

NORGES BANK PAPERS

A framework for advice on the
countercyclical capital buffer

NO.4 | 2019



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ISSN 1894-0277 (online)

ISBN 978-82-8379-129-7 (online)

A FRAMEWORK FOR ADVICE
ON THE COUNTERCYCLICAL
CAPITAL BUFFER

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A. Introduction

The countercyclical capital buffer (“the buffer”) is a time-varying capital requirement for banks and one of the macroprudential instruments in Norway. The buffer was introduced following the financial crisis as a part of the new international recommendations for bank capital and liquidity regulation (Basel III)¹. The recommendations have been implemented in EU/EEA law (CRD-IV and CRR) and in Norwegian law (Financial Institutions Act with regulations).

The Ministry of Finance sets the buffer rate. Norges Bank is responsible for preparing a decision basis and advising the Ministry of Finance on the level of the buffer every quarter based on an exchange of information and assessments with Finanstilsynet (Financial Supervisory Authority of Norway). The decision basis is harmonised with the international regulatory framework and is published in *Monetary Policy Report with financial stability assessment*. The letters containing the advice on the buffer that are submitted to the Ministry of Finance are made available on Norges Bank’s website after the Ministry of Finance has published its decision on the buffer. Norges Bank provided its first advice on the countercyclical capital buffer in December 2013.

In 2014, the European Systemic Risk Board (ESRB) issued recommendations on the countercyclical capital buffer framework for the EU and the EEA.² The analysis of the impact of capital requirements is continuously evolving at a global level, and in recent years, a number of countries have developed their buffer frameworks.

The aim of this paper is to provide an updated, detailed description of the principles and information basis for Norges Bank’s advice on the countercyclical capital buffer. Compared with a similar paper from 2013³, this updated paper contains a more elaborate description of the most important elements of the assessments on which a recommendation is based both when the buffer is to be built up and when it is to be reduced. In addition, this paper provides a more detailed description of the information basis that is used.

This paper is organised as follows: Section B explains what the countercyclical capital buffer is and its relationship with the other capital requirements. Section C describes the principles that Norges Bank will follow when providing advice on the level of the buffer. Section D

¹ See Basel Committee on Banking Supervision (2010a) and (2010b).

² See European Systemic Risk Board (ESRB) (2014a).

³ See Norges Bank (2013).

provides a description of the information basis used by Norges Bank in preparing its advice on the buffer. A more detailed review of indicators is provided in the Appendix.

B. Countercyclical capital buffer – a part of the capital requirement for banks

Experience shows that financial crises typically occur after a period of high debt growth and property price inflation. The risk of disruptions in the financial system that lead to significant negative economic consequences is referred to as systemic risk. Systemic risk is related to risk in the financial system as a whole. The banking system may be vulnerable even when individual banks in isolation are solid, for example, when banks have identical risk profiles and are exposed to each other.

Systemic risk can be both cyclical (time-varying) and structural. Cyclical systemic risk increases when financial imbalances build up, normally in periods of strong credit growth and property price inflation. In such periods, both banks and borrowers often take on more risk. Structural systemic risk entails more persistent financial system vulnerabilities, for example high banking sector interconnectedness.

The objective of the countercyclical capital buffer is to increase banking system resilience by ensuring that the banks build an extra capital buffer in good times, when systemic risk is building up.⁴ During a downturn with large bank losses, the buffer rate can be reduced to mitigate the risk that banks will amplify the downturn by over-tightening their lending to meet capital requirements.

The countercyclical capital buffer comes in addition to the minimum requirement and the other buffer requirements such as the capital conservation buffer, the systemic risk buffer and the buffer for systemically important banks (Chart 1)⁵. Banks in breach of the total buffer requirement are to submit a plan for strengthening capital ratios and may also be subject to restrictions on dividend and bonus payouts.

