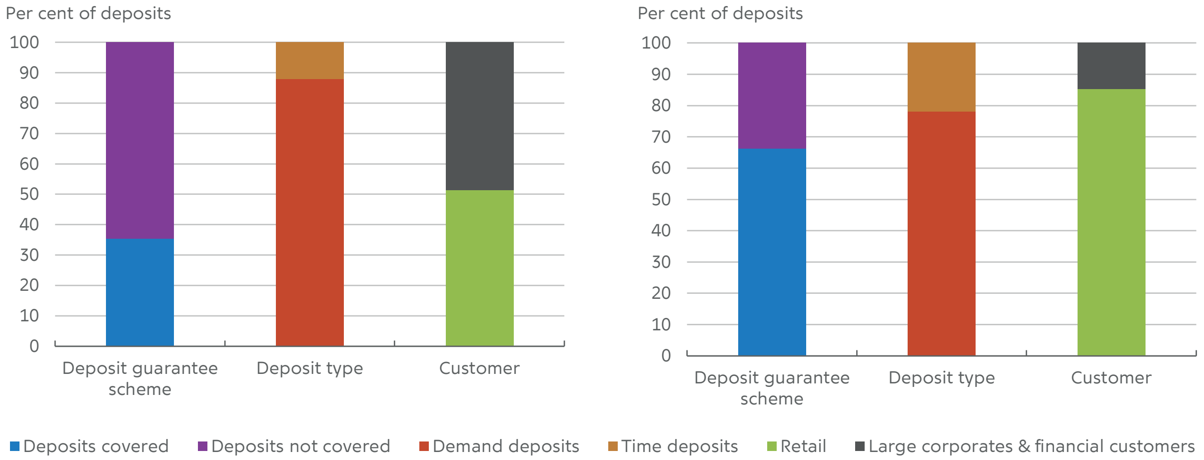
13 Deposits are covered up to 100,000 euro. See Finansiel Stabilitet, *Danish Guarantee Fund* (*link*) (in Danish only) and the Danish Executive Order on the Cover for Depositors and Investors under the Guarantee Fund (*Bekendtgørelse om Garantiformuens dækning af indskydere og investorer*) (*link*) (in Danish only).

14 In Articles 24-28 of the LCR Regulation, the stability of deposits is defined in relation to the deposit guarantee scheme, deposit type and customer type.

15 Customers can withdraw demand deposits of up to kr. 500,000 daily per customer.

Less stable deposits demand more of the liquidity risk management in the systemic banks

Chart 11



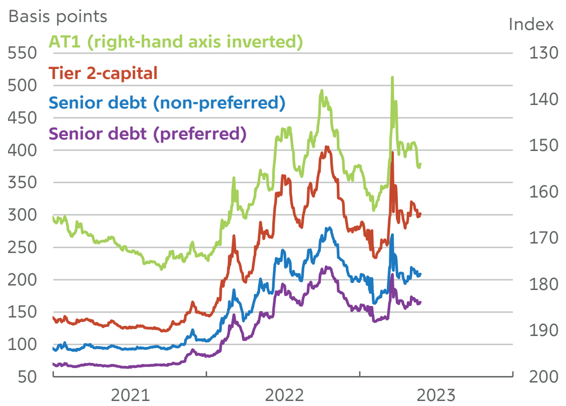
Note: The most recent observations are from end-March 2023.
Source: Danmarks Nationalbank.

About half of systemic banks' deposits come from large corporate and financial customers, while these only represent around 15 per cent of non-systemic banks' deposits, see chart 11. Deposits from large corporate and financial customers are generally less stable, as these are typically professional customers with focus on earnings and return on their funds. These customers will therefore typically react quickly to a loss of confidence in a bank's ability to remain a going concern.

Large parts of non-systemic banks' deposits are covered by the deposit guarantee scheme, see chart 11 on the right. Conversely, less than half of systemic banks' deposits are covered by the deposit guarantee scheme, although with considerable variation between the banks. A high degree of uncovered deposits places extra high demands on liquidity risk management, as deposits of this type have a greater risk of withdrawal if doubts arise about the bank's survival.

Large fluctuations in the spreads between capital and debt issuances by European banks

Chart 12



Note: Z-spread 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 most recent observations are from 28 April 2023.
Source: Refinitiv Eikon.

Large movements in credit spread on banks' capital and debt instruments

There have been large movements in the credit spreads on the banks' capital and debt instruments since the 2nd half of 2022, see chart 12. Following a decrease in credit spreads in the funding markets from October 2022 to February 2023, credit spreads increased in March 2023 across Danish and foreign banks' unsecured funding instruments. This occurred as a result of an increased risk perception of the banking sector due to problems in specific foreign banks, see also the section on financial markets.

Together with the large fluctuations in bank financing credit spreads, credit spreads have generally been higher since January 2022. At the same time, tighter monetary policy and rollback of the ECB's asset purchase programmes may have an impact on levels and volatility in the prices of banks' capital and debt instruments, see box 3.

Funding structure in euro area changes with maturities of ECB loans

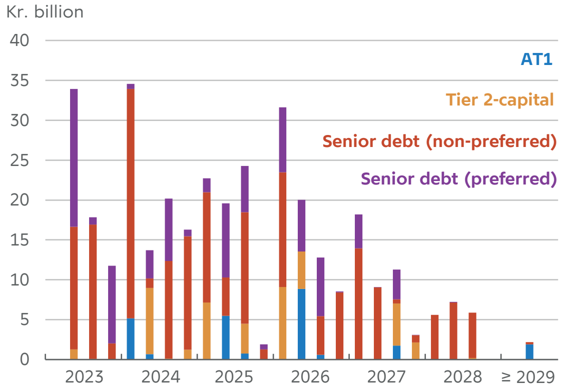
The ECB announced the third series of its targeted long-term refinancing operations (TLTRO) programme in 2019. The aim was to maintain favourable conditions for bank lending and ensure smooth monetary policy transmission.[16] A large share of European institutions' TLTRO loans fall due in June 2023. The repayment of the loans means that stable financing of approximately 477 billion euro, corresponding to approximately kr. 3,550 billion, falls due in the institutions.

The institutions will be able to repay their TLTRO loans in full or in part by drawing on their liquidity buffer and thus reducing buffers to regulatory liquidity requirements. However, buffers differ across the institutions, and some institutions must therefore obtain new funding, in the form of either deposits or market funding. This may potentially increase the Danish banks' market funding costs.

Danish institutions still need to issue market funding in 2nd half of 2023 to have excess liabilities relative to MREL requirement

Danish institutions issued debt securities at the start of 2023, when credit spreads had narrowed from the high levels in October 2022. The systemic credit institutions issued just under kr. 52 billion in non-preferred and preferred senior debt from January to mid-May 2023. In the same period, however, kr. 13 billion fell due. During the rest of the year, an additional kr. 60 billion will fall due. The institutions thus need to further issue approximately kr. 21 billion in 2023 to meet the total debt maturing for the year. In addition, several institutions are expected to issue higher amounts to ensure higher buffers to regulatory requirements. In addition, the requirements for newly appointed SIFIs[17] are being phased in, which increases these banks' capital needs.

Maturity of debt and capital instruments issued by SIFIs Chart 13



Note: The chart shows the maturity profile of Danish SIFIs' issuances of Additional Tier 1 capital (AT1), Tier 2 capital, preferred and non-preferred senior debt. For instruments with an embedded call option, the determination of the maturity date is based on the first call date. Based on reports from the end of March 2023.
Source: Reports to the Danish Financial Supervisory Authority and own calculations.

16 See the ECB's press release, *Monetary policy decisions*, 7 March 2019 (*link*).

17 See appendix 1.

Market makers' capacity to dampen volatility has been reduced

Box 3

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 and were aimed at further reducing long-term interest rates to ease financial conditions and thereby increase the low inflation.[1] The asset purchase programmes were introduced during periods of high bond market volatility. Krishnamurthy and Vissing-Jorgensen have shown how these programmes can dampen market fluctuations, including by acting as a signal that interest rates will remain low for a long period of time.[2] At the same time, investors were reassured that there was always a major buyer in the market – also during periods with high volatility. When the ECB has purchased European government bonds, volatility in the prices of, for example, German government bonds has decreased, see chart A. High volatility in prices of German government bonds also leads to high volatility in Danish government and mortgage bonds. The ECB has now stopped its purchases and, since March 2023, it has instead reduced its bond holdings by around 15 billion euro per month and expects to discontinue reinvestments under one of the banks purchase programmes which further increases the reductions to around 25 billion euro per month.

Private investors' bond purchases are often made through so-called market makers. This may, for example, be banks that have bonds in their holdings and set bid and offer prices at which investors can trade.

Market makers contribute to the liquidity of securities markets and can reduce volatility by periodically meeting high selling and buying pressures. The large Danish banks act as market makers for Danish government and mortgage bonds. Since 2014, these banks' bond trading portfolios have been reduced significantly, while the outstanding market value of mortgage bonds has grown, see chart B. The market makers' capacity to dampen volatility has therefore been reduced relative to before the asset purchase programmes. This may be of importance to bond price volatility.

Chart A:
ECB bond purchases have helped dampen volatility

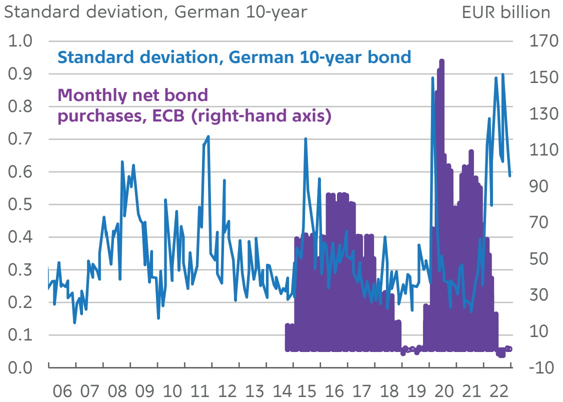
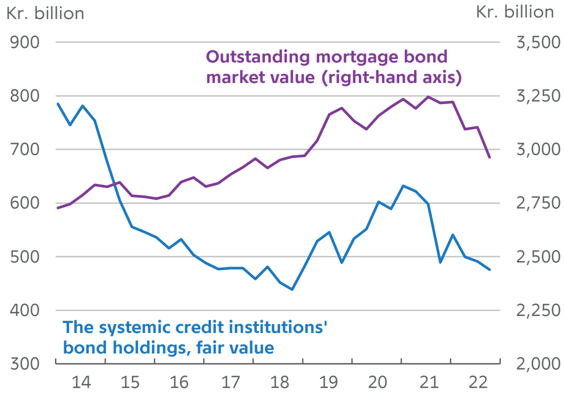


Chart B:
Market makers hold fewer bonds for trading than previously



Note: Chart A: Standard deviation in the price change of 10-year German bond. Net purchases by the ECB are actual purchases less any redemptions of maturing bonds. Chart B: Outstanding holdings of mortgage and government bonds at market value on banks' balance sheets are a measure of their trading portfolio, which is calculated at market value. Bond holdings calculated at fair value are used as an indicator of the trading holdings of government and mortgage bonds.

Source: Refinitiv Eikon, Macrobond, the ECB, reports to the Danish Financial Supervisory Authority, Danmarks Nationalbank and own calculations.

1. See ECB, *Decision ECB/2015/10*, 4 March 2015 (*link*).
2. See Krishnamurthy and Vissing-Jorgensen, *The Effects of Quantitative Easing on Interest Rates: Channels and Implications for Policy*, 2011 (*link*).

Housing interest rates and consumer prices are draining the resilience of homeowners

Since the beginning of 2022, homeowners have been affected by significant increases in consumer prices and interest rates. Rising interest rates affect homeowners with delay due to different interest rate fixation periods, and the largest interest rate pass-through will affect homeowners during 2023, see the section on financial markets.

Overall, Danish homeowners are by the end of 2023 expected to spend around kr. 850 million more per month on debt servicing than in 2021.[18] The majority of the homeowners can reduce consumption if their debt servicing obligations increase and disposable income decreases. These homeowners pose a less direct risk to the institutions. However, there may be indirect risks, as lower consumption may reduce the revenue generated by the institutions' corporate customers, see the section on business credit.

Danmarks Nationalbank expects that, in 2023 relative to 2021, 36,000 more households will have a budget deficit[19] with income being insufficient to cover a modest living standard, pay fixed costs and servicing debt[20], see chart 14. On average, these homeowners have debt of kr. 1.3 million within a Danish credit institution.

A limited number of homeowners face budget deficits due to soaring unemployment

Especially two factors have led to losses and impairment charges on household debt in credit institutions:

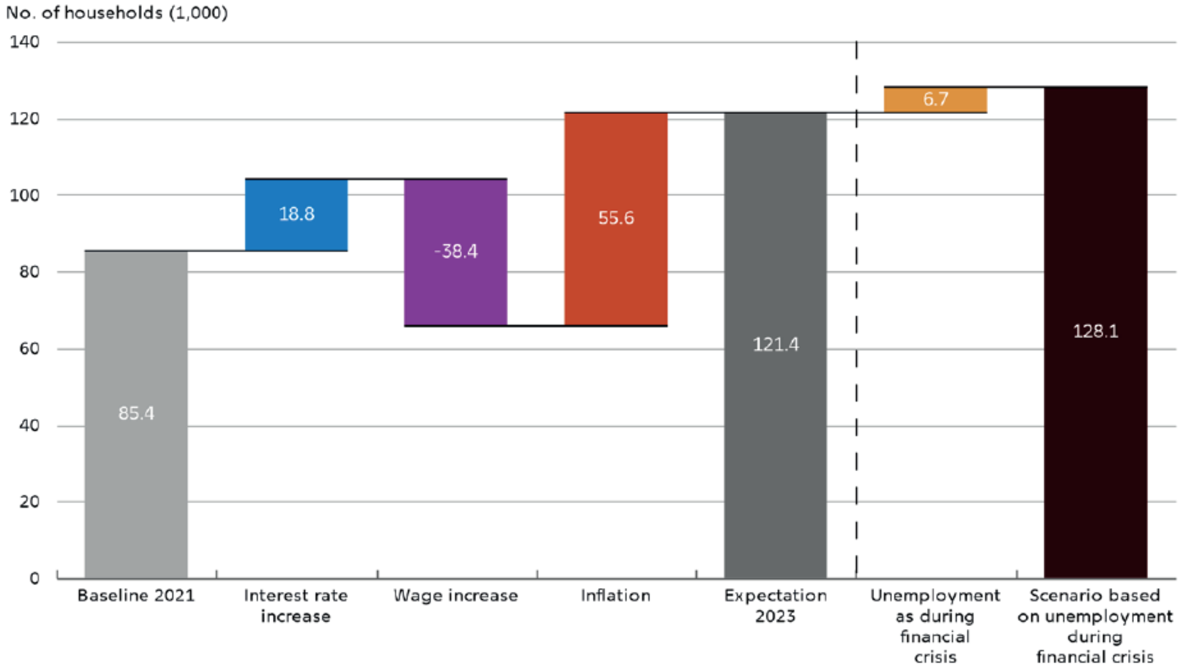
18 Difference between total (after tax) debt payments for homeowners in 2021 and expected 2023 payments.

19 Based on Danmarks Nationalbank's expectations for consumer price and wage increases and the market expectations for the development in interest rates in 2023. See box 4 and Martinello, Meyer and Nissen, Homeowners' budgets and debt servicing capacity projections, *Danmarks Nationalbank Economic Memo,* no. 4, June 2023 (*link*), for a further explanation of the method. Reference to 2021 reflects the latest available data.

20 Around 85,000 homeowners already have an estimated budget deficit in 2021. This is not necessarily the result of accommodative credit granting. For 45,000 homeowners, the deficit represents less than 10 per cent of their monthly budget. Of the remaining homeowners, 10,000 homeowners have liquid assets to cover their monthly deficit for at least ten years. Of the remaining homeowners, 23,000 have raised their loan at least three years earlier and may have been credit-rated on a different basis.

Rising interest rates and high inflation increase the number of homeowners with a budget deficit despite high wage increases

Chart 14



Note: The first bar of the chart shows the number of homeowners with housing loans in 2022 who already had a budget deficit in 2021. The following three bars show the effect of interest rate, wage and consumer price increases, respectively. Realised and expected interest rate and price increases in 2022 and 2023 cause the number to increase. Expected wage increases cause it to fall. The result is the 'Expectation 2023' bar, which is based on unchanged unemployment corresponding to 2021. The last two bars show the further effect of a marked increase in unemployment to the level seen after the financial crisis. See box 1 and Martinello, Meyer and Nissen, Homeowners' budgets and debt servicing capacity projections, *Danmarks Nationalbank Economic Memo*, no. 4, June 2023 (*link*), for further details.
Source: The credit register, Statistics Denmark and own calculations.

falling house prices and unemployment. As long as the homeowners can service their loans, falling house prices alone do not equate to losses in credit institutions. But if the homeowners' financial leeway is under pressure, reducing their debt service capability, falling house prices combined with high loan-to-value ratios can lead to losses in the credit institutions.

Households will experience a significant reduction in their disposable income if they are hit by unemployment. However, even with a very large increase in unemployment, the number of homeowners experiencing a budget deficit will only increase to a limited extent.[21] If unemployment rises to 160,000 persons, equal to the level in the years after the financial crisis, this means that only 6,700 additional homeowners will have a budget deficit, see chart 14.

In comparison, Danmarks Nationalbank's latest projection expects an increase in unemployment to

21 For a description of the method behind the calculations of the unemployed homeowners, see box 4.

88,000 persons in 2023, which supersedes a very low unemployment of 76,000 persons in 2022.[22]

The consequences of high unemployment are significantly limited with less than 40 per cent of the affected households being homeowners with housing loans. In addition, the households are, in many cases, supported by unemployment benefits[23] or a partner's unaffected income.

The 6,700 households that nevertheless incur a budget deficit because of unemployment have relatively high indebtedness. On average, this group of homeowners has debt of kr. 1.6 million. In absence of increased unemployment most of these homeowners had greater financial leeway and have thereby been able to take on more debt.

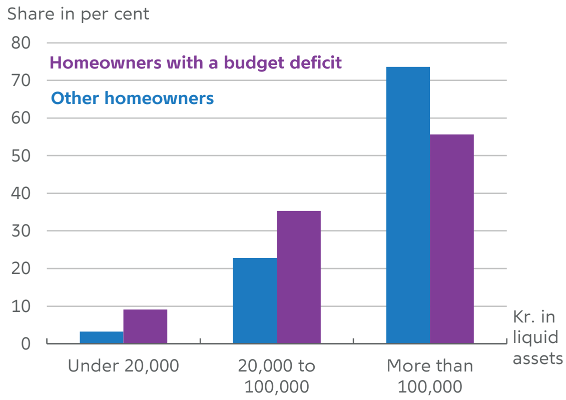
Households can finance increased costs with liquid assets for a period

Most homeowners have enough liquid assets[24] to compensate for a budget deficit for a period. However, the 36,000 homeowners with budget deficits due to consumer price and interest rate increases generally have fewer liquid assets than the homeowners who are not expected to have budget deficits, see chart 15. However, when homeowners use their liquid assets to cover their budget deficit, it drains their resilience. Taking into account how large a budget deficit the household needs to cover, 25 per cent of these homeowners will have exhausted their liquid assets within 12 months.

Some homeowners may have too few liquid assets to cover their costs, or their disposable income may be so low that they default on their debt. To the extent that their housing debt exceeds the value of their property, this may lead to losses being incurred by the credit institutions.

Most households have liquid assets that can be used to offset a budget deficit

Chart 15



Note: Homeowners' total liquid assets distributed according to whether the household is expected to have a budget deficit in a situation with rising interest rates and falling real wages.

Source: The credit register, Statistics Denmark and own calculations.

Significant fall in house prices increases number of technically insolvent homeowners

Activity on the housing market slowed down considerably in 2022 concurrent with rising interest rates and high inflation. This led to a significant drop in house prices after their peak in the 1st quarter of 2022. Over the first months of 2023, the price fall has levelled off and the number of transactions have increased since 2nd half of 2022.

In Danmarks Nationalbank's latest projection from March, it is expected that nominal house prices will fall by 13 per cent towards 3rd quarter of 2023 relative to the level in 1st quarter of 2022. This means

22 See Danmarks Nationalbank, Declining but still high inflation, *Danmarks Nationalbank Analysis (Outlook for the Danish economy)*, no. 4, March 2023 (*link*).

23 75 per cent of those selected for unemployment are insured against unemployment, and less than 200 households are affected by unemployment of more than one person.

24 Liquid assets are calculated as the homeowners' bank balances, equity and bond holdings as well as investment fund certificates.

The credit institutions have exposed debt of kr. 33 billion

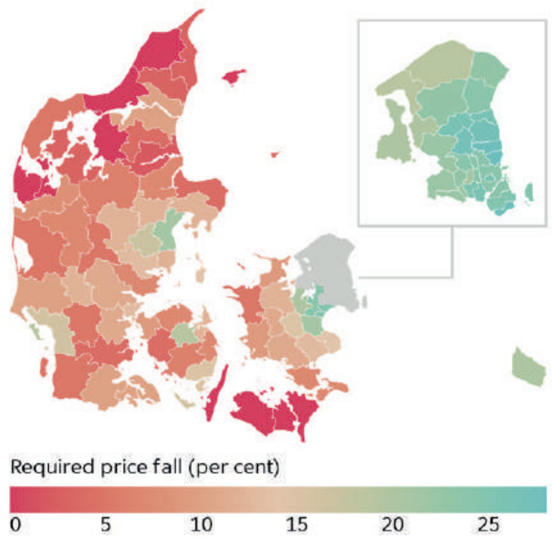
Table 1

	Share of house-holds (per cent)	Exposed debt (kr. billion)
LTV 80-100	11.0	18.3
LTV > 100	2.7	15.0
LTV > 80	13.7	33.4

Note: *LTV* indicates the loan-to-value ratio. *Exposed debt* is calculated as the difference between housing debt and the realised sale prices after both the price drop expected by end-2023 and a 20 per cent haircut. This calculation accounts for a lower market value of fixed-rate mortgage debt.
Source: The credit register.

Homeowners in rural municipalities are more vulnerable to price falls

Chart 16



Note: The chart shows the house price fall required for at least 3 per cent of homeowners in the municipality to become technically insolvent. The darker the colour, the less resilient households are to house price falls. Technical insolvency is calculated based on the market value of the total housing debt.
Source: The credit register and own calculations.

that house prices are expected to be on a par with prices at around mid-2020.

Homeowners with a budget deficit pose a risk to the institutions due to higher probability of default on their debt.[25] However, this risk can only result in a loss if the collateral behind the loan, i.e. typically the property, in the event of a sale, cannot realise an amount corresponding to the institution's exposure.

The expected fall in house prices means that 30,000 homeowners, corresponding to 2.7 per cent of Danish homeowners, will be technically insolvent by the end of 2023, see table 1.[26] Of this, the credit institutions' total lending to housing purposes exceeding the property values amounts to kr. 6.4 billion.

However, homeowners' property value may be affected both by the expected fall in house prices and by a further haircut in case of a forced sale of the property. Under the assumption of a further 20 per cent haircut in case of a forced sale, the difference between housing debt and the realised sale price of the property sum to a total of kr. 33 billion across the population[27], see table 1. This exposed debt is an indicator of the credit institutions' potential loss, if all technically insolvent and highly mortgaged homeowners were to realise a house price haircut in case of a forced sale. However, not all technically insolvent homeowners or homeowners with high loan-to-value ratios will have a budget deficit large enough to lead to a forced sale of the property. The institutions' credit risk is therefore greatest for homeowners who both have a budget deficit and whose debt exceeds the realised property price in case of a forced sale. The difference between

25 See the Danish Financial Supervisory Authority (2021), the Danish Financial Supervisory Authority and the Consumer Ombudsman's guidelines on creditworthiness assessment (*link*) (*in Danish only*), Asger Lau Andersen and Charlotte Duus, Danish Families in Mortgage Arrears, *Danmarks Nationalbank Monetary Review, 3rd Quarter 2013, Part 2 (link) (in Danish only).*

26 It should be noted that possible regional differences in the price development are not taken into account here.

27 Danmarks Nationalbank, *Finansiel Stabilitet,* 2012 (*link*) shows that the price of most properties sold at auctions in the years after the financial crisis suffered a haircut of at least 20 per cent with respect to the listing price.

housing debt and the expected realised sale price in case of a forced sale totals kr. 1.8 billion overall. This exposure is relatively modest given that the systemic credit institutions' profit before tax was kr. 36.7 billion in 2022. The institutes' ongoing earnings can be used to cover potential losses.

Homeowners in rural municipalities are more vulnerable to falling house prices

There are large geographical differences in how many homeowners become technically insolvent if house prices fall. Homeowners in rural municipalities have less home equity than homeowners in the Greater Copenhagen municipalities, and they are therefore less resilient to house price falls in connection with sales in these areas. The share of technically insolvent homeowners in nine rural municipalities is thus over 3 per cent even before the expected fall in house prices. In comparison, house prices in several Greater Copenhagen municipalities must fall by more than 25 per cent before a corresponding proportion of homeowners become technically insolvent, see chart 16. However, the difference should be viewed in the context that house prices have generally risen more in the Greater Copenhagen municipalities, and there are factors that may pull house prices down more in the area around Copenhagen than in other parts of Denmark.[28]

28 See Danmarks Nationalbank, Declining but still high inflation, *Danmarks Nationalbank Analysis (Outlook for the Danish economy)*, no. 4 March 2023 (*link*).

Key concepts in the analysis

Box 4

The analysis is based on data from the Danish credit register and microdata from Statistics Denmark. More details on data and methods are found in Martinello, Meyer and Nissen, Homeowners' budgets and debt servicing capacity projections, *Danmarks Nationalbank Economic Memo,* no. 4, June 2023.

Calculation of technically insolvent homeowners
Technically insolvent homeowners have been calculated as households for which the market value of their total housing debt exceeds the value of their property. This consequently takes into account a lower market value of fixed-rate mortgage debt. The mortgage bond prices are observed at the end of 2022. The property value is based on the bank and mortgage credit institutions' reports to the credit register as well as projections based on Danmarks Nationalbank's projection for house prices in 2023.

Calculation of increased unemployment
54,000 homeowners among those employed in 2021 are deemed to become unemployed. This number reflects the difference between unemployment during the 2008 financial crisis (160,000) and during 2021 (106,000). However, the rise in unemployment during the 2008 financial crisis started from a lower level (68,000 during the 2nd quarter of 2008). The homeowners' income under unemployment is reduced, accounting for unemployment insurance, and the households' budgets are subsequently recalculated. See Martinello, Meyer and Nissen, Homeowners' budgets and debt servicing capacity projections, *Danmarks Nationalbank Economic Memo,* no. 4, June 2023, for more details.

Calculation of budget
The term *budget deficit* is defined based on the concept of *the economic margin*.[2] The economic margin is defined as the difference between a household's[3] monthly income (disposable income from Statistics Denmark) and monthly minimum expenses.

Minimum monthly expenses are estimated for each household as the sum of:

- Expenses for credits and other debt
- Other fixed costs (childcare, property tax, transport etc.)
- Disposable income for a modest standard of living, as recommended in the Danish Financial Supervisory Authority's and the Consumer Ombudsman's Guidelines for creditworthiness assessment (2021). Reference is made to the applicable amounts at any given time in Danish Executive Order No. 1363 of 19 December 2008 on Debt Restructuring and Danish Executive Order No. 1850 of 7 December 2020 amending Danish Executive Order on Debt Restructuring.

The most complete data on households' income and taxes date from end-2021. The projected budgets for 2023 have been calculated using the following projections:

- Interest rate increases, calculated on the basis of the current forward interest rates (26 April 2023) for end-2023, and data from the credit register (calculated at end-2022), and also comprising households' adjustment of their debt composition (e.g. through refinancing) until 2022.
- Wage increases in 2022 and expected wage increases in Danmarks Nationalbank's projection for 2023 which increase homeowners' disposable income.
- Inflation in 2022 and expected inflation in Danmarks Nationalbank's projection for 2023 which affect homeowners' expected costs through inflation correction of the disposable income for a modest standard of living (total consumer price index) and fixed costs (corresponding subcomponents of the consumer price index).
- Increased unemployment which affects the expected income of homeowners in the event of unemployment. Unemployment has been simulated based on unemployment risk calculated via a machine learning model trained on 2008/2009 data (the financial crisis).

For households with a negative economic margin, it is calculated how many months they can supplement their budget using their liquid assets (calculated end-2021). The value of households' equities and investment fund certificates is adjusted downwards by the average portfolio loss in 2022 in the household sector according to Danmarks Nationalbank's securities statistics (approx. -12 per cent).

1. The stochastic variation between repeated simulations of unemployment is very limited and does not significantly affect the results. See Martinello, Meyer and Nissen, Homeowners' budgets and debt servicing capacity projections, *Danmarks Nationalbank Economic Memo*, no. 4, June 2023 (*link*).
2. See Asger Lau Andersen, Anders Møller Christensen, Charlotte Duus and Ri Kaarup, Danish Families' Financial Robustness, Variable Rates and Deferred Amortisation, *Danmarks Nationalbank, Quarterly Review, 4th Quarter 2012, Part 2 (link)*.
3. Families living at the same address, see Statistics Denmark's definition of E-families (*link*) (*in Danish only*).

Retail and service industries are vulnerable to declining private consumption

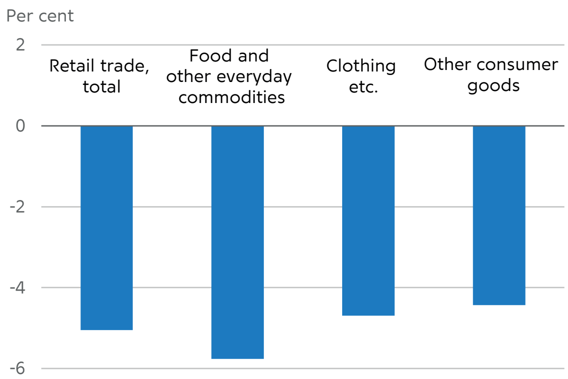
Rising interest rates and consumer prices have eroded consumers' purchasing power, while low consumer confidence continues to dampen growth in private consumption.[29]

Declining consumer demand affects the entire value chain, but it is expected to hit the consumer-facing retail and service industries first. The drop in demand can be seen in the real turnover, which has declined in large parts of the retail and service industries, see chart 17.

Declining demand may put pressure on businesses and make it harder for them to service their debt. This was evident in the period 2019-2022, where the industries that experienced the largest accumulated drop in turnover were also the industries with the largest increases in the share of businesses with non-performing loans (NPLs)[30], see chart 18.

Declining real turnover in the retail industry

Chart 17



Note: Year on year percentage change in the seasonally adjusted quantity index for retail trade in March 2023.
Source: Statistics Denmark.

29 See Danmarks Nationalbank, Declining but still high inflation, *Danmarks Nationalbank Analysis (Outlook for the Danish economy)*, no. 4, March 2023 (*link*).

30 A loan is classified as NPL if the borrower has not paid interest, fees or instalments for more than 90 days, or if it is assessed to be unlikely that the borrower will fully meet the borrower's payment obligations without any collateral being realised.

The amount of non-performing loans in the retail and service industries has not increased substantially yet

During 2022, the share of businesses with NPLs in the retail and service industries has increased slightly, but it remains at a lower level than during the covid-19 pandemic, see chart 19. This indicates that the declining consumer demand is beginning to affect businesses' debt servicing ability. However, the early signs of difficulties in the retail and service industries are primarily driven by relatively small businesses. When businesses are weighted according to their outstanding debt, the development in the share of business with NPLs is flat throughout 2022.

Risk of spillovers to other industries

The retail and service industries account for approximately 6 per cent of the banks' total corporate lending, and the direct risk of loss is therefore relatively limited.

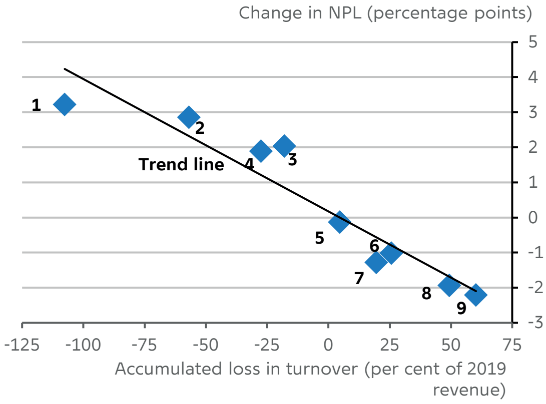
In addition to the direct risk of loss, there are also significant risks that difficulties in the retail and service industries will spread to other industries. Particularly vulnerable are wholesale businesses, which depend on being able to sell their goods to the retail industry, and businesses in the commercial real estate industry, which own the properties from which the retail and service businesses run their business activities.

Large decline in private consumption will increase losses from retail and service industries

According to Danmarks Nationalbank's latest projection, consumer demand is expected to increase again in the coming years, so that private consumption will be back at 2021 levels in 2025.[31] Against this background, it is assessed that the risk of losses in the retail and service industries spilling over to other industries is relatively limited.

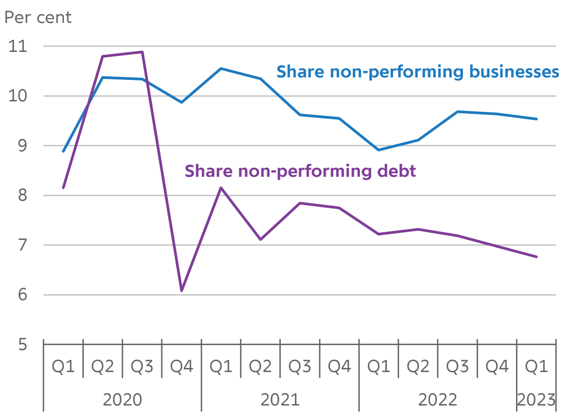
However, this may change in a risk scenario where private consumption comes under pressure again. This may be the case if the pass-through of the projected interest rate increases is not sufficient to bring inflation under control in the coming years.

Persistent declines in turnover are associated with more financially challenged businesses Chart 18



Note: Calculated at the industry level for selected consumer-facing retail and service industries.
Horizontal axis: Accumulated losses in real turnover relative to 2019 measured from 2020 through 2022 and scaled with turnover in 2019. Based on total sales from the VAT statistics. Deflated with industry-specific price indices based on the consumer price index.
Vertical axis: Change in the share of businesses with a non-performing loan from 4th quarter 2019 to 4th quarter 2022. Industries are numbered as follows: 1: Travel, hotels etc.; 2: Entertainment; 3: Transport and fuel; 4: Restaurants etc.; 5: Personal services; 6: Non-durable goods; 7: Groceries etc.; 8: Home improvement stores; 9: Durable goods.
Source: Danmarks Nationalbank and Statistics Denmark.

Stable development in retail and service businesses with non-performing loans in 2022 Chart 19



Note: Share of retail and service businesses with non-performing loans, unweighted and weighted by outstanding debt.
Source: Danmarks Nationalbank.

31 See Danmarks Nationalbank, Declining but still high inflation, *Danmarks Nationalbank Analysis (Outlook for the Danish economy)*, no. 4, March 2023 (*link*).

In this case, it will be necessary to tighten monetary policy more than currently planned, which will dampen activity and increase unemployment more than anticipated in the main scenario in Danmarks Nationalbank's latest projection. If such a scenario materialises, credit institutions could risk significantly higher losses from the retail and service industries and related industries.

Exposures to commercial real estate have previously resulted in large losses

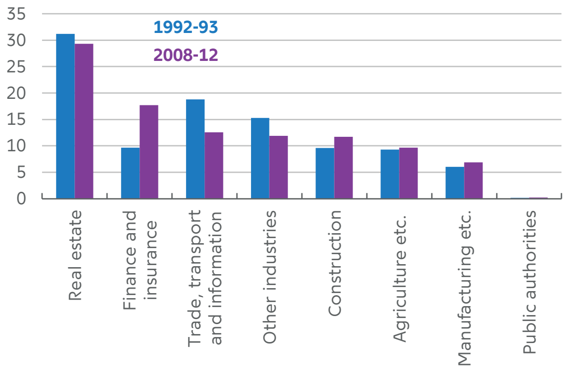
The rising interest rates are currently increasing the return requirement for commercial real estate, and this may lead to sharp price falls. Falling prices may result in the collateral pledged on the loans not being sufficient to cover the full exposure. This may lead to losses in the institutions in the event of default on the loans. Credit institutions have large exposures to the commercial real estate industry. Although the properties are primarily mortgaged through mortgage credit institutions, the risk of credit loss is greatest for the banks, as they usually provide the financing which in the event of default ranks the lowest in respect of the underlying collateral.

Overall, rising interest rates and economic downturn increase the risk that businesses in the real estate industry will not be able to service their debt. Economic downturn affects real estate businesses' earnings through lower rental income and increased vacancy rates and reduces their debt servicing capacity. Rising interest rates also increase costs, thus further squeezing the debt servicing capacity.[32]

Lending to the real estate industry has previously resulted in large impairment charges in banks. During the economic crisis in the 1990s and during the financial crisis, impairment charges on real estate loans accounted for approximately 30 per cent of total impairment charges on corporate loans, see chart 20. Lending to the real estate industry thus constituted the largest shares of the impairment charges during both these crises.

Real estate lending has accounted for the largest share of impairment charges in recent economic crises

Chart 20



Note: *Agriculture etc.* includes agriculture, hunting, forestry and fisheries. *Manufacturing etc.* includes industry, raw material extraction and energy supply. *Financing and insurance* is exclusive of credit institutions. There were data breaches in 2010. Impairment charges, broken down by industry, for the period 1992-2009 have been calculated based on the banks' losses and accumulated impairment charges, see Kim Abildgren and Jannick Damgaard, Models for Banks' Loan Impairment Charges in Stress Tests of the Financial System, *Danmarks Nationalbank, Quarterly Review, 1st Quarter 2012, Part 2 (link)*. With effect from 2010, banks began to report impairment charges by industry to the Danish Financial Supervisory Authority.

Source: Danmarks Nationalbank, the Danish Financial Supervisory Authority and own calculations.

High number of bankruptcies in 2022 should be seen in the context of the expiry of tax and VAT loans

The development in the number of bankruptcies does not indicate that businesses are under pressure, even though the level was high in 2022. The high level in 2022 should be seen as a normalisation rather than a consequence of falling consumer demand and rising costs. The development in bankruptcies should be seen in the context of the tax and VAT loans that were available to businesses in 2020 and 2021 in connection with the covid-19 pandemic. Of the businesses that went bankrupt

32 For an analysis of the debt servicing capacity of letting businesses, see Danmarks Nationalbank, Turbulent times call for a focus on risk management, *Danmarks Nationalbank Analysis (Financial stability)*, no. 14, December 2022 (*link*).

in 2022, 46 per cent had been granted a tax and/or VAT loan. In comparison, only 15 per cent of all active businesses had been granted a tax and/or VAT loan. The repayment of the loans was commenced in April 2022, around the same time that the number of bankruptcies began to increase. The increase in the number of bankruptcies in 2022 was mainly driven by businesses that had been granted a tax and/or VAT loan in 2020-2021, see chart 21.

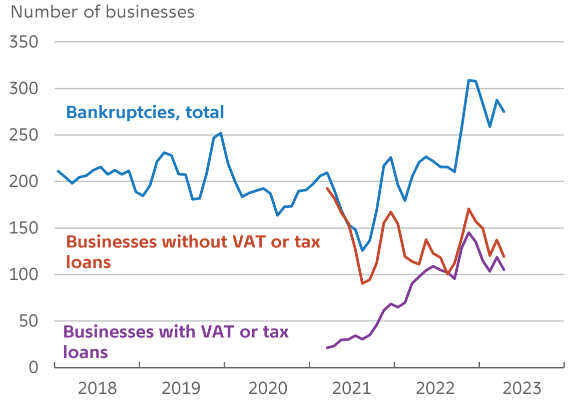
Lending should be based on thorough credit rating
Credit granting should be based on a thorough credit rating to the greatest extent possible. The development in bankruptcies indicates that the central government tax and VAT loans helped support non-viable businesses that would have gone bankrupt earlier if they had not had the opportunity to take out tax and VAT loans.[33] Deferral of the payment deadlines temporarily improves liquidity for the businesses, but will, in some cases, contribute to supporting businesses that are not viable and that should therefore not be offered further credit.

High lending growth in 2022 was to a large extent driven by draws on existing credit facilities
Bank lending to corporate customers increased significantly in 2022, not least in the 2nd half of the year, but has now decreased again. Since August 2022, the lending has decreased by kr. 13 billion, see chart 22, and the year-on-year growth rate has dropped to 5.9 per cent after having peaked at 28 per cent in August 2022. The growth rate in mortgage lending is 3.3 per cent and has been stable in recent years.

A major reason for the high lending growth in 2022 was that businesses increased their draws on existing credit facilities, see chart 23. The median utilisation rate of corporate credit facilities thus increased from 45 per cent in 3rd quarter 2021 to 61 per cent in 3rd quarter 2022 and was 59 per cent in 1st quarter 2023.

The increase in the number of bankruptcies is driven by businesses with VAT and tax loans

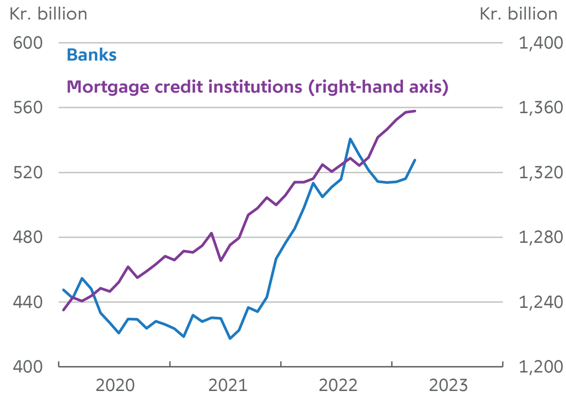
Chart 21



Note: 3-month moving average of the number of bankruptcies of active businesses, broken down by the use of VAT and tax loans. Active businesses are defined as businesses with employees or with revenue above kr. 100,000. This roughly corresponds to Statistics Denmark's definition. The most recent observations are from April 2023.
Source: The Danish Business Authority and own calculations.

Bank loan growth has slowed

Chart 22



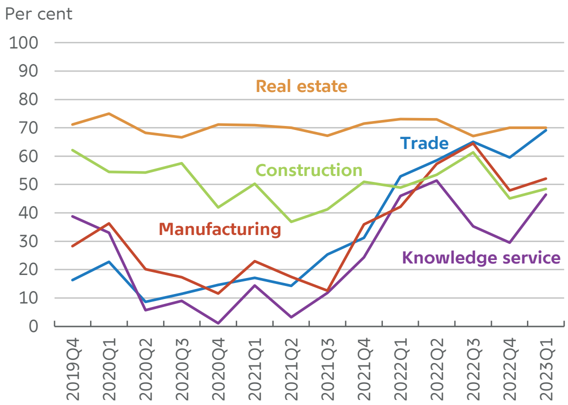
Note: Lending by banks and mortgage credit institutions to Danish non-financial businesses and self-employed persons. The most recent observations are from March 2023.
Source: Danmarks Nationalbank.

33 See Julin, Otte and Kuchler, Firm financing and public support measures during the pandemic, *Danmarks Nationalbank Working Paper*, no. 184, November 2021 (*link*).

The increased draw on credit facilities reflected higher liquidity needs among businesses due to a number of factors, including supply chain challenges and rising energy and commodity prices. For the trade industry, part of the increased draw on credit facilities was also linked to the build-up of stocks due to long delivery times and expectations of continued high revenue.

Corporate customers within trade, industry and knowledge service have increased their draw on credit facilities significantly

Chart 23



Note: Credit facility utilisation rates for non-financial businesses and self-employed persons by industry. Medians weighted by credit facility size.
Source: Danmarks Nationalbank.

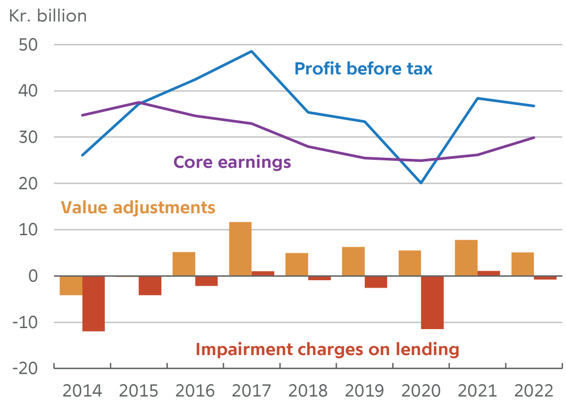
Higher interest rates increase the institutions' core earnings

The systemic credit institutions' profit before tax was kr. 36.7 billion in 2022.[34] This corresponds to an annual return on equity after tax of 7.9 per cent. The result was supported by an increase in the institutions' core earnings and continued low loan impairment charges, see chart 24. The positive result in 2022 was also due to value adjustments on the institutions' holdings, as the development in the financial markets in 4th quarter 2022 offset the large value losses in the 1st half of 2022.[35]

Core earnings are an expression of the institutions' earnings capacity in traditional banking operations.[36] Seen from a risk perspective, higher core earnings contribute to strengthening the institutions' first line of defense against loss.

The increase in core earnings should be seen in the context of higher interest rates in 2022. In the

Growth in core earnings in 2022 Chart 24



Note: Annual data for systemic credit institutions. Profit before tax is adjusted for impairment charges on goodwill and Danske Bank's fine relating to the Estonia case (see note 34).
Source: Danmarks Nationalbank.

34 Profit before tax is adjusted for impairment charges on goodwill and Danske Bank's fine relating to the Estonia case. In 2022, Danske Bank paid a fine totalling kr. 15.3 billion in connection with the money laundering case at its former Estonian branch.

35 See Danmarks Nationalbank, Turbulent times call for a focus on risk management, *Danmarks Nationalbank Analysis (Financial stability)*, no. 14, December 2022 (*link*).

36 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.

wake of the higher interest rates, the institutions have increased their interest margin, i.e. the difference between lending rate and deposit rate, which has contributed to an increase in their net interest income, see chart 25.

Improved deposit margin increases earnings
The institutions' total interest margin can be divided into a lending margin and a deposit margin.[37] The lending margin expresses the interest premium that the institutions obtain by lending money rather than placing the money in the money market. Conversely, the deposit margin reflects what institutions can earn by placing their customers' deposits in the money market.

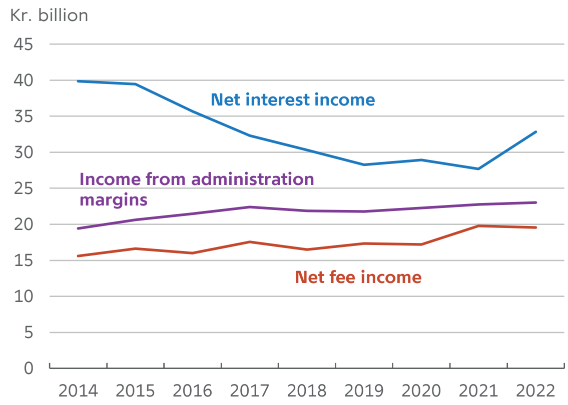
Seen over a number of years up to mid-2022, the institutions' deposit margin was negative. The reason for this was that the institutions did not decrease their deposit rate to the same extent as the decrease in money market interest rates, see chart 26.

In the wake of Danmarks Nationalbank's interest rate hikes in the 2nd half of 2022, the institutions have widened their deposit margin significantly, see chart 26. The widening is largest for households, and the deposit margin in March 2023 was roughly on a par with the period before the financial crisis. Although the institutions offer fixed-term deposits at a higher interest rate, the vast majority of household deposits are still on demand at a significantly lower interest rate, see also the previous section on liquidity and funding.

The institutions' lending margin has been declining over an extended number of years. A number of factors may have contributed to a decrease in the lending margin, including lower loss risk and the competitive situation. In 2022, the lending margin decreased further for households, while it remained unchanged for non-financial businesses, see chart 26.

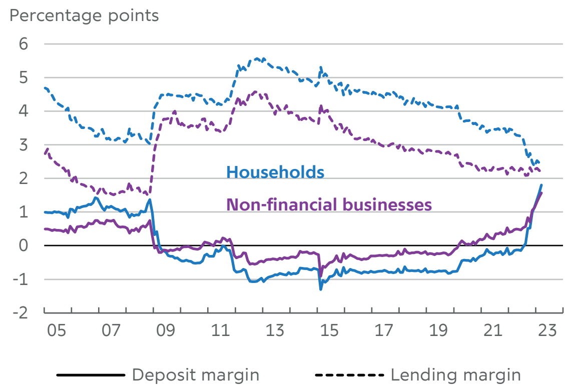
Overall, the increase in the deposit margin more than outweighs the decrease in the lending margin, which

Increase in net interest income in 2022 Chart 25



Note: Annual data for systemic credit institutions.
Source: Danmarks Nationalbank.

The institutions have recovered their deposit margins Chart 26



Note: Monthly margins are defined as the average interest rate in Danish kroner for households and non-financial businesses relative to the T/N money market rate. The most recent observations are from February 2023.
Source: Danmarks Nationalbank and own calculations.

37 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.

has increased the institutions' interest margin and thus their net interest income.

In 2023, net interest income is expected to increase more than in 2022 due to a full financial year with a higher level of interest rates. This is reflected in a significant increase in the institutions' net interest income during the 1st quarter of 2023. The increase should be seen in the light of the institutions having increased their interest margin and having more interest-bearing assets than liabilities.[38]

Loan impairment charges are still low
The systemic credit institutions' impairment charge ratio[39] remained low in 2022 and in the 1st quarter of 2023. Relative to 2021, the majority of the institutions have maintained or increased their management estimates due to the macroeconomic uncertainty.[40]

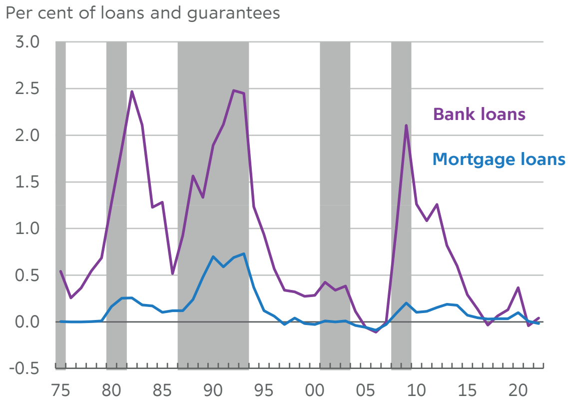
The impairment charge ratio on bank lending has historically been higher than on mortgage lending, see chart 27. Mortgage lending has a lower risk of loss than bank lending, as mortgage loans are to a greater extent secured against a mortgage on the property. This means that the institutions' impairment charges on their mortgage lending are closely linked to the development in house prices.

In Danmarks Nationalbank's latest projection from March, nominal prices of single-family houses are estimated to fall by 13 per cent until the 3th quarter of 2023 compared to the level in the 1st quarter of 2022.[41]

House price falls and higher unemployment will increase impairment charges on mortgage lending
Historically, house prices and unemployment have been of great importance to the impairment charge ratio for mortgage lending, see chart 28. Danmarks Nationalbank's latest projection estimates a roughly flat development in the unemployment rate in 2023. However, an increasing unemployment rate combined with declining house prices will increase the institutions' impairment charges and reduce the earnings effect from the increased net interest income.

Declining house prices reduce the value of the institutions' collateral in the property, but this is not a problem seen in isolation unless the home is put up for sale or forced sale, see the previous section on

Impairment charges on bank lending have historically been higher than on mortgage lending Chart 27



Note: Annual impairment charges taken to the income statement as a percentage of loans and guarantees. The grey areas show periods of economic downturn. Impairment charges on mortgage lending are exclusive of extraordinary impairment charges resulting from the transition to a new set of rules for impairment charges in mortgage credit institutions in 1990.
Source: Danmarks Nationalbank, the Association of Danish Mortgage Banks' report for 1990 and own calculations.

38 See box 4 in Danmarks Nationalbank, Turbulent times call for a focus on risk management, *Danmarks Nationalbank Analysis (Financial stability)*, no. 14, December 2022 (*link*).

39 The impairment charge ratio represents the institution's impairment charges as a percentage of total loans and guarantees.

40 The institutions use management estimates when the models for calculating impairment charges do not take future loan losses sufficiently into account.

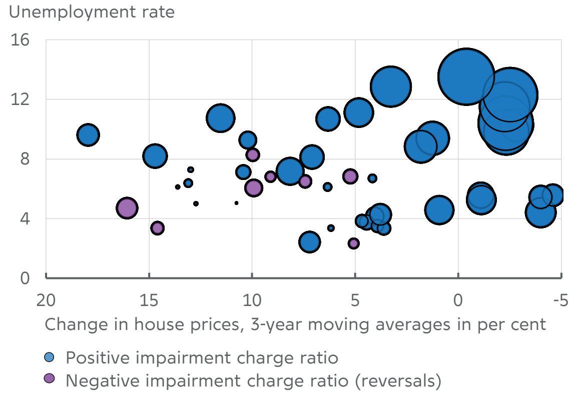
41 See Danmarks Nationalbank, Declining but still high inflation, *Danmarks Nationalbank Analysis (Outlook for the Danish economy)*, no. 4, March 2023 *(link)*.

credit to households. In periods with declining house prices, it is therefore crucial for the institutions' losses that borrowers are able to meet their current payment obligations. A large part of the institutes' mortgage lending is to households. Their ability to service debt is closely linked to unemployment.

During the financial crisis, the impairment charge ratio on mortgage lending was significantly lower than in the 1990s, see chart 27. This should be seen in the context of the unemployment rate being significantly lower during the financial crisis than in the 1990s. Since the high impairment charge ratios of the 1990s and the financial crisis, a number of factors have increased the resilience of the institutions. These includes a tightening of the institutions' credit granting through, among other regulations, the Danish Executive Order on good practice for mortgage lending and the Danish Financial Supervisory Authority's growth area guidelines.

Historically, unemployment and house prices have had a significant impact on impairment charges

Chart 28



Note: The size of the bubble indicates the size of the annual impairment charge ratio for mortgage lending for the period 1975-2022.

Source: Danmarks Nationalbank and own calculations.

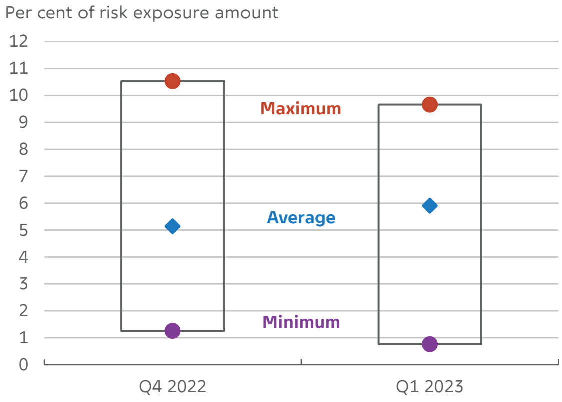
Institutions must ensure excess eligible liabilities relative to MREL requirement

The institutions must meet an aggregate minimum requirement for their eligible liabilities, the risk-based MREL requirement.[42] All the systemic institutions had excess eligible liabilities relative to their MREL requirement at the end of 1st quarter 2023, see chart 29.[43] The purpose of the MREL requirement is that the institutions can be restructured or wound up without the use of government funds, and without any substantial negative impact on financial stability, see box 5 on crisis management of banks and MREL.

Some institutions should increase their excess eligible liabilities relative to MREL requirement
During periods with stress in the financial markets where the refinancing of expired issuances may be difficult, the institutions must still be able to meet their MREL requirement.

Low excess eligible liabilities relative to MREL requirement for some institutions

Chart 29



Note: The chart shows excess eligible liabilities relative to the MREL requirement. The excess eligible liabilities has been calculated as the difference between the institutions' total MREL eligible instruments and their total risk-based MREL.
Source: Danmarks Nationalbank and own calculations.

42 The risk-based MREL requirement covers the bank's MREL requirement calculated on the basis of its solvency requirements and capital buffer requirements plus the mortgage credit institution's total capital requirements and debt buffer requirements.

43 If an institution fails to meet the MREL requirement, the Danish Financial Supervisory Authority will, as a general rule, require the institution to implement measures to ensure that the institution can again meet the MREL requirement, for example through the injection of new capital or selling off assets. In the worst-case scenario, control may be transferred to the resolution authority Financial Stability for restructuring or winding-up.

Crisis management of banks and MREL requirement

Box 5

In continuation of the experiences from the financial crisis, we now have rules for crisis management in Denmark and the rest of the EU.[1] The rules are to ensure that failing credit institutions can be handled without significant negative impact on financial stability and the real economy and without use of government funds. One of the most important tools that the authorities have acquired is the so-called bail-in tool. The bail-in tool allows the resolution authorities to write down and convert an institution's capital and debt in a crisis. Firstly, this ensures that the institution's investors and creditors – and not the taxpayers – foot the bill for crisis management of the institution. Secondly, the institution's critical functions can be continued so that the individual citizens can still conduct their banking business.

Crisis management

For all Danish systemic banks, the crisis management strategy is that the whole group must be recapitalised and continued, so that the critical functions can be maintained. This is done using the bail-in tool. The general strategy for small and medium-sized institutions in Denmark is that the resolution authority Financial Stability conducts a so-called controlled winding-down. This means that as much of the activities as possible will be sold, while the remainder of the institution will be continued temporarily under the auspices of the resolution authority Financial Stability.[2]

Minimum requirement for own funds and eligible liabilities (MREL)

As part of the crisis management regime, banks must meet a minimum requirement for eligible liabilities (MREL).[3] The object of the MREL requirement is to ensure that the institutions do not compose their liabilities in such a way that the crisis management tools, including bail-in, cannot be used or become less effective. The purpose of the MREL requirement is thus to ensure that the institutions have sufficient capital instruments and liabilities that are eligible for being written down and converted in a crisis to cover the institution's losses and restore its capital. Investors in eligible debt or capital in a credit institution must therefore be prepared to incur losses if the institution becomes distressed and subject to crisis management. The institution's other creditors also risk incurring losses during crisis management. EU legislation lays down that depositors are to have additional protection. Therefore, deposits of up to 100,000 euro are covered by the deposit guarantee scheme and are thus not at risk of losses in a crisis. In addition, uncovered deposits are ranked in the lower part of the order of losses in a failing bank.

Source: Danmarks Nationalbank.

1. See Danmarks Nationalbank, Crisis management of credit institutions – what is new?, *Danmarks Nationalbank Analysis*, no. 4, March 2021 (*link*).
2. Controlled winding-up is implemented using the business sales tool and the bridge institution tool, see Danmarks Nationalbank, Crisis management of credit institutions – what is new?, *Danmarks Nationalbank Analysis*, no. 4, March 2021 (*link*).
3. The MREL requirement can be met with, for example, capital instruments, non-preferred senior debt and ordinary senior debt. For a liability to be used to meet the MREL requirement, it must, among other requirements, have a remaining maturity of minimum one year. Danish mortgage credit institutions are exempt from the MREL requirement. Instead, they must meet a debt buffer requirement. The debt buffer requirement has the same purpose as the 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 possibility of issuing new debt instruments.[44] Overall, the systemic institutions need an additional kr. 8 billion in 2nd quarter 2024.[45]

By being dependent on market access within a short period of time, the institutions run a refinancing risk. The institutions are responsible for ensuring a sound financing structure. It is therefore important that the institutions both build up sufficient excess eligible liabilities relative to the MREL requirement and have a sufficiently long and diversified maturity on their

44 In the severe recession scenario, where the countercyclical capital buffer is assumed to be released.

45 The institutions are not assumed to be able to issue new debt instruments in the period from the 2nd half of 2023 up to and including the 1st half of 2024.

senior issuances to enable them to cope with a period with no or limited market access without breaching the requirement.[46]

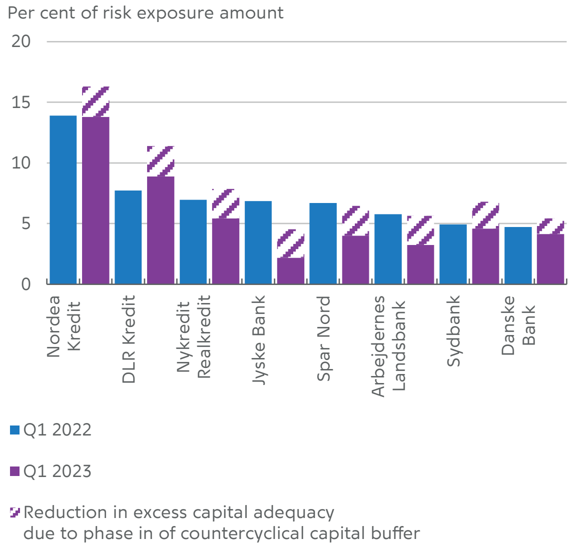
Credit institutions' excess capital has developed steadily in the past year
The systemic credit institutions' excess capital is at approximately the same levels as a year ago. However, the level of excess capital varies across institutions, see chart 30.

For several institutions, increased earnings have contributed positively to their capitalisation. However, several other factors have pulled down the excess capital: From the end of March 2023, all institutions have had to meet a requirement for a countercyclical capital buffer of 2.5 per cent of their Danish exposures. This has contributed to lower excess capital. Some institutions have also had a decrease in their excess capital due to institution-specific circumstances. The decrease in Nykredit's excess capital is especially due to a marked increase in risk-weighted exposures as a result of increased lending, implementation of new regulatory requirements for internal models and increased uncertainty in the financial markets in autumn 2022. The decrease in Jyske Bank's excess capital should be seen in the context of the acquisition of Handelsbanken's Danish activities. The acquisition has led to a significant increase in risk-weighted exposures as a result of higher lending and has also meant a significant decrease in Jyske Bank's capital base, as the bank financed part of the acquisition via its equity. Conversely, DLR Kredit's increase is due to a combination of the full profit for the year being allocated to reserves and a decrease in risk-weighted exposures due to an adjustment of the internal models.

Annual profits provide leeway for capital build-up after dividend payments
After some years with limited dividend distributions due to the coronavirus pandemic, more than half the systemic credit institutions have adopted significant distributions based on their financial statements for 2022. For the institutions that have published a dividend policy, the dividend is at the upper end of their dividend policy rate, see chart 31.

Three of the systemic credit institutions have chosen not to pay any dividend based on their financial statements for 2022. These are Danske Bank, Jyske Bank and DLR Kredit. Danske Bank's decision should be seen in the context of its losses in 2022.[47] Jyske Bank's decision should be seen in the context of the bank's capital situation, which is affected by the

Stable development in excess capital for systemic groups Chart 30



Note: The excess capital is calculated as the difference between Common Equity Tier 1 capital and Common Equity Tier 1 capital need. The countercyclical capital buffer is 2.5 per cent from the end of 1st quarter 2023. The Common Equity Tier 1 capital need is the Common Equity Tier 1 capital requirement plus the Additional Tier 1 capital and Tier 2 capital requirements which are met by Common Equity Tier 1 capital. The shaded area shows how much of the excess capital is used to meet the requirement for a 2.5 per cent countercyclical capital buffer.
Source: Danmarks Nationalbank and own calculations.

46 On 2 May 2023, the Danish Financial Supervisory Authority submitted draft guidelines for a sound financing structure in relation to the MREL and debt buffer requirements (*Vejledning om forsvarlig finansieringsstruktur i forhold til NEP- og gældsbufferkravet*) (*link*) (*in Danish only*) for consultation. In 2021, the Danish Financial Supervisory Authority submitted a similar draft for the guidelines for consultation, on which Danmarks Nationalbank submitted a consultation opinion (*link*) (*in Danish only*).

47 In 2022, Danske Bank paid a total fine of kr. 15.3 billion in connection with the money laundering case at its former Estonian branch.

acquisition of Handelsbanken's Danish activities. Jyske Bank has therefore chosen not to pay any dividend and to postpone any share buybacks until the 2nd half of 2023.

Systemic credit institutions do not have large unrealised market value losses that can erode their capital

In early March 2023, stress arose in the financial markets following problems in specific banks in the United States and Europe, see also the previous section on financial markets. This led to increased focus on accounting disclosure of, for example, bonds, see box 6. In the US bank Silicon Valley Bank, the bonds turned out to pose a risk that was not sufficiently reflected in either the bank's liquidity management or its capital management. Silicon Valley Bank was taken over by the authorities on 10 March. The rapid decline of Silicon Valley Bank underlines the need for strong liquidity and capital management.

In Silicon Valley Bank, the holding of bonds that were not regulary value-adjusted accounted for 43 per cent of the bank's assets, and the unrealised market value losses was equal to approximately 94 per cent of the capital base.

Danish banks also hold bonds that are not value-adjusted on an ongoing basis. Unlike Silicon Valley Bank, these holdings in Danish banks represent a relatively limited exposure, which is not in itself assessed to pose a challenge to the banks. In the systemic credit institution which has the largest exposure relative to its capital base, the holdings represent only 4 per cent of the assets and the unrealised market value loss constitutes 6 per cent of the capital base.

Furthermore, holdings are regulated differently in Denmark and the EU than in the United States. According to the regulation, banks in the EU and Denmark must include bonds when determining how sensitive the bank's balance sheet is to interest rate changes,[48] and the banks must reserve capital for

48 The European rules on this are known as Interest rate risk in the banking book (IRRBB). These rules aim precisely to catch whether the bank has large unrealised losses on its balance sheet when interest rates change. The IRRBB comprises bonds, deposits and loans. A potential unrealised loss on a bond portfolio can thus be balanced by a corresponding unrealised gain on issued bonds or long-term fixed-rate deposits.

Bonds booked at amortised cost Box 6

Overall, there are two ways in which the value of bonds can be recognised in banks' financial statements:

One way is that bonds are recognised at market value and are value-adjusted on an ongoing basis via profit and loss or through other comprehensive income. This affects the bank's earnings and thus its capitalisation on an ongoing basis. This provides transparency, but also risks reflecting a market risk that the bank does not necessarily intend to realise.

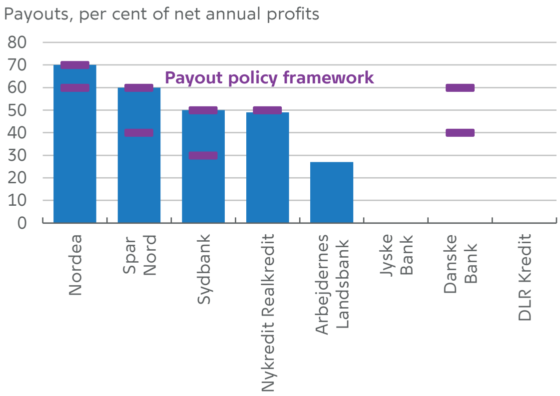
The second way is to recognise the bonds at amortised cost if the bank intends to hold the bonds to maturity. In this case, the bonds are not value-adjusted on an ongoing basis, as it is assumed that the bank will not sell them.[1] Market value fluctuations will therefore not immediately result in changes in the bank's earnings.

Over time, a discrepancy may arise between the book value and the market value. In an environment with sharply rising interest rates, the market value of bonds will fall. If, despite the intention to the contrary, the bank is forced to sell the bonds, for example due to lack of liquidity, the capital loss is realised and negatively impacts the bank's capitalisation.

Source: Danmarks Nationalbank and the Danish Financial Supervisory Authority.

1. If the bank makes ongoing market value adjustments, price fluctuations will appear as a cost or income that the bank will not end up realising if the bonds are held to maturity.

Dividends are at the upper end of the dividend policy range Chart 31



Note: The chart shows the groups' announced dividends and share buy-backs, based on the profit for the year, as well as published distribution policies.
Arbejdernes Landsbank, Jyske Bank and DLR Kredit have not published dividend policies.

Source: The institutions' annual reports and own calculations.

this risk. In Denmark, the Danish Financial Supervisory Authority has pointed out that, in addition, the banks must reserve capital when they observe a significant unrealised market value loss on their bonds that are not valued on an ongoing basis.[49] It is up to the banks themselves to set this level.

A few systemic credit institutions are close to breaching buffer requirements under stress

To assess the robustness of the financial sector's resilience, Danmarks Nationalbank conducts a stress test of the systemic credit institutions and non-systemic banks every six months, see appendix 1.

In this stress test, Danmarks Nationalbank examines whether the institutions maintain a sufficient distance to the capital requirements in three scenarios, see box 7 and appendix 2.

The stress test shows that all institutions' capital ratios comfortably exceed capital requirements relative to the risk-based capital buffer requirements in the interest rate scenario. In this scenario, negative economic growth results in a greater loss for the institutions than in the baseline scenario. Conversely, the additional interest rate increases contribute to the institutions' earnings through increasing net interest income, see section on earnings.

Overall, a severe recession leaves comfortable excess capital for the non-systemic banks on the assumption that the countercyclical capital buffer is released. The systemic institutions also maintain overall excess capital relative to the risk-based capital buffer requirements. However, there is a wide dispersion in the distribution across the institutions, and some of the systemic institutions come close to their capital buffer requirements. Without release of the countercyclical capital buffer (CCyB), a few institutions would breach their capital buffer requirements during a severe recession, see chart 32.[50]

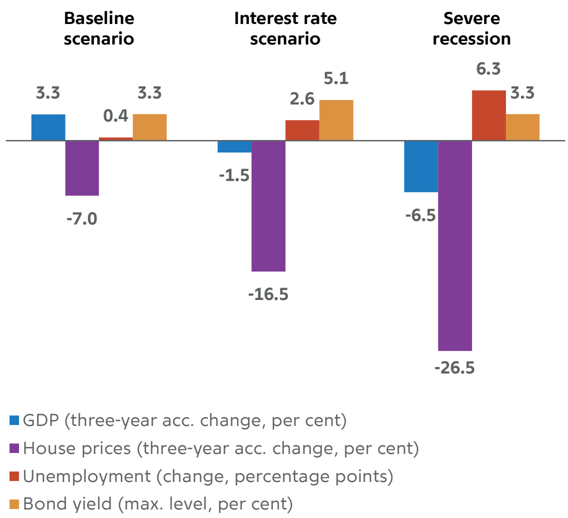
Macroeconomic scenarios in stress test over the period 2023-2025

Box 7

This stress test contains three scenarios consisting of:

1. a baseline scenario that follows Danmarks Nationalbank's latest projection[1];
2. an interest rate scenario characterised by a sharp rise in interest rates and additional reduction in house prices combined with a persistent economic downturn;
3. a severe recession scenario in which the Danish economy is hit by a severe economic downturn.

In both the interest rate scenario and the severe recession scenario, the macroeconomic downturn will hit in the 2nd half of 2023.



Note: The figures have been calculated based on annual averages. Bond yields indicate average bond yield (per cent p.a.). See also appendix 2 for a detailed description of the stress test scenarios.
Source: MONA and own calculations.

1. See Danmarks Nationalbank, Declining but still high inflation, *Danmarks Nationalbank Analysis (Outlook for the Danish economy)*, no. 15, March 2023 (*link*).

49 See the Danish Financial Supervisory Authority, *Guidelines on adequate base capital and individual solvency needs for credit institutions* (*link*) (*in Danish only*).

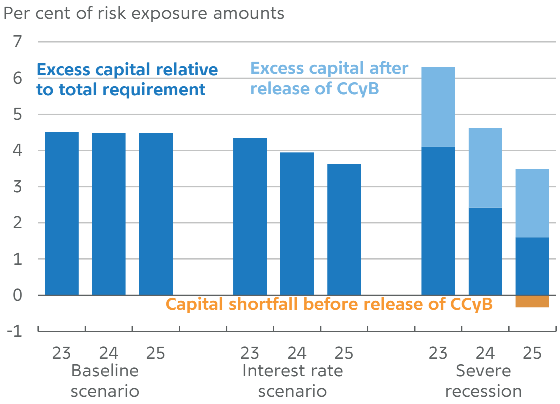
50 Failure to meet capital buffer requirements is not in itself critical to the institution's survival going forward. However, several restrictions will be imposed, e.g., in relation to dividend payments and coupon interest rate payments on hybrid capital instruments. For further information on the consequences of a breach of capital requirements, see the memo from the Danish Financial Supervisory Authority: *The Danish Supervisory Financial Authority's expectations for capital plans and capital adequacy targets*, 7 November 2018 (*link*) (*in Danish only*).

Some institutions should increase their capital towards the phasing-in of the banking package
In addition to the capital effect of a severe recession scenario, individual institutions must also hold sufficient capital to meet future capital requirements. 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).[51] The total increase in the capital requirement in 2025 for Danish systemic institutions is estimated at just under kr. 6 billion.[52] A few systemic institutions do not have adequate capital relative to meeting a more stringent requirement in a severe recession scenario without breaching their capital buffer requirements. Though the final effects of the capital requirements package are unknown, the credit institutions should generally exercise prudence in their capital planning, and some institutions should increase their capital.

The capital targets of several systemic institutions are too low to cope with a severe recession
In addition to the regulatory requirements, the credit institutions determine their capital targets following a dialogue with the Danish Financial Supervisory Authority, see box 8. At the end of 2022, the capital ratio of all systemic credit institutions except Jyske Bank was above their capital target. Jyske Bank's capital ratio was within the range of its capital target.

The object of the credit institutions' capital targets is to ensure that the credit institution is sufficiently capitalised and that all capital requirements are met – even in a situation in which the credit institution is exposed to severe macroeconomic stress.[53]

A few systemic institutions will breach capital buffer requirements if the countercyclical capital buffer is not released Chart 32



Note: The chart shows the excess capital or capital shortfall of the systemic credit institutions that either have excess capital or a capital shortfall as a percentage of their total risk exposure amounts. The stress test assumes the release of the countercyclical capital buffer (CCyB) in a severe recession. The additional excess capital and shortfall is illustrated in a severe recession scenario.
Source: Danmarks Nationalbank and own calculations.

Danmarks Nationalbank's stress test of the institutions' capital targets shows that several systemic credit institutions would not be sufficiently capitalised to withstand a severe recession if their initial capital ratio was on a par with their capital target, see chart 33.[54] Overall, they would have a capital shortfall relative to the capital buffer requirements of kr. 5 billion in 2025. This indicates that several institutions should consider increasing their capital target.

51 See European Commission, *Banking package* (*link*).

52 Assuming that the countercyclical capital buffer rate is 0 per cent.

53 For an exhaustive discussion of capital adequacy targets, see memo from the Danish Financial Supervisory Authority: *The Danish Financial Supervisory Authority's expectations for capital plans and capital adequacy targets*, 7 November 2018 (*link*) (*in Danish only*).

54 The stress test is conducted under the worst-case scenario, where the only change we make is to the credit institutions' excess capital on commencement of the stress test. If, for example, a credit institution has published a capital adequacy target of 16 per cent, the credit institution's capital ratio will be 16 per cent on commencement 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, we assume that its capital adequacy target is equal to its observed capital ratio at the end of the 4th quarter of 2022. All other input are the same as in the regular stress test. This means that it is implicitly assumed that the size of the balance sheet total 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.

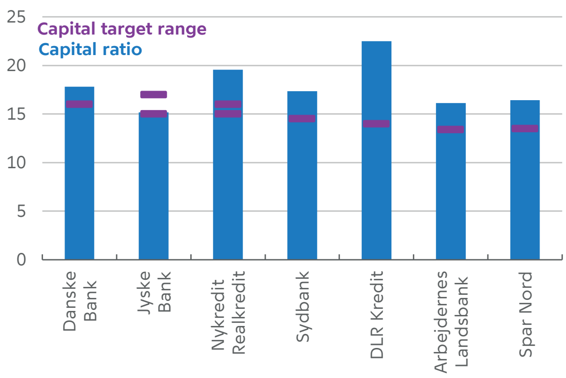
Capital adequacy targets must ensure adequate capitalisation

Box 8

The object of the capital target is to ensure that the credit institution is adequately capitalised at any given time. 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.[1] In addition, the capital target should take into account known future changes in the requirements.

The institutions' determination of their capital target is done in a dialogue with the Danish Financial Supervisory Authority, which, based on European rules, has laid down guidelines[2] for how the capital adequacy target is to be set.

Systemic credit institutions' capital adequacy targets

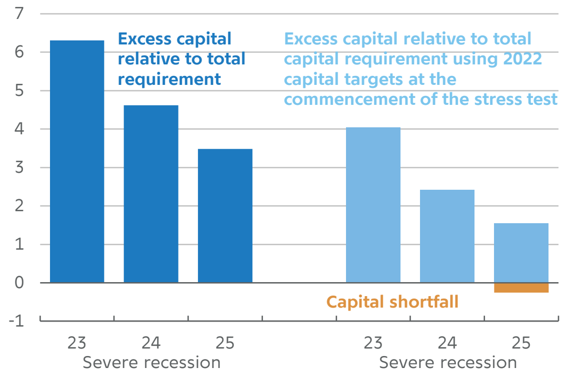


Note: The chart shows the groups' Common Equity Tier 1 capital ratios and capital targets at the end of 2022.
Source: The institutions' annual reports for 2022, Danmarks Nationalbank and own calculations.

1. The credit institutions cannot assume that the countercyclical capital buffer will be released in an institution-specific stress situation. The institutions can expect the countercyclical capital buffer to be released in a scenario of hard general stress, see the Danish Financial Supervisory Authority: *The Danish Financial Supervisory Authority's expectations for capital plans and targets (link)* (*in Danish only*).
2. See Finanstilsynet, *Vejledning om tilstrækkelig basiskapital og solvensbehov for kreditinstitutter'* (The Danish Financial Supervisory Authority's Guidelines on adequate capital base and solvency need for credit institutions) *(link)* (*in Danish only*) and *Forventninger til kapitalplaner og kapitalmålsætninger* (The Danish Financial Supervisory Authority's expectations for capital plans and capital adequacy targets), 2018 *(link)* (*in Danish only*).

The capital targets of several systemic institutions are too low to cope with a severe recession

Chart 33



Note: The chart shows the excess capital or capital deficiency of systemic banks with either excess capital adequacy or a capital need as percentages of their total risk-weighted exposure amount.
Source: Danmarks Nationalbank.

Advanced cyberattacks may threaten financial stability

Cyberattacks may threaten financial stability in Denmark in several ways. For example, a cyberattack may limit societally critical functions, impact confidence in the financial sector or cause financial losses to such an extent that the financial system is unable to absorb them.

Cyber threat is evolving and changing nature
The threat from cyber espionage and cybercrime is still assessed as very high by the Centre for Cyber Security (CFCS)[55]. On the other hand, CFCS assesses that the threat from destructive cyberattacks[56] against Danish targets is low. However, CFCS assesses it as likely that state-sponsored hacker groups are developing the capability to launch destructive cyberattacks against critical infrastructure in Denmark. In this context, it is assessed by CFCS as likely that cyber espionage is used in preparation for destructive cyberattacks. It is also possible that Danish organisations that have activities in Ukraine or deliver products or services related to the war in Ukraine may be exposed to a higher risk of being hit by attacks directed against Ukraine or of becoming collateral victims of such attacks.

As a result of the war in Ukraine, CFCS assesses that the threat from cyber activism has increased to high. The nature of the cyber threat can also quickly change if the political situation were to escalate.[57]

Continued work to limit the impact of cyberattacks
For a number of years, the Danish financial sector has targeted work at improving operational resilience with particular focus on strengthening cyber resilience. The financial institutions are themselves responsible for ensuring stable operations and operational resilience.

Work is being done to achieve this both individually and jointly, including through Danmarks Nationalbank's and the financial sector's initiatives in Financial Sector forum for Operational Resilience (FSOR) and the TIBER-DK programme, see box 9.

55 The Centre for Cyber Security (CFCS) was established in 2012 as part of the Danish Defence Intelligence Service. CFCS's mission is to support a high level of information security in infrastructure that is vital to society (*link*).

56 Descriptions of threats and types of attacks can be found in CFCS' threat assessment (*link*).

57 See Centre for Cyber Security, *The Cyber Threat Against Denmark*, threat assessment from 8 May 2023 (*link*).

The cyber threat cannot be eliminated, and there is still a need to increase cyber resilience. The reason for this is that the best hackers are continuously becoming more specialised and sophisticated in their methods. At the same time, the war in Ukraine is changing the threat landscape. Several states have the capabilities needed to carry out advanced cyber-attacks, but currently limited intentions of launching such attacks against Denmark. The threat could change with little or no warning.[58] It is therefore important that the financial sector continues to target work at increasing cyber resilience and limiting the impacts of cyberattacks.

Examples of operational measures: FSOR and TIBER-DK

Box 9

FSOR

In 2016, Danmarks Nationalbank and the financial sector established a voluntary, but binding, private/public collaboration forum: Financial Sector forum for Operational Resilience (FSOR). The purpose is to increase operational resilience across the financial sector, including resilience to cyberattacks.[1] FSOR's work is based on a risk analysis that identifies the greatest risks to the sector. It lays down a direction for the work with joint mitigating measures. These measures include a crisis management team that ensures coordinated action across the sector in the event of a systemic crisis. The participants in FSOR are the most central financial institutions, Nordic Financial CERT[2], interest group organisations and authorities, including CFCS. Danmarks Nationalbank chairs FSOR and provides secretariat services. Read more about FSOR on nationalbanken.dk (*link*).

TIBER-DK

Since the beginning of 2019, Danmarks Nationalbank has coordinated testing of cyber resilience in the financial sector under the TIBER-DK programme. A TIBER test simulates advanced attacks from state-sponsored or organised criminal groups in real production environments. Based on intelligence information about current threats, the tests use real tactics, techniques and procedures. The goal is to identify strengths and challenges in the cyber defence. Addressing the challenges increases cyber resilience. Danmarks Nationalbank was one of the first central banks to implement the programme, which today exists in another 11 European countries and in the European Central Bank (ECB). Read more about TIBER-DK on nationalbanken.dk (*link*).

1. Danmarks Nationalbank examines the cyber resilience of key actors in the Danish financial sector through questionnaire surveys that make use of self-assessment – see Danmarks Nationalbank, *Cyber resilience in the financial sector* (*link*).
2. Nordic Financial CERT is a member-driven non-profit organisation, and its objective is to strengthen the Nordic financial industry's resilience to cyberattacks and enable Nordic financial institutions to respond quickly and effectively to cybersecurity threats and online crime. Nordic Financial CERT collects and shares information about cyber threats and cyberattacks.

58 See Centre for Cyber Security, *The Cyber Threat Against Denmark*, threat assessment from 8 May 2023 (*link*).

Appendix 1: Analysis data basis

The analysis applies 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 as well as the stress test comprise eight systemic credit institutions designated by the Danish Financial Supervisory Authority in 2022. The analysis and stress test also include the non-systemic banks. This group consists of the institutions in group 2 defined by the Danish Financial Supervisory Authority for 2022, with the exception of Saxo Bank and Danish Ship Finance, which have both been omitted due to their business models. 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.

Institutions in the analysis by total assets as at 31 December 2022, kr. million

Table A1

Systemic credit institutions	Amount
Danske Bank	3,763,999
Nykredit Realkredit	1,600,129
Jyske Bank	749,997
Nordea Kredit	425,506
DLR Kredit	180,244
Sydbank	179,318
Spar Nord	123,936
Arbejdernes Landsbank	107,987
Total systemic credit institutions	7,130,115

Systemic banks	
Danske Bank	2,398,317
Jyske Bank	421,675
Nykredit Bank	234,608
Sydbank	181,309
Spar Nord	124,040
Arbejdernes Landsbank	107,987
Total systemic banks	3,467,935

Non-systemic banks	
Ringkjøbing Landbobank	68,980
Sparekassen Danmark	58,396
Sparekassen Kronjylland	39,315
Lån & Spar Bank	30,022
Sparekassen Sjælland-Fyn A/S	29,658
Middelfart Sparekasse	18,358
Total non-systemic banks	244,729

Mortgage credit institutions	
Nykredit Realkredit	1,492,504
Realkredit Danmark	782,084
Nordea Kredit	425,506
Jyske Realkredit	359,621
DLR Kredit	180,244
Total mortgage credit institutions	3,239,960

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.

Appendix 2: Stress test scenarios

The stress test is based on three scenarios for the macroeconomic development in Denmark spanning the three-year period from 2023 to 2025. The three scenarios consist of a baseline scenario that follows Danmarks Nationalbank's latest projection[59], an interest rate scenario and a severe recession scenario.[60]

The interest rate scenario reflects a situation in which it will require further interest rate increases from central banks to bring inflation under control. Interest rates in Denmark and abroad continue to rise, and will, from 2024, be 2 percentage points higher over the entire yield curve compared to the baseline scenario. The dampening effect of the interest rate increase on growth in the Danish economy is reinforced by interest rate increases abroad reducing Danish export market growth. At the same time, from 3rd quarter 2023, the Danish and international economy will be hit by declining consumer and business confidence, resulting in negative shocks to private consumption, private investments and the housing market. Both result in a reduction in house prices of 16.5 per cent over the period 2023-2025, an increase in the rate of unemployment of 2.6 percentage points and a fall in GDP of 1.5 per cent.

In the severe recession scenario, the world economy is hit by a global crisis in the 2nd half of 2023, and the Danish economy experiences a severe economic downturn. The Danish export market growth is reduced significantly, resulting in sharp falls in GDP and house prices as well as increased unemployment. At the same time, the economy is hit by declining consumer and business confidence, in line with the interest rate scenario. Overall, GDP will decline by 6.5 per cent over a three-year period and will thus be 9.5 per cent lower than in the baseline scenario in 2025. The rate of unemployment will increase by 6.3 percentage points from 2023 to 2025 and house prices will fall sharply by 26.5 per cent and be on a par with house prices in 2015 at the end of the recession.

See table A2 for selected key chartes for the scenarios.

59 See Danmarks Nationalbank, Declining but still high inflation, *Danmarks Nationalbank Analysis (Outlook for the Danish economy)*, no. 4, March 2023 (*link*).

60 The interest rate increase scenario and the severe recession scenario have been prepared in collaboration with the Danish Financial Supervisory Authority. 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*).

