

NORGES BANK MEMO

Appendix to
Norges Bank Papers No. 4 | 2022: “A
framework for decisions on the
countercyclical capital buffer”



Indicators for assessing the countercyclical capital buffer (CCyB)

i. Assessments of cyclical vulnerabilities

Assessments of cyclical vulnerabilities comprise three main elements: (a) household and corporate sector vulnerabilities, (b) real estate market vulnerabilities and (c) financial market vulnerabilities. To assess these three elements, Norges Bank uses various indicators, along with model-based and composite indicators. Indicators that will be used regularly are described below.

Household and corporate sector vulnerabilities. Total credit-to-GDP ratio and deviations from alternative trend estimates are key indicators (Charts 1.1 and 1.2) set out in the Regulation on the Countercyclical Capital Buffer. It is important to look at the breakdown of credit by borrower groups, such as different groups of households (Chart 1.3 and 1.4) and firms and by source, such as banks and the bond market (Chart 1.5). Household savings and net lending may also shed light on whether credit developments are sustainable (Chart 1.6).

The European Systemic Risk Board (ESRB) also recommends using indicators for external imbalances. Norway has a large current account surplus owing to oil and gas exports and the fiscal rule for petroleum revenue spending. Other measures of external imbalances may therefore be more useful, such as the private sector's net lending and banks' funding from abroad (Chart 1.7).

Debt-servicing capacity can be assessed using both an aggregate estimate of debt servicing costs (Charts 1.8 and 1.9), and measures of debt at risk based on studies of individual household and firm data (see for example Solheim and Vatne (2013)). Studies at the household level will capture vulnerabilities that may be related to skewed distribution of debt burdens even when debt at the macro level does not appear particularly high. A number of studies show that debt servicing burdens have peaked close to crises, and the associated risks are reflected in losses by financial institutions.¹

¹ See Drehmann, Juselius and Korinek (2017).

Chart 1.1 Credit¹⁾ as a share of BNP
Mainland Norway. 1983 Q1 – 2022 Q1

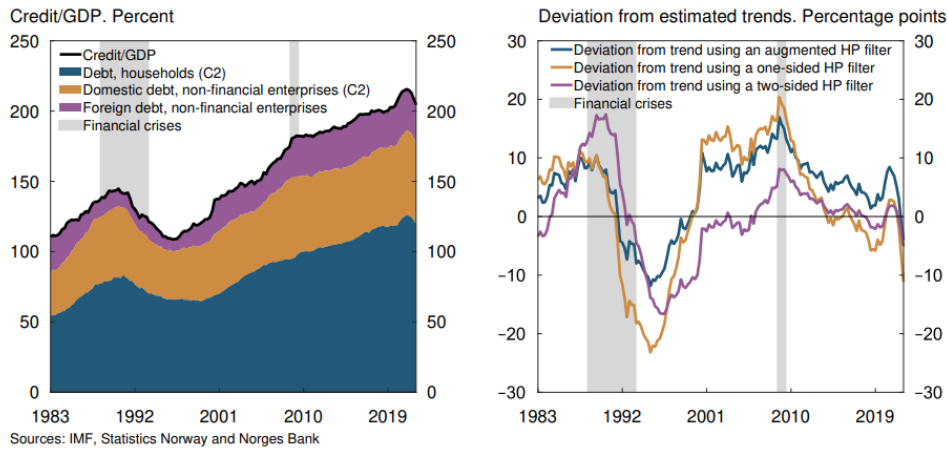


Chart 1.2 Decomposed credit gap
Credit as a share of GDP. Mainland Norway. Gap calculated as deviation from trend.¹⁾ Percentage points. 1983 Q1 – 2022 Q1

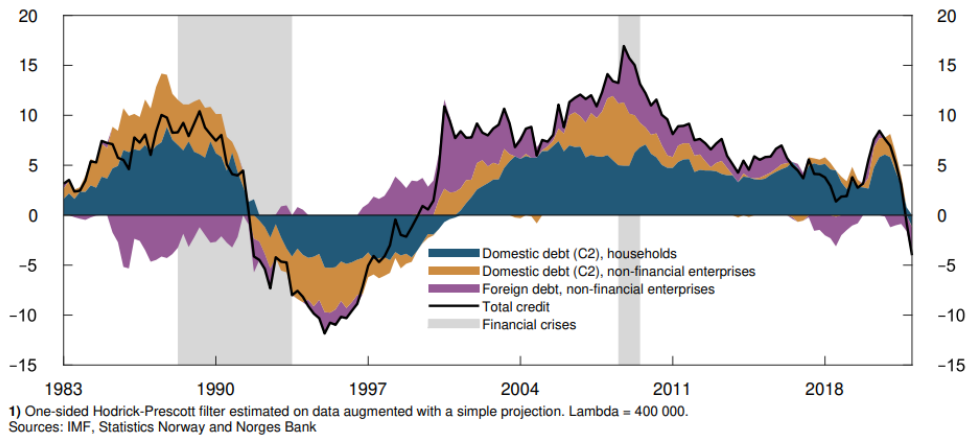


Chart 1.3 Household credit growth
C2. Increase in transactions. Percent. January 2012 – April 2022

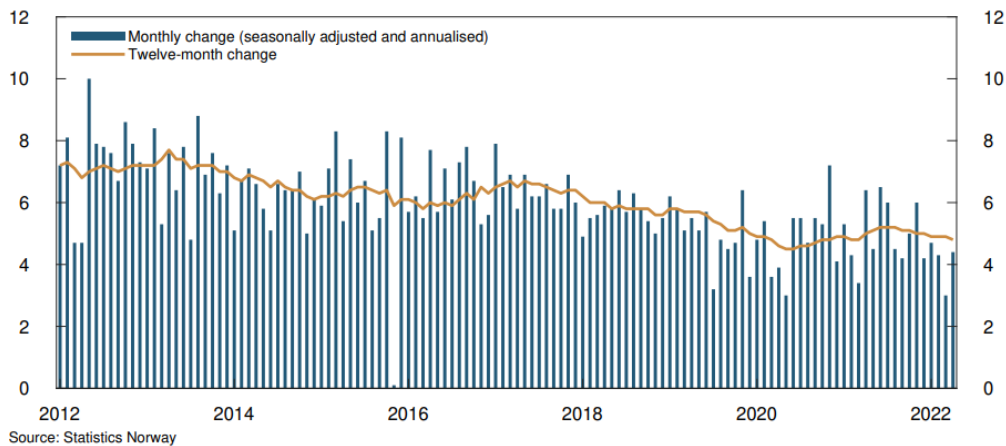


Chart 1.4 Corporate credit growth

C2. Increase in transactions. Percent. January 2012 – April 2022

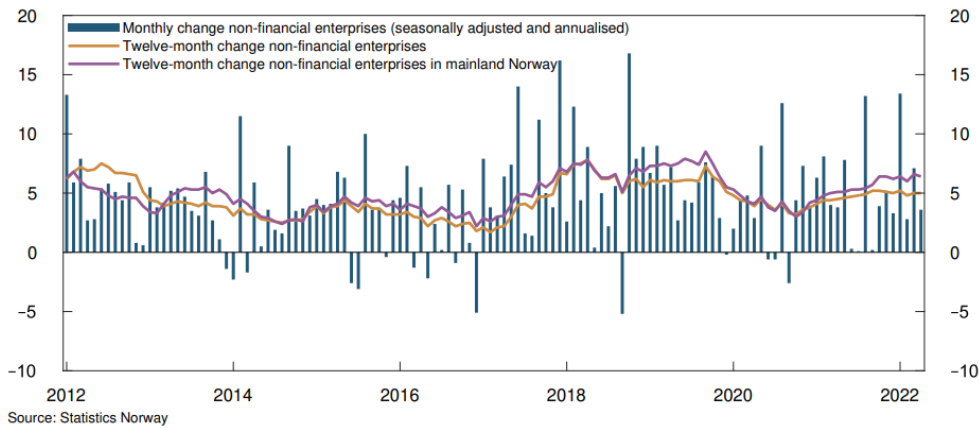


Chart 1.5 Growth in corporate credit by source

C2. Twelve-month change in stock. Decomposed by credit source. Percent. January 2015 – April 2022

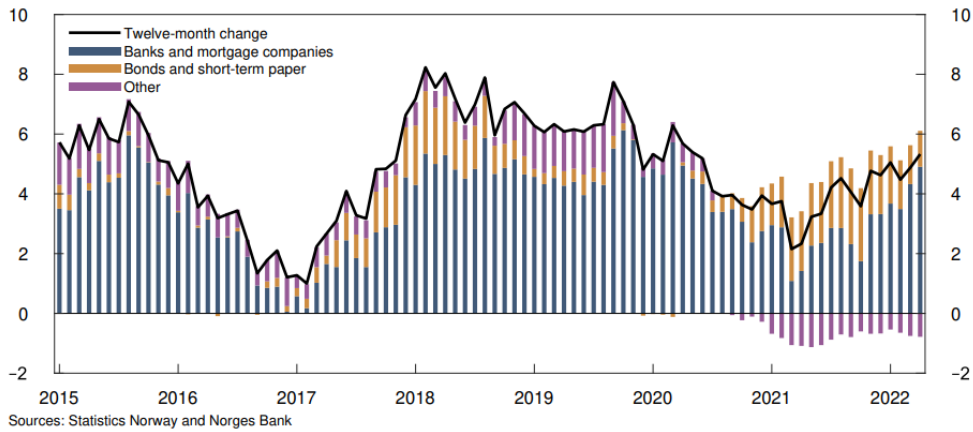
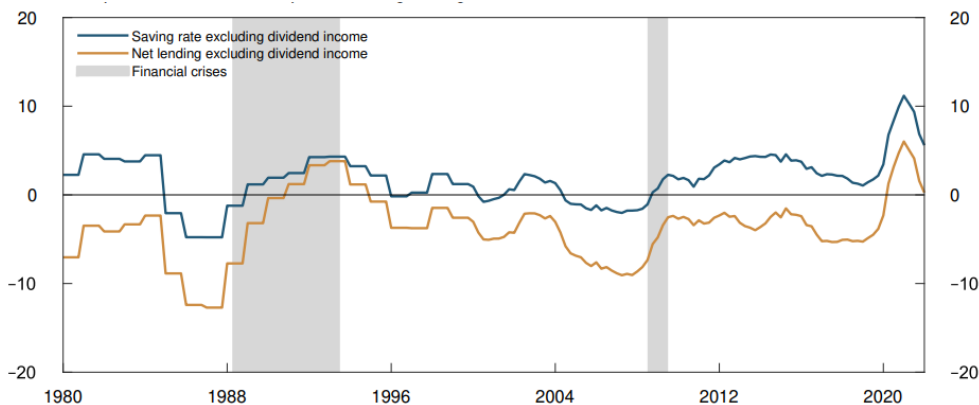


