

NORGES BANK PAPER

Appendix for
Norges Bank Paper no. 4 | 2019:
«A framework for advice on the
countercyclical capital buffer»



NORGES BANK

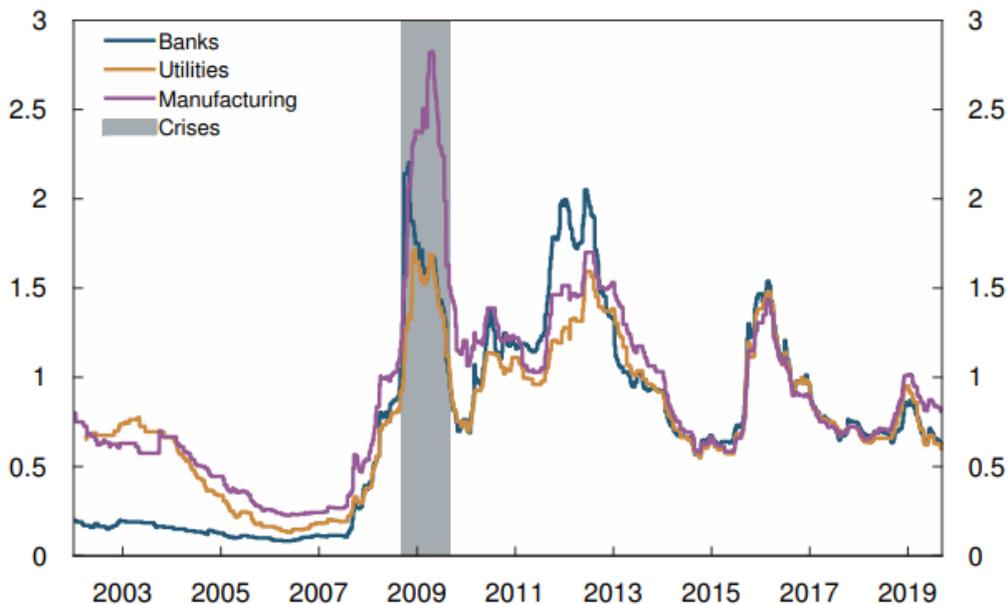
Indicators for assessing *financial imbalances and access to credit*

Assessment of financial imbalances

Norges Bank's assessments of financial imbalances can be divided into three main elements: (a) pricing of risk and lending conditions; (b) real estate market vulnerabilities; and (c) vulnerabilities in the household and corporate sectors. Norges Bank uses different indicators to assess these three elements. Indicators that will be used regularly are described below.

Pricing of risk and lending conditions. Persistently low bond market risk premiums may be a sign that financial market participants underestimate risks (Chart 1.1). Equity market developments (for example indicators of overvaluation and low volatility) may also be useful.

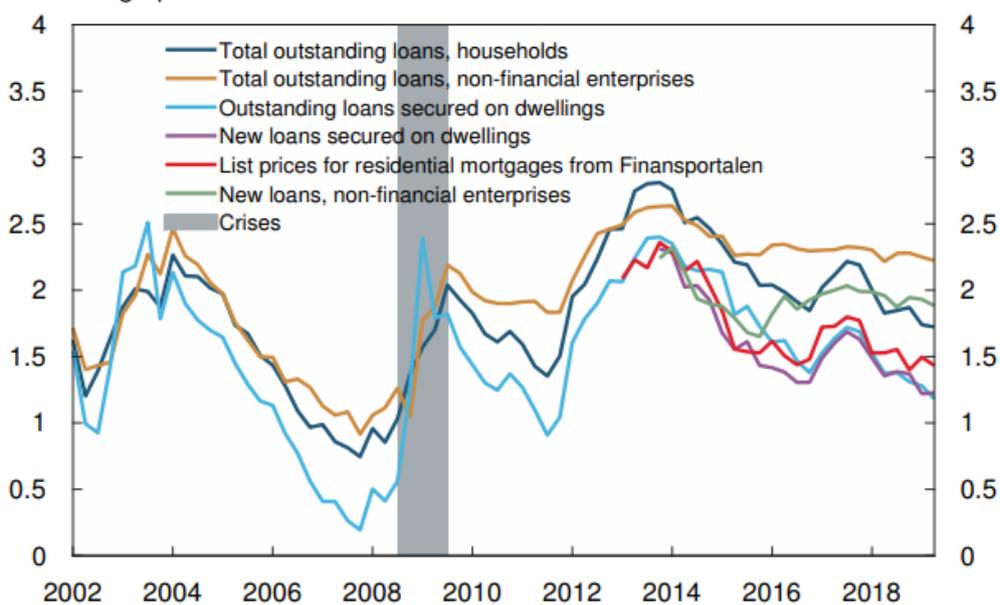
Chart 1.1 Bond market risk premium.¹⁾ Relative to three-month NIBOR. Investment grade. Five-year maturity. Percentage points. 2 January 2002 – 13 September 2019



1) Indicative risk premium on senior obligations with 5-year maturity issued by banks and enterprises with high investment grade (BBB- or better) in the industrial or utilities sectors.
Source: DNB Markets

Low lending margins may reflect strong competition between banks for borrowers and lenient lending conditions. Other indicators for lending conditions, such as credit standards measured in Norges Bank's lending survey, debt-to-income (DTI) and loan-to-value (LTV) ratios for new loans, for example from Finanstilsynet's residential mortgage lending survey, will also be used.

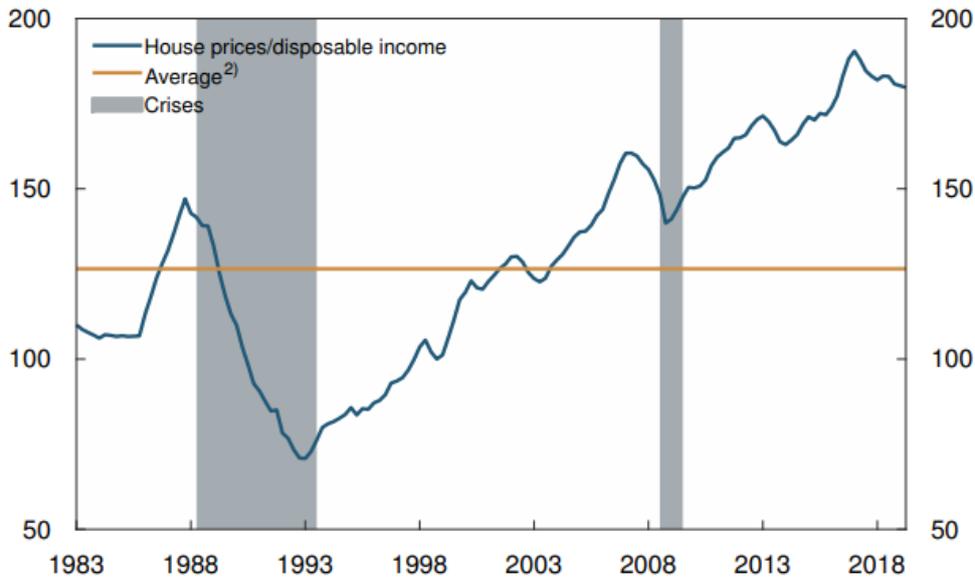
Chart 1.2 Interest margin on loans from banks and mortgage companies. Percentage point over 3-month NIBOR. 2002 Q1 – 2019 Q2



