ANALYSIS

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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.

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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.

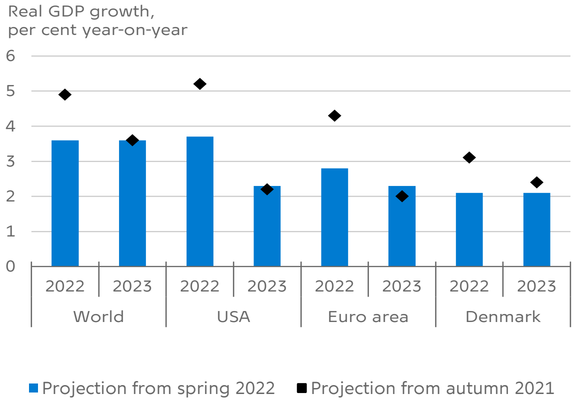
The EU Commission's banking package is estimated to cause less increase in capital requirements than previous assessments
The EU Commission's banking package indicates higher capital requirements for the largest institutions. A rough assessment indicates that the total capital requirement may increase 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.

Expected growth in world economy, euro area and Denmark has been revised downwards for 2022 Chart 1

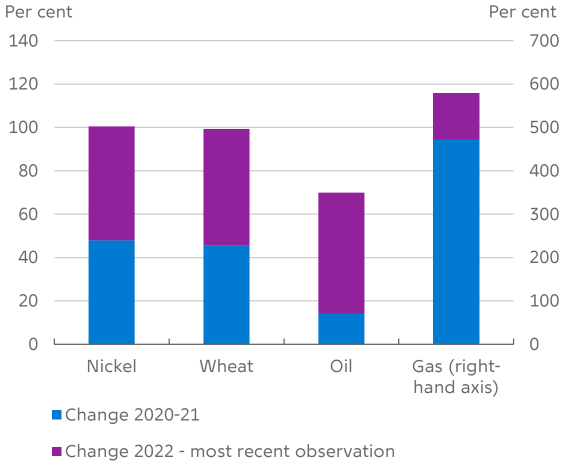


Note: IMF estimates for the world, based on constant exchange rates, and IMF estimates for the USA and the euro area from October 2021 and April 2022, respectively. GDP growth in Denmark is based on Danmarks Nationalbank's projections from September 2021 and March 2022, respectively.
Source: IMF and Danmarks Nationalbank.

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.

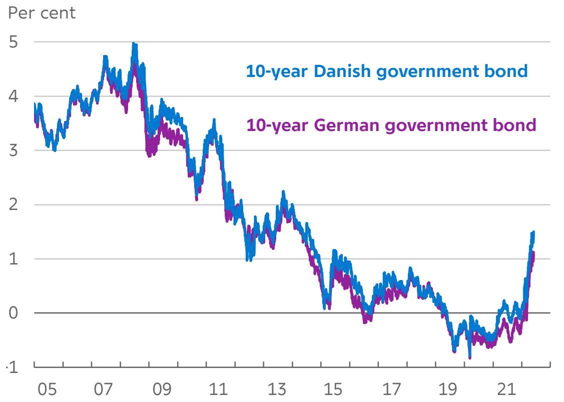
Price developments for e.g. energy and commodities have contributed to an increase in market participants' expectations of euro area inflation in the medium term. Inflation swaps traded on financial markets indicate an expectation of medium term inflation

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.

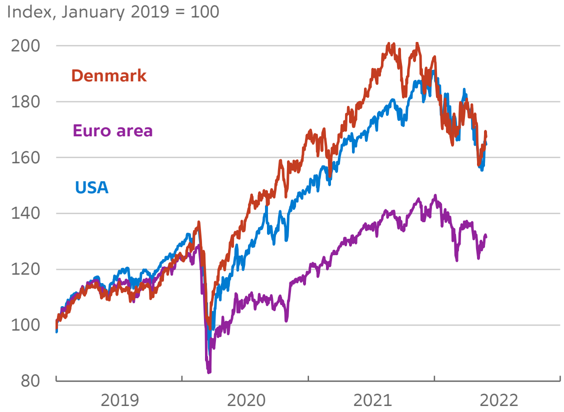
Yields on long-term mortgage bonds have generally been rising since the beginning of 2021, and interest rate increases have further picked up in 2022. Yields on short-term mortgage bonds have seen a more modest increase, see chart 4. For mortgage bonds with 3-year and 5-year maturities, yields have followed 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

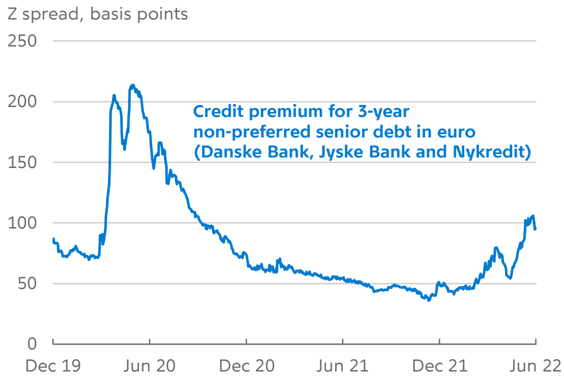
The equity markets have shown large fluctuations in 2022, see chart 5. The development reflects a number of factors, including expectations of monetary policy tightening, inflationary pressures and uncertainty related to the economic fallout from the war in Ukraine. Despite a brief period with rising 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