Chart 1.6 Households' saving and net lending¹⁾

Share of disposable income. Four-quarter moving average. Percent. 1980 Q1 – 2022 Q12²⁾

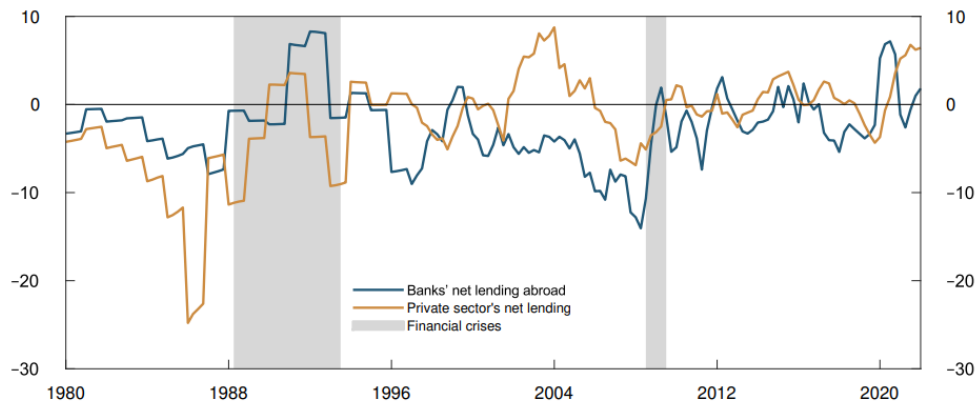


1) Saving and net lending of households and non-profit institutions serving households. Saving and net lending is adjusted by excluding dividend income received. Disposable income is adjusted by excluding dividend income received and adding savings in pension funds.

2) Annual data before 2002.

Sources: Statistics Norway and Norges Bank

Chart 1.7 Private sector's net lending¹⁾ and banks' net lending abroad
Share of GDP. Four-quarter moving average. 1980 Q1 – 2022 Q1²⁾

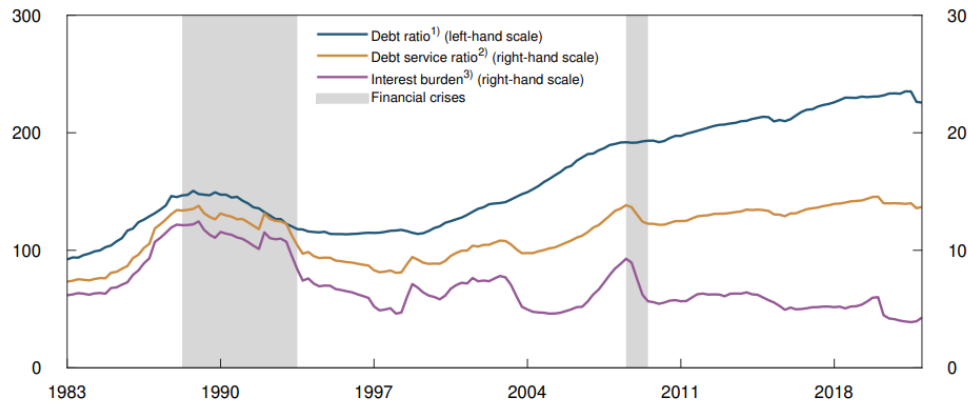


1) Total net lending minus net lending of the public sector.

2) Annual data before 2002.

Sources: Statistics Norway and Norges Bank

Chart 1.8 Household debt ratio, debt service ratio and interest burden
Percent. 1983 Q1 – 2022 Q1



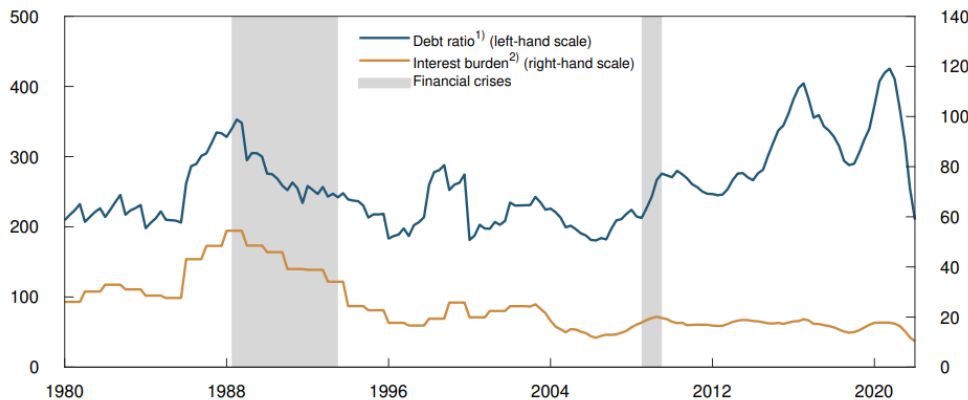
1) Loan debt as a percentage of disposable income.

2) Interest expenses and estimated principal payments as a percentage of disposable income and interest expenses.

3) Interest expenses as a percentage of disposable income and interest expenses.

Sources: Statistics Norway and Norges Bank

Chart 1.9 Non-financial enterprises' debt and interest burden
Percent. 1980 Q1 – 2022 Q1



1) Loan debt as a percentage of disposable income, dividends paid and interest expenses.

2) Interest expenses as a percentage of disposable income, dividends paid and interest expenses.

Sources: Statistics Norway and Norges Bank

Real estate market vulnerabilities. Residential and commercial property prices have risen substantially ahead of periods of financial instability in Norway (Charts 1.10 and 1.17). Other indicators may also be used for assessing cyclical vulnerabilities in the real estate market. Data for housing starts and completions, population growth (Chart 1.16) and housing market activity (Charts 1.13 and 1.14) are useful for understanding house price developments and can provide information on house price developments ahead. In the same manner, rents and yield (Charts 1.18 and 1.19) and transaction volume in the commercial real estate (CRE) market (chart 1.20) may be used for assessing CRE vulnerabilities.

Chart 1.10 Ratio of house prices to disposable income
Percent. 1983 Q1 – 2022 Q1

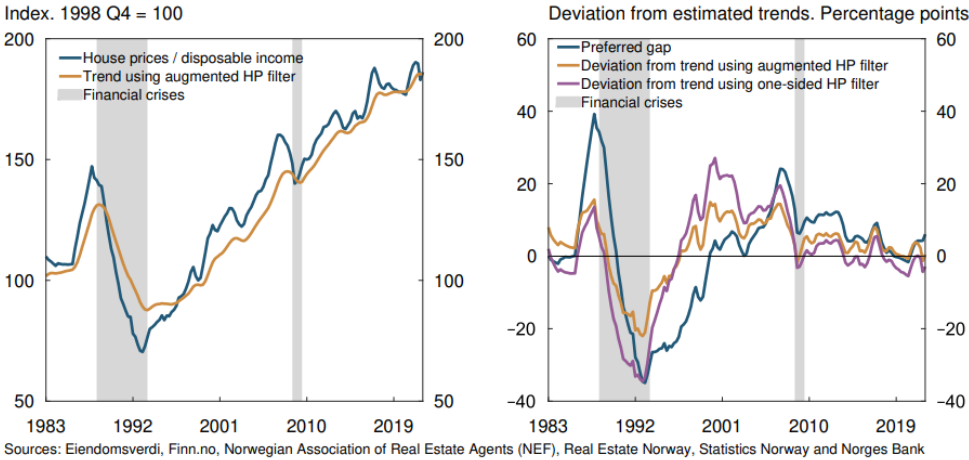


Chart 1.11 House price inflation
Percent. January 2010 – May 2022

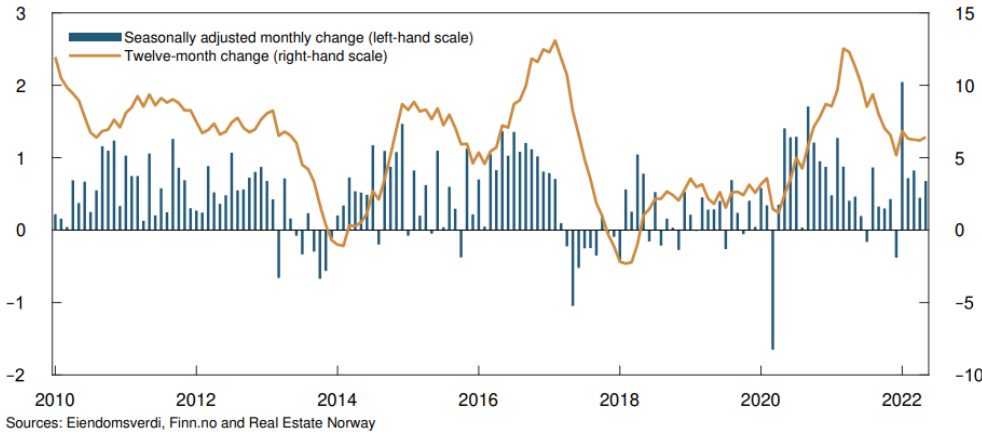


Chart 1.12 House price inflation in cities
 Twelve-month change. Percent. January 2010 – May 2022