Sources: Statistics Norway and Norges Bank

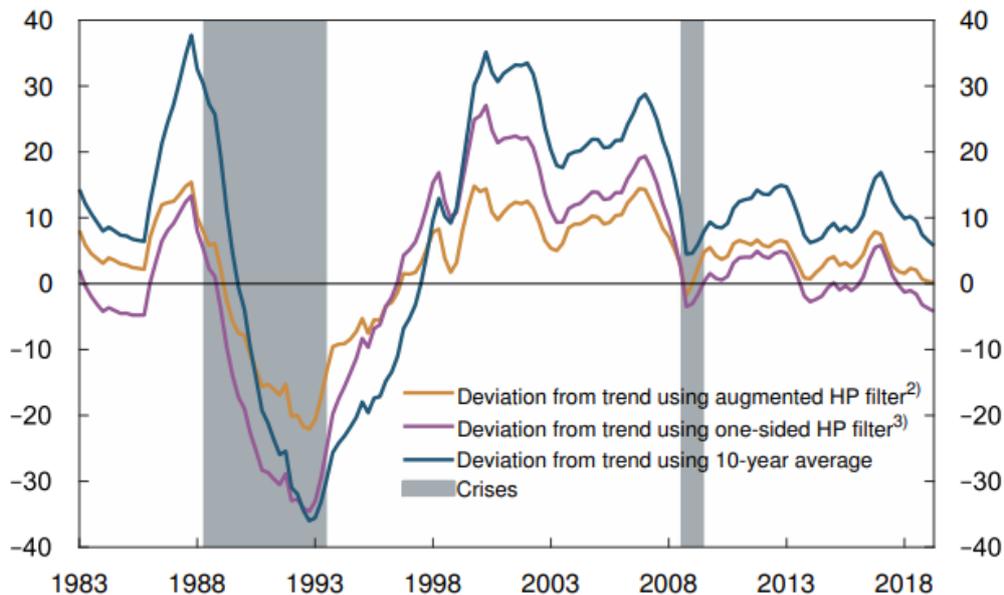
Real estate market vulnerabilities. Residential and commercial property prices have risen substantially ahead of periods of financial instability in Norway (Charts 1.3, 1.4, 1.5 and 1.6). Other indicators may also be used for assessing vulnerabilities in the real estate market. Data for housing starts and completions, population growth and housing market activity can provide information on further developments in house prices. In the same manner, required rates of return, vacancy rates and office rents may be used for assessing vulnerabilities in commercial real estate.

Chart 1.3 Ratio of house prices to disposable income¹⁾.
 Index. 1998 Q4 = 100. 1983 Q1 - 2019 Q2



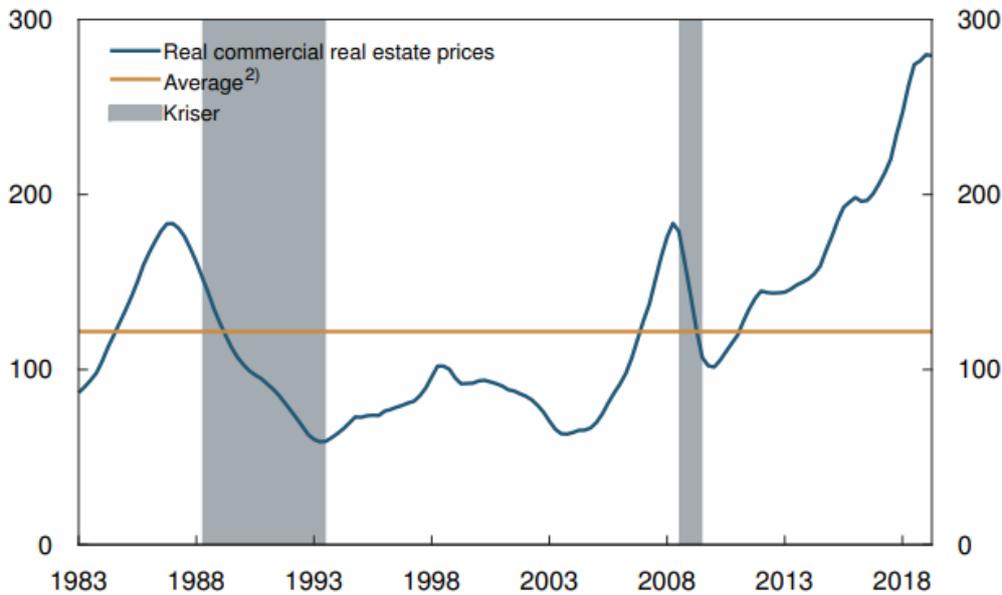
1) Disposable income per capita (aged 15-74). Disposable income is adjusted for estimated reinvested dividend income for 2000 Q1-2005 Q4 and reduction of equity capital for 2006 Q1 - 2012 Q3. From 2015Q1, growth in disposable income excluding dividend income is used. Forecast for disposable income for 2019 Q2. 2) Based on data from 1978 Q4 onwards
 Sources: Eiendomsverdi, Finn.no, Norwegian Association of Real Estate Agents (NEF), Real Estate Norway, Statistics Norway and Norges Bank

Chart 1.4 House price gap. Ratio of house prices to disposable income¹⁾.
 Deviation from estimated trends. Percent. 1983 Q1 - 2019 Q2



1) Disposable income per capita (aged 15-74). Disposable income is adjusted for estimated reinvested dividend income for 2000 Q1 - 2005 Q4 and reduction of equity capital for 2006 Q1 - 2012 Q3. From 2015 Q1, growth in disposable income excluding dividend income is used. The trends are estimated based on data from 1978 Q4 onwards. Forecast for disposable income for 2019 Q2. 2) One-sided Hodrick-Prescott filter estimated on data augmented with a simple projection. Lambda = 400 000. 3) One-sided Hodrick-Prescott filter. Lambda = 400 000.
 Sources: Eiendomsverdi, Finn.no, Norwegian Association of Real Estate Agents (NEF), Real Estate Norway, Statistics Norway and Norges Bank

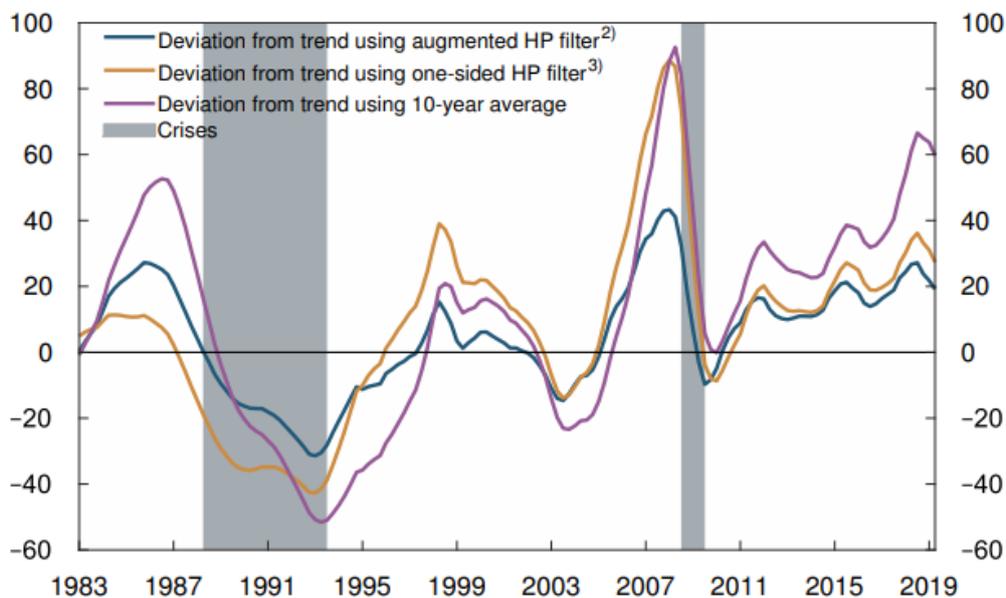
Chart 1.5 Real commercial real estate prices.¹⁾ Index. 1998 = 100. 1983 Q1 – 2019 Q2



1) Estimated real selling prices per square metre for prime office space in Oslo. Deflated by the GDP deflator for mainland Norway. Average selling prices for the past four quarters. 2) Based on data from 1981 Q3 onwards.

