

STAFF MEMO

How much CET1 capital must banks set aside for commercial real estate exposures?

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NORGES BANK

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Henrik Andersen¹

The Ministry of Finance has proposed a temporary capital requirement (risk weight floor) for commercial real estate (CRE) exposures in Norway, applicable to the largest banks. CRE is the sector where banks have historically incurred the largest losses during crises. Since CRE loan losses are low in normal times, capital requirements for CRE loans should be based on losses incurred during crises. My calculations suggest that the level of capital required with the proposed risk weight floor is high enough to cover banks' CRE loan losses² during the downturn in 2002-03, but lower than the CRE loan losses incurred during the banking crisis of 1988-93. This also applies if I assume that the profit generated by CRE loans cover some of the losses. On the other hand, risk weight floors should not be set to a level that weakens banks' incentives to provide low-risk loans, implying that such minimum requirements should not be set too high. This will be of particular importance for lending segments where credit risk varies widely, such as the CRE market. All in all, this suggests that the proposed minimum requirement is at a reasonable level.

Banks, capital requirements, loan losses, commercial real estate, credit risk.

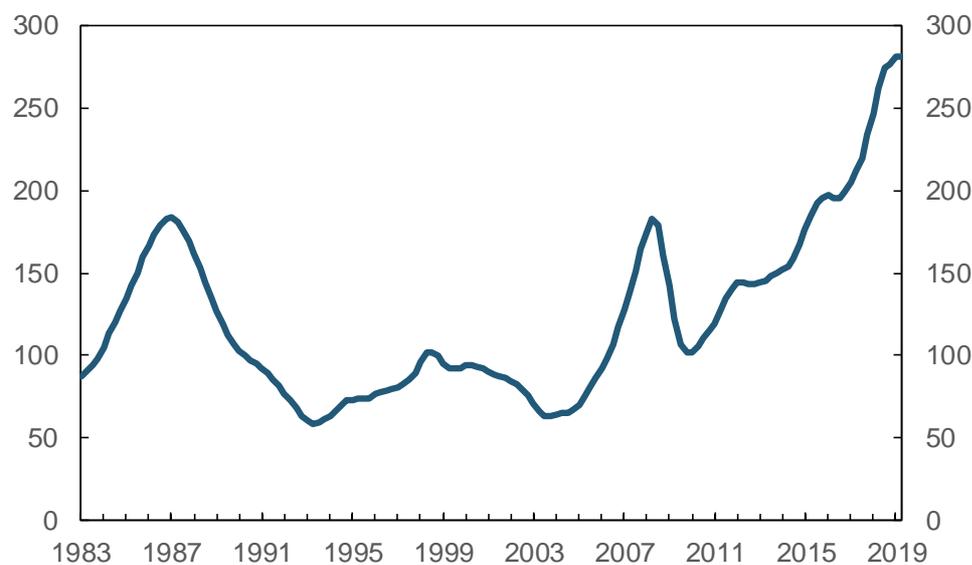
¹ The views and conclusions expressed in this publication are the author's own and do not necessarily reflect and must not be reported as those of Norges Bank. I thank Martin Andersen (DNB), Roar Hoff (DNB), Marius Hagen, Veronica Harrington, Torbjørn Hægeland, Dag Henning Jacobsen (Finance Norway), Joar Johnsen (Finance Norway), Kjell Bjørn Nordal, Sverre Krog (DNB), Haakon Solheim, Norman Spencer, Lars-Tore Turtveit, Sindre Weme and Hanna Winje for their comments and input.

² Loss ratios at that time multiplied by loan volume at end-2018.

Introduction

The purpose of this memo is to analyse how much capital banks must set aside for CRE exposures and the resiliency of banks to CRE loan losses. High commercial property prices are one of the most important sources of vulnerability in the Norwegian financial system (Chart 1). CRE is the sector where banks have historically incurred the largest losses during crises. As CRE loans currently account for almost half of banks' exposures to Norwegian enterprises, it is important that banks set aside sufficient capital for their CRE loans.

Chart 1 Real CRE prices.¹ Index. 1998 = 100. 1983 Q1 – 2019 Q2



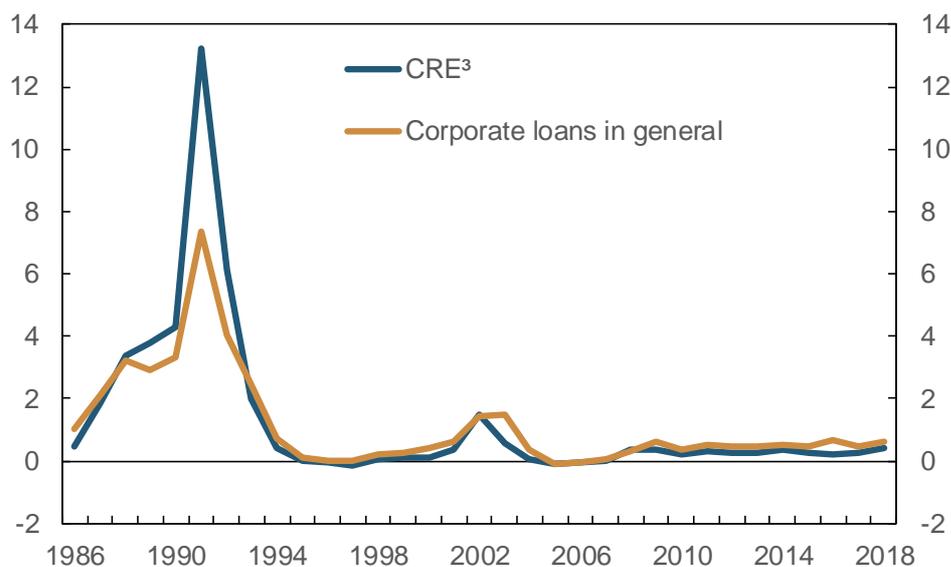
1) Calculated real selling price per square metre for prime office space in Oslo. Deflated by the GDP deflator for mainland Norway. Average selling price over previous four quarters.