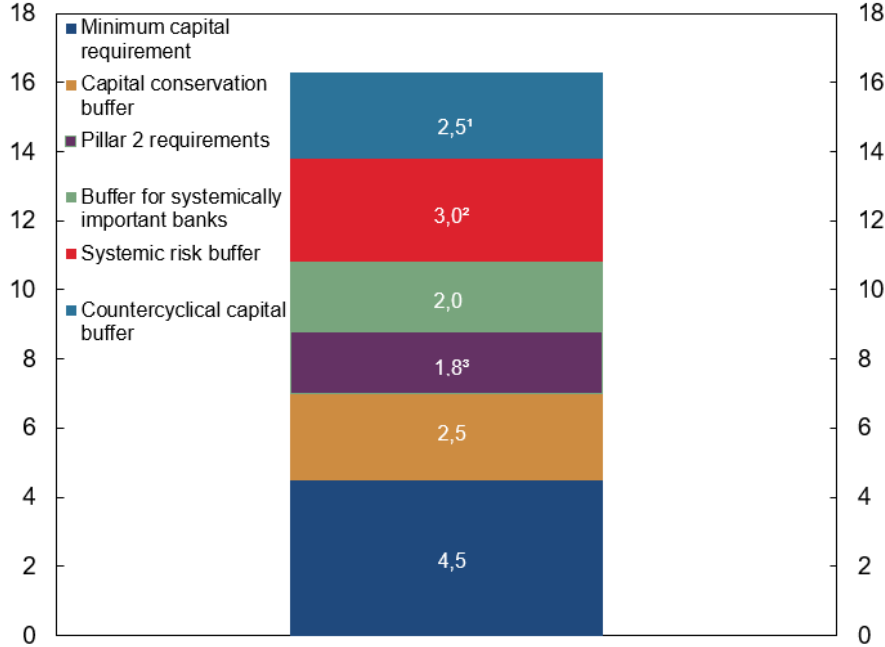
The capital buffers differ in their purpose. The capital conservation buffer is a fixed buffer intended to prevent capital ratios from falling below the minimum requirement in the event of large losses. Banks designated as systemically important are to maintain larger buffers because problems in systemically important banks can in itself have severe negative consequences for the economy. The buffer requirement for systemically important banks is to be reassessed

⁴ Section 32 of Regulation No. 2111 of 19 December 2019 on capital regulation and national implementation of CRR/CRD IV.

⁵ The buffer requirement is applied on risk-weighted assets in each bank. Banks must also satisfy an unweighted capital requirement to ensure that capital requirements are not too low as a result of lower risk weights in banks that calculate risk weights using internal models.

annually. The systemic risk buffer is designed to make the banking system more resilient to long-term, structural systemic or macroeconomic risks.⁶ Its level is to be assessed at least every other year. The countercyclical capital buffer is to be assessed quarterly and in the light of developments in cyclical systemic risk.

Chart 1. Capital requirements for Norwegian banks. Percent.



1) Will increase to 2,5 from 31.12.19. 2) Will increase to 4,5 from 31.12.2020 for advanced IRB banks and from 31.12.2022 for other banks. 3) Weighted average pillar 2 requirements for nine big Norwegian banks (DNB Bank, SpareBank 1 SR-Bank, Sparebanken Vest, SpareBank 1 SMN, Sparebanken Sør, SpareBank 1 Østlandet, SpareBank 1 Nord-Norge, Sbanken and

All of the capital buffers strengthen banks’ solvency, but the countercyclical capital buffer is the only buffer that can be reduced in a downturn to support credit provision by design. A decision to reduce the buffer may enter into force immediately. However, when a decision is made to increase the buffer, banks shall, as a rule be given 12 months to adjust before the new requirement enters into force. In special cases, an earlier entry into force can be decided.

The countercyclical capital buffer is the only buffer requirement that is also automatically applicable to foreign banks operating in Norway. This is called automatic reciprocity and is laid down in the Basel Committee’s recommendations and in the EU capital framework. Foreign banks with lending activities in Norway must comply with the Norwegian countercyclical buffer requirement for their exposures in Norway. Similarly, Norwegian banks with lending activities in other EEA countries must comply with the countercyclical buffer requirements of

⁶ The EU has adopted a revised version of the Capital Requirements Directive (CRD V), which allows the systemic risk buffer to be used sectorally in order to address systemic risks that are related to lending to individual sectors. The Basel Committee, which provides international recommendations on banking regulation, has recently published guiding principles for the use of a sectoral countercyclical capital buffer (see BSBC (2019b)).

host countries.⁷ Reciprocity allows the buffer to affect a country's entire lending market and contributes to a level playing field. Reciprocity is optional for the systemic risk buffer requirement, while the capital conservation buffer requirement is the same across the entire EEA area.