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

Chart 1.6 Commercial property price gap. Real commercial property prices as deviation from estimated trends.¹⁾ Percent. 1983 Q1 – 2019 Q2



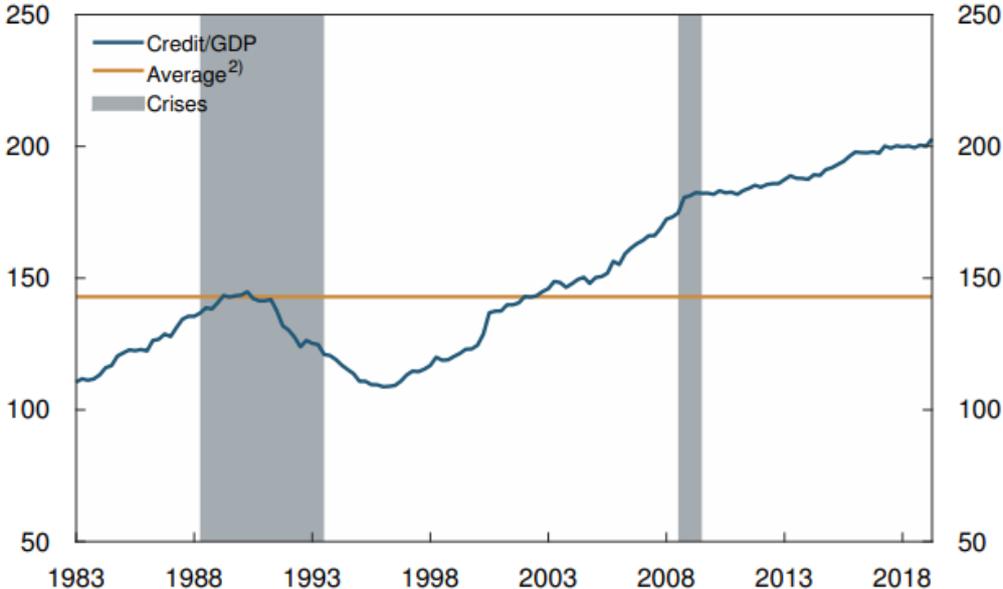
1) Estimated real selling prices per square metre for prime office space in Oslo. Deflated by the GDP deflator for mainland Norway. The trends are estimated based on data from 1981 Q3 onwards. 2) One-sided Hodrick-Prescott filter estimated on data augmented with a simple projection. Lambda = 400 000. 3) One-sided Hodrick-Prescott filter. Lambda = 400 000.

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

Vulnerabilities in corporate and household sectors. Total credit-to-GDP ratio (and measured against alternative trend estimates) is a key indicator (Charts 1.7 and 1.8) set out in the Regulation on the Countercyclical Capital Buffer. It is, however, also important to look at the breakdown of credit by borrower groups (different groups of households and enterprises) and source (banks, bond market, foreign) (Chart 1.9). Households' and enterprises' savings and net lending may also shed light on whether credit developments are sustainable (Charts 1.10 and 1.11). The wholesale funding ratio can also be used to assess credit developments. In periods where banks' lending growth exceeds deposit growth, banks must raise a larger share of their funding directly in financial markets.

The 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 1.12).

Chart 1.7 Credit¹⁾ mainland Norway as a share of mainland GDP. Percent. 1983 Q1 - 2019 Q2

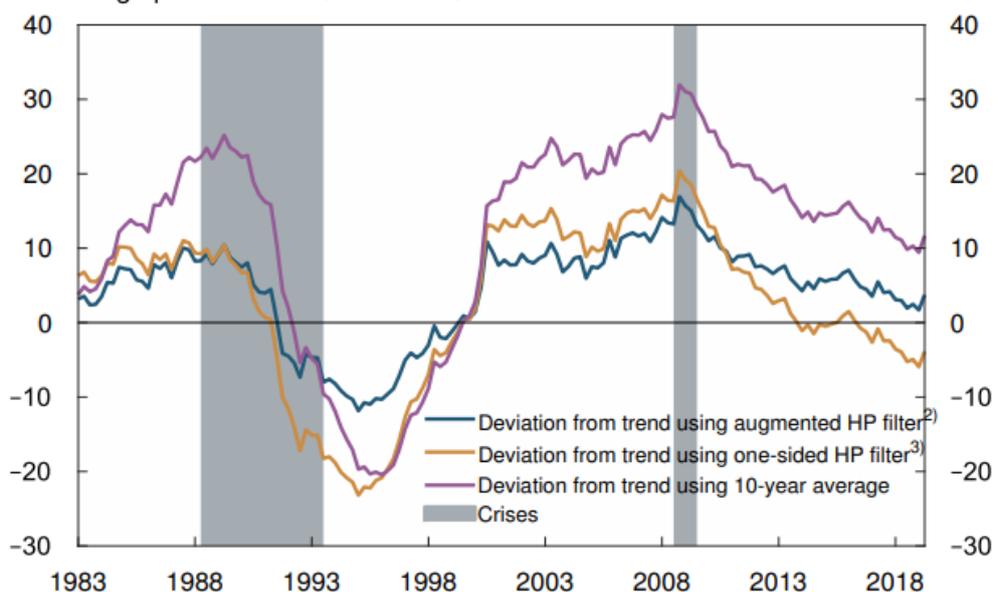


1) The sum of C2 households and C3 non-financial enterprises for mainland Norway (all non non-financial enterprises pre-1995), C3 non-financial enterprises comprises C2 non-financial enterprises and foreign debt for mainland Norway. 2) Based on data from 1975 Q4 onwards. Sources: IMF, Statistics Norway and Norges Bank

Chart 1.8 Credit gap. Credit mainland Norway as a share of mainland GDP.