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

The CRE market is dominated by enterprises leasing property to the office, retail trade, hotel and logistics segments. As there are wide differences between these segments, credit risk will also vary. The debt-servicing capacity of CRE enterprises primarily depends on the rental market, which is in turn influenced by supply and demand in the CRE market.

Demand in the commercial real estate market depends on developments in other sectors and industries. Historically, CRE revenues have been cyclically sensitive, and CRE loan losses have been high in periods of high losses in other industries (Chart 2).

Chart 2 Banks¹ losses² on corporate loans. As a share of total gross loans. Percent. 1986 – 2018

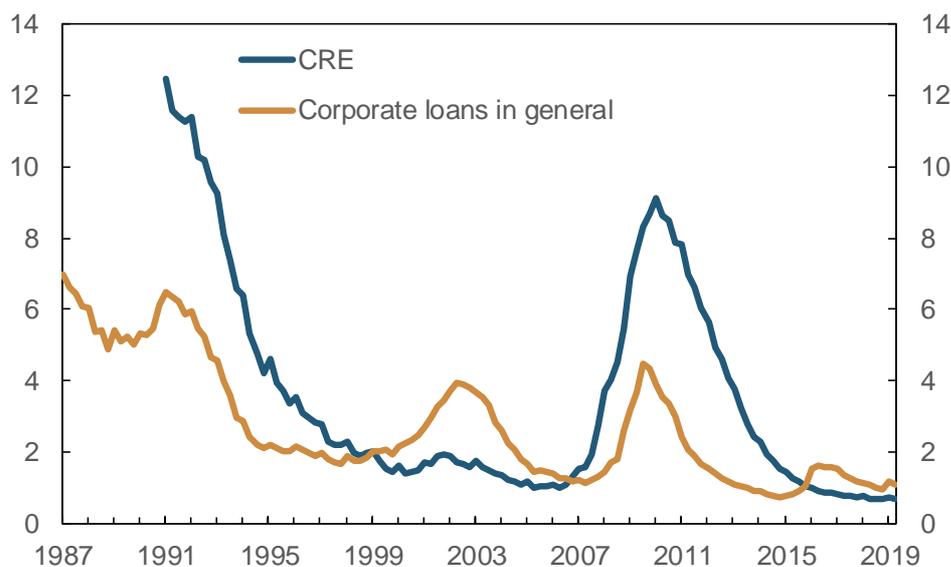


- 1) All banks in Norway as from 1996. Pre-1996 loss ratios calculated using data from all the commercial banks and the largest savings banks.
- 2) Recorded losses excluding changes in collective impairments/unspecified loan loss provisions.
- 3) Property management and commercial services.

Source: Norges Bank

Losses on CRE loans have been low in normal times, but high in times of crisis both in Norway and in other countries (Charts 2 and 3). Loan losses incurred by Norwegian banks were highest in the CRE segment during the banking crisis, but since then CRE loan losses as a share of total loans (loan loss ratio) have been among the lowest in banks' loan portfolios. Since severe downturns are a seldom occurrence, banks may be underestimating the risk. This suggests that assessments of capital requirements for CRE loans should give considerable weight to losses incurred during crises. Finanstilsynet (Financial Supervisory Authority of Norway) requires that banks' capital requirements are based on experience from the banking crisis and that banks take into account uncertainty in the data.

Chart 3 Non-performing corporate loans for the US. As a share of total gross loans. Percent. 1987 Q1 – 2019 Q2



Sources: FRED Database, Federal Reserve Bank of St. Louis

In this memo, I compare CRE loan losses during downturns and crises with the capital set aside by banks for CRE exposures and their estimated profit from these loans. Section 2 presents banks' capital requirements and the parts of the capital adequacy framework that are relevant to the analysis. Section 3 provides an overview of the data set. Section 4 calculates how much capital banks must set aside for CRE exposures, while Section 5 compares this capital with CRE loan losses during the 2002-03 downturn and the banking crisis. Section 6 discusses challenges related to the calculations and Section 7 concludes.

2. Banks' capital requirements

A bank's capital adequacy is calculated by dividing the bank's capital by its risk-weighted assets, expressed as a percentage:

$$\text{Capital adequacy ratio} = \frac{\text{Capital}}{\text{Risk-weighted assets}}$$

The numerator in the capital adequacy ratio formula, ie the bank's capital, consists of different qualities of capital. Banks must maintain minimum capital ratios of common equity tier 1 (CET1) capital, Tier 1 capital and Tier 2 capital (subordinated debt).³ This memo assesses the

³ CET1 capital is the bank's common equity capital with some deductions for intangible assets such as goodwill and deferred tax assets. Tier 1 capital comprises CET1 capital and other approved Tier 1 capital. Tier 2 capital consists of Tier 1 capital and supplementary capital.

required level of CET1 capital, which is the capital that is written down first when a bank operates at a loss.

Banks calculate the denominator in the capital adequacy ratio formula, ie risk-weighted assets, by assigning risk weights to their assets (exposures). The higher the risk of loss on an asset, the higher its risk weight should be. Risk weights are intended to reflect the risk of unexpected losses. Expected losses are reflected in lending margins and are covered by operating income.

The largest banks use internal risk models to calculate risk weights for their exposures (the IRB approach), while smaller banks use more general, standardised risk weights set by the authorities (the standardised approach). The IRB approach assumes that there is no perfect correlation between losses on individual exposures, ie that the probability of a loss does not increase on all exposures at the same time and that high losses in one segment can be absorbed wholly or in part by capital set aside for another segment.⁴ This assumption results in lower risk weights.

The rules for risk weighting provide the basis for banks' capital requirements under Pillar 1. Pillar 1 requirements also include capital requirements for operational risk and market risk.