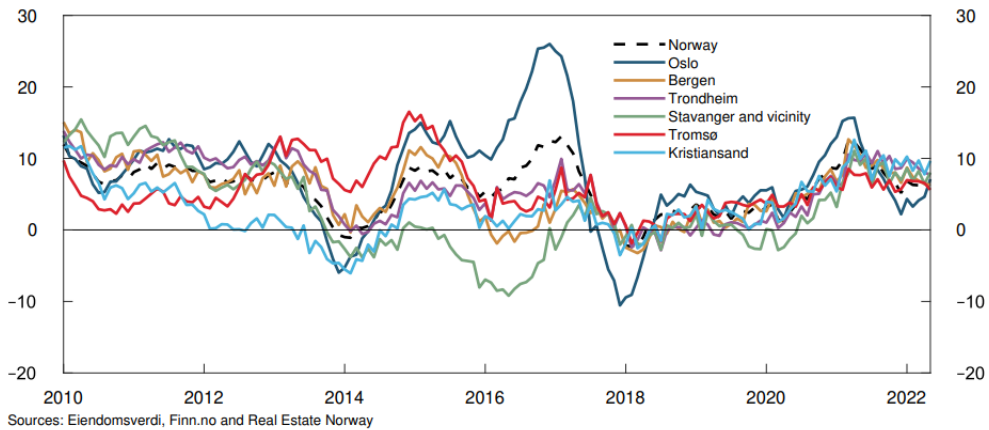


Chart 1.13 Activity in the market for existing homes
 In thousands of existing homes. January 2012 – May 2022

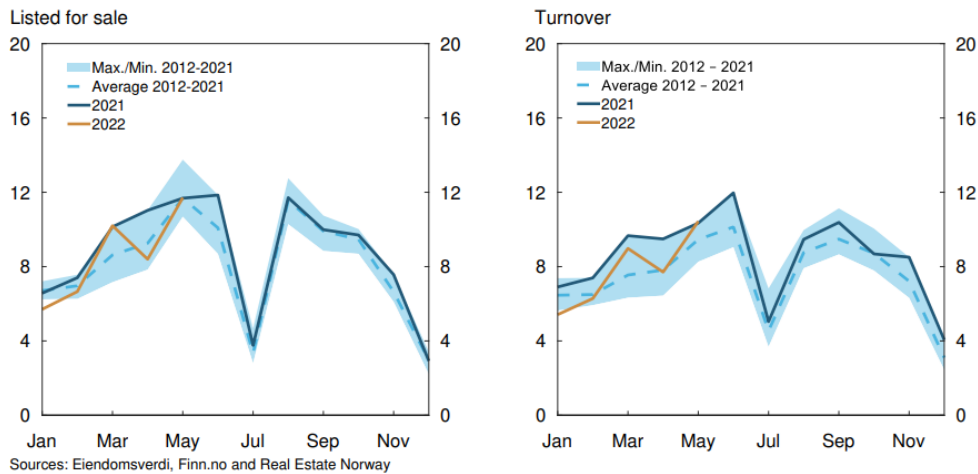


Chart 1.14 Activity in the market for existing homes
 Thousands of existing homes. Selling time in days. January 2010 – May 2022

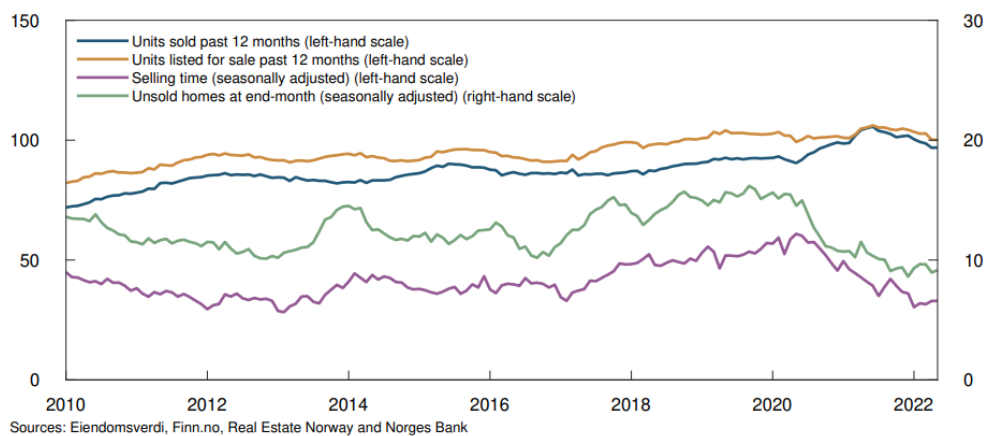
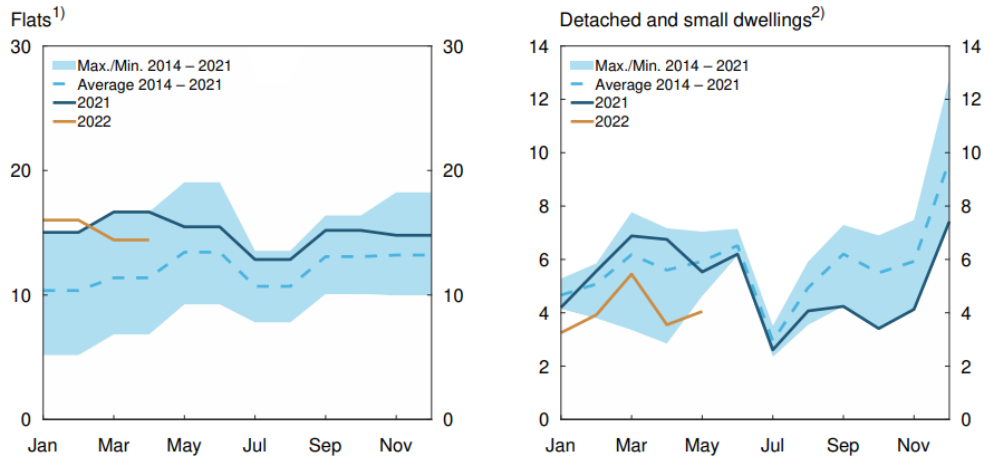
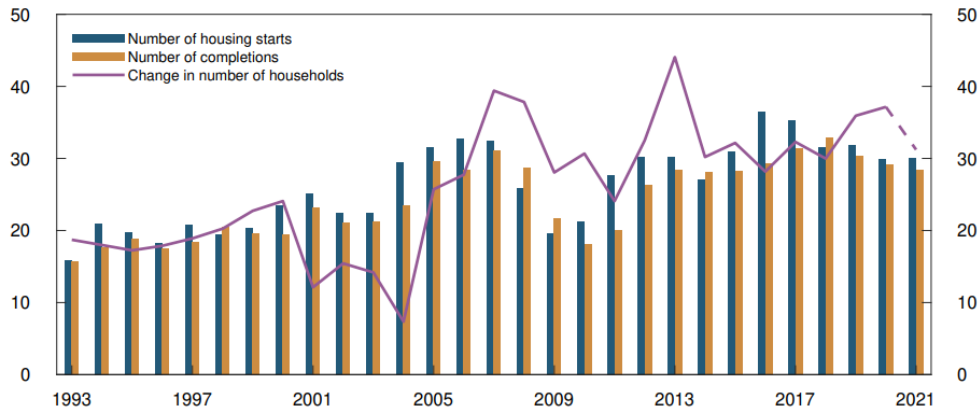


Chart 1.15 Activity in the market for new homes
Turnover. Hundreds of new homes. January 2014 – May 2022



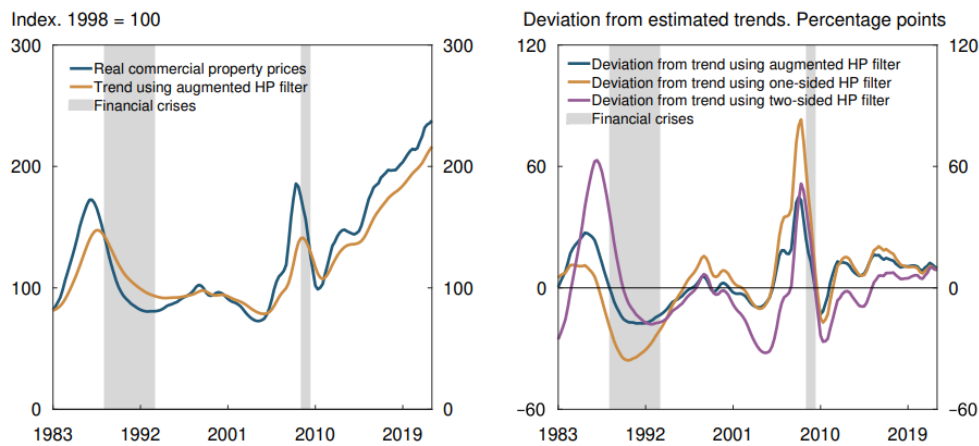
1) Flats are from ECON Nye Boliger and only include projects with more than 15 units. Data up to and including April 2022. The statistics have been transformed from bi-monthly to monthly frequencies with equal distribution.
2) Detached and small dwellings are from the Norwegian Homebuilders' Association.
Sources: Norwegian Homebuilders' Association and ECON Nye boliger, Economics Norway and Norges Bank