Deviation from estimated trends.¹⁾

Percentage points. 1983 Q1 – 2019 Q2

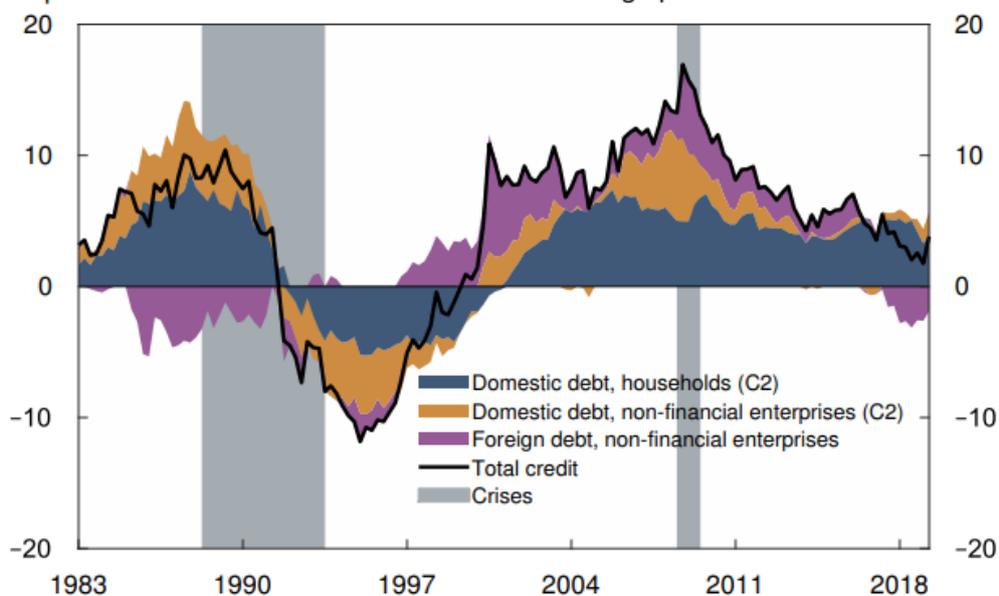


1) The sum of C2 households and C3 non-financial enterprises for mainland Norway (all non-financial enterprises pre-1995), C3 non-financial enterprises comprises C2 non-financial enterprises and foreign debt for mainland Norway. The trends are estimated based on data from 1975 Q4 onwards. 2) One-sided Hodrick-Prescott filter estimated on data augmented with a simple projection. Lambda = 400 000. 3) One-sided Hodrick-Prescott filter. Lambda = 400 000.

Sources: IMF, Statistics Norway and Norges Bank

Chart 1.9 Decomposed credit gap. Credit as a share of GDP. Mainland Norway.

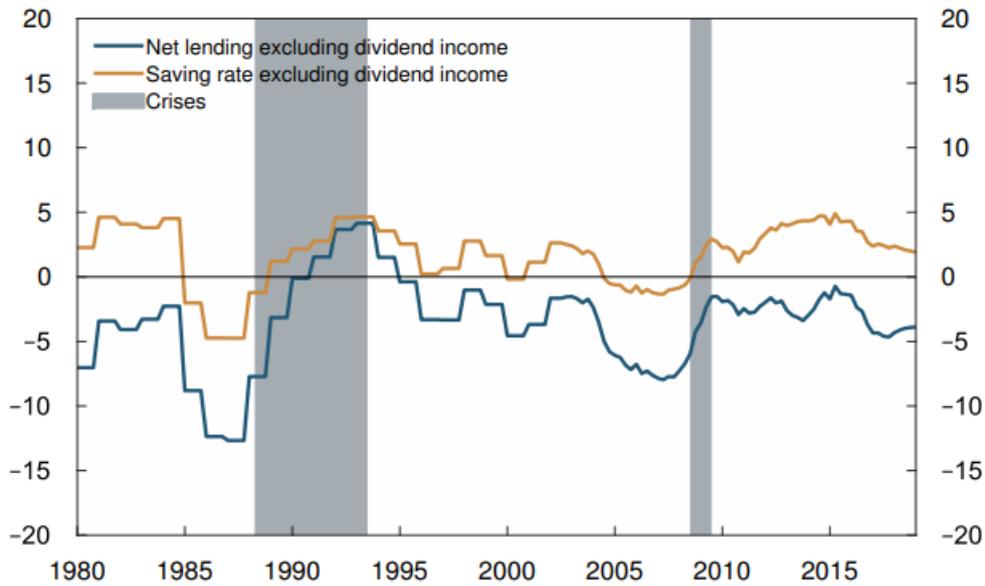
Gap calculated as deviation from trend.¹⁾ Percentage points. 1983 Q1 – 2019 Q2



1) One-sided Hodrick-Prescott filter estimated on data augmented with a simple projection.

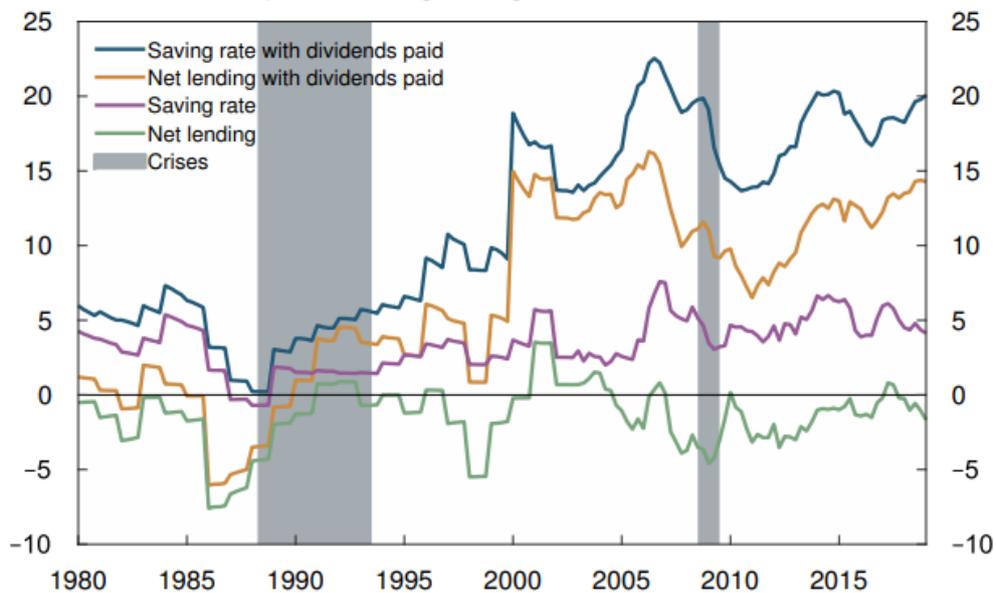
Sources: IMF, Statistics Norway and Norges Bank

Chart 1.10 Households' saving and net lending.^{1) 2)} Share of disposable income. Four-quarter moving average. Percent. 1980 Q1 – 2019 Q1



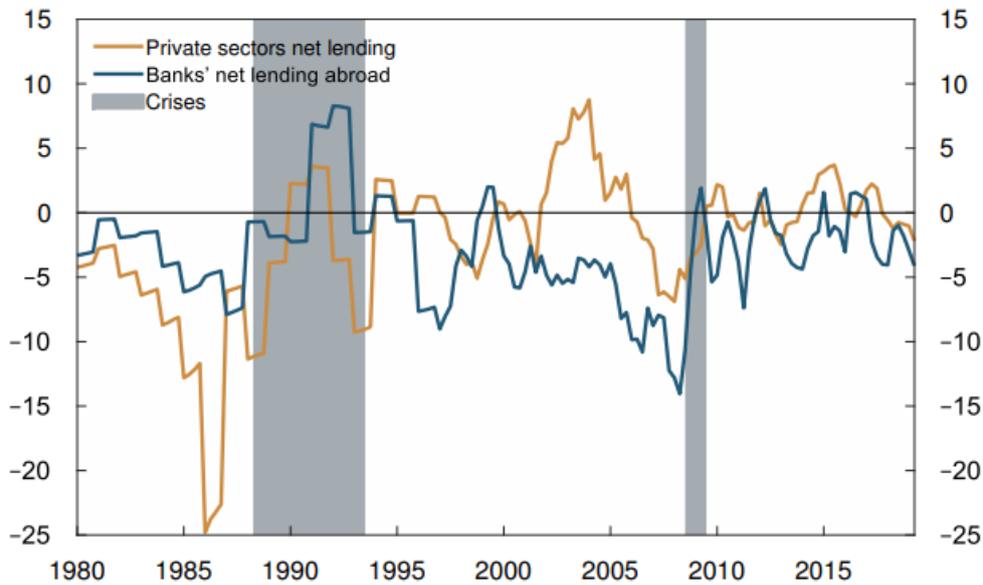
1) Saving and net lending of households and non-profit institutions serving households. Saving and net lending is adjusted by excluding dividend income received. Disposable income is adjusted by excluding dividend income received and adding savings in pension funds. 2) Annual data before 2002.
Sources: Statistics Norway and Norges Bank