Risks not covered under Pillar 1 should be covered by Pillar 2 requirements set by Finanstilsynet. Pillar 2 requirements consist of a formal requirement and a soft requirement. Finanstilsynet lays down the formal requirement by individual decision. In addition, Finanstilsynet expects banks to adjust their capital ratios to ensure a solid margin of CET1 capital above the minimum requirement. This is referred to as the soft Pillar 2 requirement.

Banks' total capital adequacy requirements, ie the Pillar 1 and Pillar 2 requirements, vary across banks. There are two reasons for this. First, DNB is the only bank required to satisfy the buffer requirements for systemically important banks under Pillar 1. Second, Pillar 2 requirements vary across banks.

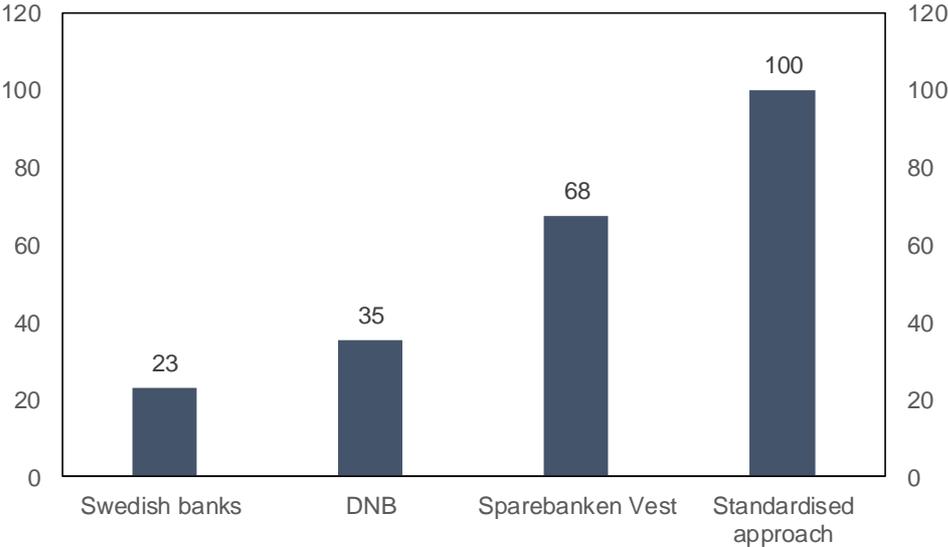
The total amount of capital a bank must hold is given by the requirements for capital adequacy, risk weighting of assets and capital requirements for operational risk and market risk. In addition, the Basel 1 transitional floor raises capital requirements for most Norwegian IRB banks.⁵ The Basel I floor will likely be removed from Norwegian capital adequacy rules towards the end of 2019.

⁴ The IRB approach assumes that banks diversify away idiosyncratic risk. The IRB approach only includes the correlation between individual exposures and a systemic risk factor.

⁵ The Basel 1 floor requires banks to maintain risk-weighted assets at a minimum of 80 percent of risk-weighted assets as calculated under the Basel 1 rules.

Risk-weighting of commercial real estate exposures varies widely (Chart 4). The risk weights that banks use for their CRE exposures range from 100 percent for standardised approach banks to a 23 percent average risk weight for the large Swedish banks. The Norwegian IRB banks are somewhere in between. Danske Bank and Nordea do not report risk weights by industry. Among Norwegian IRB banks, only DNB and Sparebanken Vest report risk weights by industry.

Chart 4 Banks' average risk weights for CRE exposures. Percent. End of 2018



Sources: Banks' Pillar 3 reports and Finansinspektionen

There may be several reasons for the wide variation in risk weights for CRE exposures. One reason may be differences in the composition of banks' portfolios. The CRE market is heterogeneous and credit risk varies widely across both segments⁶ and borrowers. Loans to enterprises with strong debt-servicing capacity and high collateral values will naturally be assigned risk weights that are considerably lower than loans to enterprises with weak debt-servicing capacity and low collateral values. Some banks have borrowers with lower credit risk than other banks, and consequently lower risk weights, because they have higher risk aversion or their risk management is better.

Another reason for the wide variation in risk weighting of CRE exposures may be that banks apply different methods and risk models, resulting in different risk weights for comparable exposures. This is one of the reasons why the European Banking Authority (EBA) is working to harmonise supervisory practices for approving and monitoring IRB

⁶ For example, lease contracts in the retail and hotel segment differ from office leases in that the rent is often linked to the tenant's turnover. Turnover volatility can therefore have a direct impact on the owner's rental income. The cost of changing premises also varies across segments. For hotels, changing premises is costly, and both tenants and owners probably operate with a longer-term perspective than those in other segments of the CRE market.

models (see EBA, 2017a and EBA, 2017b). In addition, the authorities in a number of European countries have introduced risk weight floors. The Swedish supervisory authority's preliminary assessment is that the average risk weight for CRE loans should be increased to at least 30 percent (see Finansinspektionen, 2019). The Norwegian supervisory authority, Finanstilsynet, requires banks' IRB models to be based on their experience during the banking crisis and uncertainty in the underlying data to be taken into account. Furthermore, the Ministry of Finance has proposed a temporary average risk weight floor of 35 percent for the IRB banks' CRE exposures in Norway (see Ministry of Finance, 2019).

The proposed risk weight floor for CRE exposures would not have impacted Norwegian IRB banks' capital ratios at the end of 2018 (Chart 4). Swedish banks, however, were below the proposed floor at the end of 2018, while standardised approach banks are well above.

The capital adequacy rules for banks are intended to promote sound risk management. Risk weights must therefore as far as possible reflect the actual risks associated with a bank's operations. If low risk weights are assigned to the safest loans, and vice versa, banks have an incentive to restrict their lending to high-risk borrowers or increase lending margins on these loans. Risk weights that reflect actual risk can thereby reduce vulnerabilities in the financial system. Hence, risk weight floors should not be set to a level that weakens banks' incentives to provide low-risk loans. This suggests that such minimum requirements should not be set too high.