Selected key figures in Danmarks Nationalbank's stress test scenarios Table A2

	Baseline scenario	Interest rate increase	Severe recession
2023			
GDP, per cent year-on-year	0.9	0.3	-0.7
Private consumption, per cent year-on-year	0.2	0.0	-1.6
Export market growth, per cent year-on-year	2.6	2.1	-1.4
House prices, per cent year-on-year	-9.4	-10.1	-13.3
Gross unemployment, per cent of labour force	2.7	2.8	3.1
Average bond yield, per cent p.a.	3.3	3.9	3.3
2024			
GDP, per cent year-on-year	1.2	-2.2	-6.1
Private consumption, per cent year-on-year	1.8	-1.0	-5.4
Export market growth, per cent year-on-year	2.8	0.4	-11.8
House prices, per cent year-on-year	-0.3	-5.2	-15.0
Gross unemployment, per cent of labour force	3.0	4.3	6.7
Average bond yield, per cent p.a.	3.1	5.1	3.1
2025			
GDP, per cent year-on-year	1.2	0.4	0.3
Private consumption, per cent year-on-year	1.2	-0.7	-0.4
Export market growth, per cent year-on-year	2.9	1.0	-0.9
House prices, per cent year-on-year	2.9	-2.0	-0.3
Gross unemployment, per cent of labour force	3.1	5.4	9.4
Average bond yield, per cent p.a.	3.0	5.0	3.0
Cumulative change			
GDP, three-year cumulative change per cent	3.3	-1.5	-6.5
House prices, three-year cumulative change per cent	-7.0	-16.5	-26.5

Note: Annual averages. House prices are cash prices of single-family houses. It should be noted that rounding may mean that the stated accumulated growth does not necessarily correspond to the cumulative growth that can be calculated based on the figures in the table.

PUBLICATIONS

NEWS

News offers quick and accessible insight into an Analysis, an Economic Memo, a Working Paper or a Report from Danmarks Nationalbank. News is published continuously.

ANALYSIS

Analyses from Danmarks Nationalbank focus on economic and financial matters. Some Analyses are published at regular intervals, e.g. *Outlook for the Danish economy* and *Financial stability*. Other Analyses are published continuously.

REPORT

Reports comprise recurring reports and reviews of the functioning of Danmarks Nationalbank and include, for instance, the *Annual report* and the annual publication *Danish government borrowing and debt*.

ECONOMIC MEMO

An Economic Memo is a cross between an Analysis and a Working Paper and often shows the ongoing study of the authors. The publication series is primarily aimed at professionals. Economic Memos are published continuously.

WORKING PAPER

Working Papers present research projects by economists in Danmarks Nationalbank and their associates. The series is primarily targeted at professionals and people with an interest in academia. Working Papers are published continuously.

The analysis consists of a Danish and an English version. In case of doubt regarding the correctness of the translation the Danish version is considered to be binding.

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FINANCIAL STABILITY – 1st HALF 2017

Optimism in the banking sector provides breeding ground for increased risk-taking

- The largest banks achieved their best ever performance in 2016, boosted by very low loan impairment charges.
- The banks comply with the current capital requirements, but a few systemic banks will fall short of the buffer requirement in the stress test.
- The combination of low interest rates, high asset prices and an emerging boom may increase risk-taking and put pressure on the banks' credit standards.

The banks' targets

for return on equity seem high

Read more

Large banks

have less capital than other Nordic banks

Read more

The Copenhagen housing market

has similarities with the pre-crisis period

Read more

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Summary and assessment

Record high bank earnings underpinned by very low loan impairment charges
The largest banking groups achieved their best ever overall performance in 2016. The level of earnings has risen substantially over the last three years, and the banks' financial statements for the 1st quarter of 2017 also recorded sound profits. As a result of the high earnings, the banks also recorded the highest return on equity, ROE, since 2007. The banks' higher earnings are underpinned by very low loan impairment charges, which are mainly attributable to a high level of reversals of previous years' loan impairment charges. As losses will naturally be incurred on part of the lending portfolio in connection with the banks' current lending, the low level of impairment is expected to be temporary.

High ROE targets
The managements of several Danish banks have announced target returns of up to 12.5 per cent p.a. on the book value of equity. The ROE targets appear high, given the very low level of interest rates. Moreover, in their ROE targets, the banks should take into account the temporary nature of the positive effect on earnings of the low level of loan impairment charges.

Adjustment to low interest rate environment continues
The banks' net interest income is under pressure from continued limited demand for new loans and a low interest rate level. To a certain degree, the banks have been able to compensate for this by increased income from administration margins payable on mortgage loans and other fees. On the expenditure side, there has been strong focus on increasing efficiency and reducing costs.

Large disbursements to shareholders
In step with their earnings growth, the large listed banks have considerably increased their disbursements to shareholders in recent years. In 2016, Danske Bank and Sydbank disbursed virtually their entire profit for the year after tax to their shareholders as both dividends and share buy-backs.

Lower capital base for large Danish banks than for other Nordic banks
The capital adequacy of Danish banks grew substantially from 2008 to 2013, when the largest Danish banks met the fully phased-in EU 2019 requirements. Since then, the banks overall have not increased their Tier 1 ratio to any notable extent. By Nordic comparison, the large banks in Sweden and Norway have continued to build up their capital adequacy. This should be seen in the context of those countries tightening capital requirements and activating the countercyclical capital buffer.

A few systemic banks close to buffer requirement in stress test
Results from Danmarks Nationalbank's accounts-based stress test show that, in a severe recession scenario until 2019, all systemic banks will still observe the current minimum requirements. In the same scenario, a few of the systemic banks will have a small capital shortfall relative to their total requirement, including capital buffers. In the event of non-compliance with the buffer requirements, banks become subject to a number of limitations, e.g. limitations of dividend payments. Moreover, the banks should expect that their access to external funding in the financial markets may be challenged.

Liquidity requirements observed with a margin
All banks observe the liquidity coverage ratio, LCR, with a considerable margin. That is appropriate as the LCR may be highly volatile. The systemic banks must also observe LCR requirements in the currencies that are significant for the individual bank. The foreign exchange requirement is 80 per cent from 1 April and 100 per cent from 1 October 2017.

Less liquidity in the repo markets
Both market participants and international organisations are focusing on declining repo market liquidity in the light of accommodative monetary policies and the structural changes in the market, e.g. as a result of new regulation. A well-functioning repo market is important to liquidity in other financial markets. There were significant fluctuations in prices in the repo market in euro at the most recent turn of the year, while the fluctuations in the repo market in kroner seem to be more limited.

Favourable market developments foster vulnerability in case of changes in risk perception
The stress level in the financial markets has been low over the last half year despite periods of heightened political uncertainty. The markets are generally

characterised by optimism triggered by the incipient boom, the low level of interest rates and the high asset prices. In such a situation, increased risk-taking in their market exposures may make investors and banks vulnerable to a sudden change in the perception of risk. It is important for financial sector participants to take this risk into account.

Banks' credit standards challenged
Demand for new loans remains limited. Overall, the banks cannot expect to considerably increase their lending in the coming years. The economic upswing, rising house prices and the continued low level of interest rates may lead to a general perception of low credit risk. This may intensify the pressure on the banks' credit standards. Now is the time for the banks to avoid providing the loans that will result in higher loan impairment charges when the economic cycle reverses and the stress level in the financial markets intensifies.

Developments in Copenhagen housing market similar to pre-crisis level
Unlike the pre-crisis period, so far only Copenhagen has seen significant increases in house prices and mortgage lending in recent years. If house price developments and hence credit growth were to spread to the rest of the country in the coming years, this would lead to growing concerns about build-up of systemic risks.

Housing taxation once again has a stabilising effect
The new housing taxation agreement concluded in May restores the link between housing taxes and property values from 2021. This will have a stabilising effect on house prices and hence the economy. The agreement will also enhance taxation equality geographically and across housing types, thereby dampening the current regional differences in house price developments. Expectations of housing tax adjustments may already impact house prices now and until the agreement becomes effective.

As part of the agreement, any permanent structural additional revenue from housing taxation should be reversed to homeowners in the form of lower housing tax rates. If so, there is risk that this would be a procyclical easing which would reduce the stabilising effects of housing taxation.

Steep rise in prices of rental properties
Having risen strongly, the prices of rental properties are now back at the 2007 level immediately before the financial crisis set in and prices dropped considerably, resulting in substantial losses for some banks. The requirements for return in the rental property market have generally decreased. Besides the low level of interest rates this may reflect a perception among investors of property investments as less risky. The financial market participants appear to be more robust than previously. One reason is that solvency is generally increasing in the property companies to which the banks are exposed.

Low price for viable crisis management of mortgage banks
In the Danish implementation of the new recovery and resolution regime, BRRD, mortgage banks are exempted from having to meet a minimum requirement for own funds and eligible liabilities, MREL. According to an analysis by Danmarks Nationalbank, viewed in isolation, the introduction of an MREL for mortgage banks of 8 per cent of total liabilities would correspond to an increase in administration margins of between 0.02 and 0.11 percentage point. That is a low price for protecting households, firms and the general economy if a mortgage bank were to become distressed.

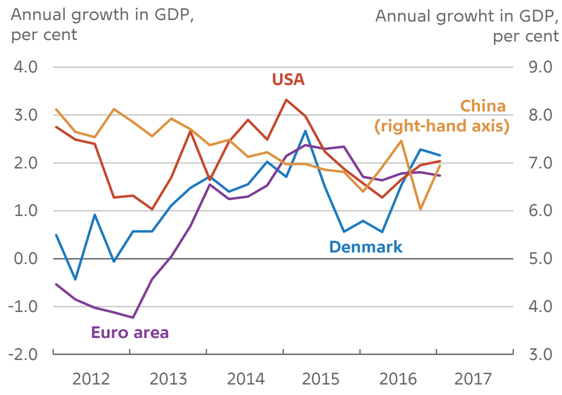
Macroeconomic and financial background

The global economy is recovering

The global economy is in a broad upswing, cf. Chart 1. Growth in industrial production and world trade has increased among the advanced economies and the emerging market economies alike. Consumer and business confidence is high in the euro area, the USA and China. While the US labour market is tightening and wage increases are mounting, the euro area still has spare resources and low nominal wage increases.

The Danish economy is in a balanced upswing and gradually heading towards a boom. The recovery has led to increased pressure on labour resources and other production capacity. After a couple of years of very low increases in consumer prices, inflation is now rising. In the Danish housing market overall, prices have flattened in recent months. In Copenhagen, price growth remains high and may be driven by self-fulfilling expectations.

The global economy is recovering Chart 1



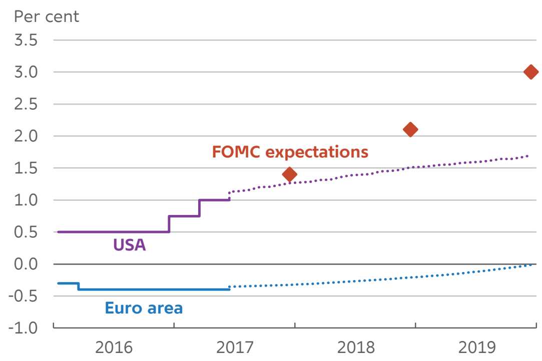
Note: The most recent observations are from the 1st quarter of 2017.
Source: Macrobond.

Interest rates raised in the USA and maintained in the euro area

In March 2017, the Federal Reserve raised the Fed funds target rate by 0.25 percentage point. This is the third raising of interest rates in the USA since the financial crisis. Accordingly, the target interval for the monetary policy rates is 0.75-1 per cent, cf. Chart 2. The members of the Federal Open Market Committee, FOMC, expect to gradually raise interest rates over the next years. The market also expects a gradual, but more limited rise in interest rates.

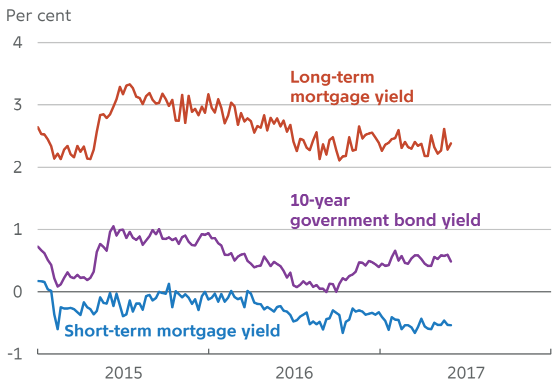
In the euro area, the ECB has maintained the monetary policy interest rate at -0.4 per cent, and despite the slight increase in market participants' interest rate expectations since the beginning of 2017, interest rates are still expected to be negative until the end of 2019. The current low level of interest rates is supplemented by the bond purchase programme, which was reduced from 80 to 60 billion euro from April 2017 and runs until December 2017 with the option of extension. In Denmark, Danmarks Nationalbank's rate of interest on certificates of deposit is still lower than the ECB's deposit rate. Due to low volatility in money market rates both in the euro area and in Denmark, the money market spread has been very stable for an extended period of time.

Expectations of rising interest rates Chart 2



Note: The Fed funds target rate shows the upper limit for the target interval, currently 0.75-1 per cent. FOMC expectations are from March. The broken lines indicate the market expectations as at 6 June 2017.
Source: FOMC, Macrobond and Scanrate Rio.

Development in Danish bond yields Chart 3



Note: The short-term mortgage yield is the average of yields on 1- and 2-year non-callable bonds, while the long-term mortgage yield is the yield on 30-year callable bonds. The 10-year government bond yield is the 10-year yield to maturity. The most recent observations are from 6 June 2017.
Source: Finance Denmark and Nordea Analytics.

The yield curve has steepened

In the autumn of 2016, long-term government bond yields in the USA and the euro area rose, e.g. due to higher market-based inflation expectations, and have been kept at the same level since then. During the same period, short-term bond yields have remained unchanged at a low level, resulting in a steeper yield curve. Long-term Danish government bond yields have mirrored those of the euro area and the USA, while mortgage bond yields have been more stable, cf. Chart 3. Short-term mortgage yields have fallen since the beginning of 2017, in the context of the gradual decline in the supply of the shortest fixed bullets. The supply has declined as changes in Danish mortgage banks' administration margins have increased the incentive for borrowers to choose loans with longer fixed-interest periods.

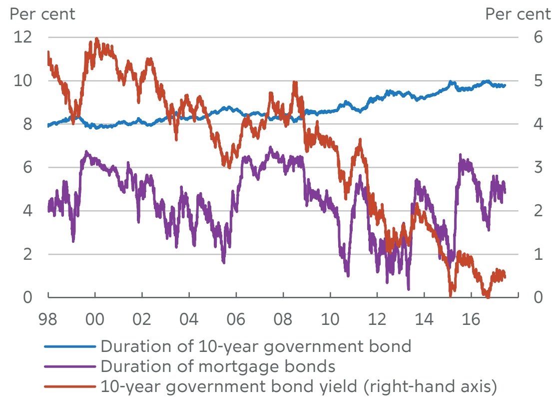
Capital losses for bond market investors on normalisation of interest rates

Long-term interest rates remain very low, viewed in a longer perspective. As a result, the price sensitivity of long-term bonds is very high, cf. Box 1. The prospects of higher growth and inflation indicate that, in the longer term, interest rates will rise to levels well above the current ones. The consequences for the financial markets of an increase in the level of interest rates depend on the adjustment process. If interest

Bond price sensitivity to interest rates Box 1

The very low level of interest rates implies high price sensitivity of long-term bonds to changes in interest rates. In the Danish bond market, long-term government bonds and mortgage bonds account for around 10 per cent and 26 per cent of the market, respectively[1]. The price sensitivity of a bond to changes in interest rates is often expressed by the duration concept. The duration measures how much a change in the level of interest rates impacts the bond price. For a non-callable bond, there is a negative relationship between interest rate and duration, implying high price sensitivity at the current level of interest rates. At the level of interest rates in April 2017, an investor who has invested e.g. kr. 100 in a 10-year government bond would lose just under kr. 10 at a rise in interest rates of 1 percentage point, cf. Chart A.

Interest rates and duration A



Note: For the 10-year Danish government bond, the Macaulay duration is shown. The duration of mortgage bonds is the option-adjusted duration (OABPV) in the Nykredit Total Index, consisting of only callable mortgage bonds. The most recent observations are from 6 June 2017.
Source: Nykredit, Nordea Analytics and own calculations.

For callable mortgage bonds, the relationship between interest rates and duration may be both negative and positive. That is why the duration of such bonds has both increased and decreased during the period of falling interest rates. The reason is the borrower's option to redeem the loan at par at any time. The call option causes the price around par to become less interest rate sensitive, cf. Chart B. It also means that a positive relationship between interest rate and price may occur at prices just above par. If interest rates increase from the current low level, the duration of callable mortgage bonds may rise substantially. This was seen e.g. in connection with the substantial interest rate hike in the 2nd quarter of 2015.
Continues

1. Long-term bonds are bonds with remaining maturities of 5 years and above. Mortgage bonds include fixed-rate callable bonds. The shares were calculated in April 2017.

rates increase gradually in step with continued economic recovery and higher inflation, the adjustment process may be smooth. The risks are linked to a situation of unexpected and sudden interest rate hikes due to a shift in market expectations. In such a scenario, strong price adjustments and high volatility in the financial markets may lead to considerable capital losses on portfolios of long-term bonds, with negative implications for highly leveraged market participants who regularly have to post margin requirements.

Limited banking sector exposure to capital losses
The relatively substantial rise in long-term yields in the 2nd quarter of 2015 caused Danish government and mortgage bond holders to incur total capital losses of just over kr. 100 billion, cf. Chart 4. The most recent interest rate increases in the autumn of 2016 resulted in correspondingly lower losses. The capital losses are mainly absorbed by insurance and pension companies taking on a high interest rate risk in order to match their long-term commitments. In recent years, pension companies have increasingly tended to provide market rate schemes rather than pension schemes with guarantees, which is why the pension companies to a lesser extent bear the direct risk in case of substantial price drops.

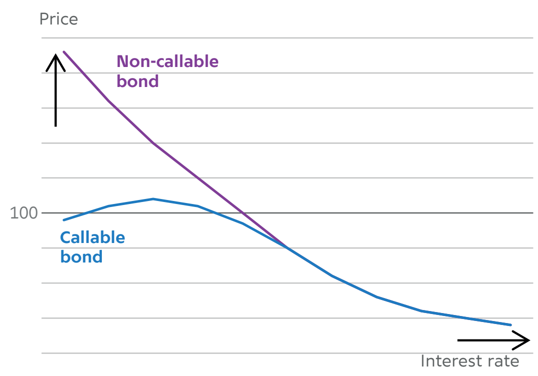
The banks' interest rate risk in the bond markets is limited as they invest mainly in short-term bonds with lower interest rate risk. There are no general signs of increased risk-taking in the banks' bond investments because of a search for yield.[1] There is great variation across banks, however, especially among the non-systemic banks. It is important for banks with risky investment strategies to ensure sound excess capital adequacy or a suitably broad-based business model to enable coverage of negative price fluctuations out of the earnings from other business activities without burdening the capital.

Low stress level in financial markets
The financial markets have been characterised by a low stress level in the last half year. According to Danmarks Nationalbank's composite financial stress indicator, the level has declined since the summer of 2016, cf. Chart 5. The stress level in the financial markets has also been low in both the euro area and

Bond price sensitivity to interest rates Box 1
Continued

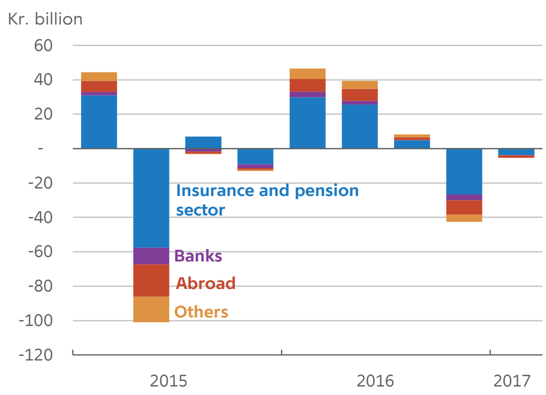
A sudden increase in the duration of callable bonds may have a self-reinforcing effect. This is attributable, inter alia, to portfolio allocations by investors, e.g. pension companies, often using a duration target for their portfolios. An increase in the duration may be reduced by divesting bonds, which will push up interest rates further.[2]

Price effects on callable bonds B



2. See Mogensen, Louise (2002), Market dynamics at low interest rates, Danmarks Nationalbank, *Monetary Review*, 1st Quarter 2002.

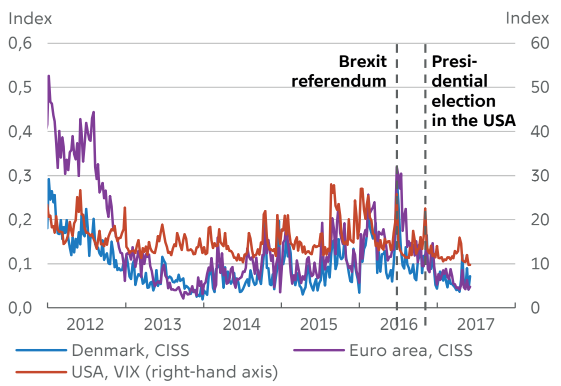
Largest price fluctuations on bond portfolios in the insurance and pension sector Chart 4



Note: The bars indicate the sum of price changes for each quarter by the sectors' bond portfolios. The most recent observations are from the 1st quarter of 2017.
Source: Danmarks Nationalbank and own calculations.

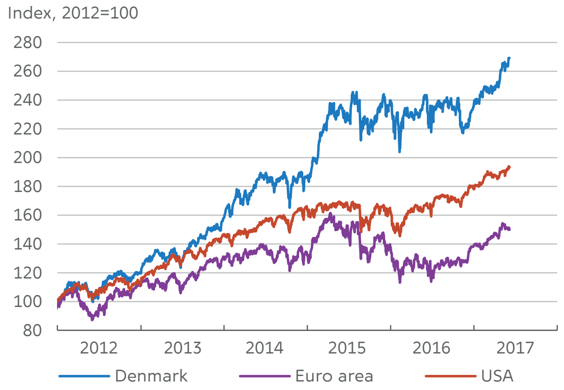
1 See Danmarks Nationalbank, *Financial stability*, 2nd Half 2016 (*link*).

Low stress level in financial markets Chart 5



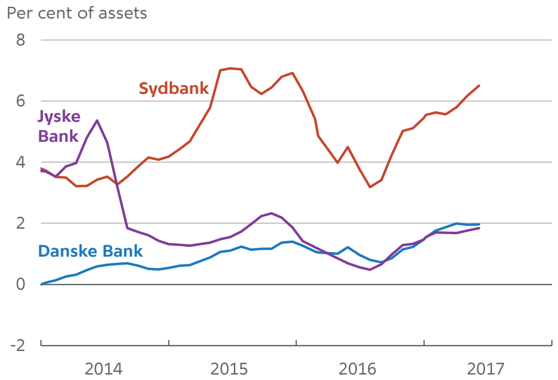
Note: CISS for the euro area is the ECB's Composite Indicator of Systemic Stress showing the degree of stress in the financial markets in the euro area. CISS for Denmark is a similar indicator, cf. Danmarks Nationalbank, *Financial stability*, 2nd Half 2014. VIX for the USA is a volatility index based on implied volatilities on S&P 500 index-linked bonds. The most recent observations are from 2 June 2017.
Source: Danmarks Nationalbank, ECB and Bloomberg.

Equity prices are at a high level Chart 6



Note: The equity indices are: OMX C20 CAP for Denmark, Eurostoxx 50 for the euro area and S&P 500 for the USA. The most recent observations are from 6 June 2017.
Source: Bloomberg and own calculations.

Market-based stress test shows higher resilience of systemic banks Chart 7



Note: The chart shows the market-based excess capital adequacy under stress. It is defined as the difference between the market value of assets, calculated under stress, and the book value of liabilities, excluding equity, less a capital requirement of 3 per cent of the assets measured by the market value. The most recent observations for the financial statements are from the 1st quarter of 2017 and for equity prices 6 June 2017.
Source: Bloomberg, SNL Financials and own calculations.

the USA. Brief episodes with higher stress levels have coincided with political uncertainty, e.g. in connection with the Brexit referendum and the US presidential election. The stress indicators measure the current stress level and cannot be used to measure the build-up of systemic risks.

Global equity prices are high and have risen further since the 4th quarter of 2016, cf. Chart 6. The high level reflects factors such as the continued search for yield in the current low interest rate environment, and the most recent price rises are based on expectations of economic recovery.

In the current situation, with the economy heading towards a boom and with high asset prices, risks to financial stability may potentially build up. Increased risk-taking in their market exposures may make investors and banks vulnerable to a sudden change in the perception of risk. A reversal of the risk perception may lead to substantial falls in asset prices, resulting in large losses. It is important for financial market participants to take this risk into account.

The general upswing also has a positive impact on the Danish banks' equity prices. The development in equity prices can be used to get an indication of the market's view of the banks' resilience under stress. For that purpose, Danmarks Nationalbank uses the market-based stress test, SRISK.[2] The test shows the banks' market-based excess capital adequacy in a severe stress scenario with a drop in equity prices of at least 40 per cent over six months. According to SRISK, the listed systemic banks currently have positive excess capital adequacy in the stress scenario. The excess capital adequacy has been going up since mid-2016, driven mainly by rising equity prices, cf. Chart 7.

Liquidity

Banks' LCR comfortably above the minimum requirement

All banks observe the minimum requirement for the liquidity coverage ratio, LCR, with a certain margin. The short-term liquidity requirement set out in EU regulation is to ensure that the banks have adequate high-quality liquid assets to cover a net outflow of liquidity in an intensive 30-day stress scenario. The systemic banks must comply with an LCR of minimum 100 per cent, while the non-systemic banks must have an LCR of minimum 80 per cent in 2017 and 100 per cent from 2018. Excess cover relative to the requirement is expedient as the LCR may be highly volatile.

Foreign exchange LCR for systemic banks
The systemic banks must also observe LCR requirements in the currencies that are significant for the individual bank. A currency is significant for a bank if the bank's total commitments in that currency constitute 5 per cent or more of its total liabilities. The requirement is 80 per cent from 1 April and 100 per cent from 1 October 2017.[3] All Danish systemic banks must observe LCR requirements in euro, while Danske Bank must also comply with LCR requirements in dollars. While Swedish kronor and Norwegian kroner are not comprised by the foreign exchange LCR requirement, the banks must ensure a sufficient currency match between the portfolio of liquid assets and the net outflow of liquidity, cf. the Capital Requirements Regulation, CRR.

Less liquidity in the repo markets
Market liquidity developments have attracted increasing attention in recent years. Market participants and international organisations alike are focusing on declining repo market liquidity. The markets are used for short-term placement or borrowing of liquidity, allowing financial market participants with a short-term liquidity shortfall to borrow quickly against collateral, typically government or mortgage bonds, and banks with excess liquidity to provide loans against collateral.

A well-functioning repo market is of significance to liquidity in other financial markets, e.g. the mortgage bond market. A new report from the Bank for International Settlements, BIS, concludes that the international repo markets are affected by the current situation of monetary policy easing in the form of negative interest rates and central banks' purchases of bonds in the euro area, among others.[4]

In addition to cyclical factors, the structural development towards the banks' lower risk appetite and new regulation could also affect the repo markets.[5] Turnover in the repo market in kroner has fallen substantially since 2012. A slight increase has been seen since 2016, but turnover remains low compared with the level in previous years, cf. Chart 8.

In many countries, the size of the banks' balance sheets around the turn of the month, quarter and year affects the banks' tax payments, payments to resolution funds and determination of regulatory key ratios such as the leverage ratio. Repo transactions expand the banks' balance sheets. Hence, they may be less inclined to conclude such transactions around the reporting days, which affects the repo

2 See Grinderslev, Oliver J. and Kristian L. Kristiansen (2016), Systemic risk in Danish banks: Implementing SRISK in a Danish context, Danmarks Nationalbank, Working Paper No. 105 (*link*).

3 The foreign exchange LCR requirement has been modified relative to the requirement for all currencies taken as one. This applies, inter alia, in relation to limitations in the composition of the liquidity buffer and the treatment of derivatives.

4 See Bank for International Settlements, *Repo Market Functioning*, April 2017.

5 See Danmarks Nationalbank, *Financial stability*, 2nd Half 2015 (*link*).

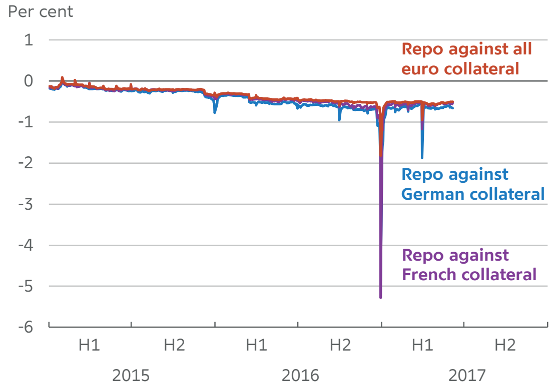
Falling turnover in the repo market in kroner

Chart 8

Note: The chart shows the daily turnover in the market for short-term repo transactions in kroner reported by market participants. The most recent observations are from 6 June 2017.
Source: Danmarks Nationalbank.

Strong end-of-period effect in the repo market in euro

Chart 9



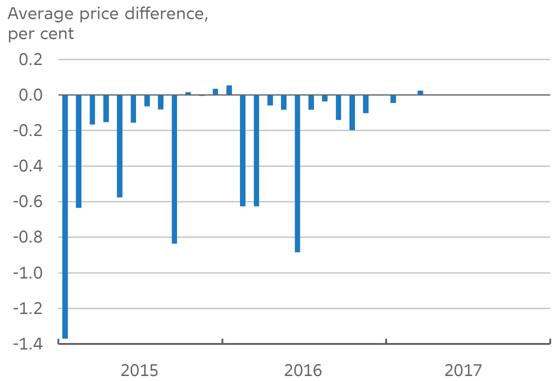
Note: The interest rate indicates the daily interest rate achieved by lending liquidity secured on government bonds. The interest rate is shown for euro against German and French government bonds and the average for the government bonds of all euro area member states. The most recent observations are from 6 June 2017.
Source: RepoFunds Rate.

markets. This is reflected in end-of-period effects with low volumes and higher prices for repo lending.

End-of-period effects have been observed in the repo markets for a number of years, but they have been particularly pronounced in the repo market in euro at the most recent turn of the year, cf. Chart 9.[6] End-of-period effects have also been observed in the repo market in kroner,[7] but they seem to have been declining over the last year, cf. Chart 10.

Declining end-of-period effects in the repo market in kroner

Chart 10



Note: The chart shows the difference between the interest rate on a repo transaction concluded on the last day of the month and the average interest rate on repo transactions concluded on the remaining days of the month. The most recent observations are from March 2017.
Source: Nordea Analytics and own calculations.

Bank earnings

Very low loan impairment charges boost bank earnings

The largest banking groups achieved their best ever overall performance in 2016. The level of earnings

6 See Danmarks Nationalbank, *Monetary and financial trends – Stable krone and calm money markets*, March 2017 (*link*).

7 Statistical tests show a significant difference between the interest rate on the last day of the month compared to the other days of the month.

has risen substantially over the last three years, cf. Chart 11. Part of the increase in the result from 2015 to 2016 is attributable to the effect on the financial statements in 2015 of Danske Bank and Nykredit booking goodwill impairments of approximately kr. 7 billion. The banks' financial statements for the 1st quarter of 2017 also generally recorded sound profits and earnings appear to continue to increase.

The earnings of medium-sized banks have also increased considerably in recent years, and earlier this year, several of the banks presented very good financial statements for 2016. There is still substantial variation across the banks.

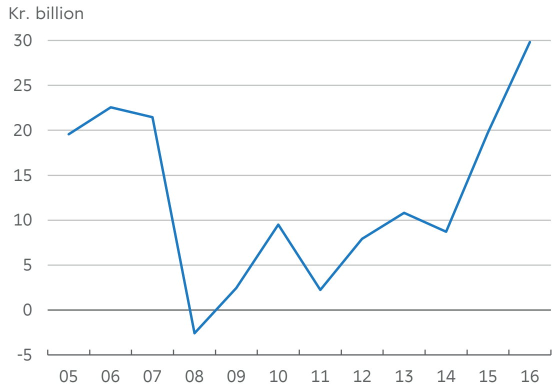
The banks' earnings were mainly boosted by very low loan impairment charge provisions, cf. Chart 12. The low loan impairment charges are partly attributable to the fall in new loan impairment charges in recent years due to the improved economic situation and the low level of interest rates. Moreover, some reversal of the banks' previous large loan impairment charges is taking place. This resulted in total loan impairment charges close to zero in 2016. The effect of reversal of loan impairment charges is temporary, and as losses will from time to time be incurred on part of the lending portfolio, the loan impairment charges[8] can be expected to increase in the long run. Normalisation of the level of interest rates could lead to higher current loan impairment charges in the banks.

Banks' ROE targets seem high

In 2016, the largest banks recorded the highest return on equity, ROE, overall since 2007, cf. Chart 13. The return on equity has increased considerably since 2014, but less than the banks' earnings in current prices, because the banks have, overall, been increasing their equity since the financial crisis.

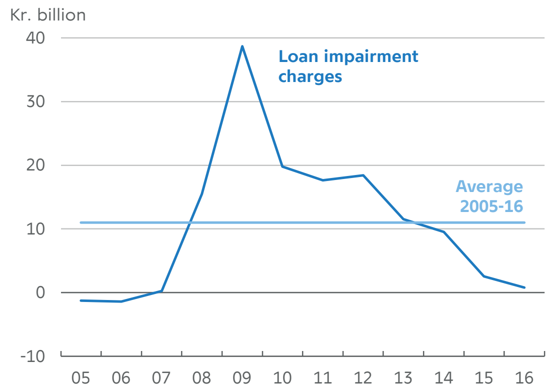
The managements of several Danish banks have announced target returns of up to 12.5 per cent p.a. on the book value of equity. For some banks, these targets are for the current period, while others have set a later date, e.g. 2018. In 2016, the banks achieved their targets.

High earnings in the largest banks Chart 11



Note: The chart shows financial statements for the Danske Bank, Nykredit, Jyske Bank and Sydbank groups.
Source: Danish Financial Supervisory Authority and own calculations.

Very low loan impairment charges in 2016 Chart 12



Note: The chart shows financial statements for Danske Bank, Nykredit, Jyske Bank and Sydbank.
Source: Danish Financial Supervisory Authority and own calculations.

8 The rules on loan impairment charges will be changed by IFRS 9, which is expected to take effect on 1 January 2018. The new rules on loan impairment charges in IFRS 9 are described in Box 2.4 in *Financial stability*, 2nd Half 2014.

The ROE targets appear high, given the very low level of interest rates. If the targets are to be achieved, the banks must have a considerable excess return relative to an investment in a Danish government bond, which is regarded as (almost) risk-free. Moreover, the banks should take into account the temporary nature of the positive effect on earnings of the low level of loan impairment charges. Adjusting for cyclical fluctuations in provisions for loan impairment charges, the return on equity in favourable macroeconomic periods like now will be lower.

In a previous analysis,[9] Danmarks Nationalbank assessed that shareholders' expected rate of return was somewhat below the banks' own targets. This indicates that the banks can deliver lower returns than the targets announced and still comply with the shareholders' requirement for a return on their investment.

Banks' adjustment to low interest rate environment continues

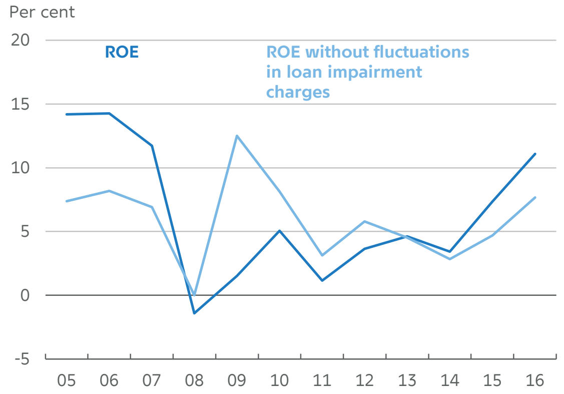
The banks' business models are being challenged by the low level of interest rates, cf. Chart 14. Their net interest income is under pressure from continued low demand for new loans and a low interest rate level. To a certain degree, the banks have been able to compensate for this by increased income from administration margins payable on mortgage loans and other fees. On the expenditure side, there has been strong focus on increasing efficiency and reducing costs.

Looking ahead, market participants expect interest rates to remain low for a prolonged period, and although the volume of new loans has increased slightly, the prospect of lending growth is still limited in the Danish market.

Up to the financial crisis, the banks' earnings growth was mainly the result of rising lending volumes, while their interest margins, i.e. the difference between the banks' interest rates on lending and deposits, fell and administration margins payable on mortgage loans were more or less stable.

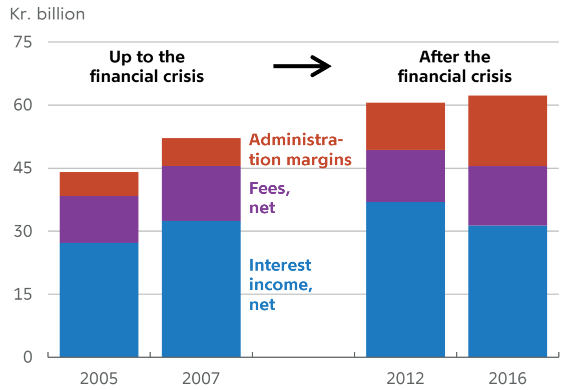
Since 2009, the banks' deposits have increased considerably, while their lending has generally declined.

ROE boosted by low loan impairment charges Chart 13



Note: Return on equity is calculated as profit after tax for the year as a percentage of the annual average equity. The chart has been calculated on the basis of financial statements for Danske Bank, Nykredit, Jyske Bank and Sydbank.
Source: Danish Financial Supervisory Authority and own calculations.

Fee income and income from administration margins make up an increasing share of earnings Chart 14



Note: The chart shows financial statements for Danske Bank, Nykredit, Jyske Bank and Sydbank.
Source: Danish Financial Supervisory Authority and own calculations.

9 See the chapter *The cost of equity* in Danmarks Nationalbank, *Financial stability*, 1st Half 2016 (*link*).

In recent years, the banks' interest margins have also been under pressure from the very low level of interest rates. Lending rates have followed the monetary policy interest rates down, while deposit rates are being adjusted with a certain lag. So far, the banks have chosen not to let interest rates on deposits from households fall below zero.

Since 2009, the largest banks have increased their earnings from fees and administration margins payable on mortgage loans, raising the administration margins for selected loan types on several occasions. The three largest mortgage banks last raised their administration margins for selected loan types in 2016. Fee income for securities trading, e.g. asset management, has also been going up since 2010.

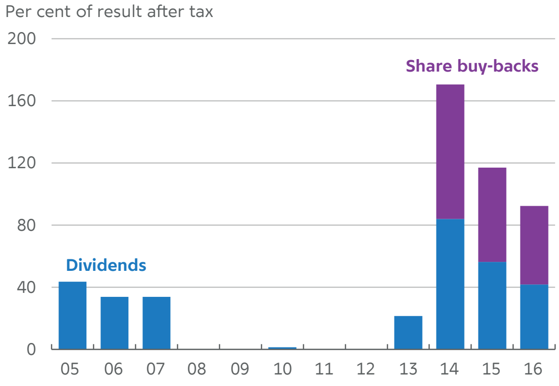
Adjusting the business model so as not to rely on net interest income may be more of a challenge for small and medium-sized banks, as their deposits make up a larger share of their funding. But fee income for small and medium-sized banks has also increased. For example, they receive fee income from their cooperation with mortgage banks where they facilitate mortgage lending. To some extent, the fees are compensation for the banks' incurring a significant part of the credit risk on the loan.

Banks' capital adequacy

Banks disbursing record results
In step with their earnings growth, the large listed banks have increased their disbursements to shareholders. Overall, the disbursements to shareholders are considerably higher than ever before, including in the years leading up to the financial crisis, cf. Chart 15. In 2016, Danske Bank and Sydbank disbursed virtually their entire profit for the year after tax to their shareholders.

In addition to paying dividends, the banks have also bought back shares in recent years. Buy-backs of shares cause the value of the remaining shares to go up, thereby generating equivalent capital gains for the shareholders.

Listed banks disburse most of their profits Chart 15



Note: The chart shows financial statements for Danske Bank, Jyske Bank and Sydbank. A year's total buy-back programme is calculated relative to the result after tax for the previous year.
Source: Thomson Reuters, financial statements, company announcements and own calculations.

The reduction in the disbursement share of the banks' profits from 2014 to 2016 should be seen in the context of the profits rising at a faster pace than dividend payments and buy-backs of shares. Danske Bank booked goodwill impairments of about kr. 9 billion in 2014.

Large Danish banks' capital base lower than that of other Nordic banks
In the wake of the financial crisis it became clear that the capital adequacy of banks had generally been too low, including in Denmark. High capital adequacy helps to ensure the banks' robustness, as they have a buffer in the event of losses that cannot not be covered by current earnings. From 2008, the capital adequacy of Danish banks grew substantially as a result of government Additional Tier 1 capital, among other factors, cf. Chart 16. In 2013, the largest Danish banks already complied with the fully phased-in EU 2019 requirements.[10] Since then, the banks overall have not increased their Tier 1 ratio to any notable extent. If the capital level at end-2016

10 See Danmarks Nationalbank, *Financial stability*, 2013 (*link*).

takes into account the share buy-back programmes already adopted this year, the level would remain unchanged from 2015 to 2016.

The large banks in both Sweden and Norway have continued to build up their capital adequacy. At the same time, the Swedish and Norwegian authorities introduced national minimum requirements for capital adequacy behind collateralised housing loans effective from 2013 and 2014, respectively. The national measures have been implemented in various ways. In Sweden, this is a supplement to the banks individual solvency need with a view to building up capital for housing loans issued with risk weights below 25 per cent. In Norway, the authorities introduced parameter floors in the calculation of risk weights for housing loans.

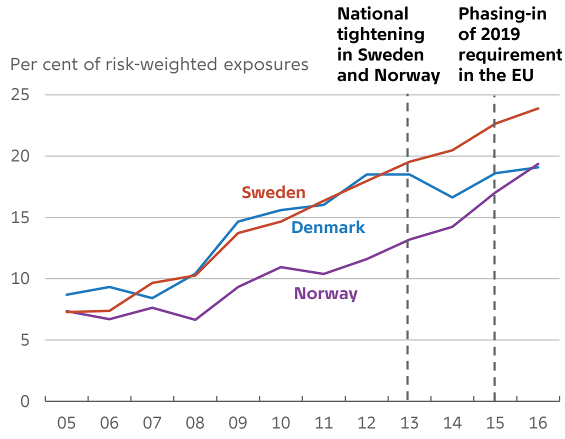
The capital requirements have not been increased in Denmark, but the authorities have implemented tighter requirements and guidelines on the banks' credit assessment, e.g. for home financing.

While the largest Danish banks have lower capital adequacy than the other Nordic banks, their capital adequacy is high compared to that of most other large banks in Europe. At end-2016, the largest Danish banks had a Tier 1 capital relative to risk-weighted exposures, the Tier 1 capital ratio, of 17-20 per cent, cf. Chart 17.

The current capital adequacy requirements for banks are calculated as a percentage of their risk-weighted exposures. It is important that the capital requirements reflect actual risks. This gives the banks an incentive to improve their risk management and portfolio structure, and it also contributes to ensuring appropriate capital allocation to the benefit of the economy. Risk-weighted exposures fluctuate over time due to changes in the risks compiled. In their capital planning, the banks must ensure that they have an adequate buffer in addition to the regulatory capital requirements for current fluctuations in their risk-weighted exposures.

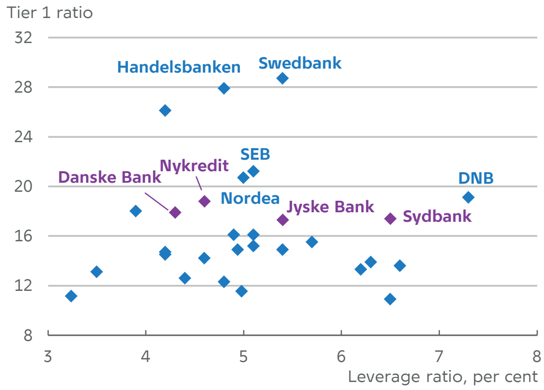
The banks must also calculate their leverage ratio as a supplement to the risk-based capital adequacy. While the Tier 1 capital ratio is calculated as Tier 1 capital relative to risk-weighted exposures, the leverage ratio is calculated as Tier 1 capital relative to unweighted exposures.

The largest Danish banks have stopped building up Tier 1 capital Chart 16



Note: The chart shows Tier 1 capital calculated relative to the fully phased-in requirements. The Danish banks are Danske Bank, Jyske Bank, Nykredit and Sydbank. The Swedish banks are Handelsbanken, Nordea, SEB and Swedbank. The Norwegian bank is DNB.
Source: SNL, financial statements and own calculations.

Nordic banking groups have the highest capitalisation in Europe Chart 17



Note: The chart shows calculations of capital relative to the fully phased-in requirements calculated at end-2016. Other banks in the chart are ABN Amro, Santander, Barclays, BBVA, BNP Paribas, Commerzbank, Crédit Agricole, Deutsche Bank, Erste, BPCE, HSBC, ING, Intesa Sanpaolo, Lloyds, Nationwide, Raiffeisen, RBS Société Générale and UniCredit.
Source: SNL and financial statements.

At end-2016, the variation in the leverage ratios of the Danish banks was relatively high. To some extent this reflects differences in their business models. The leverage ratios of banks with a large share of exposures to low risk customers are often relatively low. Low risk exposures weigh more heavily in the leverage ratio than e.g. the banks' Tier 1 ratios. For several banking groups, exposures to e.g. mortgage customers, large firms and market risk account for a large share of exposures and they often have low risk weights.

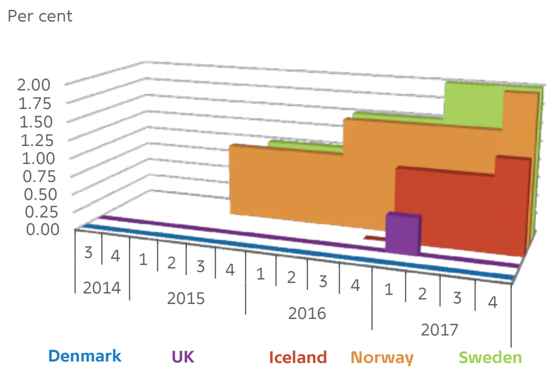
In 2016, the European Commission presented its proposal for a 3 per cent minimum leverage ratio requirement in the EU as from 2018.

Several countries have activated the countercyclical capital buffer

The countercyclical capital buffer is a tool that national authorities may use to change the banks' capital requirements as the risk of financial sector losses is increased or reduced. In order to be prepared for the next period of severe financial stress, Sweden, Norway and Iceland, among other countries, have chosen to build up the buffer well in advance, cf. Chart 18. The reason for activating the buffer in Norway and Sweden was build-up of financial imbalances. The buffer rate has been raised recently based on growing concerns about increasing credit growth and as a result of rising house prices. In Iceland, the buffer was implemented early in the financial cycle. This means that build-up of the buffer was started well in advance of risks increasing. The UK also activated the buffer early in the financial cycle, but chose to release it again after the Brexit referendum.

In Denmark, the Minister for Industry, Business and Financial Affairs sets the countercyclical capital buffer rate on a quarterly basis. If the Systemic Risk Council finds that the buffer rate should be raised, it will submit a recommendation to that effect to the Minister. In March 2017, the Council recommended that the countercyclical capital buffer rate should remain at 0 per cent in Denmark. This year, the Council will make an evaluation of its method for assessment of the buffer rate.[11]

Several countries have already activated the countercyclical capital buffer Chart 18



Note: The chart shows the time when the individual countries' decisions regarding the countercyclical capital buffer enter into force. The UK decision to raise the buffer rate to 0.25 per cent in March 2017 was not implemented as the decision was cancelled following the Brexit referendum.
Source: ESRB.

It is assessed that the countercyclical capital buffer can primarily be used to enhance the banks' resilience to losses in periods of financial stress. Release of the buffer should prevent situations in which the banks tighten their credit conditions and reduce the supply of credit so much that a credit crunch occurs with negative implications for the real economy. Since the buffer is implemented in good times when the banks are generally able to meet the buffer requirement by using retained profit, the buffer is expected to curb lending growth only to a limited extent. In an analysis, Danmarks Nationalbank has assessed how the bank's capital accumulation impacts lending growth.[12] According to that analysis, more capital only leads to a limited and brief decline in lending growth.

11 See press release (*link*) from meeting of the Systemic Risk Council, March 2017.

12 See Mikkelsen, Jakob Guldbæk, Banks' capital accumulation does not hurt GDP growth, Analysis No. 10, June 2017 (*link*).

A few systemic banks close to buffer requirement in stress test
At end-2016, all systemic groups complied with the current and fully phased-in capital requirements. The capital requirements for banks in the EU will be gradually tightened towards 2019. The capital conservation buffer is being phased in for all banks, and in addition, the systemically important banks, SIFIs, are subject to a SIFI capital buffer, the size of which depends on the bank's systemic importance. To this should be added the countercyclical capital buffer rate, which is currently set at 0 per cent, cf. above.

Danmarks Nationalbank's accounts-based stress test assesses the banks' excess capital adequacy over the next three years under various macroeconomic scenarios. Under the baseline scenario, the banks' capitalisation remains more or less unchanged towards 2019, but their excess capital adequacy falls due to the phasing-in of capital buffers, cf. Chart 19.

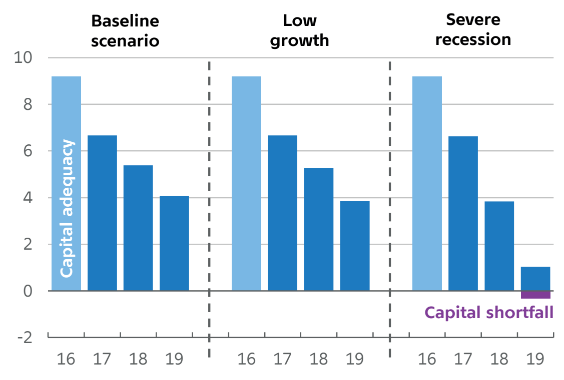
Since the banks' capital adequacy, assets and asset composition are unchanged in the stress test over the period, it cannot be taken for granted that they will also comply with the requirements in 2019.

The stress test shows that, in a severe recession scenario until 2019, all systemic banks will still observe the statutory minimum requirement of 8 per cent of risk-weighted exposures. In the same scenario, a few of the systemic banks will have a small capital shortfall relative to the total requirement, including capital buffers. In the event of non-compliance with the buffer requirements, banks become subject to a number of limitations, e.g. limitations of dividend payments. Moreover, the banks should expect that their access to external funding in the financial markets may be challenged.

The stress test covers only the banking activities of a group – not any other business areas such as affiliated mortgage banks.

A few of the non-systemic banks are seriously challenged in the severe recession stress test scenario, and some are unable to comply with their minimum requirements. In that case they will be resolved by the authorities. Before it comes to that, breach of the buffer requirements will enable the Danish Financial Supervisory Authority to intervene. The authorities have sufficient tools to address this situation, and therefore it is not assessed to be a risk to financial stability. However, the owners and creditors of the banks affected may suffer losses if the banks are to be recovered or resolved.

A few systemic banks close to buffer requirement Chart 19



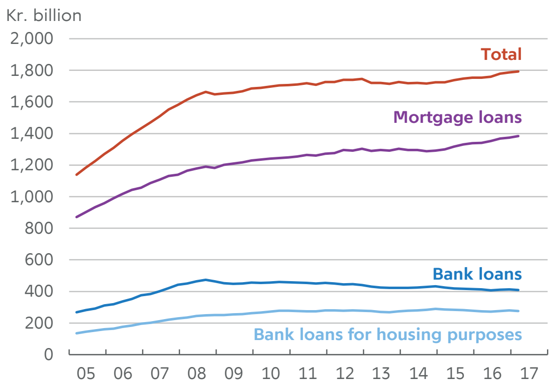
Note: The chart shows the systemic banks' total excess capital adequacy or capital shortfall as percentages of risk-weighted exposures in the stress test and its three scenarios. Excess capital adequacy and capital shortfalls have been calculated relative to the total capital requirement, including buffers.
Source: Danmarks Nationalbank and own calculations.

Banks' exposures to the housing market

Limited household demand for new loans
Household demand for new loans remains limited. Overall, the banks cannot expect to considerably increase their lending to households in the coming years. In recent years, the modest credit growth has been driven by rising lending by mortgage banks, while households customers have reduced their bank loans over a longer period, cf. Chart 20.

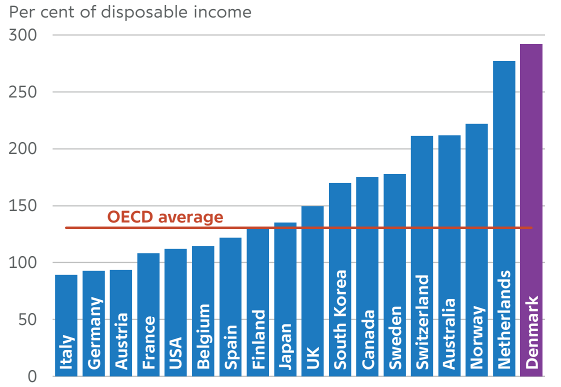
Since 2008, loans secured on the home have constituted an increasing share of banks' lending to private customers. Mortgage lending in particular has increased considerably, but lending for housing purposes also continues to represent a rising share of bank lending. In contrast, households are reducing other unsecured bank debt, e.g. consumer loans. Overall, developments are reducing the banks' credit risk, but increasing their exposure to fluctuations in the housing market.

Limited growth in lending to households driven by rising lending by mortgage banks Chart 20



Note: Bank loans funded by mortgage bonds issued, are placed in the mortgage loan category. The most recent observations are from the end of the 1st quarter of 2017.
Source: Danmarks Nationalbank.

Gross debt of Danish households is high Chart 21



Note: The chart shows the simple average for all OECD countries and the Loan-to-Income, LTI, of selected OECD countries. Observations are from end-2015.
Source: OECD and own calculations.

House prices generally rise faster than lending for housing purposes, especially in the large towns and cities. A lower Loan-to-Value, LTV, ratio of households helps enhance the banks' resilience to losses.

The Danes' total indebtedness soared in the years leading up to the financial crisis and the level remains high. In 2015, the gross debt of the Danes was high compared to other OECD countries, cf. Chart 21. At the same time, Danish households have considerable assets, e.g. in the form of sizeable pension wealth invested through pension companies.

On the one hand, lower debt service costs increase the possibility of reducing debt, but, on the other, lower costs may increase the incentive to raise further debt or omit to reduce existing debt.

It is important for banks to maintain their credit standards

There is a basis for increased pressure on the banks' credit standards in the current situation. The finances of both households and firms are supported by the general economic upswing, rising house prices and the continued low level of interest rates. Now is the time for the banks to avoid providing the loans that will result in higher loan impairment charges when the economic cycle reverses and the stress level in the financial markets increases.

According to the latest lending survey by Danmarks Nationalbank, the credit managers of the largest banks point out that they are keeping their credit standards virtually unchanged as regards both bank loans and mortgage loans, cf. Chart 22. Some medium-sized banks expect to continue easing their credit standards due to stronger competition from other banks. Moreover, they are reducing their requirements for earnings on customers through lower margin requirements and fees.

A number of smaller banks have recently chosen to open new branches in the large towns and cities to attract new customers. The branches are opened in a period when banks are generally closing many branches. In connection with the opening of new branches, it is important for the banks not to ease their credit quality requirements for new customers.

Developments in Copenhagen housing market similar to the pre-crisis level

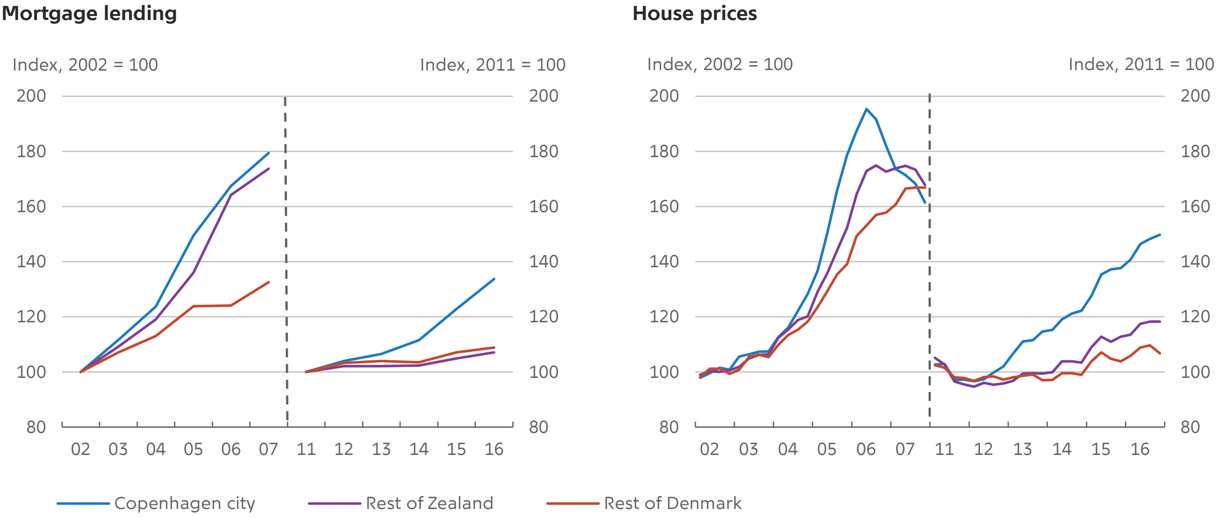
Mortgage lending growth is concentrated around Copenhagen where lending increased by almost 10 per cent in both 2015 and 2016, cf. Chart 23 (left). Copenhagen has also seen the fastest growth in house prices, cf. Chart 23 (right).

In some respects, current developments in Copenhagen are similar to the developments leading up

Some banks report competitor pressure and reduction of fees and interest margins Chart 22

Note: The net balance lies within the interval -100 to 100. A positive (negative) net balance means that credit managers of the surveyed banks have, overall, i.e. in lending-weighted terms, stated that competition has contributed to an easing (tightening) relative to the preceding quarter. The observations for the 2nd quarter of 2017 denote credit managers' expectations of the quarter based on their responses in the 1st quarter of 2017.
Source: Danmarks Nationalbank.

The Copenhagen housing market outperforms the rest of Denmark Chart 23



Note: House prices are based on the average price per square metre at the municipal level for terraced houses/one-family houses and owner-occupied flats. House prices have been weighted together across housing types and geography by the number of trades of each housing type in each municipality. The most recent observations are from the 4th quarter of 2016 for house prices; from end-2016 for mortgage lending.
Source: Mortgage banks, Finance Denmark, Statistics Denmark, Danmarks Nationalbank and own calculations.

to the financial crisis. Due to a strong rise in house prices in step with homeowners increasing their mortgage debt, the extent of homeowners' accumulation of further home equity was limited. When house prices fell, many homeowners became technically insolvent.

Unlike the situation back then, so far only Copenhagen has seen significant increases in house prices and mortgage lending in recent years. In the pre-crisis period, house prices rose throughout the country, and growth in new mortgage loans spread to the rest of Zealand and large towns and cities across Denmark. Copenhagen accounts for approximately 10 per cent of total mortgage lending to households.

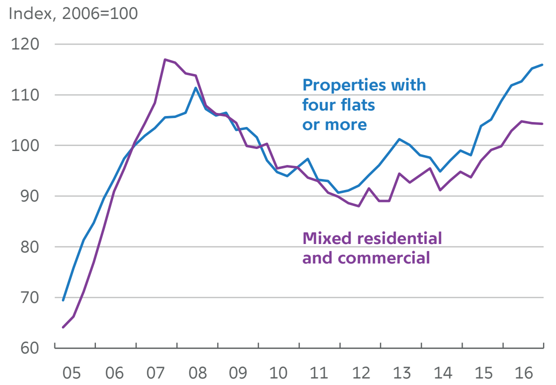
Credit growth prior to the crisis was also driven in part by a larger share of supplementary loans, which is not currently the case to the same extent.

If house price developments and hence credit growth were to spread to the rest of the country in the coming years, this would lead to growing concerns about build-up of systemic risks. In its annual review of the Danish economy in May, the IMF emphasised continued house price increases in towns and cities as a risk to financial instability calling for further macroprudential measures as well as reduced tax deductibility of interest costs relating to mortgage loans.

In March, the Systemic Risk Council submitted a recommendation to the government on limiting residential mortgage lending at variable rates or with deferred amortisation if the borrower's total debt is more than four times the income in Copenhagen and environs and in Aarhus. The recommendation is based on the Danish Financial Supervisory Authority's existing guidelines with credit rating recommendations on mortgaging of homes in growth areas, currently Copenhagen and environs and Aarhus.[13]

Housing taxation once again has a stabilising effect
The new housing taxation agreement concluded in May restores the link between housing taxes and property values from 2021. This will have a stabilising effect on house prices and hence the economy. The agreement will also enhance taxation equality

Steep rise in rental property prices since 2014 Chart 24



Note: 4-quarter moving averages. The most recent observations are from December 2016.
Source: Statistics Denmark.

geographically and across housing types, thereby dampening the current regional differences in house price developments. Expectations of housing tax adjustments may already impact house prices now and until the agreement becomes effective.

As part of the agreement, any permanent structural additional revenue from housing taxation should be reversed to homeowners in the form of lower housing tax rates. If so, there is risk that this would be a procyclical easing which would reduce the stabilising effects of housing taxation.

Financing of rental properties

The prices of rental properties are now back at the 2007 level immediately before the financial crisis set in, cf. Chart 24. The trading volume in the market remains lower than it was at that time, but estate agents are reporting growing investor interest in the market. The requirements for return in the rental property

13 See recommendation (*link*) from the Systemic Risk Council, March 2017.

market have generally decreased. Besides the low level of interest rates this may reflect a perception among investors of property investments as less risky.

Lending to the real estate industry constitutes a major share of total lending by banks. In April, their mortgage and bank lending to the industry amounted to kr. 671 billion and kr. 103 billion, respectively.

During the financial crisis, prices of properties with four or more flats fell by around 20 per cent on average. Exposures to the real estate industry entailed large losses for the banks, resulting in the resolution of several small and medium-sized banks. If prices were to fall considerably during a new period of crisis, it is important that the companies owning the properties have sufficient equity to absorb the loss. If a company does not have sufficient equity funding to cover a loss, the bank will incur a certain loss on its lending.

Solvency is generally increasing in the property companies to which the banks are exposed, cf. Chart 25. The solvency ratio shows a firm's equity relative to its total assets.

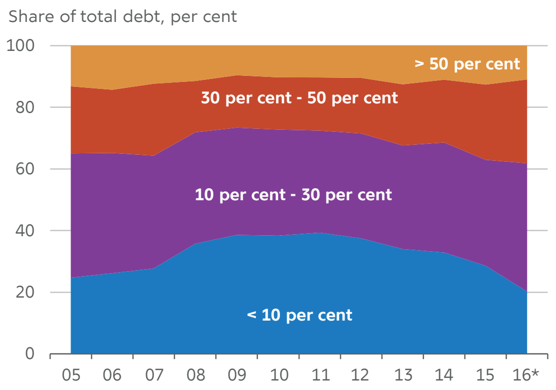
Since 2007, an increasing share of the real estate industry's assets has been held in subsidiaries of the Danish pension companies. Because of their access to self-financing through investment of household pension wealth, they are less dependent on debt financing.

However, a higher solvency ratio is not necessarily an insurance against losses for the bank. Up to the financial crisis, the financial statements of the property companies also generally indicated high solvency, but then the value of their assets in the properties turned out to be overestimated.

In the event of a property company's default, the risk of losses on bank loans is considerably higher than on mortgage loans. The reason is that it is only possible to raise mortgage loans against up to 80 per cent of the value of residential rental properties and 60 per cent of other commercial properties, while bank loans may be secured on the remaining value of the properties. In case of the borrower's default, the value of the estate initially covers repayments to the mortgage bank, and subsequently to the bank.

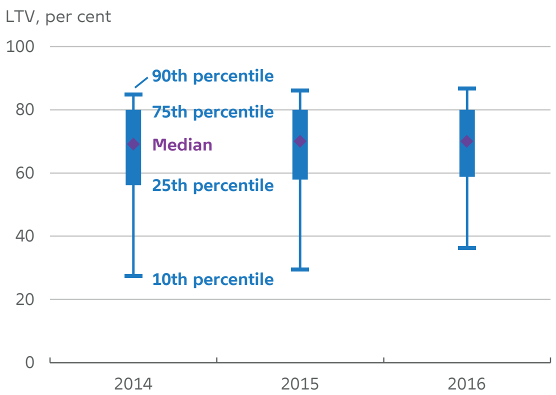
In the last three years, most of the properties owned by the real estate industry have had home equity in

Loans to property companies with high solvency ratios make up an increasing share Chart 25



Note: The chart shows the distribution of total debt to banks and mortgage banks in the financial statements of the property companies by solvency ratio. Solvency has been calculated as equity as a ratio of total assets. At present, accounting information for 2016 is only available for a subset of all property companies.
Source: Experian, NN markedsdata and own calculations.

Only few registered commercial properties with high LTV ratios Chart 26



Note: LTV is that part of a property for which a mortgage has been registered. At present, the property companies may not have borrowed against the entire mortgage. The chart only includes mortgages on properties owned by the real estate industry. Data from the Land Registry does not support a longer historical time series.
Source: Land Registry and own calculations.

addition to the registered mortgage on the property, cf. Chart 26. For most of the properties total security in both banks and mortgage banks accounts for no more than 80 per cent of the property value at the time of registration.

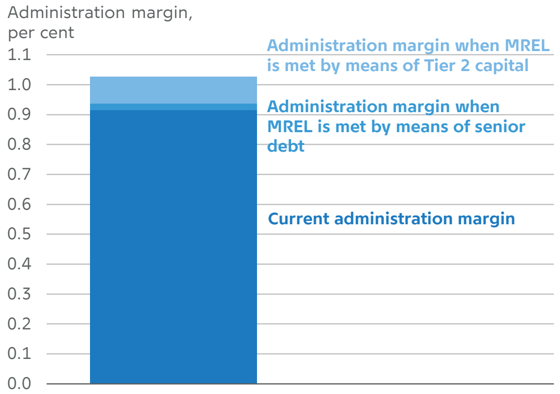
Low price for viable crisis management of mortgage banks

On 1 January 2016, the EU implemented a new recovery and resolution regime,[14] the BRRD, which provides the framework for enabling recovery and resolution of any bank, irrespective of its size and functions, without substantial negative implications for the real economy and financial stability. The new framework gives the authorities a number of tools to resolve credit institutions credibly and without central government interference.

For the systemically important banks, a core element of the resolution planning is the bail-in tool, which can be used to write down the value of liabilities or to convert them into equity. In that connection, the authorities must impose a minimum requirement concerning the volume of eligible liabilities, MREL, to be observed by the banks. An MREL prepares the banks to have sufficient funds to bear the losses in a resolution situation, as MREL is debt that can be converted to equity. This ensures that the bank becomes solvent and may continue functions that are critical to society.

In the Danish implementation of the BRRD, mortgage banks are exempted from having to meet an MREL, however. This means that the banks must be resolved without using the bail-in tool. Without an MREL, distressed mortgage banks must be closed down, which prevents continuation of the distressed bank's functions that are important to society. This implies that the central government is compelled to rescue the mortgage bank(s) in difficulties. Hence, it is Danmarks Nationalbank's clear recommendation that an MREL be set for the systemically important mortgage banks.

The borrower's average administration margin after introduction of MREL Chart 27



In January 2017, Danmarks Nationalbank published an analysis of the consequences of introducing an MREL for mortgage banks.[15] It showed that, viewed in isolation, an MREL of 8 per cent of their total liabilities and own funds would correspond to an increase in administration margins of between 0.02 and 0.11 percentage point, cf. Chart 27. That is a low price for protecting households, firms and the general economy if a mortgage bank were to become distressed. Moreover, it ensures consistent regulation of Danish and European mortgage banks.

14 See New recovery and resolution regime, Danmarks Nationalbank, *Financial stability*, 2nd Half 2015 (*link*).

15 See Too-big-to-fail can be solved inexpensively, Danmarks Nationalbank, Analysis No. 1, January 2017 (*link*).

Appendix to the financial stability analysis: Data

The analysis is based on the six banks classified by the Danish Financial Supervisory Authority in 2016 as systemically important financial institutions, SIFIs, and the non-systemic banks grouped by the Danish Financial Supervisory Authority in 2017 as group 2, cf. Table 1. Nordea Bank Danmark is no longer a SIFI, as it was converted from a subsidiary into a branch from 1 January 2017. In that connection, Nordea Kredit was classified as a SIFI. Unlike the Danish Financial Supervisory Authority's group 2, Saxo Bank has been omitted from the population due to its business model. The grouping also applies back in time. Moreover, all banks and mortgage banks are covered by the analysis and assessment of lending.

The analysis uses the term banking group or bank when the topic comprises both the bank and mortgage bank activities of the business. The terms bank and mortgage bank are used when discussing specific activities of the business.

Banks and mortgage banks in the analysis by total assets as at 31 December 2016, kr. million Table 1

Systemic financial institutions	Amount
Danske Bank (including Realkredit Danmark)	3,157,793
Jyske Bank (including BRFkredit)	586,703
Nykredit Realkredit (including Nykredit Bank)	1,400,606
Sydbank	146,686
Nordea Kredit	437,012
DLR Kredit	155,737
Systemic financial institutions, total	5,884,537
Systemic banks	
Danske Bank	2,168,239
Jyske Bank	318,452
Nykredit Bank	193,978
Sydbank	148,949
Systemic banks, total	2,829,618
Non-systemic banks	
Spar Nord Bank	79,758
Arbejdernes Landsbank	44,340
Vestjysk Bank	19,895
Ringkjøbing Landbobank	24,258

Non-systemic banks (continued)	Amount
Sparekassen Kronjylland	21,823
Den Jyske Sparekasse	15,168
Nordjyske Bank	19,444
Lån & Spar Bank	16,945
Jutlander Bank	15,733
Sparekassen Sjælland	19,845
Sparekassen Vendsyssel	15,135
Non-systemic banks, total	292,344
Ikke-systemiske pengeinstitutter i alt	329,715
Mortgage banks	
Nykredit Realkredit	1,305,554
Realkredit Danmark	862,705
Totalkredit	690,527
Nordea Kredit	437,012
BRFkredit	307,027
DLR Kredit	155,737
LR Realkredit	22,519
Mortgage banks, total	3,781,081

Note: The total assets of systemic banks, non-systemic banks and mortgage banks are stated at bank-specific level, while the total assets of the systemic groups are stated at group level.
Source: Bank financial statements database and annual reports.

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SECRETARIAT AND
COMMUNICATIONS

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FINANCIAL STABILITY – 2ND HALF 2017

Risks are building up in the financial sector

- There is a sentiment of optimism in the financial sector and considerable lending capacity has been built up. This increases credit institutions' risk appetite, which is reflected in easing of credit standards.
- Several credit institutions are increasing lending to cyclical industries and to vulnerable households with high debt ratios. At the same time, rising house prices mean that credit growth may take off suddenly.
- The conditions for activating the countercyclical capital buffer are in place.

Record-high profits

despite diving net interest income

Read more

Highest growth in lending

to industries that have previously defaulted on their loans

Read more

Credible resolution plans

with attached MREL are key to a robust economy

Read more

CONTENT

Summary and assessment

Substantial risk appetite in the financial markets
The global economy is improving, and the financial markets are characterised by low interest rates and a low level of stress. Risk perception is generally low in the markets and liquidity is ample. That provides a basis for increased risk-taking among market participants in their search for yield. An indication of a large risk appetite is an increase in demand for advanced products with complex risk profiles in the international markets. Investments in similar products led to considerable losses during the most recent financial crisis. A reversal of the risk perception may lead to substantial falls in asset prices, resulting in major losses. The effects may become self-reinforcing if many market actors need to reduce their risks at the same time.

Rising asset prices in Denmark
Economic and financial developments in Denmark are also characterised by a general sentiment of optimism. The economy is in a solid upswing and asset prices are rising. Prices in the Danish stock market have soared since the end of 2016. Despite a certain deceleration of prices since the beginning of November 2017, the level is still high. At the same time, house prices have risen in recent years, not least in the large cities.

High profits in the financial sector
The positive trend in the economy is also reflected in rising financial sector profits. In the 1st half of 2017, the largest Danish credit institutions posted record-high profits. The improvement since the 1st half of 2016 is attributable to extraordinarily high value adjustments, combined with very low loan impairment charges in recent years. Disregarding these temporary factors, core earnings have tended to decline since 2015, primarily driven by lower net interest income.

Credit standards are being eased
In general, the credit institutions have built up considerable capacity to expand lending. Overall, this may increase the institutions' risk appetite and intensify competition for customers. This development may be the driver of the mounting pressure on credit standards. Several credit institutions, mainly among the medium-sized banks, state that they are easing credit standards.

Indications of higher risk in bank lending
Lending by banks to vulnerable customers is rising. As regards lending to the corporate sector, lending to cyclically sensitive industries is increasing, especially for the medium-sized banks. An indication of higher credit risk in the housing market is the larger share of lending to households with high loan-to-income, LTI, ratios. The banks expect lending to households to increase in the coming years. Higher house prices have boosted the home equity of owners. Strong credit growth may occur if households increasingly begin to raise new loans against home equity as collateral. That was the case prior to the most recent financial crisis.

Inadequate limitation of deferred amortisation increases the vulnerability of households
The new proposal to amend the Executive Order on Good Business Practice for Mortgage Lending contributes to limiting the supply of loans to homeowners with high LTI ratios and loan-to-value, LTV, ratios. The nationwide scope of the proposal is positive, as this ensures uniform credit assessment. In contrast, it is inappropriate that high-LTI households can still finance home purchases without amortising the loan. Limiting access to deferred amortisation could reduce the vulnerability of homeowners in case of negative shocks to the economy, e.g. falling house prices and unemployment.

Interaction between the real economy and the financial system amplifies cyclical fluctuations
The banking sector's lending mirrors the business cycle. Hence, the credit institutions' tendency to ease credit standards and increase their lending exposures is a natural phenomenon in a period of economic recovery. Conversely, credit standards are tightened in cyclical downturns. All else equal, this contributes to reinforcing cyclical fluctuations. Such procyclicality may become particularly strong if credit standards are eased excessively. There are indications that this was the case in Denmark prior to the previous financial crisis. When the crisis hit, the credit institutions were compelled to tighten credit standards extraordinarily, which contributed to a stronger economic downturn.

The conditions for activating the countercyclical capital buffer are in place
The purpose of the countercyclical buffer is to reduce the real economic downturn that would be seen if households' and firms' access to credit were tightened disproportionally in periods of stress in the financial system. When the buffer is released, the institutions will have capital for maintaining their lending capacity. To increase the probability that the buffer has been built up before a period of financial stress occurs, it must be built up in times like the present.

The own funds of the credit institutions are crucial to the robustness of the sector
The largest credit institutions have generally increased their Common Equity Tier 1 ratios in recent years, partly driven by a decline in risk-weighted exposures. The build-up of Common Equity Tier 1 capital is lessening, and instead a large share of earnings is distributed to shareholders in the form of dividend and share buy-backs. The relatively high level of distribution should be seen in the light of the credit institutions' compliance with their own capital targets.

Both the EU and the Basel Committee are currently negotiating a number of amendments to the existing capital requirements. Continued uncertainty as to the future capital requirements to be met by the credit institutions underscores the importance of having adequate excess capital adequacy relative to the existing capital requirements.

Credible resolution plans comprising MREL are key to a robust economy
The preparation of credible and practicable resolution plans is essential if failing credit institutions are to be resolved without the use of government funds. For SIFIs, a robust resolution plan entails that the group overall has sufficient own funds and other eligible liabilities for both loss absorption and recapitalisation. This is a precondition for restructuring the group and continuation of its critical functions. Accordingly, a credible resolution plan is key to ensuring financial stability and a robust Danish economy.

Danmarks Nationalbank has recommended that the resolution authorities apply a single point of entry, SPE, resolution strategy to Danish SIFIs where the strategy includes mortgage banks.[1] Moreover, it has recommended that resolution authorities support this strategy by setting a consolidated MREL for the group and an internal MREL for the individual institutions, including the mortgage banks. Finally, legislators must ensure that Danish legislation on restructuring and resolution of financial institutions gives the resolution authorities access to using the bail-in tool and setting MREL for mortgage banks.

The resolution authorities' resolution strategy for non-SIFIs with balance sheet totals of less than 3 billion euro is a controlled liquidation of the institution rather than continuation. Liquidation will take place according to an arrangement which has been approved by the European Commission under the rules on state aid and which assumes full bail-in of creditors. Unsecured creditors and deposits exceeding the depositor guarantee should expect considerable losses if a private sector solution cannot be found in the recovery phase.

For Spar Nord Bank the SIFI resolution strategy and MREL will be applied, while the resolution strategies for the other non-SIFIs with balance sheet totals of more than 3 billion euro are awaiting publication.

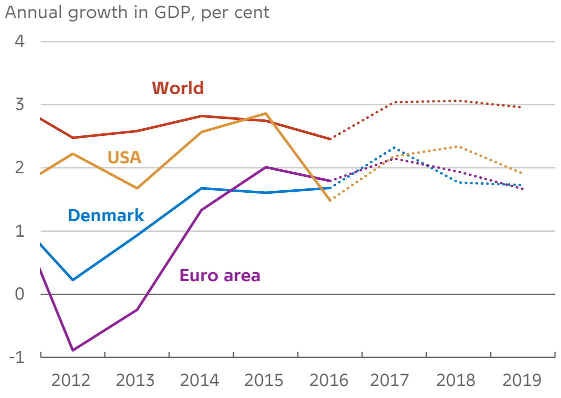
Low volatility and continued low interest rates

The global economy is recovering
The upswing in the global economy continues, broadly based in both advanced and emerging economies. Global economic growth is expected to be 3.0 per cent in 2017 and 3.1 per cent in 2018, cf. Chart 1. Growth sustainability is subject to more uncertainty from 2018-19. International organisations point to risks associated with economic policy uncertainty, growing debt, financial instability, protectionist measures, low inflation and geopolitical tensions.

The Danish economy is in a solid upswing, and the gross domestic product, GDP, is forecast to grow

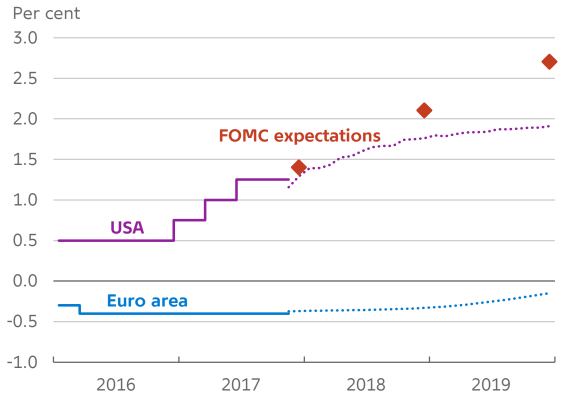
1 Cf. Danmarks Nationalbank, Recommendation for handling failing SIFI groups, *Danmarks Nationalbank Recommendation,* No. 1, 2017 (*link*).

Solid GDP growth Chart 1



Note: The dotted lines indicate expectations of future growth.
Source: Danmarks Nationalbank and IMF.

Expectations of rising interest rates Chart 2



Note: The Fed funds target rate shows the upper limit of the target interval, currently 1-1.25 per cent. FOMC expectations are from September. The dotted lines indicate the market expectations as at 24 November 2017.
Source: FOMC, Macrobond and Scanrate Rio.

by 2.3, 1.8 and 1.7 per cent in 2017, 2018 and 2019, respectively. Hence, the Danish economy will be in a boom with greater pressure on output capacity and labour resources. The labour market is under increased pressure, especially in the construction sector.

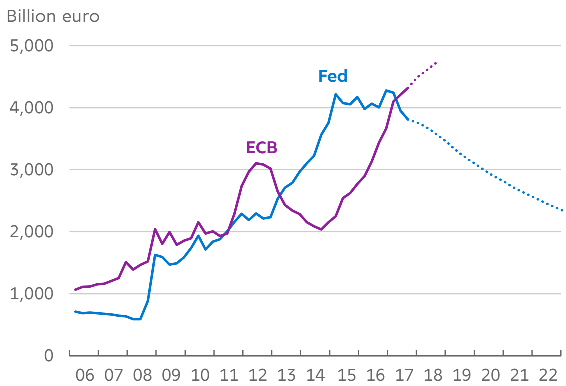
US monetary policy is expected to be tightened

The global economic upswing may lead to higher inflation, which is one of the factors behind the central banks' monetary policy interest rate decisions. The Federal Reserve, the Fed, has raised its federal funds target rate on four occasions since the financial crisis, to 1-1.25 per cent at present. The Federal Open Market Committee, FOMC, is expecting a further increase in December 2017 and gradual increases over the next few years, cf. Chart 2. Market expectations of interest rate increases in the coming years are more moderate, due to lower realised inflation than the Fed had expected. If the FOMC's interest rate expectations materialise, the market must adjust, which will affect the prices of numerous assets.

The FOMC has decided gradually to reduce the Fed's bond portfolio from October 2017, cf. Chart 3. This means that in the coming years the Fed will not reinvest payments from maturing bonds.

Quantitative easing has had positive effects and helped to fuel the economy, e.g. by reducing interest rates, increasing equity prices and narrowing credit rate spreads. The unwinding of quantitative easing

Balance sheets of the Fed and the ECB Chart 3



Note: The dotted lines indicate the central banks' expectations of future balance sheets. The development in the Fed's balance sheet is based on a reserve target of 100 billion dollars, the ECB's purely on changes resulting from the purchase programme. The most recent observations are from end of September 2017.
Source: Bloomberg and Federal Reserve.

will result in lower demand for US Treasury and mortgage bonds, and the Fed expects a rise in longer bond yields. This may, inter alia, affect market liquidity. The Fed's purchase programme has made it easy for bond owners to sell, which has been reflected in lower liquidity premia. This opportunity will be reduced as purchases decline. Conversely, the roll-back may lead to more current trading in the bond series, as the Fed's purchases have been buy-and-hold.

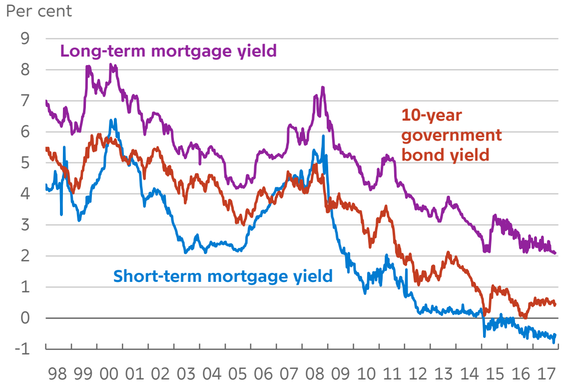
The European Central Bank, ECB, is expected to keep its monetary policy interest rates at -0.4 per cent at least until after the bond purchase programme has been discontinued. The programme comprises net purchases of bonds for 60 billion euro a month until the end of 2017 and then 30 billion euro a month until the end of September 2018. This means that the ECB's balance sheet is still being increased, but at a slower pace, cf. Chart 3. The ECB's announcements have led to expectations that interest rate will remain in negative territory until the end of 2019. In Denmark, Danmarks Nationalbank's rate of interest on certificates of deposit remains lower than the ECB's deposit rate.

Low bond yields and high foreign demand for mortgage bonds

Yields in Denmark remain very low. The yield on 10-year government bonds has been stable at around 0.5 per cent in 2017, while mortgage yields have fallen marginally, cf. Chart 4. Generally, the developments in short-term mortgage yields reflect the development in monetary policy interest rates in Denmark. However, in the last two years, during which the rate of interest on certificates of deposit has been unchanged, developments in short-term mortgage yields reflect factors such as a lower supply of short-term adjustable rate loans in Denmark.[2]

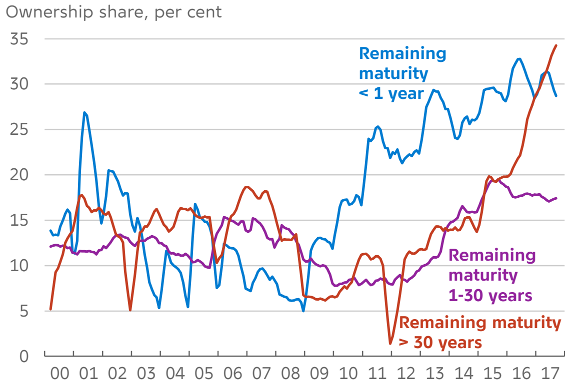
Long-term mortgage yields have fallen, partly due to increased demand for callable long-term mortgage bonds among foreign investors, cf. Chart 5. Dollar-based investors can obtain an extra return by buying currency-hedged Danish bonds. This is because the investors receive a premium when hedging their exchange rate risk on Danish kroner via currency swaps.

Historically low Danish bond yields Chart 4



Note: The short-term mortgage yield is the average of 1- and 2-year fixed bullets, while the long-term mortgage yield is the average of 30-year callable bonds. The 10-year government bond yield is a 10-year par yield. The most recent observations are from 15 November 2017.
Source: Finance Denmark and Nordea Analytics.

Increasing foreign ownership of Danish mortgage bonds Chart 5

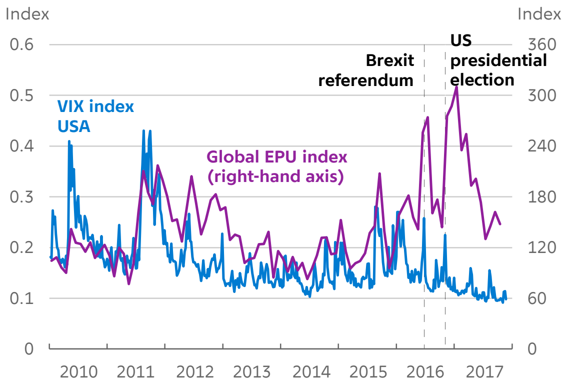


Note: The series are 3-month moving averages of the foreign-resident ownership shares of Danish mortgage bonds. The most recent observations are from end of September 2017.
Source: Danmarks Nationalbank.

2 See Danmarks Nationalbank, Stable krone and limited intervention, *Danmarks Nationalbank Report (Monetary and financial trends)*, No. 2, 2017. (*link*)

Up until the most recent financial crisis, foreign investors reduced their portfolios of Danish mortgage bonds. This shows that the increased foreign ownership of Danish mortgage bonds entails a higher risk that an exogenous domestic or external shock, e.g. in the form of higher inflation, may trigger large-scale divestment of Danish bonds, with a resultant hike in mortgage yields.