Chart 1.11 Non-financial enterprises' saving and net lending.^{1) 2)} Share of GDP. Four-quarter moving average. Percent. 1980 Q1 – 2019 Q1



1) Saving and net lending of non-financial enterprises. Saving and net lending is adjusted by adding dividends paid. 2) Annual data before 2002.
Sources: Statistics Norway and Norges Bank

Chart 1.12 Private sector's net lending¹⁾ and banks' net lending abroad. Share of GDP.²⁾ Four-quarter moving average. Percent. 1980 Q1 – 2019 Q2

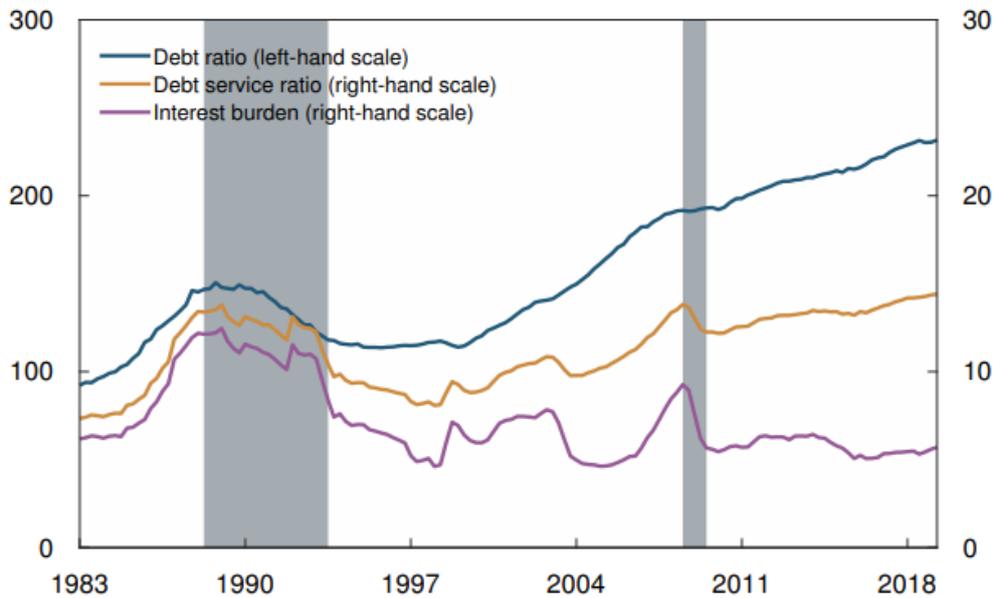


1) Total net lending minus net lending of the public sector. 2) Annual data before 2002
Sources: Statistics Norway and Norges Bank

Debt-servicing capacity can be assessed using both an aggregate estimate of debt servicing costs (comparison of the current level with historical developments) (Chart 1.13 and 1.14), and measures of debt at risk based on studies of individual household and enterprise 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. 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).

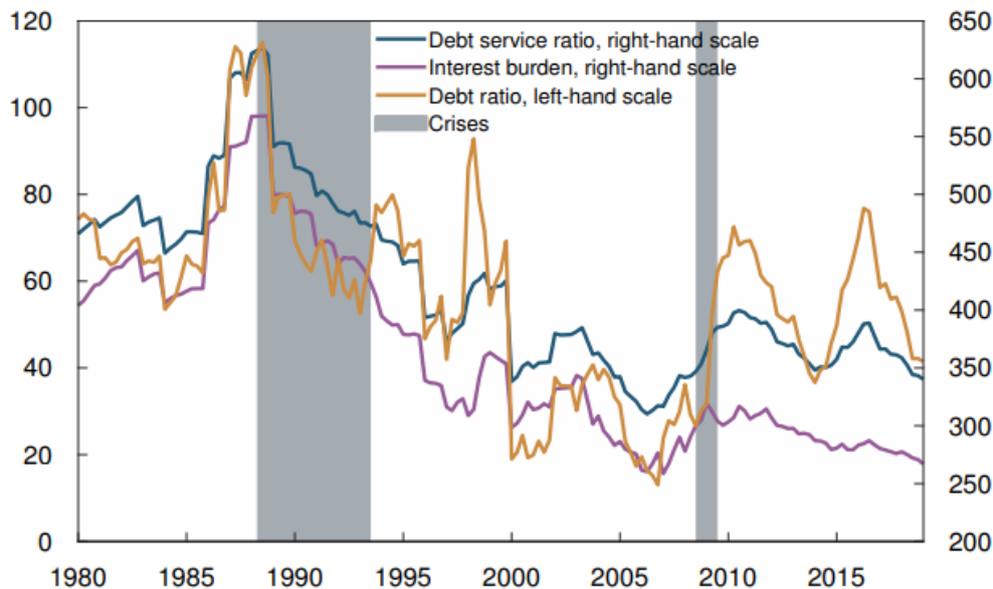
Chart 1.13 Household debt ratio¹⁾, debt service ratio²⁾ and interest burden³⁾. Percent. 1983 Q1 – 2019 Q2⁴⁾



1) Loan debt as a percentage of disposable income. 2) Ratio of interest payments and estimated principal payments to the sum of disposable income and interest payments. 3) Interest expenses as a percentage of disposable income plus interest expenses. 4) Projections for disposable income for Q2 2019.

Sources: Statistics Norway and Norges Bank

Chart 1.14 Non-financial enterprises' debt ratio¹⁾, debt service ratio²⁾ and interest burden³⁾. Percent. 1980 Q1 – 2019 Q1



1) Loan debt as a percentage of disposable income, dividends paid and interest expenses. 2) Interest expenses and estimated principal payments as a percentage of disposable income plus dividends paid and interest expenses. 3) Interest expenses as a percentage of disposable income plus dividends paid and interest expenses.

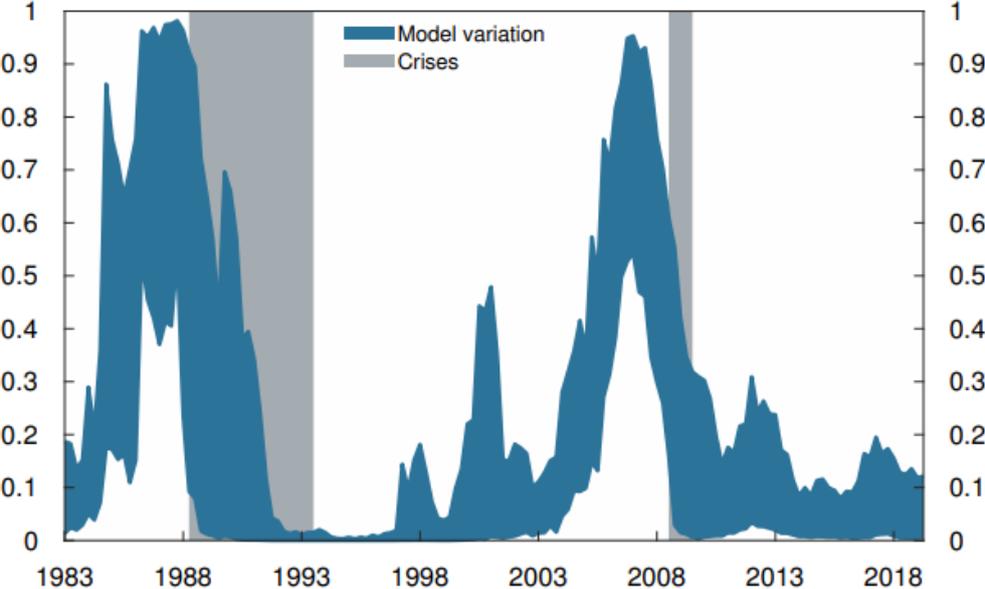
Sources: Statistics Norway and Norges Bank

Norges Bank also uses model-based and composite indicators to assess financial imbalances. Norges Bank has developed an early warning model for financial crises based on a large number of combinations of explanatory variables and trend estimation models

(Chart 1.15).² Norges Bank has also developed a ribbon heatmap as a tool for assessing systemic risk in the financial system in Norway (Chart 1.16)³.