3. Data

The calculations in this memo use data from several different sources. Banks' own disclosures provide information on profitability, capital levels, risk weights and risk-weighted assets for different subgroups. In addition, Finanstilsynet and Finansinspektionen publish capital requirements under Pillar 1 and Pillar 2 on their websites.

The banking statistics⁷ contain data back to 1987 for total bank losses and lending to the corporate market in Norway. Loss ratios by industry back to 1986 are calculated using data in the ORBOF banking statistics, in Official Norwegian Report (NOU) 1992:30 and in several issues of Norges Bank's series *Economic Bulletin* (see Andersen and Winje, 2017, for a description of how these time series are calculated).

⁷ See banks' and financial undertakings' financial reporting to the Norwegian authorities [Offentlig regnskapsrapportering for banker og finansieringsforetak (ORBOF)] <https://www.ssb.no/innrappoterinq/naeringsliv/orbof> (Norwegian only).

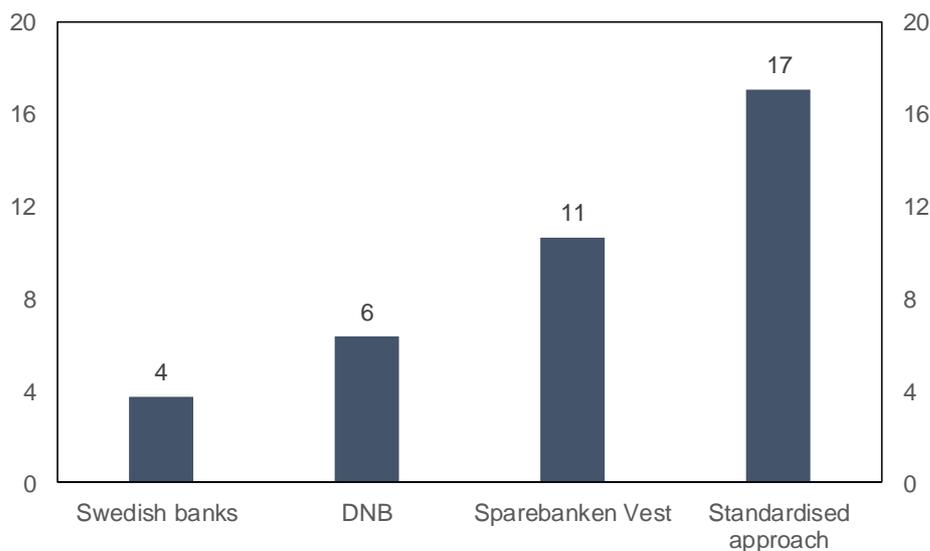
4. Banks' capital for CRE loans

The CET1 capital banks need to hold to absorb losses on CRE loans can be estimated by multiplying banks' total CET1 capital requirement by the average risk weight on CRE exposures and then adding a requirement for operational risk.⁸ If a bank has a total CET1 capital requirement of 15 percent and a requirement for operational risk of 8 percent, the proposed floor of 35 percent implies that close to 6 percent of the financing for CRE exposures must be CET1 capital:

$$15 \text{ percent} * 1.08 * 35 \text{ percent} = 5.7 \text{ percent}$$

The estimated percentage of CET1 capital banks hold for CRE exposures varies from 4 percent for the Swedish banks to 17 percent for Norwegian standardised approach banks (Chart 5). The percentages differ because the banks have different risk weights and capital adequacy requirements.

Chart 5 Estimated percentage of CET1 capital banks set aside for CRE exposures.¹ Percent. End of 2018



1) Estimated percentages include capital requirements under Pillars 1 and 2, including the operational risk requirement. Standardised approach banks' formal Pillar 2 requirements have been calculated as an equally weighted average for 79 Norwegian standardised approach banks (2.8 percent). The soft Pillar 2 requirement is assumed to be 1 percent for Norwegian banks. CRE exposures are assumed to account for the same percentage of Pillar 2 requirements as Pillar 1 requirements. The calculation does not include effects of the Basel 1 floor as the floor is likely to be removed from the Norwegian rules towards the end of 2019.

Sources: Banks' Pillar 3 reports, Finansinspektionen and Finanstilsynet

⁸ In the calculations in Sections 4 and 5, capital requirements for operational risk are assumed to be evenly distributed across banks' exposures. The operational risk requirement, ie total risk-weighted assets as a share of total risk-weighted assets excluding operational risk requirements, is set based on data for 2018. At the end of 2018, this requirement was 9 percent for DNB and 7 percent for Sparebanken Vest. The three largest Swedish banks as a whole had an operational risk requirement of 9 percent. For standardised approach banks, the requirement is set at the average for a sample of 20 standardised approach banks (8 percent).