Market risk and political uncertainty Chart 6



Note: VIX is a US volatility index based on implied volatilities on S&P 500 index options with a maturity of 30 days, i.e. investor expectations of volatility over the next month. Weekly observations are shown here. The most recent observation for is from 24 November 2017.
EPU global is a monthly GDP-weighted index of the uncertainty in future politically related economic issues, measured on the basis of press coverage, uncertainty about fiscal policy and uncertainty in the expectations of future economic conditions. The most recent observation is from October 2017.

Source: Bloomberg, Policyuncertainty.com.

Low volatility in the financial markets and considerable political uncertainty

Volatility in the financial markets is very low. Expectations of future volatility in the US stock market, measured by the VIX index, are historically low and stable. Furthermore, market participants expect the central banks to support the markets when there are signs of market turmoil. Trade in VIX derivatives also indicates that future volatility is expected to be low.

While market volatility is low, the low interest rates lead to increased global risk-taking. Equity markets are at record-high levels and corporate and mortgage yield spreads have narrowed.

Historically, financial uncertainty and economic policy uncertainty have been closely correlated, but in recent years expectations of future volatility, measured by the VIX index, have been considerably lower than the global Economic Policy Uncertainty index, EPU, cf. Chart 6.

Global political uncertainty was high in connection with e.g. the Brexit referendum in the UK and the US presidential election. Subsequently, political uncertainty has declined but nevertheless remains above the VIX. There is a risk that unforeseen changes, e.g. in the form of rising interest rates, could lead to an overreaction and create turbulence and falling prices in the financial markets. If volatility and the risk on assets increase, it may be necessary for some market actors to reduce their aggregate risk in order to comply with their own risk targets. This can be done by selling assets to reduce the balance sheet, which may cause further price falls.

Higher volumes in advanced products

At the current low level of interest rates, the search for yield may stimulate activity in advanced investment products that yield higher returns. One example is collateralised loan obligations, CLOs. A CLO is a structured product in which the underlying dynamic portfolio consists of leveraged loans, typically large corporate loans. CLOs are sold in tranches with different risks.

CLOs are a subgroup of collateralised debt obligations, CDOs, for which the underlying portfolio comprises of loans. The market for advanced products grew substantially in the period leading up to the most recent financial crisis, and the complexity and opaqueness of these products has subsequently been mentioned as one of the reasons why credit losses in the US housing market could spread and become a global financial crisis.[3] CLO issuance rose in the pre-crisis period and subsequently almost disappeared. CLO issuance began to rise again from 2012 and is now at an even higher level, cf. Chart 7. This is just one of several markets that have seen sizeable

3 Cf. Ministry of Business and Growth, The financial crisis in Denmark – causes, consequences and lessons (the "Rangvid report"), 2013.

growth in recent years. The strong growth should be viewed in the light of CLOs and other advanced products offering investors a different risk profile and return than simpler products. So growth in these segments should be seen in the context of the very low level of interest rates.

Record-high profits, but declining core earnings

Record-high earnings driven by positive value adjustments

The favourable development in the profits of the systemic credit institutions continued in the 1st half of 2017. Relative to the 1st half of 2016, total profits rose by kr. 7 billion to kr. 25 billion, corresponding to an increase of 40 per cent, cf. Chart 8. The result is boosted by an extraordinarily large contribution of kr. 7 billion from value adjustments, which is well above the historical average.

Recent years' rise in profits should be seen in the light of very low loan impairment charges. New loan impairment charges have declined and in addition the institutions have been able to reverse previous charges. In the 1st half of 2017, reversal of previous loan impairment charges exceeded new loan impairment charges among the largest banking groups so that the total was negative.

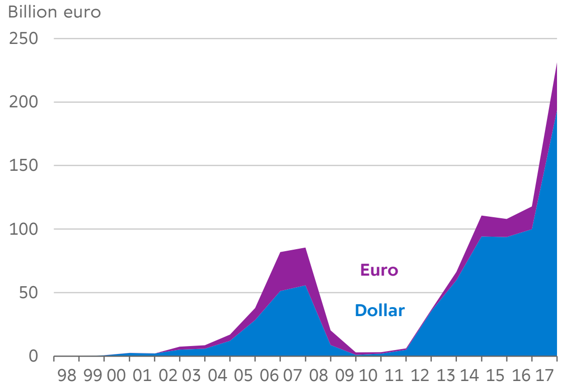
This is because debtors have found it easier to meet their obligations due to the low level of interest rates and the improved cyclical position with rising employment and incomes. So the loan impairment charges accumulated after the last crisis have been reduced, but are still above the pre-crisis level, cf. Chart 9. In 2018, International Financial Reporting Standard 9, IFRS 9, enters into force, which means that the rules on loan impairment charges will be amended, cf. Box 1. The transition to the new rules will entail an increase in accumulated loan impairment charges.

Falling net interest income and rising fee income

Core earnings, i.e. earnings before tax less value adjustment, loan impairment charges and costs, have been falling in recent years, cf. Chart 10.

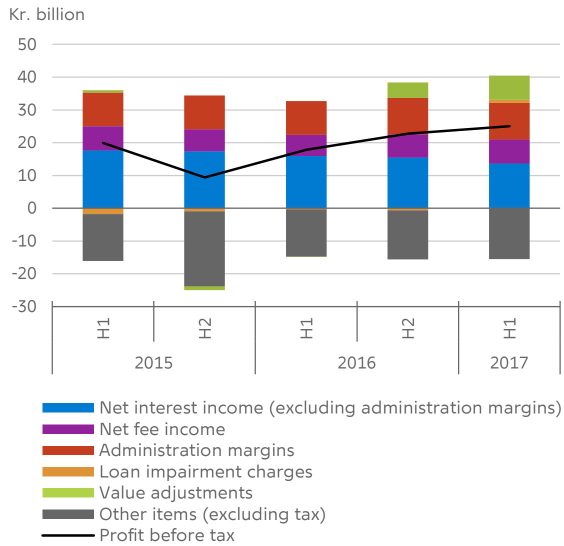
The development is primarily attributable to strongly falling net interest income, cf. Chart 11. In recent

Issuance of CLOs is back at a high level Chart 7



Note: Issuance of CLOs in dollars and euro registered by Bloomberg. The most recent observations are from 27 November 2017.
Source: Bloomberg.

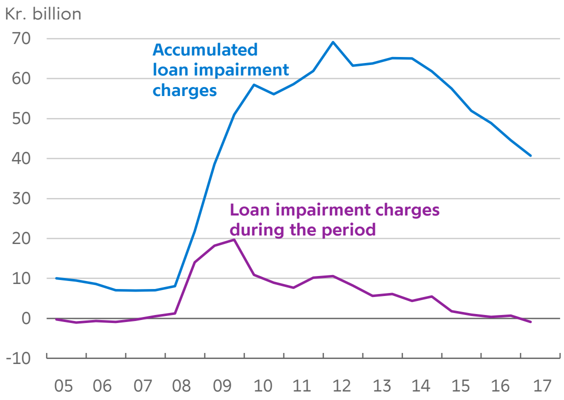
Value adjustments are driving profits Chart 8



Note: Financial statements of systemic credit institutions.
Source: Danish Financial Supervisory Authority and own calculations.

Accumulated loan impairment charges are declining

Chart 9



Note: Financial statements of systemic credit institutions. Accumulated loan impairment charges are constantly being affected by new loan impairment charges (increases) and by realised losses on loans (reductions). The most recent observations are from the 1st half of 2017.
Source: Danish Financial Supervisory Authority and own calculations.

New rules on loan impairment charges from 2018

Box 1

In 2018, a new international standard for the accounting treatment of financial instruments, International Financial Reporting Standard 9, IFRS, 9, enters into force. A new impairment model is a key element of the standard.

During the most recent financial crisis, financial reporting standards were criticised for resulting in loan impairment charges that could be described as "too little too late". The purpose of the new impairment model is to recognise impairment at an earlier stage. The model is based on *expected loss*, implying a more forward-looking approach.

The model operates with three stages for the degree of credit deterioration and two different ways of calculating losses:

- At the time when the loan is granted, provisions must be made for 12 months' expected credit losses, stage 1.
- If the probability that the borrower cannot meet its obligations rises substantially, provisions must be made for the expected credit losses over the remaining maturity, stages 2 and 3.

Continues

Continued

Box 1

The difference between stage 2 (underperforming loan) and stage 3 (non-performing loan) lies in the way income from the loan is to be recognised. At stage 2, the interest accrual on the whole loan is to be recognised, while for stage 3 loans, only interest on the part of the loan that has not been impaired is to be recognised.

The new impairment rules mean higher accumulated loss impairment charges. They will not have any impact on operations, but will be recognised directly on the balance sheet, where the increase in accumulated loan impairment charges will be offset by an equivalent after-tax reduction in equity. In order to limit the immediate effect on the institutions' capital base, a phasing-in period will apply in the EU, phasing in the effect on Common Equity Tier 1 capital until 2023.

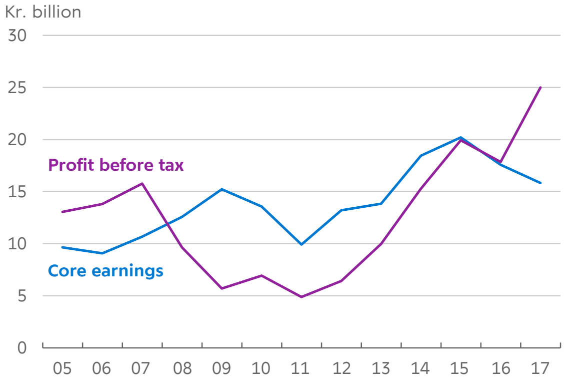
In the financial statements for the 3rd quarter, the large Danish banking groups taken as one expect an increase of 12-18 per cent in the accumulated loan impairment charges as a result of the implementation of IFRS 9 and a reduction of 0.20-0.34 percentage point in the Common Equity Tier 1 ratio. This is in line with the study performed by the European Banking Authority, EBA, of the effect of IFRS 9 with the participation of 54 European banks that were representative of the sector. The study based on the banks' estimates at end-2016 showed that for IRB institutions such as the large Danish banking groups the effect of IFRS 9 was an increase of 16 per cent in accumulated loan impairment charges and a reduction of 0.32 percentage point in Common Equity Tier 1.

For institutions calculating their capital requirements by means of the standardised approach, which applies to most small and medium-sized Danish banks, the EBA study showed an increase of 6 per cent in accumulated loan impairment charges and a reduction of 0.77 percentage point in Common Equity Tier 1.

The implementation of IFRS 9 has required considerable model development in the financial sector. There will be a fundamental shift in the calculation of loan impairment charges, which will require substantial data, estimation of a number of parameters and registration of much information. For IRB institutions, it will be an advantage that several of the components of the impairment calculations are also known from the credit models.

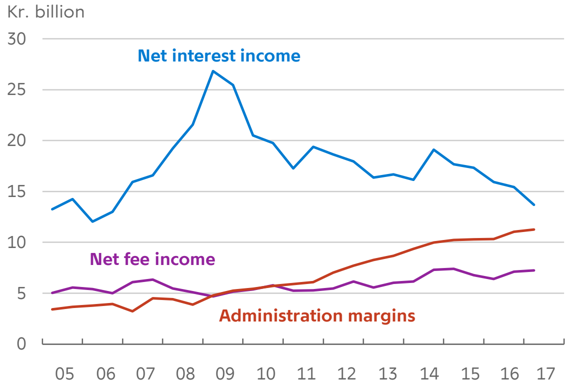
See Danmarks Nationalbank, *Financial Stability*, 2nd Half, 2014, for a detailed description of IFRS 9.

Falling core earnings Chart 10



Note: Financial statements of systemic credit institutions. Core earnings have been defined as profit after tax less loan impairment charges, value adjustments and costs. The most recent observations are from the 1st half of 2017.
Source: Danish Financial Supervisory Authority and own calculations.

Net fee income and administration margins make up for falling net interest income Chart 11



Note: Financial statements of systemic credit institutions. The most recent observations are from the 1st half of 2017.
Source: Danish Financial Supervisory Authority and own calculations.

years, the banks' interest margins have decreased due to the low level of interest rates.

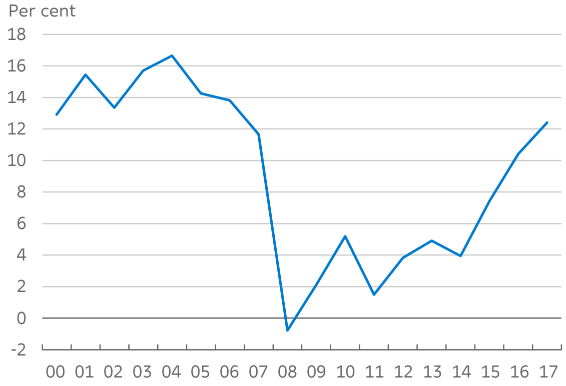
Lending rates have mirrored the falling monetary policy interest rates, while deposit rates are adjusted with a certain lag as the banks have chosen not to charge interest on deposits from personal customers and small businesses. The banks have made up for a significant share of the fall in net interest income by raising fees and administration margins.

Rising return on equity

The systemic credit institutions' return on equity has increased in recent years and is now around 12 per cent, cf. Chart 12. By comparison, the pre-crisis level was 12-16 per cent.

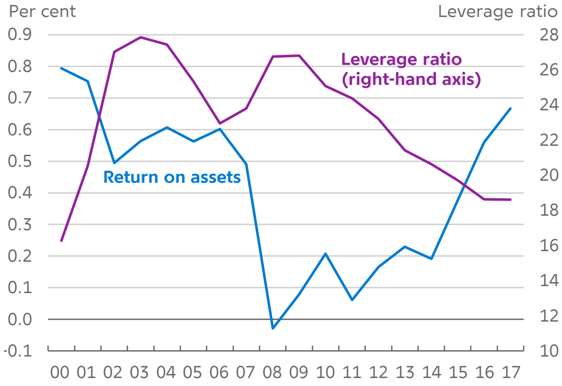
A higher return on equity can reflect either a higher return on the institution's assets or a higher leverage ratio, measured as assets relative to equity. Since the most recent financial crisis, the institutions' leverage ratio has fallen by 30 per cent, cf. Chart 13. This is primarily a result of higher capital requirements. Consequently, the return on equity has been driven by higher returns on assets.

Return on equity at a high level Chart 12



Note: Return on equity is calculated as profit after tax as a percentage of annual average equity. For 2017 half year profits are multiplied by two. For several years, return on equity was negatively impacted by write-down of goodwill, notably in 2014 and 2015. Financial statements of systemic credit institutions.
Source: Danish Financial Supervisory Authority and own calculations.

Higher return on equity attributable to higher returns on assets Chart 13



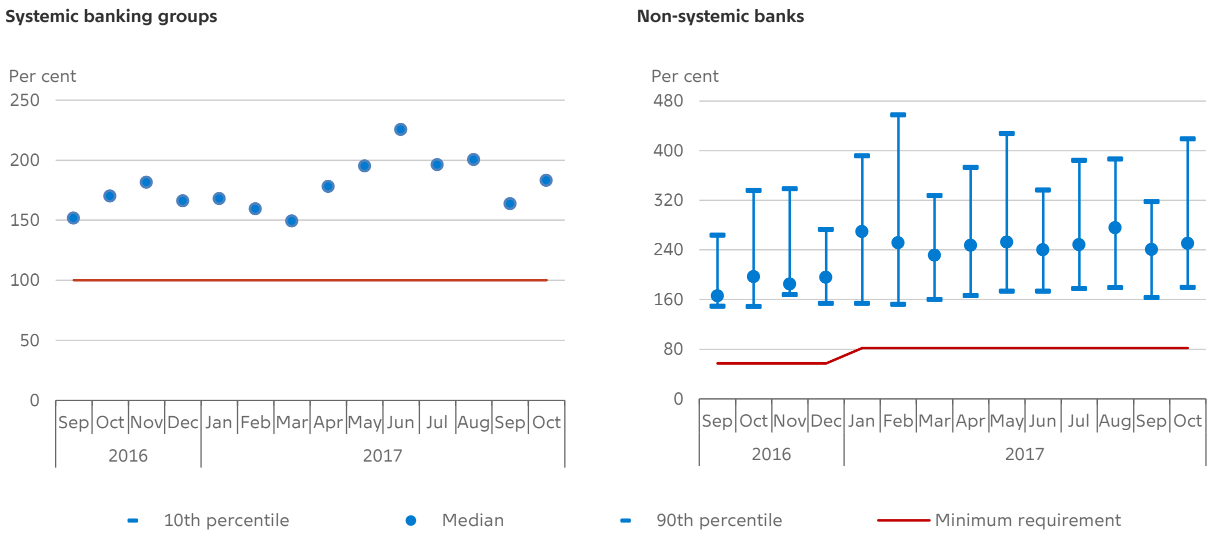
Note: The leverage ratio is defined as total assets relative to equity, while the return on assets is defined as profits after tax relative to total assets. In 2017, profits for the 1st half year are multiplied by a factor of 2. Financial statements of systemic credit institutions.
Source: Danish Financial Supervisory Authority and own calculations.

Adjustment to new liquidity requirements

Short-term liquidity requirements observed with a wide margin
The short-term Liquidity Coverage Ratio, LCR, of all the credit institutions is above the minimum requirement, cf. Chart 14. The purpose of the LCR, which was introduced in 2015, is to ensure that the institutions always have adequate high-quality liquid assets to cover the net outflow of liquidity in a 30-day intensive stress scenario. The medium-sized non-systemic banks generally have higher LCRs than the systemic banks, which, inter alia, may be attributable to their different business models. For example, the medium-sized banks finance a relatively large share of their balance sheets with deposits, while the systemic banks tend to rely more on market funding, which makes more demands on their liquidity reserves.

In 2016, the Danish Financial Supervisory Authority introduced additional requirements for the systemic credit institutions, which must also meet LCR requirements in the foreign currencies that are significant for each institution. Another currency than

Liquidity Coverage Ratio, LCR, observed with a wide margin Chart 14



Note: The LCR requirement is 100 per cent for the systemic banking groups, while the non-systemic banks must observe an LCR of 80 per cent in 2017, rising to 100 per cent in 2018. The banks switched to new LCR reporting forms in September 2016, which is why the time series begins then. The most recent observations are from October 2017.
Source: Danish Financial Supervisory Authority and own calculations.

the Danish krone is significant for an institution if its total commitments in that currency constitute at least 5 per cent of the institution's total liabilities. The institutions must meet this 100 per cent requirement from October 2017. While Swedish kronor and Norwegian kroner are not comprised by the Danish LCR requirement for foreign currencies, the institutions must still, under EU legislation, ensure a sufficient currency match between the portfolio of liquid assets and the net outflow of liquidity.

Long-term requirement for stable funding not in place
As part of an overall revision of the Capital Requirements Regulation, CRR, and the Capital Requirements Directive, CRD, the European Commission in November 2016 presented a proposal for a long-term stable funding requirement, the Net Stable Funding Ratio, NSFR, which implements the Basel Committee's NSFR standard.[4] This proposal is still being negotiated. The NSFR would require institutions to have sufficient stable funding of their activities in the medium and long term, thereby imposing restrictions on the institutions' maturity transformation.

In 2017, Danske Bank has established a new subsidiary in Sweden, Danske Hypotek AB, in which connection it moved part of its Swedish lending to the new institution and funded this lending by issuing Swedish covered bonds. Such issuance ensures Danske Bank an additional funding source in Swedish kronor, contributing to enhancing the currency match between assets and liabilities in Swedish kronor

New limit value in the supervisory diamond
From 30 June 2018, the Danish Financial Supervisory Authority's liquidity management limit value in the supervisory diamond will change from being based on the previous section 152 liquidity requirement to being based on the LCR requirement. With the new limit value, the Danish Financial Supervisory Authority is also setting a minimum level of the banks' liquidity requirement, based on a 3-month stress scenario.[5]

Indications of higher risk in bank lending

Increased lending to the corporate sector
Lending to the corporate sector is increasing, cf. Chart 15. While growth in mortgage lending to the corporate sector has been increasing steadily for a long period, lending by banks to the corporate sector began to rise in 2014. In Danmarks Nationalbank's lending survey, the banks generally report increased demand for corporate loans, especially from new customers. There is a large spread in lending growth across the sector, and some medium-sized banks are increasing their lending markedly.

Particularly lending to cyclical industries, such as property trading and letting as well as construction, is driving growth in corporate lending by medium-sized banks, cf. Chart 16. The finances of corporate customers are being underpinned by the economic upswing and the low level of interest rates.

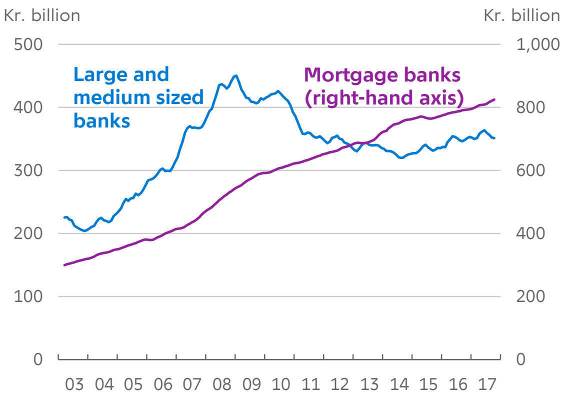
The banks' lending mirrors the business cycle. Thus, increased lending to cyclical industries is a natural element of a recovery, but loan impairment charges and losses on these industries cannot be expected to remain at the present low level when the economy reverses.

Credit standards are being eased
In the current favourable situation, many banks have the capacity to increase lending. This intensifies competition for customers as well as the pressure on the banks' credit standards. According to Danmarks Nationalbank's lending survey, the medium-sized banks have tended to ease credit standards for the

4 The NSFR proposal is included in the European Commission's proposal for a revised CRR presented in November 2016 as part of a substantial package of proposals, cf. Proposal for a Regulation of the European Parliament and of the Council amending Regulation (EU) No 575/2013 and amending Regulation (EU) No 648/2012, COM(2016) 850.

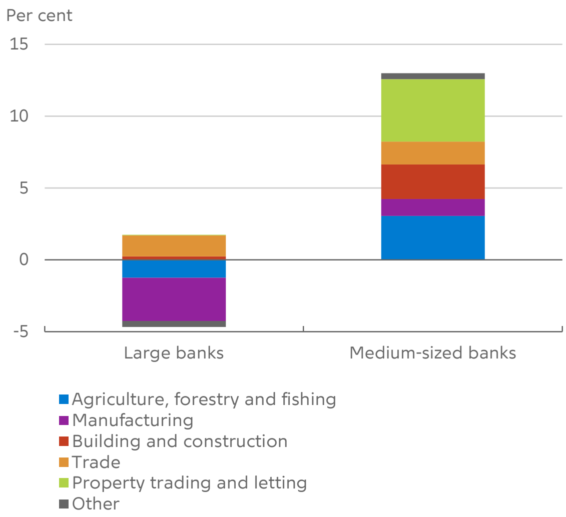
5 Cf. Danish Financial Supervisory Authority , New benchmark for liquidity in the Supervisory Diamond for banks (in Danish only), August 2017. (*link*)

Increased lending to the corporate sector Chart 15



Note: Large and medium-sized banks' lending to the corporate sector. The most recent observations are from October 2017.
Source: Danmarks Nationalbank.

Lending to cyclical industries has increased Chart 16



Note: Contributions to growth from January 2014 to October 2017.
Source: Danmarks Nationalbank.

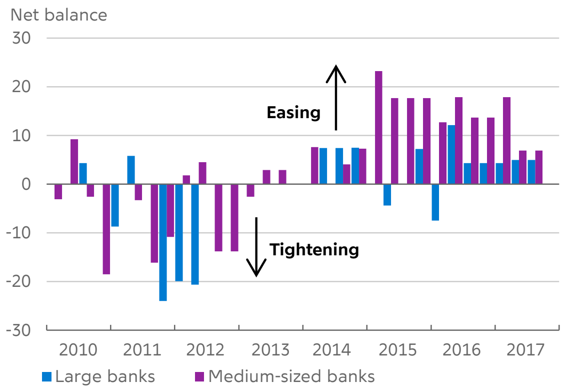
corporate sector since around 2014, cf. Chart 17. The large banks have to a greater extent stated that they have kept their credit standards unchanged, but within the last few years they have also begun to ease theirs. Both groups of banks state that increased competitive pressure is the main reason for adjusting credit standards.

In the 1st half of 2017, the Danish Financial Supervisory Authority conducted a survey of new commitments to corporate customers in a number of banks. It showed that the sector is willing to take greater risks when lending and that the banks increasingly make commitments with heightened risk.

According to Danmarks Nationalbank's lending survey, the banks' easing of credit standards in recent years has primarily taken place by easing requirements for fees and administration margins and to some extent also by easing collateral requirements, cf. Chart 18. Conversely, the requirements for credit limits and the maturity of loans are more or less unchanged.

The more relaxed margin requirements for lending may help to explain the fall in the banks' average interest margin, cf. Chart 19. The interest margin is calculated as the difference between the banks' average interest rate on corporate lending and the tomorrow/next rate.

The banks are easing credit standards for corporate customers Chart 17



Note: The net balance lies within the interval -100 to 100. A positive (negative) net balance means that credit managers of the banks in question have, overall, i.e. lending-weighted, stated that they have eased (tightened) their standards relative to the preceding quarter. The most recent observations are from 3rd quarter 2017
Source: Danmarks Nationalbank.

All else equal, the banks' tendency to ease credit conditions and increase their lending exposures in a period of economic recovery contributes to amplifying cyclical fluctuations. Such procyclicality may become particularly strong if credit standards are eased excessively in an overheated economy, as seems to have been the case in Denmark prior to the previous financial crisis. As a result, there was a need for extra severe tightening of credit standards during the crisis, which contributed to reinforcing the economic downturn.

Focus on reducing NPL ratio in good times

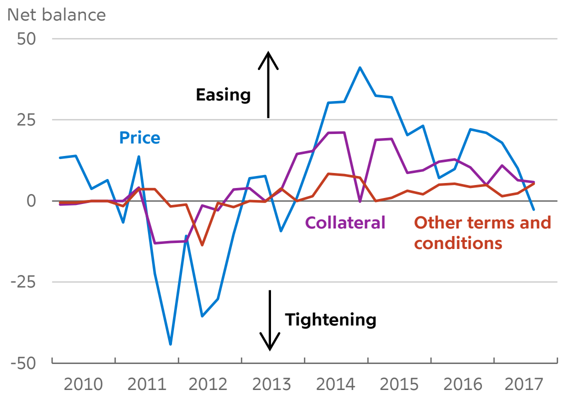
The considerable easing of credit standards up to the previous financial crisis led to a general increase in non-performing loans, NPLs. A loan is classified as non-performing if the borrower has not paid interest, fees or instalments for more than 90 days, or if it is assessed to be unlikely that the borrower will fully meet its payment obligations without any collateral being realised. Individually impaired exposures also count as NPL.

The banks have reduced NPLs as the economy has improved. NPLs as a ratio of total lending fell to 3.8 per cent for the large banks in the 1st half of 2017.[6] An exception is the NPL ratio for lending to the agricultural sector, which remains high. The banks have made large impairment charges for these loans, reflecting the deterioration in the value of the underlying collateral. However, the banks may suffer further losses if the value of the collateral decreases even more. From society's perspective, it may impede productivity developments if labour and capital are bound on farms that are not viable.

Considerable variation in NPLs between the large and medium-sized banks

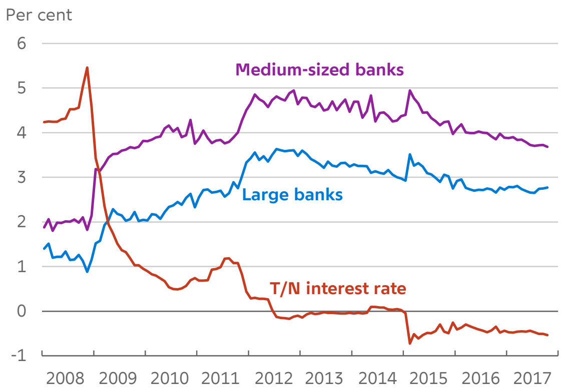
NPLs account for a smaller share of lending in the large than in the medium-sized banks. In the large banks, NPLs made up 3.5 per cent of total corporate lending in the 1st half of 2017, while it was just over 16 per cent for the medium-sized banks. It is difficult directly to compare NPL ratios for large and medium-sized banks as they typically operate with very different business models, cf. Chart 20. For example,

The banks have eased their margin and fee requirements Chart 18



Note: The net balance lies within the interval -100 to 100. A positive (negative) net balance means that credit managers of the banks in question have, overall, i.e. lending-weighted, stated that they have eased (tightened) their lending conditions relative to the preceding quarter. Responses are from the large and medium-sized banks. The most recent observations are from 3rd quarter 2017.
Source: Danmarks Nationalbank.

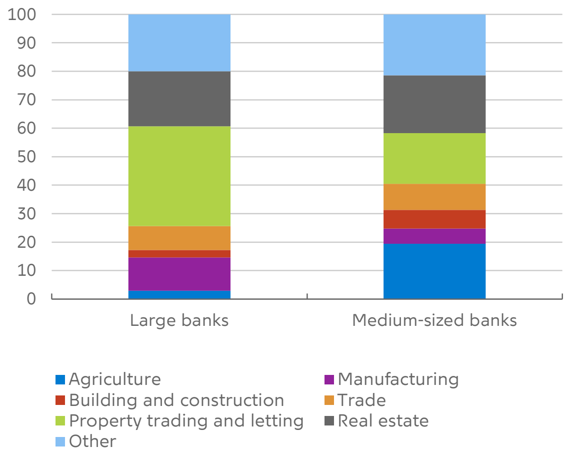
Shrinking interest margins Chart 19



Note: The lending margin is calculated as the difference between the average lending rate and the T/N interest rate. The most recent observations are from end of October 2017.
Source: Danmarks Nationalbank and Nordea Analytics.

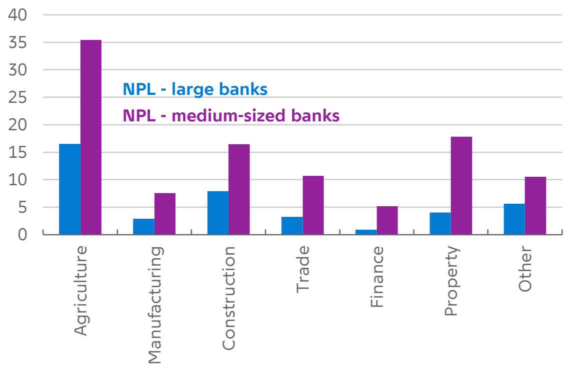
6 This section and the following section on the NPLs of Danish banks do not comprise branches of foreign banks (i.e. Nordea Bank Danmark, Handelsbanken and Santander Consumer Bank), as data is not reported.

Large and medium-sized banks operate with different business models Chart 20



Note: Distribution of banks' corporate lending in 1st half of 2017.
Source: Danish Financial Supervisory Authority and own calculations.

The medium-sized banks have high NPL ratios for cyclical industries Chart 21



Note: NPL ratios for banks' corporate lending in 1st half of 2017.
Source: Danish Financial Supervisory Authority and own calculations.

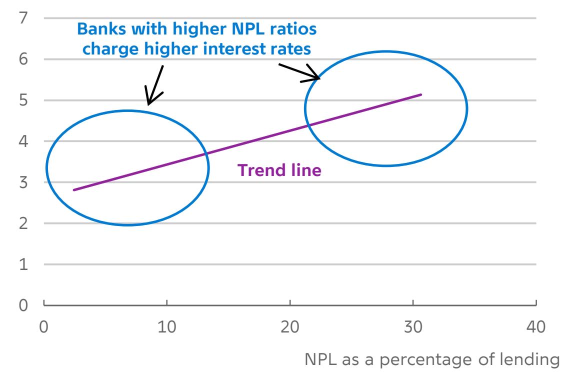
the large banks tend to lend more to financial corporations for which the NPL ratio is very low, cf. Chart 21. In addition, they tend to fund large, established firms, which as a main rule leads to a lower NPL ratio.

Conversely, NPL ratios are high for some of the industries to which the medium-sized banks have considerable exposures. This applies to lending to agriculture and to cyclical industries such as the property sector.

A comparison of banks' NPL ratios and average lending rates for the corporate sector shows that the banks with the highest NPL ratios also charge the highest interest rates, cf. Chart 22. This correlation indicates that the banks compensate for the lower credit quality by charging higher interest rates.

It is important for the banks to keep the present distribution of NPL ratios across industries in mind when granting loans in the current upswing as the cyclical industries are once again driving lending growth.

Banks with high NPL ratios charge higher interest rates Chart 22



Note: Trend line for interest rates on outstanding corporate lending and NPL as a percentage of corporate lending for individual institutions. The blue circles indicate where the largest share of institutions are located in the scatter-plot. Data covers 1st half of 2017.
Source: Danish Financial Supervisory Authority and Danmarks Nationalbank.

Increased home equity provides homeowners with an opportunity to borrow more

Total lending to homeowners has risen slightly in recent years. This moderate lending growth should be viewed in the light of the very high loan-to-income, LTI, ratios among Danish homeowners, also in an international perspective. Lending by mortgage banks has increased since 2016, while lending by banks for housing purposes has fallen over the same period. This is attributable to the gradual substitution in favour of mortgage loans, including the widespread use of mortgage-like bank loans, which are to some extent transferred from the banks' to the mortgage banks' balance sheets, cf. Box 2.

House prices have risen in recent years, cf. Chart 23. Especially the large cities have seen high rates of increase. House price developments have resulted in higher home equity for Danish homeowners.

Credit growth may take off rapidly

The years prior to the most recent financial crisis were characterised by rising house prices and considerable credit growth. House prices accelerated in 2004 and the following years. At the same time, credit growth for both new existing borrowers increased, cf. Chart 24, due to, inter alia, more extensive use of home equity as collateral for loans.

Total credit growth for households has been moderate in recent years. That is explained by increasing debt for both new and existing houseowners being offset by a fall in the debt of borrowers, who have repaid on their debt. However, pre-crisis developments show that credit growth may take off rapidly if households increasingly begin to raise new loans against home equity as collateral.

Mortgage-like bank loans

Box 2

As an alternative to traditional mortgage loans, banks offer mortgage-like loans for financing owner-occupied dwellings and summer cottages. There is no clear definition of such loans.

Mortgage-like loans are typically loans for financing up to 80 per cent of the value of the home, but some institutions offer up to 95 per cent. Often, the loan functions as an overdraft facility and is attached to a deposit account. The borrower is then free to withdraw money from and deposit money in the account, only paying interest on the amount by which the account is actually overdrawn. The rate of interest on such loans is variable and reflects a reference rate. These loans are often used in combination with ordinary mortgage loans as the overdraft facility makes mortgage-like bank loans more flexible.

Continues

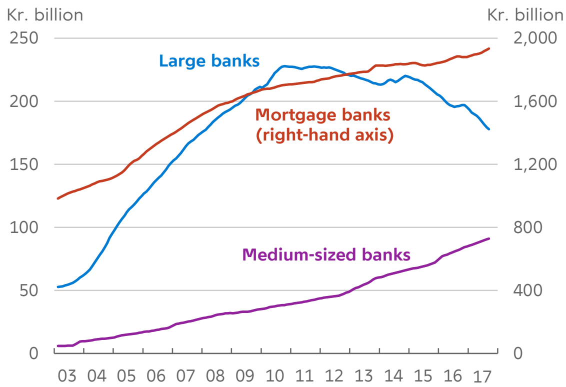
Continued

Box 2

Unlike mortgage loans, mortgage-like bank loans are not initially financed by way of mortgage bonds. When a loan is granted, it is originally financed via the bank's balance sheet like any other loan, e.g. via deposits. Thus, initially such loans have a larger financing risk than traditional mortgage loans. Subsequently, the bank may make use of shared funding and finance the loan via bonds issued by a mortgage bank. This means that the loan is transferred from the bank's to the mortgage bank's balance sheet. But in some cases, the mortgage-like loan may be rejected, e.g. if it does not meet the mortgage bank's credit standards.

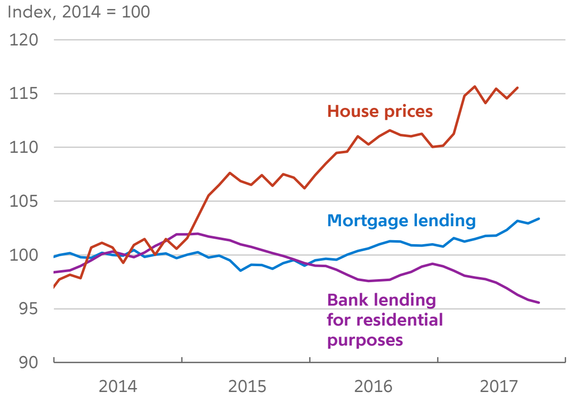
To the extent that the banks pass on the loans to the mortgage credit sector, the banks' lending declines. This is part of the explanation of the overall fall in lending for residential purposes by large banks and the increase in mortgage lending, cf. the chart. In addition, the trend towards a larger share of mortgage lending should be viewed in the context of a relatively sharper decline in the rates of interest on mortgage loans than on bank loans after the financial crisis.

Mortgage lending is increasing while the large banks are reducing lending for residential purposes



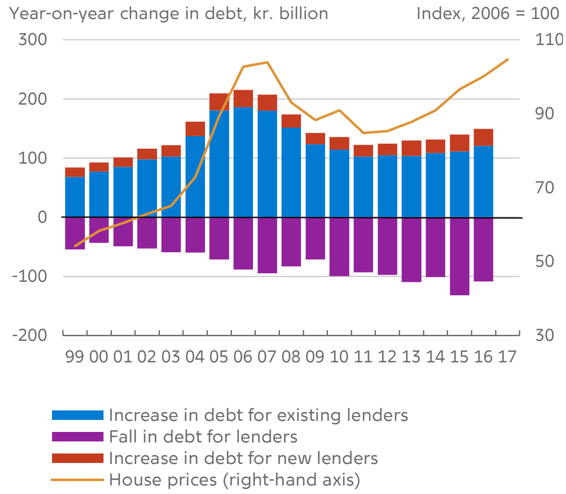
Note: Bank lending for residential purposes is shown as a 3-month moving average. The most recent observations are from October 2017.
Source: Danmarks Nationalbank.

Higher house prices boost home equity Chart 23



Note: Lending to Danish households. Bank lending for residential purposes has been calculated as a 3-month moving average in order to eliminate fluctuations. House prices are prices of single-family houses. The most recent observation for mortgage- and bank lending are October 2017 and is August 2017 for house prices.
Source: Statistics Denmark, Danmarks Nationalbank and own calculations.

Credit growth may take off suddenly Chart 24



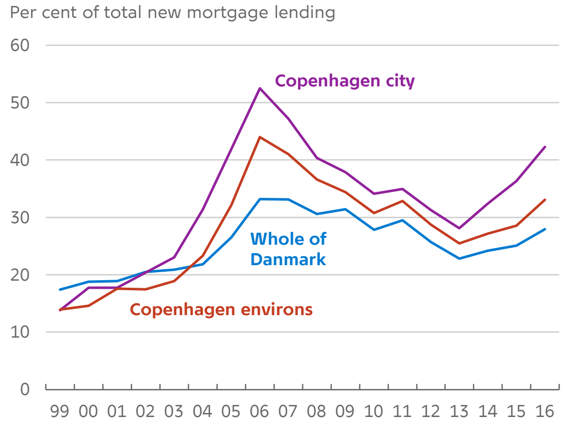
Note: The pillars show the increase (fall) in total debt of houseowners, who take on more (pay back) debt in the current year. Existing borrowers er defined as lenders with debt in the precending year. House prices are prices of single-family houses. The most recent observations of debt are from 2016, while house prices are from 1st half of 2017.
Source: Statistics Denmark and own calculations.

The share of borrowers with high LTI ratios is increasing

There are indications of an increase in credit to a group of vulnerable homeowners in recent years. This applies to homeowners with high LTI ratios. The share of homeowners with an LTI ratio greater than four has risen since 2013, cf. Chart 25. This applies particularly in areas with strong increases in house prices, such as Copenhagen. The same pattern was seen in the pre-crisis period.

In October 2017, the Danish Financial Supervisory Authority issued a consultation on a proposal to amend the Executive Order on Good Business Practice for Mortgage Lending.[7] The proposed amendment of the Executive Order should be viewed in the light of the Systemic Risk Council's recommendation of March 2017 on limitation af risky loan types for highly indebted borrowers.[8] This amendment is intended to limit the product supply when rais-

Larger share of households with LTI greater than four Chart 25



Note: Share of new mortgages lended by households with total debt above four times their income. Data from 2010 is based on reporting by mortgage banks at loan level, while data for previous periods is based on information from SKAT.
Source: Statistics Denmark, Danish mortgage banks and own calculations.

7 Draft Executive Order on amendment of the Executive Order on Good Business Practice for Mortgage Lending (in Danish only), Danish Financial Supervisory Authority, October 2017.

8 Cf. recommendation from the Systemic Risk Council, March 2017. (*link*)

ing loans for homeowners with an LTI greater than four and a loan-to-value, LTV, ratio of more than 60 per cent. It is positive that the rules apply to all high-LTI homeowners regardless of municipality of residence.[9] This ensures uniform credit assessment and reduces the risk of artificial spreading to areas that are not covered by the rules.

In contrast, it is inappropriate that high-LTI households can still finance home purchases without amortising the loan. The use of deferred amortisation loan types contributes to funding of high LTI ratios. Loan types with deferred amortisation, irrespective of the interest fixation period, entail considerably lower instalments in the first years of the mortgage loan, which enables high indebtedness, especially given the current level of interest rates. New lending by mortgage banks to homeowners with LTI ratios greater than four, LTV ratios of more than 60 per cent and with deferred amortisation is increasing, especially in the large cities. Limitation of the access to deferred amortisation could reduce the vulnerability of homeowners in case of negative shocks to the economy, e.g. falling house prices and unemployment. Moreover, higher repayments could reduce the risk of speed blindness caused by low interest rates.

The measure to limit the access to borrow for high-LTI borrowers is the most recent among several measures implemented since 2014 in order to reduce the risks associated with credit in the housing market, cf. Box 3. These measures contribute to enhancing the robustness of both borrowers and credit institutions against fluctuations in house prices and interest rates. However, it is difficult to assess the effects of the individual measures and whether they are adequate in combination.

Growth in foreign exposures

Foreign lending by the banks has risen strongly in recent years, cf. Chart 26. The Nordic countries, notably Norway and Sweden, account for the largest share of such lending. Foreign lending increases the diversification of banks' exposures. Danske Bank has growth in Norway and Sweden as a strategic goal and has increased lending to both households and

9 Danmarks Nationalbank, Consultation response regarding the Danish Financial Supervisory Authority's draft amendment to the Executive Order on Good Business Practice for Mortgage Lending, November 2017. (*link*)

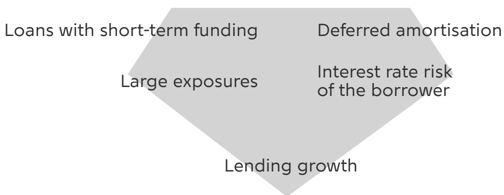
Recent measures in the housing market

Box 3

Several measures have been implemented in recent years, aiming at increasing the resilience of borrowers and hence credit institutions to negative shocks to the economy. These measures seek to limit risky borrowing by Danish households, i.e. loans with a high LTV ratio, variable rate and/or deferred amortisation. Other measures address risks in areas with strong increases in house prices.

The following four measures have been implemented since 2014:

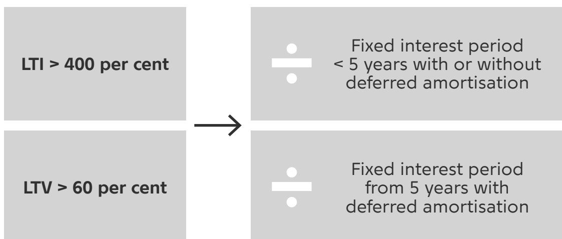
- **Supervisory diamond for mortgage banks, 2014:** Sets limit values for mortgage banks' lending in several areas:



- **5 per cent down payment requirement, 2015:** Borrowers must make a down payment of 5 per cent when buying a home. This requirement enhances borrower resilience to falling house prices.

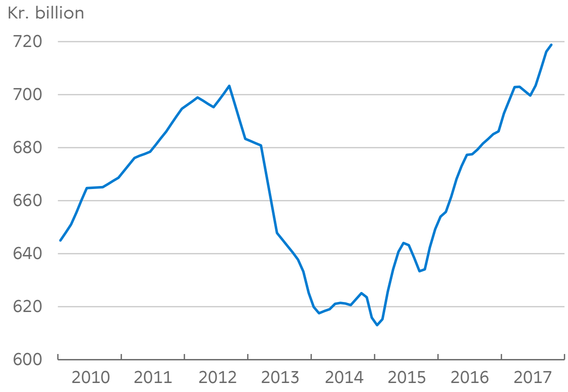
- **Guidance on mortgaging of homes in growth areas, 2016:** This provides guidance on prudent credit assessment in growth areas, addressing the risks of financially sensitive customers, e.g. with negative wealth or a high LTI ratio.

- **Guidelines for housing loans to households with high debt, 2017:** Limit the access to borrow for borrowers with high LTV and LTI ratios (debt of 4 times income). As a result, credit institutions may not grant loans with fixed interest periods of less than 5 years and deferred amortisation loans with interest rate adjustment every 5 years or less frequently.



the corporate sector in these two countries in recent years. Given the considerable house price increases in Norway and Sweden over a number of years, the International Monetary Fund, IMF, finds that the two countries' housing markets are overvalued. A price adjustment may entail that housing loans to these countries become vulnerable, but derived effects on the rest of the economy may also result in losses on other loans. House prices in Norway have fallen in 2017, but are still at a high level.

Foreign exposures are increasing Chart 26

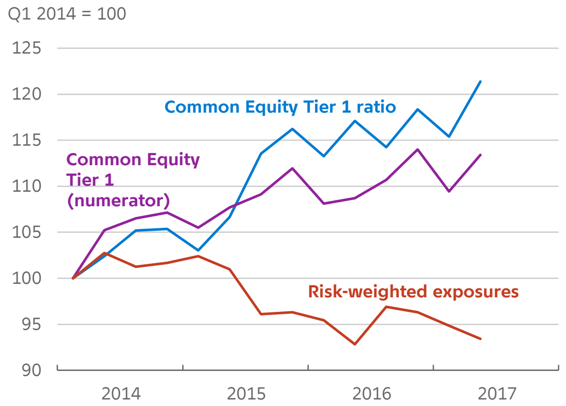


Note: Lending to households and non-financial corporations by the banks' foreign branches and subsidiaries. The most recent observation is from October 2017.
Source: Danmarks Nationalbank.

The own funds of the credit institutions are crucial to the robustness of the sector

The systemic credit institutions are meeting their own capital targets
In general, the systemic credit institutions have increased their Common Equity Tier 1 ratios in recent years, cf. Chart 27. This is partly driven by a fall in risk-weighted exposures. Several of the institutions are reducing their build-up of Common Equity Tier 1 capital, instead distributing a large share of earnings to shareholders in the form of dividend or share buy-backs.

Systemic banking groups have increased the level of Common Equity Tier 1 capital Chart 27



Note: The most recent observations are from 1st half of 2017.
Source: Danish Financial Supervisory Authority.

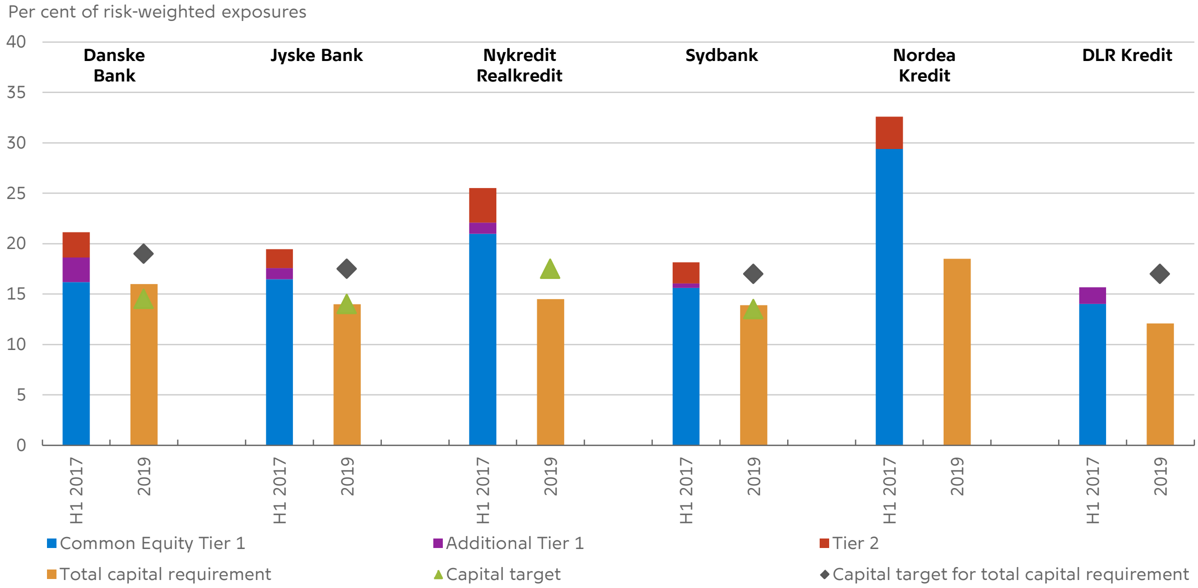
The relatively high level of distribution should be seen in the light of the institutions' compliance with their own capital targets already, cf. Chart 28. Among the systemic groups, only DLR Kredit's capital ratio is below the institution's capital target for 2019.

The credit institutions' own capital targets are currently 3-5 percentage points higher than the fully phased-in capital requirements under CRD IV/CRR. A certain excess capital adequacy relative to the total capital requirement, cf. Box 4, is a prerequisite for being able to operate in the financial markets. The excess capital adequacy is to enable credit institutions to weather negative cyclical fluctuations without breaching the capital requirements. For the large institutions, the size of the excess capital adequacy may be determined by the conditions for maintaining a given credit rating.

For several of the non-systemic banks, risk-weighted exposures have increased as a result of relatively high lending growth. Most of the non-systemic banks

The largest banking groups are meeting their own capital targets

Chart 28



Note: The overall capital requirement is calculated as the sum of the minimum capital requirement (8 per cent), the Pillar 2 add-on, the capital conservation buffer (2.5 per cent), the SIFI buffer requirement (1-3 per cent) and the countercyclical capital buffer when CRD IV/CRR have been fully phased-in. The Pillar 2 add-on and the countercyclical capital buffer are assumed to be unchanged relative to 30 June 2017.
Source: Danish Financial Supervisory Authority, annual reports and interim financial statements.

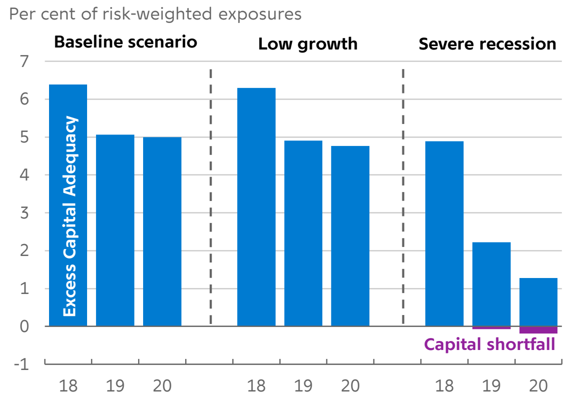
have been able to maintain or increase their capital ratios by consolidating equity wholly or partly by means of increasing earnings.

A few systemic banks come close to the buffer requirement in severe stress scenario

Danmarks Nationalbank's accounts-based stress test assesses the banks' excess capital adequacy over the next three years under the assumption of three macroeconomic scenarios.[10] The stress test shows that all of the systemic institutions are still able to meet the minimum capital requirements in a severe recession, but a few will have a limited capital shortfall relative to the total capital requirement including capital buffers, cf. Chart 29. In the event of non-compliance with the buffer requirements,

A few systemic banks are close to the buffer requirement

Chart 29



Note: Systemic banks' total excess capital adequacy and capital shortfall in per cent of risk-weighted exposures in three scenarios. Excess capital adequacy and capital shortfalls have been calculated relative to the total capital requirement including buffers.
Source: Danish Financial Supervisory Authority and own calculations.

10 The stress test covers only the banking activities of a group – not any other business areas such as affiliated mortgage banks. The three scenarios and the results of the stress test are described in more detail in Danmarks Nationalbank, In a severe recession scenario a few banks have capital shortfall, *Danmarks Nationalbank Analysis (Stress test)*, No. 22, 2017 (*link*). The analysis also contains a description of a new model for market risk stress.

Composition of capital requirements for credit institutions

Box 4

Guidance on excess capital adequacy (new element)	**Pillar 2 "Capital Guidance"** *(Proposed regulation in CRD + EBA guidelines)*	In case of breach, the supervisory authority initiates intensified dialogue with the institution
Total capital requirement	**Capital conservation buffer** **Countercyclical buffer** **Systemic risk buffer/SIFI buffer**	In case of breach, the institution must submit a capital conservation plan to the supervisory authority for approval and state the maximum amount for distribution; may also trigger other supervisory measures
	Pillar 2 add-on *(Proposal of further harmonisation in CRD + EBA guidelines)*	Breach may lead to the institution being regarded as "failing or likely to fail" or to withdrawal of its banking licence
	Pillar 1 requirement Own funds requirement – 8 per cent of risk-weighted exposures	

The total capital requirement under CRD IV/CRR is composed of several elements. According to the minimum capital requirements, the own funds must be at least 8 per cent of risk-weighted exposures. Add to this an institution-specific Pillar 2 add-on, which is to reflect risks and conditions that are not fully reflected in the calculation of risk-weighted exposures. The combined capital buffer requirement is then added to these requirements. It consists of three elements, i.e. the capital conservation buffer, the countercyclical capital buffer and – for systemic credit institutions – a SIFI buffer. These capital buffer requirements are being gradually phased in until 2019.

In the event of breach of the total capital requirement, a number of restrictions apply to distribution of dividend and payment of bonuses as well as interest on Additional Tier 1 capital. The bank is also required to prepare and submit a capital conservation plan to the Danish Financial Supervisory Authority.

the banks become subject to a number of restrictions, e.g. limitation of dividend payments. Moreover, the banks should expect that their access to external funding in the financial markets may be challenged.

The phasing-in of the capital buffer requirements will reduce the institutions' excess capital adequacy from 2017 to 2018, which also entails a decline in the institutions' excess capital adequacy in the baseline scenario.

Several of the non-systemic banks are seriously challenged in the severe recession stress test scenario, and a few will be unable to comply with the minimum capital requirement. In that case they will be resolved by the authorities. Before it comes to that, breach of the buffer requirements will enable the Danish Financial Supervisory Authority to intervene. Since the authorities have sufficient tools to address this situation, it is not assessed to constitute a risk to financial stability. However, the owners and creditors of the institutions affected may suffer losses if the institutions are to be recovered or resolved.

New requirements and increased harmonisation in the pipeline

The future capital requirements to be met by credit institutions are still uncertain. The package of proposals to amend CRR and CRD, which the European Commission presented in November 2016, includes a proposal to harmonise the Pillar 2 framework, cf. below. [11] In addition, the proposal to revise CRR also includes implementation of the Basel Committee's standard, Fundamental Review of the Trading Book, which sets new rules for calculation of risk-weighted exposures with market risk.

Concurrently, there are negotiations in the Basel Committee on completing a major reform which can be expected to include, inter alia, a so called output floor for institutions using Internal Ratings Based, IRB, approaches to calculation of risk-weighted exposures. The output floor will entail that risk-weighted exposures cannot be less than a certain percentage of risk-weighted exposures calculated using the standardised approach. The introduction of an output floor may give the institutions inappropriate incentives. IRB approaches are more risk-sensitive than standardised approaches, encouraging the institutions to optimise their risk management and portfolio allocation. This contributes to ensuring appropriate capital allocation to the benefit of the economy. Once the Basel Committee has adopted the new reform, the EU member states will have to consider how to implement it. The uncertainty about the exact design of the output floor will thus persist for some time to come.

EU harmonisation of the Pillar 2 framework
Given the current substantial variation in the level of and approach to applying the Pillar 2 add-on across the EU member states, credit institutions in different countries may be subject to different capital requirements.[12] This may be a considerable impediment to a level playing field in the single market for financial services. The Commission's package seeks to counter this by including proposals to harmonise the framework for supervisory authorities' Pillar 2 approach. This constitutes an adjustment of the EU legal basis for setting the Pillar 2 add-on.[13]

The Commission's package of proposals also introduces a new statutory element in the form of regulation of supervisory authorities' assessment of a guidance level for each institution's excess capital adequacy relative to the total capital requirement, cf. Box 4. This supplementary, non-binding capital requirement element is known as the "Pillar 2 Guidance". While the purpose of the Pillar 2 add-on is to cover identifiable risks that are not covered by the Pillar 1 requirement, the purpose of the Pillar 2 Guidance is to address risks based on possible events, i.e. the capital shortfall in a severe stress scenario and over an entire business cycle.

If an institution's capitalisation falls below the Pillar 2 Guidance, this will not entail restrictions on distribution or impose other transaction restrictions. Instead, the supervisory authority can be expected to initiate an intensified dialogue with the institution about possible measures to restore the given level of capitalisation.

In addition, the package specifies the "stacking order" of the individual capital elements, cf. Box 4. This will prevent substantial variation in the timing of restrictions imposed on institutions regarding the distribution of profits.

At the same time, in October 2017 the European Banking Authority, EBA, submitted draft guidelines on the revised procedures and methodology for the supervisory review and evaluation process, SREP, for consultation.[14] These guidelines implement the general principles of the CRD and the Bank Recovery

11 Cf. Proposal for a Directive of the European Parliament and of the Council amending Directive 2013/36/EU as regards exempted entities, financial holding companies, mixed financial holding companies, remuneration, supervisory measures and powers and capital conservation measures, COM(2016) 854.

12 Cf. EBA, Report on the Convergence of Supervisory Practices, EBA-Op-2016-11, 2016.

13 The framework for financial regulation in the EU, laid down in Regulations and Directives and adopted under the EU legislation procedure, is also called level 1 regulation. The framework is implemented in detailed rules laid down in binding technical standards adopted by the Commission, i.e. level 2 regulation, and non-binding guidelines adopted by the EBA, i.e. level 3 regulation.

14 Cf. EBA, Consultation Paper on the Draft Guidelines on the revised common procedures and methodologies for the supervisory review and evaluation process (SREP) and supervisory stress testing, EBA/CP/2017/18, 2017. The revised guidelines are expected to take effect on 1 January 2019.

and Resolution Directive, BRRD[15], inter alia in the form of a more detailed description of the elements to be included in the evaluation of the Pillar 2 add-on.[16] The guidelines aim to harmonise supervision of credit institutions across all EU member states – and to enhance the uniformity of supervisory responses. At the same time, the guidelines support the coupling of the ongoing supervision and the evaluation of whether an institution is to be subject to recovery or resolution.

A common framework for setting the Pillar 2 Guidance has already been incorporated in the revised SREP guidelines. Another key element in the SREP process will be to assess whether an institution is sufficiently addressing the Pillar 2 Guidance in its risk management and recovery plan.

It will make a positive contribution to a level playing field across the EU member states if future EU regulation entails a more harmonised approach to setting the Pillar 2 add-on as well as guidance on the level of own funds that can ensure suitable excess capital adequacy relative to the total capital requirement. It is important to take this into account in a Danish context to ensure cross-border comparability between institutions and an improved basis for joint decision-making in the supervisory colleges for cross-border groups. In this connection, it should be expected that the ECB's choice of methodology and practice in supervision of large institutions in the banking union will increasingly serve as the benchmark for credit rating agencies, analysts and investors.

New method for assessment of the countercyclical capital buffer

The purpose of the countercyclical buffer is to prevent credit institutions from excessively tightening credit standards for households and corporate customers in periods of stress in the financial system. The buffer is to be built up during periods of increasing systemic risk. The buffer is to be released when risks materialise, e.g. when the financial system is hit by a negative shock. In so far as the released capital is not used for loss-absorbing purposes, the institution may use it for capital adequacy in relation to new lending or as a contribution to its excess capital adequacy.

In Denmark, the countercyclical buffer rate has been 0 per cent so far. On 17 November 2017, the Systemic Risk Council, the Risk Council, published a revised method for evaluating the buffer rate, which is to contribute to build-up of the buffer early in a financial upswing, cf. Box 5.

The Risk Council has stated that the discussion of the countercyclical buffer rate at its December meeting will take the revised method as its point of departure. If it finds that the rate is to be changed, it will publish a recommendation to the Minister for Industry, Business and Financial Affairs, who is responsible for setting the buffer rate in Denmark. As a main rule, an increase of the countercyclical buffer rate will take effect 12 months after the Minister for Industry, Business and Financial Affairs has decided to increase it.

Danmarks Nationalbank supports the Risk Council's revised methodology for assessment of the countercyclical buffer rate. The revision will increase the probability of the buffer being built up before the financial system is hit by a negative shock requiring to release it. Early, gradual phasing-in of the buffer will give the institutions more time to build up the buffer.

A number of indicators point to risks building up in the financial system, including rising house prices and easing of credit standards, cf. above. In addition, credit growth may take off suddenly. Against this background, Danmarks Nationalbank assesses that the conditions for activating the buffer exist.

SIFI buffer requirements are lower in Denmark than in other Nordic countries

The political agreement on Bank Rescue Package 6 in 2013 included regulation on identification of Danish

15 Cf. Directive 2014/59/EU of the European Parliament and of the Council establishing a framework for the recovery and resolution of credit institutions and investment firms.

16 Besides the option of setting an add-on to the capital requirement, the supervisory authorities may also set a liquidity requirement or impose other supervisory measures under Pillar 2.

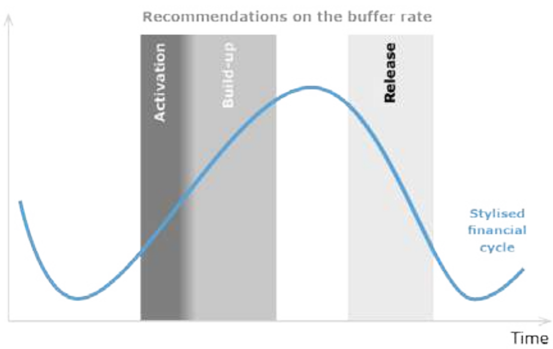
The Systemic Risk Council's approach to assessing the countercyclical buffer rate Box 5

On 17 November 2017, the Systemic Risk Council published a revised method for assessment of the countercyclical capital buffer. The method aims at early phasing-in of the buffer. This means that the building up of the buffer is commenced *before* financial imbalances emerge, cf. the chart.[1] The buffer rate is increased gradually as risks and imbalances become more pronounced.

The Risk Council's previous method entailed a risk that the buffer would not be built up in time before another negative shock would hit the financial system. Hence, the revised method incorporates a broader set of indicators detecting risk build-up at an earlier stage.[2]

Early activation of the countercyclical capital buffer provides for more gradual build-up of the buffer. This gives the institutions more time to make the necessary adjustments, e.g. by retaining profits.[3] At the same time, the costs of early activation of the buffer are assumed to be relatively limited compared with the costs, to both the economy and the individual institution, of having a capital shortfall in periods of crisis.[4]

The Systemic Risk Council's approach to assessing the buffer rate



1. The development in systemic risks is illustrated in the chart by a stylised financial cycle. Financial cycles have greater fluctuations and longer duration than business cycles. The duration of a traditional business cycle is approximately 8 years, while it is 15-20 years for a financial cycle, cf. BIS, *84th Annual Report*, 2014, Chapter 4: Debt and the Financial cycle.
2. Read more about the information basis in the Systemic Risk Council's method paper. (*link*)
3. See e.g. Bank of England, The Financial Policy Committee's approach to setting the countercyclical capital buffer, *A Policy Statement*, 2016.
4. See inter alia BCBS, An assessment of the long-term economic impact of stronger capital and liquidity requirements, 2010, and Kasper Kragh-Sørensen, Optimal capital adequacy ratios for Norwegian banks, *Norges Bank Staff Memo*, No. 29, 2012.

systemically important financial institutions, SIFIs[17], and setting the buffer requirements for Danish SIFIs. The requirement may be between 1 and 3 per cent of risk-weighted exposures, depending on the systemic importance of the SIFI.

The SIFI buffer requirement is part of the combined capital buffer requirement, which also includes the capital conservation buffer and the countercyclical capital buffer. The latter differs from the other capital requirements introduced after the crisis, in that it can be eased in times of financial stress, whereas the other requirements apply in both good and bad times.

According to the wording of the agreement, the Danish SIFI capital requirements are intended to be in line with the requirements of comparable European countries. It also appears that follow-up regarding the final level of the Danish SIFI capital requirements will take place in 2017 at the latest, and any requirements that are not in line with the requirements in comparable European countries will be adjusted.

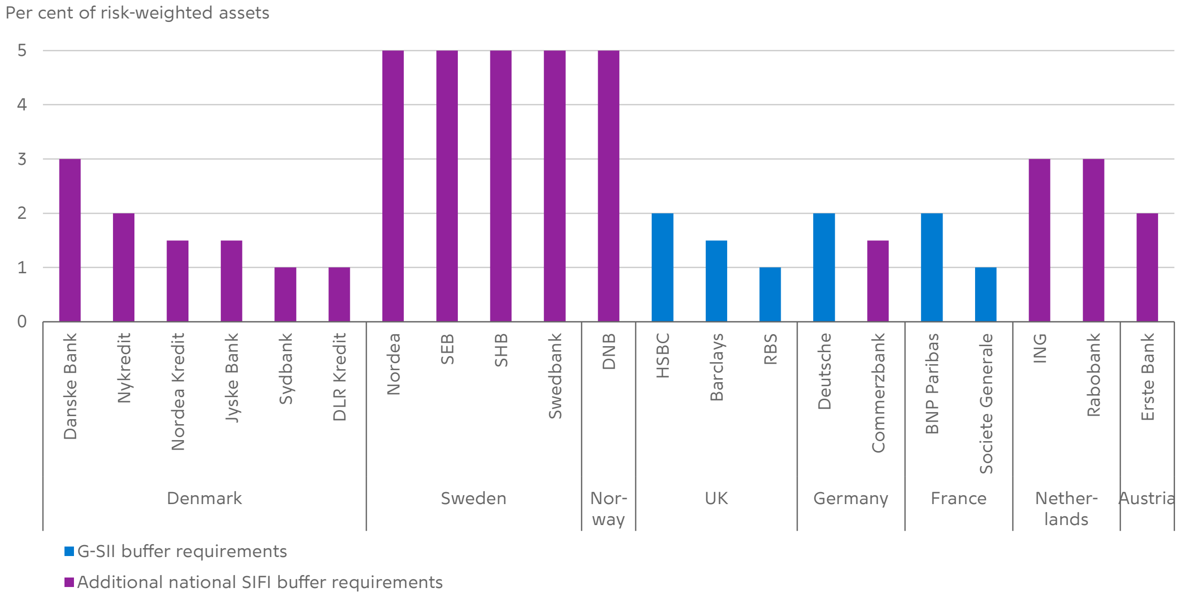
A comparison of the final level of the Danish SIFI buffer requirements with the final level of equivalent requirements for the largest institutions in several comparable countries shows considerable divergence, cf. Chart 30. The Danish SIFI buffer requirements are lower than corresponding requirements in both Norway and Sweden. In contrast, they are at the same level or higher than corresponding requirements in, inter alia, the UK, Germany and France. The higher requirements of Nordic SIFIs should be regarded in the light of the large and highly concentrated banking sectors in the Nordic countries.

In view of the current uncertainty about the future capital requirements, it would be beneficial for the issue of possible adjustment of the Danish SIFI buffer requirements to await completion of the revision of the CRR/CRD and clarification as regards the possible introduction of an output floor in the EU. Both initiatives may potentially have a major impact on the size of the future capital requirements to be imposed on Danish SIFIs.

17 Systemically important instititutions are characterised by their existence affecting the whole economy, see more concerning identification of SIFIs in Financial Business Act §§ 308 and 310.

SIFI buffer requirements are lower in Denmark than in other Nordic countries

Chart 30



Note: SII buffer requirements reflect the higher buffer requirement of global systemically important institutions. Additional national SIFI buffer requirements reflect higher capital buffer requirements on other systemically important institutions (O-SII), the systemic risk buffer rate and for Swedish institutions also "Pillar 2 systemic risk". For an institution subject to both a G-SII buffer requirement, an O-SII buffer requirement and a systemic risk buffer requirement, only the highest of these requirements applies.

Source: Financial Stability Board, Ministry of Industry, Business and Financial Affairs, Finansinspektionen, notifications to the ESRB, ECB and EBA and annual reports.

Resolution plans and proposed amendments to the minimum requirements for eligible liabilities, MREL

Credible resolution plans comprising MREL are key to a robust economy

The preparation of credible and practicable resolution plans is essential if failing credit institutions are to be resolved without the use of government funds. For SIFIs, a robust resolution plan entails that the group overall has sufficient own funds and other eligible liabilities for both loss absorption and recapitalisation. This is a precondition for restructuring the group and continuation of its critical functions. Accordingly, a credible resolution plan is key to ensuring financial stability and a robust Danish economy.

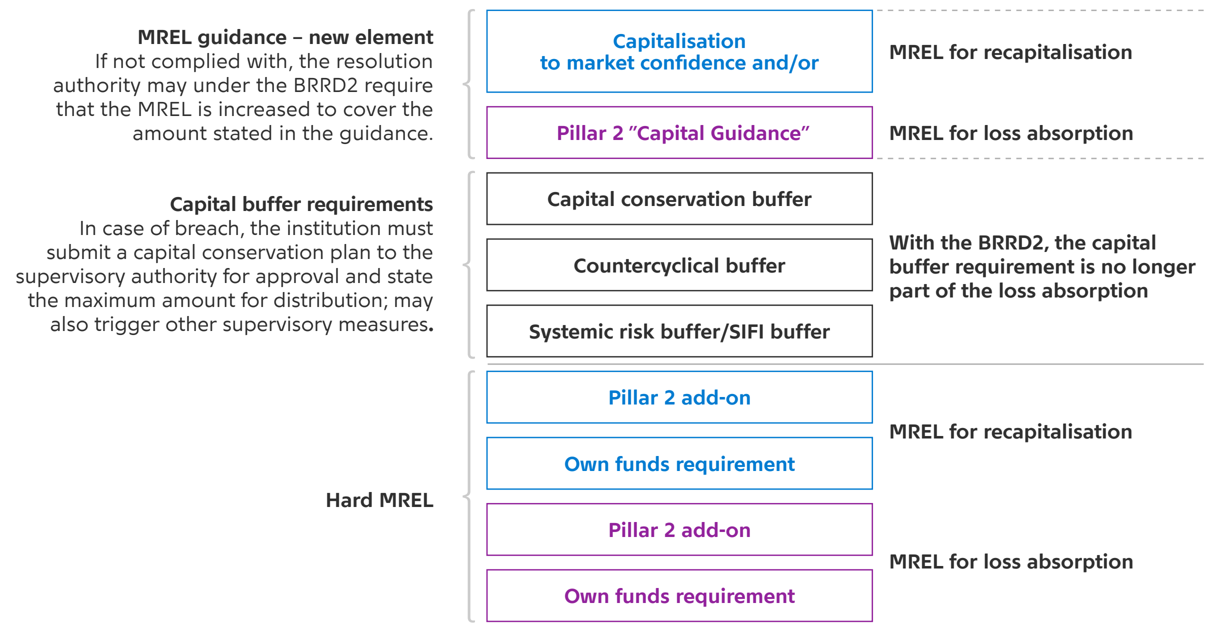
Danmarks Nationalbank has recommended that the resolution authorities apply a single point of entry, SPE, resolution strategy to Danish SIFIs where the strategy includes mortgage banks.[18] Moreover, it has recommended that resolution authorities support this strategy by setting a consolidated MREL for the group and an internal MREL for the individual institutions, including the mortgage banks[19]. Finally, legislators must ensure that Danish legislation on restructuring and resolution of financial institutions gives the resolution authorities access to using the bail-in tool and setting MREL for mortgage banks.

18 Cf. Danmarks Nationalbank, Recommendation for handling failing SIFI groups, *Danmarks Nationalbank Recommendation,* No. 1, 2017. (*link*)

19 In Danish legislation, mortgage banks are exempt from the MREL at the individual level because the bail-in tool cannot be applied to resolution of mortgage banks. For a more detailed review of the consequences of this exemption, see Danmarks Nationalbank, *Financial Stability*, 2nd Half, 2015. Here it is assessed to be essential that mortgage banks can be ordered to issue eligible liabilities, cf. Danmarks Nationalbank, Resolution strategy for SIFI groups, *Danmarks Nationalbank Analysis*, No. 21, 2017 (to be published). As regards the costs of abolishing the special regulations for mortgage banks, see Asbjørn Klein and Jacob Malte Svanborg, Too-big-to-fail can be solved inexpensively, *Danmarks Nationalbank Analysis,* No. 1, 2017. (*link*)

The Commission's proposal regarding structure of MREL for SIFIs

Box 6



As part of the Commission's package of proposals to amend BRRD, an alignment of the EU's MREL rules with the global standard for eligible liabilities applying to G-SIBs, Total Loss Absorbing Capacity, TLAC, is proposed.[1] Among other things, this will mean that in relation to groups the resolution authority must identify the "resolution entity", i.e. the legal entity to which the resolution tools are to be applied. Furthermore, the proposal entails that when determining the part of the MREL that constitutes the "loss absorption amount" the size of the capital buffer requirement will no longer be included. In addition, the proposal includes a new element on top of the MREL, "MREL guidance", which will be the guidance of the resolution authority (in Denmark the Danish Financial Supervisory Authority) on sufficient excess capital adequacy relative to the MREL. Finally, the proposal entails a certain degree of tightening of the requirements regarding the liabilities that may in future qualify as eligible, including requirements that early redemption of the capital instruments in question must be approved by the relevant authority and the that terms and conditions may not include incentives for early redemption.

1. Cf. Proposal for a Directive of the European Parliament and of the Council amending Directive 2014/59/EU on loss-absorbing and recapitalisation capacity of credit institutions and investment firms and amending Directive 98/26/EC, Directive 2002/47/EC, Directive 2012/30/EU, Directive 2011/35/EU, Directive 2005/56/EC, Directive 2004/25/EC and Directive 2007/36/EC, COM(2016) 852.

The resolution authorities' resolution strategy for non-SIFIs with balance sheet totals of less than 3 billion euro is a controlled liquidation of the institution rather than continuation. Liquidation will take place according to an arrangement which has been approved by the European Commission under the rules on state aid and which assumes full bail-in of creditors. Unsecured creditors and deposits exceeding the depositor guarantee should expect considerable losses if a private sector solution cannot be found in the recovery phase.

For Spar Nord Bank the SIFI resolution strategy and MREL will be applied[20], while the resolution strategies for the other non-SIFIs with balance sheet totals of more than 3 billion euro are awaiting publication.

20 Cf. the Danish Financial Supervisory Authority's press release, Resolution strategy and MREL for small and medium-sized banks, October 2017. (*link*)

In the EU, agreement has been reached on allowing institutions to issue a new, special kind of unsecured debt to meet the MREL. The ranking of such debt in connection with the default/resolution of the credit institution is laid down by law – a new creditor class. On 8 November 2017, the Danish Financial Supervisory Authority submitted for consultation a draft bill to amend the Financial Business Act to implement the proposal for a new creditor class. The proposal creates greater transparency for investors, which is important.

In addition, the Commission has proposed new rules about an MREL guidance. If adopted, this proposal will add a new element on top of the MREL, i.e. an MREL guidance, which will be the Danish Financial Supervisory Authority's guidance on sufficient excess capital adequacy relative to the MREL, cf. Box 7.

Proposal to amend the creditor hierarchy for resolution of credit institutions Box 7

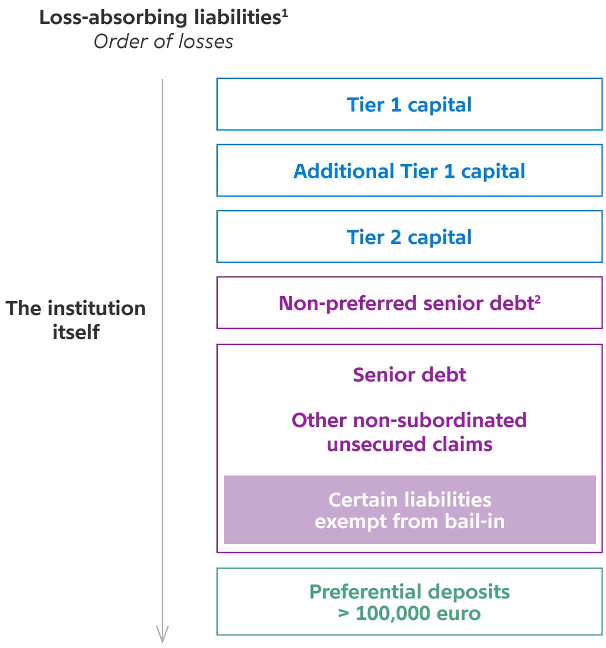
Following negotiations on the European Commission's proposal to revise the BRRD (part of the Commission's package of proposals) agreement was reached in October 2017 on an amendment which means that credit institutions will be able to issue a new, special type of unsecured debt. The ranking of this debt in connection with the default/resolution of the credit institution has been laid down by law, cf. the chart.[1] This is primarily to ensure a uniform creditor hierarchy across EU member states when using the BRRD bail-in tool, thereby creating greater transparency for investors and facilitating the use of the bail-in tool for cross-border groups. It is proposed to implement these rules via section 21 of the draft bill to amend the Financial Business Act, which the Danish Financial Supervisory Authority submitted for consultation on 8 November 2017.

The problem in relation to the existing rules is that under insolvency law some of the liabilities that can be used for MREL purposes rank alongside liabilities that must or can be exempted from bail-in in a resolution. This may be because they are completely exempted from bail-in or because they may be specifically exempted from bail-in to ensure continuation of critical functions or to prevent contagion. This means that the liabilities actually used in a bail-in must bear a larger relative share of the losses. Consequently, it could be difficult to ensure that no creditor incurs greater losses than would have been the case if the institution had been wound up under normal insolvency proceedings (the "no creditor worse off" principle).

The requirements for the new type of debt instrument are that they have a minimum original maturity of 1 year, that they do not have derivative-like characteristics, and that the contractual documentation refers directly to the relevant ranking provision in the draft bill.

According to the proposal, the amendments to the creditor hierarchy are to take effect on 1 July 2018 and apply to liabilities issued after 1 January 2018.

Bail-in hierarchy



Note: The colours indicate the following: Blue) Equity and capital instruments, Purple) Senior unsecured debt, Green) Certain deposits.
1. The bail-in tool is applied after the capital instruments have been fully written down and/or converted to Common Equity Tier 1 instruments. The order of losses is described in Danmarks Nationalbank, *Financial Stability,* 2nd Half, 2015.
2. Debt instruments used for compliance with the MREL will be placed in a special senior debt class after the expected entry into force on 1 July 2018 of the draft bill to amend the Financial Business Act. Moreover, according to the proposal, the class may also include instruments with shorter maturities than the 1-year MREL, and mortgage banks, which are exempt from the bail-in rules, will also be able to issue commitments comprised by the proposed class.

1. Cf. Proposal for a Directive of the European Parliament and of the Council on amending Directive 2014/59/EU of the European Parliament and of the Council as regards the ranking of unsecured debt instruments in insolvency hierarchy, COM(2016) 853.

MREL must support resolution plans

The EU's Bank Recovery and Resolution Directive, BRRD, gives the national resolution authorities a number of tools enabling them to restructure systemically important institutions without the use of government funds. This is ensured, inter alia, by writing down or converting capital instruments, and by ensuring that subordinated and unsecured liabilities are, to the necessary extent, written down or converted to shares and other equity in order to absorb losses in and/or recapitalise a failing financial institution, i.e. bail-in.[21]

For the resolution tools to be applied as intended in a specific situation, the resolution authorities must prepare a credible resolution plan for each institution or group. A key element of the individual resolution plan is to set a minimum requirement for eligible liabilities, MREL. In Denmark, the Danish Financial Supervisory Authority sets the MREL for the individual institutions or groups.[22]

The MREL may be met using capital instruments and unsecured debt instruments with a remaining maturity of at least 1 year. When the resolution authorities take control of a failing institution, the MREL ensures that bail-in can take place to a sufficient extent to absorb the losses and to recapitalise if the institution is to return to the market. The MREL also supports the principle that primarily shareholders and subordinated and unsecured creditors (except depositors) bear the losses. Box 7 describes the position of the new kind of unsecured debt to meet the MREL in the hierarchy of loss-absorbing liabilities (bail-in order).

MREL for SIFI banks

The Danish Financial Supervisory Authority's resolution principle for SIFI banks is that it should be possible to restructure the banks and return them to the market with sufficient capitalisation to ensure market confidence. To support this resolution strategy, the Danish Financial Supervisory Authority is expected to set the MREL for SIFI banks at twice the solvency need plus twice the capital buffer requirement[23].

According to the Commission Delegated Regulation[24], the MREL must comprise a *loss absorption amount* corresponding to the capital requirement including capital buffer requirements and a *recapitalisation amount,* at least corresponding to the capital requirement and any additional amounts necessary to ensure market confidence after application of resolution tools.

As regards setting the MREL for the individual institution, it is essential that the authorities adjust the quality and level of loss absorption and recapitalisation on the basis of its risk profile, size, interconnectedness and the resolution strategy chosen. Sufficient eligible liabilities will be required if it is to be possible and credible for the resolution authority to restructure a failing SIFI without the use of government funds.

Mortgage banks are exempt from MREL

The Danish implementation of the BRRD prevents the authorities from using the bail-in tool for mortgage banks, which are therefore exempt from having to meet an MREL. Instead, a special Danish supplementary capital requirement – the debt buffer requirement – applies to mortgage banks. For all mortgage banks, it is 2 per cent of the institution's total unweighted lending, irrespective of the institution's risks. Danish legislation assumes that a mortgage bank can always be resolved using the resolution tools, except for bail-in, combined with the special winding-up model for mortgage banks, and that the BRRD resolution objectives will be met in this way. Consequently, the Resolution Fund can not be the 'back stop' for resolution of mortgage banks, unlike for the other SIFIs.

21 A more detailed description of the EU's recovery and resolution regime, which has been implemented by Act No. 333 og 31 March 2015 and Act No. 334 og 31 March 2015, can be found in Danmarks Nationalbank, *Financial Stability*, 2nd Half, 2015.

22 The powers as resolution authority in Denmark are split between the Danish Financial Supervisory Authority, which has powers in relation to "going concern" institutions, and the Financial Stability Company, which has powers in relation to "gone concerns".

23 Cf. Danish Financial Supervisory Authority's press release, Preliminary principles for resolution plans and MREL for systemic banks, January 2017 (*link*) and the Danish Financial Supervisory Authority's memo on principles for resolution and MREL for small and medium-sized banks (only in Danish). (*link*)

24 Cf. Articles 1 and 2 of Commission Delegated Regulation (EU) 2016/1450 of 23 May 2016 supplementing Directive 2014/59/EU of the European Parliament and of the Council with regard to regulatory technical standards specifying the criteria relating to the methodology for setting the minimum requirement for own funds and eligible liabilities.

It is assessed that full or partial use of the special winding-up model will entail a substantial risk that the total lending capacity cannot be maintained and that there will be a contagion effect on the rest of the financial system.[25] When the conditions are not always met, it is not possible to implement the BRRD exemption as an absolute exemption. It should be up to the resolution authorities to assess whether the individual institutions can be deemed to be comprised by the exemption, as it is under the Single Resolution Mechanism, SRM[26].

To ensure credible resolution planning, it must therefore be possible to set an MREL for mortgage banks so that use of the bail-in tool can be planned for. Otherwise there will be an increased risk that the Danish government will have to step in to rescue a failing institution.

Given that the resolution strategies should always be based on the groups' structures and business models, it is assessed that the preferred resolution strategy should be resolution of the group as a whole. However, this requires that a consolidated MREL can be set that includes the group's mortgage credit entity.[27]

The Danish approach to resolution of non-SIFIs

Resolution strategy for banks with balance sheet totals of less than 3 billion euro

The Danish resolution authorities' resolution strategy for the smallest non-SIFIs to be supported by the MREL is a controlled "liquidation" of the institution rather than continuation. Liquidation will take place according to an arrangement which has been approved by the European Commission under the EU rules on state aid and which assumes full bail-in of creditors, cf. Box 8.

The Danish Financial Supervisory Authority is expected to set the MREL, which, besides the solvency need and capital buffers, will consist of an MREL add-on corresponding to a loss-absorbing add-on and a recapitalisation amount that will jointly be within the range 3.5-6 per cent of risk-weighted exposures.

The Danish Financial Supervisory Authority describes the solution with MREL add-on for non-SIFIs with balance sheet totals of less than 3 billion euro as a model that will improve the possibility of finding private sector solutions. This is different from the approach described previously where the MREL ensures sufficient funds for loss absorption and possibly recapitalisation in a resolution.

With an MREL add-on of this size, unsecured creditors and creditors having deposits exceeding the depositor guarantee should expect considerable

25 Cf. Danmarks Nationalbank, *Financial Stability*, 2nd Half, 2015, pp. 57-61 (*link*), which elaborates on the special conditions applying to the recovery and resolution of mortgage banks and the potential consequences of applying the special winding-up model. Asbjørn Klein and Jacob Malte Svanborg, Too-big-to-fail can be solved inexpensively, *Danmarks Nationalbank Analysis*, No. 1, 2017 (*link*) presents calculations showing that the price of setting an MREL for mortgage banks is low.

26 Cf. Article 12(5) of Regulation (EU) No 806/2014 of the European Parliament and of the Council of 15 July 2014 establishing uniform rules and a uniform procedure for the resolution of credit institutions and certain investment firms in the framework of a Single Resolution Mechanism and a Single Resolution Fund and amending Regulation (EU) No 1093/2010.

27 See Danmarks Nationalbank, Resolution strategy for SIFI groups, *Danmarks Nationalbank Analysis*, No. 21, 2017 (to be published), for further details regarding the resolution strategy for mortgage banks.

losses if a private sector solution cannot be found in the recovery phase.