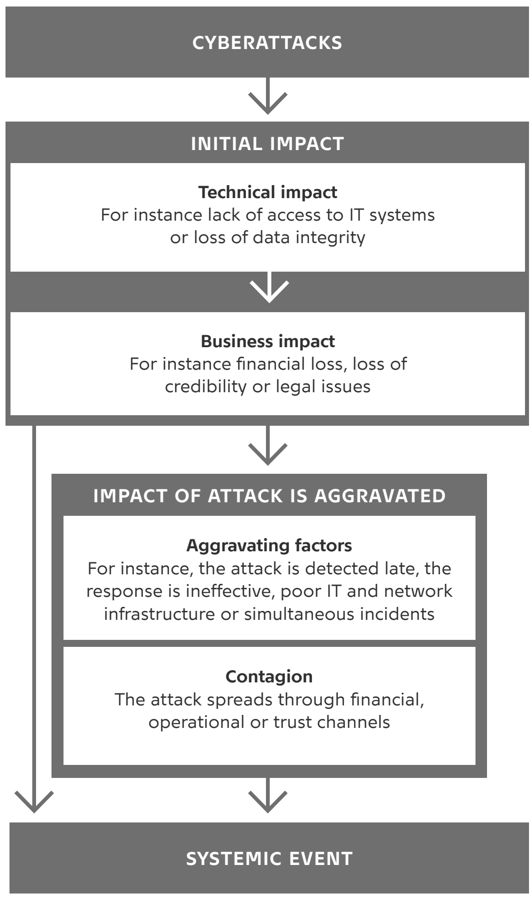
Cyberattacks may threaten financial stability in Denmark in several ways, see chart 7. A cyberattack may, for example, limit societally critical functions performed by one or more institutions or impact confidence in the financial sector.

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

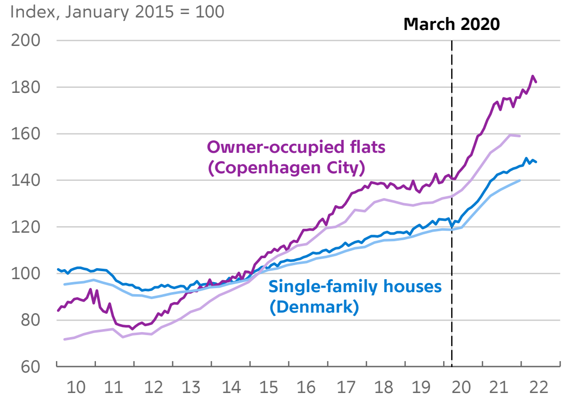
High inflation and rising interest rates may dampen housing prices in the coming year
Housing prices have risen sharply since the outbreak of covid-19, see chart 8. From March 2020 to May 2022 the prices have increased by 23 and 30 per cent for single-family homes and apartments, respectively. Housing 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

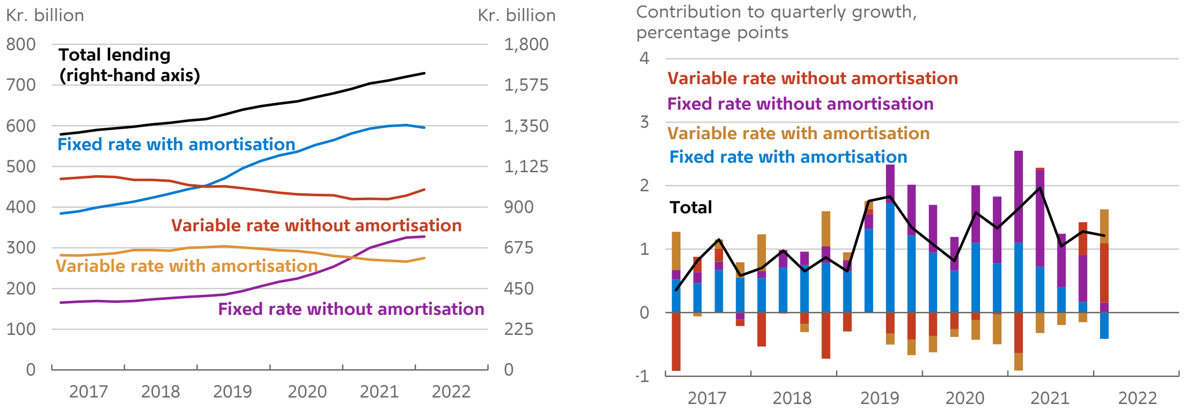
7 The credit rating of home buyers must as a starting point reflect the ability to service a fixed-rate loan with amortization, irrespective of choosing either a variable interest rate or deferred amortization. In Greater Copenhagen and Aarhus, the interest rate used for the credit rating must be one 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.

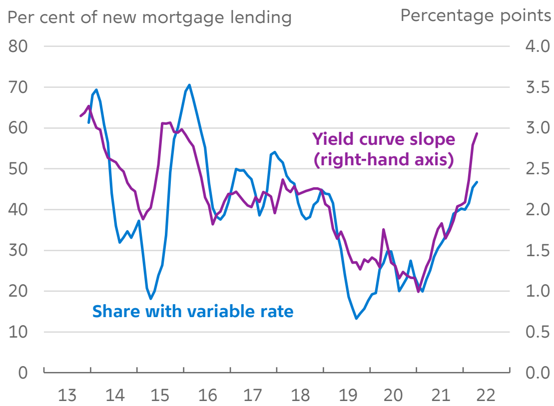
billion, while approximately 27 per cent are variable rate loans with deferred amortisation.