The heatmap 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.

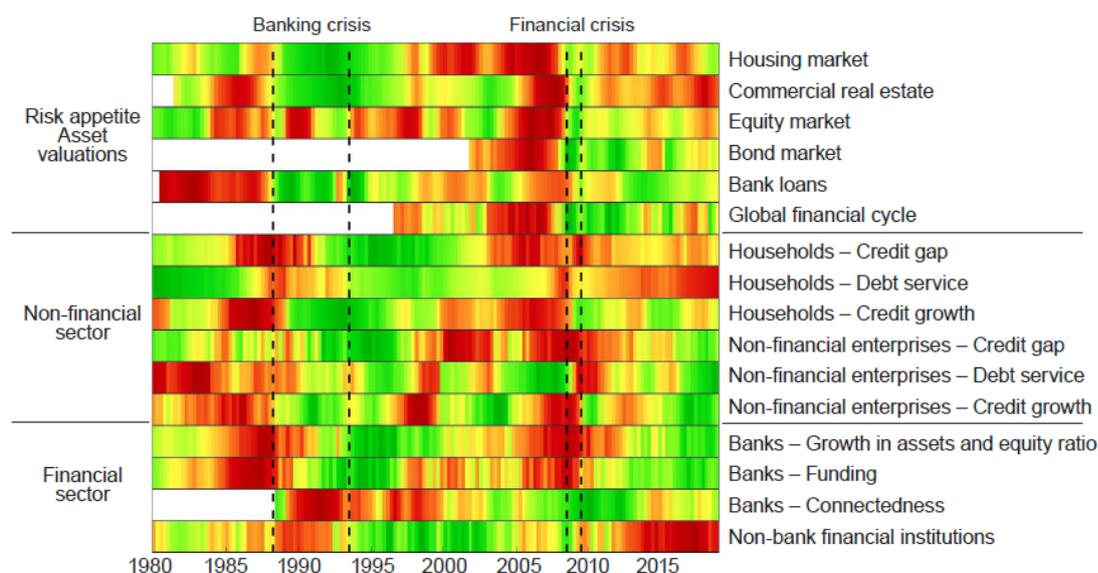
Chart 1.15 Estimated crisis probabilities based on various model specifications.¹⁾ 1983 Q1 – 2019 Q2



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

² See Norges Bank (2014) and Anundsen et al. (2016).
³ See Arbatli and Johansen (2017).

Chart 1.16 Composite indicators in the heatmap.¹⁾ 1980 Q1 - 2019 Q2



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 discussion 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, CBRE, Dagens Næringsliv, DNB Markets, Eiendomsverdi, Finn.no, Norwegian Association of Real Estate Agents (NEF), OECD, OPAK, Real Estate Norway, Statistics Norway, Thomson Reuters Datastream and Norges Bank

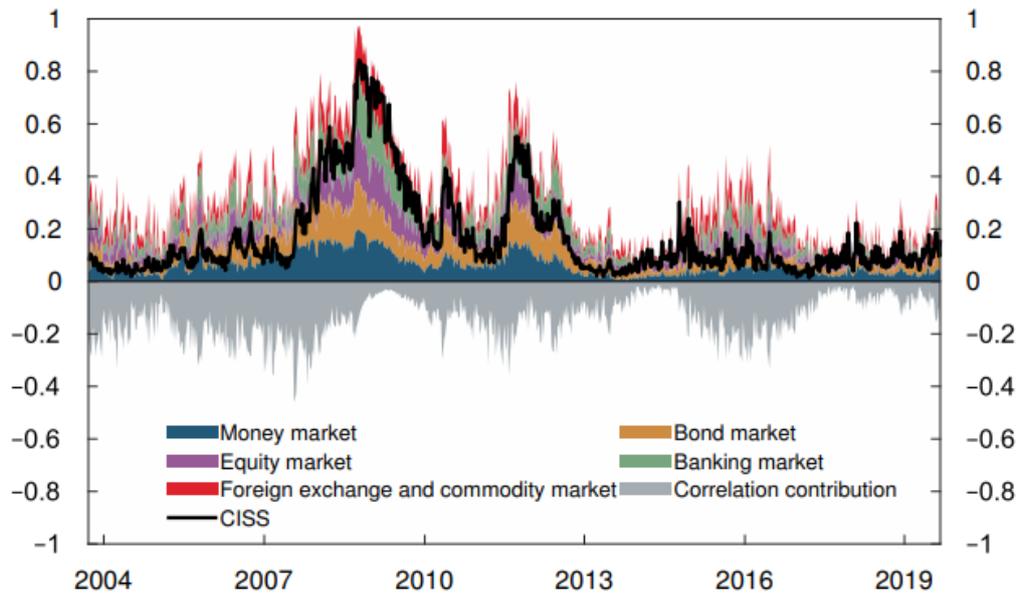
Assessment of access to credit

Norges Bank examines indicators in three different areas to establish an overall assessment of access to credit: (a) stress in financial markets; (b) developments in credit and credit practices; and (c) banks' profitability.

Financial market stress. Indicators of financial market stress (for example, risk premiums) provide information on the tightening of financial conditions. The CISS indicator, which is a composite stress indicator, can shed light on vulnerabilities related to correlation and close interlinkages between markets (Chart 1.17).⁴ Banking sector stress may be measured by a number of indicators, for example money market premiums (Chart 1.18), risk premiums on bonds issued by Norwegian and Nordic banks, equity price developments in the banking sector and CDS prices for Nordic banks (Chart 1.19). Since banks from other Nordic countries have significant market shares in Norway, these banks should also be included in the assessment.

⁴ See Hagen and Pettersen (2019).

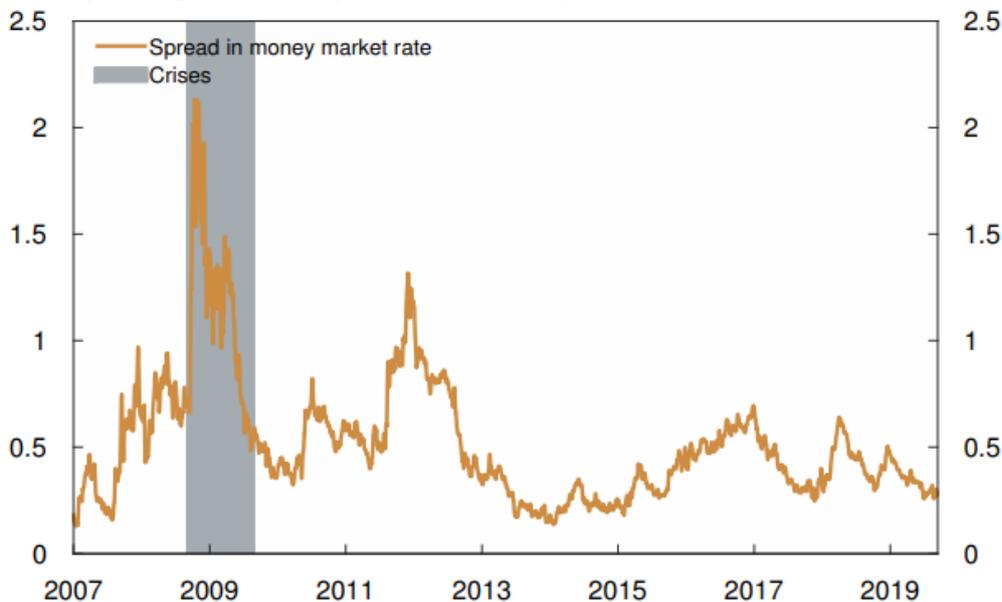
Chart 1.17 CISS indicator for Norway.¹⁾ Week 38 2003 – week 36 2019