Denmark takes a different approach to setting MRELs for small institutions than e.g. Sweden and the UK.[28] Those countries only set MREL corresponding to the total capital requirement, the strategy being simplified resolution that does not require recapitalisation.

Resolution strategy for banks with balance sheet totals of more than 3 billion euro

For institutions with balance sheet totals of more than 3 billion euro,[29] the Danish Financial Supervisory Authority expects to set MREL according to the same principles as for the smaller institutions, but with higher recapitalisation amounts.[30] However, the MREL for Spar Nord Bank will be set according to the principles for SIFIs since the resolution strategy is to continue the institution, as it is for the SIFIs. Therefore, it should be considered whether the institution is also to be regarded as a SIFI when it is a going concern.

The resolution strategy for other non-SIFIs with balance sheet totals of more than 3 billion euro has not yet been published. In its state aid approval, the Commission emphasises that the use of government funds for resolution of such institutions requires individual state aid approval. This means that planning can only take into account loss absorbsion and possibly recapitalisation in the form of write-down and conversion of creditor claims.

State aid approved Danish resolution scheme for banks with balance sheet totals of less than 3 billion euro Box 8

In August 2017, Denmark received prior approval from the Commission under the state aid rules for a Danish resolution scheme for banks with balance sheet totals of less than 3 billion euro. The approval applies for 12 months with a possibility of extension. It is a "revival" of the resolution model introduced by Bank Package 3[1].

As part of the scheme, the Danish resolution authorities have made a commitment to fully apply the bail-in tool in combination with "sale of business" and the "bridge institution". This primarily means that the institution's creditors must absorb all the institution's losses in accordance with the creditor hierarchy. After that, the Financial Stability Company may attempt to sell the institution within a period of six months. For a 6-month period, the Financial Stability Company may then try to sell the institution after capitalisation of a bridge institution using funds from the Resolution Fund. If it does not succeed in selling the institution, the Commission requires the Financial Stability Company to close the bridge institution. The bridge institution must be resolved within 2 years.

1. Act No. 721 of June 25, 2010, amendment to act on Financial Stability and the Commission's Daily News of August 2, 2017.

28 Cf. Riksgälden, Decision memorandum – Application of the minimum requirement for won funds and eligible liablilities, February, 2017, (*link*) and Bank of England, Internal MREL – the Bank of England's approach to setting a minimum requirement for own funds and eligible liabilities (MREL) within groups, and further issues, October, 2017. (*link*)

29 As of end-2nd quarter 2017, this group consisted of Arbejdernes Landsbank, Saxo Bank,Ringkjøbing Landbobank, Sparekassen Kronjylland and Vestjydsk Bank.

30 Depending on the bank size, the total MREL add-on will be up to 5 per cent of risk-weighted exposures higher than for banks with balance sheet totals of less than 3 billion euro.

Appendix to the Financial Stability analysis: data

The analysis of the earnings, liquidity and own funds of Danish credit institutions is based on the six credit institutions in 2017 classified by the Danish Financial Supervisory Authority as systemically important financial institutions, SIFIs, and the non-systemic banks grouped by the Danish Financial Supervisory Authority as group 2 in 2017, cf. Table 1. Nordea Bank Danmark is no longer a SIFI, as it was converted from a subsidiary into a branch from 1 January 2017. In that connection, Nordea Kredit was classified as a SIFI. Unlike in the Danish Financial Supervisory Authority's group 2, Saxo Bank has been omitted from the population due to its business model. The grouping also applies back in time.

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 Bank Danmark, while medium-sized banks are the Danish Financial Supervisory Authority's group 2 plus Handelsbanken and Santander Consumer Bank. In the analysis of NPL banks from Danish Financial Supervision Authority's group 1 and 2 are included.

The analysis applies the term "credit institutions" when referring to both banking and mortgage banking activities.

Banks and mortgage banks in the analysis by total assets as at 30 June 2017, kr. million Table 1

Systemic financial institutions	Amount
Danske Bank (including Realkredit Danmark)	3,241,379
Nykredit Realkredit (including Nykredit Bank)	1,379,698
Jyske Bank (including BRFkredit)	579,856
Nordea Kredit	434,459
DLR Kredit	155,419
Sydbank	140,071
Systemic financial institutions, total	5,930,881
Systemic banks	
Danske Bank	2,236,750
Jyske Bank	293,601
Nykredit Bank	165,147
Sydbank	142,326
Systemc banks, total	2,837,824
Non-systemic banks	
Spar Nord Bank	79,686
Arbejdernes Landsbank	46,025
Ringkjøbing Landbobank	25,474

Non-systemic banks (continued)	Beløb
Sparekassen Kronjylland	22,981
Vestjysk Bank	22,486
Sparekassen Sjælland	20,748
Nordjyske Bank	20,104
Lån & Spar Bank	18,442
Sparekassen Vendsyssel	17,206
Jutlander Bank	16,002
Den Jyske Sparekasse	14,994
Non-systemc banks, total	304,147
Mortgage banks	
Nykredit Realkredit	1,322,924
Realkredit Danmark	851,561
Totalkredit	707,160
Nordea Kredit	434,459
BRFkredit	318,078
DLR Kredit	155,419
LR Realkredit	22,627
Mortgage banks, total	3,812,229

Note: The total assets of systemic banks, non-systemic banks and mortgage banks are stated at bank-specific level, while the total assets of the systemic groups are stated at group level.
Source: Danish Financial Supervisory Authority and annual accounts.

ABOUT ANALYSIS

As a consequence of Danmarks Nationalbank's role in society we conduct analyses of economic and financial conditions.

Analyses are published continuously and include e.g. assessments of the current cyclical position and the financial stability.

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FINANCIAL STABILITY – 1ST HALF 2018

Lengthy period of increasing risk appetite in parts of the banking sector

- The times are good for the financial sector. The banks' competition to offer loans puts pressure on their credit standards, which have been eased for quite a while.
- Especially the medium-sized banks have been easing credit standards and are gaining market shares. Low interest rates and rising asset prices boost risk appetite. So it is essential that the competitive pressure does not ultimately affect the risk appetite of the banking system overall.
- This development emphasises the importance of having well-capitalised banks and of building up the countercyclical capital buffer so that the institutions have funds to mitigate the effects when the economy reverses.

Capacity in the repo market

in Denmark is not being limited by regulatory requirements

Read more

Falling risk weights

reflect increased use of internal models, among other factors

Read more

Banking union participation

can strengthen handling of cross-border systemic branches

Read more

CONTENT

Summary and assessment

Expectations of higher interest rates lead to increased volatility

The global upswing has continued and growth is robust in both advanced and emerging economies. In the USA, monetary policy is gradually being normalised, while the level of interest rates remains very low in the euro area. Following a lengthy period of low stress in the financial markets, volatility in the equity market rose sharply in early February 2018. This episode shows that sudden changes in market participants' expectations of monetary policy may lead to strong increases in risk premia and falling asset prices. There are indications that trade in volatility-related financial products amplified price fluctuations in the underlying assets. The turmoil was brief and did not spread to other markets such as the bond market.

High earnings among systemic credit institutions

The Danish economy is also picking up, which supports financial sector developments. In 2017, the earnings of the systemic credit institutions were record-high for the second year in a row. The financial statements for the 1st quarter of 2018 were also robust. Profits have been boosted in recent years because loan impairment charges have been reversed in view of the improved cyclical position. Extraordinarily high value adjustments also made a positive contribution in 2017.

The low level of interest rates is squeezing net interest income

The net interest income of credit institutions is still falling due to the low level of interest rates, which is squeezing the institutions' interest margins. To limit the fall in net interest income, the institutions have increasingly introduced negative interest rates on corporate deposits. In addition, income from fees and administration margins has risen as interest income has fallen.

Banks are competing on credit standards

In general, the banks have built up large capacity to increase lending. Combined with limited growth in demand for loans, this has intensified competition for customers. Hence, there is a foundation for lowering the credit quality and easing credit conditions that is not reflected in total lending growth. According to Danmarks Nationalbank's lending survey, the banks have gradually eased credit standards for corporate customers since 2013, mainly due to pressure from competitors. According to the survey, the medium-sized banks have eased their standards the most.

The medium-sized banks gain market shares in periods of high risk appetite

There is a large spread in lending growth across the sector, and growth tends to be particularly high among the medium-sized banks, which have started gaining market shares recently. In the period up to the latest financial crisis, market shares of the medium-sized banks also rose amid economic growth and high risk appetite. Back then, some of the banks contributed to the pressure on credit standards and credit quality requirements in the market. It is essential that the competitive pressure does not ultimately affect the risk appetite of the banking system overall.

Growth in lending to corporate customers is concentrated on the cyclical industries

As regards corporate lending, lending to cyclical industries such as building and construction, trade and property trading and letting has shown the strongest growth since 2014. Firms in cyclical industries have previously experienced large fluctuations in financial performance as a result of cyclical fluctuations. Consequently, the banks should assess the financial robustness of loan applicants over the entire business cycle.

Households may be vulnerable to rising interest rates combined with falling house prices

In recent years, households have opted for mortgage loans with longer fixed interest periods. More than half of all mortgage loans are still at variable rates of interest. So a rise in interest rates will have a marked impact on the interest burden of homeowners. Highly indebted households are particularly vulnerable to changes in interest rates. In 2016, one third of homeowner debt was held by households whose total debts exceeded the value of their homes. For highly indebted households, it is important to amortise the debt in order to reduce vulnerability to rising interest rates and falling house prices in the future.

Non-systemic banks are challenged in severe stress scenario

The results of Danmarks Nationalbank's stress test show that the systemic institutions have capital to withstand a severe recession, but several are close to exceeding the capital buffer requirements. Several of the small, non-systemic banks are challenged in the stress test, and some may have difficulty meeting the minimum capital requirement. Before the non-systemic banks reach the minimum requirement, the authorities will be able to step in if the buffer requirements are not met.

The countercyclical buffer has now been activated
On the basis of a recommendation from the Systemic Risk Council, the Minister for Industry, Business and Financial Affairs in March 2018 decided to set a countercyclical capital buffer rate for exposures in Denmark of 0.5 percentage point with effect from 31 March 2019.

The buffer is to be used to counter a negative impact on the real economy when the financial system is stressed. In that situation the buffer must be released. A buffer of 0.5 percentage point is a very modest counterweight to the potential losses during an economic downturn, so it is important that the buffer rate is increased if risk continues to build up.

Ample liquidity in the financial sector
Liquidity is high in the Danish financial sector and all credit institutions observe the Liquidity Coverage Ratio, LCR, with a certain margin. The systemic banks primarily hold highly liquid assets in their liquidity buffers, which contributes to the robustness of their liquidity reserves. But in the calculation of the LCR, the current adjustment of repo lending and deposits may have unintended consequences for the assessment of the institutions' portfolios of liquid assets.

Capacity in the repo market is assessed to be sufficient
The Danish repo market, which helps to support liquidity in the sector, has shrunk in recent years. In general, developments seem to be a result of falling demand, reflecting factors such as declining interest rates and narrowing interest rate spreads. There are no indications that Danish credit institutions' supply of repo financing is curbed by the new regulations. Consequently, it is assessed that the institutions have the capacity to increase their repo lending without breaching the regulatory requirements.

Risks linked to systemically important branches can be handled in the banking union
Danske Bank's increasing activities in Sweden and Norway exemplify how the Nordic-Baltic banking market is becoming still more integrated. In step with the growing financial integration, close co-operation between the various national authorities is becoming more important in relation to safeguarding financial stability. In the assessment of Danmarks Nationalbank, the systemic risks linked to the cross-border activities of the large institutions are best handled via strengthened collaboration within the banking union, where there is a single central supervisory authority and resolution authority.

Expectations of higher inflation and interest rates lead to increased volatility

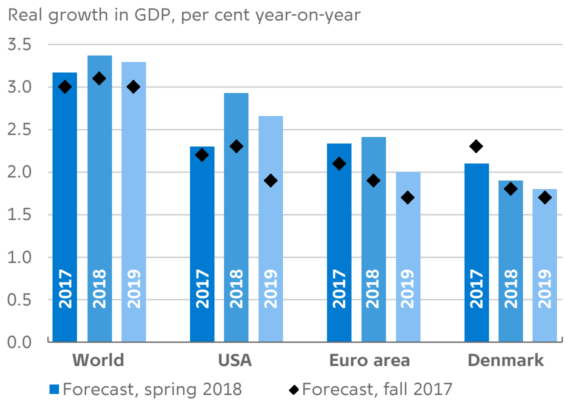
The global economy is picking up steam
The global upswing has continued and growth is robust in both advanced and emerging economies. In the last six months, the upswing has been stronger than expected and economic forecasts have been adjusted upwards, cf. Chart 1. Global growth is expected to be 3.4 per cent in 2018, while growth in the euro area and the USA is expected to be 2.4 and 2.9 per cent, respectively.[1]

At the same time, the IMF, the OECD and the European Commission all observe larger negative risks to the global upswing in the medium term. The impact of sudden interest rate shocks, asset price corrections, protectionism and geopolitical tensions are all mentioned as risks. The International organisations also caution against procyclical fiscal policy, notably in the United States.

Expectations of rising interest rates
The upswing in the USA and the euro area has led to rising pressure on the labour markets and has brought forward market participants' expectations that monetary policy will be normalised. Since December 2017, market participants' expectations of future interest rate increases in the USA have moved closer to the expectations of the Federal Open Market Committee, FOMC, cf. Chart 2. The FOMC has raised

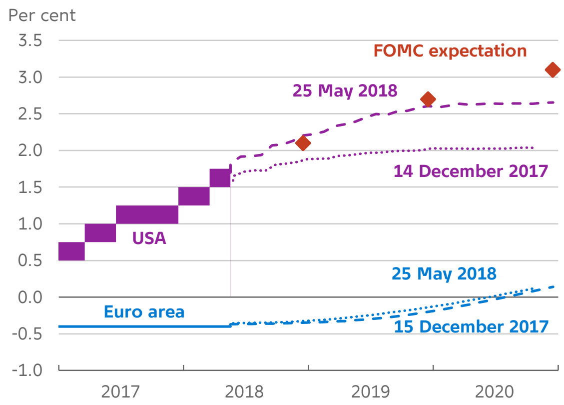
1 IMF, *World Economic Outlook*, April 2018. (*link*)

The global upswing has gained more momentum than expected Chart 1



Note: GDP growth forecasts for the world, the USA and the euro area are from the IMF's World Economic Outlooks from October 2017 and April 2018, respectively, while the forecast for Denmark's GDP growth is from Danmarks Nationalbank's projections from September 2017 and March 2018.
Source: IMF and Danmarks Nationalbank.

Interest rate expectations have risen in the USA, but are unchanged in the euro area Chart 2



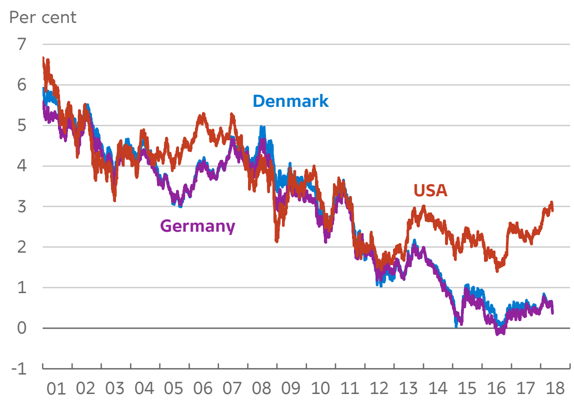
Note: Expectations in the FOMC specify the expectation for the upper limit of the Fed funds target rate. The interval is currently 1.5-1.75 per cent. The FOMC's expectations are from 25 May 2018. The broken lines are market expectations.
Source: FOMC, Macrobond and Scanrate Rio.

the interest rate once in March 2018 and in its forecast envisages a further two increases in 2018 and two in 2019. Furthermore, in October 2017 the Federal Reserve gradually began to reduce its balance sheet.

In the euro area, the European Central Bank, ECB, has kept its monetary policy interest rates unchanged, but from the turn of the year monthly net purchases under the asset purchase programme have been halved to 30 billion euro. The programme runs until September 2018 with the option of further extension. Market expectations of rising interest rates in the euro area were brought forward in the first months of 2018, but have been postponed again. The first interest rate increase is expected in 2019.

In the USA, the 10-year Treasury yield has risen since September 2017, to more than 3 per cent in April 2018, cf. Chart 3. German and Danish government yields rose in early 2018, reflecting, inter alia, expectations of faster normalisation of monetary policy, but they have fallen again and remain very low.

Government yields have risen in the USA, but remain low in Germany and Denmark Chart 3

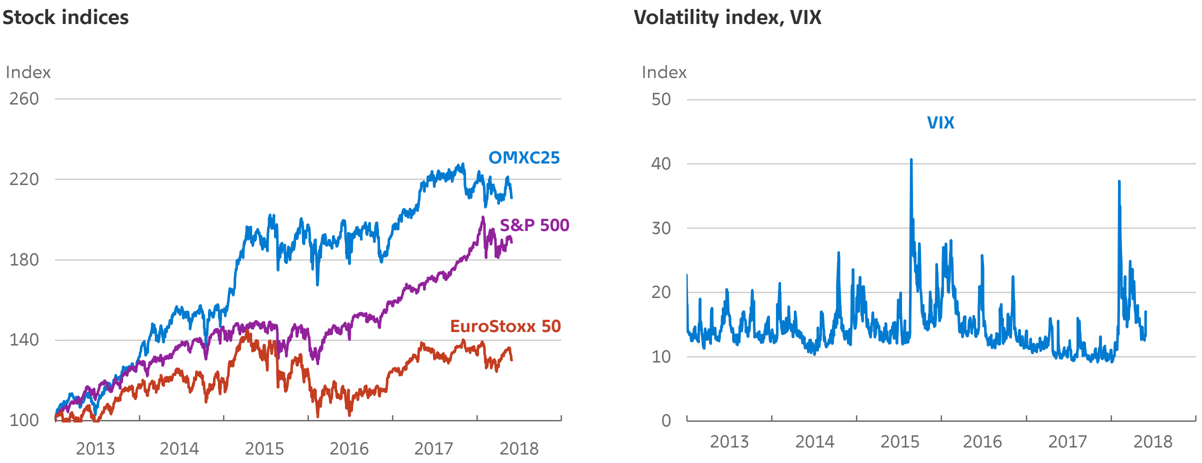


Note: 10-year par yields. The most recent observations are from 29 May 2018.
Source: Nordea Analytics.

Short, but sharp adjustment in the equity market

In early February, the equity market was characterised by high volatility. Following a lengthy period of rising prices in the market, the benchmark stock indices dived, cf. Chart 4 (left). In just one week, the

Strong adjustment in the equity market in February 2018 Chart 4



Note: The stock indices are OMXC25 for Denmark, Eurostoxx 50 for the euro area and S&P 500 for the USA. The most recent observations are from 30 May 2018. VIX is a US volatility index based on implied volatilities on S&P 500 index options with a maturity of 30 days, i.e. investor expectations of volatility over the next month. Daily observations are shown here, the most recent one being 30 May 2018.
Source: Bloomberg.

S&P 500 index fell by 9 per cent, while the EuroStoxx 600 and OMXC25 indices fell by 5 and 2 per cent, respectively. The falls came immediately after the publication of better-than-expected wage growth figures for the USA. This induced market participants to adjust their expectations of inflation, and hence the speed at which monetary policy would be normalised, upwards.

Concurrently with the fall in equity prices, implied volatility, measured by the VIX index, rose strongly, cf. Chart 4 (right). The VIX measures investors' expectations of fluctuations in the S&P 500 over the next month, calculated on the basis of prices for S&P 500 option contracts. The VIX rose to a level not seen since August 2015.

The strong falls in equity prices indicate that sudden changes in market participants' expectations regarding normalisation of monetary policy may lead to soaring risk premia and falling asset prices.

The effects of volatility-based speculation

There are indications that the market fluctuations cannot be explained by changes in inflation expectations in the market only, but were also amplified by trade in volatility-related financial products, cf. Box 1. Trade in such products may have amplified the fluctuations in the VIX index itself in connection with the February episode, as issuers in the market for derivative products needed to hedge their risks when the VIX rose. The VIX rose substantially more than the historical link between the S&P 500 and VIX indices would imply, which could indicate self-reinforcing effects, cf. Chart 5.

Furthermore, the adjustment in the VIX market may have itself reverberated on the equity markets, as investors are also able to hedge exposures in VIX futures via purchase/sale of S&P 500 futures or options.

The turmoil in the equity market did not spread to the bond market

Market developments in early February show how synthetic and leveraged products can create and amplify market fluctuations even though the market itself is small.[2] If turmoil erupts in the international financial markets, this is highly likely to affect markets in Denmark too.

The market correction came after a long period of historically low volatility in the markets, and the changes in the S&P 500 and volatility have subsequently reversed to some extent. Furthermore, the

2 The total VIX-ETP market is estimated at approximately 8 billion dollars, based on the value of the largest VIX-ETPs.

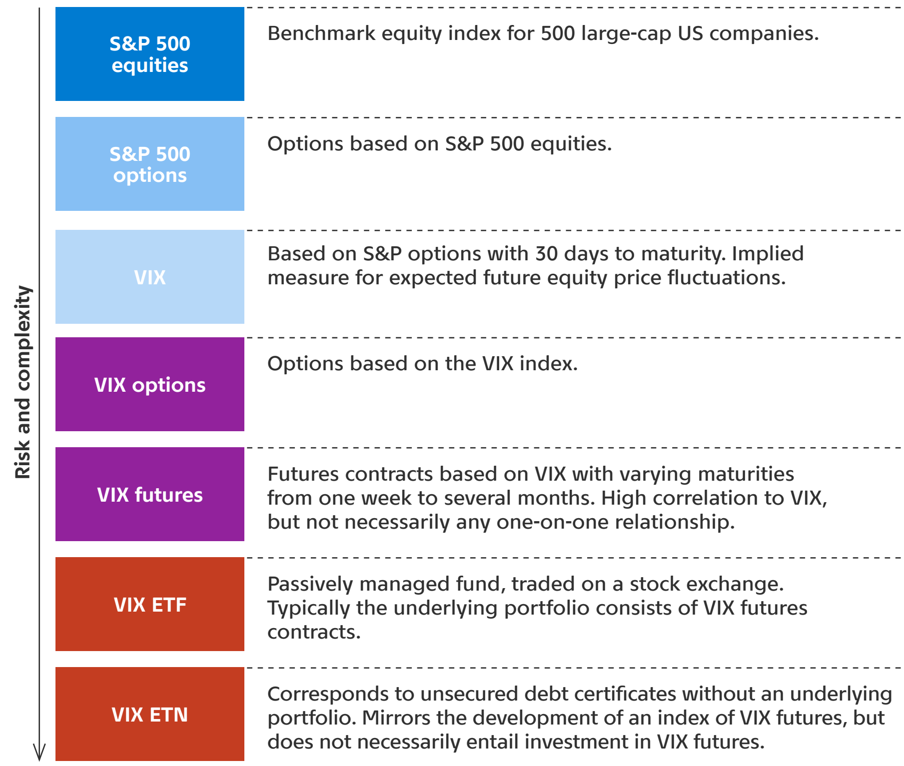
The market for VIX-related financial products

Box 1

A number of products traded in the financial markets are directly or indirectly related to the development in the VIX, cf. the Chart. The further you get into the product hierarchy, the more complex the products become. Since these products are multi-layer derivatives which may also be leveraged to different extents, fluctuations in both equity prices and volatility may have a strong impact on the market value of the products. Interconnection of the markets for options, futures contracts and exchange traded products, ETPs, may also have self-reinforcing effects.

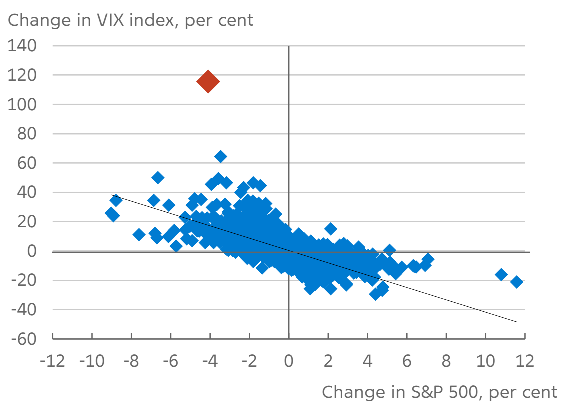
The VIX index is calculated on the basis of prices for S&P 500 options traded on the Chicago Board of Exchange, CBOE, and allow investors to speculate in the future development of the S&P 500 stock index. While the VIX index itself cannot be traded, the CBOE introduced trade in VIX-based futures in 2004 and options in 2006. The long period of historically low volatility has made special trading strategies, based on continued low implied volatility, popular. These trading strategies may entail trade in both S&P 500 options and futures, as well as trade in VIX options and futures.

The post-crisis period has seen the introduction of trade in the above-mentioned ETPs, which are to varying degrees based on VIX futures, including Exchange Traded Funds, ETFs, and Exchange Traded Notes, ETNs. ETFs are funds managing a portfolio consisting of VIX futures. ETNs are uncollateralised debt certificates issued by a bank that follow the development in an index of VIX futures. Especially the ETPs have been attracting the attention of media and supervisory authorities in connection with the large market fluctuations in early February 2018.



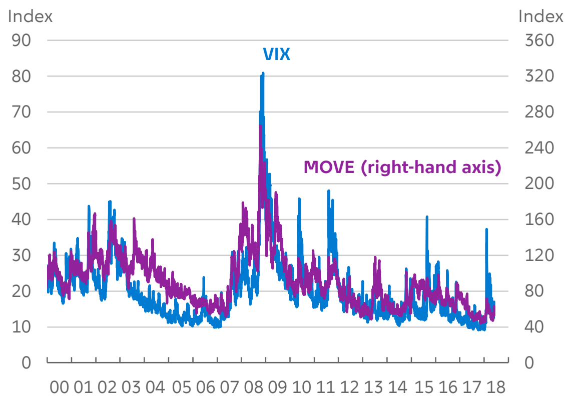
Source: CBOE and US Industry Regulatory Authority, finra.org.

A much stronger rise in the VIX index than on previous occasions when equity prices have fallen Chart 5



Note: Daily changes in the S&P 500 index and the VIX index from 3 January 1995 to 30 May 2018. The red value is the change in the VIX on 5 February 2018.
Source: Bloomberg.

Volatility in the bond market was not affected to the same extent Chart 6



Note: The MOVE index is the bond market's equivalent of the VIX and shows implied volatilities for 1-month Treasury options weighted on the basis of 2-, 5-, 10- and 30-year contracts. The most recent observations are from 30 May 2018.
Source: Bloomberg.

turmoil did not spread to other markets such as the bond market, cf. Chart 6. During other episodes of violent stress in the financial markets, credit spreads for corporate bonds and volatility in the bond markets have typically also been affected.

The reduction of the repo market seems to be driven by demand

Falling volumes of repo loans and deposits between Danish counterparties

The repo market plays a key role in relation to liquidity in the financial markets. The use of repo transactions allows market participants to place liquid funds, obtain short-term funding or gain access to collateral. In some situations, repo transactions may increase the vulnerability of the financial system. These transactions are typically short-term agreements and must be rolled over frequently to ensure long-term funding. Repo transactions may also be used to leverage the balance sheet of a credit institution. Refinancing risk and excessive leverage are precisely some of the risks that international legislation has sought to address in the wake of the latest financial crisis. As new regulation has been implemented in recent years, it has been discussed internationally whether parts of this regulation may have affected the functionality of the repo markets. One concern is that the banks have reduced their supplies of repo loans too much.

In Denmark, repo lending by credit institutions fell by almost kr. 80 billion from October 2013 to January 2018, cf. Chart 7.

New regulation does not limit repo lending in Denmark

As regards the regulatory initiatives that may have affected the repo market, focus, both internationally and in Denmark, has been on the leverage ratio, the Liquidity Coverage Ratio, LCR, and the Net Stable Funding Ratio[3], NSFR, cf. Box 2.

Credit institutions that are active in the Danish repo market report all key figures for leverage ratio and LCR. The institutions must observe an LCR of 100 per cent, while the future leverage ratio requirement is 3 per cent. On the basis of this reporting, it has been concluded that there is ample extra capacity to increase total repo lending without the statutory

3 The NSFR is still to be finalised by the EU so it has not been taken into account in the calculations.

Regulation and repo lending

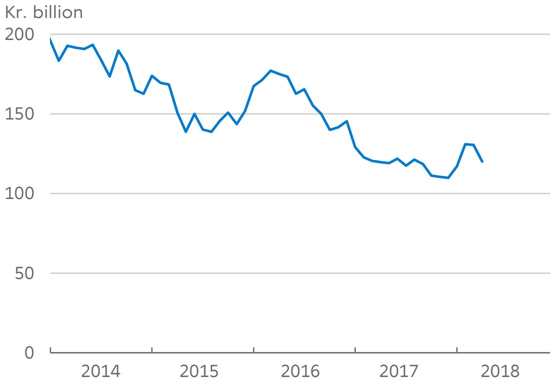
Box 2

The leverage ratio may contribute to reducing the banks' incentive to conclude repo transactions. This is because the ratio is calculated relative to unweighted exposures, unlike the risk-weighted capital requirements. Repo transactions, which are collateralised loans, have low risk weights, which mean that they are more capital intensive under the leverage ratio requirement than under the risk-weighted requirement. So a binding leverage ratio may affect the institutions' use of repo transactions.

The Liquidity Coverage Ratio, LCR, is a requirement for credit institutions to hold sufficient liquid assets to withstand 30 days of severe liquidity stress. If the maturity of the repo loan is more than 30 days, the loan cannot be included in the portfolio of liquid assets. As the LCR rules lay down specific requirements for the volume of highly liquid assets, banks may have an incentive to reduce repo lending with maturities of more than 30 days.

A falling volume of repo lending in Denmark

Chart 7



Note: Repo lending comprises repo transactions and securities lending etc. between Danish credit institutions and counterparties. Intragroup transactions have been left out. The most recent observations are from end-April 2018.
Source: Danmarks Nationalbank.

requirements becoming binding, even if a certain buffer to the requirements is taken into account, cf. Chart 8.

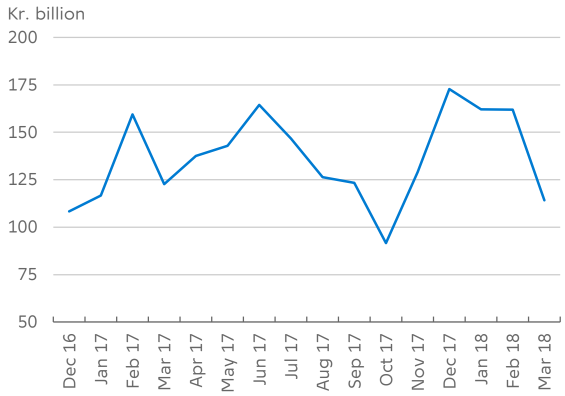
The estimated capacity fluctuates over time but shows that in March 2018 there was scope to increase repo lending for the sector by a further kr. 114 billion. At the lowest level, the extra capacity exceeds kr. 90 billion. In fact, the extra capacity exceeds the total fall in repo lending since 2013. Hence, the credit institutions' capacity to provide repo lending is not assessed to be limited at present.

Current market conditions give banks less incentive for repo financing

The reduction in repo financing has been most pronounced among credit institutions, which today borrow only one third of the October 2013 volume in the repo market, cf. Chart 9. The insurance and pension sector has also reduced its repo loans, except in a period in 2015-16 when the sector increased its repo balance sheets considerably. Alternative financial intermediaries, including e.g. hedge funds, have practically not changed their level of repo financing over this period and are now the largest loan takers in the market.

Considerable extra capacity in the Danish repo market

Chart 8

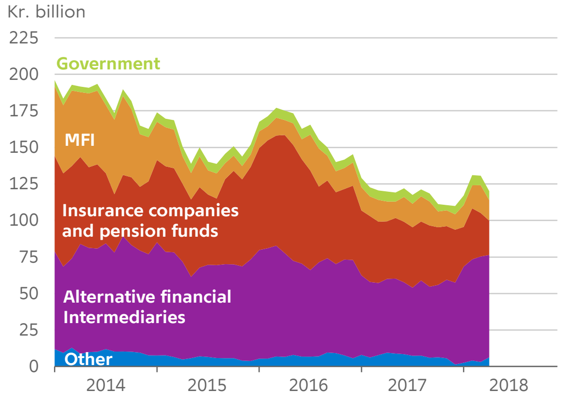


Note: It has been assumed that the banks will meet a minimum LCR of 110 per cent and a minimum leverage ratio of 4 per cent. The estimate has been calculated on the basis of the banks' reporting and takes into account the diversification rules, including statutory limitations in LCR, caps, and use of own bonds as collateral. That implies the largest possible effect from repo lending on LCR. The most recent observation is from end-March 2018.
Source: Danish Financial Supervisory Authority and own calculations.

The fall in the credit institutions' repo deposits came at the turn of the year 2014/15 and continued in early 2015. That was the period when Danmarks Nationalbank reduced the rate of interest on certificates of deposit to -0.75 per cent and intervened in the foreign exchange market in response to a strengthening trend for the Danish krone. These interventions caused the banks' net position at Danmarks Nationalbank to rise substantially. Combined with non-residents' strong demand for assets in kroner, the banks' marginal placement opportunity was primarily certificates of deposit. In such a situation, the banks have an incentive to reduce repo deposits as the net interest from borrowing in the repo market and investing the funds in certificates of deposit is negative.

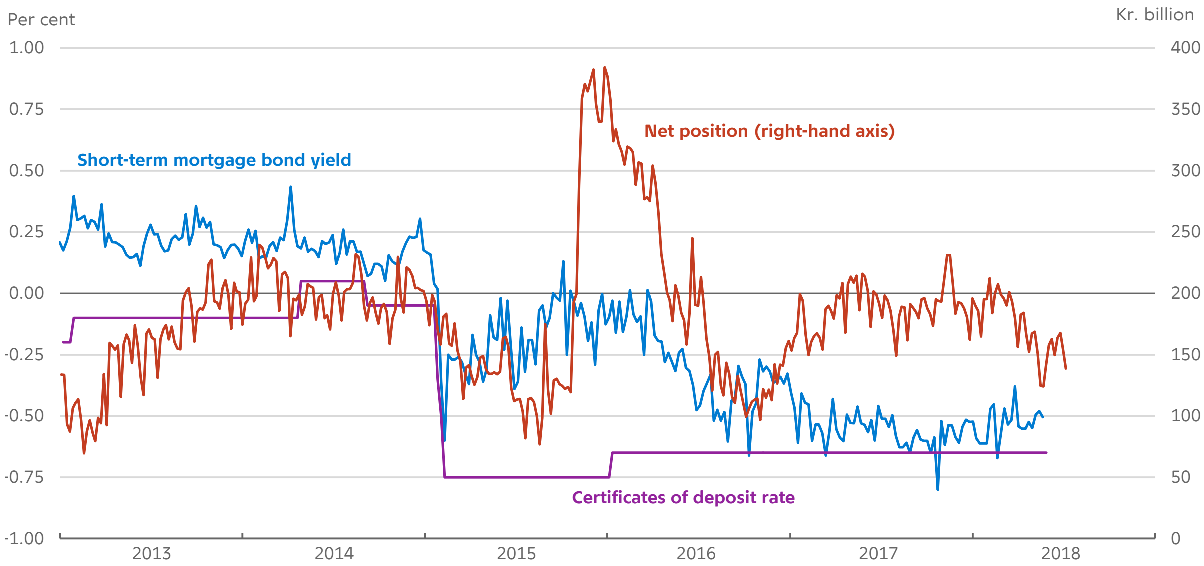
Since mid-2016, the net position has been back at the 2013 level, while the rate of interest on certificates of deposit has been -0.65 per cent since the beginning of 2016. Yields on short-term mortgage bonds and government bonds have both fallen to almost the same level. So at present the banks' marginal placement yield is close to the rate of interest on certificates of deposit, cf. Chart 10. This may be part of the explanation for the banks' current lower demand for short-term repo financing.

It is primarily the credit institutions that have reduced their repo financing Chart 9



Note: Repo lending by Danish credit institutions to domestic sectors. The most recent observations are from end-April 2018.
Source: Danmarks Nationalbank.

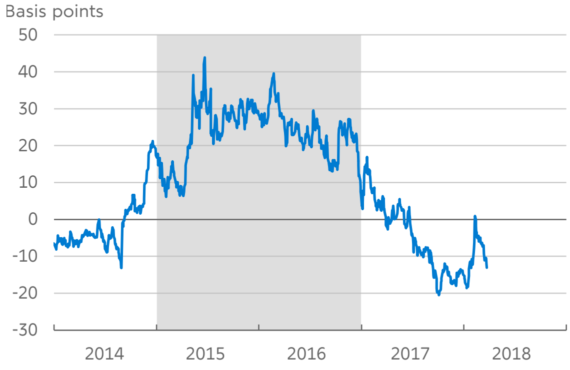
There is a link between the banks' marginal placement yield and the volume of repo financing Chart 10



Note: The short-term mortgage bond yield is the effective yield to maturity on non-callable short-term Danish bullets. The net position indicates the Danish monetary policy counterparties' total net deposits at Danmarks Nationalbank. The most recent observation is 21 May 2018 for the mortgage bond yield and 28 May 2018 for the net position and the certificates of deposit rate.
Source: Finance Denmark and Danmarks Nationalbank.

The insurance and pension sector's use of refinancing depends on the investment opportunities
The insurance and pension sector needs repo financing to fund its leveraged investments in e.g. Danish mortgage bonds. So the financing requirement will depend on the investment opportunities. In 2015-16, the sector's repo financing increased considerably. Over the same period, the option-adjusted yield for mortgage bonds rose to more than 10 basis points, cf. Chart 11. This indicates that the sector uses repo financing in periods when the yield on mortgage bonds is above a certain level. This link also points to the fall in repo lending since 2013 having been driven by demand. So the lower level of repo lending seems to reflect market conditions rather than increased difficulty in procuring liquidity in the repo market.

Repo financing increases in periods of high mortgage bond yields Chart 11



Note: The Nykredit Danish Mortgage Bond Index is calculated on the basis of a portfolio composed of the most liquid listed mortgage bonds. The grey area indicates the period during which the insurance and pension sector increased its repo financing. The most recent observations are from 29 May 2018.
Source: Nykredit Danish Mortgage Bond Index and Danmarks Nationalbank.

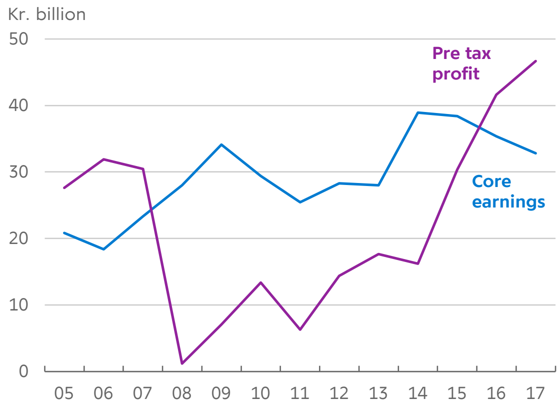
The earnings of the systemic credit institutions continue to increase

Loan impairment charges now make a positive contribution to profits
Continuing the upward trend in earnings seen in recent years, the systemic credit institutions posted record-high financial results for the second year in a row, cf. Chart 12. Reversal of loan impairment charges and large value adjustments boosted profits. If these income items are disregarded, earnings fell slightly in 2017. The financial statements for the 1st quarter of 2018 continued to show robust results. All the same, earnings were a little lower than in the same quarter of the preceding year, primarily due to large value adjustments in 2017.

The banks' loan impairment charges for the year can be broken down by reversals and new impairment charges, cf. Chart 13. 2017 was the first post-crisis year in which reversals exceeded new impairment charges. Over the last few years, the volume of reversals has been more or less constant so the fall in current loan impairment charges reflects a decline in new impairment charges.

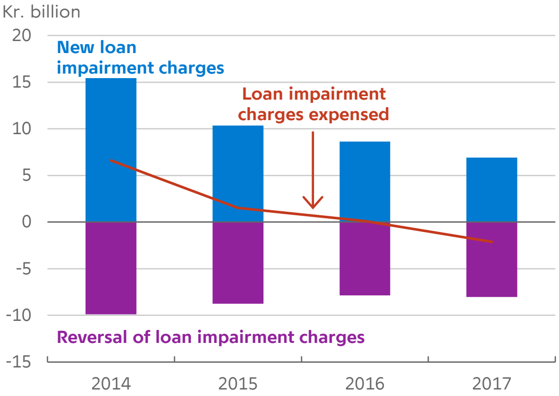
The low level of new loan impairment charges primarily reflects an improved cyclical position. As regards transactions with retail customers, net reversals totalled just over kr. 700 million in 2017, cf. Chart 14. For corporate customers, the largest net reversals were seen in the real estate sector.

High earnings among the systemic credit institutions Chart 12



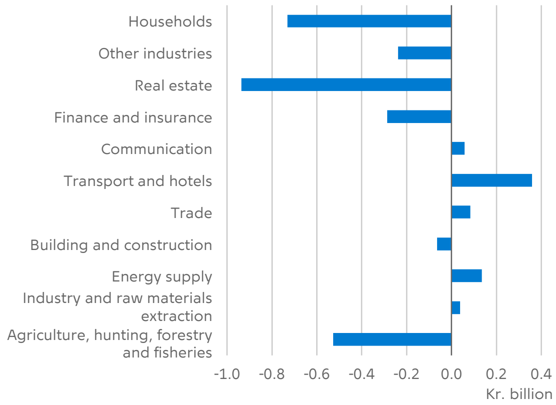
Note: Financial statements of the systemic credit institutions. Core earnings have been defined as profit before tax adjusted for goodwill less value adjustments, loan impairment charges and income from investments.
Source: Danish Financial Supervisory Authority and own calculations.

Decrease in new loan impairment charges Chart 13



Note: Financial statements of the systemic banks.
Source: Danish Financial Supervisory Authority and own calculations.

Sizeable net reversals across industries Chart 14



Note: Financial statements of the systemic banks for 2017. Reversals are shown as negative values.
Source: Danish Financial Supervisory Authority and own calculations.

Income from administration margins and net fees exceeds net interest income

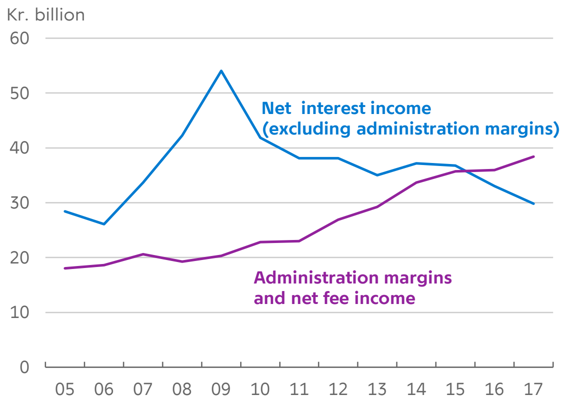
Net interest income is still being squeezed by the low level of interest rates and was just over kr. 3.1 billion lower in 2017 than in 2016, cf. Chart 15. The systemic credit institutions have compensated for this by increasing income from fees and administration margins, which has exceeded net interest income since 2016.

The reason for the low net interest income is that interest rates remain low and this puts the banks' interest margins under pressure. Since 2014, the interest margin across the large and medium-sized banks has fallen by 1 percentage point for the corporate sector and 0.7 percentage point for retail customers, cf. Chart 16.

Banks increasingly operate with negative interest rates for corporate deposits

To reduce the fall in net interest income, some banks began to charge interest on corporate deposits in 2015, and since then others have followed suit. According to Danmarks Nationalbank's semi-annual survey of the banks' use of negative interest rates, the share of corporate deposits which earned negative interest had risen to 53 per cent in September 2017, while only 10 per cent earned positive interest, cf. Chart 17. The most recently reported data for average deposit rates indicates that this tendency continues, so that most of the

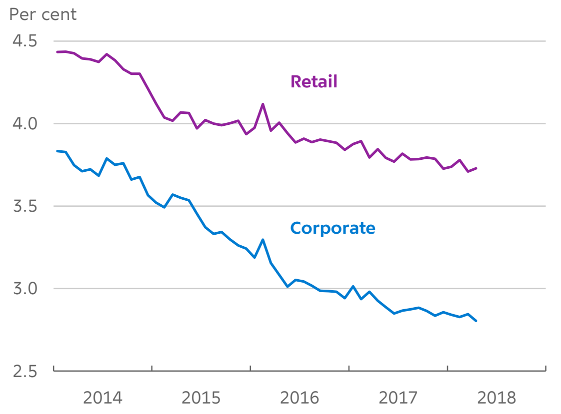
Administration margins and net fee income exceed net interest income Chart 15



Note: Financial statements of the systemic banks. Net interest income is exclusive of administration margins, and administration margins are those charged by mortgage banks.
Source: Danish Financial Supervisory Authority and own calculations.

The banks' interest margins are still narrowing

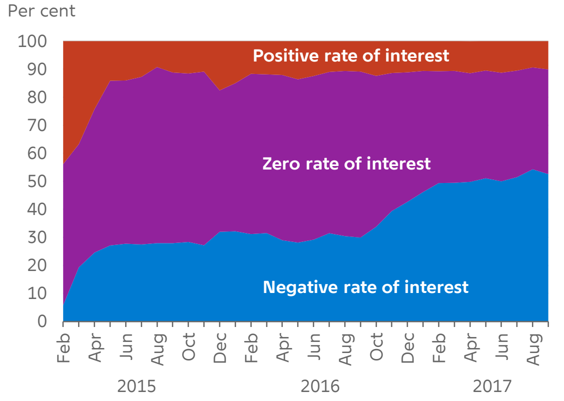
Chart 16



Note: The interest rate margins have been calculated as the difference between deposit and lending rates for retail and corporate customers, respectively, for large and medium-sized banks. The most recent observations are from end-April 2018.
Source: Danmarks Nationalbank.

A rising share of corporate deposits earn negative interest

Chart 17



Note: Breakdown of corporate bank deposits by those earning negative, zero and positive interest, respectively. The most recent observations are from September 2017.
Source: Danmarks Nationalbank.

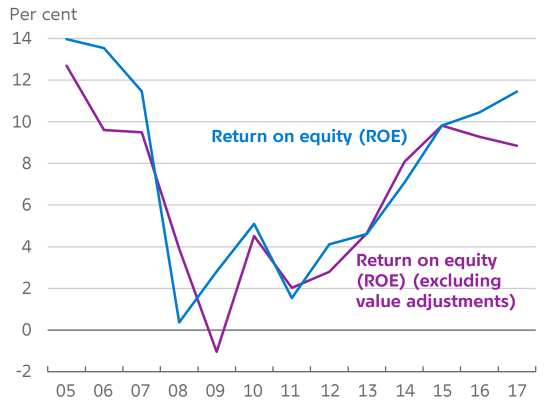
large and medium-sized banks now charge interest on corporate deposits.

Return on equity is high

The average return on equity for the systemic credit institutions continued to rise in 2017 and reached 11.2 per cent, up from 10.4 per cent in the preceding year. Especially value adjustments boost the return. If income from positive value adjustments is disregarded, the return on equity was 8.8 per cent. In view of the very low interest rates, the return on equity, even without the extraordinary contribution from value adjustments, is high, cf. Chart 18.

Return on equity has increased

Chart 18



Note: Return on equity has been adjusted for goodwill impairment charges. Data for systemic credit institutions.
Source: Danish Financial Supervisory Authority and own calculations.

Increased use of internal models has contributed to lower risk weights

Slight improvement in the systemic credit institutions' capitalisation

The systemic credit institutions all observe their own capital targets and have excess capital adequacy relative to the fully phased-in capital requirements in the Capital Requirements Regulation, CRR, so that they are able to withstand considerable financial stress without falling below the minimum requirements.

Combined with lower risk weights, the high earnings in 2017 meant that most of the systemic credit institutions were able to improve their Common Equity Tier 1 ratios slightly – despite large-scale equity buy-backs and provisions for expected dividends, cf. Chart 19.

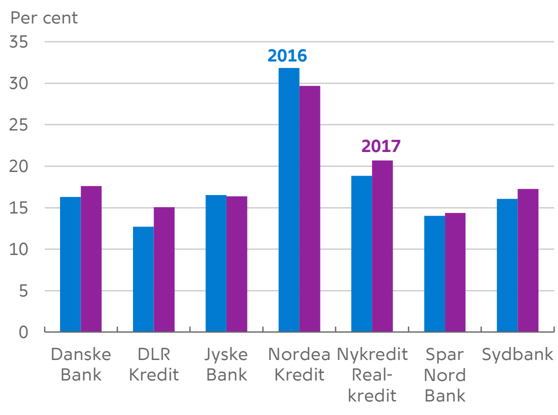
Since 2014, the level of Common Equity Tier 1 capital in the systemic credit institutions has increased by 9 per cent overall, while risk-weighted exposures have been reduced by 9 per cent. This has resulted in an average (weighted) increase in the institutions' Common Equity Tier 1 ratio of approximately 3 percentage points.

During the same period, the institutions' total balance sheet has increased marginally by around 0.3 per cent. The combination of declining risk-weighted exposures and a marginally increasing balance sheet means that average risk weights have fallen considerably, cf. Chart 20. This is attributable to several factors, including increased use of internal models.

The general improvement of the Danish housing market has not led to a marked shift in the level of risk weights for housing loans. For the largest Danish credit institutions, average risk weights for retail loans secured by real estate property are more or less stable at 13-18 per cent. However, the Danish Financial Supervisory Authority has noted that some institutions apply disproportionately low risk weights in the growth areas in and around Copenhagen and in Aarhus. Consequently, the Authority has emphasised that the average risk weight for Danish retail loans secured by real estate property should be at least 10 per cent. The Authority expects the institutions to keep up this minimum level, irrespective of the cyclical position, both for the overall portfolio and for significant sub-portfolios. For an institution with a target Common Equity Tier 1 ratio of e.g. 15 per cent, the announced expected minimum requirement for the average risk weight means that when kr. 100 is lent, at least kr. 1.5 must be financed via equity capital.

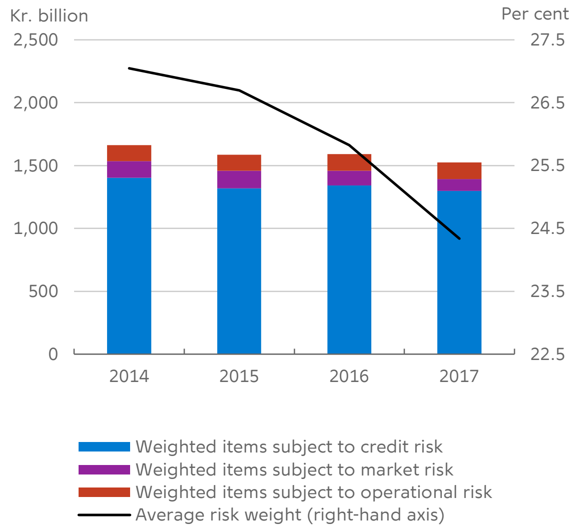
The level of the average risk weights for retail loans secured by real estate property in the largest Danish institutions remains more than twice as high as that of the largest Swedish institutions, cf. Chart 21. When comparing the capital ratios of Danish and Swedish institutions, it should be taken into account that the very low risk weights for Swedish housing loans can make the Swedish institutions appear to be

Slight improvement of Common Equity Tier 1 ratio among most systemic credit institutions Chart 19



Source: Danish Financial Supervisory Authority.

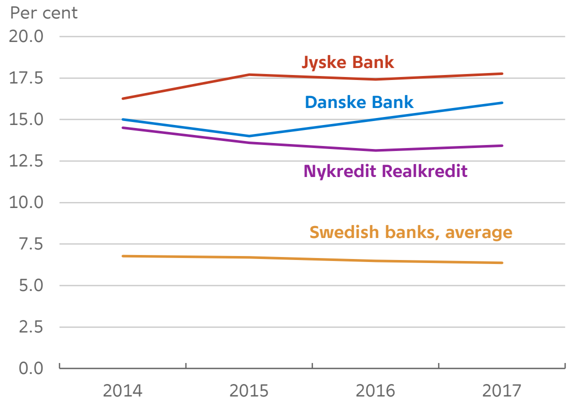
Fall in risk-weighted exposures Chart 20



Note: Based on data for systemic credit institutions. The average risk weight has been calculated as total risk-weighted exposures as a percentage of total assets, guarantees and irrevocable credit commitments. Total assets are exclusive of insurance activities, which are not comprised by the CRR consolidation.
Source: Danish Financial Supervisory Authority and own calculations.

better capitalised than the Danish ones.[4] But if the unweighted capital measure, the leverage ratio, is considered instead, the capitalisation of the largest Danish banks is closer to that of their Swedish equivalents, cf. Chart 22. All the same, the capitalisation of Danske Bank and Nykredit Realkredit is still lower than that of Nordea, SEB, Swedbank and the Norwegian bank DNB.

Average risk weights for housing loans remain substantially higher than in Swedish banks Chart 21



Note: Average risk weights using the internal ratings-based approaches for retail lending secured by real estate property. Nordea Kredit has not been included as it did not publish risk reports before 2017.
Source: Own calculations based on risk reports.

The largest banks are close to buffer requirements in a severe recession

Danmarks Nationalbank's accounts-based stress test assesses the institutions' excess capital adequacy over the next three years under three different macroeconomic scenarios.[5] The systemic credit institutions have sufficient capital to withstand a severe recession scenario, but several are close to exceeding the capital buffer requirements.

The mortgage credit activities of the credit institutions are now included in Danmarks Nationalbank's stress test. This means that it is possible to perform stress tests at group level, not only at bank level as previously. The stress test shows that the credit institutions are generally robust to even considerable loan impairment charges for mortgage loans. Given their high earnings from administration margins, the mortgage banks post mostly positive results, even in a stress scenario, but the stress test also shows that risk weights can increase by up to 25 per cent.

Several of the small, non-systemic banks are challenged in the stress test, and some may have difficulty meeting the minimum capital requirement. Before the non-systemic banks hit the minimum requirement, breach of the buffer requirements will allow the authorities to intervene. If the solution is recovery or resolution, the authorities have the tools required to address such a situation, but the owners and creditors of the banks in question may suffer losses.

The countercyclical buffer has now been activated

On the basis of a recommendation from the Systemic Risk Council, the Minister for Industry, Business and Financial Affairs in March 2018 decided to set a countercyclical capital buffer rate for exposures in Denmark of 0.5 percentage point with effect from 31 March 2019. The Council has also indicated that it expects to recommend a further increase of the buffer rate during 2018 if risk continues to build up at the current rate.

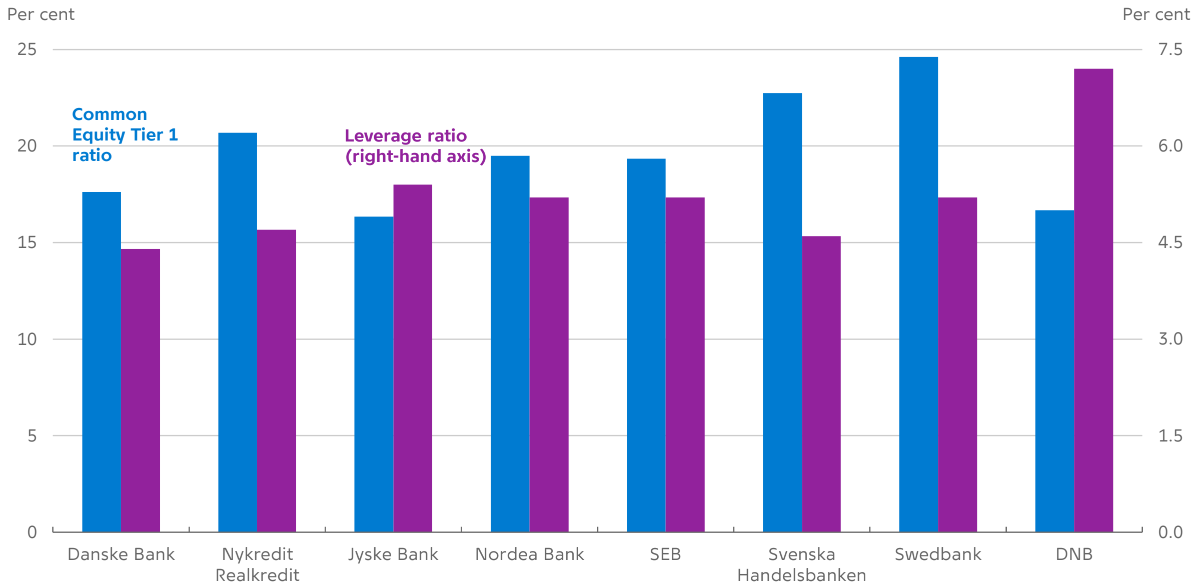
The countercyclical capital buffer differs from other capital requirements in that it varies with the development in systemic risks. The buffer is to be used

4 The Swedish Financial Supervisory Authority, Finansinspektionen, has set a floor of 25 per cent for risk weights on Swedish housing loans. This floor has been implemented under Pillar 2 and is therefore of no consequence to the size of the risk-weighted exposures. In April 2018, Finansinspektionen proposed replacing the current Pillar 2 floor by a capital requirement under Pillar 1 in accordance with article 458 of the CRR. This will reduce the published capital ratios as the risk-weighted exposures will rise.

5 The three stress scenarios and the results of the stress test are described in more detail in Danmarks Nationalbank, The largest banks are close to buffer requirements in stress test, *Danmarks Nationalbank Analysis (Stress Test)*, No. 5, May 2018. (*link*)

Large differences in capitalisation according to weighted and unweighted capitalisation measures

Chart 22



Note: Common Equity Tier 1, CET1, capital as a percentage of risk-weighted exposures. The leverage ratio is calculated as Tier 1 capital as a percentage of unweighted exposures, i.e. total assets with certain adjustments regarding derivative and repo transactions and off-balance-sheet exposures.
Source: SNL Financial and risk reports.

to counter a negative impact on the real economy when the financial system is stressed. In that situation the buffer must be released. This helps the banks to maintain a suitable level of lending in periods of stress in the system.

With the current excess Common Equity Tier 1 capital, the systemic credit institutions already comply with the countercyclical buffer requirement – even at a higher rate than 0.5 percentage point. So activation of the buffer does not lead to an instant need to inject further capital, but helps to ensure that the institutions have sufficient excess capital adequacy relative to the minimum capital requirements. A buffer of 0.5 percentage point is a very modest counterweight to the potential losses and rising risk weights during an economic downturn, so it is important that the buffer rate is increased if risk continues to build up.

Institutions should consider preparing for new Basel requirements

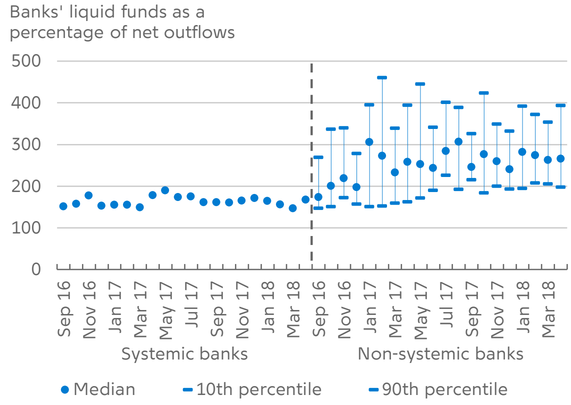
In December 2017, the Basel Committee published a reform package known as the completion of Basel III. The package supplements the measures that were part of the original Basel III reform from 2010 and comprises, inter alia:

- new, improved standard approaches to calculating risk-weighted exposures for credit risk, credit value adjustments, CVA, and operational risk
- limitation of the use of internal models and introduction of "input floors" for the PD, LGD and EAD parameters when calculating IRB risk weights for credit risk
- introduction of an output floor for total risk-weighted exposures.

Calculations made by a group of experts appointed by the Minister for Industry, Business and Financial Affairs in February 2017 show that, overall, the completion of Basel III will cause the capital requirement for the largest Danish credit institutions to rise by around kr. 78 billion.[6] Measured relative to the risk-weighted exposures, this corresponds to an average increase of 5.5 percentage points in the institutions' capital requirements. The output floor is by far the most significant reason for this increase.

The Basel Committee envisages that the reform package will enter into force on 1 January 2022, with phasing-in of the output floor from 2022 to 2027. The package must be adopted by the EU before it applies to Danish institutions. However, it is important that the institutions already begin to consider whether they need to adapt to the new requirements in connection with their capital planning for the coming years.

Banks comply with the LCR Chart 23



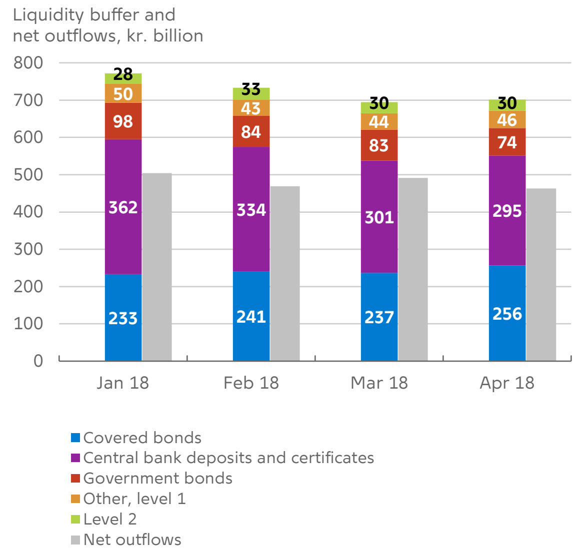
Note: The banks must comply with a minimum liquidity coverage ratio, LCR, of 100 per cent. The banks switched to new LCR reporting forms in September 2016, which is why the time series begins then. The most recent observations are from April 2018.
Source: Danmarks Nationalbank.

High liquidity in the financial sector

The banks comply with the LCR requirement
Danish banks comply with the short-term Liquidity Coverage Ratio, LCR, with a certain margin, cf. Chart 23. The excess capital adequacy helps to protect the banks against unforeseen liquidity needs. The LCR is to ensure that the banks have adequate high-quality liquid assets to cover a 30-day intensive liquidity stress scenario. The banks' LCR varies over time due to changes in the portfolio of liquid assets and/or changes in cash flows.

The liquidity buffer primarily consists of highly liquid assets
The LCR liquidity buffer may consist of a number of liquid assets, cf. Chart 24. Danish banks primarily hold central bank deposits and certificates of deposit as well as covered bonds in their liquidity buffers.

Covered bonds and central bank assets fully cover 30 days' net outflows Chart 24



Note: The total liquidity buffer and net outflows of systemic and non-systemic banks. Net outflows have been calculated on the basis of LCR reports. The most recent observations are from April 2018.
Source: Danmarks Nationalbank.

6 The calculations are based on data for Danske Bank, Nykredit Realkredit, Jyske Bank, Nordea Kredit and Sydbank as at 30 September 2016. It has been assumed that the institutions' Pillar 2 requirements are unchanged in nominal terms. See Ministry of Business, Industry and Financial Affairs, Effekter af Baselkomitéens anbefalinger om kapitalkrav til kreditinstitutter (Effects of the Basel Committee's recommendations on capital requirements for credit institutions – in Danish only), February 2018.

Hence, net outflows are fully covered by highly liquid assets, which contributes to the robustness of the banks' liquidity reserves.

Systemic institutions must comply with an LCR currency requirement

To ensure healthy liquidity management, it is also important that there is no mismatch between the individual institution's assets and liabilities in the same currency. Consequently, Danish systemic credit institutions must comply with LCR requirements in the currencies that are significant for the individual institution. A currency is significant if the institution's total commitments in that currency constitute 5 per cent or more of its total liabilities. Swedish kronor and Norwegian kroner are exempt from the foreign exchange LCR requirement. In the 1st quarter of 2018, all institutions complied with the LCR currency requirement.

Adjustment of the liquidity buffer for repo transactions

The LCR requirement is to ensure that credit institutions have an adequate buffer of liquid assets to cover their commitments in the next 30 days. Therefore, the LCR regulatory framework includes a requirement that the portfolio must be adjusted for assets that will be provided or received during the next 30-day period, for instance in the form of repo deposits and lending, cf. Box 3.

However, this adjustment could entail that the actual level of liquid assets is not reflected in the LCR calculation, given that the portfolio increases if the bank holds a larger volume of repo lending than of repo deposits.

Several Danish banks increase their portfolios of highly liquid assets, level 1A assets, by providing

Adjustment of the liquidity buffer for repo deposits and lending Box 3

The liquidity buffer must be diversified and robust. Accordingly, the LCR regulatory framework includes a requirement that at least 30 per cent of the buffer must consist of highly liquid assets such as central bank deposits or government bonds, "level 1A assets".

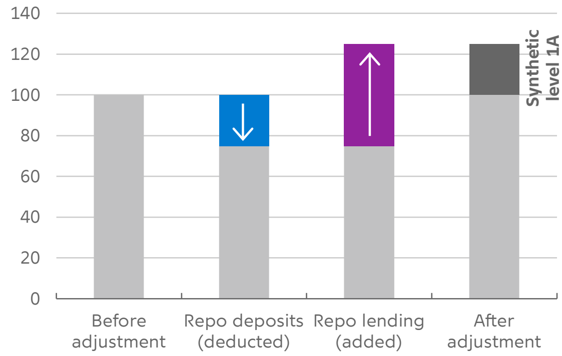
In the calculation of level 1A assets, the banks must adjust for liquidity borrowed through repo deposits or lent through repo lending[1].

This means that when a bank has received liquidity against collateral and will receive the collateral back at an agreed time, the liquidity must be deducted from the liquidity buffer. The reason is that, in effect, the liquidity has been pledged to a counterparty and is thus not at the disposal of the bank. For instance, a bank with a liquidity buffer of 100 level 1A assets which has a repo deposit of 25 has an adjusted portfolio of 75 level 1A assets, cf. the chart.

The opposite is true for repo lending in which the bank has provided a loan against collateral, for instance by buying a bond which is sold back to the counterparty at an agreed time. In that case, a bank with a liquidity buffer of 100 level 1A assets which provided a repo loan of 25 has an adjusted portfolio of 125 level 1A assets.

Due to the adjustment, a bank may have a lower or higher volume of level 1A assets than the bank actually has on its balance sheet. This means that the correction results in a *synthetic* level 1A portfolio that is positive if the bank provides more repo loans than it receives repo deposits.

The adjusted portfolio determines whether the minimum requirement of 30 per cent level 1A assets in the buffer has been complied with. If the institution has too few level 1A assets, this restricts the number of other assets that may be included. If the level 1A assets are increased, the volume of other assets that can be included in the liquidity buffer may thus be increased. For instance, if the institution has 30 level 1A assets after adjustment for repo deposits and lending, 70 other assets may be included, while any excess assets cannot be included.



1. Repo deposits entail receiving liquidity against collateral, while repo lending entails provision of loans against collateral. The examples assume that the transactions mature within 30 days and are thus included in the LCR calculation.

repo lending, whereby the bank provides loans against collateral. A few banks more than doubled their portfolios of level 1A assets through repo lending in most of 2017, cf. Chart 25. While this is in full compliance with the LCR regulations, it generally results in a less robust liquidity buffer than if the banks had instead held the liquidity provided through repo lending themselves or had held government bonds. If a bank's counterparty is unable to repay the collateralised loan, the bank is left with e.g. less liquid bonds or its own bonds. In a situation, where the bank in questionor the market as a whole is under stress, this could present a potential liquidity risk.

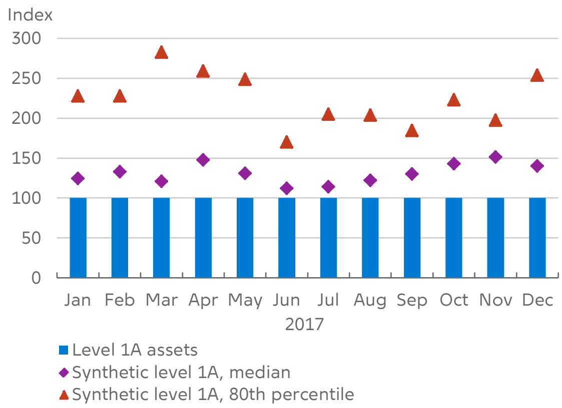
Liquidity monitoring is more than LCR
The LCR time horizon is 30 days. This means that it is not disclosed whether the institutions are faced with large maturities on individual days within the 30-day period – maturities that would be difficult to cover in a crisis. From the 1st quarter of 2018, the institutions report the maturity dates of payments. This will enable the authorities to assess more precisely when an institution will need liquidity to settle its payments.

Proposed amendments to the LCR
In January 2018, the European Commission presented draft legislation to amend the rules for calculating the LCR. As it appears from Danmarks Nationalbank's comments on the draft delegated act[7], Danmarks Nationalbank supports the amendments which solve the unwind problem for repos with central banks in a systemic crisis. As described, the framework for repo deposits and lending in the calculation of the LCR, including the adjustment of level 1A assets, may have unintended consequences.

Strong pressure to ease credit standards in the banking sector

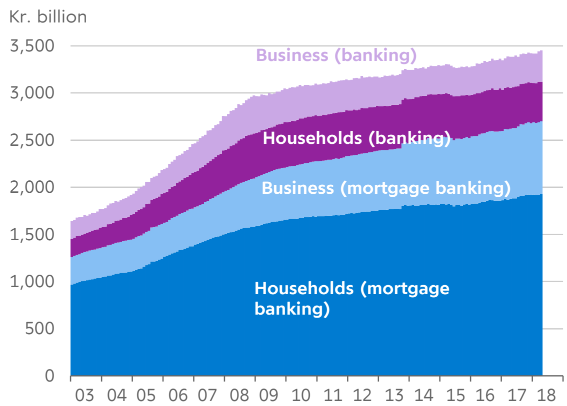
Mortgage lending continues to drive lending growth
Lending to Danish households and firms by large and medium-sized credit institutions has continued to increase over the past year, cf. Chart 26. Favourable developments in the financial sector in recent

Adjustment for repo deposits and lending has significance for the calculation of level 1A Chart 25



Note: The monthly portfolio of level 1A assets before adjustment (indexed to 100) and the portfolio of level 1A assets resulting from repo deposits and lending relative to level 1A before adjustment for the median and 80th percentile, respectively. For these purposes, level 1A after adjustment is designated as synthetic. Data for systemically important institutions.
Source: Danmarks Nationalbank and own calculations.

Increase in domestic lending is due to rising mortgage lending Chart 26



Note: Lending to households and business by large and medium-sized banks and mortgage banks. The self-employed are included in the "households" sector. The most recent observations are from end-April 2018.
Source: Danmarks Nationalbank and own calculations.

7 Danmarks Nationalbank, Comments on the Draft Delegated Act Amending the Commission Delegated Regulation on the Liquidity Coverage Ratio (LCR). (*link*)

years mean that banks generally have significant capacity to increase lending. Combined with increasing, but limited, growth in demand for loans, this has intensified competition for customers. Hence, there is a foundation for lowering the credit quality and easing credit conditions that is not reflected in total lending growth.

As a result of the gradual shift from bank loans to mortgage loans in recent years, mortgage lending continues to drive lending growth. There is a large spread in lending growth across the sector, cf. Chart 27, and growth tends to be particularly high among the medium-sized banks.

The medium-sized banks gain market shares in periods of high risk appetite

For a number of years, the large banks have overall reduced bank loans in favour of mortgage loans, including mortgage-like bank loans, which are to some extent transferred from the banks' to the mortgage banks' balance sheets. This helps to explain why the medium-sized banks are gaining market shares for household bank loans since 2014, cf. Chart 28. The market shares of medium-sized banks for corporate loans also increased in 2017 after having been stable for an extended period.

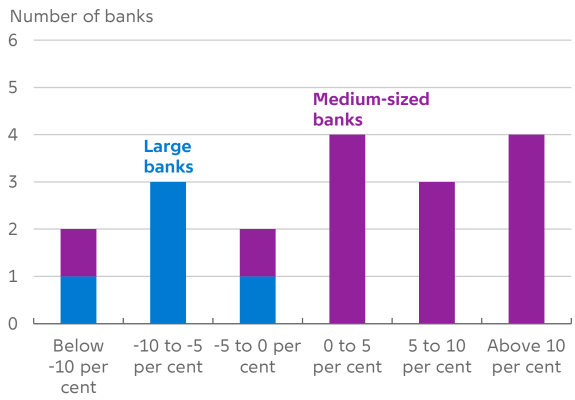
In the period up to the latest financial crisis, market shares of the medium-sized banks also rose amid economic growth and high risk appetite. Back then, some of the banks contributed to the pressure on credit standards and credit quality requirements in the market.

Signs of increased risk-taking for corporate customers

According to Danmarks Nationalbank's lending survey, the banks have been easing credit standards since 2014, cf. Chart 29. Medium-sized banks, in particular, have been easing credit standards for corporate customers. But the credit managers of the banks reported less easing of credit standards in 2017, and in the 1st quarter of 2018 credit standards remained unchanged. This should be seen in the context of medium-sized banks reporting continuous easing of credit standards for 14 consecutive quarters.

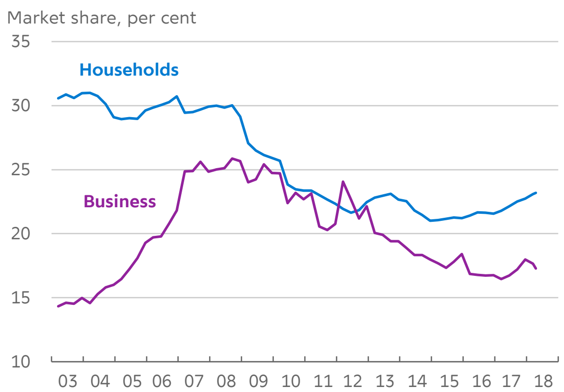
According to the survey, the credit managers of both medium-sized and large banks respond that the main reason for easing of credit standards is competitive pressure, cf. Chart 30. In the current environment of intense competition, it is essential that the

Considerable variation in banks' lending growth Chart 27



Note: The number of banks within each lending growth interval in 2017. Growth is based on banks' domestic lending to households and business.
Source: Danmarks Nationalbank and own calculations.

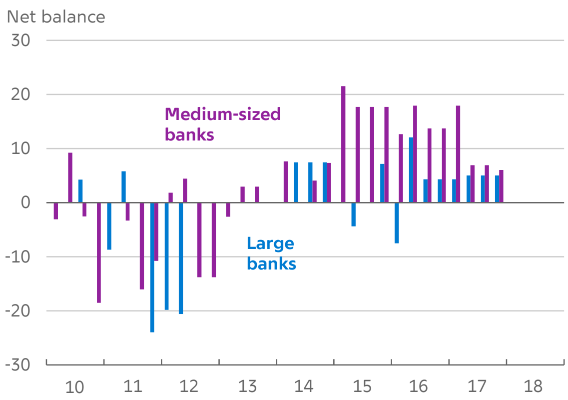
The medium-sized banks' market shares have started to increase Chart 28



Note: Lending by medium-sized banks relative to total lending by large and medium-sized banks and foreign branches in Denmark. All banks included in the Danish Financial Supervisory Authorities' population of medium-sized bank at any point in time since 2013, are included in the chart. The most recent observations are from end-April 2018.
Source: Danmarks Nationalbank and own calculations.

Banks have been easing their credit standards since 2014

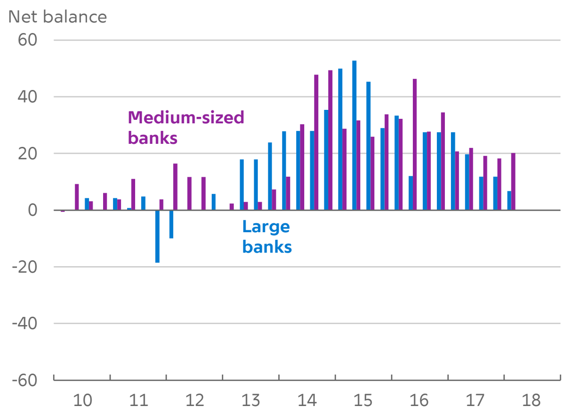
Chart 29



Note: The lending survey for corporate customers. The net balance lies within the interval -100 to 100. A positive (negative) net balance means that credit managers of the banks in question have, overall, i.e. lending-weighted, stated that they have eased (tightened) their standards relative to the preceding quarter. The most recent observations are from the 1st quarter of 2018.
Source: Danmarks Nationalbank.

Increasing pressure on credit standards from competitors

Chart 30



Note: The lending survey for corporate customers. The net balance lies within the interval -100 to 100. A positive (negative) net balance means that credit managers of the banks in question have, overall, i.e. lending-weighted, stated that they have eased (tightened) their standards relative to the preceding quarter. The most recent observations are from the 1st quarter of 2018.
Source: Danmarks Nationalbank.

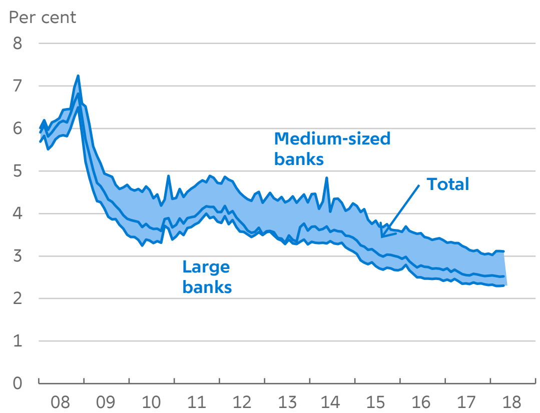
banks continuously ensure solid credit quality. This reduces the risk that lending to new customers will lead to substantial losses when the economy reverses.

Problems in a medium-sized bank do not constitute a direct threat to financial stability, but it is essential to ensure that competitive pressure does not over time affect the risk appetite of the entire banking sector.

According to Danmarks Nationalbank's lending survey, medium-sized banks' easing of credit standards has been reflected mainly in a narrowing of margins. This is consistent with interest rate developments. While the banks' average interest rate on corporate loans has stabilised over the past year, the spread between the interest rates of medium-sized and large banks has narrowed, cf. Chart 31.

Corporate interest rate spread between medium-sized and large banks has narrowed

Chart 31



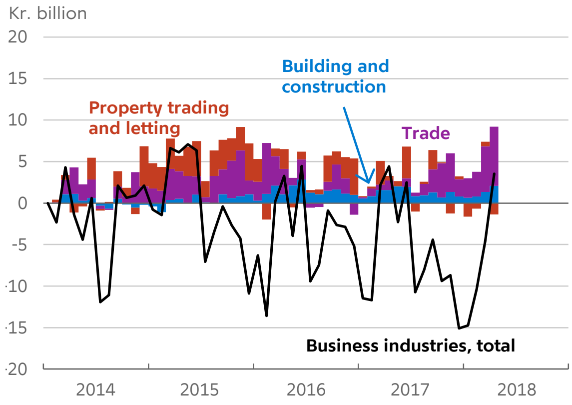
Note: The interest rate spread between medium-sized and large banks' lending reflects differences in the lenders' credit risks, but also other factors such as product structures. The most recent observations are from April 2018.
Source: Danmarks Nationalbank and own calculations.

Growth in lending to corporate customers is concentrated on the cyclical industries

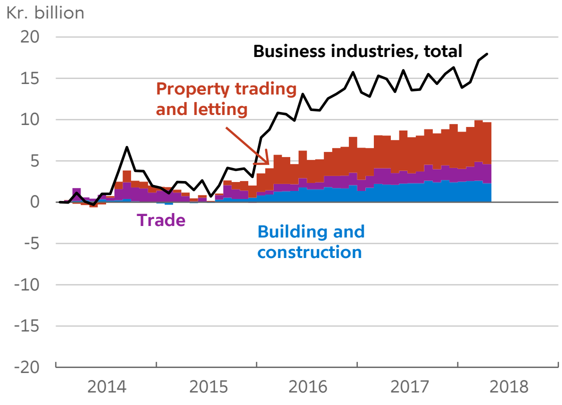
The increase in large and medium-sized banks' lending to the corporate sector has been limited, cf. Chart 32. There is considerable variation in the lending growth to different industries. Both large and medium-sized banks' lending to cyclical industries such as building and construction, trade and property trading and letting has risen since 2014.

Lending to cyclical industries has increased Figur 32

Large banks



Medium-sized banks



Note: Cumulative change in lending by large and medium-sized banks since start-2014. The category "Business industries, total" is the sum of all industries excluding "Financial and insurance activities", "Employees, etc." and "Public administration, defence and police". The most recent observations are from end-April 2018.
Source: Danmarks Nationalbank and own calculations.

In cyclical industries, firms' investment opportunities tend to improve as an upswing gains momentum, and hence their demand for bank loans will increase. That is a natural element of a period of economic growth. This also means that the banks should assess the financial robustness of loan applicants over the entire business cycle. Firms in cyclical industries have previously seen large fluctuations in their financial results over the business cycle, cf. Chart 33.

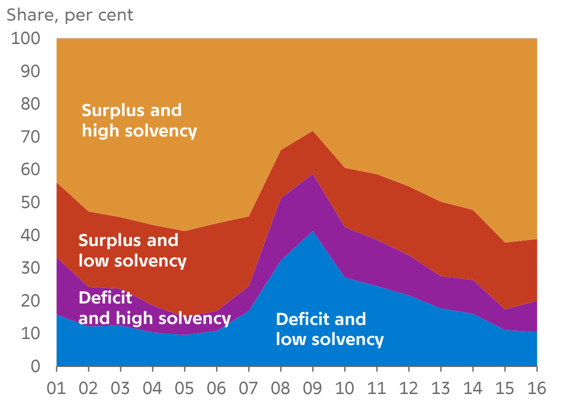
Variable rate loans are popular with corporate customers

Firms in cyclical industries have a large share of variable rate mortgage loans, cf. Chart 34.

For many firms, it makes sense to use variable rate loans in their funding structures. In a traditional business cycle, their borrowing costs will drop during the downturn, given that interest rates tend to fall with the decline in economic activity. Conversely, financial costs are higher in a boom period.

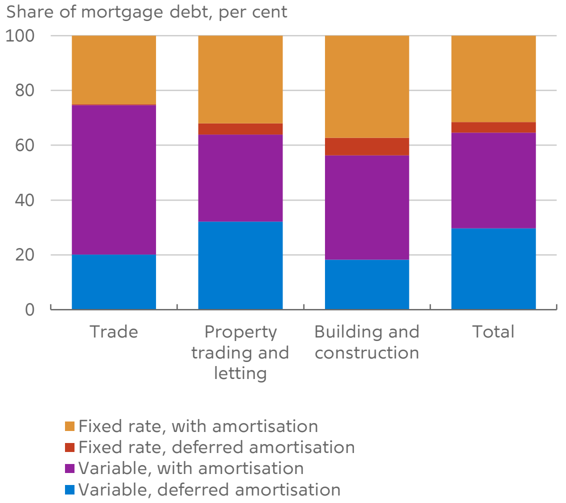
But the current economic upswing is different in that interest rates remain very low. A sudden reversal in the market risk perception could lead to an abrupt hike in interest rates. This poses a risk to customers who have primarily opted for variable rate financing.

Firms in cyclical industries faced difficulties during the latest crisis Chart 33



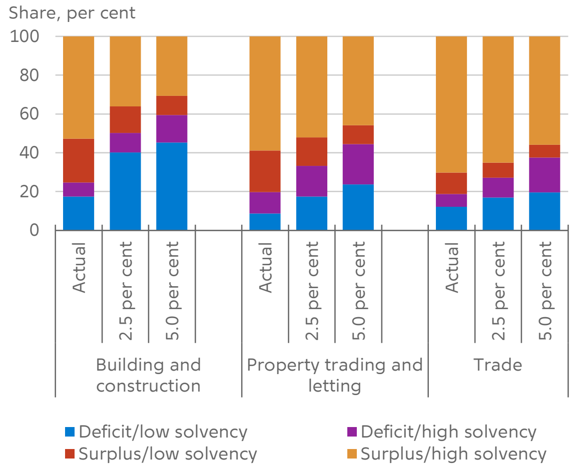
Note: Proportion of total debt of firms in the property trading and letting, trade and building and construction industries broken down by their financial results and solvency. High solvency is defined as an equity to total assets ratio of at least 15 per cent. The businesses of the self-employed are not included.
Source: Experian, Bisnode and own calculations.

Corporate customers have a large share of variable rate mortgage loans Chart 34



Note: Mortgage debt in selected industries, end-April 2018, broken down by loan products. The businesses of the self-employed are not included.
Source: Danmarks Nationalbank and own calculations.

Distribution of firms' debt in 2016 at the actual level of interest rates and at a higher level of interest rates Chart 35



Note: The proportion of total debt in the sectors broken down by financial results and solvency. High solvency is defined as an "equity to total assets" ratio of at least 15 per cent. The columns show the actual financial results in 2016 and the financial results and solvency in two scenarios in which the interest rate is set to increase by 2.5 percentage points and 5.0 percentage points, respectively. It is assumed that bank debt and a proportion of mortgage debt are at variable rates of interest. The proportion of variable rate mortgage debt has been derived from Danmarks Nationalbank's statistics on banks and mortgage banks from end-2016. The debt calculated in the financial statements has not been reconciled with the debt calculated in the bank and mortgage bank statistics.
Source: Experian, Bisnode and own calculations.

A sudden hike in interest rates will weaken the cyclical industries

The interest rate sensitivity of cyclical industries has been assessed using a number of higher interestrate scenarios. Calculations based on available financial figures for 2016 show that a sudden hike in interest rates will weaken a substantial portion of the firms, cf. Chart 35. In view of the positive economic developments, the general situation of the industries has presumably improved since 2016.

If interest rates were to rise by 2.5 percentage points, about 50 per cent of the mortgage debt of construction firms would be held by loss-making firms. In the property trading and letting and trade industries, about 30 per cent of the mortgage debt would be held by loss-making firms. An abrupt increase in interest rates will hit the building and construction industry the hardest. Thus, the share of debt in companies in this industry with deficits rises to a level similar to that seen in 2011. An interest rate increase of 5 percentage points would further increase the share of debt in companies in this industry with deficits to a level similar to that in 2009 during the financial crisis. For the other industries the financial situation deteriorates to a lesser degree relative to 2009 and 2011.