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



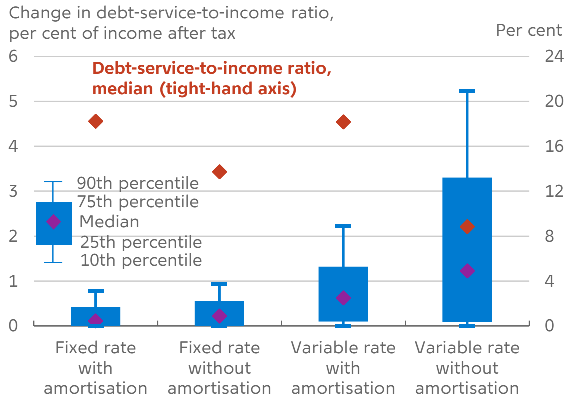
Note: New lending is calculated gross. The slope of the yield curve is defined as the difference between the long mortgage rate excluding administration margins (effective interest rate for new loans with interest rate fixation over ten years) and the short mortgage rate excluding administration margins (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

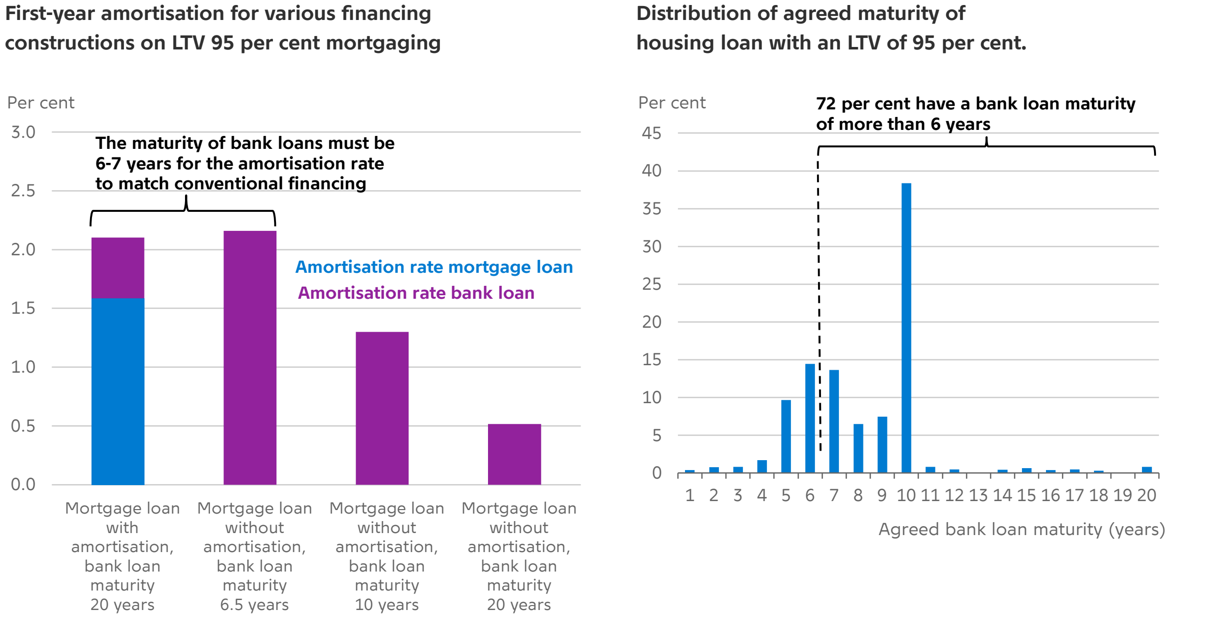
11 See Danmarks Nationalbank, Every third opt out fixed-rate on conversion, *Danmarks Nationalbank Nyt*, May 2022 (*link*).

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



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

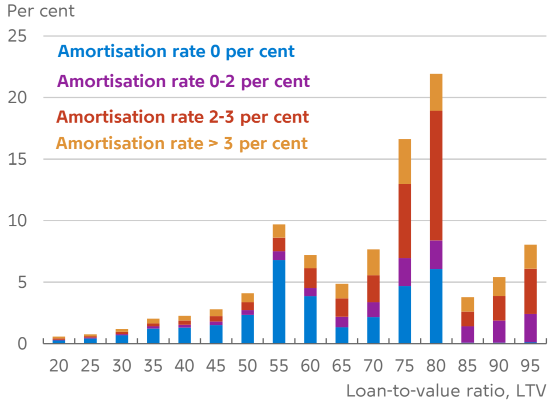
14 Up to 80 per cent of the value of the home can be financed with mortgage loans. The remaining 20 per cent of the value of the home can be financed with supplementary bank loans of 15 per cent and a minimum down payment of 5 per cent.