The buffer rate will normally be between 0 and 2.5%. The buffer can also be set above 2.5% in special circumstances.⁸ Under EU/EEA regulations, the same considerations are used for assessing a countercyclical capital buffer rate over 2.5% as for assessing a buffer rate between 0% and 2.5%. But automatic reciprocity for countercyclical capital buffer only applies for rates up to and including 2.5%. When the buffer rate exceeds 2.5%, reciprocity is optional. The ESRB also recommends reciprocity for buffer rates above 2.5%.⁹

C. Principles for Norges Bank's advice on the countercyclical capital buffer

Norges Bank provides advice on the countercyclical capital buffer in accordance with the following principles:

Banks should build and hold a countercyclical buffer when financial imbalances are building up or have built up. Higher levels of financial imbalances increase the risk of an abrupt decline in demand from households and enterprises and large bank losses. Higher capital buffers strengthen banks' solvency and can mitigate the risk that banks amplify an economic downturn by tightening lending. Moreover, a countercyclical capital buffer may curb high credit growth and mitigate the risk that financial imbalances build up further. During upturns, this may be a positive side effect of the buffer.

The buffer should be activated early with signs of increasing financial imbalances. A build-up of financial imbalances usually becomes evident with a lag, and the regulation stipulates that buffer rate increases first enter into force after 12 months. In addition, the buffer can be built up in smaller increments over time when it is activated early. Banks should build capital buffers in good times.

The objective of the buffer is to increase banks' resilience in downturns and should not be changed frequently in an attempt to manage credit growth or asset prices. The countercyclical buffer is

⁷ For exposures in non-EEA countries that have set their own capital buffers, the countercyclical capital buffer rate set by the authority of the jurisdiction in question should be recognised unless another rate has been set by the Norwegian Ministry of Finance. For non-EEA countries that do not have a system for setting a countercyclical capital buffer, the Norwegian rate applies. The Ministry initially intends to follow the recommendations from the European Systemic Risk Board (ESRB) dated 11 December 2015 on how the countercyclical capital buffer will be determined for exposures in countries that are not subject to the EEA agreement.

⁸ Section 14-3, fourth paragraph, of the Financial Institutions Act.

⁹ See ESRB (2014a).

not suitable as an instrument for fine-tuning the economy. In periods of persistently low loan losses and rising asset prices and credit growth, banks should normally hold a countercyclical buffer. The buffer rate should not be reduced automatically even if there are signs that financial imbalances are receding. The risk of a sharp downturn may remain elevated even if indicators for financial imbalances begin to recede. If financial imbalances recede significantly over time and the outlook for financial stability is good, a downward adjustment of the buffer rate may be considered. At the same time, banks should have sufficient capital buffers to withstand a severe downturn.

In the event of a severe downturn and clearly reduced access to credit, the buffer should be lowered to increase banks' lending capacity. Reducing the buffer can counteract banks' tightening of lending practices and therefore improve households' and enterprises' access to credit. This may dampen an economic downturn, for example, when there are prospects for substantial bank losses. The buffer can be reduced when other capital buffers in the banking system are assessed to be sufficient to weather the downturn. With a reduction in the buffer rate, the decision basis shall contain an estimate of when Norges Bank will provide advice to increase the buffer again to give banks as much predictability as possible.¹⁰

The countercyclical capital buffer rate shall as a rule be between 0% and 2.5%, but can be set higher than 2.5% in exceptional circumstances. Exceptional circumstances are not described in detail in the regulation. A starting point for assessing the need for a countercyclical capital buffer above 2.5% is that the risk is assessed to be particularly high, for example, when many measures of financial imbalances are at high levels at the same time, and when stress tests and other analyses indicate that banks need higher capital buffers.

The buffer rate must be viewed in light of banks' adjustment to the overall capital requirements. The usefulness of having a large buffer that can be used during a downturn must be weighed against any potential economic costs. Other capital requirements for banks and banks' capacity to meet increased buffer requirements must be considered when setting the countercyclical capital buffer.

D. Information basis for the advice on the countercyclical capital buffer

Advice on the level of the countercyclical capital buffer is based on a number of assessments – in line with the principles for the buffer described in Section C. Chart 2 below provides an overview of these assessments. *Financial imbalances* must be analysed to assess cyclical