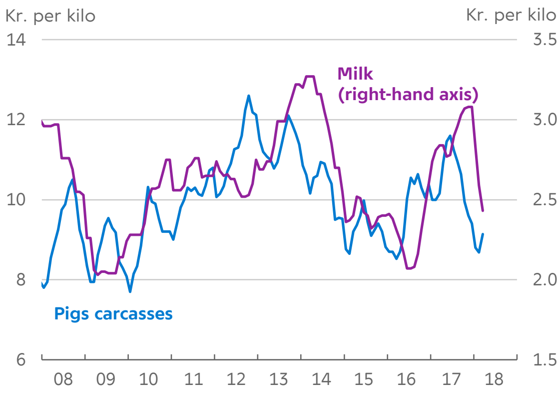
The agricultural sector is still challenged by high debts

For a number of years, the agricultural sector has been challenged by high indebtedness and fluctuating sales prices.

Since July of 2017, the market price of pigs and, subsequently, the prices of milk have dropped sharply. The fall follows a period of rising sales prices, cf. Chart 36. Bolstered by the economic upswing and low interest rates, the sector was slowly beginning to consolidate. Banks' losses on lending to the agricultural sector have also been declining.

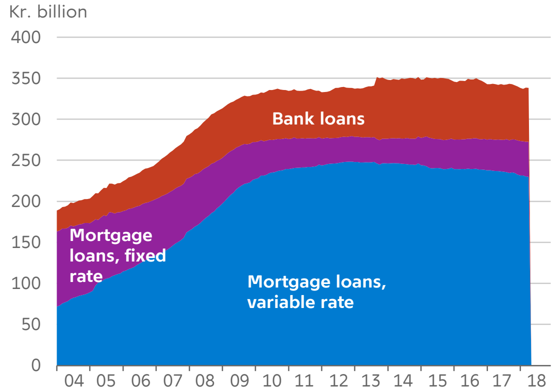
However, the total debt of the agricultural sector remains high. Recent market developments confirm that banks should not rely on price developments alone to improve the financial position of the agricultural sector. In fact, loss postponement may delay necessary adjustments and impede productivity developments in the sector.

Pork and milk prices are dropping Chart 36



Note: The most recent observations are from end-March 2018.
Source: Statistics Denmark and own calculations.

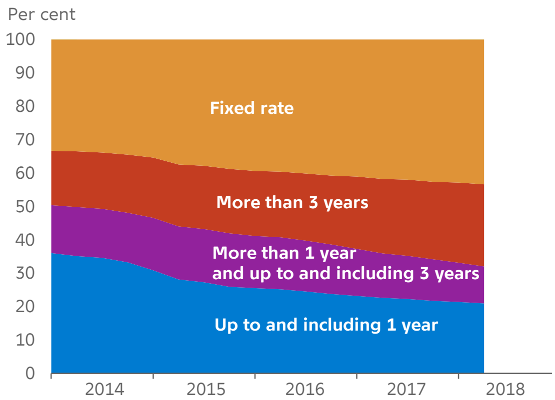
Variable interest rates render agriculture vulnerable to increases in interest rates Chart 37



Note: The most recent observations are from end-April 2018.
Source: Statistics Denmark and own calculations.

The debt composition of the agricultural sector with many variable rate loans also means that normalisation of interest rates could have major adverse implications for the agricultural sector, cf. Chart 37. The exposures of credit institutions to the agricultural sector vary considerably. In some small, local banks, the agricultural sector accounts for more than 15 per cent of total loans and guarantees, while total lending to the sector by the large banks accounts for just 3 per cent.

Homeowners choose longer fixed-interest periods Chart 38



Note: Mortgage loans of employees and old-age pensioners, nominal values, by initial interest-rate fixing. The most recent observations are from end-April 2018.
Source: Danmarks Nationalbank.

Longer fixed interest periods make households more resilient

Households are choosing longer fixed interest periods, but variable rate loans continue to dominate the market

Households are moving towards mortgage loans with longer fixed interest periods, cf. Chart 38. The share of variable rate mortgage loans with longer fixed interest periods than three years has risen, and the share of fixed rate mortgage loans is also increasing. The latter trend is less pronounced in the large towns and cities than in Denmark overall.[8]

8 Danmarks Nationalbank, Fixed-rate loans are gaining ground, *Danmarks Nationalbank Statistics (Banking and mortgage lending, balances)*, April 2018. (*link*)

More than half of all mortgage loans are still at variable rates of interest. So a rise in interest rates will have a substantial impact on the interest burden of homeowners.

According to Danmarks Nationalbank's lending survey, several credit institutions, primarily among mortgage banks and large banks, are reporting that credit standards have been tightened relative to the previous quarter, cf. Chart 39. Several institutions state that the tightening is due to the implementation of "good practice" rules for mortgage lending. Among other measures, the new rules limit the access to granting housing loans with variable rates and short fixed interest periods to homeowners with loan-to-income, LTI, ratios greater than 4 and loan-to-value, LTV, ratios of more than 60 per cent of the home value. The rules do not limit the access to granting fixed rate loans without amortisation.

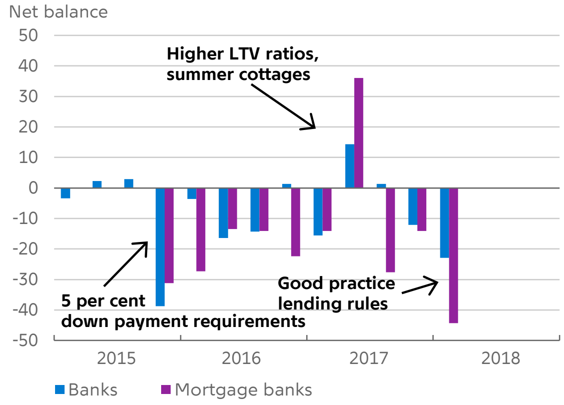
New loan types could increase debt

Over the past year, two credit institutions have introduced new loan types, allowing deferred amortisation for up to 30 years on mortgage lending. The credit institutions utilise an existing option, which was introduced in the legislation on covered bonds in 2007. These loan types give borrowers access to deferred amortisation when the LTV ratio is lower than 60 per cent. The possibility of an extended period of deferred amortisation may increase households' average LTV ratios.

The average LTV ratio for loan types with different types of deferred amortisation can be illustrated in a stylistic calculation in which all loans are assumed to have an initial LTV ratio of 80 per cent[9]. In this calculation, the average LTV ratio of the new loan types with a 30-year deferred amortisation period will rise to almost 65 per cent, cf. Chart 40. This should be seen in the context of an average LTV ratio of 47 per cent for a 30-year mortgage loan with amortisation. If housing loans with a 30-year deferred amortisation period become very popular, the increase in households' average LTV ratios will, all else equal, make them less resilient. And household indebtedness is already high.

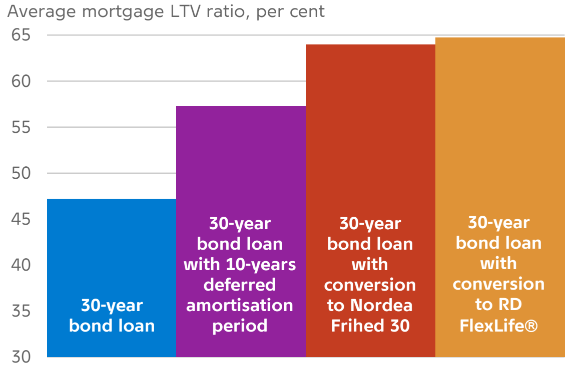
9 In the calculation of new loan types, the borrower initially takes out a 30-year bond loan and, when the LTV has decreased sufficiently, remortgages to the new loan types.

Tighter credit standards for retail customers Chart 39



Note: The net balance lies within the interval -100 to 100. A positive (negative) net balance means that credit managers of the banks in question have, overall, i.e. lending-weighted, stated that they have eased (tightened) their standards relative to the preceding quarter. The most recent observations are from the 1st quarter of 2018.
Source: Danmarks Nationalbank.

New loan types could lead to higher average LTV ratios Chart 40



Note: Mortgage loans are viewed over a 30-year period and all loans have an original LTV of 80 per cent. Borrowers with Frihed30 and FlexLife® take out a conventional mortgage loan and remortgage to the new loan types when the LTV falls below 60 and 75 per cent, respectively.
Source: Realkredit Danmark, Nordea and own calculations.

Moreover, borrowers' ability to repay their loans could change substantially over a 30-year period. Consequently, loans with an extended period of deferred amortisation may be riskier for the institutions than loan types subject to more frequent credit assessment. The risk is reduced in that the new loan types have lower LTV limits of 60 and 75 per cent, respectively, of the home value than 80 per cent for conventional mortgage loans.

Households may be vulnerable to rising interest rates combined with falling house prices

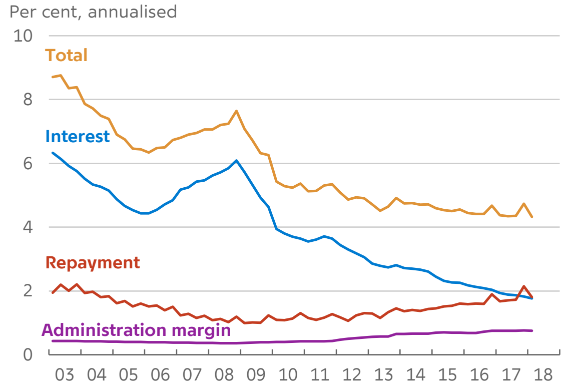
Declining interest rates in recent years have made it easier for households to service their debt. Although mortgage debt repayments have increased in recent years, total interest, administration margin and debt repayments as a percentage of household bank and mortgage bank debt continue to fall, cf. Chart 41. The interest burden decreased to 2 per cent of household bank and mortgage bank debt in 2017, and administration margin payments accounted for 0.76 per cent.

The sustained period of very low interest rates increases the probability of homeowners assuming greater risk, which may be reflected in house prices.

House prices have risen substantially in recent years, cf. Chart 42. As a result, homeowners' total debt to housing value has dropped. In 2016, one third of homeowner debt was held by households whose total debts exceeded the value of their homes, cf. Chart 43. These households are particularly vulnerable to increases in interest rates. 10 per cent of the debt is held by homeowners whose total debts exceed the value of their homes and are more than four times their income.

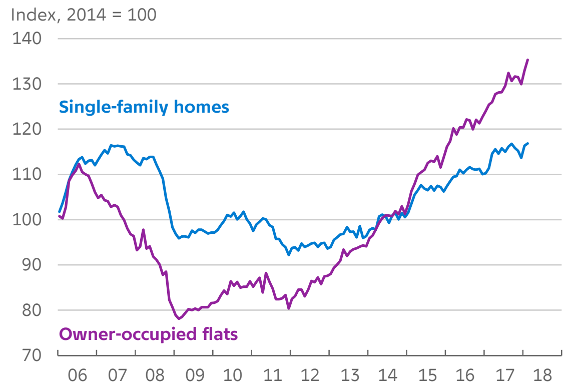
Since 2014, prices of single-family homes have increased by almost 20 per cent, while prices of owner-occupied flats have surged by more than 30 per cent. Hence, there is a risk of a housing market correction as seen after previous periods of substantial increases. A rise in interest rates can also be expected to exert downward pressure on house prices. In case of a 20 per cent drop in house prices, more than half of homeowner debt will be held by households whose total debts exceed the value of their homes. The very low interest rate environment provides a good opportunity for highly indebted households to reduce their debt burdens. This would boost their resilience to future interest rate rises and house price falls.

The household interest burden is shrinking — Chart 41



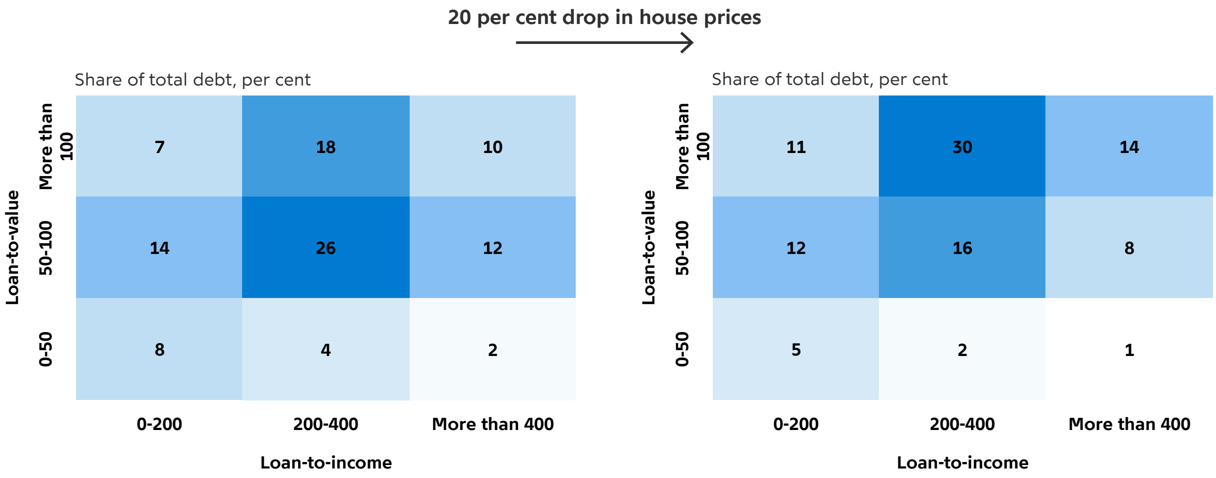
Note: Interest payments and administration margin payments and repayments as a percentage of household mortgage debt and bank debt. Due to lacking statistics for bank debt repayments, repayments include only mortgage debt repayments. The most recent observations are from the 1st quarter of 2018.
Source: Danmarks Nationalbank.

House prices are high — Chart 42



Note: Price index for single-family houses and owner-occupied flats for all of Denmark. The most recent observations are from February 2018.
Source: Statistics Denmark.

Highly indebted households are vulnerable to house price falls Chart 43



Note: Distribution of homeowner debt relative to gross income excluding pension contributions (loan-to-income) and debt relative to house value (loan-to-value), end-2016. Debt includes housing debt and other debt. Self-employed individuals, non-tax payers and households with gross incomes below kr. 25,000 are not included. Left-hand chart: actual distribution. Right-hand chart: distribution in the event of a 20 per cent house price fall.
Source: Statistics Denmark and own calculations.

Increased integration of Nordic banking sectors

Growing exposures in Norway and Sweden
Foreign lending by Danish banks has risen strongly in recent years, cf. Chart 44.[10]

The increase in foreign lending is driven mainly by Danske Bank's Norwegian and Swedish activities. For a number of years, Danske Bank's strategy has been to expand its activities in these two countries to further diversify its business[11]. Over the past three years, total lending to both countries has increased by about 25 per cent, cf. Chart 45.

After many years of rising property prices in Sweden and Norway, prices began to fall in 2017, cf. Chart 46 (left). Several international institutions, including

Foreign lending by banks is increasing Chart 44

Note: Lending to households and non-financial corporations by the banks' foreign branches and subsidiaries. The most recent observations are from end-April 2018.
Source: Danmarks Nationalbank.

10 Recent developments in foreign lending are affected by Danske Bank entering into an agreement on the sale of a portfolio of Irish residential mortgage loans in October 2017, cf. Danske Bank's annual report 2017.

11 Danske Bank's annual report 2017.

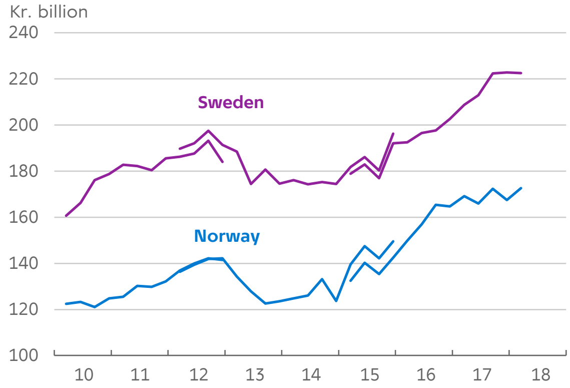
IMF, have regularly assessed that house price developments in both Norway and Sweden constitute a major risk to the real economy and the financial sector. Other things being equal, a continued decline in house prices will increase the risk associated with housing lending in the two countries.

Overall, Danske Bank's lending is robust, with average LTV ratios of between 60 and 65 per cent, cf. Chart 46 (right). The LTV ratios have not fallen as much as house prices have risen. The LTV ratios for Norwegian lending have remained unchanged in recent years. This indicates that new loans have been provided at higher LTV ratios. All else equal, this increases the risk of losses on loans if house prices continue to fall.

Risk linked to systemically important branches must be manageable

Danske Bank's increasing activities in Sweden and Norway exemplify how the Nordic-Baltic banking market is becoming still more integrated. Thus, a number of large banking groups operate across the Nordic-Baltic countries. In April 2018, the market share for lending in Denmark by branches of foreign banks was 8 per cent, while foreign lending by Danish institutions accounted for 17 per cent of total lending, cf. Chart 47 and Chart 48. In step with the growing financial integration, close cooperation be-

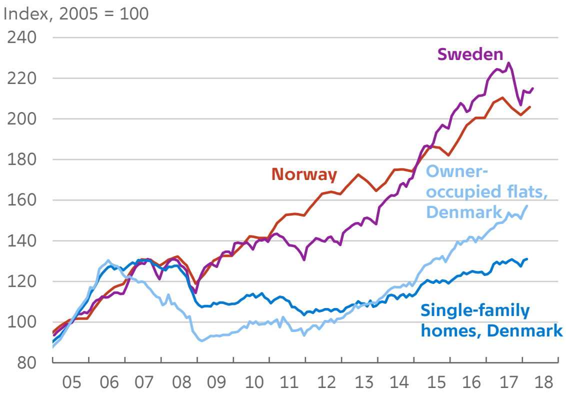
Danske Bank is expanding in Norway and Sweden Chart 45



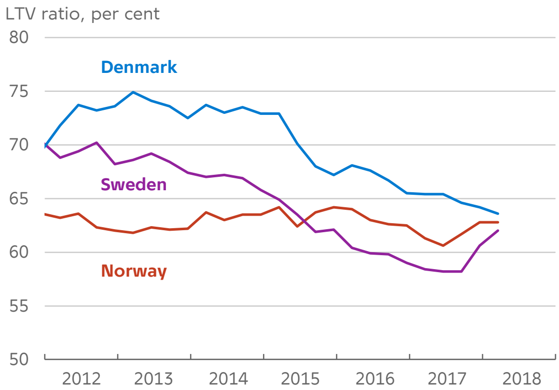
Note: Data breaks in 2012 and 2015 are due to changes in accounting policies. The most recent observations are from the 1st quarter of 2018.
Source: Danske Bank's financial statements.

Falling house prices in Norway and Sweden are increasing loan-to-values ratios Chart 46

House prices

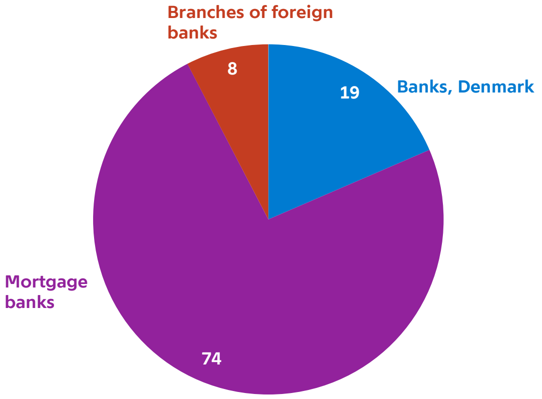


LTV ratios



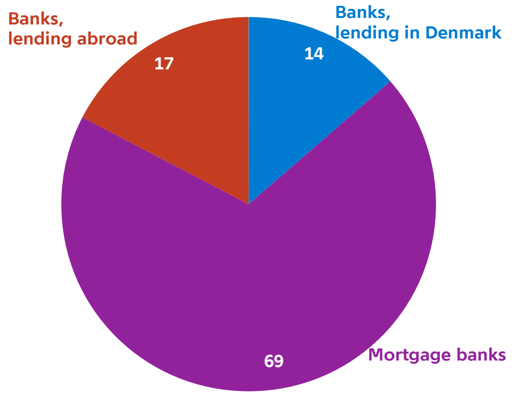
Note: The most recent observations for house prices are end-February 2018 for Denmark, end-March 2018 for Norway and end-April 2018 for Sweden. The most recent observations for loan-to-value ratios are from the 1st quarter of 2018.
Source: Statistics Denmark, Valueguard, Statistics Norway and Danske Bank's financial statements.

Market shares for lending in Denmark Chart 47



Note: Lending in Denmark by banks and mortgage banks, broken down by Danish and foreign institutions. Market shares were calculated in April 2018.
Source: Danmarks Nationalbank.

Foreign lending constitutes more than half of all lending by Danish banks Chart 48



Note: Lending to households and non-financial corporations by banks, mortgage banks and foreign branches and subsidiaries of banks. Lending was calculated in April 2018.
Source: Danmarks Nationalbank.

tween the various national authorities is becoming increasingly important in relation to safeguarding financial stability.

In early 2017, the Swedish institution Nordea Bank AB changed its legal structure with the conversion of subsidiaries in Denmark, Norway and Finland into branches. As a result, the responsibility for supervision and resolution planning for Nordea's Danish banking activities was transferred from the Danish to the Swedish authorities. In September 2017, Nordea Bank AB announced that they would initiate a process to re-domicile the parent company to Finland. The re-domiciliation was approved by the shareholders at the annual general meeting in March 2018 and, provided that it receives the requisite regulatory approvals, it is expected to be effective from October 2018. Given that Finland is a member of the banking union, the re-domiciliation will mean that all of Nordea Bank AB's current banking activities in Denmark, Finland, Norway and Sweden will be subject to direct supervision by the ECB and to the resolution powers of the Single Resolution Board.[12] However, Nordea Kredit, designated as a systemically important financial institution in Denmark in January 2017, is still a Danish subsidiary and thus subject to the powers of the Danish authorities.

Danske Bank similarly reorganised its Finnish operations into a branch of Danske Bank A/S as at 31 December 2017.

Danmarks Nationalbank finds that, fundamentally, the increased integration of the Nordic banking markets entails a number of significant advantages. Thus, it is expedient for large, cross-border institutions to have a legal structure that reflects their business and operational frameworks. This may strengthen the internal governance of the institutions and reduce administrative complexity and unnecessary regulatory burdens.

At the same time, a number of positive effects can be obtained from such restructuring. It will provide more consistent and holistic supervision of the relevant groups and the possibility of simpler handling

12 It will also include branches of Nordea Bank AB in other EU member states.

of a recovery or resolution situation, thereby reducing systemic risks.

But it is essential that both institutions and authorities take into account that large branches are important not just for the group as a whole – they are also significant to the financial stability of the country in which the branch is located (the host country).

Existing EU legislation[13] already sets out clear rules for the division of powers and obligations between the authorities of the home and host member states. Generally, the branch of a credit institution domiciled in an EU member state is subject to the rules, supervision and resolution powers of the home member state. EU legislation also establishes a number of principles for cooperation within supervisory and resolution colleges.

However, with the establishment of large systemically important branches, current rules need to be implemented in a more detailed and operational framework for the cooperation between the supervisory and resolution authorities of the home and host member states. Close and ongoing cooperation will ensure that the necessary allowance is made for a systemically important branch's business model and strategy, risk exposure and the risks posed by the branch to the financial system of the host member state.

Against this backdrop, in December 2016, a Memorandum of Understanding, MoU, was signed between the Nordic supervisory authorities and the ECB on information exchange and planning of supervision.[14] At the same time, a Nordic MoU was signed at the political level, supporting coordination of resolution planning and reciprocity of macroprudential measures, cf. Box 4.[15]

Similarly, in December 2016, the Nordic and Baltic central banks signed a MoU on the role of central banks if a cross-border banking group encounters li-

Reciprocation of macroprudential measures

Box 4

Macroprudential measures address risks in the financial system. Such measures are implemented by national authorities in order to prevent the risks from becoming so large that they have negative implications for the financial system and the real economy. Macroprudential measures include initiatives such as higher capital requirements and restrictions on credit terms.

Generally, a macroprudential measure implemented by, for instance, Danish authorities applies only to institutions subject to supervision in Denmark. This means that branches of foreign banks and loans directly from banks abroad are not comprised. So to ensure the effect of the measure – and thus financial stability – it may be important that authorities in other countries recognise it. This may be especially important when it comes to large, foreign branches with significant market shares in Denmark, such as Nordea.

Recognition by other countries of a macroprudential measure, e.g. in Denmark, will also help to ensure that consistent requirements apply to Danish institutions and foreign institutions with exposures in Denmark (level playing field). This will prevent regulatory arbitrage, whereby an institution exploits differences in national regulation to place its activities in the jurisdictions with the lowest requirements. Mutual recognition of macroprudential measures is often referred to as reciprocity.

Whether foreign branches and cross-border loans are covered by a macroprudential measure also depends on the specific measure. Reciprocity may be mandatory, voluntary or not mentioned in the relevant legislation. For instance, reciprocity is mandatory for the countercyclical capital buffer up to a limit of 2.5 per cent for EU member states, while reciprocity is voluntary for the systemic buffer and not mentioned in the legislation for Pillar 2 add-ons.

The Memorandum of Understanding, MoU, entered into by the Nordic Ministers for Finance, Economic and Business Affairs[1] establishes a general principle of full reciprocity between the Nordic countries to ensure a level playing field and the smooth functioning of the single Nordic market.

1. See a description of the background to and framework for reciprocation of macroprudential measures in the Systemic Risk Council's method paper of 21 June 2017. (*link*)

13 Capital Requirements Directive IV, CRDIV, and Bank Recovery and Resolution Directive, BRRD.

14 Cf. MoU on prudential supervision of significant branches in Sweden, Norway, Denmark and Finland. (*link*)

15 Cf. Memorandum of Understanding on cooperation regarding significant branches of cross-border banking groups. (*link*)

quidity problems. The MoU supports information exchange between the central banks and their possible cooperation in this situation. Finally, in January 2018, a MoU was signed on cooperation and coordination on cross-border financial stability between relevant ministries, central banks and supervisory and resolution authorities in the Nordic-Baltic countries.[16]

Efforts are also being made at the EU level to ensure sufficiently close cooperation between the authorities. To support these efforts, in November 2017, the European Banking Association, EBA, adopted new guidelines on cooperation and coordination of supervision of "significant-plus" branches.[17] These are branches which provide critical functions that are essential either to the institution or group or to the financial stability of the host member state. In such cases, the relevant supervisory authorities must adopt an intensified and more coordinated approach to supervision and assessment of recovery planning.

The attempts, under the auspices of the EBA, to establish a pan-European understanding of how best to handle systemically important branches in terms of supervision is a positive step. However, in the assessment of Danmarks Nationalbank, the strengthened collaboration within the banking union, where there is a single central supervisory authority and resolution authority, will be far more effective when it comes to containing the systemic risks linked to the cross-border activities of the large institutions.[18]

One of the main objectives of the banking union – with a Single Banking Supervisory Mechanism (under the auspices of the ECB) and a Single Resolution BoarD, SRB, – is to ensure strong and harmonised regulatory handling of cross-border banking activities. The banking union currently comprises euro area member states only. The Danish government is currently performing various analyses with a view to deciding on Danish participation in the autumn of 2019. The Swedish government is also analysing the implications of possible Swedish participation.

Danmarks Nationalbank believes that Denmark should participate in the banking union. This would lead to enhanced supervision and a stronger framework for the resolution regime for Danish banks. At the same time, it would increase competition for financial services in Denmark – for the benefit of citizens.

16 Cf. MoU on cooperation regarding banks with cross-border establishments (*link*) and MoU on cooperation and coordination on cross-border financial stability (*link*).

17 Cf. Guidelines on supervision of significant branches, EBA/GL/2017/14, 1 November 2017, applying from 1 January 2018.

18 In the autumn of 2017, the Danish government launched work to finally decide on Danish participation in the banking union. The Coordination Committee on Financial Stability is in charge of this work.

Appendix to the Financial Stability analysis: data

The analysis of the earnings, liquidity and own funds of Danish credit institutions is based on the six credit institutions in 2017 classified by the Danish Financial Supervisory Authority as systemically important financial institutions, SIFIs. In addition, Spar Nord is included in the group of systemic credit institutions, since the Minister for Industry, Business and Financial Affairs in December 2017 announced that the bank would be appointed as a SIFI as a result of the adjusted model for appointing SIFIs. The analysis also includes the non-systemic banks grouped by the Danish Financial Supervisory Authority as group 2 in 2017, cf. Table 1. Nordea Bank Danmark is no longer a SIFI, as it was converted from a subsidiary into a branch from 1 January 2017. In that connection, Nordea Kredit was classified as a SIFI. Unlike in the Danish Financial Supervisory Authority's group 2, Saxo Bank has been omitted from the population due to its business model and Spar Nord has been moved to group 1. The grouping also applies back in time.

Banks and mortgage banks in the analysis by total assets as at 31 December 2017, kr. million

Table 1

Systemic credit institutions	Amount
Danske Bank (incl. Realkredit Danmark)	3,193,311
Nykredit Realkredit (incl. Nykredit Bank)	1,426,810
Jyske Bank (incl. BRFkredit)	597,440
Nordea Kredit	440,201
DLR Kredit	163,375
Sydbank	138,494
Spar Nord	80,367
Systemic financial institutions, total	6,039,997

Systemic banks	
Danske Bank	2,293,624
Jyske Bank	295,738
Nykredit Bank	172,925
Sydbank	140,763
Spar Nord	80,597
Systemic banks, total	2,983,648

Non-systemic banks	Amount
Arbejdernes Landsbank	47,261
Ringkjøbing Landbobank	25,796
Sparekassen Kronjylland	23,288
Vestjysk Bank	21,902
Sparekassen Sjælland-Fyn A/S	21,443
Nordjyske Bank	20,527
Lån & Spar Bank	19,212
Sparekassen Vendsyssel	17,510
Jutlander Bank	16,753
Den Jyske Sparekasse	15,015
Non-systemic banks, total	228,707

Mortgage banks	
Nykredit Realkredit (incl. Totalkredit)	1,367,291
Realkredit Danmark	876,874
Nordea Kredit	440,201
BRFkredit	337,732
DLR Kredit	163,375
LR Realkredit	24,236
Mortgage banks, total	3,209,708

Note: The total assets of systemic banks, non-systemic banks and mortgage banks are stated at bank-specific level, while the total assets of the systemic groups are stated at group level.
Source: Danish Financial Supervisory Authority.

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 Bank Danmark, while medium-sized banks are the Danish Financial Supervisory Authority's group 2 plus Handelsbanken and Santander Consumer Bank.

The analysis applies the term "credit institutions" when referring to both banking and mortgage banking activities. The term "bank" is used when referring specifically to the banking activities.

ABOUT ANALYSIS

As a consequence of Danmarks Nationalbank's role in society we conduct analyses of economic and financial conditions.

Analyses are published continuously and include e.g. assessments of the current cyclical position and the financial stability.

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DANMARKS NATIONALBANK

ANALYSIS

DANMARKS NATIONALBANK

30 NOVEMBER 2018 — NO. 22

FINANCIAL STABILITY – 2ND HALF 2018

Low interest rates and ample lending capacity put pressure on credit standards

- The results of the largest banks remain high, underpinned by income from value adjustments and low loan impairment charges.
- Overall, lending growth is limited, but the medium-sized banks have strengthened their activities in growth areas such as Aarhus and Copenhagen by opening new branches and substantially increasing lending for housing purposes. It is important for the banks to allow for potential risks associated with entering into new market areas and to refrain from using credit standards as a competition parameter to attract customers.
- Money laundering problems have spelled out the need for increased focus on measures to combat illegal activities. Efficient anti-money laundering measures call for stronger cross-border cooperation.

Many agricultural loans

are non-performing, but most banks have scope to realise losses.

Read more

A leverage ratio requirement

should result in a reconsideration of capital targets.

Read more

The liquidity in the financial sector

is still sufficient and the price of exchanging is relatively stable.

Read more

CONTENT

Summary and assessment

Low interest rates support activity, but trade war and Brexit affect the financial markets
Interest rates remain very low and, combined with growth abroad, support economic activity in Denmark. The current trade war between the USA and China and uncertain prospects about a future Brexit agreement between the UK and the EU are increasing uncertainty among market participants. In the euro area, market participants are not expecting positive monetary policy rates until 2020, while US interest rates are still expected to rise. The dollar has strengthened in step with the normalisation of monetary policy in the USA, thus generating pressure on a few emerging market economies. Equity markets have declined both internationally and in Denmark since late August. The equity price of systemic Danish banks has fallen by almost 40 per cent on average since the beginning of the year, driven mainly by price developments in Danske Bank.

Measures to combat money laundering call for stronger cross-border cooperation
Money laundering may undermine customers' and investors' confidence in individual banks and the financial sector in general. This means that money laundering can be detrimental to financial stability. It is the responsibility of the individual bank to ensure that it has the tools and resources required to prevent and identify potential money laundering through its business. That requires banks to have in-depth knowledge of their customers. Economic crime exploits the infrastructure of the financial sector, which typically has a cross-border dimension. Consequently, strengthening cross-border cooperation between the authorities is crucial to combat money laundering.

Bank earnings still buoyed up by value adjustments and low loan impairment charges
The systemic credit institutions' results remain high, still underpinned by high value adjustments and low loan impairment charges. Over the past year, their results have been declining, however, and that development continued in the 3rd quarter. Unlike the result, core earnings have been more stable. Net interest income has been under pressure for a long time and is now at the lowest level for 12 years. The rise in net fee income and income from administration margins has offset the decline in net interest income.

Limited lending growth, but continued high debt level
Growth in total lending to households and the corporate sector is limited, but it remains high relative to the size of the economy. The long period of low interest rates and expansionary financial conditions provides a basis for further risk-taking among credit institutions. Given the credit institutions' ample lending capacity, it is important to carefully monitor credit developments.

Medium-sized banks are increasing lending to private borrowers and their presence in growth areas
The medium-sized banks have seen strong lending growth, especially in the growth areas defined as Copenhagen and environs and Aarhus. The reason for the development in these areas is their large population, high rate of migration and house prices that have been increasing for several years. The medium-sized banks have expanded and opened new branches, most of which are located in the growth areas and thus far from their traditional neighbouring areas. It is important for the banks to consider the higher risk of granting loans far from their local communities. Credit standards should not be used as a competition parameter to attract customers and gaining a foothold in new areas.

The agricultural sector has unsustainably high debt
A large share of the banks' loans to the agricultural sector is non-performing loans. The financial position of many farmers is so poor that it is doubtful whether their business is viable in the longer run. The banks have already impaired a number of the loans, and their earnings are generally high. Consequently, most banks are believed to have scope to tidy up their agricultural portfolios. The large banks' lending to the agricultural sector is relatively limited, so they can accommodate even very large realised losses. Against that background, Danmarks Nationalbank assesses that the agricultural sector does not constitute a systemic risk to financial stability in Denmark.

There is still sufficient liquidity in the financial sector
Danish banks comply with the short-term Liquidity Coverage Ratio, LCR, with a certain margin. Overall, the banks have excess liquidity, and the price of exchanging krone liquidity among the banks is relatively stable.

Credit institutions are close to meeting an MREL that is in conformity with the EU requirement

The systemic credit institutions are currently issuing eligible liabilities and close to meeting an MREL at group level including the mortgage business. However, Danish systemic credit institutions are not obliged to meet such a requirement, as mortgage credit institutions are not subject to an MREL but to a debt buffer requirement. This creates problems in relation to lack of risk sensitivity and credible resolution planning.

Minimum leverage ratio requirement may overrule buffer requirements

The systemic credit institutions all meet their own capital targets and their excess capital adequacy is generally solid relative to the fully phased-in capital requirements. For institutions with a large share of assets with very low risk weights, the implementation of a leverage ratio could entail a higher Tier 1 requirement than the previous risk-based capital requirements. For others, a leverage ratio could constitute a restriction in terms of the ability of the capital buffers to absorb losses in going-concern institutions, as a future leverage ratio is a "hard" capital requirement, unlike the capital buffers. Hence, the introduction of a minimum leverage ratio requirement should induce the institutions to reconsider their capital targets in the medium term to ensure an appropriate level of excess capital relative to the new requirement. As a result, the capital will still be able to absorb losses without any risk of resolution of the institution.

Low interest rates support activity, but financial markets show volatility

Growth in the global economy, but trade war and Brexit cause uncertainty

Interest rates remain very low and, combined with growth abroad, support economic activity in Denmark. Danmarks Nationalbank expects the upswing in the Danish economy to continue in the coming years and that the economy will move further into the boom.[1]

The International Monetary Fund, IMF, expects global economic growth of 3.2 per cent in 2018. The IMF has adjusted its growth forecast downwards by 0.2 percentage point since April 2018, inter alia as a result of estimated effects of the current trade war between the USA and China.

There is still uncertainty about the future Brexit agreement between the UK and the EU and hence also about the consequences of Brexit for financial stability. A hard Brexit with no agreement in the financial area could involve a number of risks for Danish credit institutions. Generally, the direct exposures of Danish credit institutions to the UK are limited, but negative effects via the financial markets cannot be ruled out.

Equity market fluctuations

Equity markets have declined since late August, cf. Chart 1, but unlike the other indices, the benchmark US stock index, S&P 500, has increased since the correction at the beginning of the year. The strong falls in equity prices from a high level indicate that changes in market participants' expectations may lead to sharp drops in asset prices.

The Danish stock index, OMX C25, has fallen approximately 8 per cent since the beginning of the year. The price of systemic Danish credit institutions is down by almost 40 per cent on average, driven mainly by price developments in Danske Bank, cf. Chart 2.

The dollar has strengthened

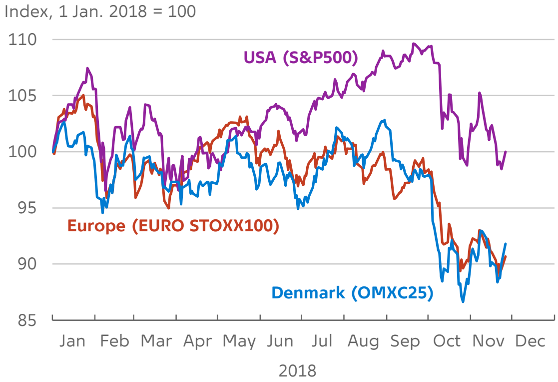
Since the financial crisis, several emerging market economies have increased their dollar debt ratio, which makes them more vulnerable to fluctuations in the dollar. The dollar has strengthened in step with the normalisation of monetary policy in the USA, generating pressure on a few emerging market economies, e.g. Turkey and Argentina, which have weak economies with high debt ratios.[2] A large external funding need, rising US interest rates and concerns about the effect of global trade war have led to a capital outflow, resulting in falling exchange rates, cf. Chart 3. Exchange rates for the other emerging market economies have also fallen over the year, but not as strongly.

1 Cf. Danmarks Nationalbank, Boom with no signs of imbalances, *Danmarks Nationalbank Analysis (Outlook for the Danish economy)*, No. 15, September 2018. (*link*)

2 In June 2018, the IMF granted Argentina a 3-year borrowing programme for up to 50 billion dollars.

Equity markets decline in the 3rd quarter

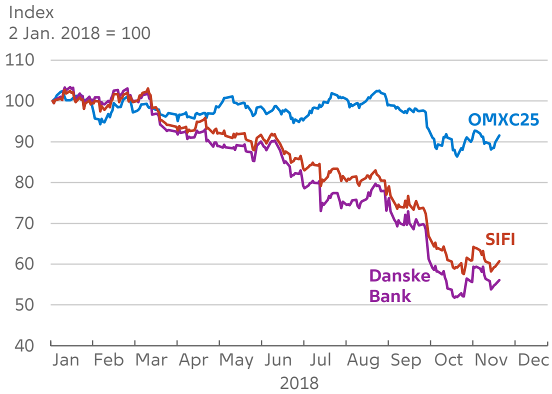
Chart 1



Note: The most recent observations are from 26 November 2018.
Source: Thomson Reuters.

Equity prices for Danish credit institutions have fallen more than the market in general

Chart 2



Note: SIFI is an average of price developments for Danske Bank, Jyske Bank, Sydbank and Spar Nord weighted by market value. The most recent observations are from 26 November 2018.
Source: Nasdaq OMX Nordic.

Expectations that monetary policy will be normalised

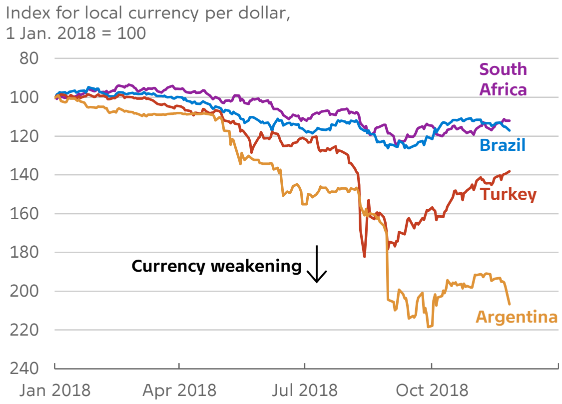
In the euro area, market participants are not expecting monetary policy rates to become positive until 2020, cf. Chart 4. As from October, the European Central Bank, ECB, lowered the bond purchase level further, announcing that they expect to stop purchases by the end of the year, but intend to reinvest payments from maturing bonds. The ECB also announced that it expects to keep the monetary policy rates at the current levels, at least through the summer of 2019. The ECB's announcement did not lead to any considerable fluctuations in the markets.

US monetary policy interest rates have been rising. Market participants expect the interest rates to continue rising, but less than expected by the Federal Reserve, cf. Chart 4. Changes in market expectations regarding interest rate developments could lead to fluctuations in e.g. the equity market.

Purchase programmes from e.g. the ECB and the Federal Reserve have contributed to dampening long-term bond yields and have reduced the global supply of bonds of high credit quality in the market. For investors holding funds for placement, this provides a natural opportunity to search other markets for securities with similar characteristics, including the Danish mortgage market.

Substantial weakening of exchange rates in a few emerging market economies

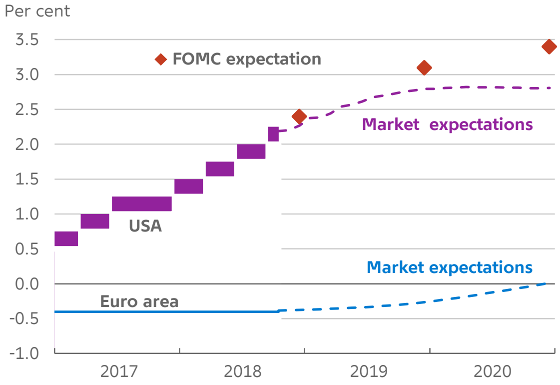
Chart 3



Note: Local currency. The most recent observations are from 29 October 2018.
Source: Macrobond.

Expectations of positive interest rates in the EU in 2020

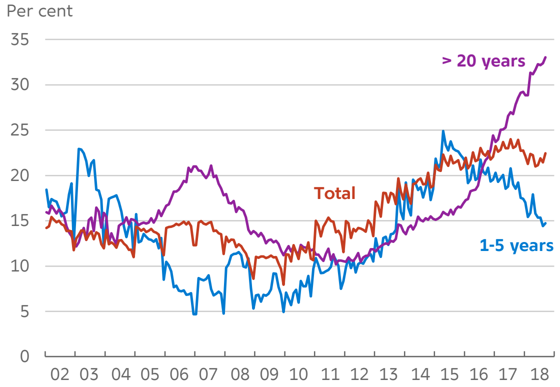
Chart 4



Note: The most recent observations are from 29 October 2018. Fed funds target range for the USA, the ECB's deposit rate for the euro area. The broken lines denote market expectations based on futures prices.
Source: Federal Reserve, ScanRate RIO and Macrobond.

More than 30 per cent of outstanding long-term mortgage bonds are held by foreign investors

Chart 5



Note: Foreign investors' ownership shares of mortgage bonds by maturity. The most recent observations are from September 2018.
Source: Danmarks Nationalbank.

Foreign investors increase their ownership share of long-term mortgage bonds

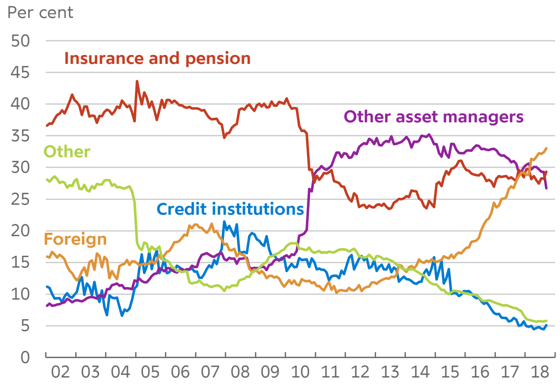
Since 2012, foreign investors have shown strong interest in long-term Danish mortgage bonds. The share of mortgage bonds with remaining maturities exceeding 20 years owned by foreign investors has increased from 17 per cent to more than 33 per cent since 2016, cf. Chart 5.

The rise is offset by a decline in ownership shares broadly distributed across other sectors, except the insurance and pension sector, which has retained its ownership share of just over 30 per cent, cf. Chart 6. Danish credit institutions currently hold 5 per cent of outstanding long-term mortgage bonds, compared with almost 15 per cent in 2014, and they are the largest net sellers of long-term mortgage bonds.

On the one hand, growing demand from foreign investors contributes to a larger investor base, helping to ensure attractive interest rates for Danish homeowners. On the other hand, strong reliance on foreign investors may amplify market fluctuations in times of crisis, if foreign investors tend to return to their home markets.

Ownership share of long-term mortgage bonds has declined for all sectors except insurance and pension

Chart 6



Note: The most recent observations are from September 2018.
Source: Danmarks Nationalbank.

Money laundering is detrimental to financial stability

Money laundering problems in a number of European banks have spelled out the need for increased focus on measures to combat misuse of the banking sector for illegal activities. It is the responsibility of the management of each bank to ensure that it has the tools required to prevent and identify potential money laundering through its business. At the same time, there is a need for coordinated effort between firms and authorities. Economic crime exploits the infrastructure of the financial sector, which typically has a cross-border dimension. Consequently, strengthening cross-border cooperation between the authorities is crucial to combat money laundering.

Money laundering may undermine confidence in the financial sector

Customer and investor confidence is an essential prerequisite for providing financial services. So the loss of confidence can be harmful for a bank. Its sources of funding may be challenged e.g. if customer uncertainty results in significant deposit withdrawals, or if investors demand a substantially higher risk premium on the bank's issuance. The bank may also incur higher costs in the form of fines imposed by the authorities. Moreover, if the bank is also systemically important to the financial sector, the challenges of a single bank may have a negative impact on society. Finally, increased lack of confidence in a single bank may spread to the other actors in the financial sector and to the authorities. Consequently, money laundering problems in a single bank could spread to the entire financial sector and could in turn affect financial stability.

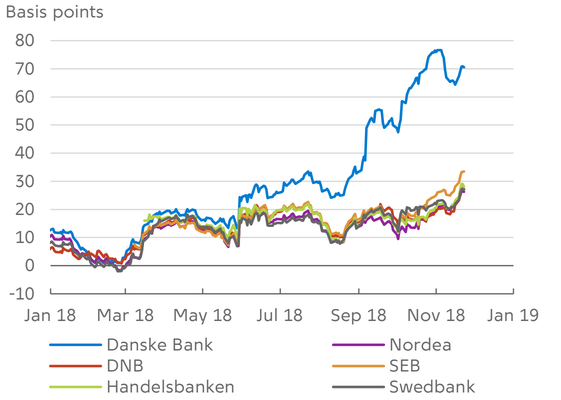
Market reactions to the money laundering case in Danske Bank

During 2018, the scope of the money laundering case in Danske Bank's Estonian branch has grown significantly – also by international standards. The bank's internal investigation of money laundering in the branch comprises transactions of around 200 billion euro in the period 2007-15. Hence, the case has attracted considerable attention in and outside Denmark. With a balance sheet total that is 1½ times higher than Denmark's gross domestic product, GDP, Danske Bank is Denmark's largest bank and classified as systemically important.

The financial markets have reacted strongly to the ongoing publication of information about money laundering problems in the Estonian branch. The share price has fallen by almost 45 per cent since the beginning of 2018, cf. Chart 2. The credit rating agencies rating Danske Bank have all reacted to the money laundering case and changed their expectations to "negative" on the grounds that the scope of the case may grow, that there is a risk of sanctions as well as the general loss of confidence among customers and investors. Standard & Poor's and Moody's have downgraded their ratings of the bank itself and of its long-term issuance. Furthermore, Standard & Poor's has pointed out that Denmark's credit rating, which is the highest possible (AAA), could be challenged, should the external funding of the financial sector come under pressure because of damage to its reputation.

Danske Bank's market funding costs have grown in step with the increasing scope of the money laundering case. In November, the bank's senior debt traded at just over 40 basis points higher than senior debt issued by other comparable Nordic banks, cf. Chart 7.

Rising price of Danske Bank's senior debt Chart 7



Note: The zero-volatility spread (Z spread) is an expression of the additional costs of obtaining funding with the debt instrument in question. The additional costs are calculated by parallel-shifting a risk-free zero-coupon yield structure, so the discounting thereby results in the price of the debt instrument. The most recent observations are from 8 November 2018.

Source: Bloomberg.

Anti-money laundering measures require a coordinated effort by banks and authorities

The pivotal role of banks in the financial infrastructure involves a social responsibility to ensure that their businesses are not misused for illegal activities. In step with the increasing speed and efficiency of payment systems, the importance of the banks' knowledge of their customers and their use of reliable systems to monitor transactions have become key elements in the efforts to combat money laundering. It is a precondition for the authorities' ability to efficiently combat and investigate money laundering that the banks are initially capable of identifying and examining suspicious transactions. Moreover, a particularly high degree of

Anti-money laundering provisions in Denmark

Box 1

What is money laundering?
Money laundering means to unlawfully receive or obtain for oneself or others a share in profits or means obtained through criminal offence.[1] The purpose of money laundering transactions and activities is to conceal the origin of the means by a masking process so that they appear to have originated from a legitimate source, but where the person in question knows or assumes that such money is derived from criminal activity.

Key elements of the Danish Money Laundering Act
In Denmark, money laundering is combated through financial undertakings, including banks, in accordance with the Money Laundering Act. Undertakings covered by the Act must comply with a number of requirements for the purpose of preventing and minimising the risk of money laundering. Specifically, the undertakings must comply with rules on knowledge about their customers, and they are obliged to investigate suspicious transactions and notify the authorities. One consequence of the banks' obligation to know their customers is that the banks' customers must be required to provide proof of identity and that the banks must understand the point of the customer's business connection or the individual transaction. Circumstances such as customer relationships with correspondent banks located outside the EU or the EEA lead to more stringent requirements for proof of identity and knowledge of customers. The duty of notification implies that a bank, which is aware of or suspects that any transactions, funds or activities are or have been associated with money laundering or terrorist financing, must notify the Public Prosecutor for Serious Economic and International Crime.[2] In Denmark, the Danish Financial Supervisory Authority (FSA) supervises the banks' compliance with the Act,[3] while the foreign subsidiaries and branches of Danish firms are subject to supervision by the supervisory authority of the host country.[4]

Continuous tightening of anti-money laundering legislation
The Danish anti-money laundering rules are based on European anti-money laundering directives which constitute the framework for measures to combat money laundering and terrorist financing. In 2017, the fourth anti-money laundering directive[5] was implemented in Denmark, implying a shift from a rule-based approach to a more risk-based and targeted approach to preventing money laundering.[6] For example, the banks are now required to a greater extent to base their knowledge of their customers on a risk assessment of the customer relationship in order to focus on the customers associated with the greatest risk. The requirements are tightened in particular regarding politically exposed persons, customers failing to appear in person and cross-border correspondent banking.[7] A previous exception of certain customers deemed to be of low risk (e.g. other banks, listed firms and public authorities), has been abolished, so all customers must be identified on the basis of a risk assessment.

Given the money laundering cases seen in recent years, a number of further national initiatives have also been implemented with focus on increasing the maximum penalty for money laundering, the ability to revoke a firm's licence in case of gross violations of the Money Laundering Act and setting stricter "fit and proper" requirements regarding members of the management board. Most recently, a political agreement was concluded in September 2018 to further tighten legislation in this area. The proposal strengthens the anti-money laundering secretariat of the Public Prosecutor for Serious Economic and International Crime and increases the level of fines significantly. In addition, the agreement also contains intentions to extend the requirements to executive boards and boards of directors of the firms in question.[8]

1. Cf. section 3 of Act no. 651 of 8 June 2017 on Measures to Prevent Money Laundering and Financing of Terrorism (The Money Laundering Act).
2. Cf. sections 3 and 5 of the Money Laundering Act.
3. Cf. section 47 of the Money Laundering Act.
4. Danish undertakings operating in another EU or EEA country must comply with national regulation in the country in question regarding money laundering and financing of terrorism, cf. section 31 of the Money Laundering Act.
5. Directive (EU) 2015/849 of the European Parliament and of the Council of 20 May 2015 on the prevention of the use of the financial system for the purposes of money laundering or terrorist financing.
6. Cf. page 6 of the Danish Financial Supervisory Authority's guideline no. 9854 of 11 October 2018 on measures to prevent money laundering and financing of terrorism (in Danish only).
7. Cf. Part 2 (Risk assessment and risk management) in the FSA guideline defined above.
8. Cf. Agreement of 19 September 2018 between the government parties (Venstre – The Liberal Party of Denmark, Liberal Alliance and the Conservative People's Party) and the Social Democratic Party, the Danish People's Party, the Social Liberals and the Socialist People's Party on further initiatives to strengthen the efforts to combat money laundering and terrorist financing.

prudence is required, if a bank chooses to expand its business abroad where knowledge of its customers is challenged. In recent years, a number of political initiatives have been taken to strengthen the efforts to combat money laundering in Denmark, cf. Box 1. The fourth money laundering directive involves a transition to a more risk-based approach to anti-money laundering, requiring the banks to direct their anti-money laundering efforts towards those areas of their business model where the risk is higher. This change is a step forward as it helps support a more targeted effort, but it makes demands on the banks' individual risk assessment. In addition, the maximum penalty and the level of fines for money laundering have increased and it has become possible to revoke a firm's licence.

European cooperation to prevent money laundering should be strengthened

In Europe, the latest cases of money laundering in European banks have also led to proposals for further initiatives. The reinforced anti-money laundering efforts by the Danish authorities are necessary, but it is also absolutely essential to create a better framework for European cooperation. As money laundering activities exploit the cross-border financial infrastructure, measures to combat money laundering also call for stronger cross-border supervisory cooperation in the EU. This would provide a far better overview of international banking groups' activities, while at the same time enabling the build-up of strong competencies in this area.

Systemic credit institutions' earnings are still high

The systemic credit institutions' results remain high, still underpinned by high value adjustments and low loan impairment charges, cf. Chart 8. Over the past year, results have been declining, however, and that development continued in the 3rd quarter.

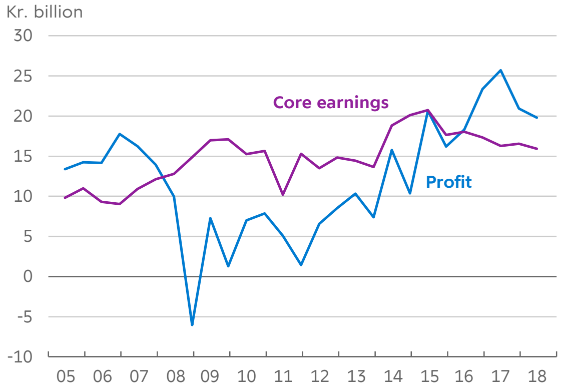
Return on equity supported by low level of impairment

Since 2015, systemic credit institutions have either had very low loan impairment charges or reversed loan impairment charges, thereby supporting the return on equity, ROE.

The current loan impairment charges of the systemic credit institutions have been considerably below the historical average since 2015, cf. Chart 9. This low level should be viewed in the light of the low level of interest rates and favourable economic developments. During a potential deterioration of the economy, the level of impairment should be expected to increase.

Decline in systemic credit institutions' earnings

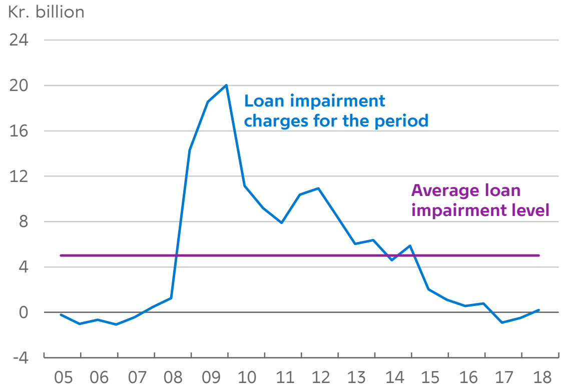
Chart 8



Note: Six-month results of the systemic credit institutions have been calculated before tax and adjusted for goodwill impairment charges. Core earnings are defined as profit before tax less value adjustments, loan impairment charges and value adjustments of income from investments.
Source: Danmarks Nationalbank.

Loan impairment charges boost profits

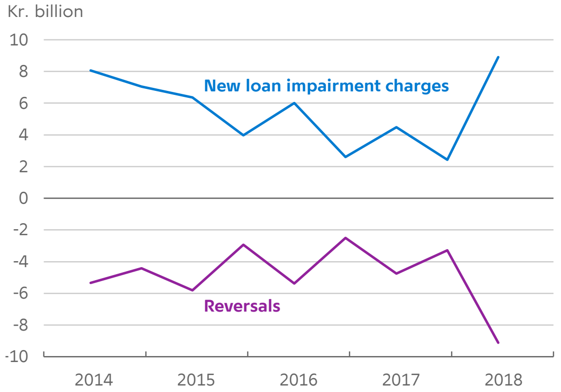
Chart 9



Note: Six-month data for systemic credit institutions. The average is calculated over the period under review.
Source: Danmarks Nationalbank.

The low level of loan impairment charges is attributable to the fall in new loan impairment charges, while the volume of reversals has been more or less constant. Since the transition to the new IFRS 9 impairment rules on 1 January 2018, the volume of new loan impairment charges has increased, however. Under IFRS 9, impairment charges must be made for both realised and expected losses. This is in contrast to the old impairment rules, IAS 39, according to which an objective evidence of impairment must exist before the loan impairment charge was made.

Increase in new loan impairment charges and reversals Chart 10



Note: Six-month data for systemic banks.
Source: Danmarks Nationalbank.

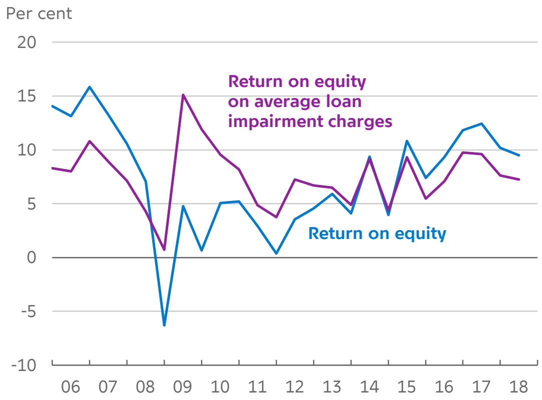
Part of the explanation of the increase in the volume of loan impairment charges is also that the agricultural sector was negatively affected by drought. The effect of the impairment charges for the period is countered by an equivalent increase in the volume of reversals, however, cf. Chart 10.

The low level of impairment has a positive effect on the credit institutions' ROE. If the current level is replaced by the average level of impairment over the last 12 years, ROE in the 1st half of 2018 will fall from 9.5 to 7.3 per cent p.a., cf. Chart 11.

Core earnings are almost unchanged
Unlike the result, core earnings in the systemic credit institutions have been more stable, cf. Chart 8, also in the 3rd quarter of 2018.

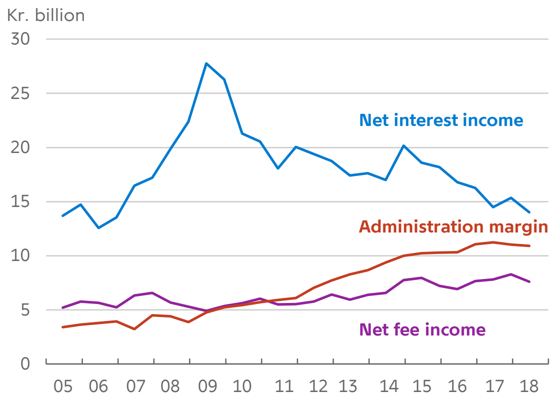
Developments in core earnings are driven mainly by changes in income, given that the cost level has

ROE supported by low loan impairment charges Chart 11



Note: Six-month data for systemic credit institutions. Return on equity p.a. is after tax. The average historical level of impairment is calculated over the last 12 years.
Source: Danmarks Nationalbank.

Rising administration margins and net fees have offset decline in net interest income Chart 12

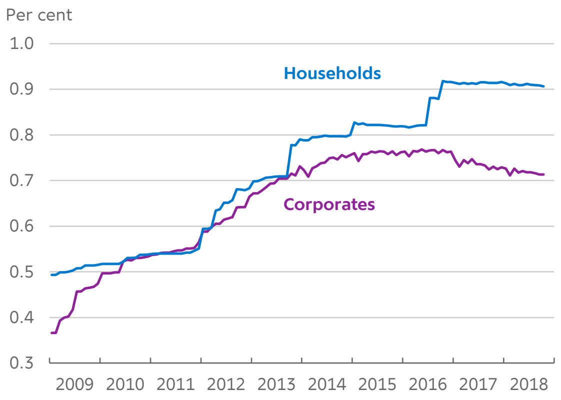


Note: Six-month data for systemic credit institutions.
Source: Danmarks Nationalbank.

remained largely constant since 2009. The increase in net fee income and income from administration margins has offset the decline in net interest income, cf. Chart 12.

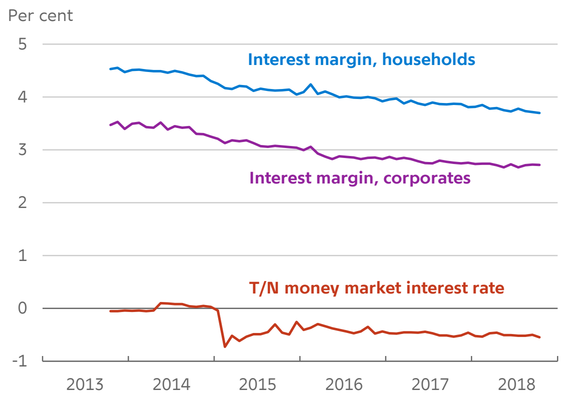
Net fee income has shown a rising trend since the crisis, but fell back slightly in the 1st half of 2018. Income from administration margins has more than doubled since 2009, since both administration margins and the volume of mortgage lending have increased. But over the past year, income from

Increase in average administration margins has stopped Chart 13



Note: Average administration margins for outstanding domestic mortgage lending in Danish kroner.
Source: Danmarks Nationalbank.

Shrinking interest margins Chart 14



Note: The interest margin is the difference between the average deposit and lending rates.
Source: Nasdaq OMX Nordic and Danmarks Nationalbank.

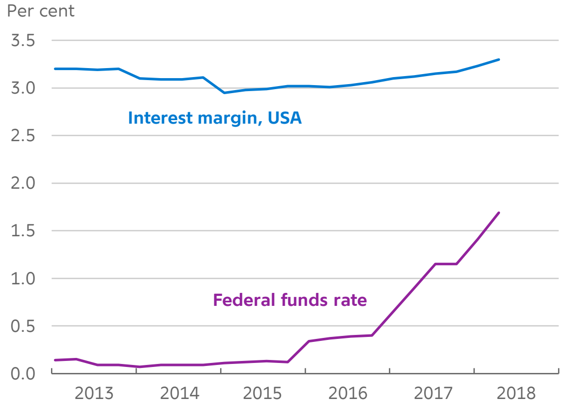
administration margins has also declined slightly, reflecting a slight decrease in average administration margins, cf. Chart 13.

Net interest income has been under pressure for a long time and is currently at a 12-year low. This is due primarily to declining interest margins, cf. Chart 14. The decreasing interest margins should be viewed in the light of the very low money market rates, exerting downward pressure on both deposit and lending rates. However, deposit rates have not quite mirrored the fall in lending rates, since the banks generally choose not to charge negative interest on deposits from personal customers, and several banks are still reluctant to charge negative interest to corporate customers.

When interest rates begin to rise again, this will presumably ease the pressure on the banks' interest margins, although several factors affect interest margin developments. As a case in point, improved credit quality among banking customers may help to reduce lending rates, because the banks' risk decreases. Moreover, there is limited demand for bank loans.

In the USA, interest rates have been rising in recent years, and US banks have succeeded in raising interest margins slightly, cf. Chart 15.

Modest increase in US interest margins Chart 15



Note: The US interest margin is calculated as the ratio of income from the banks' assets relative to total assets. The most recent observations are from April 2018.
Source: Federal Reserve Bank of St. Louis.

Medium-sized banks are gravitating towards the large towns and cities

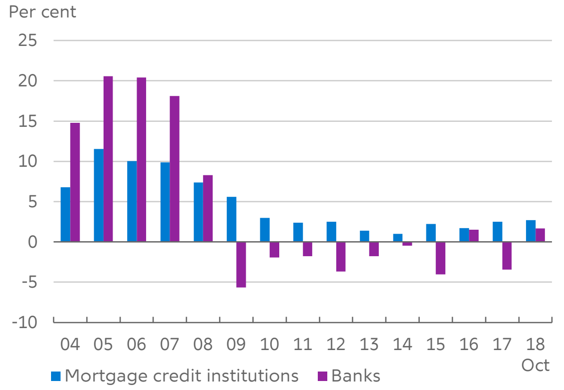
Overall, lending growth to households and the corporate sector is limited

Total lending to Danish households and corporate customers continues to grow and has reached just under kr. 3,500 billion. Lending growth is driven by mortgage lending, which has shown relatively stable growth since 2010, cf. Chart 16. However, bank lending has declined in most of the years during the same period.

In recent years, lending growth has been limited relative to the increases seen in the run-up to the latest crisis. However, it is important to remember that debt has not been reduced since the crisis. Debt is also higher than before the financial crisis, in terms of lending relative to GDP, cf. Chart 17. Prior to mid-2009, lending increased relative to GDP. Until mid-2008, the increase was driven by lending rising faster than GDP, and in the subsequent year it was driven by a contraction in GDP during the crisis. Due to the cyclical improvement in recent years, underpinned by relatively modest lending growth, the lending-to-GDP ratio has decreased.

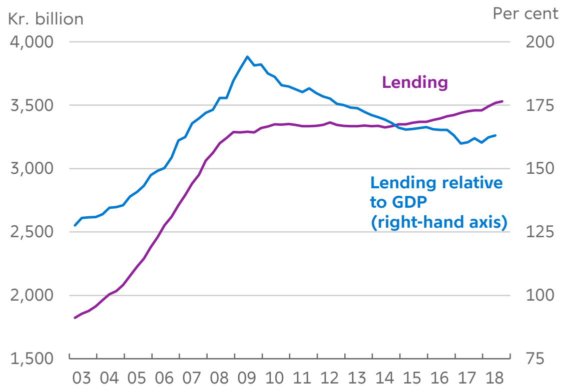
By international standards, lending remains high relative to the size of the economy, cf. Chart 18. But high Danish lending is offset by even higher assets. The long period of low interest rates and expansionary financial conditions provides a basis for further risk-taking as regards lending. The credit institutions have ample lending capacity, so it is important to carefully monitor credit developments.

Stable growth rate in mortgage lending — Chart 16



Note: Lending in Denmark by large and medium-sized banks and mortgage credit institutions. Growth rates until and including 2017 are calculated at end-December. The most recent observations are calculated from October 2017 to October 2018.
Source: Danmarks Nationalbank.

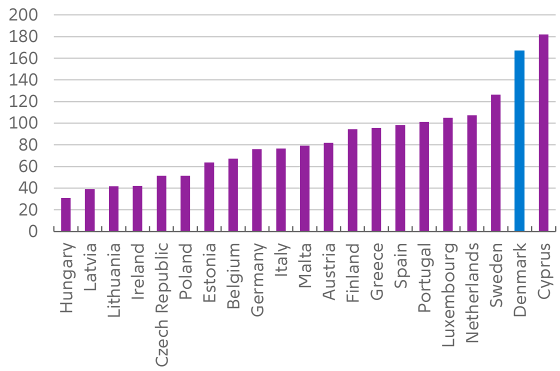
Lending relative to GDP remains high — Chart 17



Note: Lending to households and non-financial corporations in Denmark by all banks and mortgage credit institutions. The most recent observations are from the 3rd quarter of 2018.
Source: Danmarks Nationalbank.

Lending relative to GDP remains high by international standards

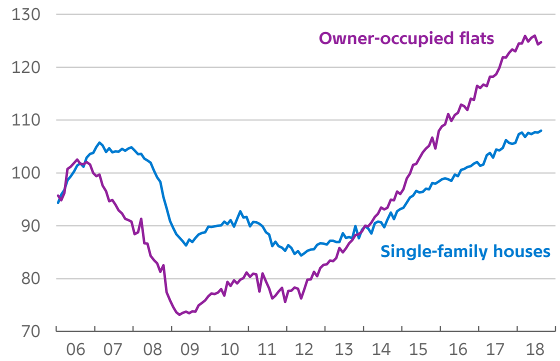
Chart 18



Note: Lending to domestic households and non-financial corporations by credit institutions as well as their holdings of securities other than equity issued by domestic households and non-financial corporations. The most recent observations are from the 2nd quarter of 2018.
Source: ECB and own calculations.

Surge in prices of owner-occupied flats has slowed down

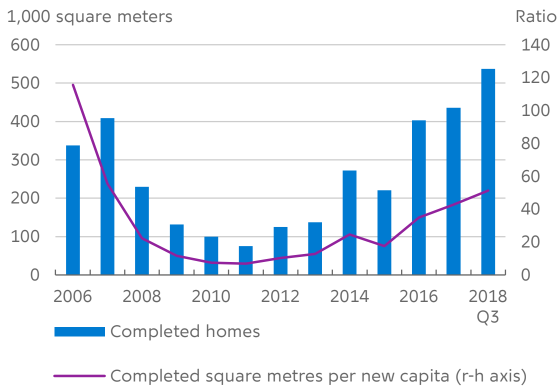
Chart 19



Note: Seasonally adjusted. The most recent observations are from August 2018.
Source: Statistics Denmark and Danmarks Nationalbank.

More square metres are being constructed for each new inhabitant in Copenhagen and Frederiksberg

Chart 20



Note: Data for the municipalities of Copenhagen and Frederiksberg. Annual growth until and including 2017 is calculated at end-December. The most recent observations are calculated from the 3rd quarter of 2017 until the 3rd quarter of 2018.
Source: Statistics Denmark, Danmarks Nationalbank and own calculations.

Slowdown in price growth for owner-occupied flats
Housing market developments have been stable in 2018. At the national level, house prices have increased at a slightly slower pace over the past six months, while the surge in prices of owner-occupied flats in large towns and cities has slowed down, cf. Chart 19.

The slowdown in the market for owner-occupied flats may be due to several factors. On the supply side, construction activity in the larger urban areas helps to curb prices. Over the past few years, the amount of newly constructed housing square metres per new capita in Copenhagen has increased substantially, cf. Chart 20. On the demand side, all else equal, recent years' surge in prices means that fewer home buyers will be able to finance a home purchase in the larger urban areas. This trend will presumably be reinforced by new lending rules, introduced in early 2018. These rules restrict access to variable rate loans and deferred amortisation loans in case of high DTI and LTV ratios.[3] Finally, the amendment of the housing taxation rules from 2021 onwards, adopted last year, can already have a dampening effect on price increases, especially for owner-occupied flats in Copenhagen.

3 The rules are binding if a household raises debt constituting more than four times its income at an LTV ratio exceeding 60 per cent.

Mortgage lending is growing most rapidly in the growth areas

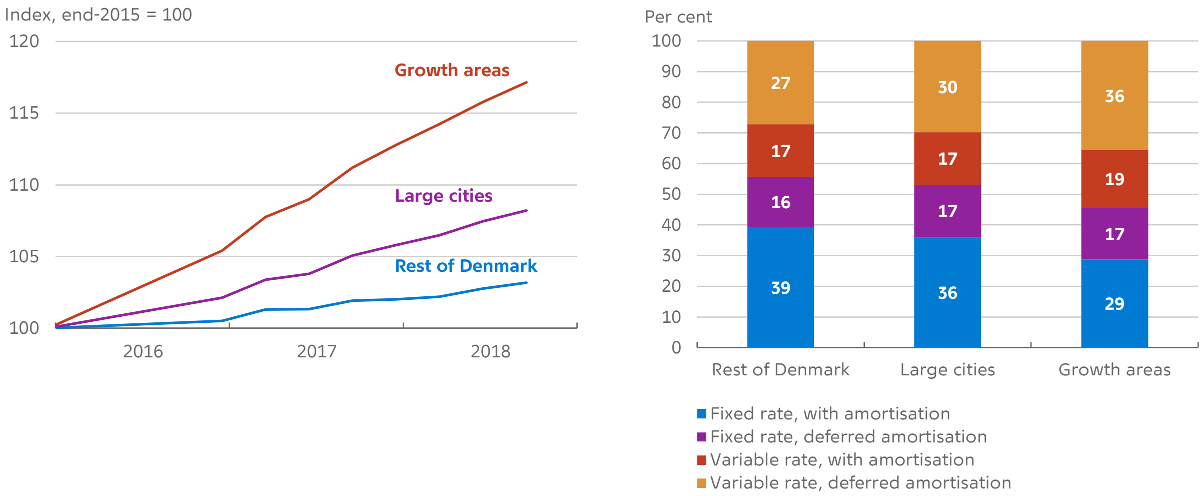
In recent years, house price growth has varied from one part of the country to another. Owner-occupied flats, especially in the Copenhagen area, have seen high rises in price, while price increases have been smaller in other parts of the country. House price and population growth are reflected on the loan side. Mortgage lending for owner-occupied housing has risen more in the growth areas in and around Copenhagen and in Aarhus than in the rest of the country, cf. Chart 21 (left).

Home owners in the growth areas finance their homes using riskier loan types with variable rates and deferred amortisation to a higher extent than other home owners, cf. Chart 21 (right). At the same time, more home owners in the growth areas have higher DTI (debt-to-income) ratios, cf. Chart 22. However, new mortgage lending to home owners with high DTI ratios declined slightly in 2017.

The new lending rules introduced in early 2018 help to fence in the risks of risky loan types. As part of the political agreement on the new lending rules, credit

Mortgage lending increases predominantly in the growth areas where riskier loans are taken out

Chart 21



Note: Left: Mortgage lending for owner-occupied housing. The most recent observations are from the 3rd quarter 2018. Right: Mortgage lending taken out in 2017, broken down by loan type. Growth areas are defined as Copenhagen and environs and Aarhus. Large cities cover the eight largest cities other than the growth areas.

Source: Statistics Denmark, mortgage credit institutions and Danmarks Nationalbank.

institutions were required to report the volume of new loans to home owners with high DTI ratios, high LTV ratios and risky loan types. The Ministry of Industry, Business and Financial Affairs recently published its lending review, which shows that in 2018 the credit institutions have reduced the proportion of new risky housing loans in accordance with the new rules.

Medium-sized banks are increasing lending to households

Falling bank lending to households in recent years is attributable primarily to the large banks, which have reduced lending to households, cf. Chart 23. About 50 per cent of the fall in large banks' lending since the peak is due to lower lending for housing purposes, which should be seen in the context of the banks' transfer of mortgage-like bank loans to the mortgage credit institutions. At the same time, the medium-sized banks are increasing lending to households, which has risen by 18 per cent over the last four years. This rise is driven exclusively by lending for housing purposes, which has surged by more than 40 per cent during the same period.

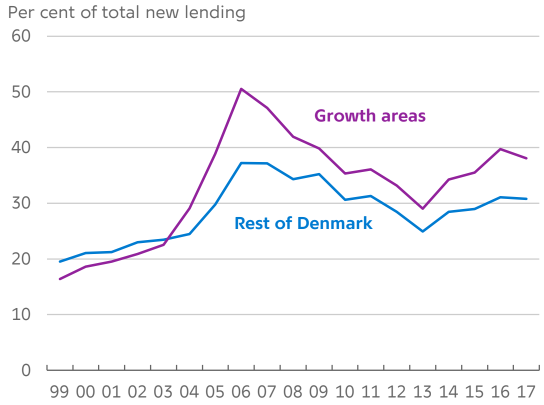
Highest increase in housing loans by medium-sized banks in the growth areas

The medium-sized banks' lending for housing purposes is increasing especially in the growth areas, cf. Chart 24, same as for mortgage lending. Lending growth is particularly high for the medium-sized banks based outside Copenhagen. Their lending for housing purposes in the growth areas has surged by 65 per cent over the past two and a half years. This indicates that the banks are gravitating towards Copenhagen and Aarhus. This development reflects the large population, high rate of migration and house prices that have been increasing for several years in these areas. As a result of this development, almost one-fourth of the lending of the medium-sized banks based outside Copenhagen is now granted in the growth areas, compared with just over one-fifth at the end of 2015.

With the fall in lending by the large banks, the medium-sized banks' market share of housing loans is on the rise. If Copenhagen-based medium-sized banks are disregarded, the market share in the growth areas has increased from 6 to 9 per cent since 2015.

Small fall in new mortgage lending to home owners with DTI ratios above 4

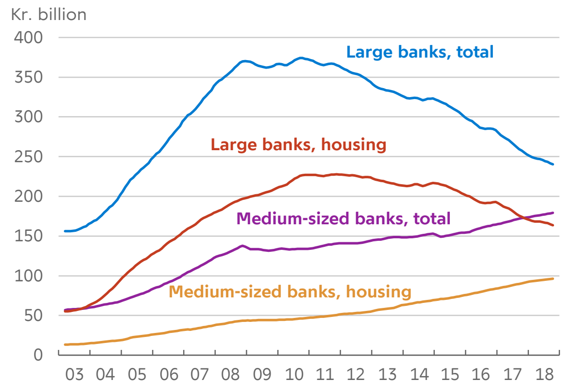
Chart 22



Note: The debt-to-income, DTI, ratio is defined as total debt relative to income before tax. Growth areas comprise the areas Copenhagen City, Copenhagen environs and the municipality of Aarhus.
Source: Statistics Denmark and own calculations.

Medium-sized banks' lending to households is on the rise

Chart 23



Note: Lending is calculated as a 3-month moving average. The most recent observations are from October 2018.
Source: Danmarks Nationalbank.

Medium-sized banks' housing loans are growing most rapidly in the growth areas

Chart 24

Lending growth, end-2015 - mid-2018

Per cent	Medium-sized banks	Medium-sized banks excl. Copenhagen-based banks
Rest of Denmark	20	40
Large cities	23	36
Growth areas	32	65

Note: Medium-sized banks' housing loans to households, broken down by regions. Housing loans comprise both owner-occupied and cooperative housing.
Source: Danmarks Nationalbank.

Medium-sized banks are opening branches outside their neighbouring areas

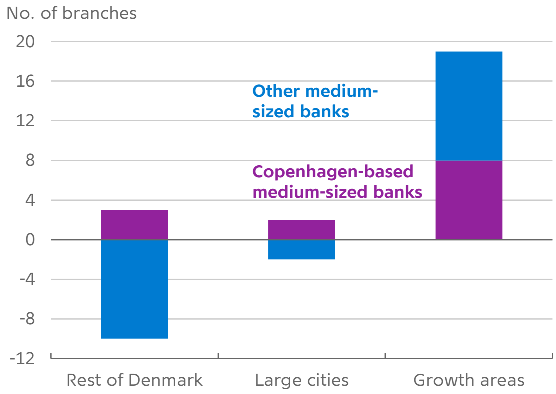
The number of branches has generally been declining for several years, driven by the large banks. Since 2012, they have closed 244 branches nationwide, about half of which in the growth areas and large towns and cities. The large number of branch closures should be seen in the context of digitisation of customer service, entailing that branches can cover larger areas and more customers.

At the same time, medium-sized banks have been expanding, especially in the growth areas, where they have opened 19 more branches than they have closed since 2012, cf. Chart 25. The medium-sized banks generally tend to open new bank branches outside their traditional neighbouring areas. As a result, almost all medium-sized banks are now present in the growth areas. The establishment of branches in large towns and cities help to explain why the medium-sized banks based outside Copenhagen are increasing lending in the growth areas.

Entry into new market areas far from the banks' traditional neighbouring areas may involve risks, since,

Medium-sized banks are expanding in growth areas, 2012-18

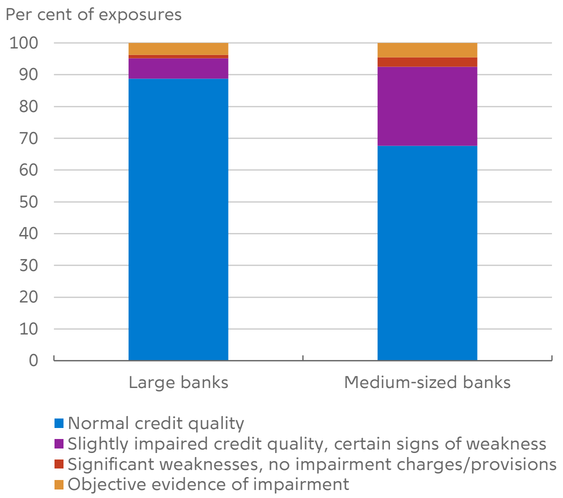
Chart 25



Note: The figures cover net branch openings in the period 2012 to November 2018.
Source: CVR register.

given the distance, the banks have limited knowledge of the area. Moreover, competition for customers intensifies as medium-sized banks open branches in new areas. This could lead to easing of credit quality requirements and conditions for new lending. About 32 per cent of the medium-sized banks' lending to households have impaired credit quality, which is a significantly higher share than for the large banks, cf. Chart 26. Borrowers in medium-sized banks are therefore weaker on average than borrowers in large banks. According to the banks, they are not easing requirements for households. In Danmarks Nationalbank's lending survey, the medium-sized banks responded that they are not easing credit standards for households. However, they also responded that competitor behaviour is negatively affecting credit standards, but not enough for general easing to be seen. Intensified competition could be the result of the medium-sized banks' lending growth and expansion towards the cities. While competition is healthy for the market, it is important that the banks maintain high credit standards to ensure that they do not advance in new markets based on excessive risk-taking. When the economy reverses, such behaviour could cause substantial problems.

A larger share of loans to households from medium-sized banks has impaired credit quality Chart 26



Note: Exposures are calculated as the sum of lending, guarantees and unused credit lines before impairment charges and provisions. Observations are from end-2017.
Source: Danish Financial Supervisory Authority and own calculations.

Protracted period of easing of credit standards for corporate customers

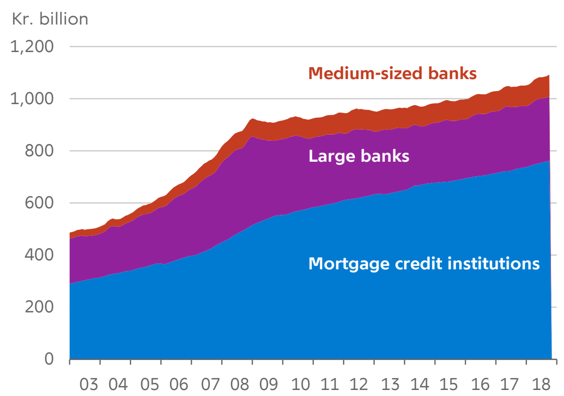
Mortgage lending is also driving lending growth to the corporate sector

Lending to the corporate sector has continued to grow over the past year, cf. Chart 27. Mortgage lending is still driving lending growth to the corporate sector, while bank lending by the large and medium-sized banks is expanding at a slower pace.

Credit standards for corporate customers have been eased for quite a while

Although growth in lending to the corporate sector is limited, risks may build up if credit quality requirements are eased. According to Danmarks Nationalbank's lending survey, the medium-sized banks tightened their credit standards for corporate customers in the 3rd quarter of 2018 after two quarters of unchanged credit standards, cf. Chart 28. However, the tightening should be seen in the context of the banks' reporting of 14 quarters of continuous easing. The large banks have continued to ease credit standards for corporate customers in the past two quarters after keeping them unchanged in the 1st quarter of 2018. According to the lending survey, the protracted period of easing for corporate customers is due to competition pressures. This has primarily been reflected in

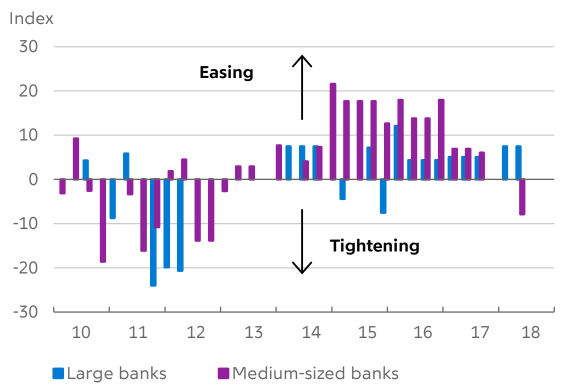
Mortgage lending is still driving lending growth to the corporate sector Chart 27



Note: Lending to the corporate sector by large and medium-sized banks and mortgage credit institutions, 3-month moving average. The most recent observations are from end-October 2018.
Source: Danmarks Nationalbank.

Credit standards for corporate customers have been eased regularly since 2014

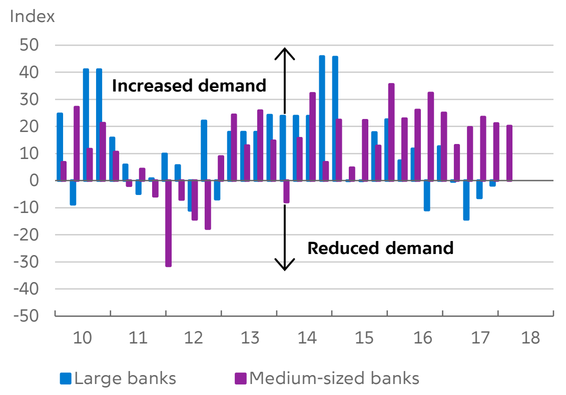
Chart 28



Note: Lending survey for corporate customers. The net balance may lie within the interval -100 to 100. A positive (negative) net balance means that credit managers of the banks in question have, overall, i.e. lending-weighted, stated that they have eased (tightened) their standards relative to the preceding quarter. The most recent observations are from the 3rd quarter of 2018.
Source: Danmarks Nationalbank.