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

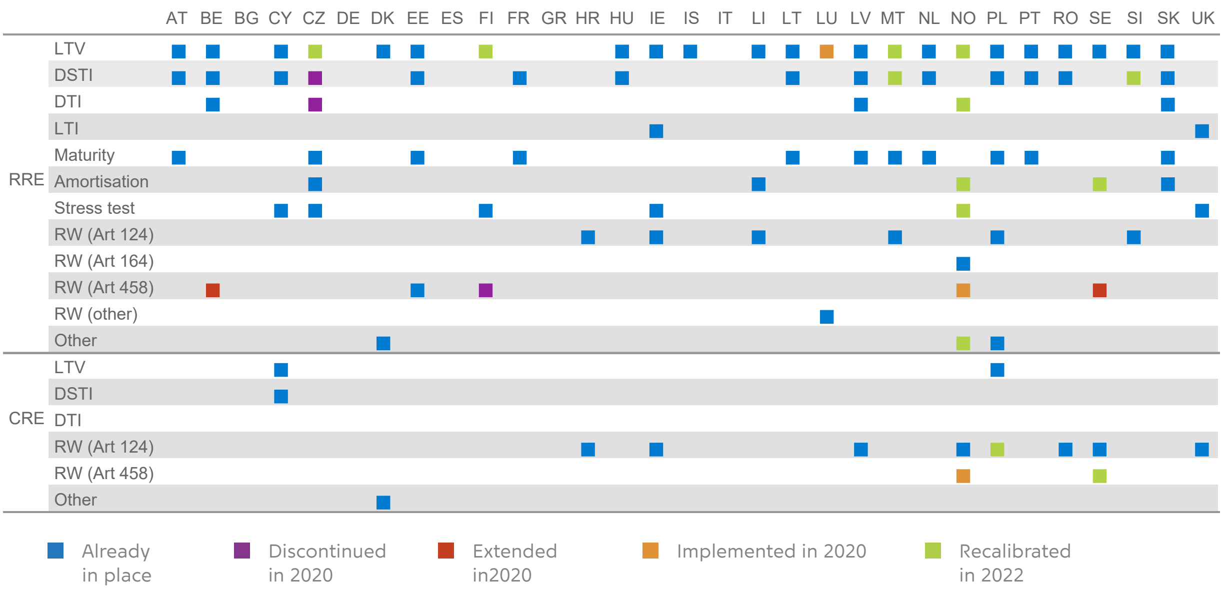
Every five years, the European Commission must assess whether the legal framework for pursuing macroprudential policy in the EU is working as it should. As part of the revision, the European Commission has considered whether there are deficiencies that should be addressed. At the present time, the macroprudential 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

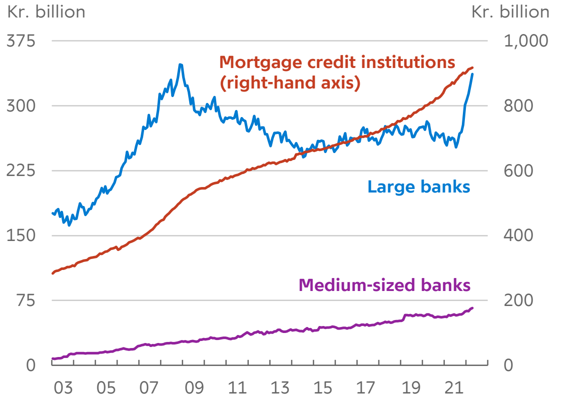
Bank lending to corporate customers has grown by more than 26 per cent in the past year, while mortgage lending to corporate customers has grown more moderately by 6 per cent. Especially large banks have increased their corporate lending, see chart 14. The lending is spread across several industries 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.

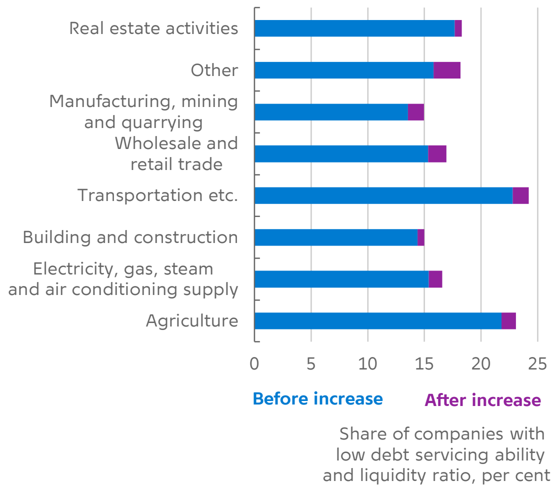
Some companies get low debt servicing ability following higher prices on energy and commodities and interest rate hike

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

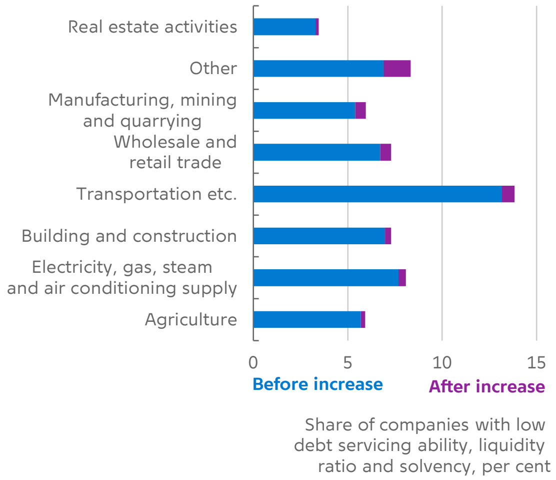
In the short term, increased pressure on companies' ability to meet their debt obligations may lead to increased demand for, for example, bank loan facilities. Less than 10 per cent of the companies have low