Chart 1.16 Residential construction and household formation
Housing starts, completions and annual change in number of households.
1993 – 2021¹⁾



1) Projections for households for 2021 adjusted for actual population in 2021 and excluding refugees from Ukraine. Projections for household formation are based on demographic projections from Statistics Norway and change in the number of individuals per household in the past five years.
Sources: Statistics Norway and Norges Bank

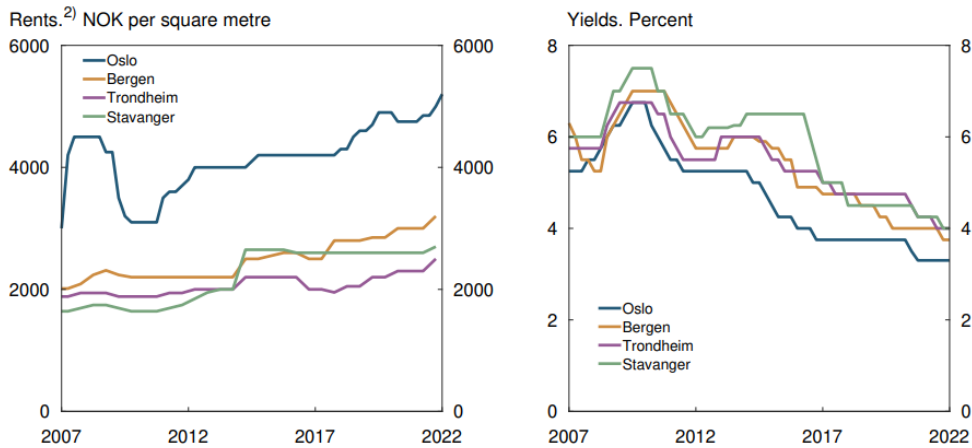
Chart 1.17 Real commercial property prices
1983 Q1 – 2022 Q2



Sources: Dagens Næringsliv, JLL, OPAK, Statistics Norway and Norges Bank

Chart 1.18 Rents and yields

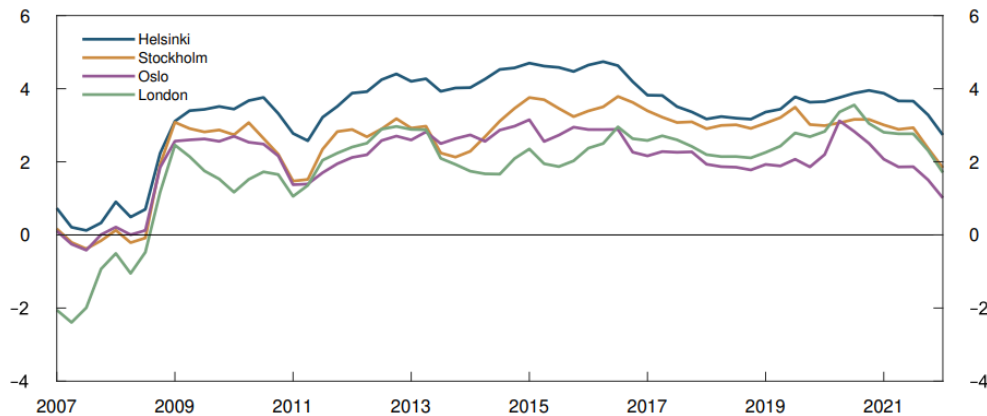
Prime real estate in cities. 2007 Q1 – 2022 Q1¹⁾



1) Rents for 2022 Q1 are only for Oslo.
 2) Quarterly data for Bergen, Trondheim and Stavanger are estimated using linear interpolation of semi-annual observations.
 Source: JLL

Chart 1.19 Estimated risk premium in commercial real estate

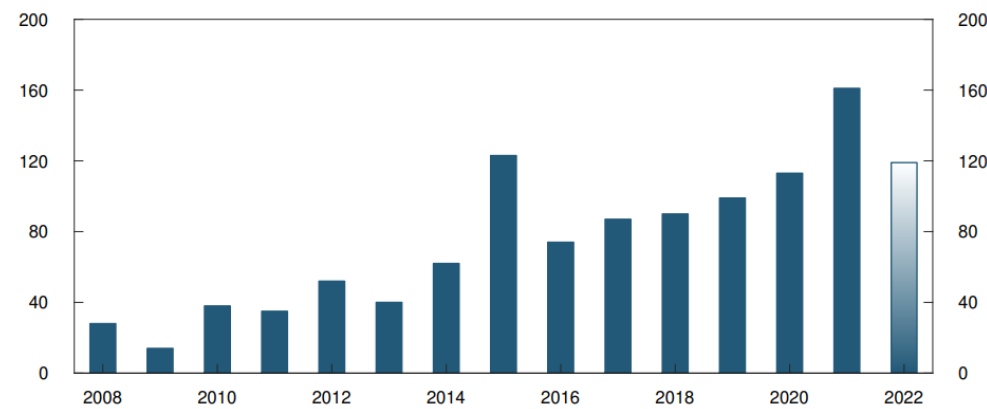
Yields less than five-year swap rate. Prime real estate. Percentage points. 2007 Q1 – 2022 Q1



Sources: Datastream and JLL

Chart 1.20 Volume of CRE transactions

In billions of NOK. 2008 – 2022. Projection for 2022

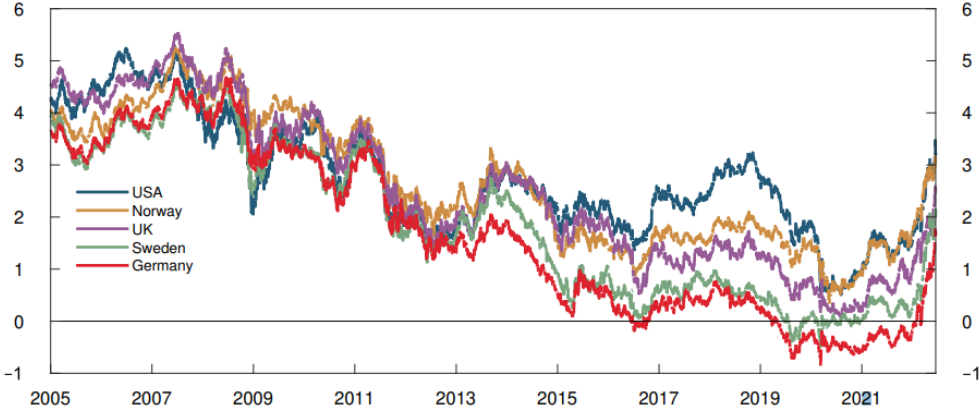


Source: Entra Konsensusrapport 2022 Q1

Financial market vulnerabilities. Persistently low interest rates can induce market participants to assume greater risk and generate sharp rises in equity prices (Chart 1.21 and 1.22). High equity valuations relative to book values and earnings, and persistently low bond market risk premiums may also indicate high risk appetite in the financial market (Charts 1.23 to 1.26).

Chart 1.21 Long-term government bond yields

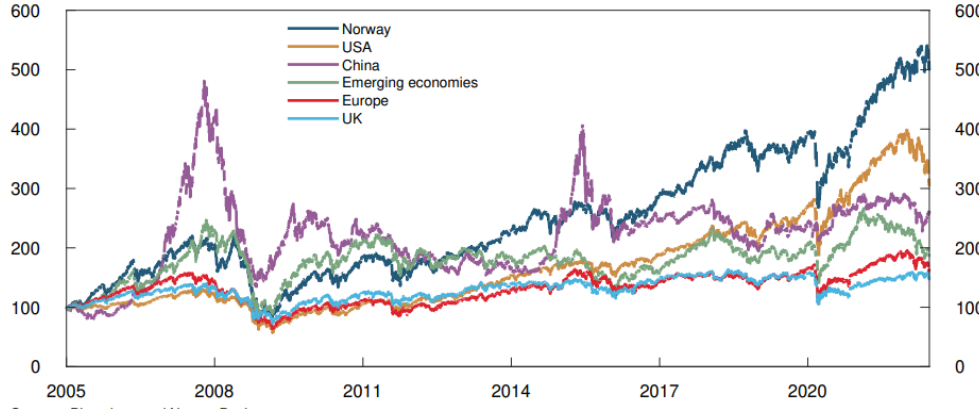
Ten-year government bonds. Percent. 1 January 2005 – 17 June 2022