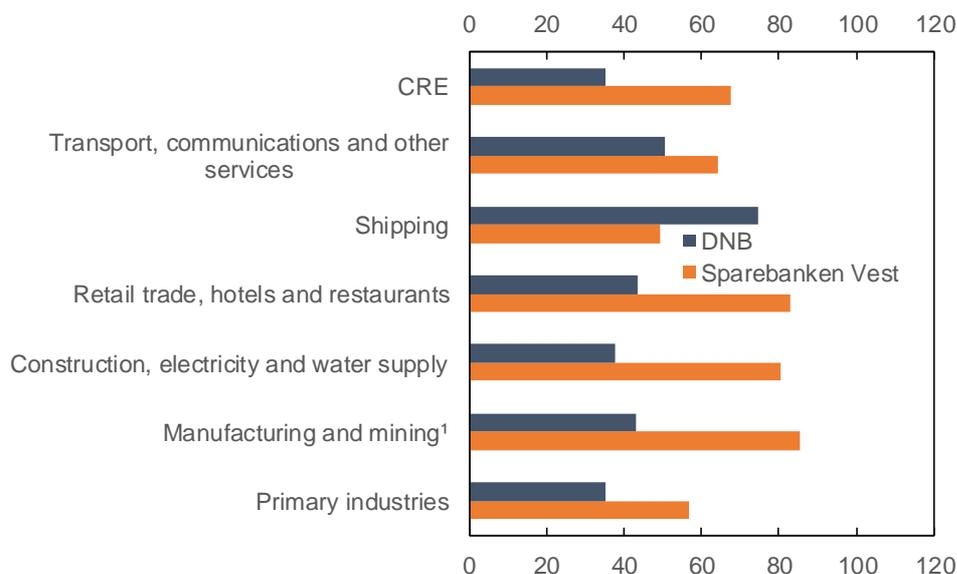
In practice, a number of Norwegian banks probably finance their CRE loans with a higher share of CET1 capital than indicated in the calculations above. This partly reflects a Pillar 2 requirement for concentration risk imposed by Finanstilsynet on banks with large CRE exposures (see Finanstilsynet, 2016). This requirement is included in the formal Pillar 2 requirement. The additional Pillar 2 requirement can be up to 4 percentage points for banks with a highly concentrated portfolio. Banks with well-diversified portfolios are not subject to a concentration risk requirement. Pillar 2 requirements for concentration risk have a limited effect on the Norwegian IRB banks included in the calculations in Sections 4 and 5. The share of CRE loans in DNB's and Sparebanken Vest's lending portfolios is lower than the average for Norwegian banks. For some of the standardised approach banks, the impact can be more pronounced. Smaller banks' corporate lending portfolios generally have the largest share of CRE loans (see Finanstilsynet, 2019).

5. Banks' profit and capital compared with loan losses during crises

Capital requirements for CRE exposures can be compared with the share of losses on these loans during downturns and crises. The capital set aside for exposures to a single industry is not necessarily intended to cover all the losses that could be incurred on these loans in a deep crisis. Operating income is used to cover expected losses. In addition, the IRB approach assumes that the risk of losses does not increase on all exposures at the same time and that high losses in one segment can be absorbed wholly or in part by capital set aside for another segment. However, in assessing banks' resilience to downturns and crises, it can be useful to assess the share of losses on loans to an industry that can be covered by the profit generated by and the capital set aside for these particular loans.

Banks do not report industry-specific profit from loans, but some banks report total profit generated by their corporate loans. Reported figures for 2018 show that DNB and Sparebanken Vest could have had loss ratios on their corporate portfolios of close to 3 percent without losing money on lending to this sector. These banks' average risk weights for CRE exposures are lower than for loans to a number of other industries (see Chart 6). This may indicate that DNB and Sparebanken Vest do not assess the credit risk of a CRE loan to be higher than for corporate loans as a whole. If this is the case, lending margins on CRE loans, which are intended to cover expected losses on such loans, are not likely to be higher than lending margins on corporate loans in general. I therefore assume that banks can absorb losses on their CRE loans equivalent to a loss ratio of up to 3 percent using the profit generated by these loans.

Chart 6 Average risk weight for loans to selected industries. Percent. End of 2018



1) Manufacturing for DNB

Sources: Banks' Pillar 3 reports

In Norway, loss ratios for CRE loans above 1 percent have not been observed since the economic downturn in 2002-03. In 2002, CRE loans were written down by 1.5 percent and by a further 0.6 percent in 2003. The losses banks would have incurred with similar loss ratios in 2018 can be compared with the assumed profit generated by CRE loans and the capital required with the proposed risk weight floor. The losses are calculated by multiplying the cumulative loss ratio for the CRE industry in 2002-03 (2.1 percent) by the volume of bank lending to the industry at the end of 2018.

My calculations suggest that the level of capital required with the proposed risk weight floor is high enough to cover banks' CRE loan losses during the downturn in 2002-03. The assumed profit generated by CRE loans (3 percent) alone would have been sufficient to cover such losses. Banks can also draw on the capital they have set aside. According to the calculations in Section 4, the proposed floor implies that close to 6 percent of the financing for CRE exposures must be CET1 capital.⁹ In other words, the capital required with the proposed risk weight floor could alone have covered loss ratios nearly three times as high as in 2002 and 2003.

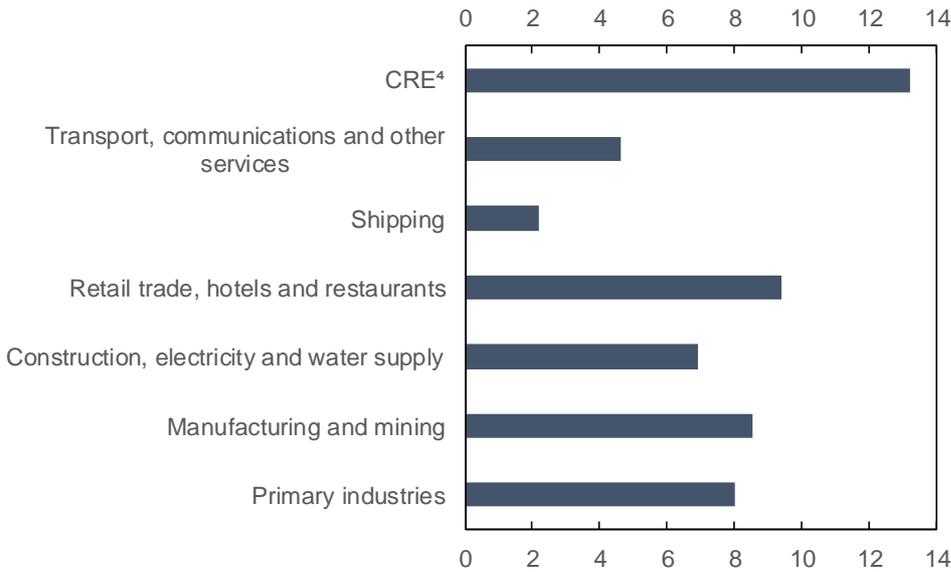
To find large losses on CRE loans, we have to go back to the banking crisis in 1988-93 (Chart 2). In that period, total CRE loan losses made up almost a third of the period's average CRE lending. This loss ratio probably included losses on new CRE loans approved during the

⁹ With a total CET1 capital requirement of 15 percent and a premium for operational risk of 8 percent.

period. Hence to illustrate the banks' capital need in a crisis, I use the CRE loss ratio in 1991, which is the year of the banking crisis with the highest CRE loan losses. The 1991 losses are calculated by multiplying the industry's loss ratio in 1991 by the volume of bank lending to the industry at the end of 2018.