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

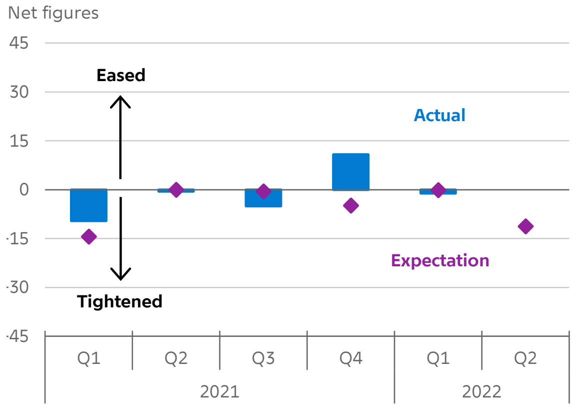


Note: Share of companies in each industry with low debt servicing capacity and liquidity ratio as well as low solvency before and after an increase in interest rates, energy- and commodity prices. Debt servicing ability is defined as low when the company's earnings before interest, taxes, depreciation 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*).

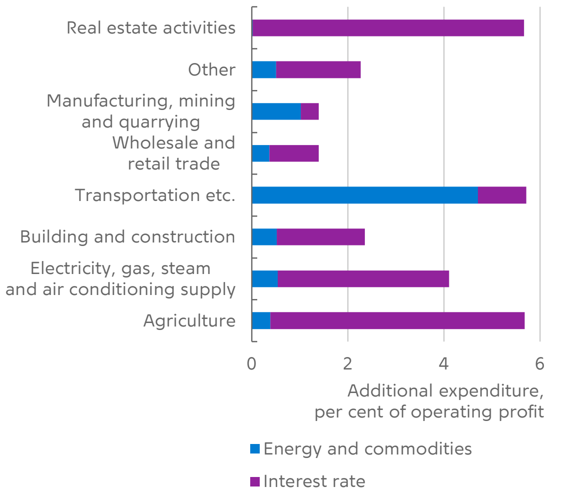
Box 4

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.

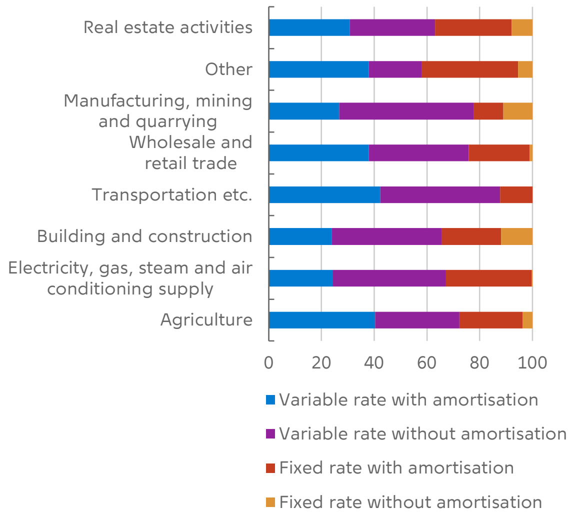
Differences in additional expenses across industries should be seen in the light of industry-specific energy and commodity consumption and the volume of variable rate debt. On average, corporate customers have variable rate mortgage loans of around 65 per cent. Also companies in cyclically-sensitive 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.

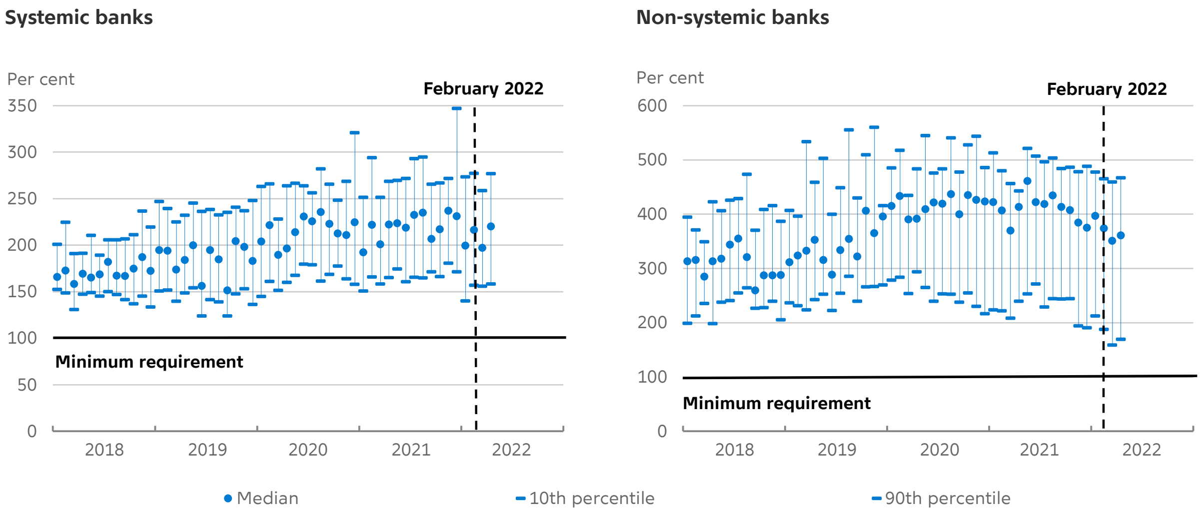
Chart B
Corporate customers use variable rate mortgage loans to a wide extent