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, Thomson Reuters Datastream and Norges Bank

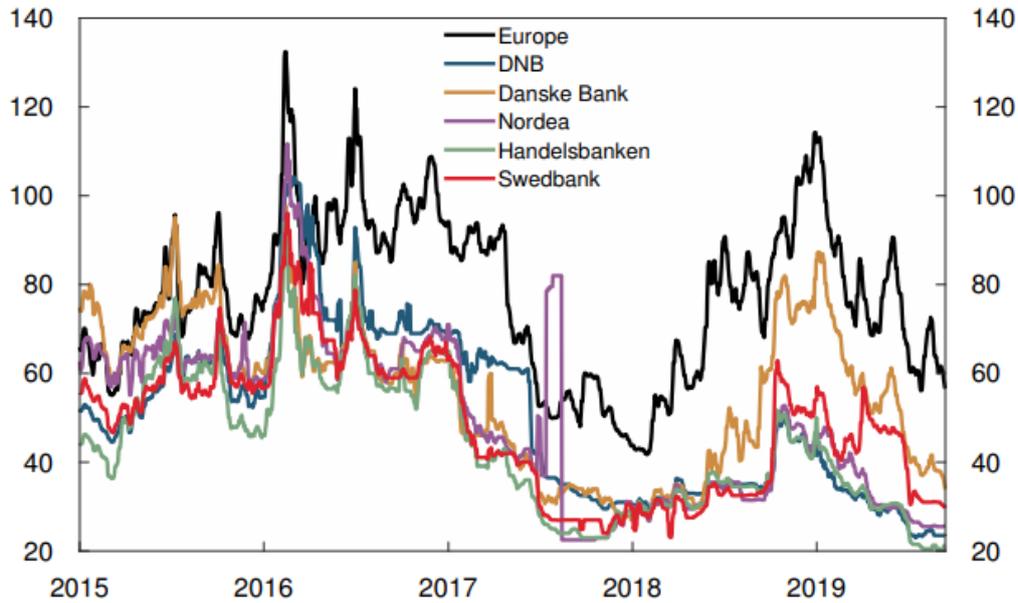
Chart 1.18 Spread in Norwegian three-month money market rate.¹⁾ Five-day moving average. Percentage points. 1 January 2007 – 13 September 2019



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

Sources: Thomson Reuters and Norges Bank

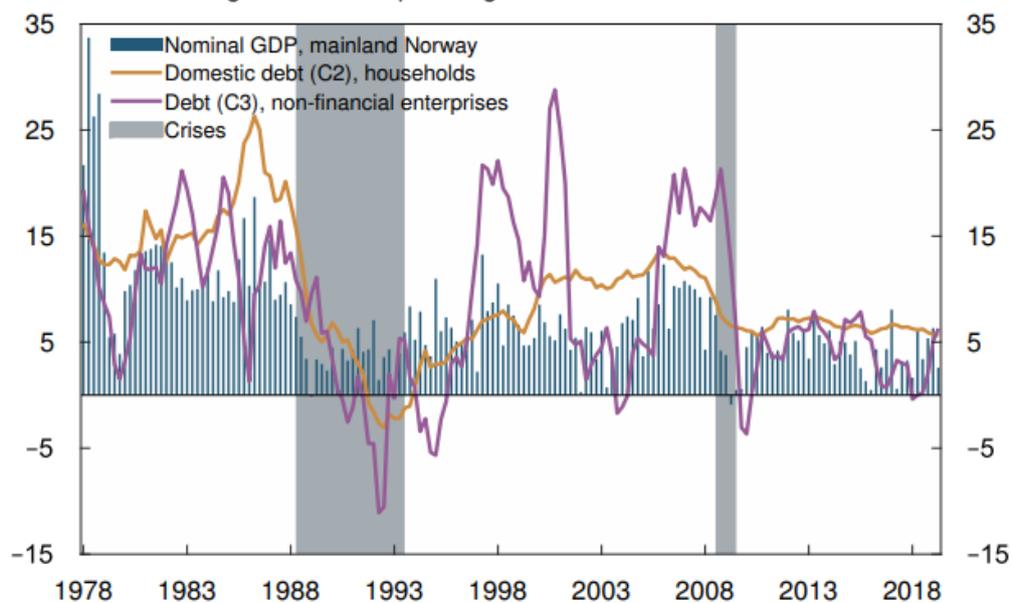
Chart 1.19 CDS prices for Nordic banks. Senior bonds. Five-year maturity. Five-day moving average. Basis points. 1 January 2015 – 13 September 2019



Source: Bloomberg

Developments in credit and credit practices. Higher lending margins may be an indicator of a tighter credit supply (Chart 1.2). Developments in credit (to different sectors and from different sources) may, combined with a measures of banks' credit practices such as in Norges Bank's lending survey, provide information about financing conditions faced by households and enterprises (Chart 1.20).

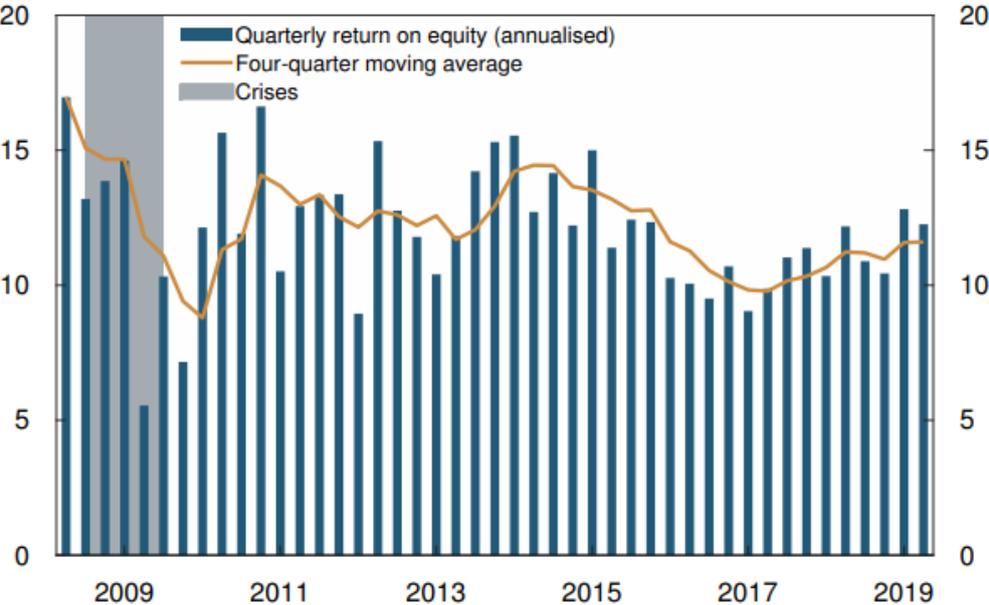
Chart 1.20 Credit growth. Four-quarter growth. Percent. 1978 Q1 – 2019 Q2