The calculations suggest the capital required with the proposed risk weight floor for commercial real estate is lower than CRE loan losses during the banking crisis. This is also the case if I assume that profit generated by CRE loans cover some of the losses. In 1991, CRE loans were written down by more than 13 percent (see Chart 7). This means that the capital required by the proposed floor (6 percent) is equivalent to less than half of the 1991 losses, while the assumed profit generated by such loans (3 percent) amount to less than a quarter. Losses were also high in the other five years of the banking crisis. Hence, a comparison with the 1991 losses is likely to underestimate banks' capital needs during the banking crisis.

Chart 7 Banks' loss ratios for loans to selected industries in the banking crisis year with the highest loss ratios. Percent.



- 1) All banks in Norway as from 1996. Pre-1996 loss ratios calculated using data for all the commercial banks and the largest savings banks.
- 2) Recognised losses excluding changes in collective impairment losses/unspecified loan loss provisions.
- 3) 1989 for primary industries, 1992 for shipping and 1991 for the remaining industries in the chart.
- 4) Property management and commercial services.

Source: Norges Bank

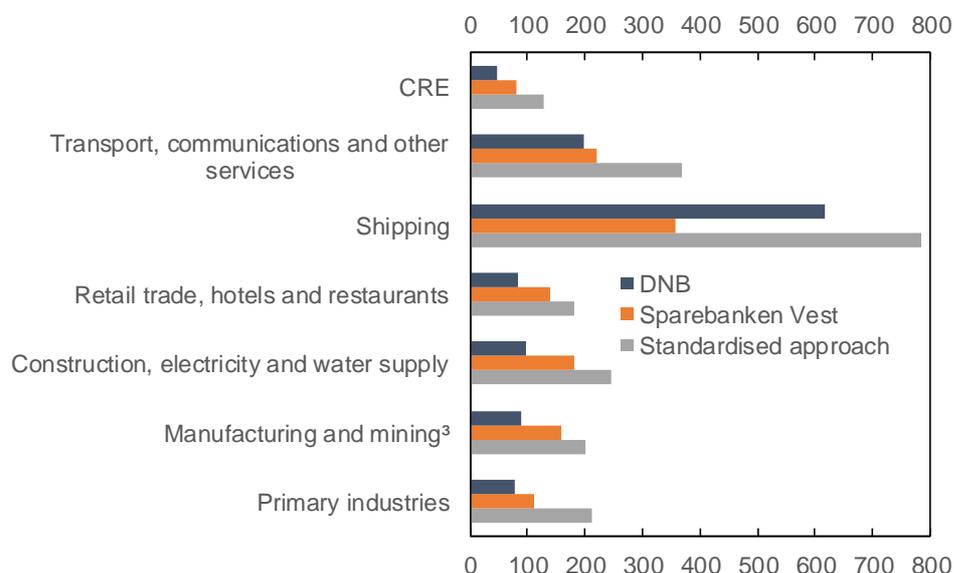
Even though banks' average risk weights for CRE loans are higher than the proposed minimum requirement, the 1991 losses are higher than the capital set aside for CRE exposures by the largest banks. This is also the case if I assume that profit generated by CRE loans cover

some of the losses on CRE loans. For the three largest Swedish banks as a whole, the calculations in Section 4 show that 4 percent of the financing for CRE exposures is CET1 capital. The sum of this capital and the assumed profit generated by CRE loans (7 percent) is lower than the 1991 losses. For DNB, the capital set aside for CRE exposures is equivalent to about half of the 1991 losses, while the assumed profit from CRE loans (3 percent) amount to less than a quarter of the 1991 losses. Sparebanken Vest's total assumed profit and capital for CRE loans are slightly higher than the 1991 losses, while the capital of banks applying the standardised approach could absorb the 1991 losses alone.

Compared with CRE exposures, the capital that banks set aside for exposures to other industries accounts for a larger share of the banking crisis losses. To illustrate banks' capital needs during the banking crisis, I use the losses in the worst year of the banking crisis for each industry, ie the year each industry had its highest losses.¹⁰ Relative to these losses, the capital set aside by banks varies widely between different industries (Chart 8). For example, the capital set aside by Norwegian banks for shipping loans could have absorbed several times higher loss levels than experienced on such loans in the worst banking crisis year for the shipping industry, ie in 1992. This may reflect that banks have lost more on shipping loans after 2008 than they did during the banking crisis. The IRB banks calculate risk weights using historical default and loss data, and risk weights will normally be higher if years with high default and loss rates are included in the observation period.

¹⁰ The year when the industry recorded the highest loss ratio during the banking crisis, ie 1989 for primary industries, 1992 for shipping and 1991 for the remaining industries.

Chart 8 Capital¹ set aside for exposures to selected industries as a share of losses² in the year of the banking crisis with the highest loss ratio. Percent



1) The bank's total CET1 capital requirement * the bank's average risk weight for loans to the industry * operational risk requirement * the bank's volume of lending to the industry at the end of 2018.

2) Loss ratio for the industry in the banking crisis year with the highest loss ratio * the bank's volume of lending to the industry at the end of 2018.

3) Manufacturing for DNB.