Sources: Bloomberg and Norges Bank

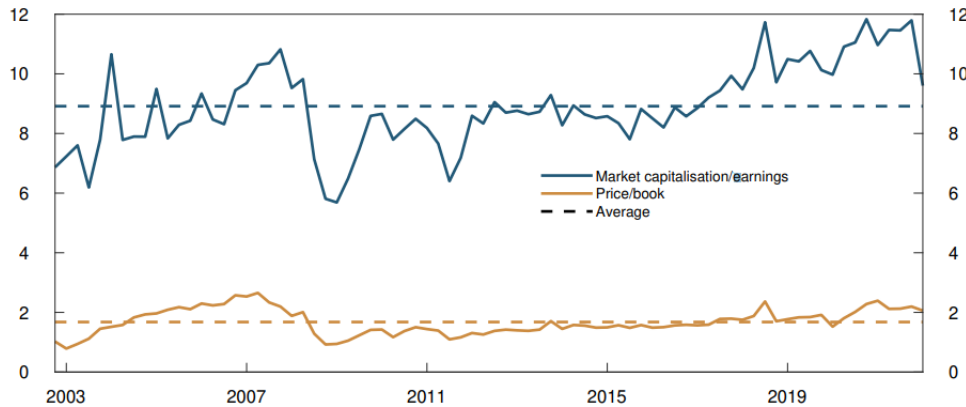
Chart 1.22 Stock prices

Selected equity markets. Index. 3 January 2005 = 100. 1 January 2005 – 17 June 2022



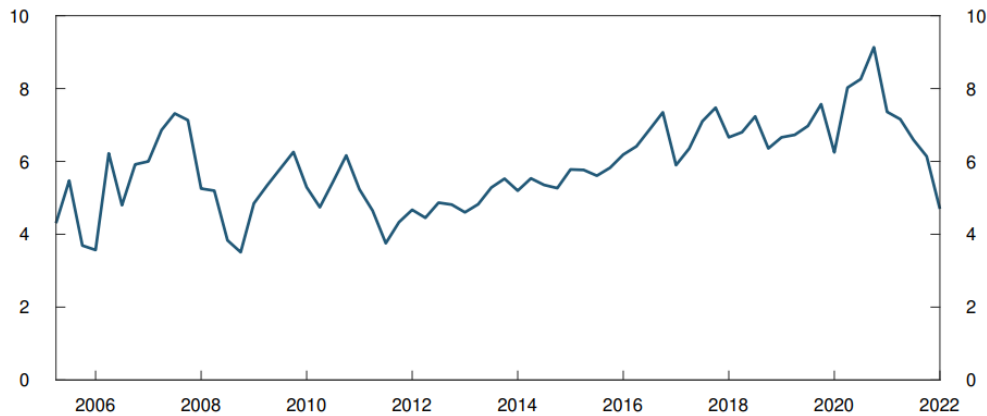
Sources: Bloomberg and Norges Bank

Chart 1.23 Market capitalisation-to-earnings and price-to-book ratios
 Sample of Norwegian listed companies.¹⁾ 2002 Q4 – 2022 Q1



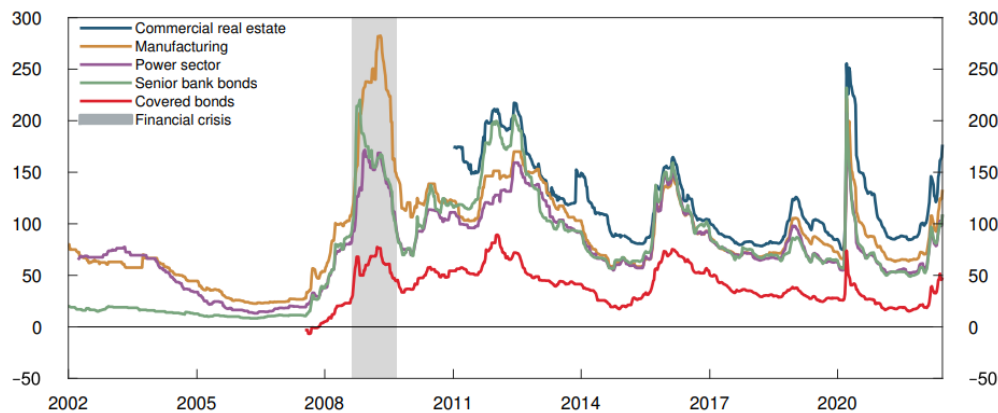
¹⁾ Market capitalisation is the market value of equity and interest-bearing debt less cash. Earnings are a four-quarter moving average of operating earnings before depreciation, amortisation and impairment. Price/book is the market value of equity in relation to the carrying amount of assets excluding intangibles. The sample is Norwegian listed companies excluding financial institutions, companies engaged in oil production etc, companies registered abroad, companies without interest bearing debt and companies presenting incomplete financial reports.
 Sources: Bloomberg and Norges Bank

Chart 1.24 Market capitalisation-to-earnings ratio
 Oslo Børs. Earnings in the next four quarters.¹⁾ 2005 Q2 – 2022 Q1



¹⁾ Earnings are operating profit before depreciation, impairment, interest income and interest expense.
 Source: Bloomberg

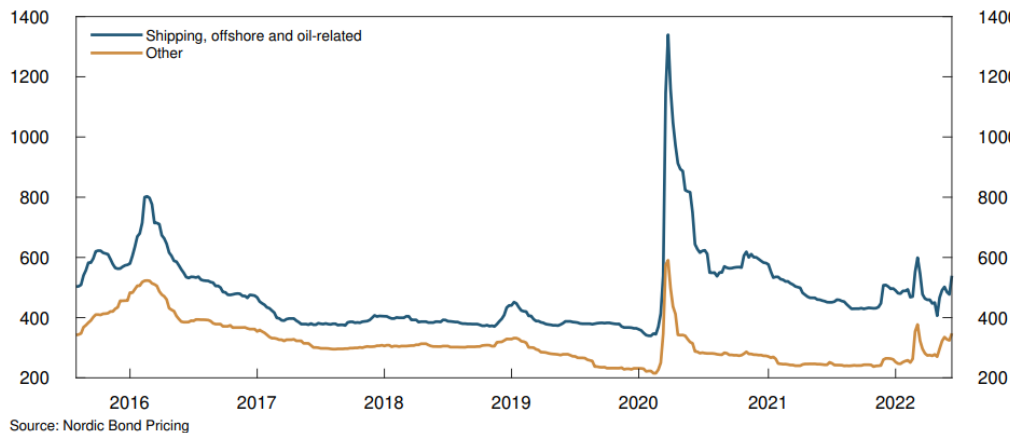
Chart 1.25 Bond market risk premium¹⁾
 Investment grade. Five-year maturity. Basis points over three-month Nibor.
 Week 1 2002 – week 24 2022²⁾



¹⁾ Indicative risk premium on senior obligations with five-year maturity issued by banks and enterprises with investment grade (BBB- or better).
²⁾ There is a change in the data source in August 2015 from DNB Markets to Nordic Bond Pricing, which constitutes a break in the series. Data for covered bonds from Week 27 2007. Data for commercial real estate from Week 1 2011.
 Sources: DNB Markets and Nordic Bond Pricing

Chart 1.26 Bond market risk premium

High-yield. Five-year maturity. Percentage points over three-month Nibor.
Week 32 2015 – week 24 2022



Composite indicators. Model estimates and composite indicators can contribute to the assessment of the overall level of cyclical vulnerability. Norges Bank uses quantile regressions to link the risk of a substantial fall in GDP to a measure of cyclical vulnerability (Chart 1.27) (see box in the *Memo*).² The analysis includes a broad set of cyclical vulnerability indicators. The greater the number of indicators towards the right in the chart, the higher the level of cyclical vulnerability.

The heatmap for composite indicators (Chart 1.29)³ tracks developments in a broad range of indicators in three main areas: risk appetite and asset valuations, non-financial private sector vulnerabilities (household and corporate), and financial sector vulnerabilities. Developments in each individual indicator are mapped into a common colour coding scheme, where green (red) reflects low (high) levels of vulnerability. The heatmap thus provides a visual summary of current vulnerabilities in the Norwegian financial system compared with historical episodes.

Norges Bank has also developed an early warning model for financial crises based on a large number of combinations of explanatory variables and trend estimation models (Chart 1.28).⁴

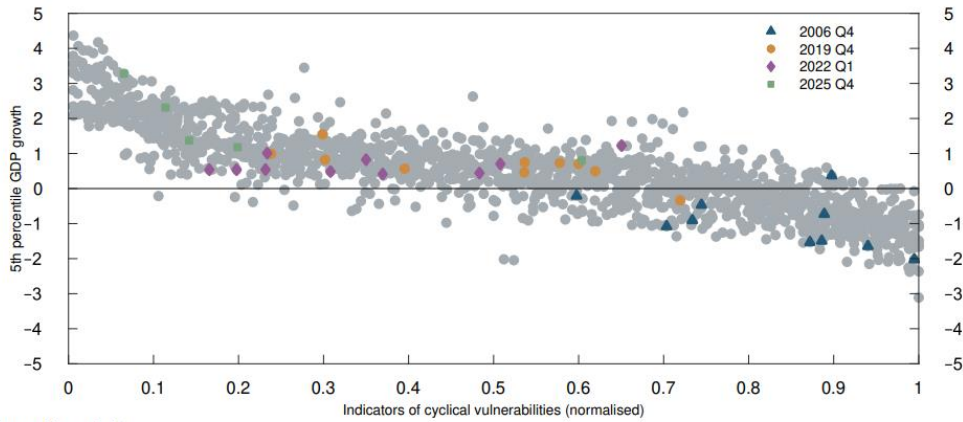
Reference rate calculations for the CCyB are based on the credit gaps in Chart 1.1 and follow international recommendations (Chart 1.30).

² See Arbatli-Saxegaard, Gerdrup and Johansen (2020)

³ See Arbatli and Johansen (2017).