Medium-sized banks are reporting increased demand from new corporate customers

Chart 29



Note: Lending survey for corporate customers. The net balance may lie within the interval -100 to 100. A positive (negative) net balance means that credit managers of the banks in question have, overall, i.e. lending-weighted, stated that demand from new customers has increased (decreased) relative to the preceding quarter. The most recent observations are from the 3rd quarter of 2018.
Source: Danmarks Nationalbank.

lower margin requirements and lower fees and, to a lesser degree, in lower collateral requirements.

In the current environment of economic recovery and intense competition among banks, it is important that the banks ensure solid credit quality.

The medium-sized banks' credit managers have been reporting increased demand from new corporate customers for 17 consecutive quarters, cf. Chart 29. The banks should maintain their credit standards, also towards new customers. If credit standards are eased, this could result in losses when the economy reverses and the earnings opportunities of firms decline. Consequently, the banks should assess firms' resilience throughout the business cycle to ensure their foundation is solid when the economy reverses.

The agricultural sector has unsustainably high debt

Banks should accept losses on non-viable farms
While the general economy is booming, the agricultural sector remains in crisis. The agricultural sector does not follow the same business cycle patterns as the general Danish economy, and structural challenges remain unsolved. In 2018, the sector is also affected by drought, which could bring farms closer to default.

The banks should accept losses on non-viable agricultural customers and help them transfer land and other assets to farms with better prospects. Even if this could – at least temporarily – exert downward pressure on land prices.

Banks' credit policies were too lenient in the run-up to the latest financial crisis

Ten years after the financial crisis, the agricultural sector is still hampered by the debt raised from the credit institutions during the agricultural land price bubble, cf. Chart 30.

In the years leading up to 2008, rising land prices caused the value of agricultural assets to increase sharply. Credit institutions issued a large number of new, large loans to the agricultural sector collateralised against inflated land prices. And in some institutions, access to credit was too lenient.

When the bubble burst, the equity of many agricultural customers of the institutions came under pressure.

In 2011, due to the substantial risks of the sector and very low number of agricultural land transactions, the Danish Financial Supervisory Authority (FSA) conducted a survey of the land prices applied by the credit institutions in their impairment calculations. Since then, the Danish FSA has regularly published the prices per hectare of agricultural land applied when the Danish FSA assesses loan impairment charges and provisions for the solvency need in the credit institutions.

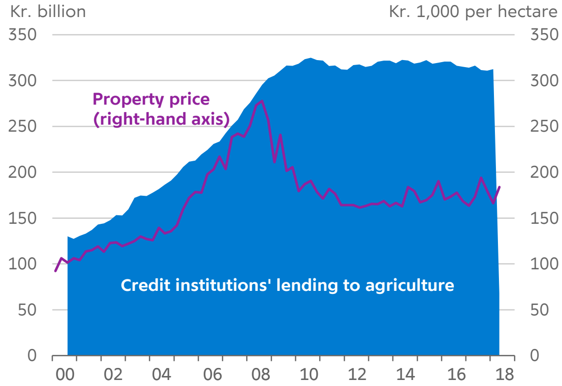
Credit institutions can accept agricultural properties as collateral at prices higher than the Danish FSA, provided these prices are specifically documented based on comparable transactions in the property's neighbouring area.

A large share of the banks' agricultural loans are non-performing loans

A large share of the banks' agricultural customers default on their loans. In June 2018, about 40 per cent of the agricultural loans in the medium-sized banks were non-performing loans, NPLs, cf. Chart 31. By comparison, the share of agricultural NPLs was approximately 10 per cent in the large banks.

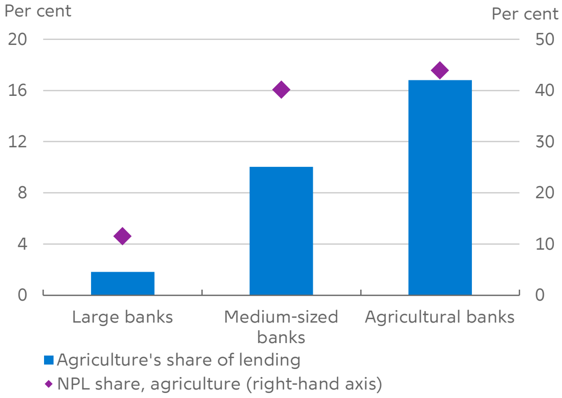
A loan is classified as NPL if the borrower has not paid interest, fees or instalments for more than 90 days, or if it is assessed to be unlikely that the borrower will fully meet its payment obligations without any collateral being realised.

Agricultural land price bubble in the run-up to the financial crisis is still an impediment for agriculture Chart 30



Note: Lending to agriculture, forestry and fishing by all credit institutions. The most recent observations are from the 2nd quarter of 2018 for property prices and the 3rd quarter for lending. Adjustment for data break in October 2013.
Source: Statistics Denmark, Danmarks Nationalbank and own calculations.

Many bank loans to the agricultural sector are NPLs Chart 31



Note: Share of non-performing loans, NPLs. Agricultural banks are the five banks in the population whose agricultural loans account for more than 10 per cent of total lending, excluding lending to credit institutions. 1st half 2018.
Source: Danmarks Nationalbank and own calculations.

Banks have made provisions for future agricultural losses

In the aftermath of the financial crisis, the banks have written down some of their agricultural exposures, cf. Chart 32. Loan impairment charges are recorded for future losses on an ongoing basis in the banks' corrective accounts.

However, in 2017, a number of banks reversed previous loan impairment charges due a temporary improvement in farmers' market conditions. In the 1st half of 2018, the medium-sized banks increased their accumulated loan impairment charges again, while loan impairment charges have continued to fall in the large banks.

Overall, the large banks have made provisions for future losses for a smaller share of their agricultural loans than the medium-sized banks. However, when it comes to agricultural NPLs, the large banks do not seem to have made less provisions.

Many farmers do not have a viable business

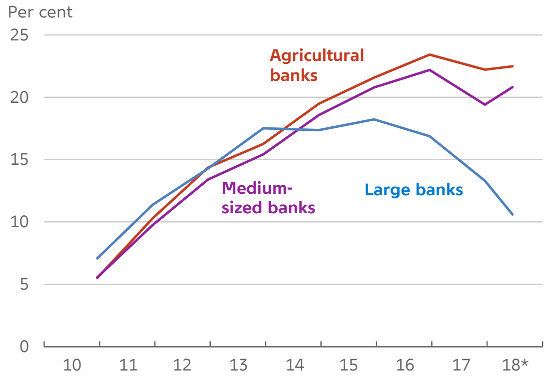
The financial position of many farmers is so poor that it is doubtful whether their business is viable in the longer run. More than half of the credit institutions' agricultural loans are granted to farmers with a low equity-to-debt ratio, cf. Chart 33. If only bank loans to the agricultural sector are considered, i.e. excluding mortgage loans, around 80 per cent have low equity. This indicates that farmers with a poor financial position find it difficult to obtain loans from mortgage credit institutions.

At the same time, many farmers with low equity operate at a loss and may expect to see further erosion of their equity.

Equity is the type of financing best suited to absorb operating losses. If equity accounts for a high proportion of financing, this will make the financial position of the individual farmer more resilient and the debt less risky.

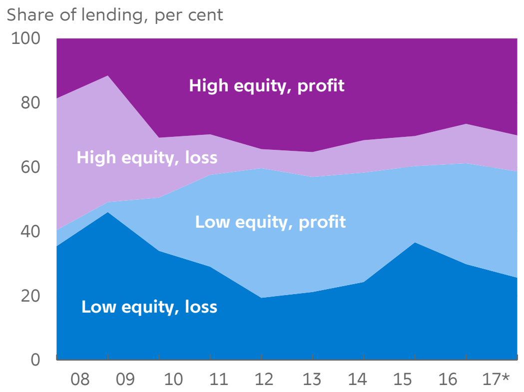
Few farmers have previously managed to turn around their financial position. Over the past five

Provisions for future losses have already been made for a large share of agricultural loans Chart 32



Note: Accumulated loan impairment charges are constantly being affected by new loan impairment charges (increases) and by realised losses on loans (reductions). Agricultural banks are the five banks in the population whose agricultural loans account for more than 10 per cent of total lending, excluding lending to credit institutions. The most recent observations for 2018 are for the 1st half.
Source: Danmarks Nationalbank and own calculations.

Many farmers work under financial constraints Chart 33

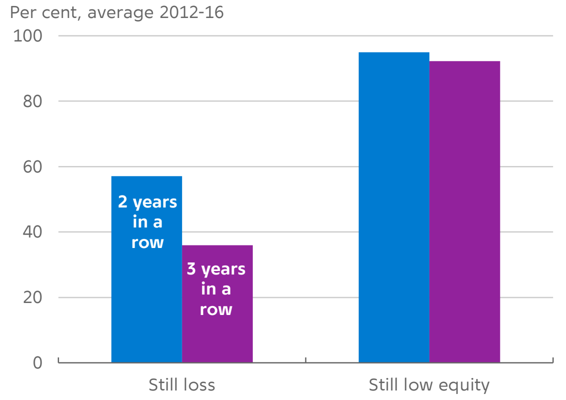


Note: Full-time farmers' debt to credit institutions. Low (high) equity is defined as equity of less (more) than 30 per cent of the assets. The estimation of data for 2017 takes as its point of departure the sample of farm financial statements on which Statistics Denmark's accounts statistics for agriculture are based.
Source: Statistics Denmark (individual data) and own calculations.

years of final figures in farm financial statements, 57 per cent of farmers with operating losses in a given year had operated with a loss for two years in a row and 36 per cent for three years in a row, cf. Chart 34. The farmers who had turned a loss into a profit did not manage to increase equity significantly. 95 per cent of farmers with low equity had had low equity for two years and 92 per cent for three years.

In recent years, low interest rates have buoyed up farmers with non-viable finances. More than 80 per cent of total agricultural debt to credit institutions is variable rate debt – including bank debt. If interest rates rise by 2.5 percentage points, the financial costs of full-time farmers are expected to increase by a total of 67 per cent.

Most farmers with weak financial ratios have had problems for several years in a row Chart 34



Note: Full-time farms. Average for 2011-16. Low (high) equity is defined as equity of less (more) than 30 per cent of the assets. Share of full-time farmers in the sample of farm financial statements, upon which Statistics Denmark's accounts statistics for agriculture are based, with low equity (loss), as they also had low equity (loss) the previous year. It cannot be assessed whether farms leaving the sample have defaulted or have been eliminated for other reasons.

Source: Statistics Denmark (individual data) and own calculations.

Banks may have an incentive to offer forbearance to agricultural customers with non-performing loans

Many non-viable farmers have escaped default for a number of years. This could indicate that some banks offer forbearance to agricultural customers. However, the number of defaults has been higher than previously in 2015-18.

If many farms are put up for sale at the same time in a given area, this may cause local price pressures. That will lead to higher realised losses for banks which have provided agricultural lending in that area. This could induce some banks to breathe artificial life into farmers that would otherwise default. It should be in the interests of both banks and farmers to make the necessary adjustments in the sector while interest rates remain low.

Most banks have the scope to contribute to the necessary adjustments

The banks have already written down a number of the loans, and their earnings are generally high. Consequently, Danmarks Nationalbank finds that most banks have the scope to tidy up their agricultural portfolios.

The large banks' lending to the agricultural sector is relatively limited, so they can handle even very large realised losses. The losses may be covered by already accumulated loan impairment charges and, if necessary, by a small share of earnings. Against this backdrop, Danmarks Nationalbank assesses that the agricultural sector does not pose a systemic risk to financial stability in Denmark.

The medium-sized banks for which agricultural lending accounts for a limited share of total lending are also assessed to be able to handle the realisation of even large agricultural losses.

But the medium-sized banks for which agricultural lending accounts for a large share of total lending could be faced with serious challenges. When they are to realise losses on customers with NPLs, this could substantially reduce their earnings capacity and, in a worst case scenario, put their excess capital adequacy relative to their total capital requirement under pressure.

Increasing prices in the commercial property market

The market for commercial properties is characterised by rising prices and low required rates of return

The market for commercial properties is still characterised by high prices and transaction volumes. Foreign investors account for a considerable share of transactions, particularly in Copenhagen, but as prices in Copenhagen rise and expected returns fall correspondingly, they, like the Danish investors, are also turning their attention to other Danish cities. This development shows that the market for commercial properties is becoming increasingly global and that Denmark is seen as an attractive and safe country to invest in.

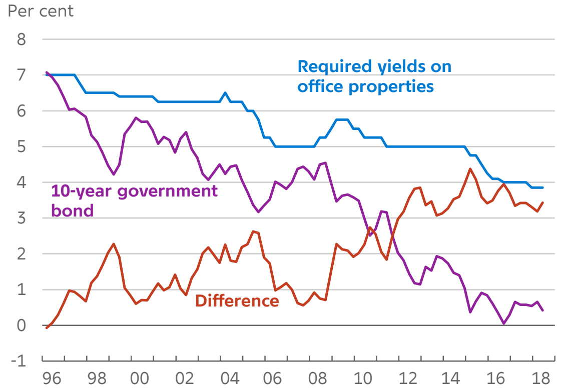
One of the reasons for the high prices is that investors require lower returns as a result of the general fall in interest rates, cf. Chart 35. The latter stimulates investment in asset classes generating higher returns than bonds do.

The property companies are better capitalised today than in the pre-crisis years

Lower required returns are reflected not only in high prices for properties traded, but also in the financial statements of the property companies that value their property portfolios at market price on a current basis. Measured by the solvency ratio, i.e. the relationship between a firm's equity and balance sheet, both Danish and foreign property companies are better capitalised today, cf. Chart 36. Compared with the pre-crisis years, the rising book values of the properties do not go hand in hand with rising debt levels to the same extent.

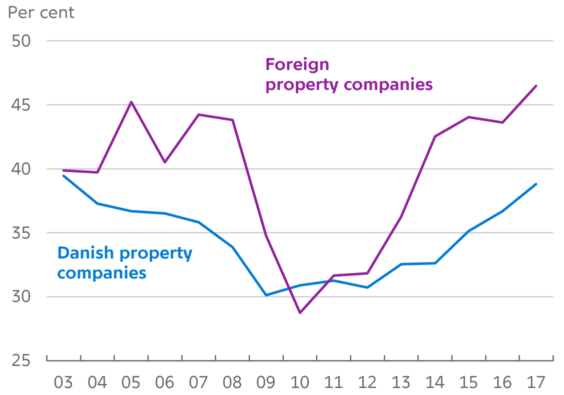
The improved solvency ratio mainly reflects a decline in the number of thinly capitalised property companies, defined as companies with a solvency ratio below 20 per cent, cf. Chart 37. However, more property companies seem to be increasing their debts substantially. A sudden interest rate hike could have a negative impact on property prices, thereby squeezing the companies' earnings and balance sheets. In addition, a price drop may be reinforced if foreign actors withdraw from the market.

Low required returns on commercial properties Chart 35



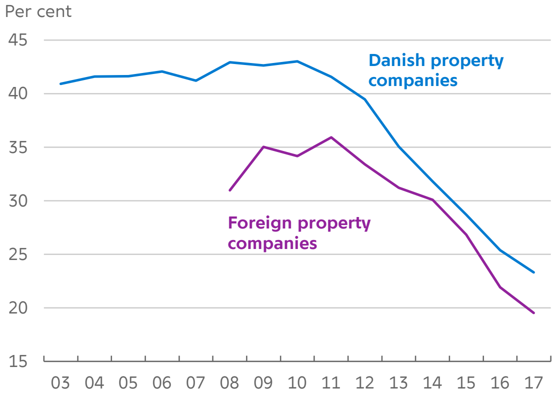
Note: CBRE estimates of property investors' average required return in the first year in terms of operational income from the property, excluding value adjustments of the property. The most recent observations are from the 1st quarter of 2018.
Source: CBRE and Danmarks Nationalbank.

The average solvency ratio is increasing Chart 36



Note: The solvency ratio is defined as equity relative to total assets.
Source: Own calculations based on data from Bisnode and the CVR register.

Fewer thinly capitalised property companies Chart 37



Note: A thinly capitalised property company is defined as a company with a solvency ratio below 20 per cent.
Source: Own calculations based on data from Bisnode and the CVR register.

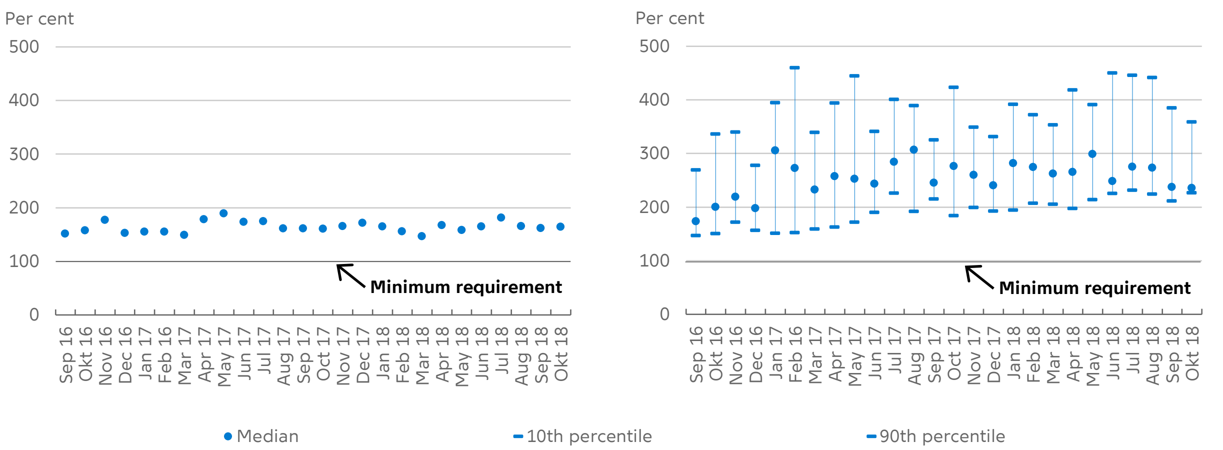
The liquidity in the financial sector is still sufficient

The banks are LCR compliant

The Danish banks fulfil the short-term Liquidity Coverage Ratio, LCR, requirement with a certain margin, cf. Chart 38. This requirement is to ensure that the banks have sufficient liquid funds to withstand a 30-day liquidity stress scenario. The banks must calculate the ratio on a daily basis, but following a review of financial regulation, the Danish FSA has announced that the calculation frequency may be reduced for some non-systemic banks with a stable, high LCR.

The Danish banks also observe the Danish FSA's 3-month liquidity stress requirement, which is part of the Supervisory Diamond and based on a projection of the LCR with a few adjustments.

The banks fulfil the LCR requirement with a certain margin Chart 38



Note: The LCR (Liquidity Coverage Ratio), which must be higher than 100 per cent, 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 end-October 2018.
Source: Danmarks Nationalbank.

Credit institutions are close to meeting an MREL at group level including the mortgage business

The systemic credit institutions are currently issuing eligible liabilities and are not far from meeting a requirement[4] at group level including the mortgage business, cf. Chart 39. An MREL is to ensure sufficient liabilities to absorb losses in a failing bank so that it can keep operating or be resolved in accordance with its individual resolution plan.

However, Danish systemic credit institutions are not bound by an MREL at group level as mortgage credit institutions are not subject to an MREL but to a debt buffer requirement. The latter constitutes a fixed share of lending. This creates problems in relation to lack of risk sensitivity and credible resolution planning. The total requirement for Danish credit institutions is currently more or less identical to an MREL at group level including the mortgage business, cf. Chart 39.

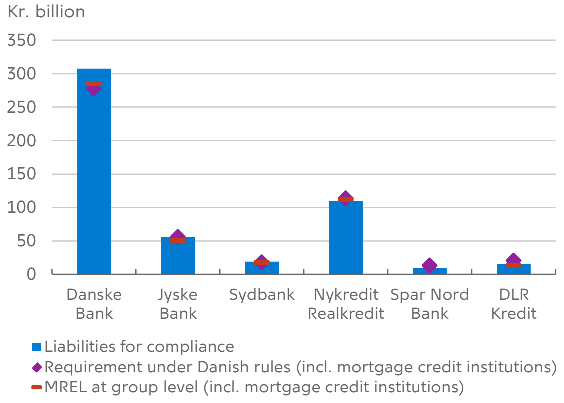
There is still sufficient krone liquidity

With a few exceptions, the net position of monetary policy counterparties against Danmarks Nationalbank has been within the interval kr. 150 to 200 billion in recent years. In other words, the banks overall have excess liquidity. In March 2018, the net position was approaching kr. 100 billion, cf. Chart 40, and there were indications that krone liquidity was becoming scarcer. This was reflected in a high price for interbank krone liquidity, the Tomorrow/Next, T/N, rate, at that time, cf. Chart 41.

For some years, the Danish money market has been characterised by falling activity, the largest share of turnover being driven by currency swaps. The modest turnover in money market lending should be viewed in the context of ample krone liquidity among the banks overall.

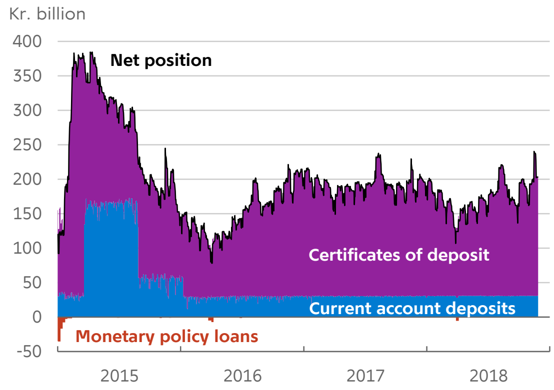
Developments in the T/N rate support the assessment that in general there is sufficient liquidity in the sector as the rate has been more or less stable in the range from -0.45 to -0.55 since the introduction of daily purchases/sales of certificates of deposit in February 2017, cf. Chart 41. At the turn of the month,

Credit institutions are close to meeting an MREL at group level including the mortgage business Chart 39



Note: Either 8 per cent of assets or two times the total capital requirement including capital buffer requirements, whichever is higher. Eligible liabilities and own funds include unsecured senior debt, eligible liabilities and total capital. Until 2022, the requirements may be fulfilled by means of unsecured senior debt meeting certain conditions. The point of departure is the fully phased-in requirement and a countercyclical capital buffer of 1 per cent. Requirements under Danish rules are based on financial statements at end-2016. The most recent observations for issuance are from 7 September 2018.
Source: Published MRELs, financial statements for 2016 and the 1st half of 2018 and Danmarks Nationalbank.

The net position indicates that there is still excess liquidity Chart 40



Note: The most recent observations are from 26 November 2018.
Source: Danmarks Nationalbank.

4 Cf. Articles 1 and 2 of Commission Delegated Regulation (EU) 2016/1450 of 23 May 2016 supplementing Directive 2014/59/EU of the European Parliament and of the Council with regard to regulatory technical standards specifying the criteria relating to the methodology for setting the minimum requirement for own funds and eligible liabilities.

and especially at the turn of the quarter, interest rates are higher, however.

The credit spread[5] for short-term liquidity in the money market has also been relatively constant during this period. This indicates that there are no problems in relation to borrowing liquidity in the money market.

Longer-dated mortgage bonds behind loans with reference rate have contributed to reducing the annual refinancing volume

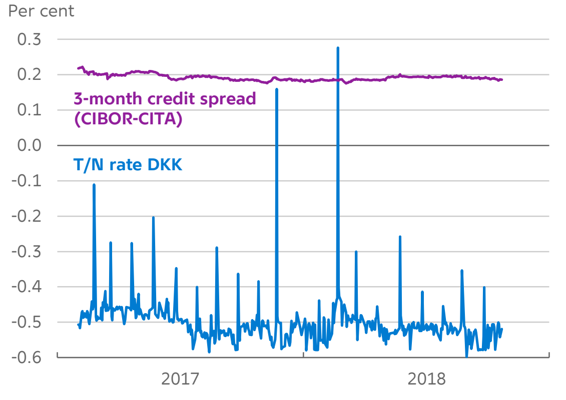
For a number of years, focus has been on reducing and spreading the total volume of refinancing in order to reduce the refinancing risk for variable rate mortgage loans. The total refinancing volume is now considerably lower than at the peak in 2013, and especially the volume of very short-term adjustable rate loans has been reduced, cf. Chart 42. Variable rate loans now account for 62 per cent of total mortgage lending.

One measure that has helped to spread and reduce the total volume of refinancing has been the introduction of loan types based on a reference interest rate, e.g. the CITA 6 rate, but financed by bonds with a maturity of typically 3-5 years.[6] The longer maturities of the bonds contribute to reducing the volume, while borrowers still have short fixed-interest periods. These loans have gradually become more popular, and loans based on a reference rate now account for 30 per cent of the annual refinancing volume.

Loans based on a reference rate are purchased mainly by Danish credit institutions

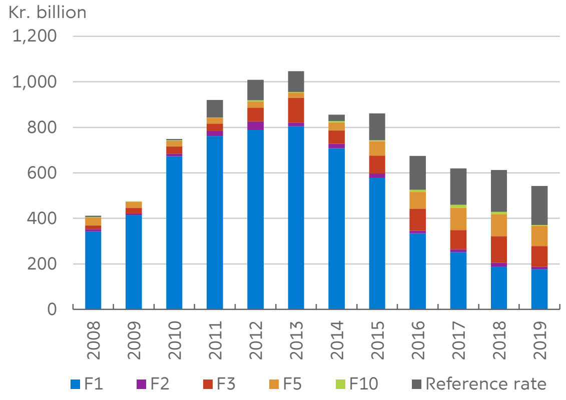
The group of investors in bonds with a reference rate in Danish kroner (CITA or CIBOR) comprises mainly Danish investors, the majority of which are credit institutions, cf. Chart 43. In terms of ensuring sales opportunities in a stress situation a broad group of investors is desirable.

T/N rate and credit spread do not indicate a general shortage of liquidity Chart 41



Note: Daily observations of T/N rate and spread between CIBOR 3M fixing and CITA 3M fixing in Denmark since 1 February 2017. The most recent observations are from 23 November 2018.
Source: Nasdaq OMX Nordic.

The annual refinancing volume has been reduced Chart 42



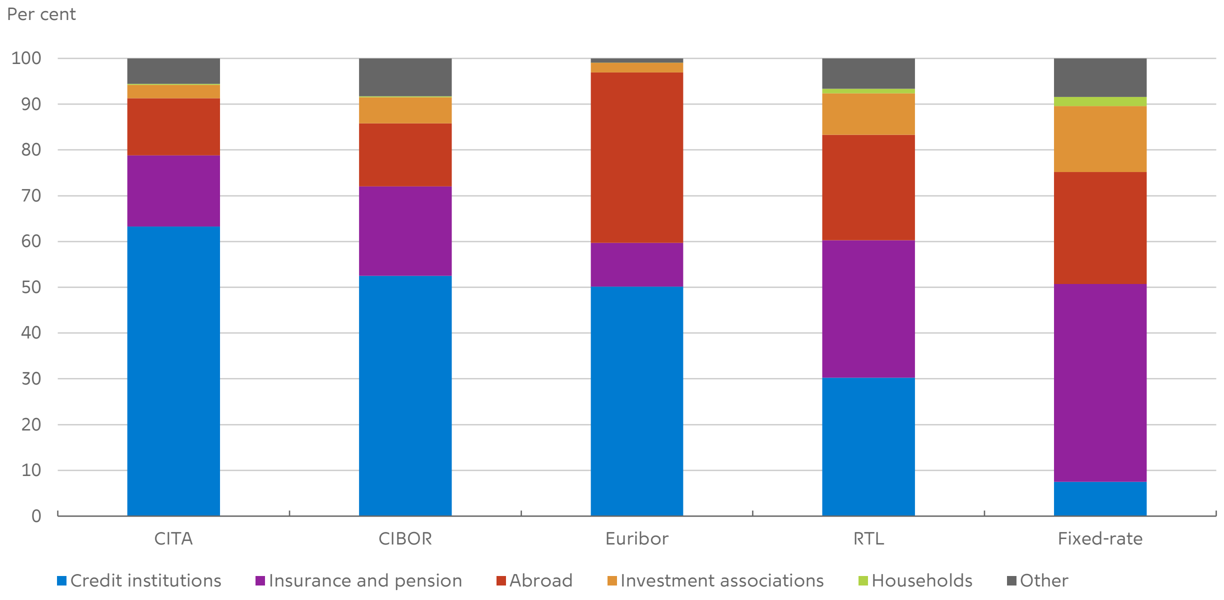
Note: The refinancing volume includes various loan types. The breakdown by refinancing frequency has been estimated on the basis of changes in the nominal outstanding volumes within the relevant intervals for remaining time to maturity. F1-F10 indicate adjustable rate loans with a fixed rate of interest for the number of years stated. F1 is adjustable rate loans with a fixed interest period of 1 year and so forth. The most recent observations are from August 2018.
Source: Danmarks Nationalbank.

5 The credit spread is calculated as the spread between CIBOR and CITA and estimates the credit premium for exchange of liquidity between banks. CIBOR is the interest rate at which a bank is willing to lend Danish kroner to another bank for a period on an uncollateralised basis. Hence, CIBOR includes a credit risk. CITA is the swap rate at which a bank is willing to pay to receive the daily T/N fixing over an agreed period. No principal amount is exchanged when trading CITA interest rate swaps, so the credit risk is very limited.

6 They are marketed as e.g. "Flexkort®" (flex short), "F-kort" (F short) or "Kort Rente" (short-term interest rate).

Investor breakdown of various types of mortgage bonds

Chart 43



Note: Average investor distribution in the period from July 2015 until and including August 2018, based on end-of-month data.
Source: Scanrate and Danmarks Nationalbank.

Minimum leverage ratio requirement may overrule buffer requirements

Issuance of subordinated capital boosts own funds
The systemic credit institutions all meet their own capital targets and their excess capital adequacy is generally solid relative to the fully phased-in requirements in the Capital Requirements Regulation, CRR. The institutions also have sufficient capital to meet the countercyclical capital buffer requirement, which will be 1 percentage point with effect from 30 September 2019.[7]

The relatively high earnings over the last year have led to only modest increases in Common Equity Tier 1 capital among the systemic credit institutions, cf. Chart 44. This is primarily because the earnings are to a large extent distributed to shareholders, either as dividends or via share buy-back programmes. In addition, the transition to the new IFRS 9 impairment rules has generally led to a small decline in Common Equity Tier 1 because the level of loan impairment charges is higher under the new rules.[8] However, several systemic credit institutions have increased their total own funds over the last year by issuing Additional Tier 1 capital and Tier 2 capital.

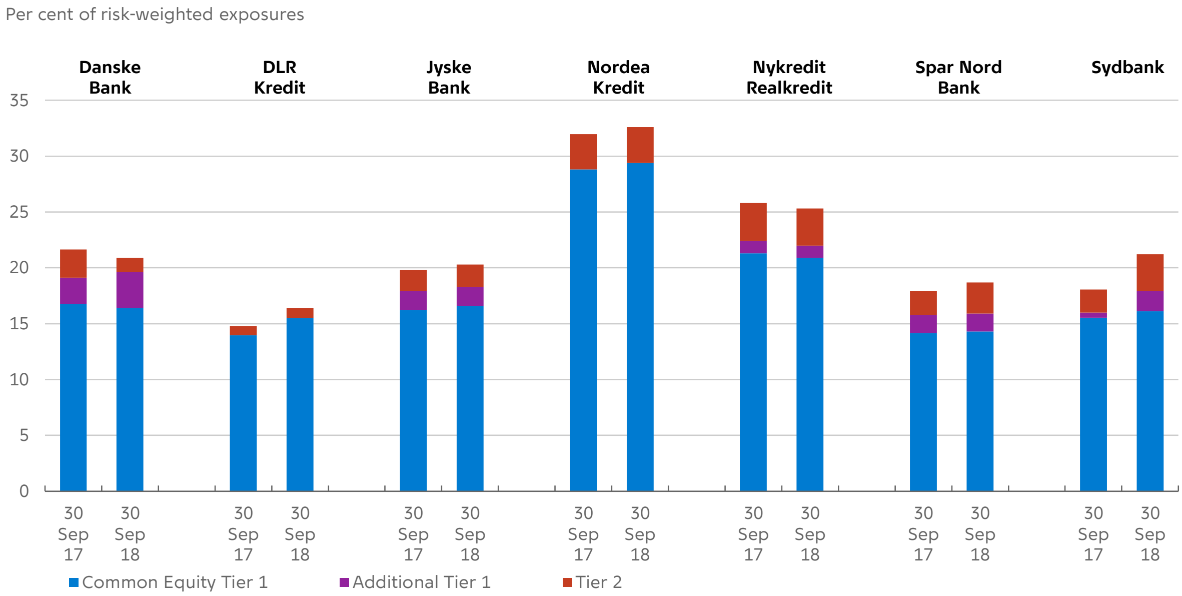
Systemic credit institutions observe capital requirements in stress test
Danmarks Nationalbank's accounts-based stress test shows that the systemic credit institutions all have sufficient capital to withstand a severe recession

7 The Systemic Risk Council expects to recommend a further increase of the buffer rate by 0.5 percentage point in the 1st quarter of 2019 unless the risk build-up in the financial system slows down considerably, cf. press release (*link*).

8 Danske Bank, Sydbank and Spar Nord Bank have chosen to apply the transitional arrangement for IFRS 9, which means that the new rules do not take full effect until the 2023 capital statement. The transitional arrangement does not apply to mortgage lending measured at fair value.

Several systemic credit institutions have increased their own funds by issuing subordinated capital

Chart 44



Source: Danish Financial Supervisory Authority and published financial statements.

scenario.[9] They keep a comfortable distance to the minimum capital requirement, but a few are close to exceeding the total capital requirement, even though the severe stress scenario excludes the countercyclical capital buffer.[10] In the severe scenario, the institutions' aggregate excess capital adequacy relative to the total capital requirement is approximately 3 percentage points, but the figure masks considerable divergence between the institutions.

Danmarks Nationalbank also estimates an indicator for the stock exchange listed systemic credit institutions' market-based excess capital adequacy in a severe stress, SRISK, cf. Chart 45.[11] The level of SRISK has fallen in line with the diving equity prices of Danish systemic credit institutions in recent months, cf. Chart 2. The fall in the indicator reflects that the market's assessment of the institution's robustness has been reduced.

On 2 November 2018, the European Banking Authority, EBA, published the results of a pan-European stress test. From Denmark, Danske Bank, Nykredit and Jyske Bank were included in the stress test, while the Danish Financial Supervisory Authority chose to let Sydbank conduct a similar stress test. In the pan-European test, the capital ratios of the Danish institutions are

9 In the stress test, the institutions' excess capital adequacy over the next three years has been assessed in three different macroeconomic scenarios. Danmarks Nationalbank has applied a new approach to making the scenarios countercyclical, i.e. more severe in good times and milder in bad times. The stress scenarios and the results of the stress test, as well as the underlying methodology, are described in more detail in *Danmarks Nationalbank Analysis (Stress Test)*, No. 21, 30 November 2018.

10 In the stress test, it is assumed that the countercyclical capital buffer will be released in the severe stress scenario. Hence, the total capital requirement in the severe scenario comprises the minimum capital requirements, a Pillar 2 add-on, the SIFI buffer and the capital conservation buffer.

11 In the stress scenario it is assumed that stock indices tumble by at least 40 per cent over a six-month period. See Oliver J. Grinderslev and Kristian L. Kristiansen, Systemic risk in Danish banks: Implementing SRISK in a Danish context, *Danmarks Nationalbank Working Paper*, No. 105, 2016 (*link*).

reduced by between 4 and 5 percentage points, but all of them still have excess capital adequacy relative to the aggregate capital requirement if the countercyclical capital buffer is disregarded. The relatively large decline in capital ratios should be viewed in the light of an extremely severe scenario in which Denmark is much harder hit than Europe in general.

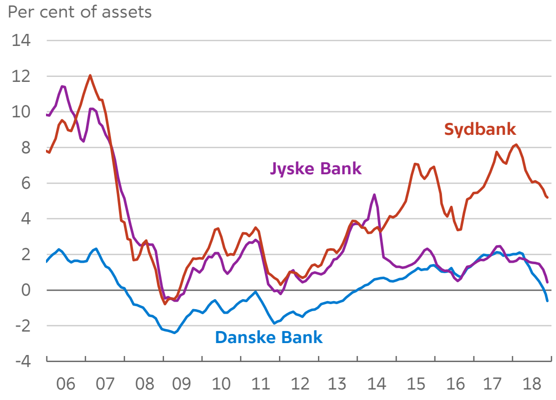
Minimum leverage ratio requirement may overrule risk-based capital requirements

Today, the leverage ratio is implemented as a disclosure requirement in the EU. Following the adoption of a revised Capital Requirements Regulation, CRR2, the ratio will be a new minimum capital requirement, meaning that Tier 1 capital (Common Equity Tier 1 plus Additional Tier 1) must constitute at least 3 per cent of non-risk weighted exposures.[12] According to the most recently published risk reports, the systemic credit institutions all have leverage ratios well above the future minimum requirement, cf. Chart 46.

For institutions with a large share of assets with very low risk weights, the leverage ratio could entail a higher Tier 1 requirement than the risk-based capital requirements applying until now. It looks as if this might be the case for two of the systemic credit institutions, which have mortgage credit as the most significant leg of their business models, cf. Chart 47. For the other institutions, the risk-based capital requirements (including capital buffers) can still be expected to constitute the highest Tier 1 requirement.

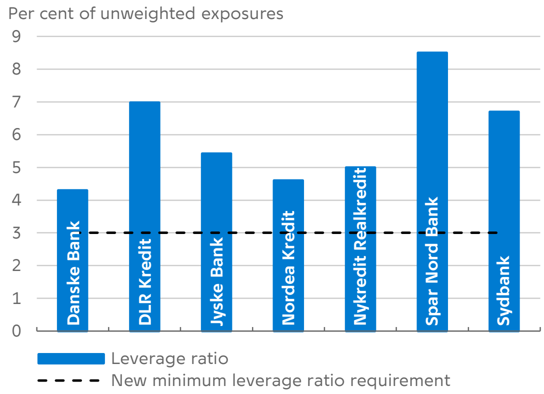
However, the minimum leverage ratio requirement could also have an impact on these institutions as it could constitute a restriction in terms of the ability of the capital buffers to absorb losses in going-concern institutions. The capital buffer requirements are basically "soft" requirements, so non-compliance will result in a number of restrictions on an institution's opportunities to distribute dividend and pay out bonuses.[13] In contrast, the minimum ratio will be a "hard" requirement and non-compliance will mean that the institution may not continue to operate. Consequent-

Market-based stress test, SRISK, shows a decline in robustness among systemic credit institutions Chart 45



Note: 3-month moving averages of market-based excess capital adequacy during stress. It is defined as the difference between the market value of assets, calculated under stress, and the book value of liabilities, excluding equity, less a capital requirement of 3 per cent of the assets measured by the market value. The most recent observations are from the 2nd quarter of 2018 for financial statements and 15 October 2018 for equity prices.
Source: Bloomberg, SNL Financial and own calculations.

Systemic credit institutions meet future minimum leverage ratio requirement Chart 46

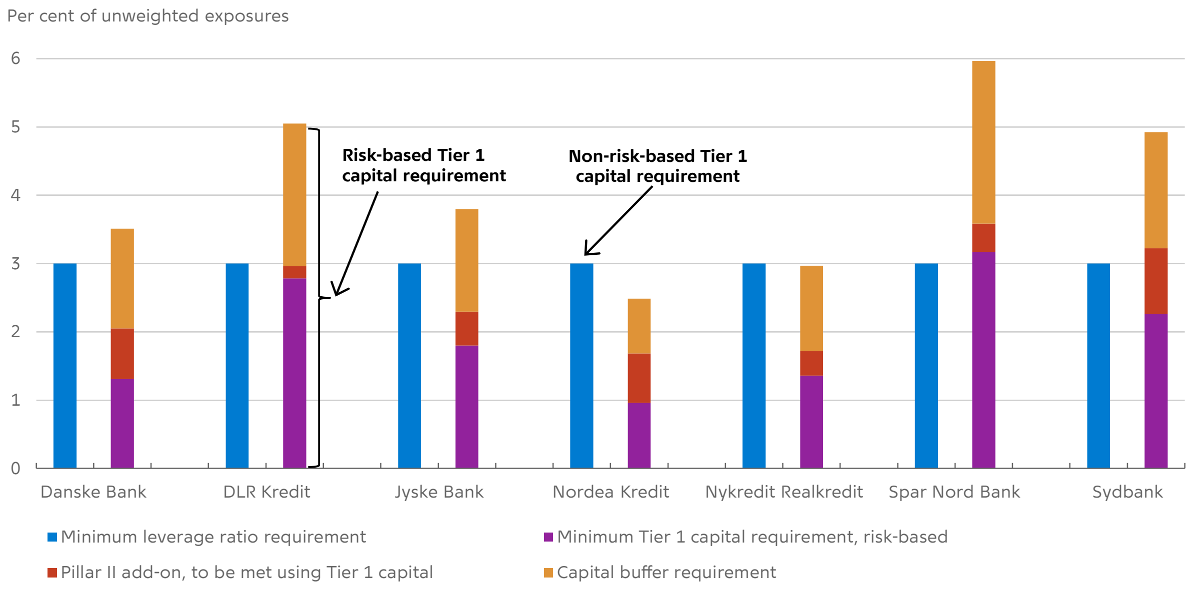


Note: The most recently published leverage ratio for each institution – as at 31 December 2017 for DLR Kredit, Jyske Bank and Spar Nord Bank, 30 June 2018 for Nordea Kredit and 30 September 2018 for Danske Bank, Nykredit Realkredit and Sydbank.
Source: Risk reports/Pillar 3 disclosures.

12 In May 2018, negotiations between the member states on the European Commission's proposal from November 2016 to amend the Capital Requirements Regulation, CRR, and the Capital Requirements Directive, CRD, were concluded. The proposal is still being negotiated with the European Parliament, but no amendments are expected in relation to calibration of the leverage ratio.

13 Furthermore, the institution is required to prepare and submit a capital plan to the Danish Financial Supervisory Authority. The Authority may also take a number of discretionary measures.

A future minimum leverage ratio requirement may overrule risk-based capital requirements Chart 47



Note: The risk-based requirements for Tier 1 capital are shown as percentages of unweighted exposures so as to enable immediate comparison with the minimum leverage ratio requirement. The capital buffer requirement reflects the fully phased-in requirements for the SIFI buffer, the capital conservation buffer and a countercyclical capital buffer of 1 per cent. It has generally been assumed that 75 per cent of the Pillar 2 add-on is to be met using Tier 1 capital, but that Danske Bank's Pillar 2 add-on in relation to compliance and reputational risk must be met 100 per cent by means of Common Equity Tier 1.
Source: Danish Financial Supervisory Authority, risk reports/Pillar 3 disclosures, published financial statements and own calculations.

ly, the introduction of a minimum leverage ratio requirement should make the institutions reconsider their medium-term capital targets in order to ensure sufficient excess capital adequacy relative to the new requirement so that the capital can still absorb losses without the institution risking resolution.

In the longer term, the introduction of an "output floor" is expected to increase capital requirements by an average of 34 per cent compared with the current level for the five largest Danish credit institutions.[14] If the output floor is implemented in EU legislation in accordance with the recommendations of the Basel Committee, it will become a binding requirement for most of the systemic institutions by 2027 at the latest.[15] But even after that, the minimum leverage ratio requirement may impose a restriction on the use of capital buffers to absorb losses, particularly in institutions with a large share of low-risk assets.

Both the leverage ratio and the output floor will potentially strengthen the institutions' capitalisation by requiring them to hold more capital. But at the same time, they may have an unfortunate impact on the institutions' incentives to pursue sound risk policies. If the leverage ratio is binding on the individual institution, it will completely remove the risk sensitivity of the capital requirements. In other words, the capital requirement will be the same for a loan with a very high risk and a loan with a very low risk. If the output floor is binding instead, risk sensitivity will depend on the risk weighting using the standardised approach. This entails a higher degree of risk sensitivity than the leverage ratio, but a substantial reduction of risk sensitivity relative to the risk weighting of the IRB approaches.

14 See Ministry of Business, Industry and Financial Affairs, *Effekter af Baselkomitéens anbefalinger om kapitalkrav til kreditinstitutter* (Effects of the Basel Committee's recommendations on capital requirements for credit institutions – in Danish only), February 2018 [*link*].

15 The Basel Committee envisages phasing-in of the output floor in the period from 2022 to 2027.

Appendix: Data for the analysis

The analysis applies the term "credit institutions" when referring to both banking and mortgage credit institution activities. The term "bank" refers specifically to entities carrying out banking activities.

The analysis of Danish credit institutions' earnings, liquidity and own funds comprises seven systemic credit institutions. Besides the six credit institutions classified by the Danish Financial Supervisory Authority as systemically important financial institutions, SIFIs, in 2018, Spar Nord Bank has been included as both a systemic credit institution and a systemic bank. The reason is that the Ministry of Industry, Business and Financial Affairs in December 2017 announced that Spar Nord Bank will become a SIFI because the model for classification of SIFIs has been adjusted. The analysis also includes the non-systemic banks in the Danish Financial Supervisory Authority's group 2 in 2018. These institutions are listed in Table 1. Unlike in the Authority's group 2, Saxo Bank has been omitted because of its business model. The grouping applies back in time.

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 Handelsbanken and Santander Consumer Bank.

Institutions in the analysis by balance sheet total as at 30 June 2018, kr. million Table 1

Systemic credit institutions	Amount
Danske Bank (including Realkredit Danmark)	3,234,694
Nykredit Realkredit (including Nykredit Bank)	1,422,310
Jyske Bank (including BRFkredit)	593,002
Nordea Kredit	439,160
DLR Kredit	157,929
Sydbank	136,147
Spar Nord Bank	83,561
Systemic credit institutions, total	6,066,803

Systemic banks	
Danske Bank	2,320,801
Jyske Bank	286,510
Nykredit Bank	173,375
Sydbank	138,430
Spar Nord Bank	83,690
Systemic banks, total	3,002,806

Non-systemic banks	Amount
Ringkjøbing Landbobank	49,859
Arbejdernes Landsbank	49,691
Sparekassen Kronjylland	25,055
Sparekassen Sjælland-Fyn	23,318
Vestjysk Bank	21,560
Sparekassen Vendsyssel	20,789
Lån & Spar Bank	20,530
Jutlander Bank	17,487
Den Jyske Sparekasse	15,458
Non-systemic banks, total	243,747

Mortgage credit institutions	
Nykredit Realkredit (including Totalkredit)	1,358,470
Realkredit Danmark	858,384
Nordea Kredit	439,160
BRFkredit	339,696
DLR Kredit	157,929
LR Realkredit	24,541
Mortgage credit institutions, total	3,178,180

Note: The balance sheet totals of systemic banks, non-systemic banks and mortgage credit institutions are stated at institution level, while the balance sheet totals of the systemic credit institutions are stated at group level.
Source: Danmarks Nationalbank..

ABOUT ANALYSIS

As a consequence of Danmarks Nationalbank's role in society we conduct analyses of economic and financial conditions.

Analyses are published continuously and include e.g. assessments of the current cyclical position and the financial stability.

The analysis consists of a Danish and an English version. In case of doubt regarding the correctness of the translation the Danish version is considered to be binding.

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DANMARKS NATIONALBANK

ANALYSIS

DANMARKS NATIONALBANK

27 MAY 2019 — NO. 11

FINANCIAL STABILITY, 1ST HALF 2019

Prospects of lower earnings and higher capital requirements for banks

- The systemic credit institutions' results remain high, underpinned by low loan impairment charges since 2010. A substantial dampening of economic growth would lead to higher loan impairment charges and consequently lower earnings in future.
- In the current favourable situation, many banks have the capacity to increase lending. This intensifies competition for customers and increases pressure on the banks' credit standards. If credit standards are eased, this could result in losses when the economy reverses.
- Excess capital adequacy in systemic credit institutions was lower at end-2018 than the year before. The requirements for banks' capital structure are likely to be tightened considerably in the coming years. This may put pressure on the systemic credit institutions' excess capital adequacy if they fail to build up further capital adequacy beforehand.

MREL maturity dates

should be spread to ensure compliance in periods with limited market access

Read more

New reference rates

in Denmark is an important work and should also include longer maturities

Read more

The banks take on greater risks

when lending for acquisitions

Read more

CONTENTS

Summary and assessment

Expectations of lower growth and persistently low interest rates

The global economy is growing, but growth expectations have declined, especially for the euro area. In the euro area, monetary policy remains accommodative, and the market expects negative interest rates until the beginning of 2023. The equity price per krone of earnings, and hence the price of a share in European bank earnings, is falling. This fall may reflect a lower risk appetite among investors as well as more elements of uncertainty in relation to the banks' future earnings, e.g. economic growth, financial market developments and the extent of money laundering.

Measures to combat money laundering call for a strengthened effort on a European scale

Efficient anti-money laundering measures require a coordinated effort by banks and authorities. The banks play a key role by ensuring that they have sufficient knowledge of their customers and by monitoring the customers' transactions. The Danish authorities have launched several initiatives to strengthen the anti-money laundering effort, including tightening of legislation in 2018 and 2019. Economic crime exploits the infrastructure of the financial sector, which typically has a cross-border dimension. Consequently, a strengthened effort on a European scale is crucial in order to combat money laundering.

The work to develop new Danish reference rates is important

Finance Denmark has published a consultation paper on the introduction of a new risk-free overnight reference rate for the Danish krone market, based on overnight transactions. It is positive that a new reference rate will be based on actual transactions rather than quoted prices, as the underlying transactions will enhance confidence in the reference rate. With the aim of clarification and of strengthening confidence in reference rates in Denmark, the new reference rate should be implemented rapidly and the existing one should be phased out. International efforts are also ongoing regarding development of transaction-based reference rates for longer maturities than overnight. It is important that the Danish financial sector also continues this work. Denmark needs solutions concerning reference rates for longer maturities and for migrating existing contracts from old to new reference rates. Such solutions should match international best practice in this area.

Credit institutions' earnings are buoyed up by low loan impairment charges

Earnings remain high for the systemic credit institutions[1], despite lower results in 2018 than the historically high levels in 2016 and 2017. Since 2010, results have been underpinned by falling loan impairment charges, which were negative in some periods due to large reversals. The decline in profits since mid-2017 is largely due to lower value adjustments, as costs have been almost unchanged and core earnings have seen a weak decrease. Income from market activities has fallen and in 2018 it was below the average for the period 2010-18. A considerable dampening of growth would entail higher loan impairment charges. Unless compensated by other income, this would lead to lower earnings in future.

Total lending remains high by international standards

Denmark has a higher credit-to-GDP ratio than the other EU member states, although it has approached those of comparable countries in recent years. The high credit-to-GDP ratio in Denmark is offset by the considerable assets held by households, such as pension assets and real estate.

Medium-sized banks are increasing lending to households

Bank lending to households has declined in recent years. This decline is mainly attributable to the large banks, while the medium-sized banks have increased lending. The medium-sized banks' relatively high lending growth is driven by factors such as their expansion into the growth areas, defined as Copenhagen and environs and Aarhus. Moreover, competition for customers intensifies as medium-sized banks establish a foothold in the growth areas. While competition is healthy for the market, it is important that

1 For the data for the analysis, see Appendix.

the banks maintain high credit standards to ensure that they do not advance in new markets by taking excessive risk.

Intensified competition for corporate customers puts credit standards under pressure

In the current favourable environment, many banks have capacity to increase lending, which intensifies both competition for corporate customers and the pressure on credit standards. If credit standards are eased, this could result in losses when the economy reverses and firms' earnings opportunities decline. The interest margin should reflect the risk on the loan in question, and the robustness of firms should be assessed across the entire business cycle to ensure that their foundation is solid when the economy reverses.

Growing risk appetite among the banks when lending for acquisitions

Interest in leveraged buyouts has been rising in recent years, reflecting low interest rates and a growing economy. Traded prices have increased and there is fierce competition between banks and other actors who are ready to finance acquisitions. In November 2018, the Danish Financial Supervisory Authority warned that several banks are prepared to take on greater risks in the market than previously. This could mean that larger loans are granted and that requirements for repayment surety are reduced.

Lending by pension companies in Denmark is limited

In recent years, pension companies have increased their investment in alternative asset classes, such as direct lending, in response to the low interest rate environment and high valuations of other financial assets. In 2017, the pension companies received several instructions from the Danish Financial Supervisory Authority to strengthen their credit policies for direct lending. Pension companies' direct lending to real estate companies in Denmark is limited, however.

MREL maturity dates should be spread

The minimum requirement for own funds and eligible liabilities, MREL, will take effect on 1 July 2019 for most systemic credit institutions in Denmark. The typical maturities of issuances by Danish credit institutions are 3 or 5 years. According to Danmarks Nationalbank's stress test, the systemic credit institutions depend heavily on still being able to issue new MREL funds in a severe stress scenario in order to meet the MREL. Given that periods of no or limited capital market access may arise, the institutions should focus on the length and maturity profiles of their issuances to avoid strong concentration of maturing issuances and breach of the MREL. It is important for the credit institutions to have a certain excess of eligible liabilities relative to the MREL to ensure compliance through a period with no or limited market access.

Lower excess capital adequacy and prospects of tighter capital requirements

Excess capital adequacy in systemic groups was lower at end-2018 than the year before. Overall, the systemic groups channelled more than their profits for the year back to their shareholders in 2018. The requirements for banks' capital structure are likely to be tightened notably in the coming years, due to e.g. the Basel Committee's recommendation for revision of the banks' IRB approaches to calculating risk-weighted assets and an output floor. Unless the systemic groups build up further capital before the tighter requirements enter into force, their excess capital adequacy may come under pressure. Having sufficient capital is important if the banks for this reason are to avoid tightening their credit policies in the event of a cyclical reversal.

Denmark's MREL implementation is problematic and unnecessarily complex

The principle of always being able to recapitalise systemic groups without the use of public funds is a cornerstone of regulatory measures implemented by authorities all over the world after the most recent financial crisis. Danmarks Nationalbank has pointed out that the exemption of mortgage credit institutions from the MREL creates problems as regards lack of risk sensitivity and credible resolution planning. At the same time, the combination of capital, MREL and debt buffer requirements is unnecessarily complex. A complex requirement makes it difficult to assess the institutions' compliance and the size of their excess capital adequacy.

Expectations of lower growth and continued low interest rates

The global economy is growing, but growth is weaker, especially in the euro area
The global economy is growing, but growth expectations have declined, especially for the euro area. The global economy is expected to grow by 2.7 per cent in 2019 and by 2.9 per cent in 2020, cf. Chart 1. The IMF growth forecast for the euro area has been reduced from 1.9 to 1.3 per cent, reflecting lower economic activity in some countries and sectors.[2]

Interest rates are expected to remain low in the euro area
In the euro area, monetary policy is expected to remain accommodative. The European Central Bank, ECB, expects to keep its monetary policy interest rates unchanged at the current low levels throughout the 2nd half of 2019. The ECB's deposit rate is -0.4 per cent.

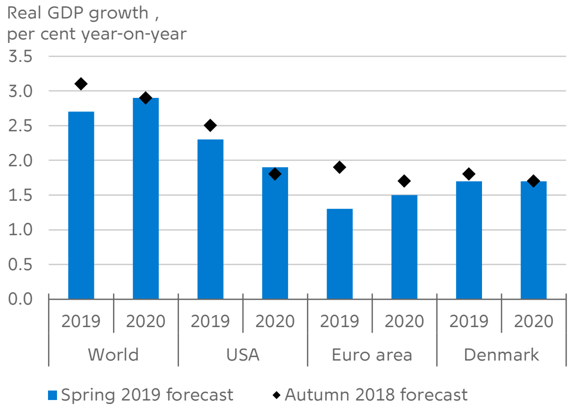
Market participants expect the ECB's key interest rate to remain negative until the beginning of 2023. This is a shift from December 2018, when market participants expected interest rates to become positive at the beginning of 2021, cf. Chart 2.

At the end of 2018, the ECB ceased to buy further bonds under the asset purchase programme introduced in 2015 to support euro area growth and bring inflation closer to the target. However, the ECB still makes extensive purchases in the bond market, as it reinvests the full amount from maturing bonds purchased under the programme. The ECB has announced that the reinvestments will continue for an extended period of time past the date of the first rise in interest rates.

In March, the ECB announced a further accommodative measure in the form of a new round of Targeted Longer-Term Refinancing Operations, TLTROs, giving euro area banks access to loans on favourable terms to encourage them to increase lending. The first 2-year loans will be granted in September 2019 and the last ones in March 2021.

Expectations of lower growth, especially in the euro area

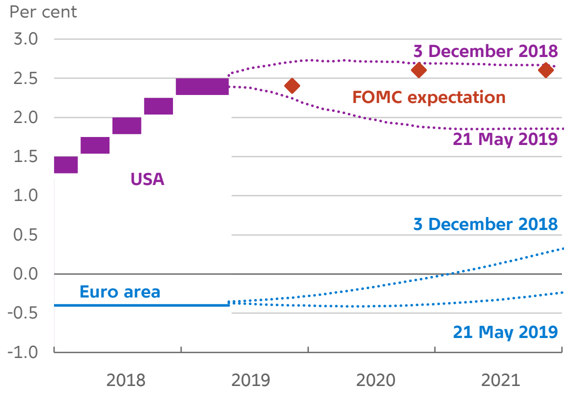
Chart 1



Note: GDP growth forecasts for the world, the USA and the euro area are from the IMF's World Economic Outlooks from October 2018 and April 2019, respectively. The forecast for Denmark is from Danmarks Nationalbank's projections from September 2018 and March 2019.
Source: IMF and Danmarks Nationalbank.

Interest rates are expected to remain low in the euro area

Chart 2



Note: The chart shows the ECB's deposit rate for the euro area and the Fed funds target range for the USA. The broken lines are based on implied 1-month forward rates for the euro area and futures prices for the USA. FOMC expectations from March 2019.
Source: Macrobond.

2 See IMF, *World Economic Outlook*, April 2019, Chapter 1.

The US Federal Open Market Committee, FOMC, has adjusted its economic outlook, now expecting lower target rates. In the short term, market expectations almost match the FOMC outlook, but in the longer term, the market expects even lower interest rates than indicated by the FOMC.

The financial markets have been influenced by a decreasing growth outlook

Equity prices in Denmark and globally dived in the autumn of 2018 in a market with higher volatility than in the preceding years. The global equity markets recovered in early 2019, and volatility fell again, cf. Chart 3. This should be viewed in the light of, inter alia, the Fed's announcement in January that the FOMC would be patient and consider financial market developments in its future interest rate decisions.

Financial market developments had a negative impact on earnings in several Danish banks at the end of 2018, cf. page 6.

Money laundering generates negative publicity

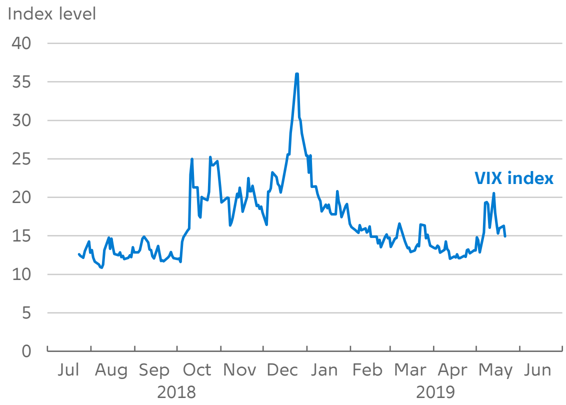
The media image of the Danish financial sector has been dominated by the money laundering problems in Danske Bank's branch in Estonia and the management's approach to this issue. This has led to a considerable increase in the number of newspaper articles in English giving Danish banks, primarily Danske Bank, negative publicity, cf. Chart 4.

Anti-money laundering measures require a coordinated effort by banks and authorities

Efficient anti-money laundering measures require a coordinated effort by banks and authorities. The banks play a central role by ensuring that they have sufficient knowledge of their customers and by monitoring the customers' transactions. Moreover, it makes great demands on a bank's risk assessment, policies, business procedures and systems if it chooses to expand its business abroad, where knowledge of its customers is limited. It is a precondition for the authorities' ability to efficiently investigate money laundering that the banks are capable of identifying and reporting suspicious transactions.

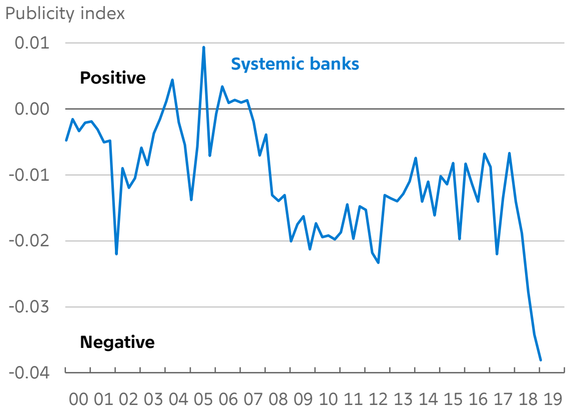
The Danish authorities have launched a number of initiatives to combat money laundering including tightening of legislation in 2018 and 2019. Legislation was tightened inter alia by increasing the maximum penalty and the level of fines for money laundering and by making it possible to revoke a firm's licence in the event of money laundering. In

Volatility declined in early 2019 Chart 3



Note: VIX is a US volatility index based on implied volatilities on S&P 500 index options with a maturity of 30 days, i.e. investor expectations of volatility over the next month. The most recent observation is from 21 May 2019.
Source: Bloomberg and announcements from the US Federal Open Market Committee.

Sentiment measure reflects reputational risk for Danske Bank Chart 4



Note: The publicity index is calculated on the basis of all Reuters articles in English about Danish systemic banks. The measure indicates the difference between the number of positive and negative words in a text, weighted by the total number of words in the text. A dictionary of positive and negative words defined by Loughran and McDonald, specifically for financial content documents has been used, cf. When is a liability not a liability? Textual analysis, dictionaries and 10-Ks, *The Journal of Finance*, Vol. 66, No. 1, February 2011, pp. 35-65.
Source: Thomson Reuters and Danmarks Nationalbank.

addition, in May 2019, enhanced cooperation between the Nordic and Baltic supervisory authorities was established to combat money laundering.

The European effort to combat money laundering should be strengthened
The reinforced anti-money laundering efforts by the Danish authorities are necessary, but it is also absolutely essential to create a better framework for European cooperation. Given the cross-border nature of money laundering, a cross-border EU effort is also necessary to combat it. A joint European effort would enable the build-up of strong competencies in this area and also provide a far better overview of international banking groups' cross-border activities.

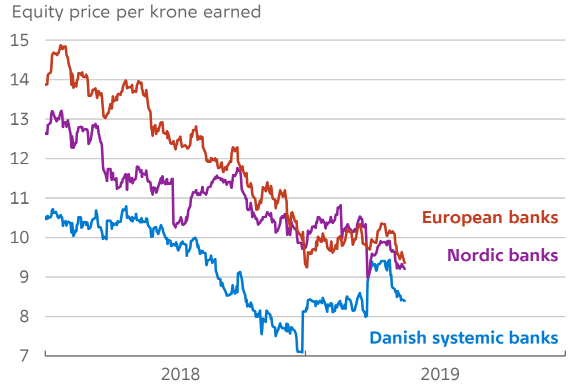
Declining interest in acquiring shares of bank earnings
The equity price per krone of earnings, and hence the price of a share in Danish bank earnings, has fallen since the beginning of 2018. Comparable Nordic and other European banks show a similar development, cf. Chart 5. Falling interest may reflect a lower risk appetite among investors as well as more elements of uncertainty in relation to the banks' future earnings, e.g. economic growth, financial market developments and the extent of money laundering.

The work to develop new Danish reference rates is important
Reference rates are of major importance to the financial markets, both internationally and in Denmark, where a large volume of mortgage loans and derivatives are linked to reference rates. Consequently, it is also essential to ensure confidence in the reference rates applied.

Finance Denmark has published a consultation paper on the introduction of a new risk-free overnight reference rate for the Danish krone market, based on overnight transactions. It is positive that a new reference rate will be based on actual transactions rather than quoted prices, as the underlying transactions will enhance confidence in the reference rate. A shift from quoted to transaction-based reference rates has also taken place in the euro area, the USA and the UK, among others.

With the aim of clarification and of strengthening confidence in reference rates in Denmark, the new reference rate should be implemented rapidly and the existing Tomorrow/Next rate, T/N rate, should be phased out. Phasing-out of the T/N rate is in step

Falling price of future bank earnings Chart 5



Note: The chart shows equity prices measured by the price/earnings ratio for listed systemically important Danish banks and selected Nordic banks (DNB, SHB, Swedbank, Nordea and SEB). European banks are based on the MSCI Europe Banks Index. The most recent observation is from 20 May 2019.
Source: Bloomberg.

with the euro area's decision to phase out EONIA in favour of the new transaction-based €STR.

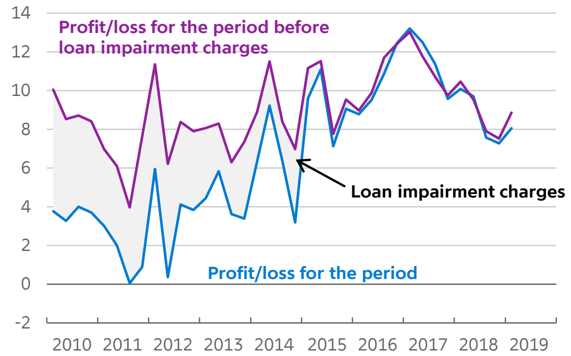
International efforts are also ongoing regarding development of transaction-based reference rates for longer maturities than overnight. It is important that the Danish financial sector also continues this work. Denmark needs solutions concerning reference rates for longer maturities and for migrating existing contracts from old to new reference rates. Such solutions should match international best practice in this area.

Credit institutions' earnings are buoyed up by low loan impairment charges

Low loan impairment charges buoy up results
The systemic credit institutions' earnings remain high, although results were lower in 2018 than the historically high levels in 2016 and 2017, cf. Chart 6. The beginning of 2019 has seen an increase in the results compared with the two previous quarters. Since 2010, profits have been underpinned by falling loan impairment charges, which have been negative in some periods due to large reversals. In 2018, new loan impairment charges slightly exceeded reversals,

The systemic credit institutions' results have declined

Chart 6



Note: Data is quarterly and the most recent observation is from the 1st quarter of 2019. The result is before tax and adjusted for goodwill impairment charges.
Source: Danmarks Nationalbank.

resulting in marginally positive total loan impairment charges.

In an international perspective, the return on equity was high in 2016 and 2017 compared with large Central and Northern European banks, while the Nordic banks maintained a high return on equity throughout the period, cf. Chart 7. In 2018, the Danish banks were placed somewhere between the Nordic and the European banks. Several Danish systemic credit institutions have reduced their expectations relative to 2016 and 2017.

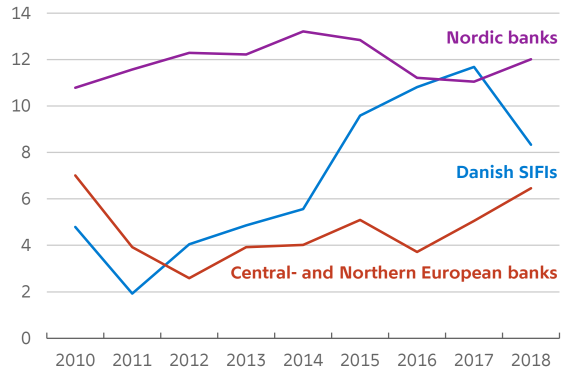
The impact of net interest income on earnings has declined

Declining net interest income still has an impact on the institutions' earnings, cf. Chart 8. Lower net interest income is a result of the low interest rates and is mainly attributable to falling interest margins. Previously, the fall in net interest income was offset by higher income from administration margins and fee income. Total net interest and fee income fell in 2018 due to stagnating income from these items. The continued downward trend in net interest income means that it accounted for 43 per cent of total net interest and fee income in 2018, compared with 67 per cent in 2010.

A considerable dampening of GDP growth would entail higher loan impairment charges. Unless com-

The systemic credit institutions' return on equity is approaching that of the large European banks

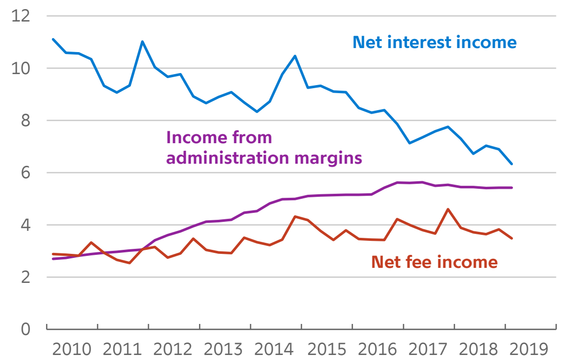
Chart 7



Note: Annual data for large credit institutions. The most recent observation is from 2018. Danish SIFIs include Danske Bank, Jyske Bank, Nykredit Realkredit, Spar Nord and Sydbank. Nordic banks include Nordea, DNB, Handelsbanken, SEB and Swedbank. Central and Northern European banks include Dexia, KBC, BNP Paribas, Crédit Agricole, Crédit Mutuel, Groupe BPCE, Société Générale, ABN Ambro, Rabobank, ING, Credit Suisse, UBS, Barclays, HSBC, Lloyds Bank, Royal Bank of Scotland, Standard Chartered, Commerzbank, Deutsche Bank, Erste Group Bank and Raiffeisen Bank.
Source: SNL and own calculations.

Sustained fall in net interest income

Chart 8



Note: Quarterly data for systemic credit institutions. The most recent observation is from the 1st quarter of 2019.
Source: Danmarks Nationalbank.

pensated by other income, this would lead to lower earnings in future.

Value adjustments have driven profit developments in recent years

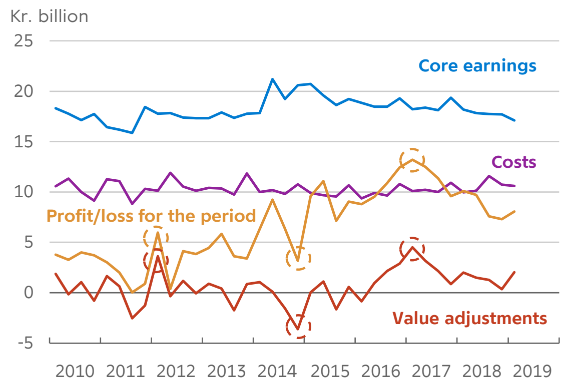
Fluctuations in systemic credit institutions' profits are mainly attributable to items other than traditional bank earnings such as net interest and fee income. Accordingly, lower value adjustments have been the main driver of the decline in the groups' profits since mid-2017, cf. Chart 9. On the other hand, costs have remained almost unchanged, while core earnings have fallen a little. Fluctuations in value adjustments have also had a considerable impact on results in other periods.

Market-related income is putting pressure on credit institutions' results

The systemic groups' income from market activities has decreased in recent years and in 2018 it was below the average for the period 2010-18, cf. Chart 10 (left). In the first quarter of 2019, however, income from market activities increased to about the average for the period. Conversely, income from traditional banking activities such as lending and deposits is higher than at the beginning of the period.

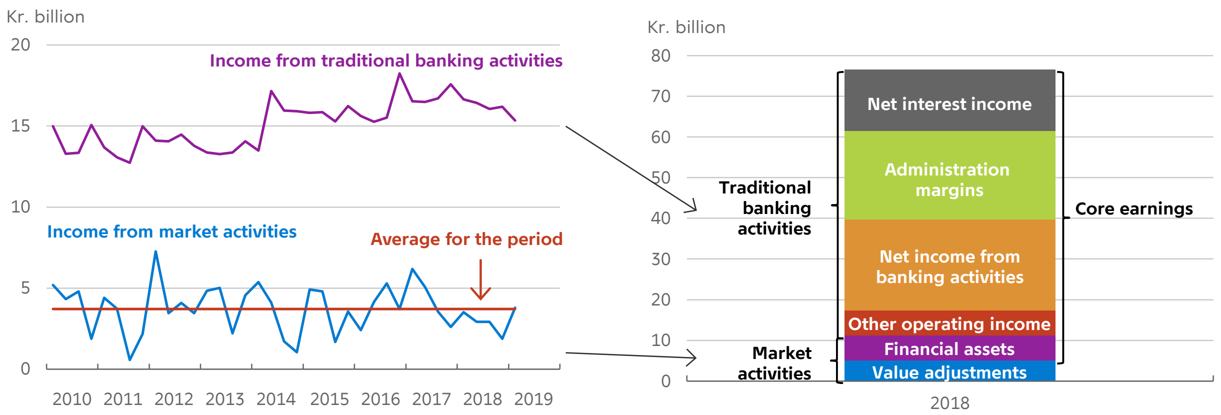
Market-related income is seldom the largest source of income for the large Danish institutions. In 2018, income from market activities was just under kr. 11 bil-

Fluctuations in value adjustments affect results Chart 9



Note: Core earnings are defined as profit before tax less loan impairment charges, value adjustments and costs. The result is before tax and adjusted for goodwill impairment charges. The broken circles indicate periods of either high or low value adjustments. Quarterly data for systemic credit institutions. The most recent observation is from the 1st quarter of 2019.
Source: Danmarks Nationalbank.

Income affected by financial market developments was below average throughout 2018 Chart 10

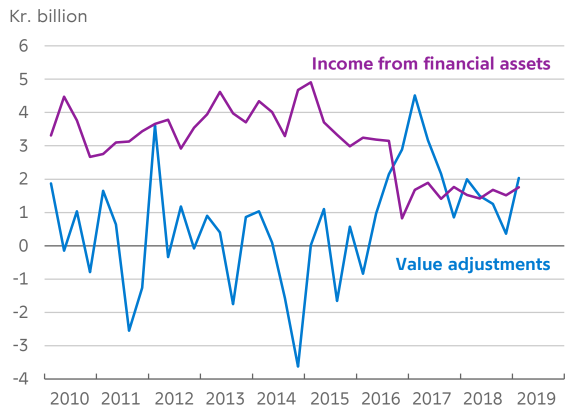


Note: Traditional banking activities are defined by net interest income on lending-related items and net fee income. Market-related income covers value adjustments, interest income and dividends from financial assets. In addition to net core earnings, the result consists of other income, costs and loan impairment charges. Left: Quarterly data for systemic credit institutions, where the most recent observation is from the 1st quarter of 2019. Right: Annual data from 2018 for systemic credit institutions.
Source: Danmarks Nationalbank.

lion, accounting for 14 per cent of total earnings from traditional banking activities and market activity, cf. Chart 10 (right). This is the lowest share in the period 2010-18, when income from market activities accounted for 20 per cent on average of total income from traditional banking activities and market activity.

A breakdown of earnings from market activities shows that the decline is primarily attributable to the lower value adjustments from the institutions' financial positions as mentioned above. Income from financial assets also fell slightly in 2018, cf. Chart 11. Overall, these income items were 9 per cent lower than in 2017, and income has generally fallen in recent years, mainly driven by lower interest income from bond portfolios.

Earnings from market activities have been significantly reduced Chart 11



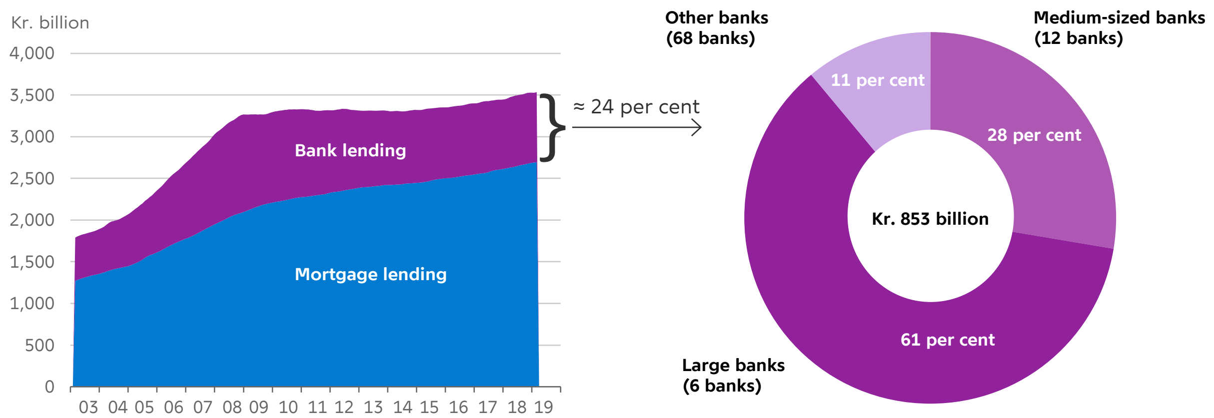
Note: "Income from market activity" from Chart 10 split into income from financial assets (interest income and dividends) and value adjustments.
Source: Danmarks Nationalbank.

Total lending remains high by international standards

Rising lending to households and the corporate sector

Lending to households and non-financial corporations continues to rise, cf. Chart 12. (left). Lending growth has been driven by mortgage lending since 2009, while bank lending has decreased in a large part of this period. Mortgage lending now accounts for 76 per cent of total lending to Danish house-

Mortgage lending is driving total lending growth Chart 12



Note: Lending to households and non-financial corporations, 3-month moving averages. The most recent observation is from the end of March 2019. Other banks are made up of groups 3-4 and branches of foreign banks not belonging to large and medium-sized banks.
Source: Danmarks Nationalbank.

holds and corporate customers of just over kr. 3,500 billion, relative to around 67 per cent in 2010. The six large banks account for the lion's share of bank lending, cf. Chart 12 (right).

Recent years have been characterised by limited demand for loans and expansionary financial conditions. At the same time, the institutions have ample liquidity which they wish to lend. This could induce the institutions to take greater risks when lending, although total lending growth is limited.

Total lending is high by international standards
Denmark has a higher credit-to-GDP ratio than the other EU member states, although it has approached those of comparable countries in recent years, cf. Chart 13.[3] The credit-to-GDP ratio rose until the end of 2009. Subsequently, the combination of higher GDP and relatively modest lending growth has led to a decrease in the credit-to-GDP ratio.

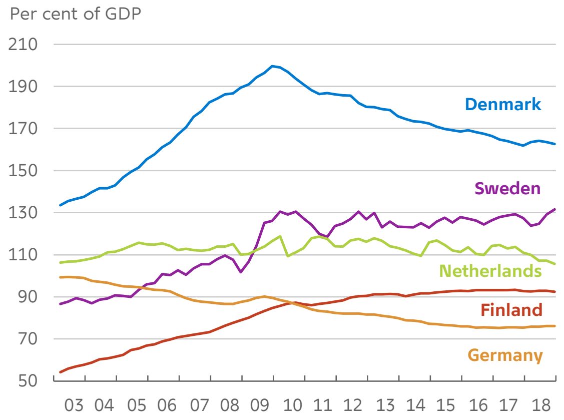
High household debt is offset by considerable assets
The high credit-to-GDP ratio in Denmark is offset by the considerable assets held by households. The total increase in household assets of 37 per cent since the end of 2012 has been driven mainly by pension and housing wealth and shares and other securities, cf. Chart 14.

Household deposits have also increased in this period in step with the other assets, and deposits still accounted for around 10 per cent of total assets at end-2018.

Especially for households in the highest income brackets, deposits relative to income have increased in recent years. One reason is the lack of more attractive alternative placement options.[4] All other things being equal, the historically low interest rates imply low opportunity costs of holding deposits. At the same time, lending rates have fallen considerably. The low interest rate environment could therefore induce households to increase their deposits rather than reducing their debts.

Denmark has the highest credit-to-GDP ratio by international standards

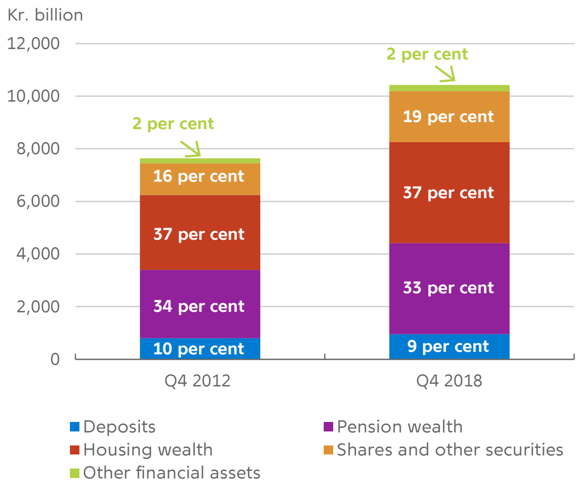
Chart 13



Note: Credit institutions' lending to households, non-profit institutions serving households and non-financial corporations. The most recent observation is from the 4th quarter of 2018.
Source: ECB and own calculations.

Deposits account for only a modest share of household assets

Chart 14



Note: The calculation of households' housing wealth does not include cooperative housing, commercial properties owned by the household sector (including self-employed individuals), agricultural land and undeveloped building plots. Shares and other securities consists of debt instruments as well as shares and other equity investments. Other financial assets comprises banknotes and coins, trade receivables and other unpaid outstanding accounts due, other deposits from financial intermediaries other than banks and mortgage credit institutions as well as financial derivatives and employee options. All assets are stated in market prices. Closing balance 4th quarter 2012 and 4th quarter 2018.
Source: Danmarks Nationalbank.

3 In the 4th quarter of 2018, Denmark had the highest credit-to-GDP ratio out of 26 EU member states.

4 Cf. Jonas Ladegaard Hensch and Erik Haller Pedersen, Low interest rates boost bank deposits, *Danmarks Nationalbank Analysis*, No. 9, July 2018.

Homeowners have become less vulnerable to interest rate increases

Households are still moving towards mortgage loans with longer fixed interest periods, cf. Chart 15. The share of variable rate mortgage loans with fixed interest periods exceeding three years has risen in recent years. The same applies to fixed rate mortgage loans. The fact that households increasingly opt for longer fixed interest periods and fixed rate loans should be viewed in the light of, inter alia, the historically low interest rates, which make it more attractive for highly indebted households to lock interest rates. In addition, the mortgage credit institutions' administration margin structure may also have played a role, as deferred amortisation loans and loans with short fixed interest periods have become relatively more expensive.

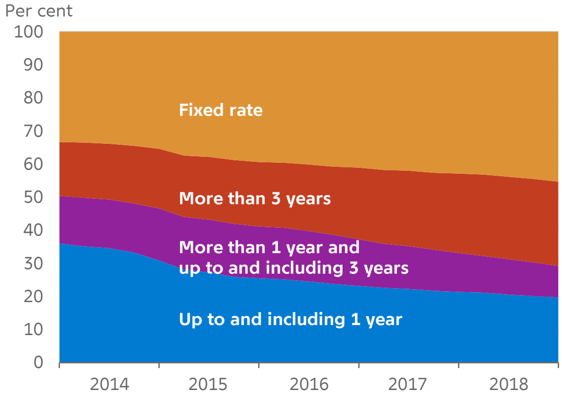
The tendency among households to opt for longer fixed interest periods also reflects the banks' changed credit policies as a result of the implementation of new borrower-based regulatory measures in recent years.

Recent regulatory measures include amendments to the rules for good practice in lending for housing purposes, which took effect in 2018. The amendments restrict fixed interest periods and deferred amortisation for loans to highly indebted households with an LTI, loan-to-income, ratio of more than four and an LTV, loan-to-value, ratio of more than 60 per cent.[5]

At the same time, the Danish Financial Supervisory Authority's 2016 guidelines on prudent lending to households with high LTI ratios and insufficient wealth in growth areas have also limited the borrowing opportunities of certain households.[6]

Despite the growth in fixed rate mortgage credit, more than half of all mortgage loans are still at variable rates of interest. So higher interest rates will still have an impact on homeowners' future interest payments, but to a lower degree than previously.

Homeowners choose longer fixed-interest periods Chart 15



Note: Mortgage loans, nominal values, of employees and old-age pensioners by initial interest-rate fixing. The most recent observation is from January 2019.
Source: Danmarks Nationalbank.

As homeowners move towards longer fixed interest periods, they are also moving towards loans with amortisation. The share of mortgage loans with deferred amortisation is 46 per cent and has fallen steadily since the peak in 2014, when deferred amortisation loans accounted for 56 per cent of mortgage lending. In other words, the Danes are opting for less risky loan types.

Over the past year, the institutions have introduced the option of mortgage loans with deferred amortisation for up to 30 years. Given that the introduction of new loan types has previously had a substantial impact on the loan market, careful monitoring of developments in these new loans is important.

Slowdown in price increases for owner-occupied flats

Following several years of rising prices for owner-occupied flats in Copenhagen, prices have been

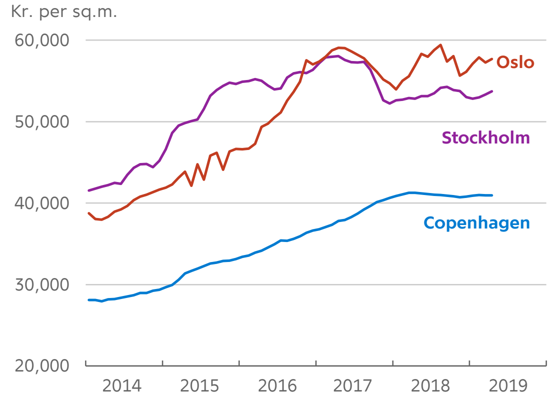
5 See Helene Kronholm Bohn-Jespersen and Katrine Graabæk Mogensen, While the sun is shining, prepare for a rainy day, *Danmarks Nationalbank Analysis*, No. 16, November 2018 for an overview of other borrower-based measures.

6 See Christian Sinding Bentzen, Henrik Yde Andersen and Simon Juul Hviid, Impacts of 2016 guidelines on mortgaging of homes, *Danmarks Nationalbank Analysis*, No. 18, November 2018.

almost unchanged for the past year, while trading activity has subsided. This could indicate that prices have peaked for the time being. But prices for owner-occupied flats are still at a lower level than in Oslo and Stockholm, cf. Chart 16. Several international organisations, including the IMF, have regularly assessed that house price developments in both Norway and Sweden constitute a major risk to the real economy and the financial sector.

Given this slowdown, the Copenhagen housing market is set for a soft landing where prices will be more likely to reflect the development in household income and the level of interest rates. The slowdown in the Copenhagen housing market may be driven by several factors. On the supply side, a substantial new construction and the consequent increase in the housing stock contributed to the slowdown. On the demand side, recent years' considerable price increases and regulatory measures mean that fewer home buyers in the large cities have access to sufficient loans to finance a home purchase.