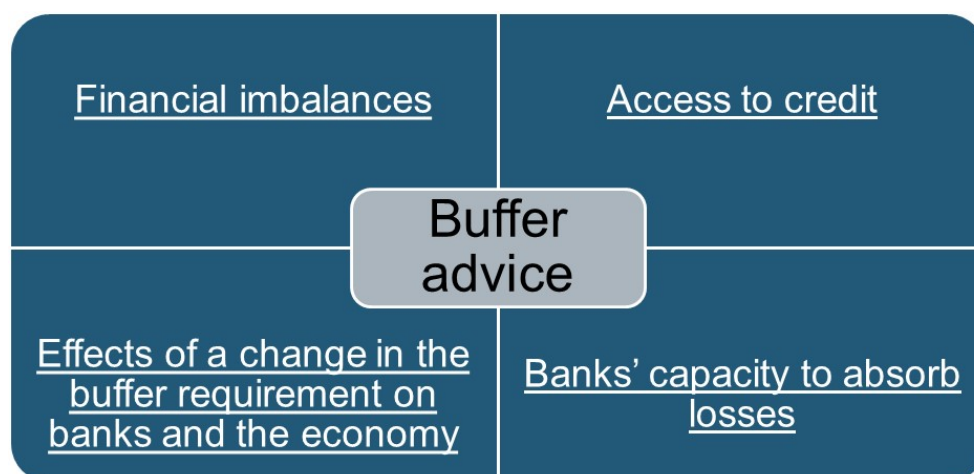
¹⁰ Section 2, final paragraph, of Decision 1 January 2020 on the decision basis and advice on the countercyclical capital buffer.

systemic risk that may trigger or amplify a pronounced downturn. *Access to credit* is analysed to assess whether there is or could be a need to reduce the buffer rate because creditworthy enterprises and households cannot access credit. *Banks' capacity to absorb losses* is analysed to assess the level of the buffer given the assessments of imbalances and whether banks' buffers are sufficient in a downturn. *Effects of a change in the buffer requirement on banks and the economy* must also be assessed before providing advice to change the buffer rate (see Box 1).

Assessments of the four areas in Chart 2 are based on a broad range of indicators, models and market information. The set of indicators that constitute a starting point for Norges Bank's assessments of *financial imbalances* and *access to credit* are described in greater detail in the Appendix of this paper. The set of indicators comply with the ESRB's recommendations.¹¹ Norges Bank will analyse developments in the indicators and compare the current situation with historical trends and averages. A technical calculation of trends can be useful in analysing economic variables that rise over time.

There will not be a mechanical relationship between developments in the indicators and Norges Bank's advice on the buffer. In addition to indicators and quantitative analyses, advice on the countercyclical buffer is based on judgement. The set of indicators will be updated as access to data is expanded and new methods and indicators are developed. International rules and recommendations, and other countries' countercyclical capital buffer frameworks contain little information on the assessments on which a reduction in the buffer rate should be based. So far, a countercyclical capital buffer rate that is currently in effect has been reduced only in Hong Kong.¹²

Chart 2: Assessments in the advice on the countercyclical capital buffer



¹¹ See ESRB (2014a).

¹² In summer 2016, the Bank of England reversed an earlier decision to increase the countercyclical capital buffer in connection with the Brexit vote. The reversal took place before the increase would have entered into force.

Box I: Economic effects of a change in the countercyclical buffer requirement

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When a capital requirement is increased, banks can increase their capital ratio in two ways. They can raise more capital or they can reduce the risk-weighted assets that are used to calculate the capital ratio. If banks raise more capital by increasing lending rates to increase profits or by changing lending practices to reduce risk-weighted assets, the economy will be affected. It will become more difficult or expensive for some borrowers to access credit. Effects on lending rates or lending practices will be minimal, if any, if banks raise capital by deciding not to distribute dividends or by raising new equity.

If banks already have sufficient capital from before, they can leave their capital unchanged and, in that case, the increase in capital requirement will not have direct effects on the economy. In Norway, the experience has been that the largest banks let their capital ratios lie close to the total requirement. This implies that the capital requirement is binding.

The introduction of and the increase in the countercyclical buffer requirement in Norway coincided with a build-up of capital in banks. Other capital requirements also increased in the period between 2013 and 2016, making it difficult to isolate the effect of the countercyclical capital buffer on banks' capital accumulation.

A study of banks' adjustment to increased capital requirements up to 2014 in Aronsen et al. (2014) indicate that capital was largely built up by retaining profits and not paying out dividends to shareholders. An empirical study of Norwegian banks' adjustment to new capital requirements introduced in 2013 (see Juelsrud and Wold (2018)) confirms that banks adjusted their capital ratios in response to the new capital requirements. Moreover, Juelsrud and Wold document real economic effects of increased capital requirements: banks reduced their risk-weighted assets, increased lending rates, and loans to enterprises fell relative to loans to households when the capital requirements were increased. Loans to enterprises are more risky and the risk weight is therefore higher than for household loans. The analysis in Galaasen and Solheim (2018) also describes a possible shift away from loans to enterprises as a result of an increase in the countercyclical capital buffer. Using data for European banks, Gropp et al. (2018) also find that banks that participated in the stress test conducted by the European Banking Authority (EBA) in 2011 adapted to higher capital requirements by reducing risk-weighted assets, not by increasing equity capital. Higher capital requirements then have a tightening effect on the economy.