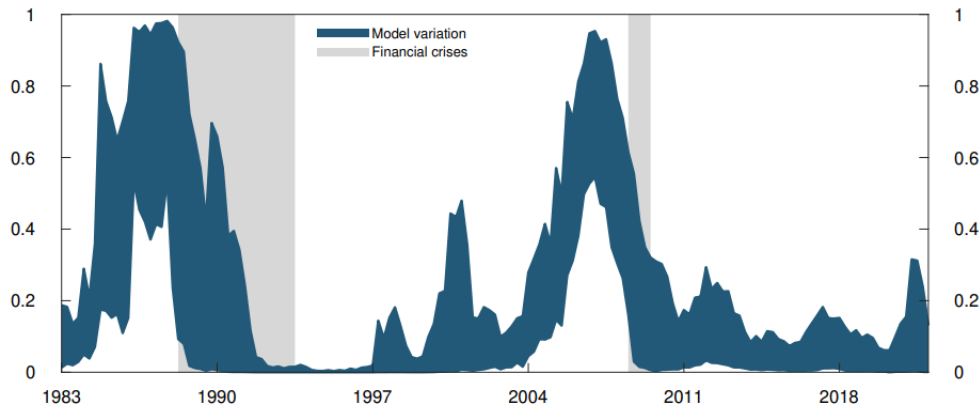
⁴ See Norges Bank (2014) and Anundsen et al (2016).

Chart 1.27 Linkages between cyclical vulnerabilities and GDP growth
 Indicators of cyclical vulnerabilities (normalised) on the horizontal scale and 5th percentile projections for GDP growth on the vertical scale.
 1985 Q1 – 2022 Q1. Predictions from 2022 Q2



Source: Norges Bank

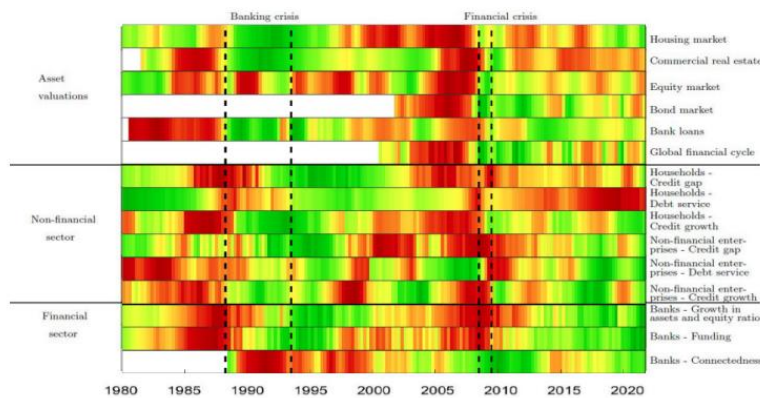
Chart 1.28 Estimated crisis probabilities based on various model specifications¹⁾
 1983 Q1 – 2022 Q1



¹⁾ Norges Bank has developed early warning models for financial crises based on credit and property price developments. The models are described in Monetary Policy Report 3/14 (page 40) and in Anundsen, A. K., K. Gerdrup, F. Hansen and K. Kragh-Sørensen (2016) "Bubbles and crises: The role of house prices and credit", Journal of Applied Econometrics, 31 (7), November/December, 1291-1311. Estimated crises probabilities are based on a large number of combinations of explanatory variables and trend estimation models.

Source: Norges Bank

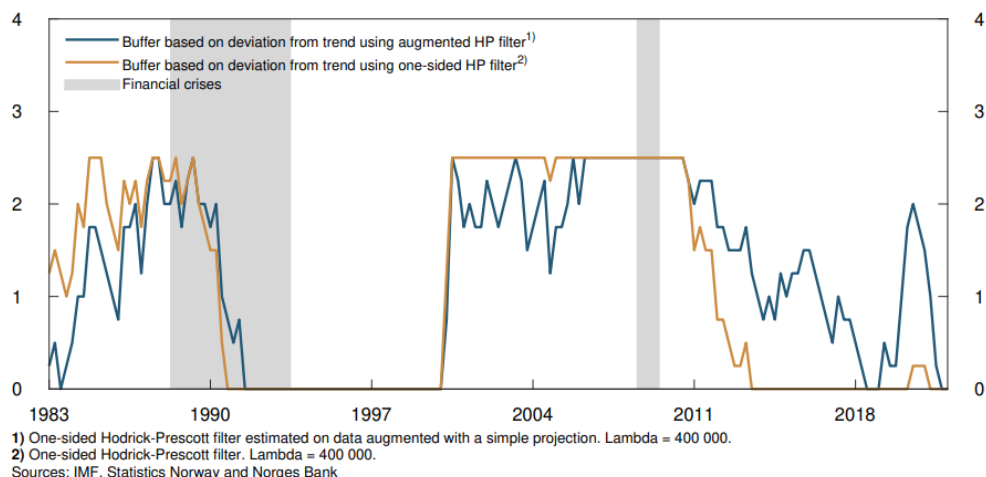
Chart 1.29 Composite indicators in the heatmap¹⁾
 1980 Q1 - 2022 Q1



¹⁾ The heatmap tracks developments in a broad range of indicators. Developments in each individual indicator are mapped into a common colour coding scheme, where green (red) reflects low (high) levels of vulnerability. Composite indicators are constructed by averaging individual indicators. For a detailed description of the heatmap and the individual indicators, see Arbatli, E.C. and R.M. Johansen (2017) "A Heatmap for Monitoring Systemic Risk in Norway". Staff Memo 10/2017. Norges Bank.

Sources: BIS, Bloomberg, Dagens Næringsliv, DNB Markets, Eiendomsverdi, Finn.no, Norwegian Association of Real Estate Agents (NEF), OECD, OPAK, Real Estate Norway, Statistics Norway, Thomson Reuters and Norges Bank

Chart 1.30 Reference rates for the countercyclical capital buffer under alternative trend estimates
Percent. 1983 Q1 – 2022 Q1



ii. Access to credit

In its assessment of access to credit, Norges Bank uses information on two main areas: (a) stress in financial markets and (b) bank credit standards.

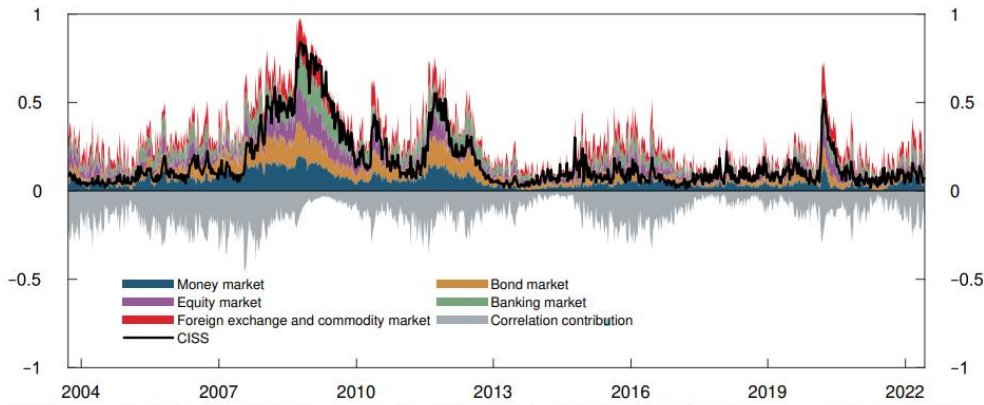
Stress in financial markets. Indicators of financial market stress provide information on the tightening of financial conditions. In this regard, developments in fixed income and equity markets can be useful indicators (Chart 1.21 and 1.22). The CISS indicator, which is a composite stress indicator, can shed light on vulnerabilities related to correlation and close interlinkages between markets (Chart 1.31).

Banking sector stress may be measured using different indicators, for example money market premiums (Chart 1.32), risk premiums on bonds issued by Norwegian and Nordic Banks, equity price developments in the banking sector and CDS prices for banks (Chart 1.33). Since banks from other Nordic countries have significant market shares in Norway, these banks must also be included in the assessment.

Stress in the corporate bond market can be measured by bond issuance (Chart 1.34) and risk premiums for investment grade and high-yield firms (Charts 1.25 and 1.26).

Chart 1.31 CISS indicator for Norway¹⁾

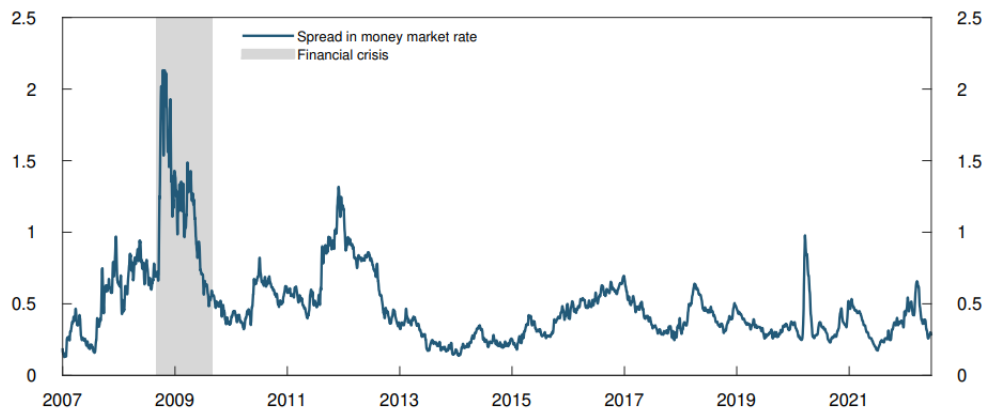
Week 38 2003 – week 23 2022



1) CISS, measured by the black line, is higher the more stress there is in the different market segments (the coloured areas above zero increases) and the more correlation there is between segments (the grey area below zero decreases). CISS is described in Monetary Policy Report 1/19 and Hagen, M. and P.M. Pettersen (2019) "An improved composite indicator of systemic stress (CISS) for Norway". Staff Memo 3/19. Norges Bank. Sources: Bloomberg, DNB Markets, Refinitiv Datastream and Norges Bank