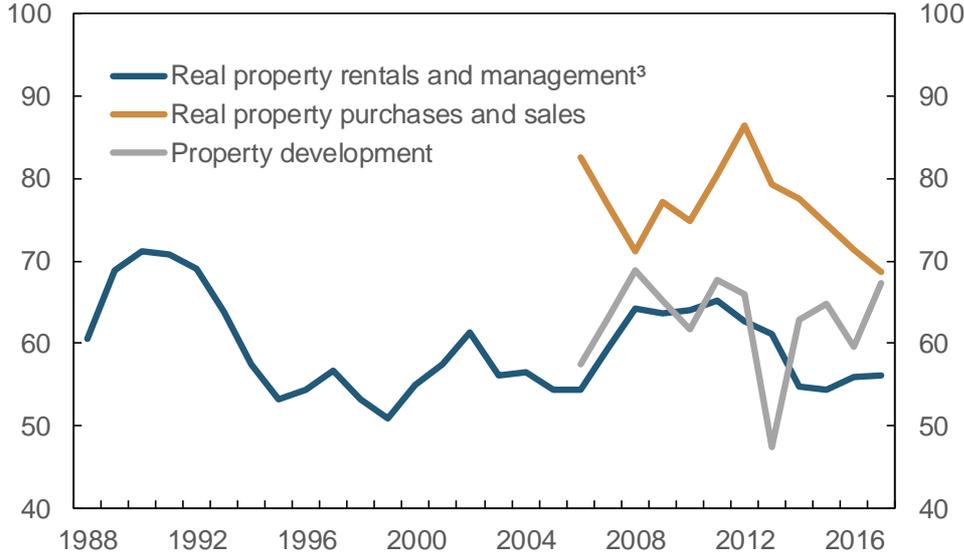
Sources: Banks' Pillar 3 reports, Finansinspektionen, Finanstilsynet and Norges Bank

6. Challenges related to the calculations

There are a number of problematic aspects in comparing banks' assumed profit and capital requirements for CRE loans with losses on such loans during the banking crisis. The Norwegian economy has undergone major structural changes since the banking crisis. The interest rate level, for example, is considerably lower. On average interest expenses for commercial property management enterprises amounted to 15 percent of interest-bearing debt during the banking crisis, compared with 3.0 percent today (see Finanstilsynet, 2019). Over the past 20 years, property prices have been rising and credit risk associated with CRE loans has been low (see Hagen et al., 2019). Norwegian government finances are also stronger. This may have increased the fiscal space to pursue an expansionary policy during economic downturns. On the other hand, vulnerabilities related to high commercial property prices have increased. Finanstilsynet's analyses show that commercial property enterprises' debt-servicing capacity and financial strength would be severely impaired in a deep downturn with sharply falling property prices and a higher interest rate level (see Finanstilsynet, 2019).

Banks have further developed their risk management since the banking crisis, and the banks’ customer base may have changed considerably.¹¹ Today, banks’ credit standards give more weight to the cash flow of CRE enterprises than prior to the banking crisis. Furthermore, banks’ have set stricter requirements for equity and loan-to-value (LTV) ratios for CRE enterprises since the banking crisis (see Finanstilsynet, 2019). Banks have in recent years increased the equity ratio requirement for loans collateralised by office property in central Oslo, and prices for such properties must typically fall by more than 40 percent before banks incur losses. The LTV ratio for commercial property rental and management enterprises has declined compared with the start of the banking crisis (Chart 9). Between 1988 and 2017, this ratio fell by 4.4 percentage points. All in all, this may suggest that economic setbacks like the banking crisis would have resulted in lower CRE loan losses today than during the banking crisis.

Chart 9 Loan-to-value ratio¹ for commercial real estate by subsegment². Percent. 1988 – 2017



- 1) Net loan debt as a share of the book value of a property.
- 2) The commercial property management enterprises in the sample account for about 83 percent of total net loan debt for the three subcategories.
- 3) For the years 1988-1998, the sample is based on non-consolidated company accounts. The sample for this period also includes the segment “Real property purchases and sales”.

Source: Finanstilsynet

The calculations in Section 5 do not take account of loan loss reversals recorded by banks following the banking crisis. The reversals contributed to losses that were very low in the post-crisis years and

¹¹ The CRE sector also includes companies where real estate is held in its own entity separate from the company’s operations. A property belonging to a manufacturing entity can for example be classified as commercial property. There was a considerable increase in companies separating real estate from the company’s operations in the 1990s and 2000s (see Finanstilsynet, 2019).

slightly negative in 1996 (Chart 2). After the banking crisis, however, several banks had already been through a solvency crisis that forced the authorities to recapitalise them. A reasonable precautionary requirement would therefore be that the calculations should reflect banks' potential capital needs during downturns and crises and not the loss reversals that might be recorded after the crisis is over. Overall, it is likely that the calculation in Section 5 underestimates banks' capital needs during the banking crisis because it includes losses for only one of the six banking crisis years. Losses were also considerable in the five remaining crisis years. In addition, these loss ratios do not include unspecified loan loss provisions. In the period 1988-1993, unspecified loan loss provisions accounted for 10 percent of banks' total loan losses.

If losses on non-CRE loans and financial instruments remain low, banks' capacity to absorb losses on CRE loans will be considerably higher. Banks' first line of defence is to use operating income to absorb losses. If the increase in losses only affects CRE loans, banks' loss-absorbing capacity will be considerable. In 2018, the Norwegian banking sector¹² recorded a pre-tax profit of NOK 72 billion. This profit could have covered an annual CRE loan loss ratio of over 10 percent.

Historically, CRE loan losses have been high in periods of high losses in other industries (Chart 2). In such a situation, the capacity to absorb losses on CRE loans with operating income will be considerably lower as the income will also have to cover other losses. In 2018, for example, the profit of the banking sector before loan losses and taxes covered an annual ratio of losses to total loans of one and a half percent.¹³ However, it is uncertain whether banks would be able to maintain profitability before extraordinary losses during downturns and crises. During the banking crisis and the financial crisis, Norwegian banks maintained profitability before extraordinary losses, but for several large Irish banks, profitability before loan losses was reduced by more than half during the financial crisis (see Norges Bank, 2015).