Sources: Statistics Norway and Norges Bank

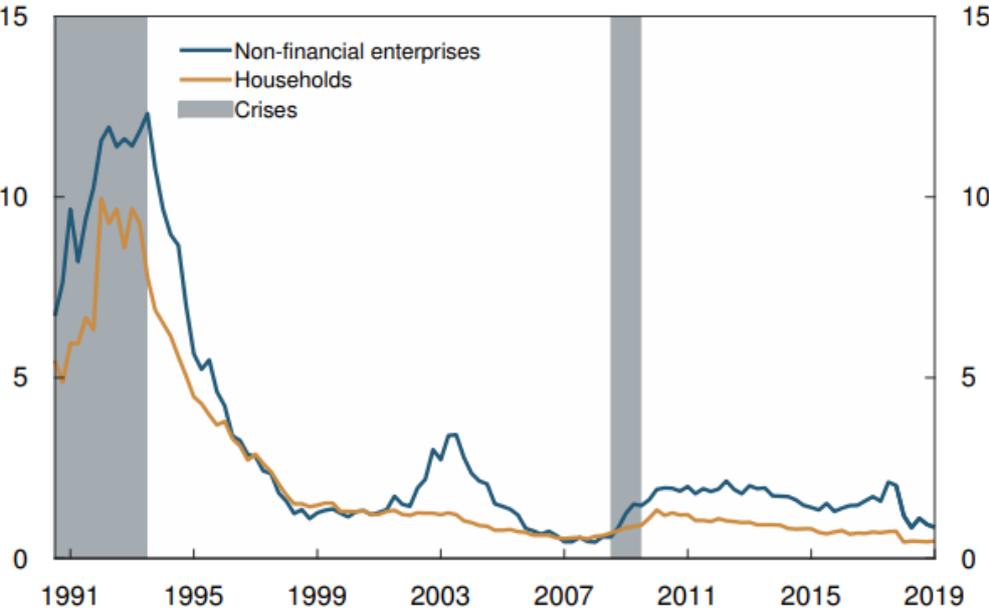
Banks' profitability. If bank losses increase or are expected to increase, capital requirements can be a binding constraint for lending. In such situations banks will probably reduce their lending activity. Return on equity (Chart 1.21), share of non-performing loans (Chart 1.22), loan losses (Chart 1.23) and losses on securities along with developments in capital ratios (Chart 1.24) may be used to assess banks' profitability.

Chart 1.21 Return on equity for large Norwegian banks. Percent. 2008 Q2 – 2019 Q2



Sources: Banks' quarterly reports and Norges Bank

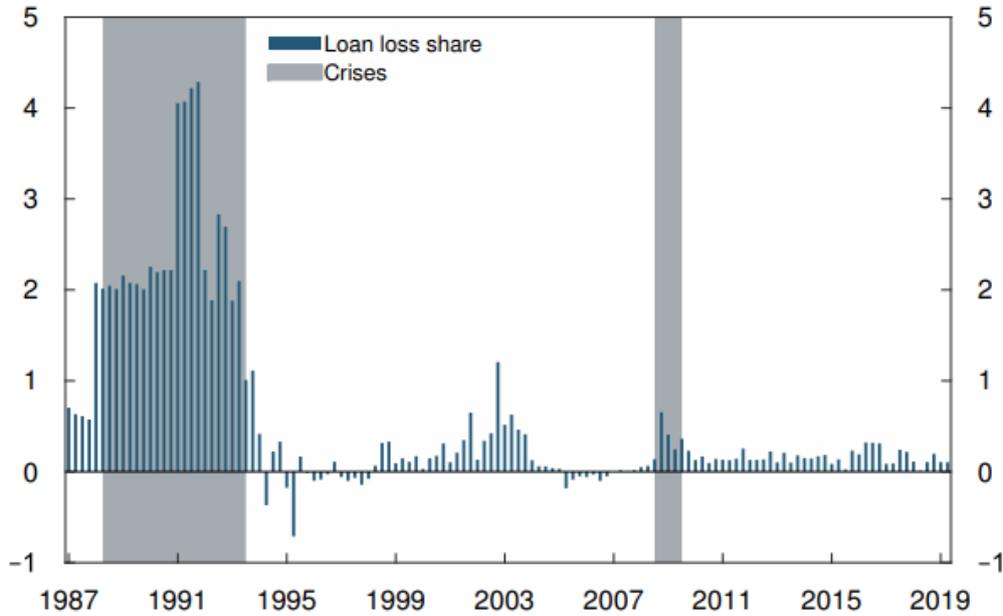
Chart 1.22 Non-performing loans as a percentage of total loans.¹⁾ All banks and mortgage companies in Norway. 1990 Q3 – 2019 Q1



1) Break in the definition of non-performing loans in Q4 2009 and Q1 2018. From 2018 onwards, only non-performing loans according to the 90-day definition are included.

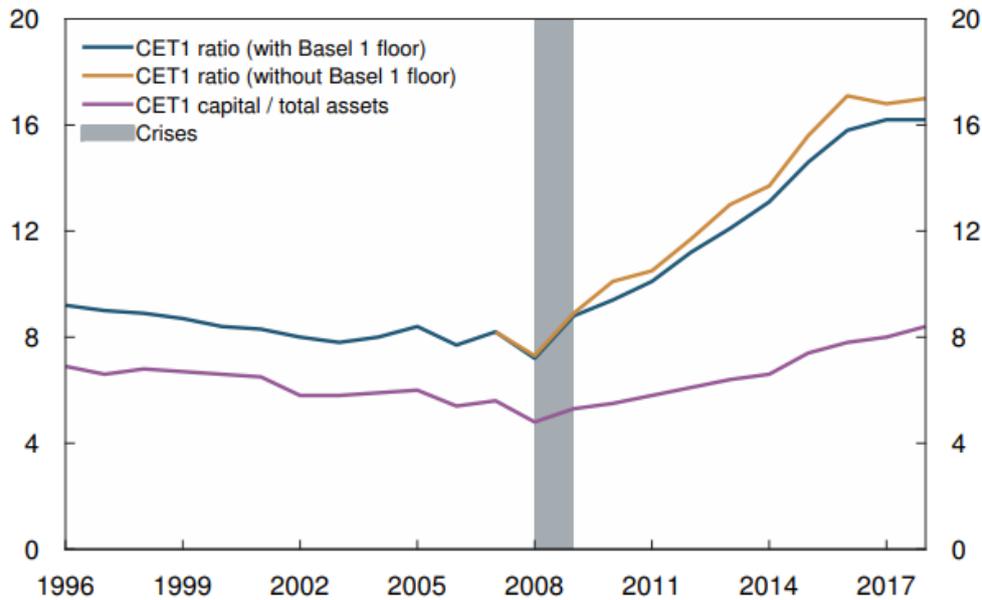
Source: Norges Bank

Chart 1.23 Loan losses as a share of total loans. Annualised. All banks and mortgage companies in Norway. Percent. 1987 Q1 – 2019 Q2



1) Annual data up to and including 1991. Annual values are divided equally over the quarters.
Source: Norges Bank

Chart 1.24 Norwegian banks' Common Equity Tier 1 (CET1) capital ratios. Share of risk-weighted assets and total assets.¹⁾ Percent. 1996 – 2018



1) Consolidated figures where applicable. Parent banks otherwise. Nordea has been removed from the historical series owing to its conversion to a branch in 2017.
Source: Finanstilsynet (Financial Supervisory Authority of Norway)

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