Chart 1.32 Spread in Norwegian three-month money market rate¹⁾

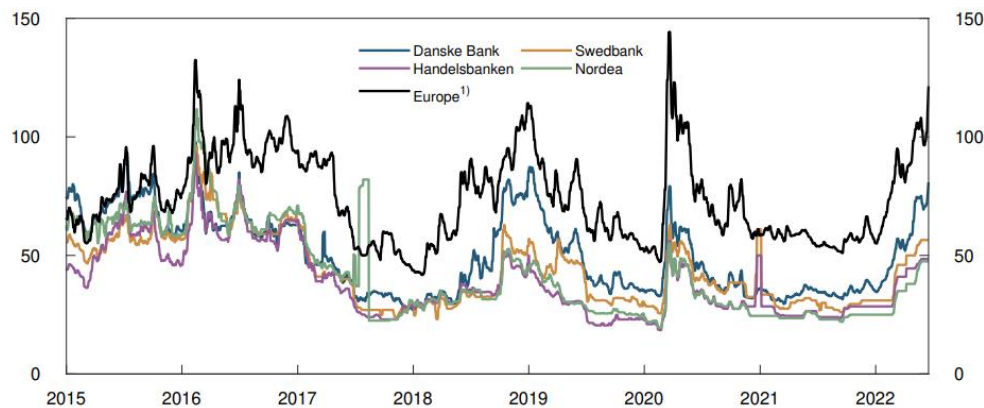
Five-day moving average. Percentage points. 1 January 2007 – 19 June 2022



1) Norges Bank's forecast of the difference between three-month money market rate and expected policy rate. Sources: Refinitiv Datastream and Norges Bank

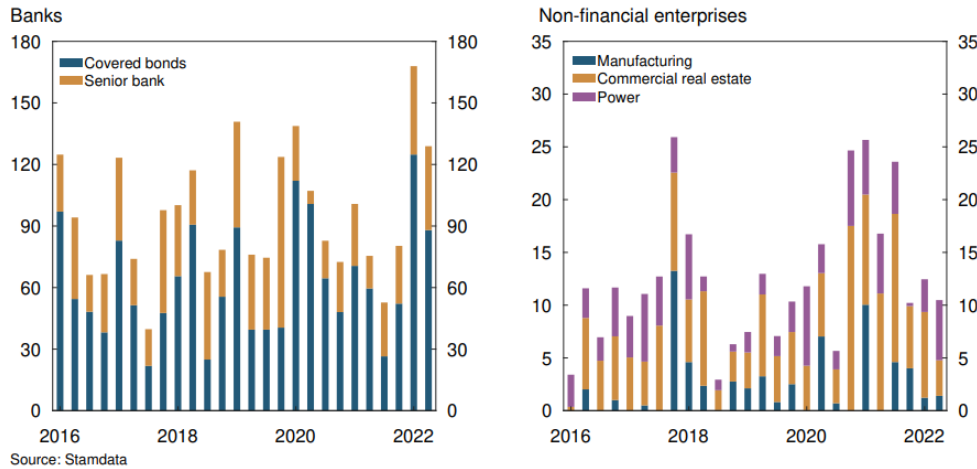
Chart 1.33 CDS prices for Nordic banks

Senior bonds. Five-year maturity. Five-day moving average. Basis points. 1 January 2015 – 17 June 2022



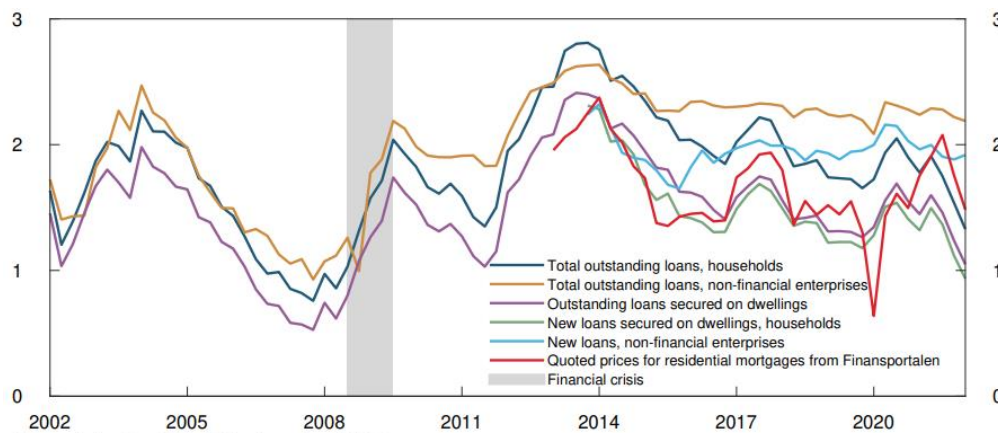
1) The Markit iTraxx Europe Senior Financial index. Source: Bloomberg

Chart 1.34 Bond market activity
In billions of NOK. Norwegian issuers



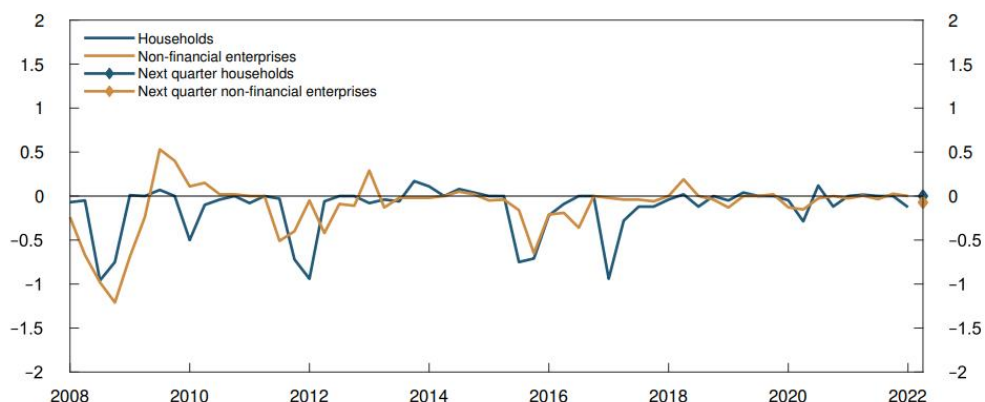
Banks' credit standards. Increased lending margins can be an indicator of a tighter credit supply (Chart 1.35). Developments in credit (to different sectors and from different sources) can, in combination with measures of banks' credit standards, such as eg from Norges Bank's Survey of Bank Lending (Chart 1.36), provide information on the financing conditions households and firms face. Other indicators of credit conditions, such as debt-to-income (DTI) and loan-to-value (LTV) ratios for new loans, eg from Finanstilsynet's (Financial Supervisory Authority of Norway) residential mortgage lending survey, will also be used.

Chart 1.35 Interest margin on loans from banks and mortgage companies
Percentage points over three-month Nibor. 2002 Q1 – 2022 Q1¹⁾



¹⁾ Quoted prices from 2013 Q1. New loans from 2013 Q4.
Sources: Finansportalen, Statistics Norway and Norges Bank

Chart 1.36 Banks' credit standards for households¹⁾ and enterprises²⁾
 Change from previous quarter.³⁾ Survey of bank lending. 2008 Q1 – 2022 Q2

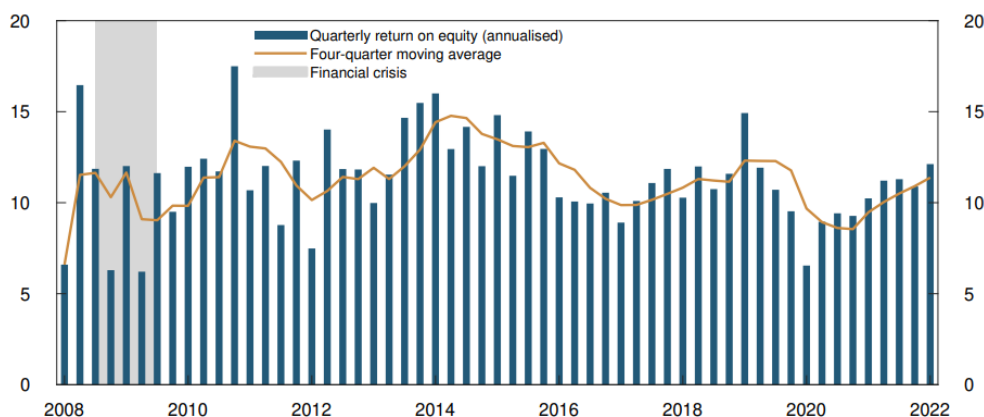


1) Residential mortgages.
 2) Total credit to non-financial enterprises.
 3) Scale: 2/1 = Much/somewhat easier to obtain credit, 0 = Approx. unchanged, -1/-2 = Somewhat/much tighter credit standards.
 Source: Norges Bank