We can expect the opposite effect on the real economy if the capital buffer requirements are reduced. In the event of lower buffer requirements, banks can allow themselves to increase risk-weighted assets by increasing lending or increasing the share of lending with higher risk weights. This will affect the economy in that it becomes easier and perhaps less expensive to borrow.

Banks may also choose not to change lending rates or lending practices, keeping the level of capital ratios unchanged even if the capital requirement is reduced. This may be because the bank expects that it will have to pay more for debt financing if it reduces its capital ratio as a result of an increase in risk. Another possible reason is that banks find it costly to adjust capital ratios upwards later if the capital requirement should increase again. A Danish study (see Imbierowicz et al. (2018)) indicates that banks tend not to reduce their capital ratios when the capital requirement is reduced. The results suggest that time-varying capital requirements have moderate effects on the economy.

There is limited empirical evidence about the effect of reducing capital buffers. Jiménez et al. (2017) use experience from dynamic provisioning in Spain to shed light on the effects of time-varying capital buffers. They find that banks that had built

up capital in good times, and could therefore draw down these buffers in periods of weak profitability, were better poised to maintain credit supply during the financial crisis. This contributed to easing credit conditions for enterprises in a period with tighter access to financing. Imbierowicz et al. (2018), mentioned above, study the effects of both higher and lower capital requirements. They find that reduced capital requirements result in some increase in lending, and so not only in higher voluntary buffers. Arbatli and Juelsrud (forthcoming, 2020) study the effects of lower capital requirements as a result of the phasing in of Basel II in Norway and find that banks with a greater reduction in capital requirements, increased their lending more.

Capital requirements and their macroeconomic effects have been the subject of many studies. The Basel Committee (2010c) summarises the empirical analyses of the impact of stronger capital requirements on GDP, credit growth and lending margins.¹ The study points to the macroeconomic costs accruing from higher capital requirements as they entail higher total financing costs for banks and hence higher lending margins. This contributes, in turn, to reduced credit provision and lower output in the short term than would otherwise be the case. Akram (2014) has analysed the impact of higher capital requirements using a macroeconomic model that is estimated for Norway. Akram finds a somewhat weaker impact than the Basel Committee's results.

The results of the Norwegian and international studies of stronger capital requirements are uncertain and vary with the choice of methodology and analysis period. Common to many of the studies is that the impact of stronger capital requirements depends on how the central bank's reaction pattern is specified. Lower GDP growth and inflation owing to higher capital requirements may be counteracted by lower policy rates. Moreover, the results depend on how fast the requirement is assumed to be phased in. Longer implementation times entail lower costs. Most studies find that the negative longer-term impact of a transition to permanently higher capital requirements is very small.

¹ See also Jacobsen et al. (2011) and Vale (2011). See Basel Committee on Banking Supervision (2019a), which provides a shorter update of the 2010 study.

i. Financial imbalances

The assessment of financial imbalances comprises three main elements: (a) pricing of risk and lending conditions; (b) real estate market vulnerabilities; and (c) vulnerabilities in the household and corporate sectors. See Appendix 1 for an overview of the indicators Norges Bank will use in its assessment of financial imbalances.¹³

Periods with persistently high risk-taking, lower risk pricing and lenient lending conditions may suggest that financial market participants underestimate risks in the financial system. This can lead to higher debt burdens and asset valuations, and therefore higher credit and

¹³ The ESRB recommends that designated authorities monitor a set of variables that cover property prices, credit developments, external imbalances, strength of bank balance sheets, private sector debt burdens and potential mispricing of risk (ESRB 2014a). The ESRB also recommends that authorities monitor indicators derived from models combining a selection of these indicators. See ESRB (2014b) for a detailed analysis of indicators used in setting the countercyclical capital buffer. The Decision on the Decision Basis and Advice on the Countercyclical Capital Buffer states that the decision basis shall contain an overview of the relationship between credit and GDP and how this deviates from long-run trends, other indicators and Norges bank's assessment of systemic risk that is building up or has built up over time. Together with the credit-to-GDP ratio, indicators for house prices relative to disposable income, commercial property prices and the wholesale funding ratio of Norwegian credit institutions constitute the key indicators in the first framework for Norges Bank's advice on the countercyclical capital buffer (Norges Bank 2013).

market risk in the economy. Studies find that indicators for pricing of risk may signal increased vulnerability in the non-financial sector.¹⁴