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

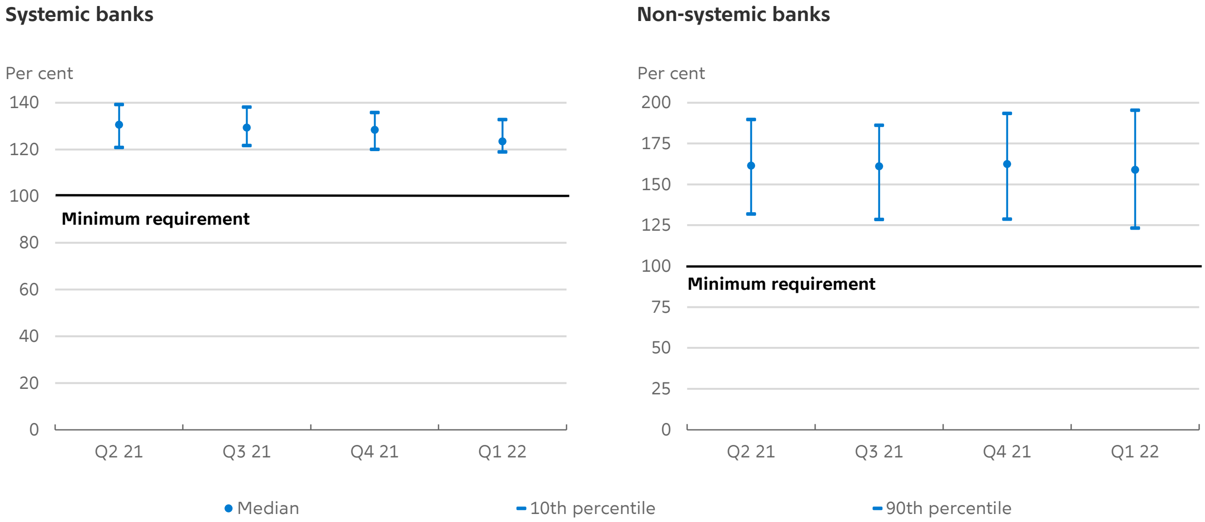
Chart 18



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*).

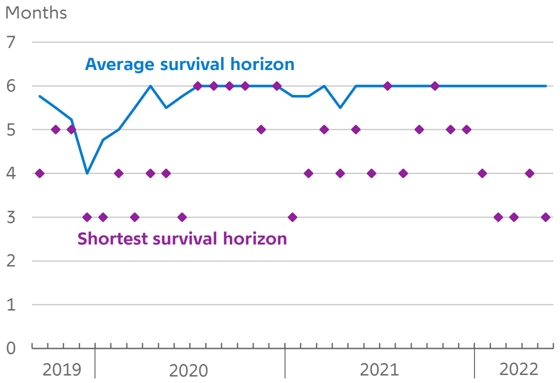
22 Bank facilities are to be understood as credit and liquidity facilities as well as repo facilities.

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.

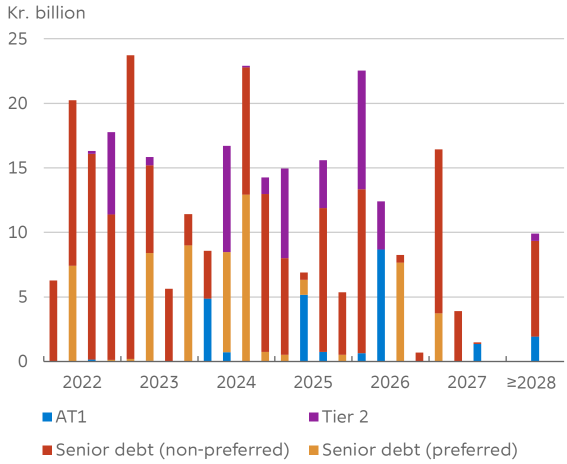
Chart 20



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*.

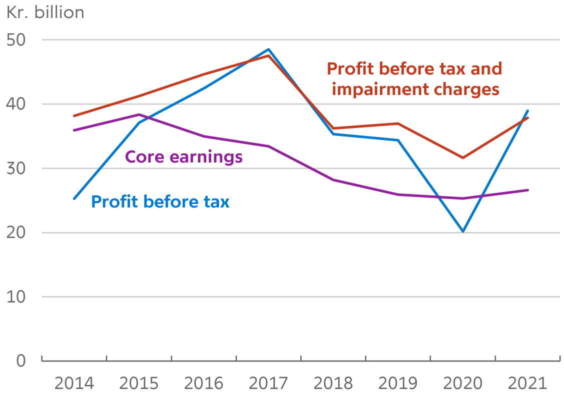
Credit institutions' core earnings have stabilised

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

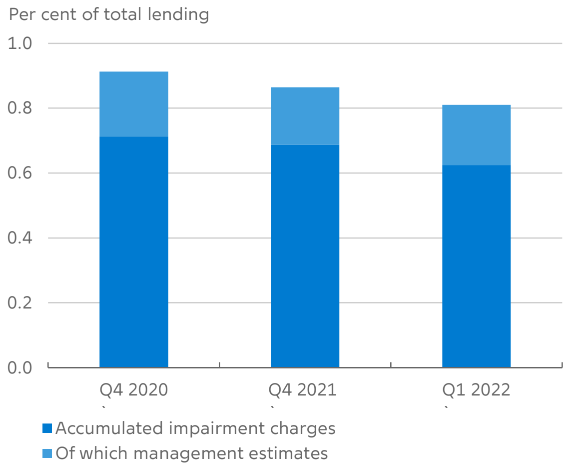


Note: Annual data for systemic credit institutions. Profit before tax has been adjusted for impairments on goodwill.
Source: Danmarks Nationalbank and own calculations.