Banks' capacity to absorb losses

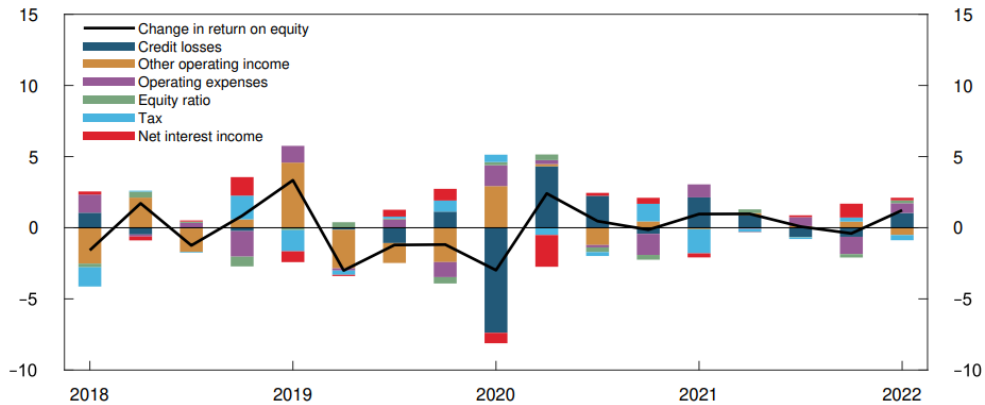
An assessment of banks' capacity to absorb losses will be based on banks' profitability, capital adequacy and losses. Banks' return on equity (Charts 1.37 and 1.38), capital adequacy (Chart 1.42), credit loss ratio (Chart 1.39) and impairment (Chart 1.40) can be used as indicators. Furthermore, stress tests that take into account cyclical vulnerabilities are important for shedding light on whether banks hold sufficient capital to meet a downturn with large losses without amplifying the downturn by tightening credit conditions (Chart 1.41).

Chart 1.37 Return on equity for large Norwegian banks
 Percent. 2008 Q1 – 2022 Q1



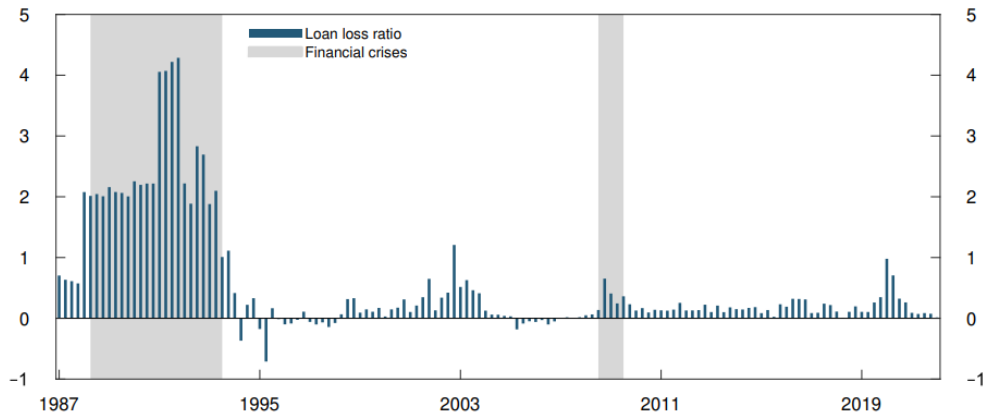
Sources: S&P Capital IQ and Norges Bank

Chart 1.38 Contributions to change in return on equity
 Large Norwegian banks.¹⁾ Percent. 2018 Q1 – 2022 Q1



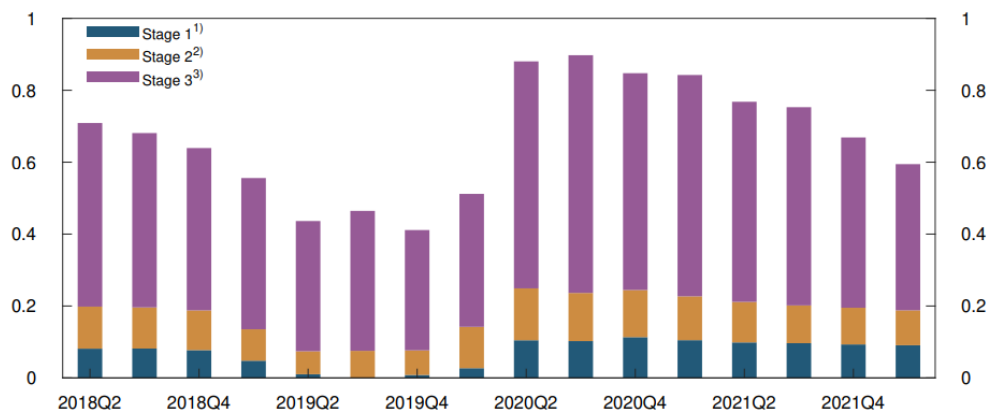
¹⁾ Weighted average of DNB, SP1 SR-Bank, Sparebanken Vest, SP1 SMN, Sparebanken Sør, SP1 Østlandet and SP1 Nord-Norge.
 Sources: Banks' quarterly reports and Norges Bank

Chart 1.39 Credit losses as a share of gross lending
 Annualised. All banks and mortgage companies in Norway. Percent.
 1987 Q1 – 2022 Q1¹⁾



¹⁾ Annual data on credit losses in the period to 1991. Annual values are divided equally over the quarters.
 Source: Norges Bank

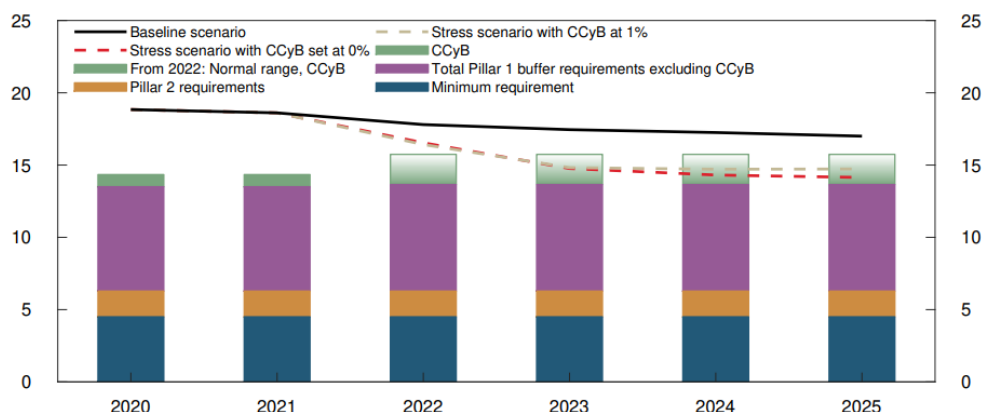
Chart 1.40 Impairment losses by stage under IFRS9
 Norway's 23 largest banks. Share of gross lending. Percent.
 2018 Q2 – 2022 Q1



¹⁾ Classification at initial recognition (performing loans)
²⁾ Significant increase in credit risk
³⁾ Significant increase in credit risk + objective evidence of impairment
 Sources: Banks' FINREP reporting and Finanstilsynet

Chart 1.41 Stress scenario in Financial stability 2021

Macro bank's capital requirements and CET1 ratio, baseline scenario and stress scenario. Percent



Sources: Banks' quarterly reports, Finanstilsynet (Financial Supervisory Authority of Norway), S&P Capital IQ and Norges Bank

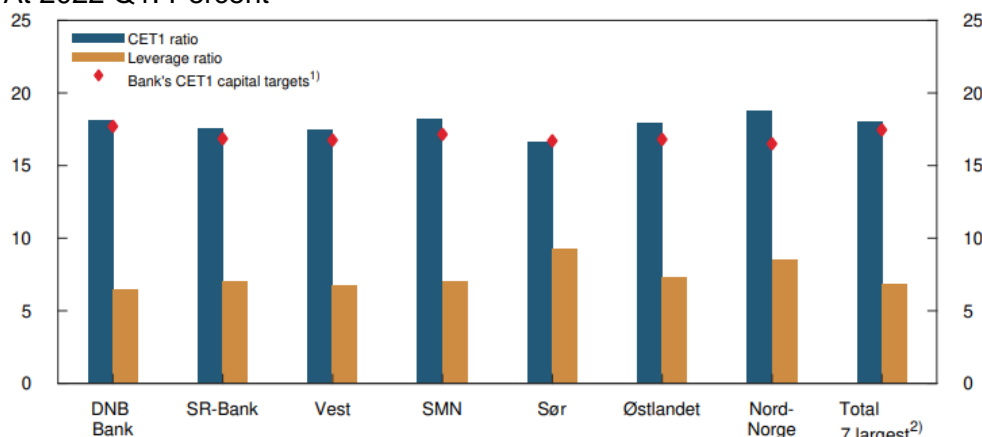
iii. Effects of a change in the CCyB rate on banks and the economy

When the CCyB rate is being increased, banks' needs for raising capital, adjusting their dividend policy or increasing earnings by raising the pricing of loans are assessed. This assessment may be based on banks' capital adequacy compared with their capital requirements (Chart 1.42), earnings, (Charts 1.37 and 1.38) and credit growth (Chart 1.6).

With a reduction in the CCyB rate, it is necessary to assess whether the reduction can be expected to have the intended effect and increase banks' willingness to lend to households and firms. Stress tests (Chart 1.41) can provide an indication of the magnitude of the potential effect of a lower CCyB rate on bank lending. In its assessments, Norges Bank will also use information about banks' liquidity and capital situation and other relevant market information.

Chart 1.42 Capital ratios in large Norwegian banks

At 2022 Q1. Percent



1) Capital targets are defined here as regulatory requirements at 31 March 2023 with a capital margin requirement.

2) Total 7 largest are a weighted average of the seven banks in the chart.

Sources: Banking groups' quarterly reports and Norges Bank

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