Measures of the pricing of risk might, for example, be bond market risk premiums and indicators of overvaluation and low volatility in the equity market. Lending conditions can, for example, be measured by lending margins and with the aid of Norges Bank's Survey of Bank Lending and Finanstilsynet's (Financial Supervisory Authority of Norway) residential mortgage lending survey.¹⁵

Real estate is both an asset and collateral, and hence influences both economic agents' desire to borrow and access to credit. The interaction between credit and asset prices may lead to a build-up of imbalances, and may amplify an economic downturn.¹⁶ Commercial real estate (CRE) is the sector with the largest bank debt, and is among the sectors in Norway that have historically exposed banks to the largest loan losses.¹⁷ Developments in residential and commercial property prices are important indicators for the assessment of financial imbalances. Both indicators have risen substantially ahead of periods of financial instability in Norway.

Higher debt levels make borrowers more vulnerable to negative income shocks and higher interest rates. The debt-servicing capacity of borrowers may, for example, be assessed by examining what share of their incomes goes towards interest and principal payments. If debt-servicing capacity weakens, the risk of bank loan losses increases. Both banks and borrowers often take on higher risk in periods with strong credit growth. Experience shows that strong credit growth has led to deeper crises.¹⁸ The ratio of credit to GDP has historically increased ahead of crises in both Norway¹⁹ and other countries²⁰, and is recommended as a key indicator by the Basel Committee and the ESRB (see Box II on the Basel Committee's buffer guide). But aggregate measures of credit can conceal increased vulnerability in credit market segments. It is therefore important to examine the allocation of credit, from different sources and between borrower groups. Information on household and corporate saving may also be used to shed light on whether credit developments are sustainable.²¹

Norges Bank also uses model-based and composite indicators to assess financial imbalances (see Appendix).²²

¹⁴ See e.g. Aikman et al. (2017), Arbatli and Johansen (2017) and Danielsson, Valenzuela and Zer (2018).

¹⁵ Note that these indicators can also be used for assessing access to credit (See Section *D.ii*).

¹⁶ See eg Claessens, Kose and Terrones (2011), Drehmann, Borio and Thatsaronis (2012) and Anundsen et al. (2016).

¹⁷ See Kragh-Sørensen and Solheim (2014).

¹⁸ See Schularick and Taylor (2012), Jorda, Schularick and Taylor (2011 and 2013).

¹⁹ See e.g. Gerdrup (2003), Riiser (2005), Anh (2011) and Gerdrup, Kvinlog and Schaanning (2013).

²⁰ See e.g. Borio and Drehmann (2009), Borio and Lowe (2002), Drehmann et al (2011), and Reinhart and Rogoff (2009).

²¹ Banks' wholesale funding share is another indicator that can shed light on whether credit growth is sustainable. Interpretations and possible measurement problems related to this indicator are discussed in Alstadheim (forthcoming, 2020)

²² Research indicates that composite indicators combining information from a number of different indicators provide better signals of financial crises. (ESRB (2014b), Lang et al. (2019)).

ii. Access to credit

Advice to adjust the buffer rate downward or lower it to zero in the event of an economic downturn will be based on an assessment of whether, owing to banks' capital situation, banks' credit provision is or may be a significant barrier to developments in the real economy. In order to assess this, Norges Bank must analyse the financing conditions that households and enterprises face or are expected to face.

In this assessment, Norges Bank will use information on three main areas: (a) financial market stress; (b) developments in credit and credit practices; and (c) banks' profitability (see Appendix 1).

Measures of financial market stress, such as risk premiums, may provide information on tightening financial conditions and banks' access to funding (see for example the description of a composite indicator for systemic stress in Appendix). More limited access to funding and a higher price for funding may impair banks' credit provision. Historically, indicators of market stress have risen prior to crisis periods in Norway and other countries, but market signals can fluctuate sharply and must be interpreted with caution.

Credit growth and interest spreads on loans to the non-financial sector are useful indicators of financing conditions faced by households and enterprises. Norges Bank's Survey of Bank Lending can also provide useful information.

Low bank profitability, primarily owing to credit losses, may prompt banks to reduce credit growth to ensure capital adequacy.²³ Return on equity, the share of non-performing loans and loan losses are examples of useful indicators.

²³ There is little in the economic literature on identifying and analysing indicators that can be used for reducing the buffer rate. The ESRB recommends monitoring indicators of financial market stress, but that policymakers must largely rely on professional judgement in assessing when the buffer rate should be reduced (ESRB (2014a)). ESRB (2018) points out that market-based stress indicators should be supplemented by measures of credit growth and credit conditions to assess access to credit.