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

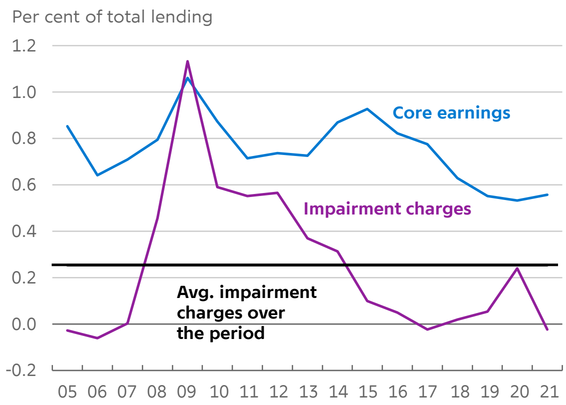
Chart 23



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

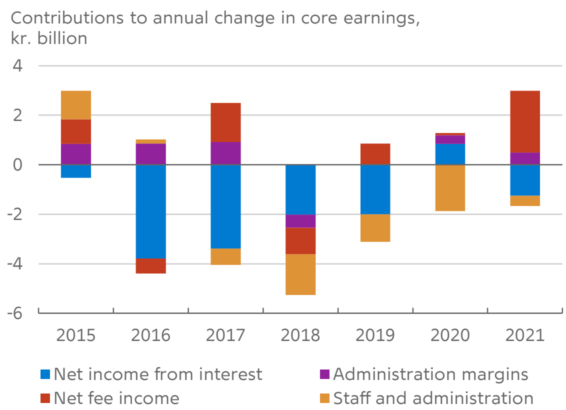
Chart 24



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.

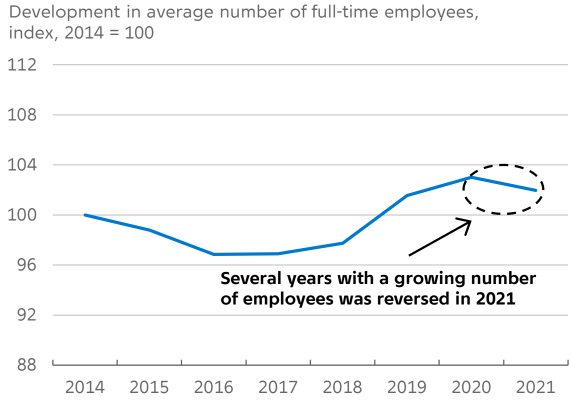
Despite measures, the level of costs remains high
The systemic credit institutions' staff costs and administrative expenses increased again in 2021. The increase can also be attributed to one-off costs for example large-scale IT projects and restructurings.

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.

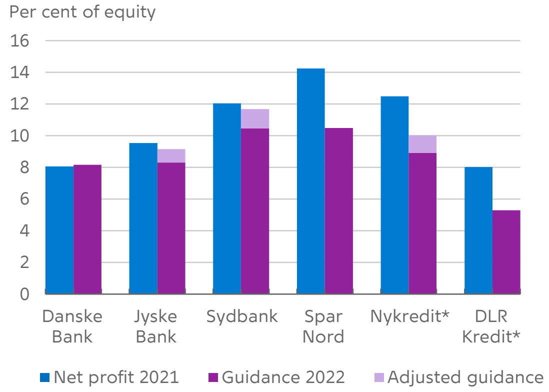
29 See box 4.1, page 46, in Danmarks Nationalbank, Financial Stability 1st half of 2015, *Danmarks Nationalbank Analysis*, June 2015 (*link*) for a detailed description of the correlation between interest rate level, slope of the yield curve and net interest income.

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

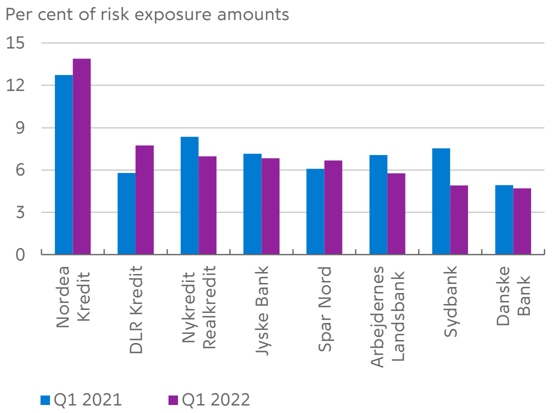
The excess capital ratios of systemic credit institutions have evolved differently over the past year, and there are still large differences across the institutions' excess capital ratios, see chart 28. The stated excess capital is the distance between the institutions' Common Equity Tier 1, CET1, capital 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).*