The price for owner-occupied flats in Copenhagen has flattened out Chart 16



Note: Price per square metre for owner-occupied flats in Copenhagen City and Stockholm. For Oslo the price per square metre is shown for all dwellings. Price per square metre for Copenhagen City is seasonally adjusted. The most recent observation is from April 2019. Average exchange rate for January 2014-April 2019 for DKK/SEK and DKK/NOK.

Source: Boligsiden, Svensk Mäklarstatistik, Eiendom Norge and own calculations.

The slowdown in the housing market is clearly reflected in the market for project flats

The slowdown in the Copenhagen housing market is clearly reflected in the market for project flats, which can be seen as an early indicator of trading activity in the housing market in general. While the supply of project flats remains high, sales of project flats have declined markedly since 2017, cf. Chart 17 (left). In Copenhagen City, sales of project flats peaked in May 2017, but had fallen by around 80 per cent until April 2019. However, it should be noted that sales of project flats account for only a modest share of total sales of owner-occupied flats, cf. Chart 17 (right). The general decrease in sales of project flats may increase the risk of losses for the owners of the project properties up for sale if the lower demand leads to a decline in prices or potential loss of value if the project flats are rented out rather than sold.

Overall, households are reducing bank debt

Total bank lending to households has decreased in recent years, amounting to just under kr. 485 billion at end-March 2019. Overall, households are not raising more bank debt, but mortgage debt. One reason is that households who are homeowners have access to cheaper loan financing of consumption and home improvements by converting existing mortgage loans or raising top-up loans secured on the home.

The overall decline in bank lending to households can be attributed to lower lending for both housing purposes and consumer loans, cf. Chart 18. However, consumer lending has flattened recently.

Consumer loans are normally uncollateralised, meaning that they typically imply a higher credit risk. Households who are not homeowners and are not able to pledge their homes as collateral thus have to raise consumer loans. At the same time, consumer loans are characterised by a smaller principal and a considerably shorter maturity than housing loans. Consequently, the composition of total consumer lending may change quickly as old loans are serviced and new loans are raised.

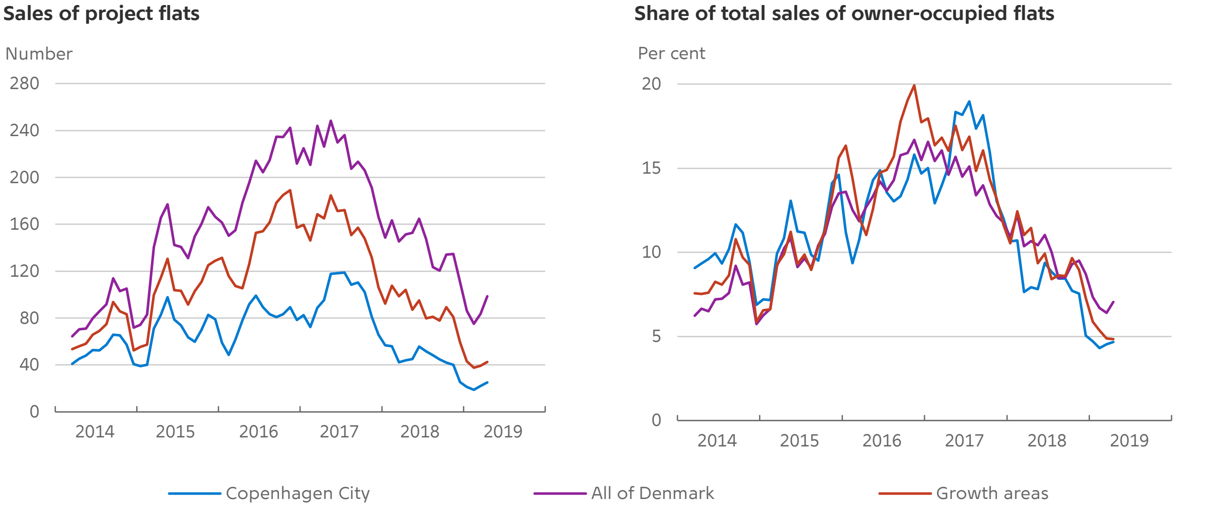
Consumer banks are winning market shares

In Denmark, there are several specialised banks almost entirely providing consumer lending services. Below, banks where consumer loans account for more than 95 per cent of their lending to households are referred to as consumer banks.

These banks have markedly increased their market share, cf. Chart 19. Over the last 5 years alone, their consumer lending has grown by 10 per cent p.a., and

Fewer project flats are being sold, but project flats account for only a modest share of total sales of owner-occupied flats

Chart 17



Note: Growth areas are defined as Copenhagen City, Copenhagen environs and the City of Aarhus. 3-month moving averages. The most recent observation is from April 2019. The shares are calculated as the share of project flat sales of total sales of owner-occupied flats in the three areas.
Source: Boligsiden and own calculations.

consumer banks now account for just over 20 per cent of the market for consumer loans in Denmark, or kr. 40 billion.

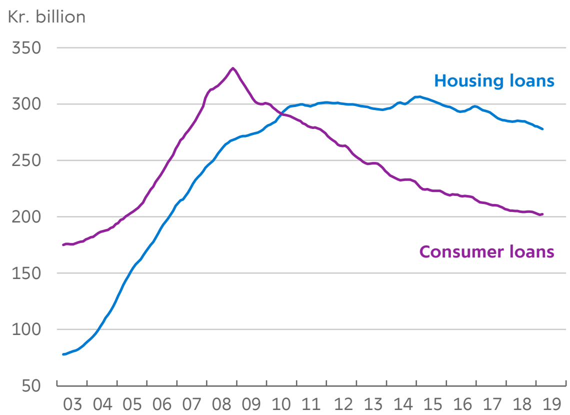
The Danish Financial Supervisory Authority has pointed out that there are pronounced differences in credit assessment practices among selected consumer banks – especially in relation to households' disposable amounts.[7]

A too lenient credit assessment may undermine a household's resilience to changes in the economy, such as interest rate increases or higher unemployment. This may impact the households' ability to service their total debt.

Outside the banking sector, there are several credit *firms* providing consumer loans to households which are not defined as consumer *banks*. These firms are supervised by the Consumer Ombudsman. They provide mainly short-term loans with maturities of

Households are raising less bank debt

Chart 18



Note: Total bank lending to households broken down by housing and consumer loans. Consumer loans is the sum of bank lending for the purposes of Consumer credit and Other. 3-month moving averages. The most recent observation is from March 2019.
Source: Danmarks Nationalbank.

7 (*link*) – in Danish only.

less than 3 months, known as quick or instant loans. In 2017, the total volume of this loan type, which is not included in this analysis, was estimated at kr. 0.5 billion.[8]

Medium-sized banks are increasing lending to households

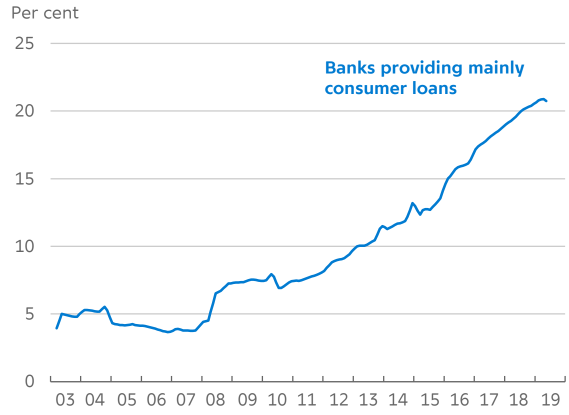
The decrease in total bank lending to households has been driven mainly by the large banks in recent years, cf. Chart 20. At the same time, the medium-sized banks have increased their lending to households by just over 21 per cent since the beginning of 2015.

This implies considerable variation in lending growth across banks. The large banks have increasingly provided mortgage loans, including mortgage-like bank loans, which are to some extent transferred from the banks' to the mortgage credit institutions' balance sheets. This may help to explain the increase in the medium-sized banks' market share, cf. Chart 21.

The medium-sized banks' relatively high lending growth is driven by factors such as their expansion into the growth areas, which has intensified competition. This could lead to easing of credit quality requirements and conditions for new lending. Compared with the large banks, the medium-sized banks have a larger share of loans with impaired credit quality. This seems to indicate that, on average, customers of medium-sized banks are in a weaker position than customers of large banks.

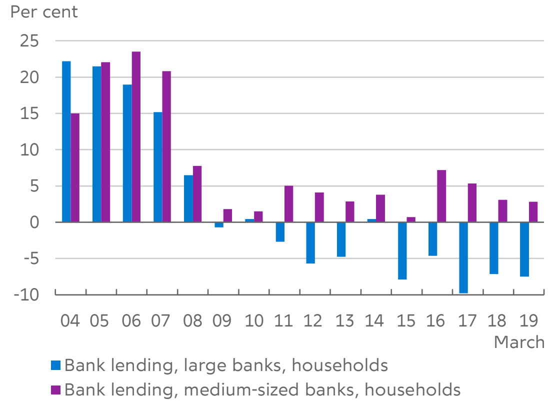
According to the banks themselves, they are not easing requirements for households. In Danmarks Nationalbank's lending survey, the medium-sized banks responded that they are not easing credit standards for households. However, they also responded that competitor behaviour is negatively affecting credit standards. Intensified competition could be the result of the medium-sized banks' growth in lending to households. While competition is healthy for the market, it is important that the banks maintain high credit standards to ensure that they do not advance in new markets on the basis of excessive risk-taking. When the economy reverses, such behaviour could cause substantial problems.

Banks providing mainly consumer lending services are winning market shares for consumer loans Chart 19



Note: Banks where consumer loans account for more than 95 per cent of their lending to households in a given quarter. The number of banks providing mainly consumer lending services varies from 11 to 27 banks. 3-month moving averages. The most recent observation is from March 2019.
Source: Danmarks Nationalbank.

Medium-sized banks have increased their lending to households Chart 20



Note: Growth in bank lending to households by large and medium-sized banks. Growth rates until and including 2018 are calculated at end-December. The most recent observation is calculated from March 2018 to March 2019.
Source: Danmarks Nationalbank.

8 (*link*) – in Danish only.

Competition for corporate customers puts credit standards under pressure

Growth in lending to the corporate sector continues at a moderate pace
Lending to the corporate sector has risen by 4 per cent over the last year. That is marginally more than in the preceding years, and lending growth is showing a slight upward tendency. Mortgage credit is still driving lending growth, cf. Chart 22. Bank lending is rising a little, and the distribution of market shares between the large and medium-sized banks is stable. Average annual growth for the large and medium-sized banks is 3.3 and 4.9 per cent, respectively. The industry breakdown of bank lending has been stable in recent years, but there has been a slight tendency for lending to "Trade" to have risen over the last year.

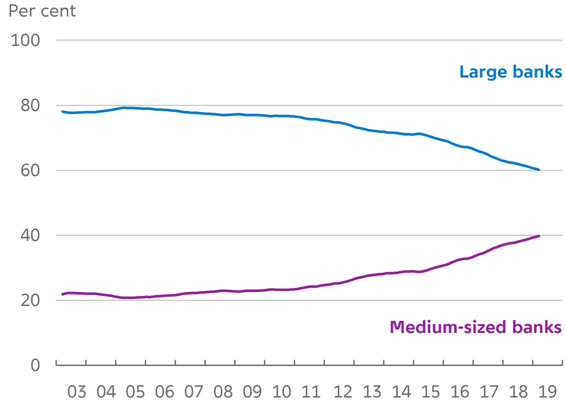
Strong competitive pressure among the banks
In the current favourable situation, many banks have capacity to increase lending. This intensifies competition for customers and increases pressure on the banks' credit standards. According to Danmarks Nationalbank's lending survey, credit standards for the corporate sector were more or less unchanged in the 1st quarter of 2019. The institutions still report stronger competitive pressure as the primary reason why credit standards are squeezed, cf. Chart 23. The institutions have been reporting increased competition continuously since 2013.

Competitive pressure has mainly been reflected in lower interest margin and fee requirements, cf. Chart 24. With few exceptions, the institutions have been reporting easing of margin and fee requirements since 2013.

There is ample access to funding. Only few firms are reporting financial restrictions on production, cf. Chart 25. This indicates that the limited growth in lending is driven primarily by low demand.

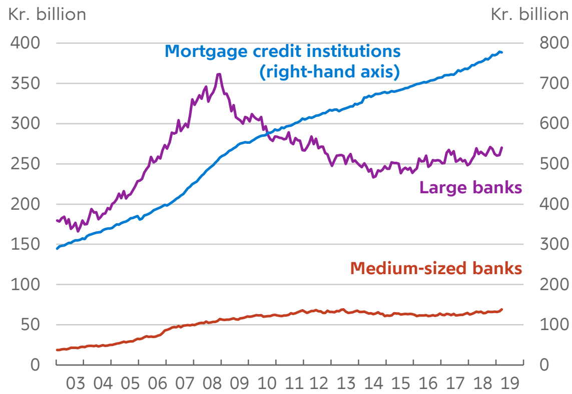
Wider spread in corporate leverage ratios
Leverage ratios show a wider spread, and on average firms have consolidated. An indicator[9] based on

Rising market share for bank lending to households by medium-sized banks Chart 21



Note: Shares of total lending to households by large and medium-sized banks, 3-month moving averages. The most recent observation is from March 2019.
Source: Danmarks Nationalbank.

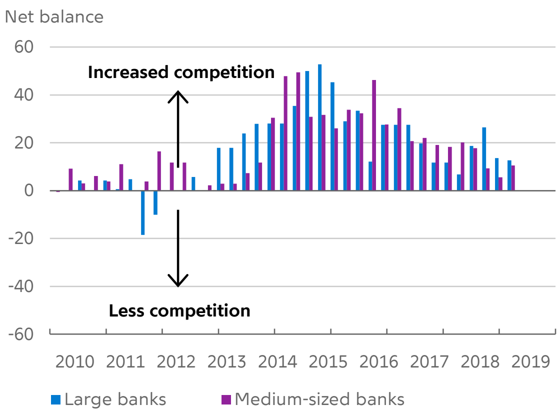
Moderate growth in lending to the corporate sector is still driven by mortgage credit Chart 22



Note: Lending to Danish non-financial corporations by all large and medium-sized banks and mortgage credit institutions. The most recent observation is from March 2019.
Source: Danmarks Nationalbank.

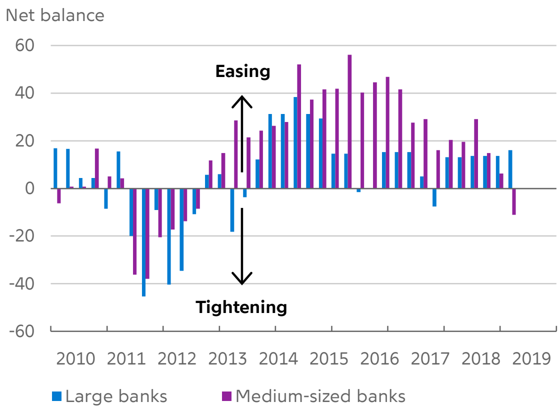
9 Danmarks Nationalbank, The riskiness of corporate credit allocation is increasing, *Danmarks Nationalbank Analysis*, No. 4, February 2019.

Increasing competitor pressure since 2013 Chart 23



Note: Lending survey for corporate customers. The net balance may lie within the −100 to 100 interval. A positive (negative) net balance means that credit managers of the institutions in question have, overall, i.e. lending-weighted, stated that competitor behaviour has contributed to easing (tightening) of credit standards relative to the preceding quarter. The most recent observation is from the 1st quarter of 2019.
Source: Danmarks Nationalbank.

Banks are easing their interest margin and fee requirements Chart 24



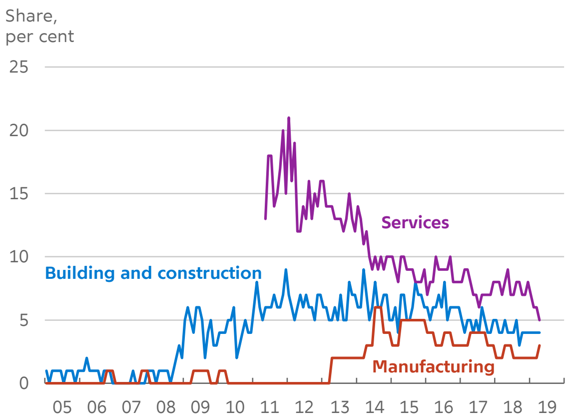
Note: Lending survey for corporate customers. The net balance may lie within the −100 to 100 interval. A positive (negative) net balance means that credit managers of the banks in question have, overall, i.e. lending-weighted, stated that their margin and fee requirements have been eased (tightened) relative to the preceding quarter. The most recent observation is from the 1st quarter of 2019.
Source: Danmarks Nationalbank.

firms' financial statements shows that the riskiness of credit allocation has risen since 2013, as the firms which increase their debts the most have higher average leverage ratios than those which increase their debts the least, cf. Chart 26. Overall, the indicator was at a lower level in 2017 than in the pre-crisis period, however.

So despite the economic upswing, the firms that increase their debts the most have not consolidated. It is important for the credit institutions to charge the right price when extending new loans to the most highly leveraged firms, and they should not ease their credit standards. If equity accounts for a smaller share of funding, this will make the finances of the individual firm less robust and the debt riskier.

Historically, the indicator used has proved to have explanatory powers as it showed a rising riskiness of credit allocation in the years leading up to the financial crisis, followed by lower risk during the crisis as the banks tightened their credit standards for corporate customers.

Few firms are reporting restrictions on the access to funding Chart 25



Note: Share of firms stating financial restrictions as the reason for production constraints. The most recent observations are from April 2019.
Source: Statistics Denmark.

Interest margins are still declining
The lower margin requirements for loans may be one of the reasons why the banks' average interest margin continues to decline, cf. Chart 27. The interest margin is measured as the difference between the banks' average lending and deposit rates for the corporate sector.

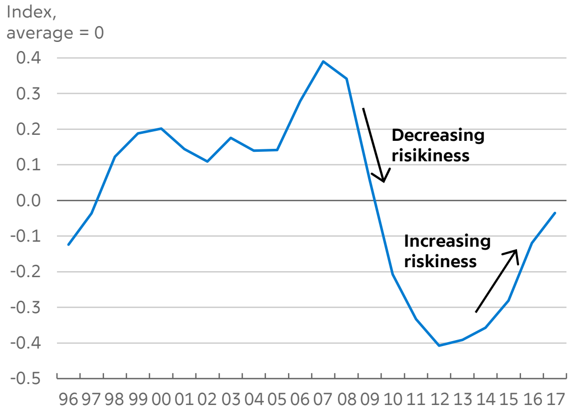
In the current environment of intense competition among banks in an economic upswing, it is important that the banks maintain a solid credit quality. If credit standards are eased, this could result in losses when the economy reverses and firms' earnings opportunities decline. The interest margin should reflect the risk on the loan in question, and the robustness of firms should be assessed across the entire business cycle to ensure that their foundation is solid when the economy reverses.

Although the credit quality of the medium-sized banks has improved, it remains considerably lower than for the large banks
The quality of the medium-sized banks' lending is substantially lower than that of the large banks. This is to some extent due to the large and medium-sized banks having different business models.

The lower credit quality can help to explain why the medium-sized banks have higher interest margins. Whether the interest level is sufficient to cover the risks cannot be known for certain until the economy reverses. It is important that the medium-sized banks take the lower credit quality into account as it can, all else equal, be expected to lead to greater losses in the long term, also on new customers. Loan impairment charges and losses are not likely to remain at the current low level when the cyclical position changes.

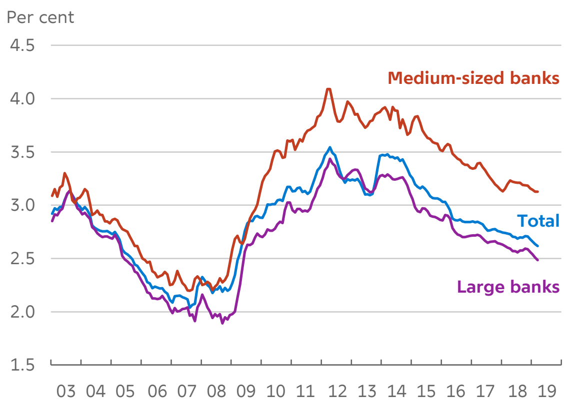
The lending portfolios of the medium-sized banks have, however, improved, cf. Chart 28. One of the reasons for the improved credit quality is that the finances of corporate customers are supported by the economic upswing and the low level of interest rates. The proportion of impaired and reduced-quality loans has decreased in recent years. In particular, the credit quality has improved for loans for real estate and agriculture. For the large banks, the credit quality is more or less unchanged.

Increasing riskiness of credit allocation Chart 26



Note: The riskiness of credit allocation indicator is based on financial data for firms' leverage. A positive (negative) value indicates that the index is higher (lower) than its historical average. See Danmarks Nationalbank, The riskiness of corporate credit allocation is increasing, *Danmarks Nationalbank Analysis*, No. 4, February 2019, for a more detailed description of how the indicator is calculated.
Source: Bisnode and own calculations.

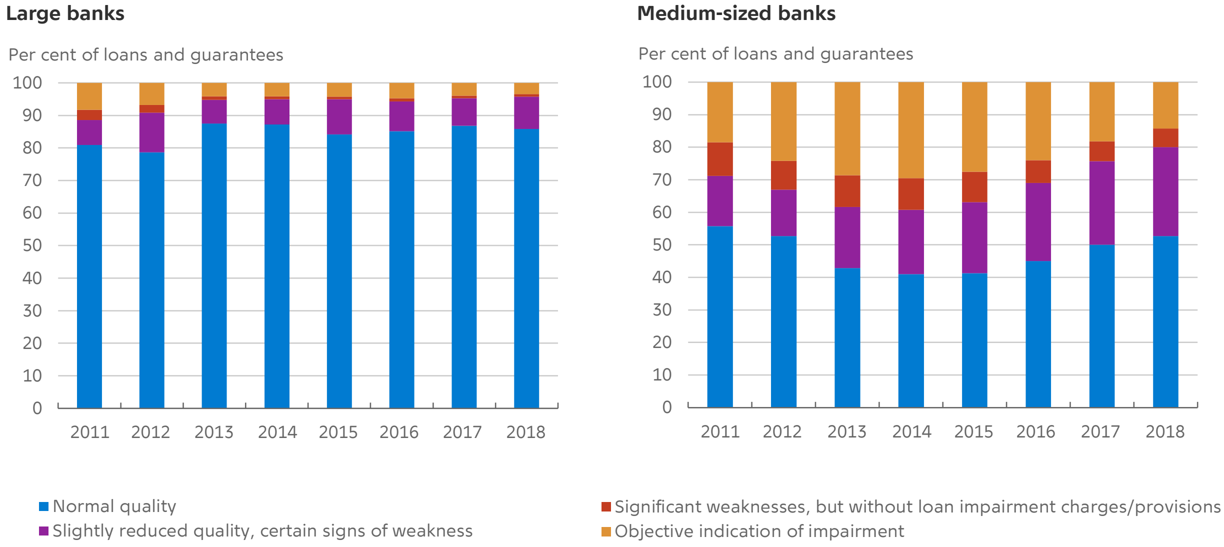
Continued decline in interest margins Chart 27



Note: Interest margins on outstanding business, excluding repo transactions, 3-month averages. The interest margin is calculated as lending rates less deposit rates. The spread between large and medium-sized interest margins reflects differences in the lenders' credit risks, but also other factors such as product structures. The most recent observation is from March 2019.
Source: Danmarks Nationalbank and own calculations.

The credit quality of the medium-sized banks has improved, but remains considerably lower than for the large banks

Chart 28



Note: Lending and guarantees to the corporate sector by quality for large and medium-sized banks.
Source: Danish Financial Supervisory Authority and own calculations.

Growth in leveraged buyouts with high risk

Growing risk appetite among the banks when lending for acquisitions

Interest in leveraged buyouts has been increasing in recent years, reflecting low interest rates and an expanding economy. Traded prices have risen and there is fierce competition among banks and other actors who are ready to finance acquisitions.

In November 2018, the Danish Financial Supervisory Authority warned that several banks are prepared to take on greater risks in the market than previously.[10] Risk appetite differs across the banking sector, and credit policies are to varying degrees inadequate. This could imply reduced requirements for repayment surety. It is a widespread practice that the loan document requires the firm to have e.g. a minimum solvency ratio. If this requirement is breached, the loan may fall due for redemption.

More firms are being acquired by private equity funds

Many leveraged buyouts are made by private equity funds. A private equity fund is an investment firm with capital commitments from a number of investors. The fund subsequently invests the capital by acquiring firms, cf. Box 1. The investments are leveraged by means of loans from e.g. banks to fund a substantial share of the acquisition price.

Since 2010, private equity funds have been acquiring a growing number of firms in Denmark, cf. Chart 29. In 2018, more than 200 firms were owned by private equity funds. They account for only around 1 per thousand of all Danish firms and for

10 The Danish Financial Supervisory Authority's thematic analysis of loans for acquisitions from November 2018 was based on inspections at Danske Bank, Jyske Bank, Nordea, Nykredit Bank, SEB and Sydbank (*link*) – in Danish only.

What is a private equity fund?

Box 1

A number of private equity funds, including large European players and smaller Danish players, have investments in Danish firms. The chart below shows the structure of Capital A/S, a fictitious private equity fund that has invested in a firm called the Portfolio company 1.

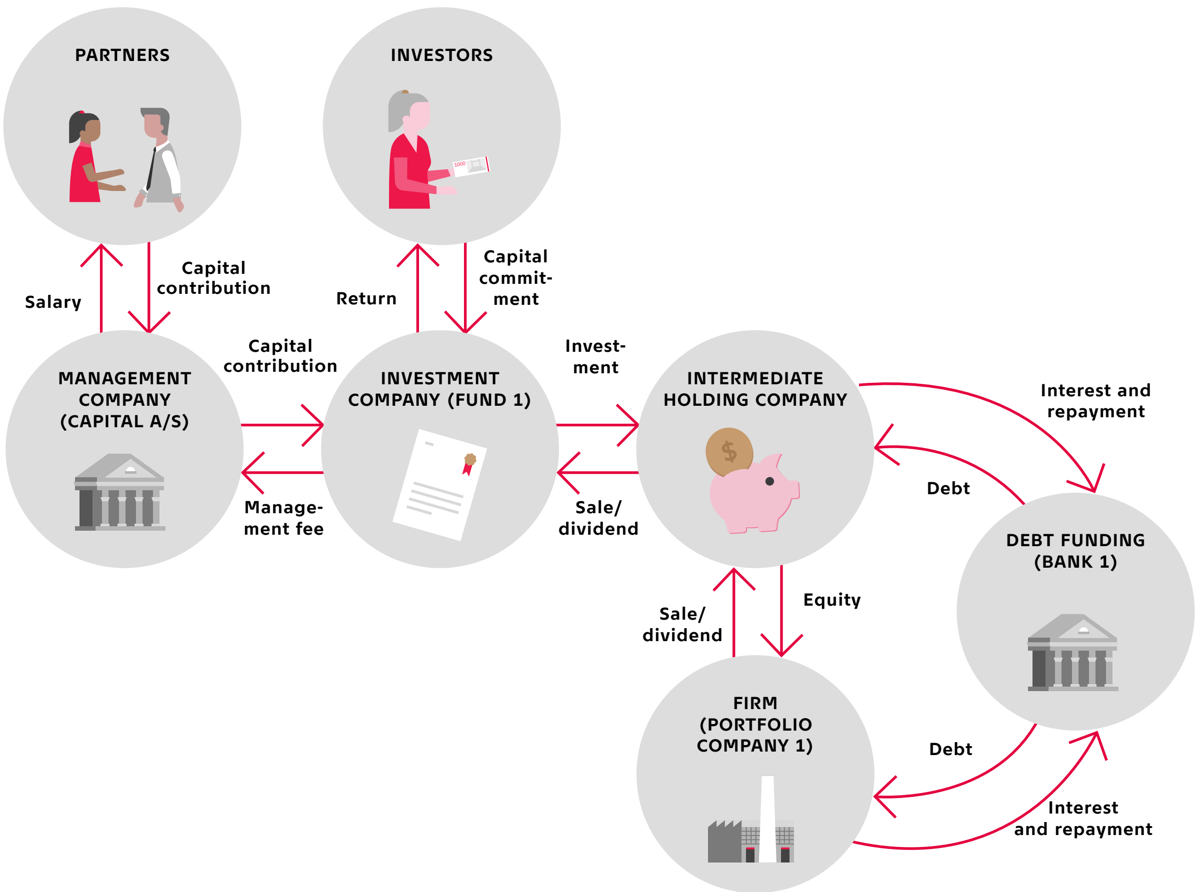
The private equity fund consists of a number of funds with a joint management company. Each fund is established as an independent investment firm (fund), often a limited partnership, acting independently under the management of one or more partners of the private equity fund. By way of example, Capital A/S has established a fund called Fund 1.

A number of investors make a capital commitment to a fund that they will contribute up to a certain amount for its company acquisitions. In most cases, the partners also contribute by making a personal capital commitment to the fund. Once the partners have selected a candidate for acquisition, they typically establish an intermediate holding company owned by the fund, in which they place funds from their investors. At the same time, the intermediate holding company raises debt in one or more banks and/or other financial institutions. The intermediate holding company then acquires the selected firm with funds from both investors and loans raised. For example, the investment in the Portfolio company 1 was made as part of Fund 1, in which Bank 1 contributed the debt funding.

Return on equity in a portfolio company consists of current dividend and, in the longer term, income from resale of the portfolio company. Most often, private equity funds will own portfolio companies for 3-7 years. Income is forwarded from the intermediate holding company to the fund after servicing of debt. Ultimately, the investors recoup the return on their investments from the fund, less an administration fee to the management company and the partners.

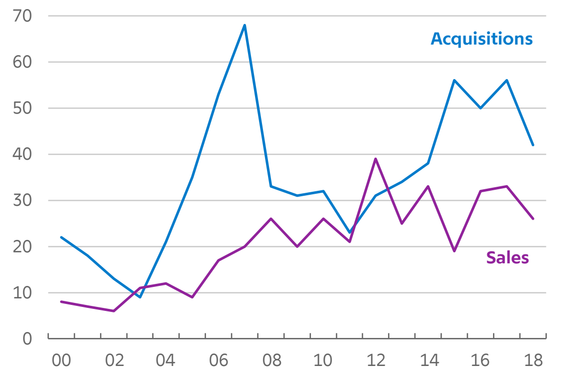
If a loss is incurred by one of the funds' investments, e.g. the failure of a portfolio company, the intermediate holding company will initially incur the loss. In most cases, the fund's entire investment will be lost, whereas part of the outstanding debt of the banks and/or other financial institutions may be repaid, depending on the available assets and securities of the insolvent estate. Since each fund invests in several portfolio companies, the loss in the event of the failure of a firm may be compensated by the return on investments in the fund's more successful portfolio companies.

Corporate structure of a private equity fund



The number of acquired firms has risen since 2010

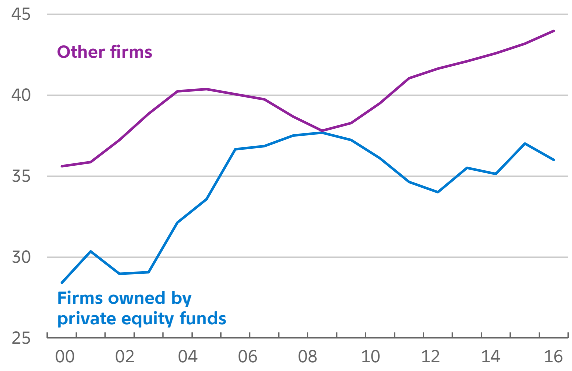
Chart 29



Note: Firms in Denmark acquired and sold by Danish and foreign private equity funds in a given year. The latest update is from 22 May 2019.
Source: Danish Venture Capital And Private Equity Association (DVCA) and own calculations.

Firms owned by private equity funds have not been consolidating to the same extent as others

Chart 30



Note: The sum of equity as a share of the total balance sheet of all firms in each group. 3-year moving averages. The compilation of the debt of each firm does not allow for any additional debt of intermediate holding companies between firms and private equity funds.
Source: DVCA, Experian, Bisnode and own calculations.

1.3 per cent of the aggregate accounting balance sheet.

Most recently, the number of acquisitions fell in 2018. This could be because prices for firms have reached a level that gives rise to concern about the firms' continued ability to service loans.

Firms owned by private equity funds are more heavily indebted than other firms

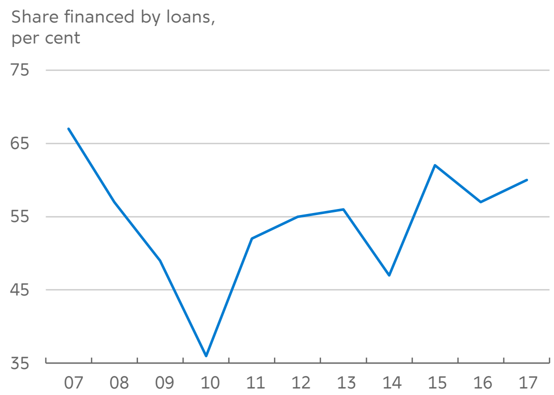
Firms owned by private equity funds generally have higher debts after the acquisition than before. While the share of equity in firms owned by private equity funds has been virtually unchanged since 2010, other firms have reduced their debts in the same period, cf. Chart 30. See Box 2 for a model-based analysis of the indebtedness of Danish firms owned by private equity funds.

One of the reasons why the debts of the acquired firms rise is that loans raised in connection with the acquisitions are placed in the firms.

In the assessment of the Danish Venture Capital And Private Equity Association, an average of 60 per cent of the price for acquisitions made by private equity funds was loan-financed in 2017, up from 36 per cent in 2010, cf. Chart 31. So the participating banks have funded an increased share of the acquisitions.

Rising share of debt funding in connection with acquisitions

Chart 31



Note: Share of purchase sum financed by loans in connection with business acquisitions by private equity funds in Denmark.
Source: DVCA and own calculations.

Level of indebtedness of firms owned by private equity funds in Denmark

Box 2

There are several possible reasons why firms owned by private equity funds are more indebted than other firms. Private equity funds generally acquire established firms, and, on average, such firms are both older and larger than other firms. Firms with stable earnings over a prolonged period have better access to obtaining loan financing at a relatively attractive interest rate. This box reviews the results of two quantitative analyses isolating the link between ownership by private equity funds and indebtedness from other factors that may affect a firm's financing structure.

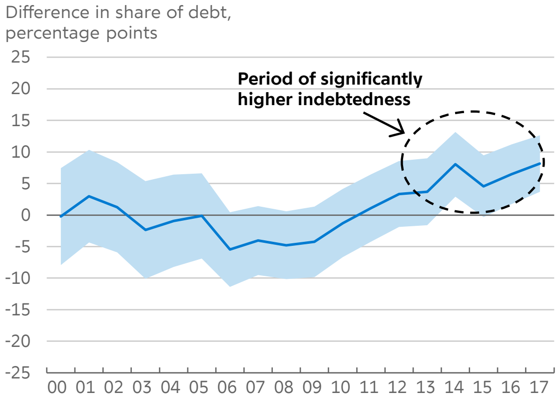
The first analysis estimates a linear regression model using data from the financial statements of most Danish firms in the period 1995-2017. The result shows that, viewed in isolation, the debt of firms owned by private equity funds is 1.37 percentage points higher as a ratio of the accounting balance sheet than would otherwise be the case, cf. the chart (left). While the effect is generally limited, the estimated parameter is significant at a 1 per cent confidence interval. Qualitatively, the effect of ownership by a private equity fund is in line with most earlier studies both internationally and in Denmark.[1]

In the other model, the effect is estimated independently for each year since 2000, cf. the chart (right). The parameter estimates indicate an increase in the indebtedness of firms owned by private equity funds since 2010 relative to other firms, and that the difference has been statistically significant since 2014. In the same period, traded prices in firm acquisitions have increased and competition among banks has been fierce.

Model of firms' debt as a percentage of the balance sheet in the period 1995-2017

Variable	Estimate	t-value
Ownership by private equity fund (dummy)	1.37391	2.688***
Age (log)	-0.11544	-3.191***
Balance sheet (log)	2.19939	141.174***
Fixed effects (years)	Yes	
Fixed effects (firms)	Yes	
Adjusted R^2	0.04523	

Annual effect of ownership by a private equity fund on firms' debt as a percentage of the balance sheet



Note: Left-hand chart: *** indicates that the estimated parameter cannot be rejected at a 1 per cent confidence interval. Linear regression model of firms' debt as a share of the accounting balance sheet with two-way fixed effects (firms and years). The model is estimated on the basis of unbalanced panel data with 2,192,178 observations. Right-hand chart: 18 linear regression models of firms' debt as a share of the accounting balance sheet with the explanatory variables ownership by private equity fund (dummy), age (log), balance sheet (log) and fixed effects (industry). Estimations are based on the same data as the overall model on the left.

Source: Bisnode, Experian, DVCA and own calculations.

1. See e.g. Bennedsen, M., Thomsen, S., Nielsen, S. B., Bundgaard, J., Meisner Nielsen, K., & Poulsen, T., Private equity i Danmark (Private equity in Denmark – in Danish only). Centre for Economic and Business Research, Copenhagen Business School, 2008; Vinten, F., The performance of private equity buyout fund owned firms, Centre for Economic and Business Research, Copenhagen Business School, 2008; Ministry of Economic and Business Affairs, Kapitalfonde i Danmark (Private equity funds in Denmark – in Danish only), *Økonomisk Tema*, No. 4, Nov. 2006; and Kaplan, S. N. & Strömberg, P., Leveraged buyouts and private equity, *Journal of Economic Perspectives, Vol. 23, No. 1, Winter 2009*, pp. 121-146.

In a situation where the economy reverses and/or the level of interest rates rises, firms with high debt ratios may experience problems servicing their debts, or they may violate other terms of the loan documents. However, a private equity fund often has further capital at its disposal that can rapidly be invested in a highly indebted firm if this is deemed to be advantageous.

Lending by pension companies in Denmark is limited

Pension companies are increasing their investments in alternative asset classes

Pension companies primarily invest their customers' assets in bonds, equities, properties and alternative asset classes. In recent years, pension companies have increased their investments in alternative asset classes, partly because of the low interest rate environment and high valuations of other financial assets.[11] Alternative investments are attractive to pension companies as they are often expected to provide stable, less cyclical long-term returns, similar to investments in bonds. In addition, pension companies can achieve higher returns by investing in less liquid assets.

Direct lending is one of many different alternative asset classes.[12] In general, with a direct loan a pension company lends money to a firm, such as a real estate company, outside listed markets. The loan may be provided directly by the pension company or via an investment fund. Direct loans are often illiquid compared with listed bonds, and hence the returns can be expected to be higher.

Property investments make up a considerable share of pension companies' assets

Pension companies can obtain exposure to the real estate sector via several channels, most frequently in the form of property investments on the balance sheet. In the 3rd quarter of 2018, pension companies had invested kr. 256 billion in properties.

Property investments are attractive for pension companies as they provide stable long-term payment flows and properties may rise in value over time so that an extra gain is achieved. However, high prices in the property market exert downward pressure on expected future returns.

An alternative way to become exposed to the real estate sector is to provide direct loans to real estate companies against the underlying properties as collateral.

The pension sector's lending to real estate companies in Denmark is limited

Total direct lending from the pension sector to all sectors amounted to kr. 141 billion in the 3rd quarter of 2018. The volume of direct lending provided by the individual pension companies varies strongly across the largest companies, cf. Chart 32. For one pension company, direct lending constitutes more than 10 per cent of the balance sheet.

Foreign exposures account for more than 80 per cent of the pension sector's direct lending. Foreign lending includes e.g. collateralised loans to banks, loans to non-financial corporations, loans for infrastructure projects,investments in collateralised loan obligations, CLOs, as well as other types of structured credit investments. Most of the foreign lending is managed by external investment funds.

Direct lending to Danish borrowers is limited and amounts to kr. 23 billion, of which kr. 13 billion is to firms in the real estate sector, cf. Chart 33. Real estate companies typically raise the loans in connection with the financing of construction projects. When lending to real estate companies, pension companies are to some extent competing with credit institutions.

Companies must have strong credit policy frameworks in order to handle direct lending

As a main rule, pension companies require properties as collateral when lending to real estate companies. This means that the pension company can acquire the property and add it to its existing

11 Hereafter, "pension companies" refers to life insurance companies, multi-employer occupational pension funds and ATP.

12 Direct lending is defined as collateralised and uncollateralised loans, structured credit investments, loans arranged by credit funds, mortgage deeds and other alternative credit investments.

portfolio if the counterparty defaults. Pension companies are often willing to take on the counterparty risk and potentially acquire a property on account of their long-term obligations. In times of low expected returns on real estate, it may therefore be an advantage for pension companies to lend money to real estate companies instead of purchasing properties themselves.

Real estate companies borrow from pension companies rather than banks and mortgage credit institutions if they can obtain better prices or better terms, or if they are unable to obtain financing from banks and mortgage credit institutions.

In 2017, the Danish Financial Supervisory Authority conducted a thematic survey in which it reviewed the credit policy framework of the individual pension companies in relation to direct lending.[13] All companies were instructed to strengthen their frameworks. Pension companies have an obligation to identify and manage the risks of the assets in which they invest.

Pension companies' direct lending to real estate companies in Denmark is limited. If the volume increases, this may lead to increased competition with banks and mortgage credit institutions, which also provide financing for real estate companies, and could possibly result in a lowering of credit standards.

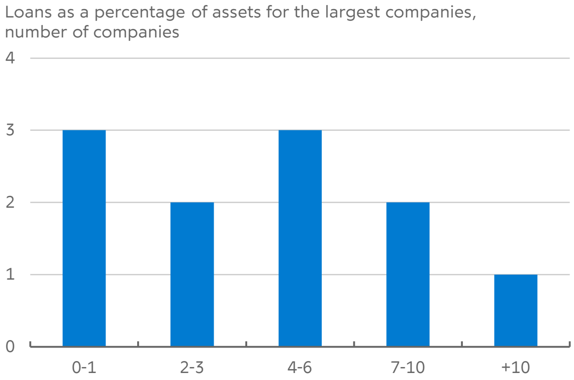
The banks are focusing on MREL compliance

The banks' liquidity coverage ratio is comfortably above the minimum requirement
All banks fullfil the minimum requirement for the liquidity coverage ratio, LCR, with a certain margin, cf. Chart 34.

The LCR requirement set out in EU regulation is to ensure that the banks have adequate high-quality liquid assets to cover a net outflow of liquidity in an intensive 30-day stress scenario.

Loans as a percentage of assets vary across companies

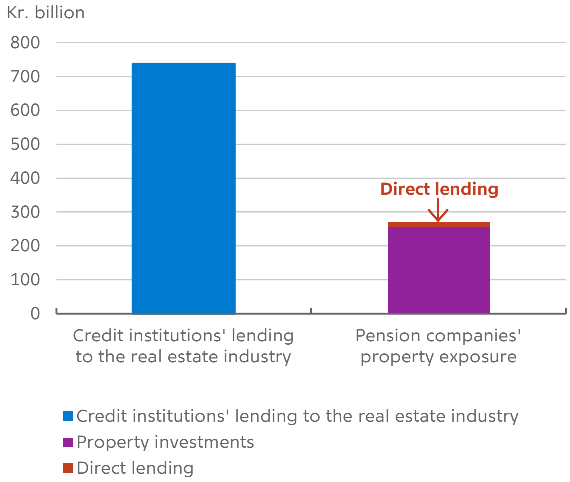
Chart 32



Note: Data includes the pension sector's assets categorised as lending, both direct and through investment funds. The 11 companies shown are the largest companies in the sector. Intragroup loans are included. The observation is from the 3rd quarter of 2018.
Source: Reporting by the sector and own calculations.

The pension sector's direct lending to real estate companies in Denmark is limited

Chart 33

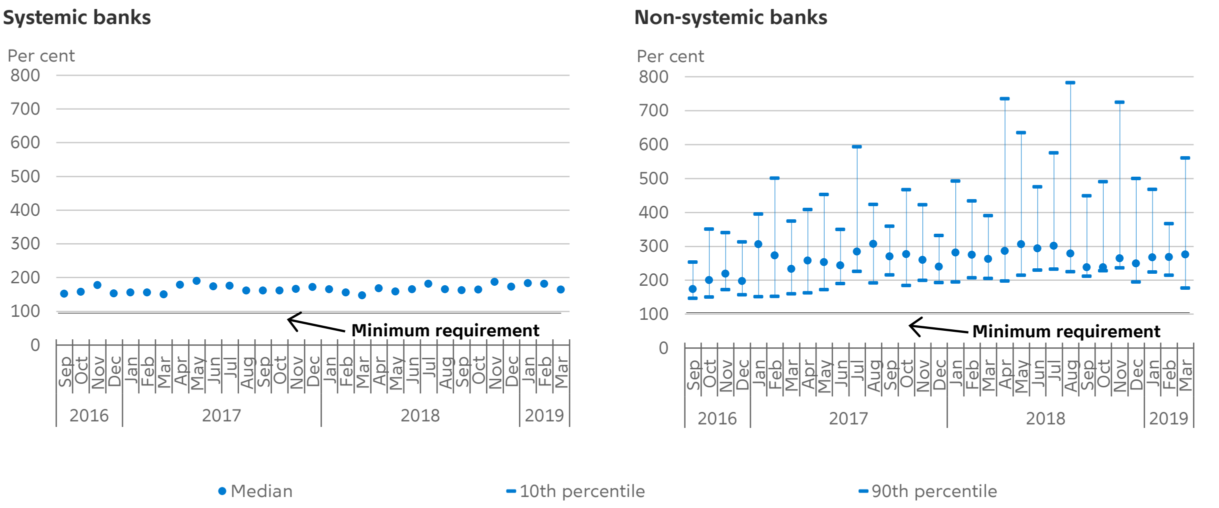


Note: Data includes the pension sector's assets categorised as lending, both direct and through investment funds. Intragroup loans are included. Credit institutions' lending is lending in Denmark to the real estate industry by banks and mortgage credit institutions. The observation is from the 3rd quarter of 2018.
Source: Danmarks Nationalbank, reporting by the sector and own calculations.

13 (*link*) – in Danish only.

The banks are LCR compliant

Chart 34



Note: The LCR, Liquidity Coverage Ratio, which must be higher than 100 per cent, is calculated as the bank's liquid assets divided by outgoing net cash flows over a 30-day stress period. The most recent observation is from end-May 2019.
Source: Danmarks Nationalbank.

The liquidity buffer consists primarily of central bank deposits and covered bonds

The banks' buffers of liquid assets consist primarily of covered bonds, such as Danish mortgage bonds, and claims on central banks. The high share of covered bonds should be seen in the light of a limited supply of Danish government bonds of kr. 427 billion at end-2018. A similar situation is seen in Sweden and Norway.

To ensure an adequate match between net outflows of liquidity and assets in various currencies, the systemic banks must also fullfil the LCR requirement in foreign currency if that currency constitutes more than 5 per cent of the bank's equity and liabilities.[14]

Few Danish issuers of covered bonds

The outstanding volume of covered bonds in Danish kroner consists primarily of issuances by the large mortgage credit institutions and Danske Bank. They have all been designated as systemically important institutions, making them subject to higher capital requirements and closer oversight.[15] This concentration on few issuers and the large volume of covered bonds in the liquidity portfolios make it particularly important that investors trust that the mortgage credit institutions are robust and comprised by credible resolution models.

The banks are focusing on MREL compliance

Danish systemic credit institutions had jointly issued non-preferred senior debt amounting to kr. 75 billion at end-April 2019. This debt can be used to meet the requirement for sufficient own funds and eligible liabilities that can absorb losses in a failing bank or be used for recapitalisation. The MREL takes effect for the systemic Danish banks on 1 July 2019.[16]

In some cases, issuance of non-preferred senior debt replaces maturing existing debt, while in other cases such issuance provides extra liquidity for the banks. It is important that the resultant liquidity is not used for increased risk-taking.

14 The foreign exchange LCR requirement does not apply to Swedish kronor and Norwegian kroner.

15 Danish Ship Finance and KommuneKredit also issue covered bonds.

16 Gradual phasing-in applies to Spar Nord Bank.

MREL maturity dates should be spread
Typical MREL issuances by Danish banks have maturities of 3 or 5 years. If the remaining maturity falls below one year, they can no longer be used to meet the MREL.[17]

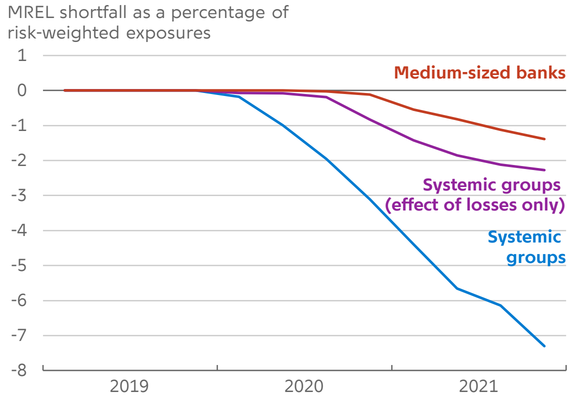
According to Danmarks Nationalbank's stress test, the systemic credit institutions depend heavily on still being able to issue new MREL funds in a severe stress scenario in order to meet the MREL, cf. Chart 35.[18] Given that periods of no or limited capital market access may arise, the banks should focus on the length and maturity profiles of their issuances to avoid strong concentration of maturing issuances and breach of the MREL. It is important for the credit institutions to have a certain excess of eligible liabilities relative to the MREL to ensure compliance through a period with no or limited market access.

The maturity profile should allow adequate flexibility in terms of time of issuance
The risk premium on non-preferred senior debt, and hence the cost of issuance, reflects the general market appetite for debt in the relevant credit classes and the risk on the individual bank. At end-2018, the average risk premium for European banks was approximately 75 basis points higher than in April 2019 for a bank bond with a credit rating of around BBB, which is representative for MREL issuance by Danish banks, cf. Chart 36. So flexibility in terms of the time of issuance may have an impact on the cost of issuing non-preferred senior debt to meet the MREL.

Non-residents buy non-preferred senior debt
Non-residents hold around 92 per cent of the non-preferred senior debt issued by Danish banks, cf. Chart 37. Danish banks, on the other hand, hold less than 1 per cent of the issues. It is important for financial stability that problems in one bank do not spread to other banks in the event that debt is written down.

Short remaining maturities on MREL issues may lead to breaches of MRELs under stress

Chart 35



Note: Stress scenario with a severe recession. The MREL shortfall is defined as the amount the groups are short of in order to satisfy the MREL divided by the banks' total risk-weighted exposures (systemic and non-systemic banks, respectively). The purple line indicates the MREL shortfalls of the systemic groups, assuming they regularly refinance the maturing debt instruments that can be used to meet MRELs. For further information about the stress scenarios and the results of the stress test, as well as the underlying methodology, see Danmarks Nationalbank, Banks face new requirements in the stress test, Danmarks Nationalbank Analysis (Stress test), No. 10, May 2019.

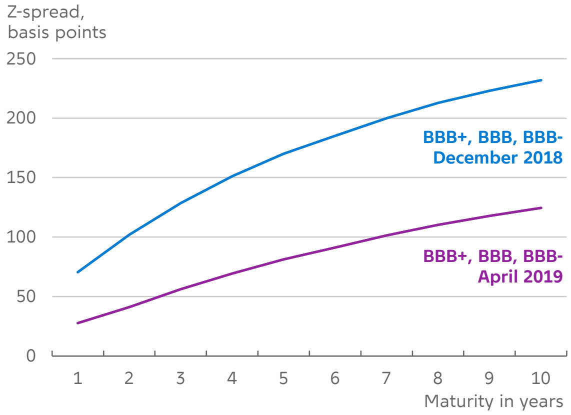
Source: Danish Financial Supervisory Authority, Bloomberg and own calculations.

17 Under the EU's existing Bank Recovery and Resolution Directive, BRRD, the debt instruments may not have derivative-like characteristics either. With the forthcoming BRRDII, the resolution authority may permit an institution to include a call option in the debt instruments stating that the institution may redeem the debt if the remaining maturity is 1 year or less.

18 For further information about the stress scenarios and the results of the stress test, as well as the underlying methodology, see Danmarks Nationalbank, Banks face new requirements in the stress test, *Danmarks Nationalbank Analysis (Stress test)*, No. 10, May 2019.

The general credit spread for non-preferred senior debt may fluctuate

Chart 36

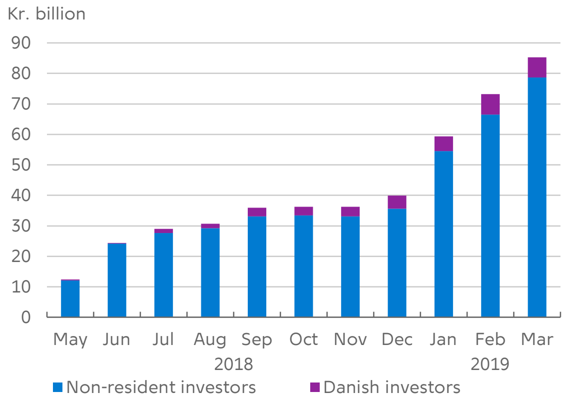


Note: The chart shows Z spreads for debt issued in euro by European banks with credit assessments (Bloomberg composite BBB+, BBB, BBB-) representative of Danish banks' non-preferred senior debt. The Z spread is an expression of the additional costs of obtaining funding with the debt instrument in question, where the additional costs are calculated by parallel-shifting a risk-free zero-coupon yield structure, so that the discounting results in the price of the debt instrument.

Source: Bloomberg.

Non-residents own most of the banks' non-preferred senior debt

Chart 37



Source: Danmarks Nationalbank.

Lower excess capital adequacy and prospects of tighter capital requirements

Excess capital adequacy decreased in 2018

Excess capital adequacy in the systemic groups was lower at end-2018 than the year before, cf. Chart 38. The groups still posted high earnings, but several other factors had a downward impact on excess capital adequacy.

On 1 January 2019, the European capital requirements had been fully phased in. The largest Danish banks observed these requirements as early as in 2013, but since then they have increased their capital ratios less than banks in the other Nordic countries.

Conversely, the medium-sized banks have increased their excess capital adequacy over the last year.

Systemic groups distribute profits to shareholders

Overall, the systemic groups channelled more than their profits for the year back to their shareholders in 2018, cf. Chart 39. Disbursements to shareholders came in the form of both dividends and share buy-backs.

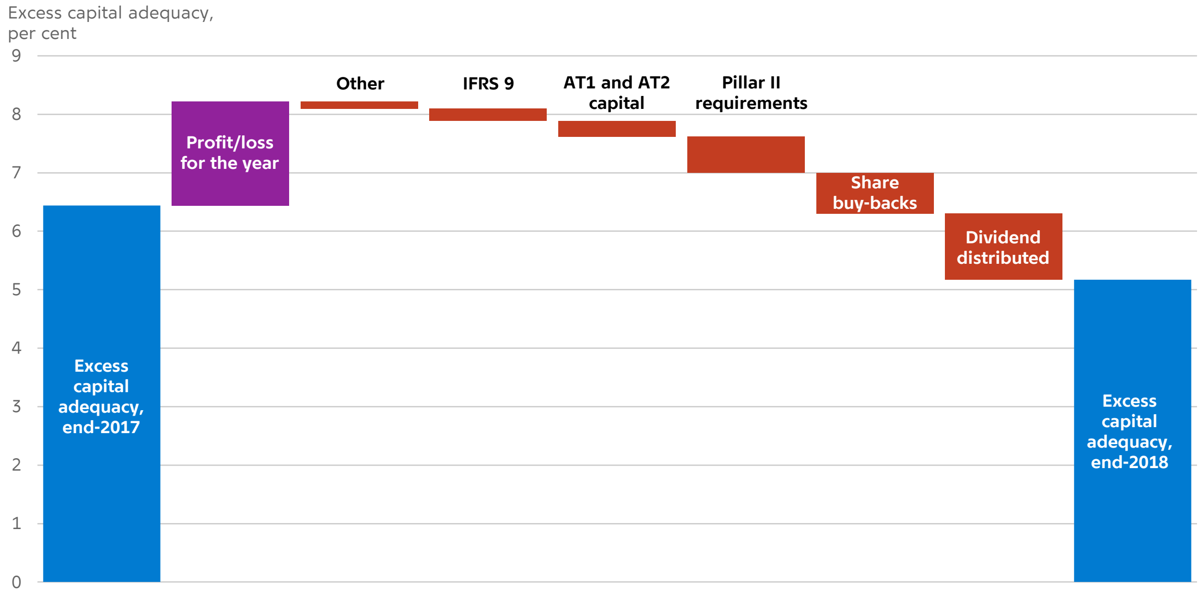
Dividends distributed in 2018 were adopted at annual general meetings early in the year on the basis of the 2017 profits, which were at a historically high level. The groups expect this year's profits to be lower than last year's.

Limited effect of new impairment rules

Other elements also had an impact on developments in the capital base in 2018. Notably, the Danish Financial Supervisory Authority increased the individual Pillar II requirements for several systemic groups. For example, the requirement for Danske Bank was increased in response to the money laundering case at the bank's Estonian branch.

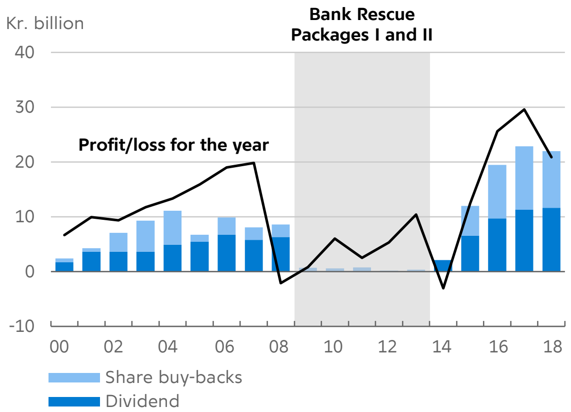
The transition to the new financial reporting standard IFRS 9 on 1 January 2018 reduced the groups' excess

Declining excess capital adequacy of the systemic groups Chart 38



Note: Excess capital adequacy is the capital base less the total risk-weighted capital requirement, including the fully phased-in buffer requirements, including a countercyclical capital buffer of 1 per cent.
Source: Danish Financial Supervisory Authority and own calculations.

Large disbursements to shareholders of systemic banks Chart 39



Note: Systemic banks. The banks' scope for distributing dividends was limited under Bank Rescue Packages 1 and 2.
Source: Danmarks Nationalbank and own calculations.

capital adequacy a little. The new calculation method for impairments has increased the accumulated loan impairment charges. The transition was recognised directly on the balance sheet, where the increase in accumulated loan impairment charges was offset by an equivalent after-tax reduction in equity.

The impact of the change has varied across the groups, as some have opted for gradual phasing-in towards 2023.

Capital requirements are likely to rise in the coming years

The requirements for banks' capital structure are likely to be tightened considerably in the coming years, cf. Chart 40. The tighter requirements may squeeze the excess capital adequacy of the systemic groups if they do not build up further capital beforehand. It is important that the banks hold sufficient capital so that they will not have to tighten their credit policies for this reason when the economy reverses.

In March, the Systemic Risk Council recommended that the Minister for Industry, Business and Financial Affairs should increase the countercyclical capital buffer rate in Denmark from 1.0 to 1.5 per cent with effect from 30 June 2020. Within a period of three months, the Minister must either comply with the recommendation or explain why it will not be complied with.

The Systemic Risk Council expects to make a recommendation to the Minister to further increase the buffer rate to 2 per cent in the 3rd quarter. Unless the risk build-up in the financial system slows down considerably, the Council is of the opinion that the buffer rate should gradually be built up to 2.5 per cent.

The Basel Committee has recommended a revision of the banks' IRB approaches to calculating risk weights, as well as an "output floor"[19]. With this proposal, the Basel Committee wishes to restore confidence in the banks' risk weights, and it has suggested implementing the requirements in 2022, with a gradual phasing-in of the output floor in the period until 2027.

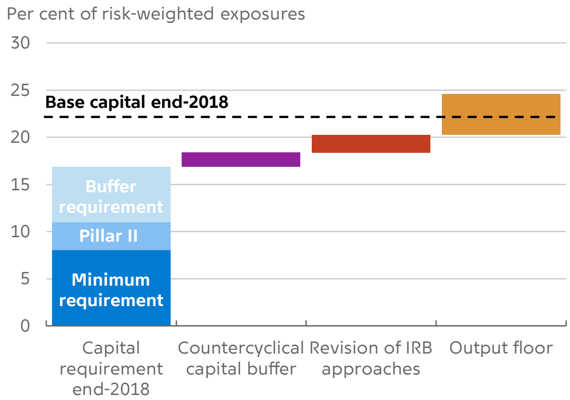
According to the Danish expert group on Basel proposals[20], the Basel Committee's recommendations may increase the capital requirements for the systemic groups by 34 per cent on average. In that case, their existing capital base will not be sufficient. The Danish Financial Supervisory Authority may assess that the groups' individual Pillar II requirements can be reduced after implementation of the enhanced Pillar I requirements.

The systemic groups find that their existing excess capital adequacy is sufficient to comply with the coming Basel requirements, or that they will be able to build up further capital by retaining profits.

The extent of the final requirements, which must first be implemented in EU legislation, remains uncertain. Initially, the European Commission has asked the European Banking Authority, EBA, to prepare a report on the consequences for the European banking sector. Several systemic groups in Denmark have contributed data for the report, which is expected to be published in June 2019.

Danmarks Nationalbank shares the Basel Committee's aim of ensuring confidence in the banks' capital base. But while the output floor will potentially strengthen the groups' capitalisation, it may have an unfortunate impact on their incentives to pursue sound risk policies. Thus, groups with a binding output floor will have reduced risk sensitivity relative to risk weighting based on IRB approaches. Implementation of the output floor in EU legislation should, as far as possible, take place in such a way that detrimental effects on risk sensitivity are limited.

Systemic groups may need to build up further capital adequacy Chart 40



Note: Capital base and fully phased-in capital requirements for systemic groups, including an already adopted countercyclical capital buffer of 1 percentage point. "Countercyclical capital buffer" is set at 1.5 per cent, calculated as 2.5 per cent less already adopted increases. The buffer rate can be set at a higher value if justified by the assessment basis. Combined, "Revision of IRB approaches" and "Output floor" make up the estimated effect of the most recent proposal from the Basel Committee.

Source: Danish Financial Supervisory Authority, expert group on Basel proposals and own calculations.

19 The output floor applies for credit institutions using internal ratings-based (IRB) approaches when calculating their risk-weighted exposures. The floor is 72.5 per cent of the total risk-weighted exposures that would be calculated using the simpler standardised approach.

20 In February 2018, the expert group reported to the Minister for Industry, Business and Financial Affairs (*link*) – in Danish only.

Excess capital relative to buffer requirement halves in severe recession scenario
Danmarks Nationalbank's stress test shows that all the systemic groups will still be able to meet the current risk-based buffer requirements in the event of a severe recession in the next three years towards 2022, cf. Chart 41.[21] A few are close to exceeding their buffer requirements, but all of them keep a comfortable distance to the risk-based minimum requirement.

In the event of non-compliance with the buffer requirements, the institutions become subject to a number of restrictions, e.g. on dividend payments. Moreover, the institutions should expect that their access to external funding in the financial markets may be challenged.

Leverage-based minimum requirement reduces the banks' buffers
For groups with a large share of assets with very low risk weights, the leverage ratio requirement could entail a higher Tier 1 requirement than the risk-based buffer requirement.

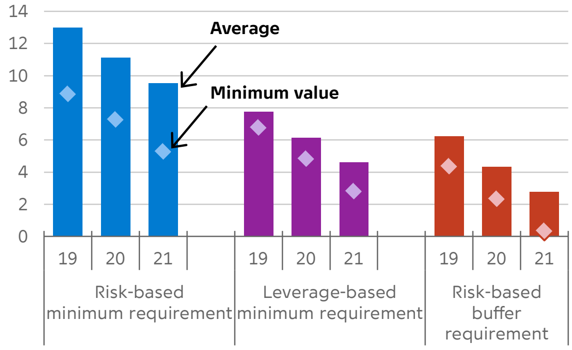
For several of the other groups, the leverage ratio constitutes a restriction in terms of the ability of the capital buffers to absorb losses before the minimum requirement is breached. The majority of the systemic groups are closer to hitting the leverage ratio requirement than the risk-based minimum requirement in a stress scenario. This means that a considerable portion of the capital buffer above the risk-based minimum requirement does not constitute an actual buffer. In practice, the groups will hit the minimum leverage-based requirement before their buffers are depleted. In the medium-sized banks, the leverage requirement is generally non-binding.

The minimum leverage ratio requirement will be implemented in 2021 with the amended Capital Requirements Regulation, CRR2. The requirement is a minimum Tier 1 leverage ratio of 3 per cent of the banks' non-risk-based exposures.

Systemic groups are still meeting all requirements in a severe recession scenario

Chart 41

Excess capital adequacy as a percentage of risk-weighted exposures



Note: Excess capital adequacy in systemic groups in a severe recession scenario. The bars show a weighted average of excess capital adequacy for all systemic groups and the diamonds show the value for the systemic group with the lowest excess capital adequacy.
Source: Danmarks Nationalbank.

The largest systemic groups have sufficient MREL funds
Most of the systemic credit institutions have now built up sufficient funds to meet MRELs exceeding the existing capital requirements and the debt buffer requirement for mortgage credit institutions. Spar Nord does not have to meet its fully phased-in MREL until 2022. For the other groups, the requirement for sufficient MREL funds will be phased in on 1 July 2019.

In the event of non-compliance with the MREL, the Financial Supervisory Authority will as a first step require the institution to comply within a deadline. Furthermore, a non-compliant institution can be sanctioned with several restrictions, e.g. on dividend payment. Transfer of the institution to the Financial Stability Company is not a possibility before the institution's capital buffers are emptied.[22]

21 For further information about the stress scenarios and the results of the stress test, as well as the underlying methodology, see Danmarks Nationalbank, Banks face new requirements in the stress test *Danmarks Nationalbank Analysis (Stress test)*, No. 10, May 2019.

22 See Financial Supervisory Authority's note regarding the reaction chain in case of non-compliance with MREL from november 2017 (*link*) – in Danish only.

Denmark's MREL implementation is problematic and unnecessarily complex

The principle of always being able to recapitalise systemic groups without the use of public funds is a cornerstone of regulatory measures implemented by authorities all over the world after the most recent financial crisis. Danmarks Nationalbank has pointed out that the exemption of mortgage credit institutions from the MREL creates problems as regards lack of risk sensitivity and credible resolution planning.[23]

At the same time, the combination of capital, MREL and debt buffer requirements is unnecessarily complex, cf. the examples in Box 3. A complex requirement makes it difficult to assess the institutions' compliance and the size of their excess capital adequacy.

More severe sanctions are being introduced for non-compliance with the MREL

With the EU's forthcoming second Bank Recovery and Resolution Directive, BRRDII, a number of possible sanctions will be tightened. For example, in future resolution authorities will as a starting point have to restrict dividend payments after nine months' non-compliance with the MREL. Moreover, the authorities will be able to use their general powers to address impediments to resolution in connection with non-compliance.[24] The adjusted requirements are expected to be implemented as legislation in force from 2021.

23 See Danmarks Nationalbank, *Consultation response concerning the bill to amend the Danish Financial Business Act, Anti-Money Laundering Act, Act on Alternative Investment Fund Managers, etc. and various other acts (part III)*, 19 February 2018 (*link*).

24 As regards restrictions on dividend payments and the authorities' general powers to address impediments to resolution, see Article 45k of the forthcoming BRRDII.

Illustration of the complexity of the combined capital, MREL and debt buffer requirement for a group comprising a mortgage credit institution

Box 3

The combined requirement for the groups' capital structure comprises funds for loss absorption, recapitalisation and debt buffer for mortgage lending, respectively, cf. Charts A and B. The loss absorption funds correspond to the aggregate capital buffer requirement for the groups. The recapitalisation funds are to ensure that the bank in the group can always be recapitalised in a crisis. Consequently, the funds for recapitalisation constitute the aggregate buffer requirement for the bank – countercyclical buffer excepted, however. The mortgage credit institution in the group is exempt from the MREL and not included in the recapitalisation funds. Instead, the mortgage credit institution is subject to a "debt buffer" requirement of 2 per cent of its total lending.

From 2022, a minimum level of 8 per cent of the group's total assets will be introduced for the group's combined capital, MREL and debt buffer requirement. This is ensured by increasing the debt buffer requirement for the mortgage credit institution until the combined requirement for the whole group reaches 8 per cent.

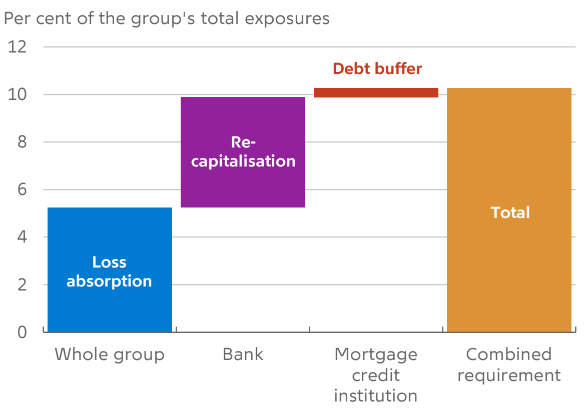
Examples of groups with high and low risk weights, respectively

The combined capital, MREL and debt buffer requirement and the future minimum requirement determine the combination of risk-weighted and unweighted requirements that must be met for the various activities of the group. The two stylised examples below illustrate the complexity of the calculations and possible differences in the final requirement.

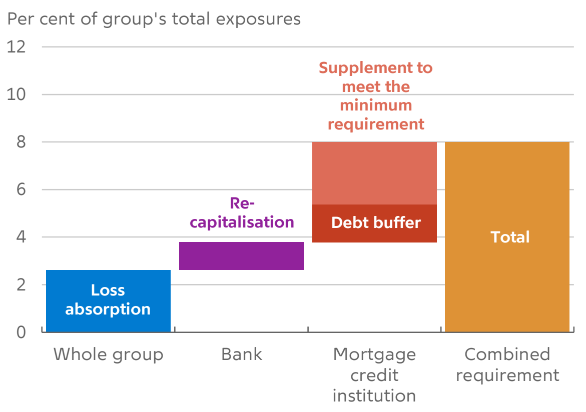
Chart A shows a group with a relatively large bank where lending has a higher risk weight in the bank than in the mortgage credit institution. The bank has a total exposure of kr. 80 billion, with an average risk weight of 35 per cent, and the mortgage credit institution has exposures of kr. 20 billion, with an average risk weight of 10 per cent. Intragroup exposures are disregarded; otherwise it would have been necessary to adjust for these on the balance sheets of the bank and the mortgage credit institution.[1] In the example, the unweighted debt buffer requirement is relatively modest, and the combined requirement is higher than the unweighted minimum requirement of 8 per cent.

Chart B shows a group with a relatively large mortgage credit institution. The bank has a total exposure of kr. 20 billion, the mortgage credit institution kr. 80 billion. The average risk weights for the bank and mortgage credit institution are still 35 and 10 per cent, respectively. In the example, the unweighted debt buffer requirement is initially relatively high, but in addition, the minimum requirement is higher than the combined requirement. This means that the debt buffer requirement is increased further until the combined requirement reaches 8 per cent of the group's consolidated balance sheet.

Example with large bank in the group — Chart A



Example with large mortgage credit institution in the group — Chart B



Note: The individual Pillar II add-on has been set at 12 per cent, the SIFI buffer at 2 per cent and the countercyclical capital buffer at 1 per cent. No intragroup exposures. Chart A: Bank has exposures of kr. 80 billion with average risk weight of 35 per cent; mortgage credit institution has kr. 20 billion with average risk weight of 10 per cent. Chart B: Bank has exposures of kr. 20 billion, mortgage credit institution of kr. 80 billion. Same risk weights.

Source: Own calculations.

1. An example of the calculations behind an adjustment on the basis of exposures across the group can be found in the Danish Financial Supervisory Authority's fact sheet *Fakta om krav til nedskrivningsegnede passiver (NEP-krav) for systemisk vigtige pengeinstitutter* (*Facts about minimum requirements for own funds and eligible liabilities (MRELs) for systemically important banks* (*link*) – in Danish only.

Appendix: Data for the analysis

Banks and mortgage credit institutions in the analysis by total assets as at 30 December 2018, kr. million

Table 1

Systemic credit institutions	Amount
Danske Bank (including Realkredit Danmark)	3,108,265
Nykredit Realkredit (including Nykredit Bank)	1,447,991
Jyske Bank (including BRFkredit)	599,947
Nordea Kredit	438,825
DLR Kredit	160,738
Sydbank	140,514
Spar Nord	82,793
Systemic credit institutions, total	**5,979,073**

Systemic banks	
Danske Bank	2,177,552
Jyske Bank	278,570
Nykredit Bank	186,581
Sydbank	142,869
Spar Nord	82,917
Systemic banks, total	**2,868,488**

Non-systemic banks	
Arbejdernes Landsbank	54,974
Ringkjøbing Landbobank	49,651
Sparekassen Kronjylland	26,422
Sparekassen Sjælland-Fyn A/S	23,818
Lån & Spar Bank	21,734
Vestjysk Bank	21,198
Sparekassen Vendsyssel	20,621
Jutlander Bank	18,248
Den Jyske Sparekasse	15,351
Alm. Brand Bank	13,155
Non-systemic banks, total	**297,293**

Mortgage credit institutions	
Nykredit Realkredit (including Totalkredit)	1,358,540
Realkredit Danmark	871,206
Nordea Kredit	438,825
BRFkredit	353,280
DLR Kredit	160,738
LR Realkredit	24,934
Mortgage credit institutions, total	**3,964,820**

Note: The balance sheet totals of systemic banks, non-systemic banks and mortgage credit institutions are stated at institution level, while the balance sheet totals of the systemic credit institutions are stated at group level.
Source: Danmarks Nationalbank.

The analysis applies the term "credit institutions" or "groups" when referring to the activities of both banks and mortgage credit institutions. The term "bank" refers specifically to entities carrying out banking activities.

The analysis of Danish credit institutions' earnings, liquidity and own funds comprises seven systemic credit institutions. The analysis also includes the non-systemic banks in the Danish Financial Supervisory Authority's group 2 in 2019.[25] These institutions are listed in Table 1. Unlike in the Authority's group 2, Saxo Bank has been omitted because of its business model. The grouping also applies back in time.

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.[26] Large banks are the systemic banks plus Nordea Danmark, while medium-sized banks are the non-systemic banks plus Handelsbanken and Santander Consumer Bank.

25 See Financial Supervisory Authority's website for a breakdown of banks by size (*link*).

26 See Danmarks Nationalbank (*link*).

ABOUT ANALYSIS

As a consequence of Danmarks Nationalbank's role in society we conduct analyses of economic and financial conditions.

Analyses are published continuously and include e.g. assessments of the current cyclical position and the financial stability.

The analysis consists of a Danish and an English version. In case of doubt regarding the correctness of the translation the Danish version is considered to be binding.

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FINANCIAL STABILITY – 2ND HALF 2019

Lower excess capital adequacy for the banks

- The largest credit institutions' results remain high, underpinned by low loan impairment charges and income from mortgage loan refinancing. Several institutions have launched initiatives aimed at securing future earnings.
- The largest credit institutions have reduced excess capital adequacy, and for a few it is low. The institutions should reconsider their capital targets to ensure an appropriate distance between capitalisation and capital requirements.
- The largest banks generally have robust liquidity. Sensitivity analyses of the banks' liquidity are important for an understanding of the risks associated with liquidity withdrawal in a crisis.

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Negative deposit rates

for households will have a limited impact on earnings

Read more

Homeowners opt for

fixed rate mortgage loans and become more resilient to interest rate changes

Read more

Intensified competitive

pressure and declining margins for corporate customers

Read more

Summary and assessment

Prospects of more moderate growth and persistently low interest rates
Global economic growth is declining, and growth expectations have been reduced, also for the euro area. In September, the European Central Bank, ECB, lowered its deposit rate by 0.1 percentage point to -0.50 per cent, and the market expects even lower interest rates in the coming years. At the same time, Danmarks Nationalbank lowered its certificate of deposit rate to -0.75 per cent. The accommodative monetary policy has led to a decrease in short-term money market interest rates and substantial declines in the yields on Danish mortgage and government bonds, which reached the lowest levels ever in the autumn of 2019.

Results remain high, but core earnings are falling
The systemic credit institutions' earnings remain high, underpinned by low loan impairment charges. However, the long period of negative interest rates has entailed lower core earnings for the institutions. Net fee income and income from administration margins have receded a little in recent years, meaning that they are making up for the decline in net interest income to a lower degree than previously. The large wave of mortgage refinancing in 2019, especially in the 2nd half, will have a positive impact on net fee income, but as a one-off effect only. Weaker earnings will reduce the institutions' first line of defence against losses. It is important that the institutions continue to enhance efficiency and reduce their costs to offset falling core earnings.

Households have so far been exempt from negative deposit rates
For households, the banks have not reduced interest rates to the same extent as they have done for corporate customers. As a result, the banks are, on average, paying zero or positive deposit rates to households, while placing excess liquidity in the market at negative interest rates. Together with the rising customer funding surplus, this puts increasing downward pressure on the banks' net interest income.

Negative deposit rates for households will have a limited impact on earnings
Several banks have announced that they will introduce negative deposit rates for households on deposits exceeding kr. 750,000. Danmarks Nationalbank finds that the introduction of negative deposit rates of -0.75 per cent for Danish households will have a limited impact on the sector's overall earnings. An interest rate of -0.75 per cent on household deposits exceeding kr. 750,000 would cause the sector's earnings to rise by approximately kr. 1.1 billion, disregarding depositors' opportunities of responding to the negative interest rates. For instance, households with both debt and bank deposits could respond by reducing deposits by means of debt servicing.

Institutions should ensure an appropriate distance between capital targets and capital requirements
The systemic credit institutions' capitalisation has been stable in recent years, but increasing capital requirements have reduced their excess capital adequacy. Danmarks Nationalbank finds that a few of the systemic institutions should reconsider their capital targets to ensure an appropriate distance between capitalisation and capital requirements. The need to reconsider capital targets is underscored by Danmarks Nationalbank's most recent stress test of the institutions' solvency. It shows that a few of the systemic banks will fall short of their capital buffer requirements in a severe stress scenario even if the countercyclical capital buffer is assumed to be released.

Denmark is one of the EU member states where the new Basel rules are expected to have the strongest impact
The forthcoming implementation of the 2017 Basel reform is also a reason for the systemic institutions to reconsider their capital planning. Like institutions in other Northern European countries, Danish institutions are among those that should be expected to see the strongest increases in capital requirements. The increases can predominantly be attributed to the introduction of the output floor, which will impose a lower limit for risk-weighted exposures calculated on the basis of historical losses.

MREL compliance reached as at 1 July 2019
The systemic institutions all met the minimum requirement for eligible liabilities, MREL, on 1 July 2019, when it became effective. However, the excess capital adequacy relative to the new requirement is limited, and findings from Danmarks Nationalbank's stress test show that the systemic institutions will

have a substantial need to issue new MREL-eligible instruments in a stress scenario. Danmarks Nationalbank expects the institutions to continue building up MREL-eligible instruments in the coming years. Given that periods of no or limited capital market access may arise, the institutions should focus on the length and maturity profiles of their issuances to avoid strong concentration of maturing issuances and breach of the MREL.

Homeowners opt for fixed rate mortgage loans, becoming increasingly resilient to changes in interest rates
Overall growth in lending to households is driven by fixed rate mortgage loans. Fixed rate mortgage loans now account for 46 per cent of mortgage lending, compared with 33 per cent at the beginning of 2014. Consequently, households have become more resilient to changes in interest rates on their debt. Fixed rate mortgage lending is increasing in all municipalities, but most in Copenhagen and environs and around the large cities. Both banks and mortgage credit institutions report lower risk appetite for lending to households in recent quarters. Risk appetite has declined due to, inter alia, changes to good practice for lending for housing purposes and the guidelines on prudent credit assessment when granting housing loans in growth areas.

Intensified competitive pressure and falling interest margins for corporate lending
Growth in lending to corporate customers continues at a moderate pace. Credit standards for corporate customers were more or less unchanged in the 3rd quarter of 2019, but both banks and mortgage credit institutions still report that competitor behaviour has contributed to their easing of credit standards. The competitive pressure is primarily reflected in the banks' interest margin, which continues to decline. It is important that the institutions maintain a sound credit quality and that the interest margin reflects the risk on lending. Since losses do not materialise until the economy reverses, the institutions should assess firms' resilience over the entire business cycle.

The banks' liquidity is robust, but sensitive to deposit withdrawal
Danmarks Nationalbank has developed a tool for assessing bank liquidity sensitivity. The sensitivity analysis shows that the liquidity of the systemic banks is generally robust to a market downturn where the banks cannot expect to be able to renew existing loans and issuances when they mature. The sensitivity analysis also shows that the systemic banks' liquidity position is more sensitive to an institution-specific shock, for instance with doubt about whether an individual bank will survive and with depositors withdrawing funds. It is important that the banks themselves have a deep understanding of the sensitivity to various risks affecting liquidity withdrawal in a crisis.

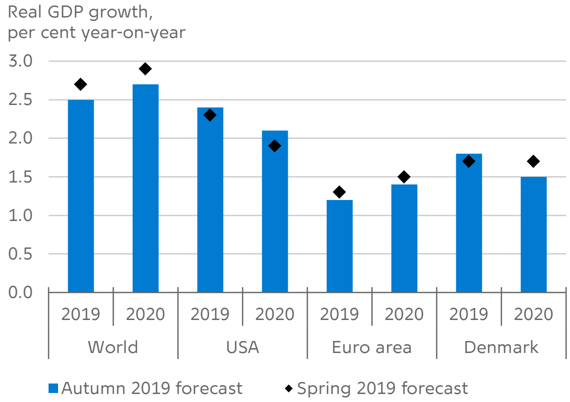
Prospects of more moderate growth and persistently low interest rates

A more moderate growth outlook

Global growth is declining. The latest forecasts from the International Monetary Fund, IMF, predict global economic growth, but at a moderate level. The IMF has reduced its global growth estimate, now expecting global economic growth of 2.5 per cent for 2019, relative to 2.7 per cent in April. This is the lowest level since 2012. The downward revision of the IMF growth estimates is motivated by, inter alia, the trade conflict between the USA and China and a general slowdown. However, the forecast for the US economy has been adjusted slightly upwards since April, but the expectation for 2020 is still for lower growth compared with 2019.

Expected growth in the euro area has also been adjusted downwards since April, primarily due to weak industrial production, which has fallen in Germany, among other countries. Similarly, Danmarks Nationalbank's most recent projection indicates declining growth in the Danish economy in 2020, cf. Chart 1.

Downward adjustment of expected growth in the global economy, the euro area and Denmark Chart 1

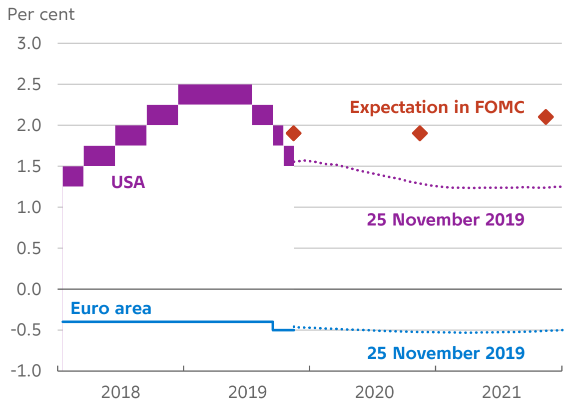


Note: The chart shows the IMF forecast for the world based on exchange rates and the IMF forecasts for the USA and the euro area. The forecast for Denmark is from Danmarks Nationalbank's projections from March 2019 and September 2019.
Source: IMF and Danmarks Nationalbank.

Lower monetary policy interest rates in response to slowdown

In September, the European Central Bank, ECB, lowered its deposit rate by 0.1 percentage point to -0.50 per cent. At the same time, the ECB introduced a two-tier interest rate system allowing banks to deposit a part of their liquidity at 0 per cent. The ECB also announced that it would resume its asset purchase programme. The economic stimulus in the form of a lower key interest rate is implemented after the ECB's downward adjustment of inflation expectations against the background of mounting concerns about the global macroeconomic situation. The market expects even lower interest rates in the coming years, cf. Chart 2.

The market expects even lower interest rates Chart 2



Note: Fed funds target rate for the USA, the ECB's deposit rate for the euro area. The dotted lines denote market expectations based on futures prices. The most recent observations are from 25 November 2019.
Source: Federal Reserve, ScanRate RIO and Macrobond.

The Federal Reserve, FED, has also lowered the fed funds target rate. This has led to a fall in market expectations of future interest rates.

Interest rate spike in the secured US money market

On 17 September 2019, the price of a secured overnight dollar loan, i.e. the repo rate, rose to around 9 per cent during one day, cf. Chart 3. On that day and the subsequent days, the FED operated in the market with measures to reduce the repo rate, thus aiming to keep the federal funds rate for unsecured borrowing within 2-2.25 per cent, which was the target. The repo rate hike was presumably a consequence of several concurrent events resulting in a dollar shortage.

In the wake of the strong repo rate fluctuations, the FED announced that it would resume purchasing government bonds, mainly in order to increase the volume of dollars.

Danmarks Nationalbank has reduced the key monetary policy interest rate

The fixed exchange rate policy means that Denmark's monetary policy is aimed at keeping the krone stable against the euro. That is why Danmarks Nationalbank mirrored the ECB and lowered the rate of interest on certificates of deposit by 10 basis points to -0.75 per cent from 13 September 2019, close to an all-time low. The lending, current account and discount rates are unchanged. At the moment, the monetary policy counterparties need to deposit substantial funds with Danmarks Nationalbank, and in this situation the monetary policy deposit rates determine the money market rates and the exchange rate of the krone.

Falling interest rates affect the return on banks' bond portfolios

The accommodative monetary policy has led to a decrease in short-term money market interest rates and substantial declines in the yields on Danish mortgage and government bonds. In the autumn of 2019, yields on mortgage and government bonds were the lowest ever. The very low level of interest rates affects yields on the banks' bond portfolios held for liquidity management purposes. The volume of bonds with a yield to maturity of less than -0.5 per cent has thus risen considerably during 2019, cf. Chart 4.