Box II: Basel Committee's buffer guide

The credit gap, which shows the deviation of the credit-to-GDP ratio from an estimated trend¹, is part of the international framework for the countercyclical capital buffer. Historically, the credit gap has risen ahead of periods of financial instability. According to the international recommendations of the Basel Committee on Banking Supervision, which are implemented in EU regulation, the credit gap should be calculated as part of the decision basis for the buffer. Using the credit gap, the authorities should estimate a buffer guide as a basis for assessing the level of the countercyclical capital buffer each quarter. However, both the Basel recommendations and the EU regulation emphasise that there should not be a mechanical relationship between the buffer guide and the level of the countercyclical capital buffer. Other information and the authorities' judgement should play an important role.²

In the buffer guide, there is a link between the credit gap and the buffer level: The size of the buffer is zero when the credit gap is below 2. For credit gaps above 2, the buffer increases linearly and reaches 2.5 percent when the credit gap exceeds 10. The thresholds of 2 and 10 are chosen based on an analysis of historical, international banking crises.

Chart 3: Reference rates for the countercyclical capital buffer under alternative trend estimates. Percent. 1983 Q1 – 2019 Q2

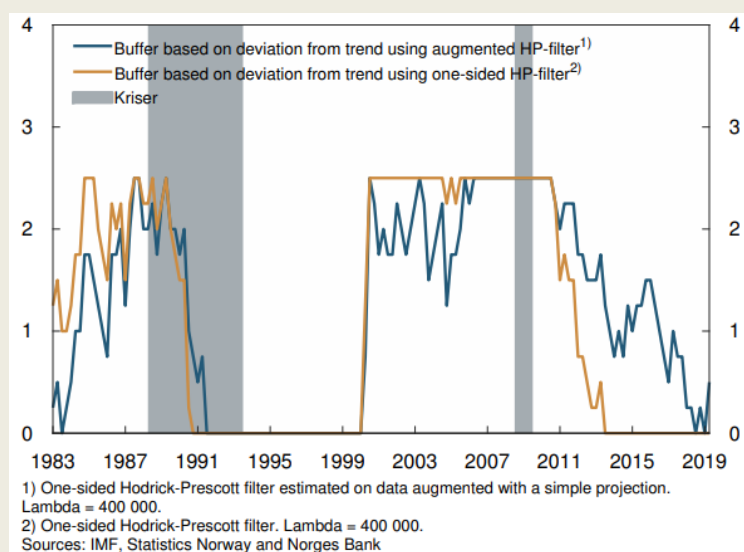


Chart 3 shows the buffer guide estimated for Norway using two different methods for the credit gap and 2.5 percent as the maximum buffer level. One of the methods uses a trend estimated based on a one-sided HP filter, as recommended by the Basel Committee. The other method is identical except that it is based on data augmented by a simple forecast that dampens the filter's effect of giving relatively large weight to the latest data observations. The chart shows that the buffer guide would have resulted in a high countercyclical capital buffer in Norway ahead of the banking crisis and the financial crisis.

The usefulness of the credit gap as an indicator for the countercyclical capital buffer will vary across countries and over time. The buffer guide can be suited to signalling a need to increase banks' buffer capital when credit is expanding rapidly in an economic upturn. After a period of rapid credit growth, however, the credit gap may narrow even if credit growth is not low. This is because the estimated trend will be high owing to the period of rapid credit growth, as observed in Norway and a

number of other countries following the financial crisis. The buffer guide is not well suited as an indicator for capital buffers in banks through the entire credit cycle.

¹ The BCBS recommends estimating trend using a one-sided HP filter with $\lambda=400\,000$. Norges Bank also uses a trend estimated on data augmented by a simple forecast. See, for example, Norges Bank (2013) and Gerdrup, Kvinlog and Schaanning (2013) for further details on trend estimation.

² See BCBS (2010) and ESRB (2014a).

iii. Banks' capacity to absorb losses

Banks' capacity to absorb losses is analysed to assess whether banks have sufficient buffers in a downturn. That, in turn, must be assessed in light of the level of financial imbalances – which can trigger or amplify a downturn and lead to substantial bank losses. Higher imbalances may contribute to deeper crises. Banks should therefore hold larger capital buffers when imbalances are increasing.

When the authorities are considering reducing the buffer rate, they must also assess whether banks' remaining capital buffer will be sufficient to get them through the downturn.

An assessment of banks' capacity to absorb losses will be based on banks' capital adequacy, earnings and loss prospects in a cyclical downturn, given an assessment of financial imbalances. Stress tests contain such information and can shed light on whether banks hold sufficient capital to meet a sharp downturn with large losses without amplifying the downturn by tightening credit conditions (see Box III).