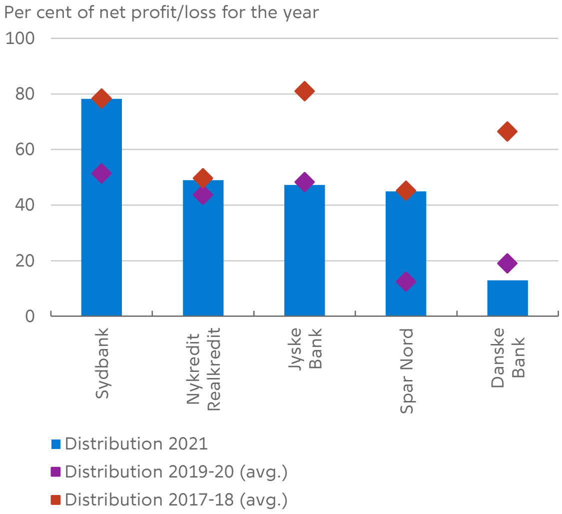
31 See European Banking Authority, *Guidelines on PD estimation, LGD estimation and treatment of defaulted assets (Compliance table) (link).*

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

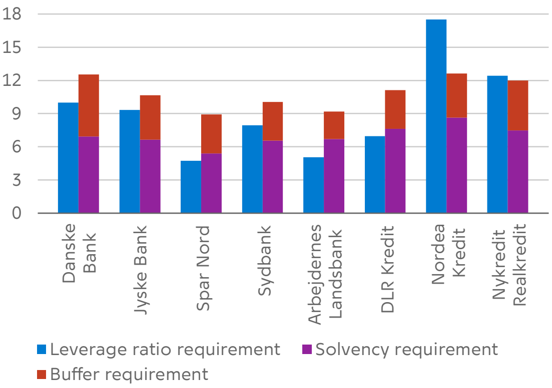
Box 5

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

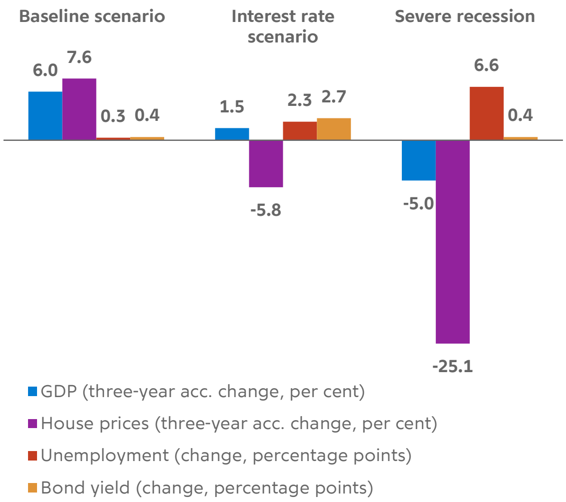
Macroeconomic scenarios in the stress test

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

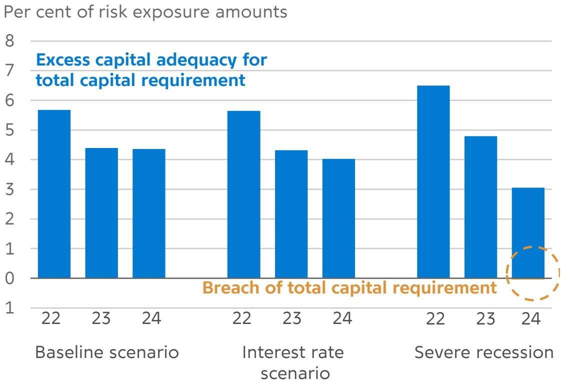
Concurrently with the capital buffer requirements, the institutions must also meet an aggregate requirement for their eligible liabilities, MREL and buffer requirements.[39] The excess capital relative to the MREL and buffer requirements is on average over 3 per cent of the risk exposure amounts for the systemic credit institutions in the 1st quarter of 2022, see chart 31.

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.

Some systemic institutions come close to buffer requirements in severe recession scenario

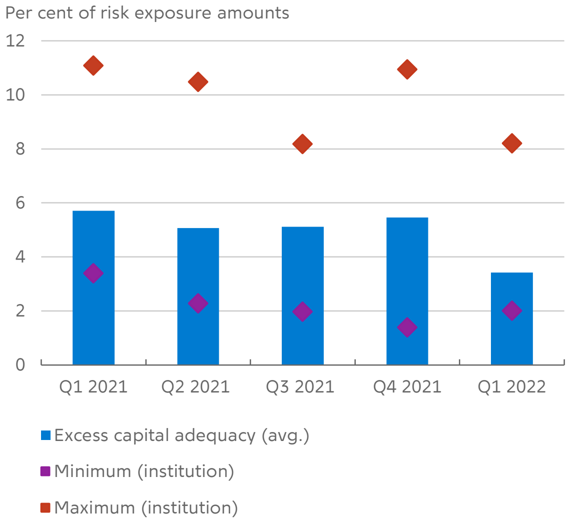
Chart 30



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.

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.

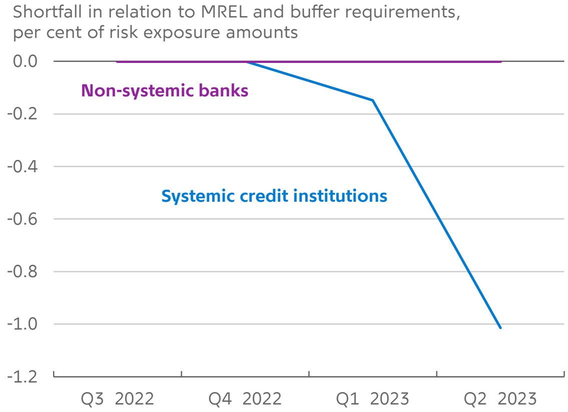
Some institutions cannot meet MREL and buffer requirements during a period with market turbulence

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.

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