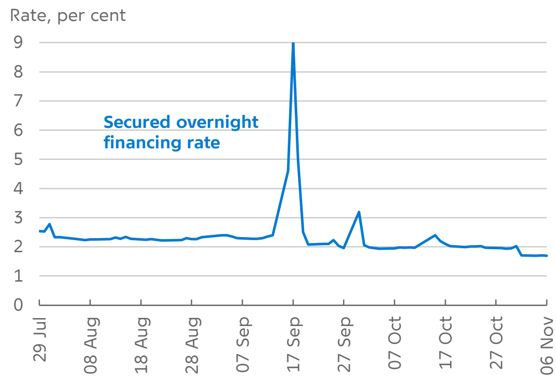
Bank equities have lost value, and the price/book ratio is below 1

The price/book ratio for a bank's equity may provide an indication of investors' confidence in the bank's ability to generate value for the shareholders. A level below 1 has usually indicated lower investor confidence in the bank's ability to perform well in future, or that the asset value reflects the book value.

The average price/book ratio for Danish systemic banks has been below 1 since the end of 2018. For the Danish systemic banks, this ratio has thus moved from being lower than the level for comparable

Strong increase in interest rates in the secured US money market

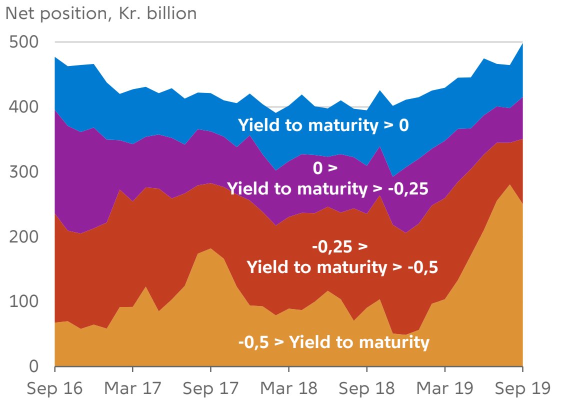
Chart 3



Note: The chart shows the 99th percentile of the secured overnight financing rate. The most recent observation is from 6 November 2019.
Source: Federal Reserve Bank of New York.

Banks' portfolios of negative yield bonds have increased

Chart 4



Note: The chart shows the return on systemic banks' bond portfolios by yield to maturity, i.e. the return on a bond if held to maturity. The most recent observation is from September 2019.
Source: Danmarks Nationalbank and Bloomberg.

Nordic banks in the period 2015-18 to being considerably lower, cf. Chart 5.

The falling price/book ratio is attributable to the development in return on equity, among other factors. By comparison to European banks, Danish banks posted a high return on equity in 2016 and 2017, but the return declined in 2018 and early 2019 to a substantially lower level than that of the Nordic banks. Since 2012, the Nordic banks have managed to maintain a high return on equity.

New reference rates

In October, the reference rate for unsecured overnight interbank loans in the euro area, EONIA, was replaced by the new euro short-term rate, €STR, as reference rate. €STR is based on interbank transactions and transactions between banks and other financial institutions. The ECB publishes the reference rate daily. The transition to a new interest rate can be a huge task for financial corporations, due to EONIA's very extensive use as a reference rate on a number of financial products and in risk and valuation models. This transition is an element of a major international effort to replace traditional interbank interest rates, so-called IBORs, with alternative transaction-based reference rates. Similar work on an overnight reference rate is being performed in Denmark under the auspices of Finance Denmark. The introduction of a Danish transaction-based reference rate will increase the confidence in that rate and will be in accordance with international developments in the area. With the aim of clarification and of strengthening confidence in reference rates in Denmark, the new reference rate should be implemented rapidly and the existing one should be phased out. It is also important to find solutions concerning reference rates for longer maturities and for migrating existing contracts from old to new reference rates.

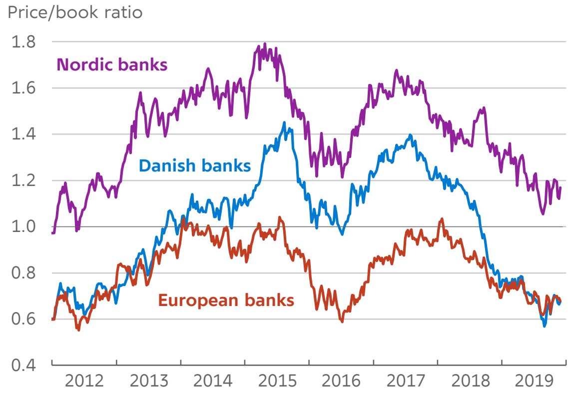
Bank earnings remain high

Results remain high, but core earnings are falling

The systemic credit institutions' earnings remain high, also in the 3rd quarter of 2019. The return on equity for these institutions was 8.4 per cent p.a. in the 1st half of 2019, corresponding to the level at end-2015, and the interim result is still well above the results in the post-crisis period, cf. Chart 6.

The price/book ratio is lower for Danish banks than for comparable Nordic banks

Chart 5

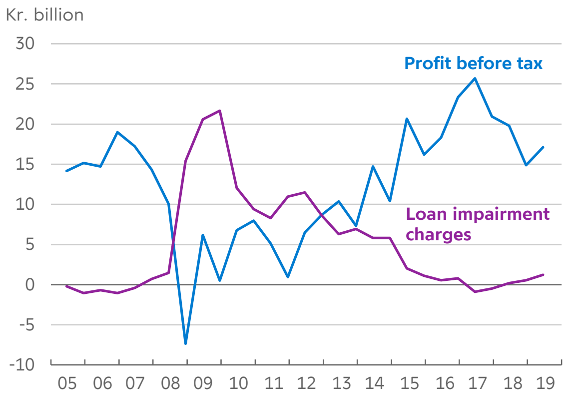


Note: Danish banks comprise Danske Bank, Jyske Bank, Sydbank and Spar Nord. Nordic banks consist of DNB, Svenska Handelsbanken, Swedbank, Nordea and SEB. European banks are based on the STOXX Europe 600 Banks index. Unweighted averages of weekly observations. The most recent observation is from 22 November 2019.

Source: Bloomberg.

Earnings are buoyed up by low loan impairment charges

Chart 6



Note: Six-month data for systemic credit institutions. The result is before tax and adjusted for goodwill impairment charges. The most recent observation is from the 1st half of 2019.

Source: Danmarks Nationalbank.

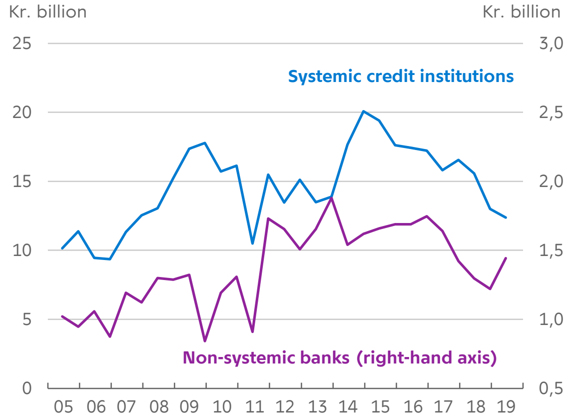
Earnings have been buoyed up by low loan impairment charges for a prolonged period, cf. Chart 6. The low loan impairment charges should be viewed in the light of the favourable cyclical situation and the low level of interest rates, which makes it easier for households and firms to service their debts. Earnings have also been supported by recent years' positive value adjustments.

However, the long period of negative interest rates has entailed falling core earnings, cf. Chart 7. Core earnings consist mainly of net interest and net fee income less costs and are a measure of the institutions' ability to make a profit on their core business. The non-systemic banks' core earnings increased in the 1st half of 2019 due to such factors as rising net fee income. Weaker earnings will reduce the institutions' first line of defence against losses.

Net interest income accounts for a smaller share of earnings

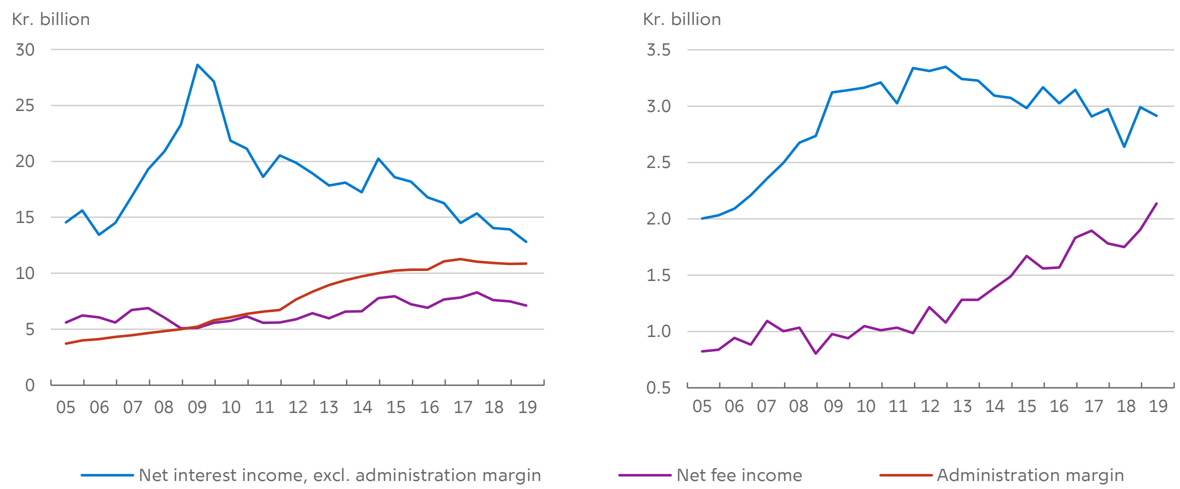
The systemic credit institutions' declining core earnings are mostly attributable to falling net interest income, cf. Chart 8. At the same time, net fee income has receded a little in recent years, while income from administration margins is almost unchanged. Net fee income and income from administration margins are thus making up for the decline in net interest income to a lower degree than previously.

Core earnings have declined in recent years Chart 7



Note: Six-month data for systemic credit institutions and non-systemic banks. Core earnings are defined as profit before tax less dividend from equity investments, value adjustments, loan impairment charges and income from investments. The systemic credit institutions' core earnings have been adjusted for goodwill impairment charges. The most recent observation is from the 1st half of 2019.
Source: Danmarks Nationalbank.

Sustained fall in net interest income Chart 8



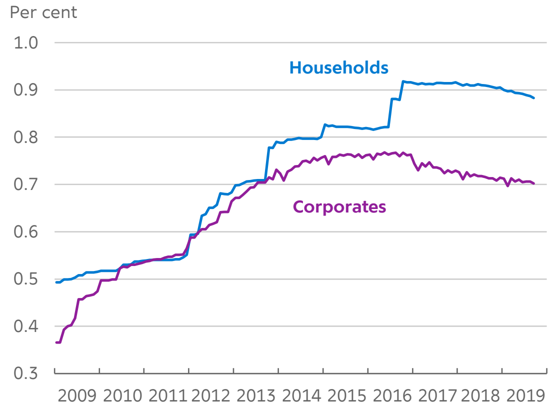
Note: Six-month data for systemic credit institutions and non-systemic banks. The most recent observation is from the 1st half of 2019.
Source: Danmarks Nationalbank.

For the non-systemic banks, net interest income has also declined in recent years, but core earnings have been buoyed up by higher net fee income, cf. Chart 8. Also in the 3rd quarter of 2019, core earnings were buoyed up by higher net fee income.

The development in administration margins and net fees is driven by e.g. mortgage changes

The systemic credit institutions' income from administration margins has been almost unchanged since 2017 despite continually increasing mortgage lending. The flattening of income from administration margins reflects a drop in average administration margins as more borrowers convert their loans to safer loan types with lower administration margins, cf. Chart 9. In recent years, the institutions changed their administration margin structure, so that loans with deferred amortisation and short fixed-interest periods became relatively more expensive.

Average administration margins are receding Chart 9



Note: Average administration margins for outstanding domestic mortgage lending in Danish kroner. The most recent observation is from September 2019.
Source: Danmarks Nationalbank.

For the non-systemic banks participating in the Totalkredit partnership, income from mortgage lending appears as fee income. Recent years' strong increases in non-systemic banks' net fee income are driven, inter alia, by higher fee income from intermediation of mortgage loans.

In contrast, net fee income for the systemic credit institutions taken as one has been declining since end-2017. A contributing factor is the systemic banks' lower fee income from securities trading. In addition, fee income will fall as more and more homeowners opt for mortgage loans with longer fixed-interest periods, since a brokerage fee is payable for each refinancing.

The large volume of refinancing of mortgage loans in 2019[1] has a positive impact on net fee income in 2019, especially in the 2nd half. But this is a one-off effect which will only temporarily boost core earnings.

Interest income has declined due to lower lending rates

The banks' interest income has been falling for a prolonged period despite the slight increase in interest-bearing assets. As market rates have fallen, interest income from lending has made up an increasing share of the institutions' interest income, cf. Chart 10.

Historically, the return on interest-bearing assets has been higher for the non-systemic banks than for the systemic banks. The higher return reflects higher average lending rates for households and corporate customers, cf. Chart 11, and should be viewed in conjunction with, inter alia, the credit quality of the loan portfolio.[2]

The spread between the lending rate and the money market interest rate has narrowed in recent years for both systemic and non-systemic banks, driven by the competitive situation, among other factors.[3]

Banks have adapted deposit rates for corporate customers to the negative market rates

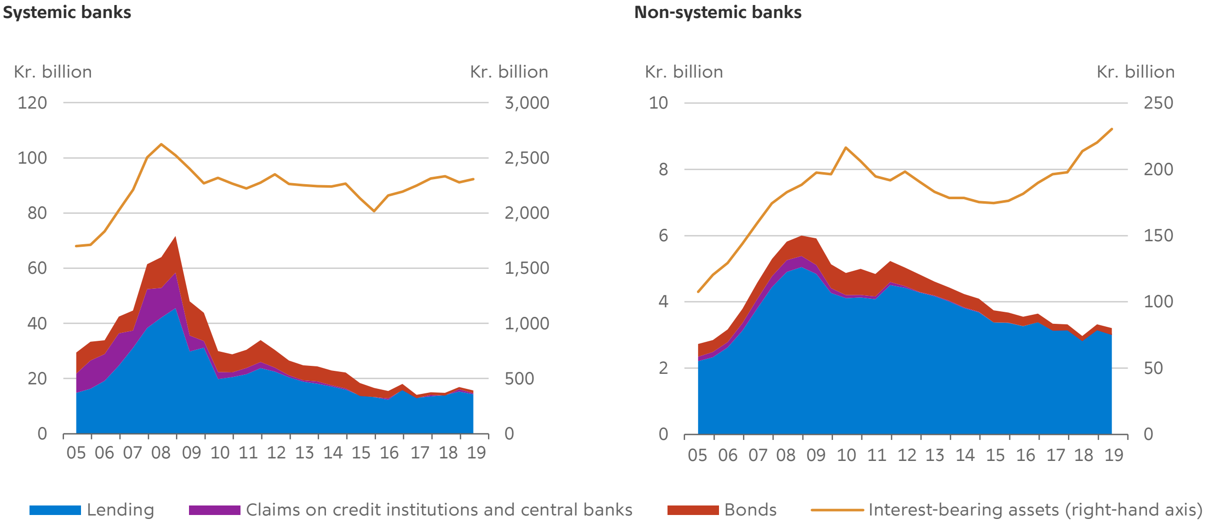
Falling market rates have also entailed lower interest costs, cf. Chart 12. The systemic banks' interest costs are affected more by market rates, since they also

1 See the section "Homeowners opt for fixed rate mortgage loans".

2 See the section "Homeowners opt for fixed rate mortgage loans" and Danmarks Nationalbank, Prospects of lower earnings and higher capital requirements for banks, *Danmarks Nationalbank Analysis (Financial stability, 1st Half 2019)*, No. 11, May 2019.

3 See the section "Homeowners opt for fixed rate mortgage loans".

Interest income has declined despite the slight increase in interest-bearing assets Chart 10



Note: Six-month data for systemic and non-systemic banks. Interest-bearing assets are defined as the sum of the following assets: claims on credit institutions and central banks, lending and other receiveables at fair value and amortised cost, and bonds at fair value and amortised cost. The most recent observation is from the 1st half of 2019.
Source: Danmarks Nationalbank and own calculations.

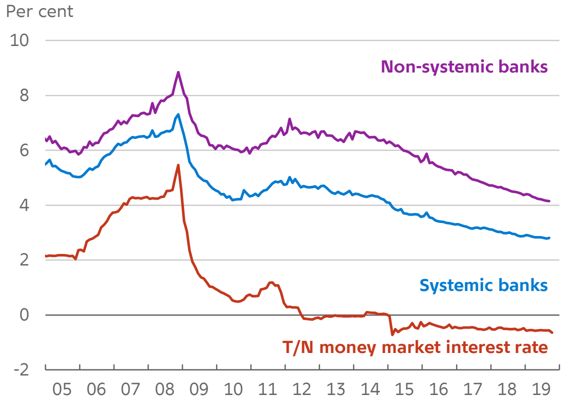
issue bonds as a source of funding, in addition to deposits. Interest costs have fallen, despite recent years' slight increase in interest-bearing liabilities. Practically all of this increase is driven by deposits.

The systemic banks have lower average deposit rates for corporate customers than the non-systemic banks, and the former have adapted deposit rates to money market interest rate developments to a higher degree, cf. Chart 13. In April 2019, 63 per cent of the systemic banks' corporate deposits were subject to negative interest rates, compared with 23 per cent for the non-systemic banks, cf. Chart 14. Some of this variation is due to the systemic and non-systemic banks having different business models. The extent of negative deposit rates for corporate customers varies substantially across the individual banks, but there is a general trend towards increased use of negative interest rates.

Households have so far been exempt from negative deposit rates

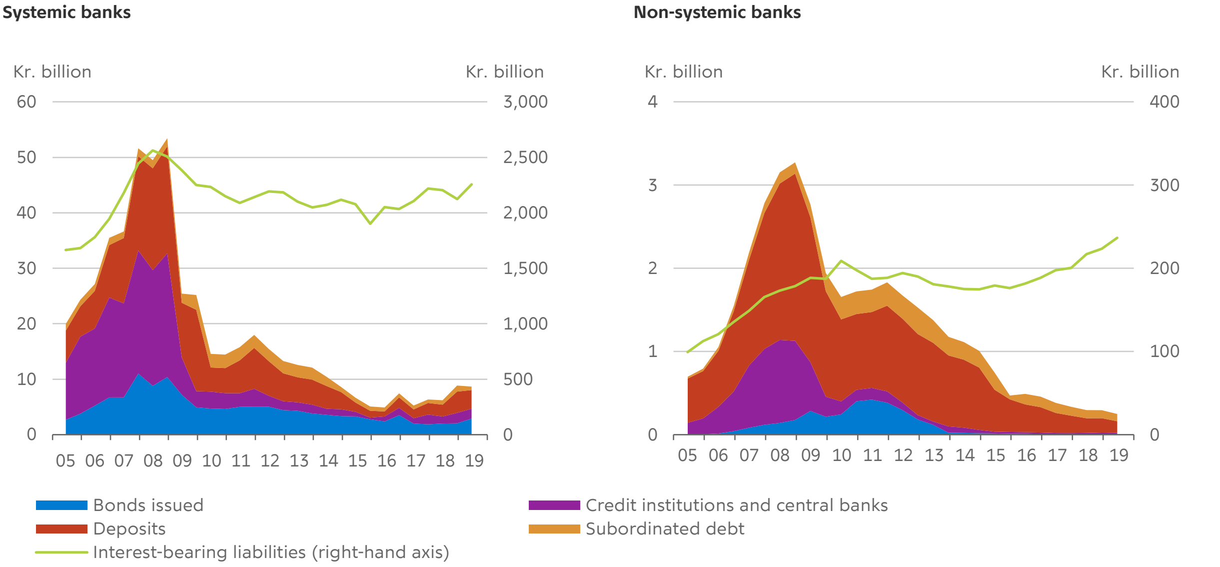
For households, the banks have not reduced deposit rates to the same extent as they have done for corporate customers, cf. Chart 15. As a result, the banks are, on average, paying positive deposit rates to households, while placing excess liquidity in the

Lending rates have decreased faster than deposit rates in recent years Chart 11



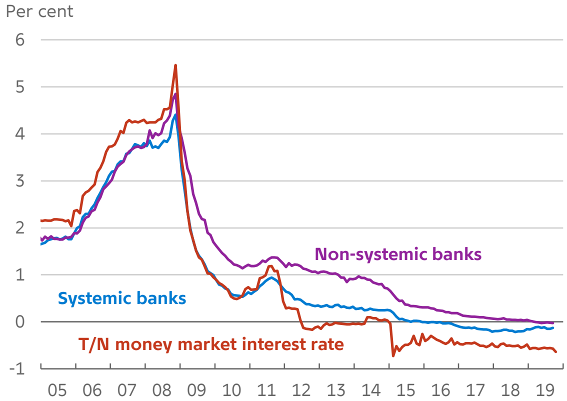
Note: Lending rates comprise loans in all currencies vis-à-vis Danish counterparties (excluding bad loans). A few non-systemic banks are not included for the whole period, as they have not reported to Danmarks Nationalbank's interest rate statistics. The most recent observation is from September 2019 for lending rates and October 2019 for the T/N money market interest rate.
Source: Danmarks Nationalbank and Nasdaq OMX Nordic.

Interest costs have declined despite the slight increase in interest-bearing liabilities Chart 12



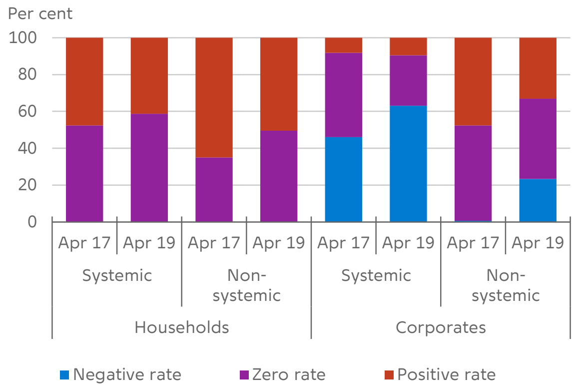
Note: Six-month data for systemic and non-systemic banks. Interest-bearing liabilities are defined as the sum of the following liabilities: debt to credit institutions and central banks, deposits and other debt (including deposits in pooling schemes), bonds issued at fair value and amortised cost and subordinated capital. The most recent observation is from the 1st half of 2019.
Source: Danmarks Nationalbank and own calculations.

Negative deposit rates for corporate customers Chart 13



Note: Deposit rates comprise deposits in all currencies from Danish corporate customers. A few non-systemic banks are not included for the whole period, as they have not reported to Danmarks Nationalbank's interest rate statistics. The most recent observation is from September 2019 for deposit rates and October 2019 for the T/N money market interest rate.
Source: Danmarks Nationalbank, Nasdaq OMX Nordic and DFBF.

The systemic banks have adapted deposit rates to a higher degree Chart 14



Note: Shares of deposits (excluding deposits in pooling schemes), as percentages of the average balance sheet, invested at positive, zero and negative interest rates, respectively, for Danish customers. The non-systemic banks exclude Alm. Brand Bank.
Source: Danmarks Nationalbank and own calculations.

market at negative interest rates. In step with the rising customer funding surplus, this puts increasing downward pressure on the banks' net interest income. All else equal, this combination will hit the non-systemic banks the hardest, as their lending activities are financed by deposits to a higher degree.

The non-systemic banks have adapted household deposit rates more slowly, but the deposit rate gap between systemic and non-systemic banks has narrowed in recent years. This development should be viewed in the light of the non-systemic banks' more extensive use of zero interest rates for households, as the share of household deposits at zero interest rate has risen from 35 per cent in 2017 to almost 50 per cent in 2019, cf. Chart 14. The non-systemic banks' slower adaptation of household deposit rates may be related to their relatively more pronounced dependence on deposit financing, so they are more careful about retaining customers.

It should be noted that although the deposit rate has dropped to zero or close to zero for households, long-term interest rates have declined even more – albeit from a higher level. Accordingly, the spread between these two interest rates has narrowed. This implies a smaller loss of interest on bank deposits rather than holding bonds or servicing debt. All else equal, this makes bank deposits cheaper and more attractive today compared with previously.[4]

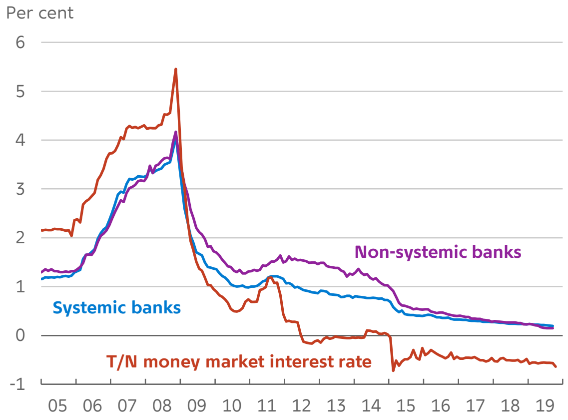
The systemic and non-systemic banks' average deposit rates are to some extent buoyed up by the interest rates on so-called lending-related deposits, cf. Chart 16. When a bank grants a mortgage-like bank loan, the customer is often also offered a deposit account which accrues interest at the lending rate. Since this lending rate is normally substantially higher than the average deposit rate, this type of deposit will push up the calculated average deposit rate. Even when adjusted for lending-related deposits, deposit rates vary between systemic and non-systemic banks.

Negative deposit rates for households will have a limited impact on earnings

Several banks have announced that they will introduce negative deposit rates for households in the

Household deposit rates are close to zero

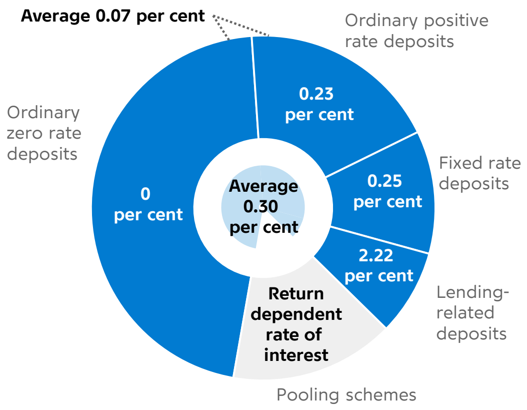
Chart 15



Note: Deposit rates comprise deposits in all currencies from Danish households. A few non-systemic banks are not included for the whole period, as they have not reported to Danmarks Nationalbank's interest rate statistics. The most recent observation is from September 2019 for deposit rates and October 2019 for the T/N money market interest rate.
Source: Danmarks Nationalbank, Nasdaq OMX Nordic and DFBF.

Low deposit rates for Danish household customers

Chart 16



Note: Average deposit rates in Danish kroner for "Employees, pensioners, etc." in Denmark. Data is for April 2019.
Source: Danmarks Nationalbank.

4 See Danmarks Nationalbank, Low interest rates boost bank deposits, *Danmarks Nationalbank Analysis*, No. 9, July 2018 (*link*).

coming months. Danmarks Nationalbank finds that the introduction of negative deposit rates of -0.75 per cent for Danish households will have a limited impact on the sector's earnings overall at the banks' current thresholds for which deposits are affected by negative deposit rates.

Should the banks taken as one introduce negative deposit rates for households on all deposits irrespective of size, deposits of approximately kr. 790 billion would be affected by negative interest rates, cf. Chart 17. The remaining deposits of around kr. 240 billion include e.g. deposits invested by the bank in pooling schemes on the customer's behalf, where the interest rate depends on the return on the pooling scheme.

Most people have modest bank deposits. For approximately 70 per cent of the just under 5 million people with deposit accounts, deposits amount to less than kr. 100,000. By comparison, around 178,000 persons have bank deposits exceeding kr. 750,000, totalling around kr. 280 billion, cf. Chart 18.[5]

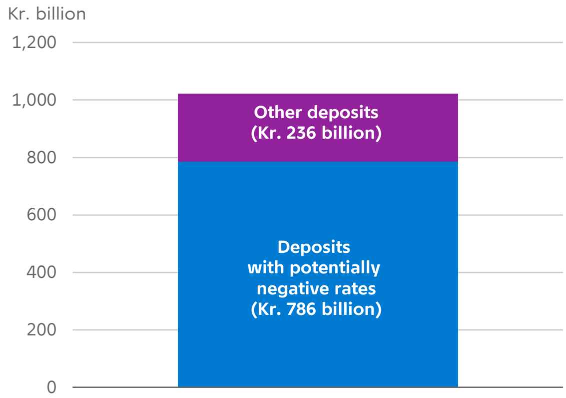
An interest rate of -0.75 per cent on household deposits exceeding kr. 750,000 would cause the sector's earnings to rise by approximately kr. 1.1 billion, disregarding depositors' opportunities of responding to the negative interest rates. This corresponds to 3.7 per cent of the banks' total earnings of just over kr. 30 billion in 2018.

The total effect on earnings of introducing negative deposit rates for households depends on the threshold at which the negative deposit rates kick in. The more deposits that are affected by negative deposit rates, the higher the impact will be on the sector's earnings as a whole. A negative deposit rate on deposits exceeding e.g. kr. 200,000 would result in a positive annual effect on earnings of approximately kr. 2.8 billion, cf. Chart 19. This corresponds to 9.2 per cent of the banks' total earnings in 2018.

Households are likely to respond if affected by negative interest rates

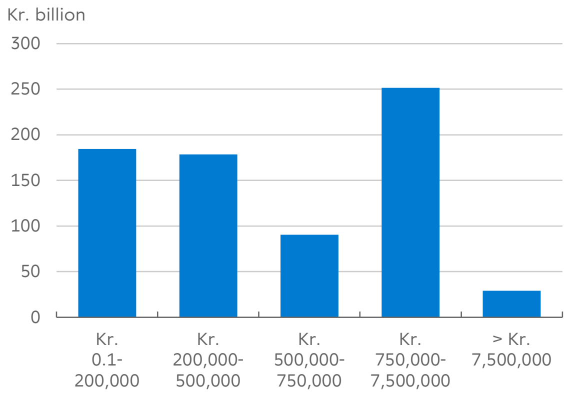
The presented forecasts of the effect of negative deposit rates on the sector's earnings should be

Not all household deposits can be subject to negative interest rates Chart 17



Note: Deposits with potentially negative rates consist of demand deposits excluding lending-related deposits (kr. 692 billion), cash deposits in pension savings accounts (kr. 55 billion), deposits redeemable at notice (kr. 25 billion) and time deposit excluding special deposit types (kr. 14 billion). Cash deposits stated at end-2018. Lending-related deposits stated at April 2019. Deposits stated at September 2019.
Source: Danmarks Nationalbank, Danish Financial Supervisory Authority and own calculations.

Household deposits by size Chart 18



Note: The chart shows total deposits broken down by deposit size. Only total deposits per person can be calculated. Deposits can be distributed on several banks. This calculation covers 4.8 million persons. Register data from end-2018.
Source: Statistics Denmark and own calculations.

5 Given that negative interest rates do not apply to the first kr. 750,000 of the deposit, deposits totalling around kr. 147 billion will accrue negative interest rates if all banks set the limit at kr. 750,000.

regarded as high-side forecasts. One reason is that the effect is overestimated for customers who have spread their deposits across several banks. The effect calculations do not take derived behavioural effects in individual households into account either.

An example of a possible behavioural effect is that households with both debt and bank deposits could reduce deposits by means of debt servicing. Moreover, negative deposit rates on demand deposits or cash pension savings can be avoided by investing the funds in e.g. pooling schemes or securities. Finally, households can withdraw their deposits and hold cash. Negative deposit rates may generate higher fee income for the banks if the negative deposit rates induce customers to move a part of their deposits to investment products. The behavioural effects of introducing negative deposit rates for households are described in more detail in Box 1.

Rising costs reduce core earnings

The banks' costs have risen in recent years, primarily due to higher staff costs and administrative expenses, cf. Chart 20. Despite the increased focus on costs, no substantial savings have been obtained yet, which can be attributed to, inter alia, rising costs for implementation of regulatory and compliance measures.

Given the rising costs and declining core earnings, it is important that the institutions continue to focus on enhancing efficiency and reducing costs to offset falling core earnings. This applies even though investments in automation and digitalisation will only contribute to efficiency gains in the longer term.

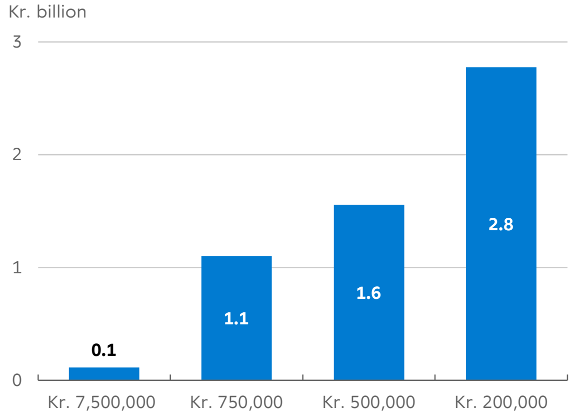
A few institutions have low excess capital adequacy

Reduced excess capital adequacy

The systemic credit institutions' capitalisation has been stable in recent years, cf. Chart 21. At the same time, the capital requirements that may vary over time, i.e. the Pillar II requirement and the countercyclical capital buffer, have increased. This implies a reduction of excess capital adequacy, i.e. less distance between the institutions' actual capital ratios and total capital requirements.

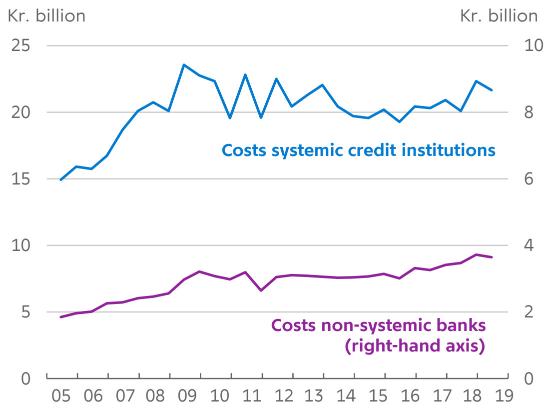
There is substantial variation in excess capital adequacy across the systemic credit institutions, and

The effect on earnings of introducing negative deposit rates for households depends on the threshold Chart 19



Note: The estimated effects on earnings at different limits of amounts are based on register data. The calculation does not take into account that deposits may be distributed on several banks. The most recent observation is from end-2018.
Source: Statistics Denmark and own calculations.

High costs reduce core earnings Chart 20



Note: Six-month data for systemic credit institutions and non-systemic banks. Costs are defined as the sum of staff costs and administrative expenses, depreciation and amortisation of intangible and tangible assets and other operating costs. The systemic credit institutions' costs have been adjusted for goodwill impairment charges. The most recent observation is from the 1st half of 2019.
Source: Danmarks Nationalbank and own calculations.

How do households respond to negative deposit rates?

Box 1

Household deposit rates have fallen over a prolonged period and are now zero or just above zero, cf. Charts 15 and 16. The falling deposit rates do not appear to have reduced household deposits. Conversely, deposits have risen faster than justified by the transaction requirement, e.g. measured by domestic demand. The increase in deposits can be attributed to the lower spread between bond yields and deposit rates, which has made bank deposits more attractive.

Negative deposit rates may be the turning point for when households begin to reduce their deposits. Having to pay for holding money in the bank, i.e. a negative return, could have a psychological effect. The households' response depends very much on their return and liquidity preferences. Negative interest rates could change this, and the behaviour may show non-linearity when interest rates fall below zero.

Households can reduce their deposits or avoid negative interest rates in several ways: (1) They can reduce debt. (2) They can opt for fixed deposits which still carry positive interest rates, cf. Chart 16, but that would be at the expense of liquidity. (3) They can invest in e.g. pooling schemes or securities, which are also less liquid assets. (4) They can avoid negative interest rates by spreading deposits across several banks, if the institutions set a threshold for when deposits are affected by negative interest rates. (5) They can withdraw their deposits and hold more cash. However, holding large amounts of cash is rather risky, not to mention the costs of safe storage. The first effect, debt reduction, is elaborated below.

Household deposits can potentially be reduced by reducing debt

Household deposits have risen slightly faster than household debt in recent years. Household deposits and debt are driven by the same underlying factors – domestic demand, property prices and interest rates, among others – and tend to mirror each other over time.

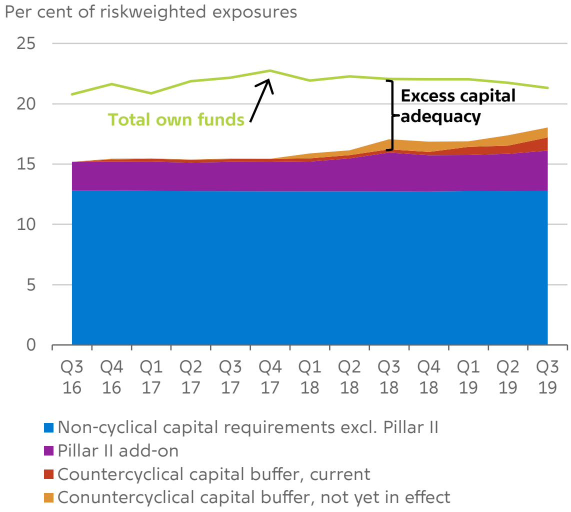
Household-level register data shows that many households have both considerable deposits and substantial debt.[1] This is not a new phenomenon. A rational approach for liquidity-preferring households could be to have both debt and bank deposits. Households can be hesitant to reduce debt if they are uncertain about the possibility of obtaining credit later when they need it.

Calculations based on register data show that debt reduction can reduce total household deposits by approximately kr. 160 billion. This result is calculated assuming that households with mortgage debt reduce their deposits to 2 months' income after tax.[2] People with higher incomes will thus have higher bank deposits than those with lower incomes. For an average household, 2 months' income after tax corresponds to around kr. 58,000. Under the above assumptions, 20 per cent of the households will reduce debt. The results are not particularly sensitive to assumptions of 1, 2 or 3 months' income. If the deposit is instead reduced to 1 month's income, total deposits can potentially be reduced by around kr. 190 billion, while the figure for 3 months' income is around kr. 140 billion.

At the end of 2018, household deposits totalled kr. 990 billion, while total mortgage debt and bank debt totalled around kr. 2,400 billion. A reduction of total deposits (and debt) by around kr. 160 billion thus corresponds to approximately 16 per cent lower deposits and around 7 per cent lower debt.[3] The share of deposits that can be reduced by servicing debt has been relatively constant over the last 20 years. The constant share indicates that households prefer liquid funds. If a positive return is preferred over liquidity, household behaviour may potentially shift when deposit rates become negative.

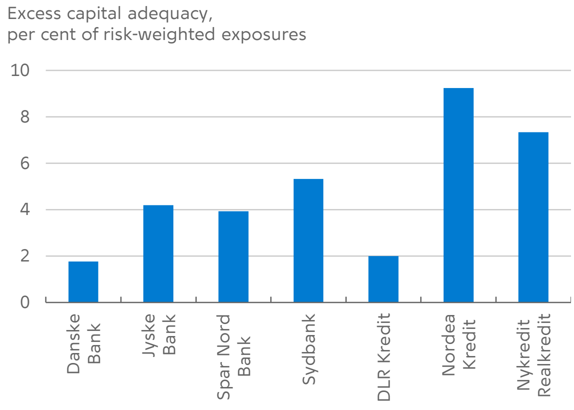
1. In the register data-based calculation, bank deposits are primarily demand deposits. Tax-privileged deposit types (e.g. children's savings and pension savings) are not included.
2. The calculation does not assume that households reduce their bank debt.
3. A previous Danmarks Nationalbank analysis indicates that money demand will be reduced by around 5 percentage points if deposit rates fall by 1 percentage point, cf. Erik Haller Pedersen and Jonas Ladegaard Hensch, Low interest rates boost bank deposits, *Danmarks Nationalbank Analysis*, No. 9, July 2018 (*link*). A decline in the deposit rate relative to the bond yield will increase the loss of interest on holding bank deposits rather than bonds or servicing debt, which will reduce deposits according to this analysis.

The distance between own funds and capital requirement has been reduced in systemic institutions Chart 21



Note: "Non-cyclical capital requirements excluding Pillar II" comprise fully phased-in requirements for minimum capital, capital conservation buffer and SIFI buffer. "Countercyclical capital buffer, not yet in effect" reflects buffer increases adopted by the Minister for Industry, Business and Financial Affairs, which will take effect in future periods.
Source: Danish Financial Supervisory Authority and own calculations.

Considerable variation in excess capital adequacy across institutions Chart 22



Note: As at 30 September 2019. Excess capital adequacy calculated at the capital level (Common Equity Tier 1 capital, Tier 1 capital or total own funds) with the shortest distance to the risk-based capital requirements for the institution. The risk-based capital requirements consist of the minimum capital requirement, the Pillar II add-on, the SIFI buffer, the capital conservation buffer and the countercyclical capital buffer. It is assumed that the exposure-weighted countercyclical capital buffer is 1.2 per cent for Danske Bank and 1.0 per cent for the other institutions.
Source: Danish Financial Supervisory Authority and own calculations.

in a few institutions, the distance to the combined capital buffer requirement is less than 2 per cent of risk-weighted exposures, cf. Chart 22. The excess capital adequacy of a few systemic institutions is thus low, not least in the light of expectations of higher capital requirements in the coming years, cf. below.

Institutions should ensure an appropriate distance between capital targets and capital requirements
All systemic institutions comply with their current capital targets. This also applies to institutions with currently low excess capital adequacy. That is why Danmarks Nationalbank finds that these institutions should reconsider their capital targets to ensure an appropriate distance between capitalisation and capital requirements.

The need to reconsider capital targets is driven by several factors. Firstly, weaker earnings will – as mentioned previously – reduce the institutions' first line of defence against losses. Secondly, the level of Pillar II add-ons has increased in more institutions. Thirdly, it has been decided to raise the countercyclical capital buffer rate for credit exposures in Denmark from the current level of 1.0 per cent to 1.5 per cent as at 30 June 2020 and 2.0 per cent as at 30 December 2020. Moreover, the Systemic Risk Council has announced that it expects to recommend a further increase of the buffer in the 1st quarter of 2020, unless the build-up of risk in the financial system slows down considerably.

A higher countercyclical capital buffer rate will not make the institutions less resilient. However, given unchanged capitalisation, they will, all else equal, be at a higher risk of becoming subject to restrictions on payment of dividends and interest on Additional Tier 1 capital.

The institutions can improve their capitalisation by issuing more equities or retaining a larger share of profits. Disbursements to shareholders in the form of dividends and buy-backs were historically high in 2015-18. In 2019, the level of disbursements will apparently be considerably lower, cf. Chart 23. Lower disbursements contribute to increasing capitalisation, making it easier to meet higher capital targets.

Solvency stress test emphasises the need to reconsider capital targets

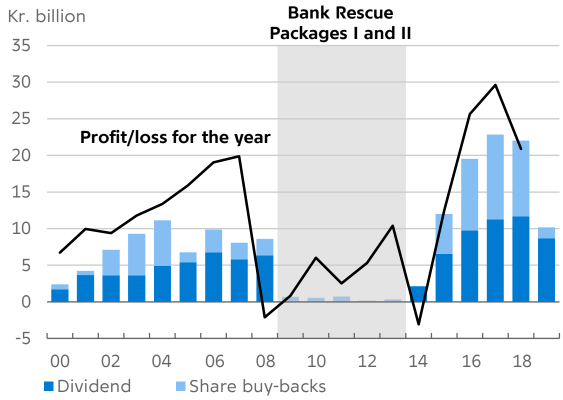
The need to reconsider capital targets is underscored by the findings in Danmarks Nationalbank's most recent stress test of the banks' capitalisation.[6] It shows that a few of the systemic banks will fall short of their capital buffer requirements in a severe stress scenario – even if the countercyclical capital buffer is assumed to be released. The buffer can be released with immediate effect if the financial system becomes stressed. But in some scenarios, one or more institutions could encounter difficulties without release of the buffer.

The non-systemic banks' accumulation of capital also seems to have declined. Several of the small non-systemic banks also breach their capital buffer requirements in Danmarks Nationalbank's stress test. However, these banks' breaches of their buffer requirements are not found to pose a threat to financial stability.

Denmark is one of the EU member states where the new Basel rules are expected to have the strongest impact

The forthcoming implementation of the December 2017 Basel reform, cf. Box 2, is also a reason for the systemic institutions to reconsider their capital planning. In August 2019, the European Banking Authority, EBA, published an analysis of the impacts of the reform, which shows that Danish institutions – together with institutions in other Northern European countries – are among those that can expect the largest increases in capital requirements.[7] A large share of the increases is attributable to the introduction of the output floor. The output floor means that the institutions' risk-weighted exposures cannot constitute less than 72.5 per cent of the risk-weighting calculated using the standardised

Decline in disbursements to shareholders Chart 23



Note.: Systemic banks. The banks' scope for distributing dividends was limited under Bank Rescue Packages 1 and 2. Buy-backs and dividends in 2019 cover the period January-September.
Source: Danmarks Nationalbank.

The December 2017 Basel reform Box 2

In December 2017, the Basel Committee on Banking Supervision, BCBS, completed a major reform package, issuing revised standards for credit risk, operational risk and counterparty risk (CVA risk) and introducing a new floor, i.e. the output floor, under the institutions' risk weights. The reform package is supplemented by a new set of rules on market risk (Fundamental Review of the Trading Book), issued in a new version in January 2019.

The BCBS has set 1 January 2022 as the deadline for timely implementation of the new standards, but with the possibility of gradual phasing in of the output floor by 1 January 2027.

In October 2019, the European Commission launched a public consultation on European implementation of the reform package with 3 January 2020 as the deadline for replies. The Commission is expected subsequently to publish an overall proposal for implementation in the EU.

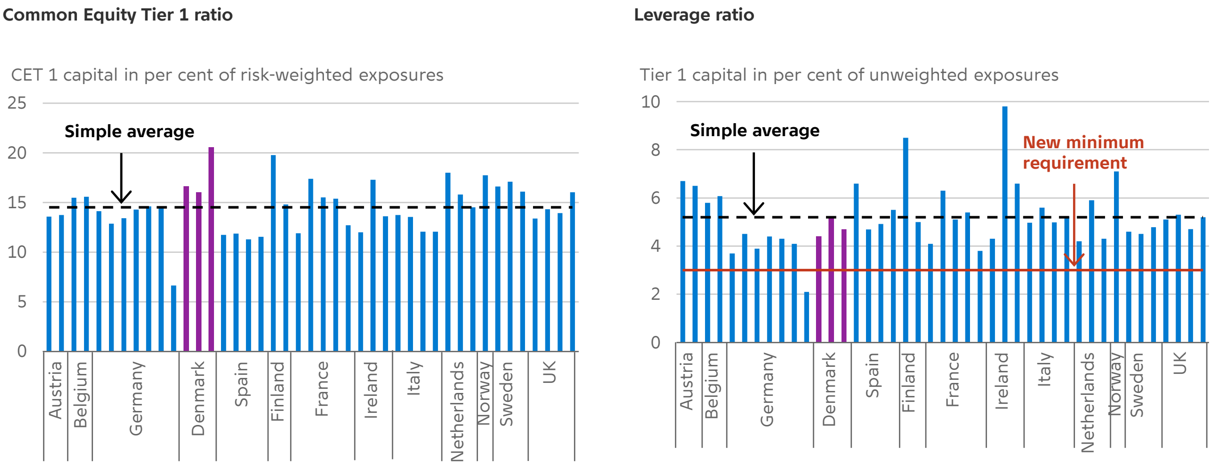
As regards the new rules on market risk, it was decided, when the revised Capital Requirements Regulation, CRR 2, was adopted in May 2019, that these rules should initially be applied as a reporting requirement in the EU.

6 For more information about the stress test, see Danmarks Nationalbank, Banks are less resilient to stress, *Danmarks Nationalbank Analysis (Stress test)*, No. 24, November 2019.

7 Cf. European Banking Authority, EBA, *Basel III Reforms: Impact Study and Key Recommendations*, August 2019 (*link*).

The largest Danish credit institutions are among those with the highest capitalisation measured in relation to risk-weighted exposures

Chart 24



Note: As at 30 June 2019. The comparison is based on data from the institutions that participated in the EBA's most recent stress test from 2018, although a few countries/outliers have been excluded. The minimum requirement of the leverage ratio will become effective in mid-2021.
Source: SNL Financial and interim reports.

approaches, even though IRB approaches based on loss experience warrant lower risk weighting.[8]

The institutions' capital ratios are high according to risk-based measures due to low risk weights

The international credit assessment agencies find that the systemic credit institutions are well capitalised. By European comparison, the largest Danish institutions are among those with the highest capitalisation when the comparison is based on risk-based measures, cf. Chart 24 (left). A non-risk-based approach using the leverage ratio shows that these institutions' capitalisation is either lower than or close to a European average, cf. Chart 24 (right).[9]

The reason for the very different results in relation to the average – depending on whether risk-based capital targets are used – is that the largest Danish institutions have a large share of relatively safe loans secured on real estate. The use of IRB models for calculation of risk weights results in similarly low risk-weighted exposures for the institutions. This also explains why Denmark is one of the countries where the output floor is expected to bring the strongest increases in capital requirements.

MREL compliance reached as at 1 July 2019

The institutions' capital requirements are supplemented by a minimum requirement for own funds and eligible liabilities, MREL. The MREL is to ensure that an institution can be resolved under the chosen resolution strategy if it becomes failing or likely to fail. The general resolution principle for systemic institutions is that it should be restructured and sent

8 According to the EBA analysis, the Tier 1 capital requirements of Danish banks are expected to increase by around 40 per cent. A Danish expert group established by the Minister for Industry, Business and Financial Affairs previously estimated the effect for the systemic credit institutions at an increase in capital requirements of 34 per cent on average. The difference between the two estimates can be attributed to such factors as different assumptions and populations.

9 The leverage ratio is calculated as Tier 1 capital as a percentage of unweighted exposures.

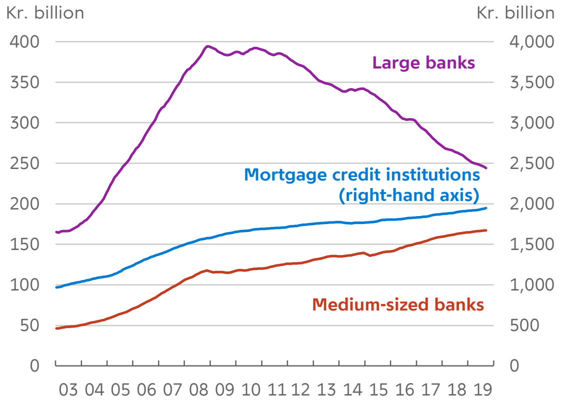
back to the market with sufficient capitalisation to ensure market confidence.

All systemic institutions reached MREL compliance as at 1 July 2019, when the requirement was to be met for the first time.[10] Excess MREL relative to the new requirement is limited, however, and results from Danmarks Nationalbank's stress test show that the systemic institutions will need to issue substantial amounts of MREL-eligible instruments in a stress scenario. Danmarks Nationalbank expects the institutions to continue building up MREL-eligible instruments in the coming years.

The MREL can be met, inter alia, by issuing non-preferred senior debt. Typical issuances by Danish institutions have maturities of 3-5 years. Maturities for these issuances are generally longer in the rest of the EU, typically 5-10 years. Given that periods of no or limited capital market access may arise, the institutions should focus on the length and maturity profiles of their issuances to avoid strong concentration of maturing issuances and breach of the MREL.

Mortgage lending to households is increasing, while bank lending is continuing its decline

Chart 25



Note: Lending to Danish households by large and medium-sized banks and mortgage credit institutions, 3-month moving averages, nominal values. The most recent observation is from end-September 2019.
Source: Danmarks Nationalbank.

Homeowners opt for fixed rate mortgage loans

Falling bank lending to households and increased mortgage lending
Lending to households by large and medium-sized banks and mortgage credit institutions has risen by 1.2 per cent on average over the past year, cf. Chart 25. Lending growth is driven almost exclusively by mortgage credit, showing a growth rate of 2.2 per cent. The growth in mortgage lending is driven by loans secured on owner-occupied housing and summer cottages, showing a growth rate of 3.1 per cent. Loans secured on owner-occupied housing and summer cottages make up 84 per cent of mortgage lending to households. Loans secured on agricultural properties and other real estate categories account for 12 and 4 per cent, respectively. Lending is on the decrease for these categories.

Bank lending is declining overall. But the medium-sized banks are still taking market shares from the large banks despite the receding lending growth over the past year, although to a lesser extent than previously. Lending growth for the medium-sized banks is 2.8 per cent, while it is declining by 6.3 per cent for the large banks.

Growth in mortgage lending is almost exclusively driven by fixed rate loans
The increase in mortgage lending for owner-occupied housing and summer cottages is driven by growth in fixed rate loans. Fixed rate mortgage loans have grown by 9.3 per cent on average over the past

10 Spar Nord received SIFI status in January 2019, but is not obliged to observe the new MREL in full until the beginning of 2022. Mortgage credit institutions are exempt from the MREL, but must instead observe a debt buffer requirement of 2 per cent of the institution's total lending. As from January 2022, groups comprising banking and mortgage credit activities are subject to a combined minimum requirement, under which the sum of capital, MREL and debt buffer requirements must be at least 8 per cent of the group's balance sheet.

year, and growth has accelerated over the period, cf. Chart 26. Variable rate loans have decreased by 1.3 per cent on average. Fixed rate loans now account for 46 per cent of mortgage lending, against 33 per cent at the beginning of 2014. This means that households have become more resilient to interest rate changes related to their debt.

The falling interest rates in 2019 have made it more attractive for many homeowners to refinance their mortgage loans. During the current wave of refinancing, a record-high number of homeowners have chosen to remortgage. During the first 9 months of the year, prepayments have amounted to no less than kr. 300 billion for household mortgage loans secured on owner-occupied housing and summer cottages. Besides cases of refinancing, prepayments also include termination of loans in connection with property sales or for other reasons.

Some homeowners choose to raise larger loans when refinancing. In previous waves of refinancing, households used the additional mortgage credit for consumption and home improvements and for reducing other debt.[11]

Strongest lending growth in fixed rate mortgage loans around the large cities

Fixed rate mortgage lending is increasing in all municipalities, cf. Chart 27. Growth is strongest in Copenhagen and Copenhagen environs and around the large cities.

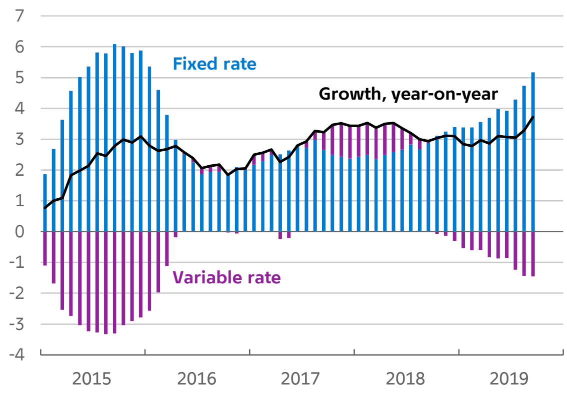
Variable rate mortgage lending is decreasing in most municipalities. However, some municipalities in Copenhagen and Copenhagen environs stand out in that variable rate mortgage debt is also increasing, albeit at a considerably lower growth rate than for fixed rate loans. Variable rate mortgage debt is falling in all other parts of Denmark.

The institutions report reduced risk appetite for households

The institutions report almost unchanged credit standards for households in the 3rd quarter of 2019, while the competitive pressure has intensified a little. According to Danmarks Nationalbank's lending

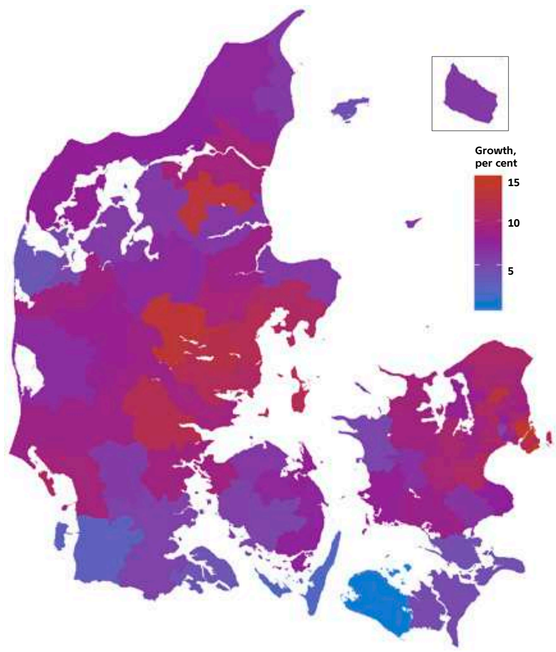
11 Cf. Danmarks Nationalbank, Mortgage refinancing supports private consumption, *Danmarks Nationalbank Analysis*, No. 17, September 2019.

The increase in mortgage lending for owner-occupied housing and summer cottages is driven by fixed rate loans Chart 26



Note: Mortgage lending to households for owner-occupied housing and summer cottages, nominal values. The most recent observation is from September 2019.
Source: Danmarks Nationalbank.

Fixed rate loans are increasing most strongly around the large cities Chart 27



Note: Average annual growth in fixed rate mortgage lending to households, owner-occupied housing and summer cottages, nominal values. The most recent observation is from September 2019.
Source: Danmarks Nationalbank.

survey, the demand for mortgage loans from existing customers has soared, cf. Chart 28. The mortgage credit institutions also report rising demand from new customers. According to some of the institutions, some homeowners raise additional mortgage loans when refinancing, which are partially used to reduce bank debt.

Both banks and mortgage credit institutions have reported reduced risk appetite in recent quarters, cf. Chart 29. Especially the large banks and mortgage credit institutions are reporting reduced risk appetite. Some institutions state that the reduced risk appetite is due to the changes to good practice for lending for housing purposes and the guidelines on prudent credit assessment when granting housing loans in growth areas. Moreover, some institutions report that credit approval will to some extent be granted centrally in future.

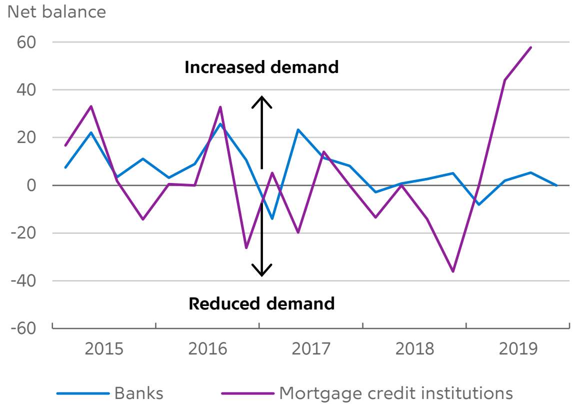
Strong competition for corporate customers

Growth in lending to corporate customers continues at a moderate pace
Lending to corporate customers by large and medium-sized banks and mortgage credit institutions has risen by just under 4 per cent over the past year, cf. Chart 30. Lending growth has declined a little over the last half year, driven by the large banks' decline in average annual growth. On average, lending by the large banks has increased by 2.1 per cent over the past year, while the figure for medium-sized banks is 4.5 per cent. The market shares of the large and medium-sized banks are unchanged. Growth in lending to corporate customers is still driven by mortgage credit. The average lending growth for mortgage credit institutions has been 4.4 per cent over the past year, and lending growth is showing a slight upward tendency.

Intensified competitive pressure and falling interest margins for corporate lending
According to Danmarks Nationalbank's lending survey, credit standards for corporate customers were more or less unchanged in the 3rd quarter of 2019. Both banks and mortgage credit institutions still report that competitor behaviour has contributed to their easing of credit standards, cf. Chart 31. Several banks expect the competitive pressure to increase

Substantial demand for mortgage loans from existing household customers during the wave of refinancing

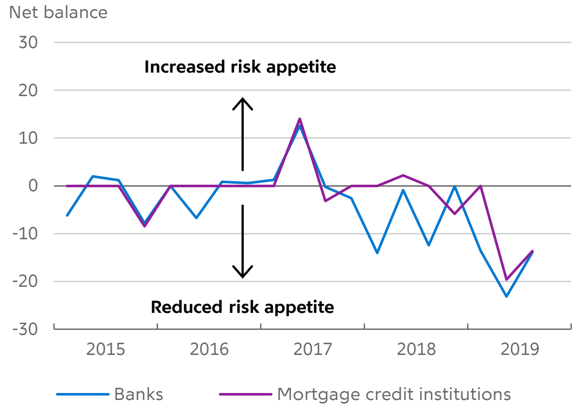
Chart 28



Note: Lending survey for households. The net balance may lie within the interval -100 to 100. A positive (negative) net balance means that credit managers of the institutions in question have, overall, i.e. lending-weighted, stated that demand from existing customers has increased (decreased) relative to the preceding quarter. The most recent observation is from the 3rd quarter of 2019.
Source: Danmarks Nationalbank.

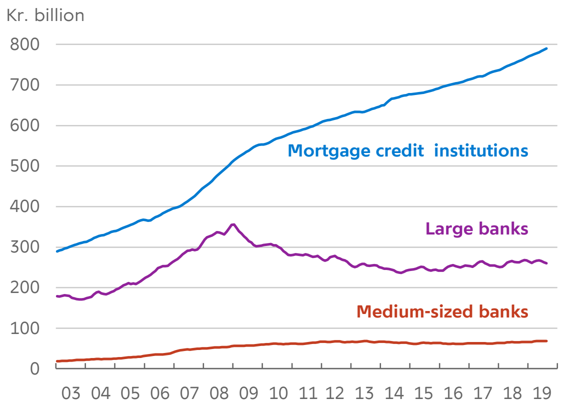
The institutions report reduced risk appetite to households

Chart 29



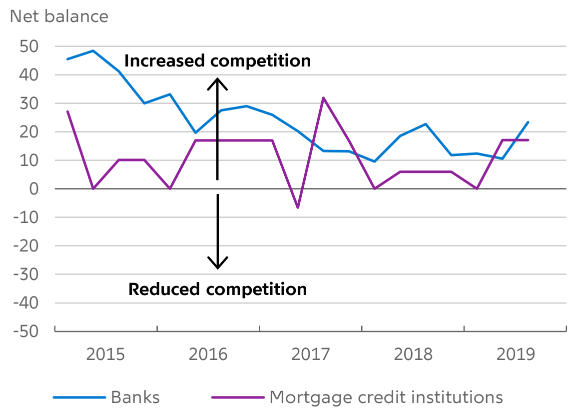
Note: Lending survey for households. The net balance may lie within the interval -100 to 100. A positive (negative) net balance means that credit managers of the institutions in question have, overall, i.e. lending-weighted, stated that they have increased (reduced) their risk appetite relative to the preceding quarter. The most recent observation is from the 3rd quarter of 2019.
Source: Danmarks Nationalbank.

Lending growth to corporate customers is still driven by mortgage credit Chart 30



Note: Lending to Danish non-financial corporations by large and medium-sized banks and mortgage credit institutions. 3-month moving averages. The most recent observation is from September 2019.
Source: Danmarks Nationalbank.

Increasing competitor pressure for corporate customers Chart 31

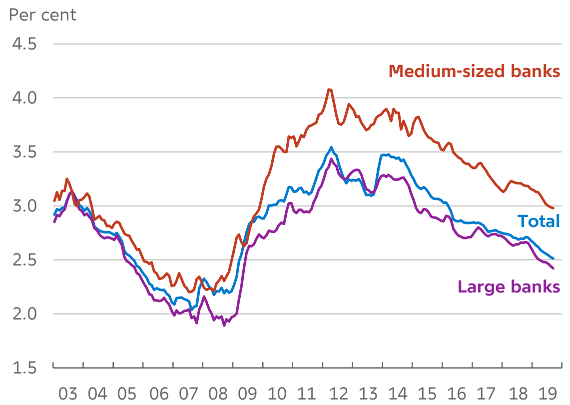


Note: Lending survey for corporate customers. The net balance may lie within the −100 to 100 interval. A positive (negative) net balance means that credit managers of the institutions in question have, overall, i.e. lending-weighted, stated that competitor behaviour has contributed to easing (tightening) of credit standards relative to the preceding quarter. The most recent observation is from the 3rd quarter of 2019.
Source: Danmarks Nationalbank.

further in the 4th quarter, while the mortgage credit institutions expect the competitive pressure to remain unchanged.

The strong competitive pressure is primarily reflected in the banks' interest margins. The large and medium-sized banks' interest margins continue to decline, cf. Chart 32. The interest margin is defined as the difference between the banks' average lending and deposit rates for corporate customers. The credit quality can help to explain why the medium-sized banks have higher interest margins. The share of corporate lending with normal credit quality is 55 per cent for the medium-sized banks and has improved slightly over the last half year. But the credit quality is still considerably lower than that of the large banks, whose share of corporate lending with normal credit quality is 86 per cent. It is important for the institutions to maintain a sound credit quality and to ensure that the interest margin reflects the risk on the loan. Since losses do not materialise until the economy reverses, the institutions should assess firms' resilience throughout the business cycle.

Competition for corporate customers puts pressure on margins Chart 32



Note: Interest margins on outstanding business, excluding repo transactions, 3-month averages. The interest margin is calculated as lending rates less deposit rates. The spread between large and medium-sized interest margins reflects differences in the loans' credit risks, but also other factors such as product structures. The most recent observation is from September 2019.
Source: Danmarks Nationalbank.

Demand for mortgage loans from corporate customers is increasing, while it is stagnating for bank loans

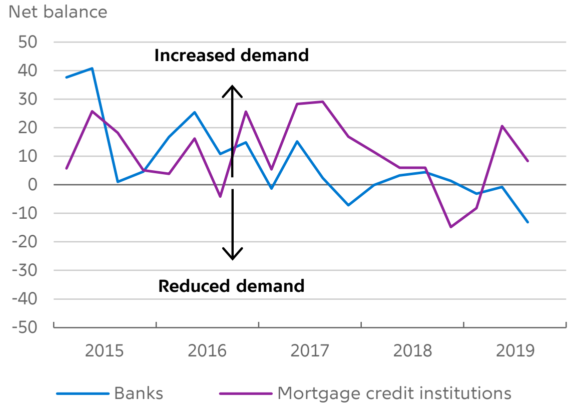
Corporate customers' demand for mortgage loans is increasing. Over the last two quarters, mortgage credit institutions have reported rising demand from new customers, cf. Chart 33. The demand from existing customers is also reported to have grown. Demand has increased from large, small and medium-sized corporate customers. According to some of the mortgage credit institutions, refinancing activity is high. This could help to explain the last two quarters' intensified competitive pressure among mortgage credit institutions.

Both large and medium-sized banks are reporting lower demand from new customers. The lower demand contrasts with the situation in recent years when medium-sized banks reported increasing demand for loans from new customers. The stagnating demand could contribute to even tougher competition.

A good funding climate for Danish firms
There is still a good funding climate for firms. Few firms are reporting restrictions on the access to funding, cf. Chart 34. According to analyses from the Confederation of Danish Industry[12], 65 per cent of firms find that funding access is good or very good, which is a historically high level. Firms' funding access depends on their key ratios, meaning that firms with higher returns on assets and solvency ratios find that their funding access is better.

Increasing demand for mortgage loans and falling demand for bank loans from new corporate customers

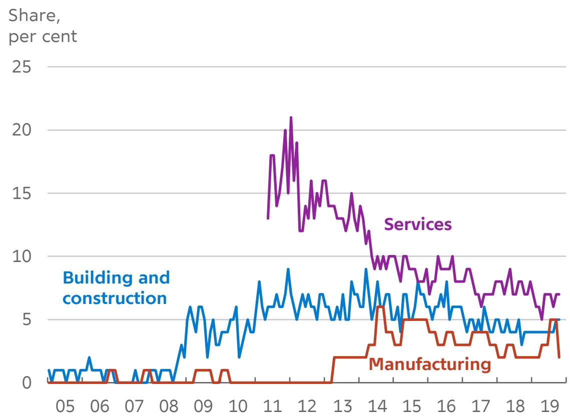
Chart 33



Note: Lending survey for corporate customers. The net balance may lie within the interval -100 to 100. A positive (negative) net balance means that credit managers of the institutions in question have, overall, i.e. lending-weighted, stated that demand from new customers has increased (decreased) relative to the preceding quarter. The most recent observation is from the 3rd quarter of 2019.
Source: Danmarks Nationalbank.

Few firms report restricted funding access

Chart 34



Note: Share of firms stating financial restrictions as the reason for production constraints. The most recent observation is from September 2019.
Source: Statistics Denmark.

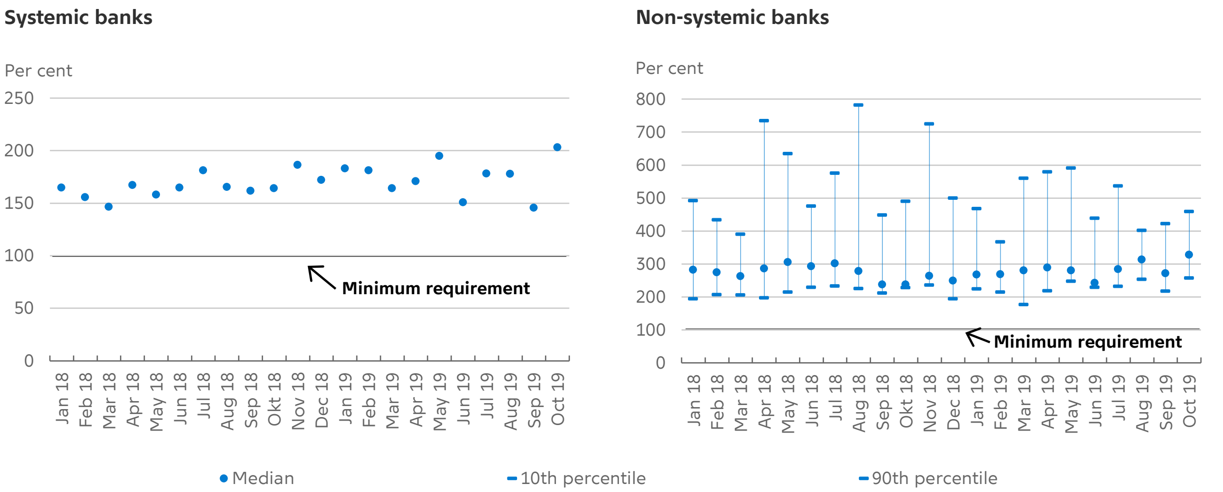
Liquidity is robust, but sensitive to deposit withdrawal

Short-term LCR observed with a certain margin
Danish banks observe the short-term Liquidity Coverage Ratio, LCR, requirement, which is to ensure that the banks have sufficient liquid funds to withstand a 30-day severe liquidity stress scenario, cf. Chart 35. In the current climate of favourable market liquidity, it is natural for the banks to have a certain amount of excess liquidity to be able to withstand liquidity shocks in periods of less accessible liquidity.

12 Confederation of Danish Industry, *Historisk lave renter på lån til virksomhederne* (Historically low interest rates on corporate loans – in Danish only), September 2019, and Confederation of Danish Industry, *Historisk nemt at låne penge* (Borrowing is historically easy – in Danish only), April 2019.

The banks comply with the short-term Liquidity Coverage Ratio, LCR, with a certain margin

Chart 35



Note: The LCR (Liquidity Coverage Ratio), which must be higher than 100 per cent, is calculated as the bank's liquid assets divided by net cash outflows over a 30-day stress period. The most recent observation is from end-October 2019.
Source: Danmarks Nationalbank.

Besides the general LCR requirement, banks must also ensure a sufficient match between net outflow and liquid assets in relevant currencies. In addition, the systemic Danish banks must observe a liquidity requirement in currencies making up more than 5 per cent of their liabilities. However, the requirement does not apply to Swedish kronor and Norwegian kroner. In the 3rd quarter of 2019, all institutions complied with the liquidity requirement in currencies.

The banks' total liquidity stock mainly consists of mortgage bonds

The banks' liquidity should be diversified in order to reduce concentration risks. Concentration may occur for asset classes as well as counterparties. The LCR partially takes concentration into account concerning asset classes, but not counterparties.[13] If liquidity is highly concentrated on one asset class or a few counterparties, the institution's liquidity risk increases, all else equal[14], as the value of the liquid assets may fall more than expected, e.g. if one of the counterparties encounter difficulties.

Overall, the systemic banks' liquidity distribution is relatively concentrated in terms of both asset classes and counterparty exposure, cf. Chart 36.

Covered bonds, mainly mortgage bonds, clearly account for the largest share of liquidity. This reflects that mortgage bonds account for the largest share of the market for highly liquid assets in Danish kroner. Alternatively, the banks could assume either a higher credit risk or currency risk, which does not seem appropriate.

The liquidity concentration reflects a limited number of issuers

All mortgage bonds in the liquidity stock have high credit ratings. Despite the low credit risk on the

13 In the LCR, liquid assets are denoted high quality liquid assets, HQLA. They are a subset of the banks' total liquidity stock. When calculating HQLA, at least 30 per cent must be government-guaranteed assets or central bank deposits. In addition, there are requirements as to the maximum shares of various asset classes. The most important factor for Danish institutions is that mortgage bonds must not exceed 70 per cent.

14 The risk is affected by the type of counterparty/counterparties. For example, an exposure solely to Danmarks Nationalbank will not be regarded as entailing elevated liquidity risk.

individual issuers, the institution will still assume an elevated liquidity risk if the liquidity stock is not diversified on several issuers.

Basically, a bank's exposure to a counterparty should not be so concentrated that it may encounter liquidity difficulties if the counterparty runs into difficulties.

The concentration on individual issuers is assessed to be relatively limited in relation to a benchmark for diversification. The benchmark is based on the individual mortgage bond issuers' market shares. Deviations from such a benchmark show that the systemic banks hold more than their market shares would justify for three out of the six issuers of mortgage bonds, cf. Chart 37. Conversely, the exposure to two of the issuers is lower than justified by their market shares.

It should be noted that a 1:1 reflection of the benchmark would not be appropriate. The reason is that such reflection would imply that institutions would also have a large share of own issuances in their liquidity stock, since the systemic banks and mortgage bond issuers overlap. Holding own issuances in the liquidity stock entails a special risk, since own bonds can be expected to be difficult to sell in the event of uncertainty about the institution's solvency.

A sensitivity analysis of the banks' liquidity shows resilience to market stress ...

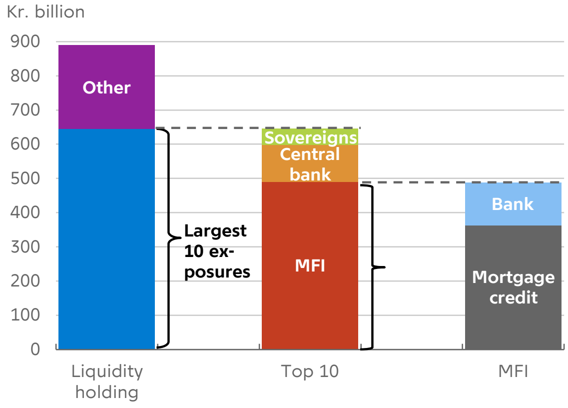
Danmarks Nationalbank has developed a tool for assessment of the banks' liquidity position. The sensitivity analysis provides information on the factors affecting the banks' liquidity position and how fast a bank may run into liquidity difficulties. The sensitivity analysis thus supplements the statutory liquidity requirement, LCR, and the future NSFR (Net Stable Funding Ratio).

The sensitivity analysis is based on three scenarios: a market-specific scenario, an institution-specific scenario and a combination scenario, cf. Chart 38. The scenarios and assumptions of the liquidity sensitivity analysis are explained in more detail in Box 3.

The sensitivity analysis shows that the liquidity of the systemic banks is generally robust to a market downturn entailing that the banks cannot expect to be able to renew existing loans and issuances when they mature. There is, however, considerable variation between the banks. A situation where the banks are not able to renew existing loans is rem-

The banks' liquidity consists mainly of assets issued by financial counterparties

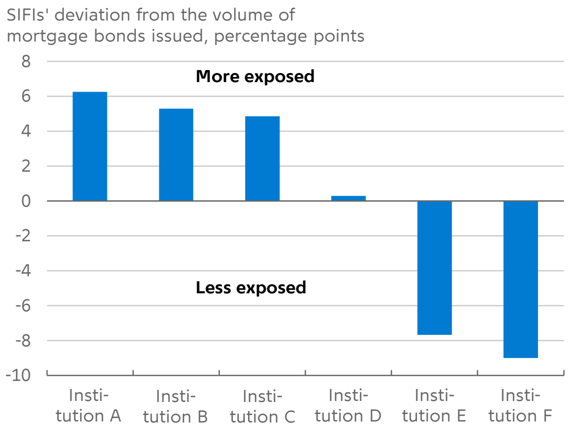
Chart 36



Note: The liquidity stock consists of unencumbered assets that a bank can use for liquidity purposes, i.e. a broader definition that the LCR definition of liquid assets. The stock is compiled without haircuts. MFI stands for monetary financial institutions. The chart shows the systemic banks' liquidity stock at end-August 2019.
Source: Danmarks Nationalbank.

The concentration of mortgage bonds on individual counterparties varies

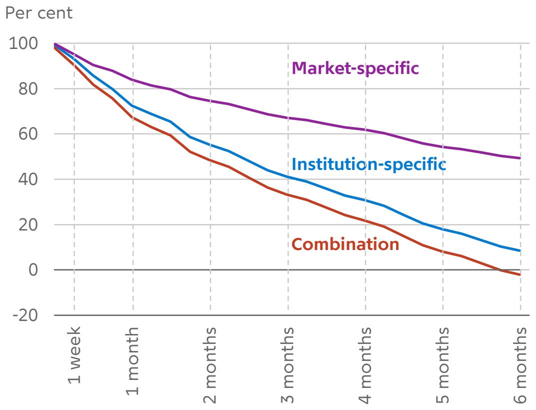
Chart 37



Note: The chart shows the deviation of SIFIs' average stock of mortgage bonds from the distribution of outstanding bonds.
Source: Danmarks Nationalbank.

The institutions are more exposed to an institution-specific shock than a marked-specific one

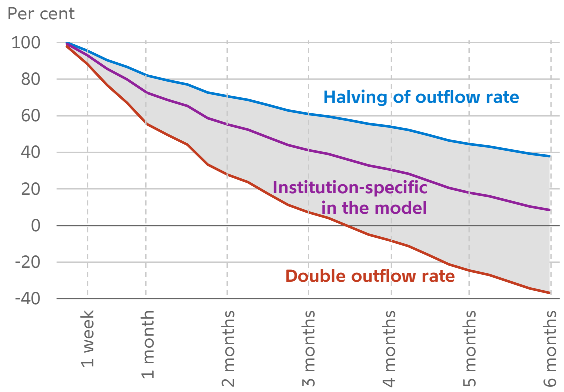
Chart 38



Note: The chart shows the systemic banks' net liquidity over time in various outflow scenarios. Net liquidity is defined as the liquidity stock adjusted for net outflow over time. Data from end-August 2019.
Source: Danmarks Nationalbank.

The outflow rate for deposits is decisive for how long the liquidity position remains positive

Chart 39



Note: The chart shows the sensitivity to a change to the assumption of how fast demand deposits are withdrawn.
Source: Danmarks Nationalbank.

iniscent of what hit the financial markets after the collapse of Lehman Brothers in September 2008.

… but the liquidity is sensitive to deposit withdrawals

The sensitivity analysis also shows that the systemic banks' liquidity position is more sensitive to an institution-specific shock, for instance with doubt about whether an individual bank will survive and with depositors consequently withdrawing deposits. The most important parameter for explaining the difference is by how much and how fast household and corporate customers withdraw their deposits from the bank. The aim of the combination scenario is to illustrate a situation of both risks materialising at the same time. Although this is a very severe scenario, the sensitivity analysis shows that the banks still have time to react before they run into liquidity difficulties.

Even small changes to the assumption of how fast customers withdraw their deposits may have a considerable impact on when a bank's liquidity runs dry, cf. Chart 39. For instance, a bank's survival horizon will be reduced by almost three months if the outflow rate doubles.

It is important that the banks themselves have a deep understanding of the sensitivity to various risks affecting liquidity withdrawals in a crisis. They can obtain this understanding by, inter alia, actively using stress tests for liquidity and risk management purposes e.g. via frameworks for survival horizon, outflow rates, etc. It is also important to perform robustness checks of the models' sensitivity to the individual parameters, e.g. by assuming different outflow rates.

New, more risk-sensitive liquidity requirement for mortgage credit institutions

In 2015, the Danish Financial Supervisory Authority introduced a Pillar II liquidity requirement for mortgage credit institutions, i.e. a minimum requirement of 2.5 per cent of lending, to cover risks not directly covered by the short-term LCR. An example is the risk associated with refinancing auctions. In September 2019, the Danish Financial Supervisory Authority revised the model to take into account a new requirement for reserving liquid assets equivalent to 2 per cent of lending in mortgage credit institutions. This requirement is an element of the forthcoming EU Directive on regulation of mortgage bonds and other covered bonds. The revised model is more risk-sensitive than the existing one, as the future liquidity requirement will fluctuate in step with, inter alia, the size of refinancing auctions and the volume of open refinancing where the funding behind the

Explanation of the scenarios and assumptions in the liquidity sensitivity analysis

Box 3

The projection of the liquidity position is based on calculations of the banks' excess liquidity under various assumptions of outflow rates regarding both contractual flows and demand deposits as well as the realisation value of the various assets in the liquidity stock.

The scenarios have been constructed under the assumption that the liquidity stock is to be sold in the market. This gives a picture of how long the bank is able to manage its own liquidity situation without resorting to Danmarks Nationalbank's facilities.

The outflow rates for demand deposits are inspired by the outflow weights in the ECB's 2019 sensitivity analysis, but have been adjusted to fit the different scenario constructions in the two sensitivity analyses. The outflow rates are found to be severe, but far from inconceivable in a historical context. The outflow is assumed to be most severe in the first 30 days, followed by a gradual reduction.

Given that the sensitivity analysis is constructed at institution level, it addresses the degree of banks' liquidity without the influence from affiliated mortgage credit institutions, if applicable.

The analysis operates with three scenarios:
- Market-specific scenario
- Institution-specific scenario
- Combination scenario.

Market-specific scenario
Simulates general stress in the banking sector with funding markets closing, but with no strong effect on daily customer transactions, e.g. household customers are not withdrawing demand deposits. Relatively high haircuts are assumed for the liquidity stock, as it is expected to be difficult to realise the assets in a general banking sector stress situation. For example a 7 per cent haircut for mortgage bonds are assumed, matching the haircut in the short-term LCR.

Institution-specific scenario
Simulates stress at individual bank level, e.g. due to rumours of difficulties. On the one hand, it is assumed that the bank loses access to the funding markets with simultaneous considerable losses of deposits. On the other hand, it is assumed that the lending balance is gradually reduced via prepayments from corporate customers, and that the liquidity stock can be realised at relatively limited haircuts (e.g. a haircut of 3 per cent is applied to mortgage bonds). However, assets issued by the institution are assumed to be realised at a large loss of value of 50 per cent.

Combination scenario
Simulates a general financial sector stress situation where the institution is also hit by an institution-specific event. For example rumours of imminent failure during a general crisis. This is a very difficult situation, in which the bank's access to funding markets can be expected to be gone, simultaneously with a deposit outflow from the balance sheet. But it is not possible to reduce lending, given that the whole sector is under pressure, and at the same time the realisation value of the liquidity stock has been reduced considerably. Technically, the most severe parameters from the two above scenarios are applied.

1. Information on and results of the ECB's sensitivity analysis are available at the ECB website (*link*).

customers' refinancing of mortgage loans has not yet been raised. The new requirement is thus expected to clarify the fluctuations in mortgage credit institutions' liquidity positions resulting from large waves of refinancing when interest rates change. Danmarks Nationalbank takes a positive view on enhancing the risk sensitivity of the liquidity requirement. The new liquidity requirement must be reported as from December 2019 and is expected to be implemented no later than the European requirement for reserving liquid assets equivalent to 2 per cent of lending become effective.

Appendix: Data for the analysis

Institutions in the analysis by balance sheet total as at 30 June 2019, kr. million Table 1

Systemic credit institutions	Amount
Danske Bank (including Realkredit Danmark)	3,290,789
Nykredit Realkredit (including Nykredit Bank)	1,540,708
Jyske Bank (including Jyske Realkredit)	646,416
Nordea Kredit	455,230
DLR Kredit	165,730
Sydbank	152,073
Spar Nord	89,354
Systemic groups, total	**6,340,300**
Systemic banks	
Danske Bank	2,324,499
Jyske Bank	304,701
Nykredit Bank	214,260
Sydbank	154,372
Spar Nord	89,482
Systemic banks, total	**3,087,314**

Non-systemic banks	
Arbejdernes Landsbank	57,884
Ringkjøbing Landbobank	52,426
Sparekassen Kronjylland	28,415
Sparekassen Sjælland-Fyn A/S	24,885
Lån & Spar Bank	24,092
Sparekassen Vendsyssel	22,067
Vestjysk Bank	21,592
Jutlander Bank	19,120
Den Jyske Sparekasse	15,736
Alm. Brand Bank	13,913
Non-systemic banks, total	**280,131**
Mortgage credit institutions	
Nykredit Realkredit (including Totalkredit)	1,472,231
Realkredit Danmark	910,400
Nordea Kredit	455,230
Jyske Realkredit	380,237
DLR Kredit	165,730
LR Realkredit	28,914
Mortgage credit institutions, total	**3,412,741**

Note: The balance sheet totals of systemic banks, non-systemic banks and mortgage credit institutions are stated at institution level, while the balance sheet totals of the systemic credit institutions are stated at group level with the exception of DLR Kredit and Nordea Kredit which are stated at institution level.
Source: Danmarks Nationalbank.

The analysis applies 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.

The analysis of Danish credit institutions’ earnings, liquidity and own funds comprises seven systemic credit institutions. The analysis also includes the non-systemic banks in the Danish Financial Supervisory Authority’s group 2 in 2019. These institutions are listed in Table 1. Unlike in the Danish Financial Supervisory Authority’s group 2, Saxo Bank has been omitted because of its business model. The grouping also applies back in time.

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 the branch Nordea Danmark, while medium-sized banks are the Danish Financial Supervisory Authority’s group 2 plus the branches Handelsbanken and Santander Consumer Bank.

ABOUT ANALYSIS

As a consequence of Danmarks Nationalbank's role in society we conduct analyses of economic and financial conditions.

Analyses are published continuously and include e.g. assessments of the current cyclical position and the financial stability.

The analysis consists of a Danish and an English version. In case of doubt regarding the correctness of the translation the Danish version is considered to be binding.

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