Box III: Stress testing as a part of the decision basis for the countercyclical capital buffer

Stress testing is used by policymakers in many countries to analyse the consequences for banks of a pronounced, but conceivable downturn.

There are different kinds of stress tests. Some focus on analysing the resilience of individual banks in a given crisis scenario, in order to see whether they will remain solvent. Other analyses also include feedback effects from banks to developments in the real economy, so that the depth of the crisis can be endogenous. In these cases, the focus is more on macroeconomic outcomes and not on individual banks' solvency. Modelling bank behaviour in a crisis scenario will be crucial for the results of this kind of macro stress test. Norges Bank uses this latter kind of stress test, and this kind of stress testing framework is a natural starting point for assessing the effects of reducing the buffer in a crisis. For Norges Bank, stress testing is a key tool for describing how useful it is for banks to hold a buffer capital reserve prior to a crisis.

In a crisis, credit losses will typically substantially weaken banks' CET1 capital ratios. In addition, the risk weights will rise owing to higher credit risk than in good times. Both can contribute to reducing CET1 capital ratios.

How banks' choose to cushion a fall in capital adequacy will be significant for the economic impact of the crisis in the stress test. In Norges Bank's stress tests,¹ it is assumed that banks will limit the decline in capital adequacy in a hypothetical crisis by tightening the supply of new credit in order to meet the capital requirements. It is assumed that banks will change their lending practices along two dimensions to comply with capital requirements: 1) Banks increase lending margins so that earnings and capital adequacy rises; 2) Banks tighten lending standards by increasing collateral requirements. Overall, these changes pull down credit growth, investment and consumption. In this way, banks' behaviour will contribute to worsening the downturn in the real economy.

On the other hand, if policymakers have introduced capital buffer requirements prior to losses, capital requirements can be reduced at the same time as actual capital adequacy falls. This may dampen the rise in lending margins and the tightening of lending practices, since even after credit losses, banks satisfy the new lower requirements. Norges Bank's stress tests assume that banks allow capital ratios to fall in a crisis if capital requirements are reduced.

As a small open economy, Norway is exposed to external shocks. Domestic financial imbalances that have built up may make the Norwegian economy more vulnerable to adverse external shocks and amplify the effects of a downturn. This suggests that the depth of the downturn in the stress scenario varies with measures of financial imbalances. If the downturn is especially deep and losses substantial, a greater reduction in capital requirements than otherwise may be necessary to cushion banks' tightening of credit.

A cyclical stress test that reflects developments in vulnerabilities over time may thus elucidate the level of the countercyclical capital buffer desirable at a given time if a crisis should occur (see for example the discussion in Norges Bank (2018)).

The results of stress tests are shrouded in considerable uncertainty since they assess developments in a situation that rarely arises. Stress test results will vary from year to year, owing to both new assessments of the magnitude of financial imbalances and new assessments of economic relationships.

Stress testing alone cannot provide answers to the question of what is the correct level of the buffer. The reason is that stress tests are not suited to studying the costs

associated with higher capital requirements and therefore provide no information about the trade-offs between the benefits of good contingency arrangements and the costs associated with high capital requirements.

¹ See Andersen et al. (2019) for a detailed description of Norges Bank's model framework for macroprudential stress testing.

iv. Effects of a change in the buffer requirement on banks and the economy

When Norges Bank issues advice to change the buffer rate, it must also assess the options banks have for adjusting to such changes and the effects of changes in the buffer requirement on the economy.

When the buffer is being increased, banks' needs for raising capital, adjusting their dividend policy or increasing their earnings by raising the pricing of loans are assessed. This assessment may be based on banks' lending growth, earnings and capital adequacy. An increase in the pricing of loans may be a positive side effect if credit growth is high. However, banks' adjustments may also have undesirable outcomes. Banks may opt to raise their capital ratios by increasing the share of exposures with low risk weights, for example residential mortgage loans. This may impair enterprises' access to financing if enterprises lack alternative credit sources. Norges Bank therefore monitors the composition of banks' credit growth and assesses potential side effects of changes in the buffer requirement.

With a reduction in the buffer, 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 enterprises. There is little empirical knowledge regarding the effect of lowering capital requirements (see Box 1). The effect of reducing the buffer may depend on whether banks will maintain their access to wholesale funding if they reduce their capital ratios. Norges Bank's assessment of banks' liquidity situation and other market information will be relevant.

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