Even if it is assumed that the banks cannot use operating income from other assets to absorb losses on CRE loans, they could probably absorb losses with larger capital buffers than implied by the calculations in Section 4. Several banks have set aside extra capital for CRE loans to comply with Finanstilsynet's Pillar 2 requirements related to concentration risk. The calculations in Sections 4 and 5 assume that CRE exposures account for the same percentage of Pillar 2 requirements as Pillar 1 requirements. This means, for example, that 0.3 percentage point of Sparebanken Vest's total Pillar 2 requirement of 1.7 percentage points is assumed to be linked to CRE exposures. If Sparebanken Vest's Pillar 2 requirements for CRE exposures are 1 percentage point, and not 0.3 percentage point, as assumed in the

¹² All banks and credit institutions in Norway.

¹³ Loss-absorbing capacity is higher if losses only increase on Norwegian corporate loans. In 2018, the profit of the Norwegian banking sector could have covered an annual loss ratio for Norwegian corporate loans of more than 5 percent.

calculations in Sections 4 and 5, the calculations will underestimate the bank's capital buffers by about 35 percent.

Furthermore, banks have built up large capital buffers to cover losses on other exposures. In 2018, DNB's and Sparebanken Vest's capital requirements for CRE exposures accounted for 5 and 15 percent respectively of their total capital requirements. In addition, some IRB banks' capital adequacy is somewhat higher than their total CET1 capital requirement.

Thus, if the banking sector's profitability before loan losses and taxes remains at the same level as in 2018, the Norwegian banking sector will withstand generally higher loss ratios than during the banking crisis, for CRE loans and for the banking sector's total exposures. With the same loss ratios for the banking sector's total exposures as during the banking crisis, the Norwegian banking sector would have lost NOK 736 billion on its exposures over six years¹⁴, the duration of the banking crisis. In cumulative terms over six years, the banking sector's profit before loan losses and taxes is equivalent to NOK 466 billion. In addition, the Norwegian banking sector had equity capital of NOK 563 billion at the end of 2018. In total, these buffers could have covered loss ratios for the banking sector's total exposures that were 40 percent higher than during the banking crisis, provided that the banking sector's profitability before loan losses and taxes remained at the same level as in 2018. This is in line with the results of the stress test in *Financial Stability Report 2019*, which show that the largest Norwegian banks' capital buffers are generally large enough to absorb the losses incurred in the event of a severe downturn in the Norwegian economy, even if CRE loan losses exceeded the capital set aside for these loans (see Norges Bank, 2019).

7. Conclusion

The Ministry of Finance has proposed a temporary capital requirement (risk weight floor) for CRE exposures held by the largest banks (IRB banks). CRE is the sector where banks have historically incurred the largest losses during crises. Since CRE loan losses are low in normal times, capital requirements for CRE loans should be based on losses incurred during crises.

The purpose of this memo is to analyse how much capital banks must set aside for CRE exposures and the level of CRE loan losses banks can absorb. I compare the share of CRE losses during the downturn in 2002-03 and the Norwegian banking crisis in 1988-93 with the assumed profit and capital requirements for such loans. To illustrate banks' capital needs in a crisis, I use the losses in the worst year of the

¹⁴ Cumulative loss ratio for banks' total exposures in the period 1988-93 multiplied by the lending volume of the banking sector in 2018.

banking crisis for each industry, ie the year each industry had its highest losses. Loan losses are calculated by multiplying the loss ratios of that time by banks' volume of lending in 2018.

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My calculations suggest that the level of capital required with the proposed risk weight floor is high enough to cover the CRE loan losses incurred by banks during the downturn in 2002-03. Losses on CRE loans were considerably higher during the banking crisis. Losses in the worst year of the banking crisis exceed the capital required under the proposed risk weight floor, even though I assume that the profit generated by CRE loans would cover some of the losses.

At the end of 2018, Norwegian banks had set aside more capital for their CRE exposures than is required with the proposed risk weight floor. The capital set aside for such loans by the very largest banks is nonetheless lower than the losses incurred in the worst year of the banking crisis. This also applies if I assume that the profit generated by CRE loans cover some of the losses. Moreover, compared with CRE exposures, the capital that banks set aside for exposures to other industries accounts for a larger share of the banking crisis losses. On the other hand, the capital set aside by the IRB banks for exposures to an industry should not necessarily cover all the potential losses on these loans in a deep crisis. The IRB approach assumes that high losses within one segment may be covered wholly or in part by capital set aside for another segment. In addition, minimum risk weight requirements should not be set to a level that weakens banks' incentives to provide low-risk loans, implying that such minimum requirements should not be set too high. This will be of particular importance for lending segments where credit risk varies widely, such as the CRE market. All in all, this suggests that the proposed risk weight floor is at a reasonable level.

Comparing banks' profit and capital requirements with losses during the Norwegian banking crisis is challenging for a number of reasons. The Norwegian economy has undergone major structural changes since the banking crisis. The interest rate level, for example, is considerably lower, and banks have further developed their risk management. All in all, these factors may suggest that a similar economic setback today would have resulted in lower losses on CRE loans today than during the banking crisis. On the other hand, vulnerabilities related to high commercial property prices have increased.

Banks' capacity to absorb larger losses on CRE loans is considerably higher if they maintain overall profitability. This includes keeping other credit losses low. In such a situation, banks can cover CRE loan losses using the profit from other loans and the capital buffers for losses on these loans. Historically, however, losses on CRE loans have been high in periods of high losses in other industries. At the same time, figures for 2018 show that the Norwegian banking sector could have absorbed the same loss path over six years as during the banking crisis for all its exposures as a whole. This corresponds to the results of the stress test

in *Financial Stability Report 2019*, which shows that the capital buffers of the largest Norwegian banks as a whole are sufficient to absorb the losses incurred if a severe downturn in the Norwegian economy were to occur.

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