Norges Bank Watch 2017

An independent Evaluation of Monetary Policy in Norway

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FOREWORD

Each year, the Centre for Monetary Economics (CME) at The Department of Economics, BI Norwegian School of Management, appoints an independent group of experts to evaluate monetary policy in Norway.

This year, the committee consists of Erik Bruce, Chief Analyst at Nordea Markets, and myself, Professor in Economics at BI Norwegian Business School.

The committee is solely responsible for the report and the views therein. The report does not necessarily represent the views of the CME or of its members.

The Ministry of Finance partly funds the Norges Bank Watch reports, which contain useful information and analyses for the Ministry's evaluation of monetary policy presented each year in a White Paper to Parliament.

Oslo, February 28, 2017

Centre for Monetary Economics

Tommy Sveen

NORGES BANK WATCH 2017 – EXECUTIVE SUMMARY

Section 2 reviews and comments on Norges Bank's monetary policy in 2016. After a cut in March, Norges Bank raised their interest rate forecasts throughout 2016. The Bank made a rather well-signalled interest rate cut in September and the general impression is that it will take much for Norges Bank to cut rates further. The stabilization and later rise in oil prices in 2016 worked together with a much stronger than expected growth in housing prices is part of the explanation. In our view, the surprisingly positive development in registered unemployment is of equal importance. In 2016, Norges Bank chose to believe that registered unemployment gave a more accurate picture of the situation in the labour market, or at least of the output gap, than Statistics Norway's Labour Force Survey's (LFS) unemployment, which had increased much more.

NBW share Norges Bank's view that registered unemployment gives the best picture of developments in unemployment and the output gap. We therefore have no problem understanding that Norges Bank ended the downward movement in rates in 2016. The limited rise in registered unemployment since the oil price drop is due to the downturn in oil related business and nothing Norges Bank either could or should try to offset.

Even if Norges Bank ended 2016 with a firm conclusion that registered unemployment gave the best picture, the Bank seems to have been in doubt throughout 2016 about how much weight to give LFS unemployment. The way this uncertainty was communicated was rather vague.

In our view, Norges Bank's forward guidance would have been better if the Bank had been consistently more open on how they judged developments in the labour market. The main communication challenge for Norges Bank in 2016 was not connected to the labour market, however. Norges Bank has over time become a good communicator, something earlier Norges Bank Watches have applauded. Norges Bank not only publishes an interest rate forecast, they also publish a numeric explanation of why forecasts change (interest rate account). The idea is that the market should be able to understand and anticipate changes in Norges Bank policy rate forecasts when the economy deviates from expectations.

Norges Bank's inflation targeting has become more flexible in recent years, which has also been appreciated by earlier NBWs. Increased flexibility poses challenges to communication, however, which became very clear in 2016. Due to the risks and uncertainties connected to low rates, Norges Bank said in March that they would react less to news than before. Therefore, the interest rate account was not "*an exact expression of Norges Bank's response pattern ahead*". This prompts one to ask why Norges Bank still publishes the interest rate account. One possible reason is that the account could still explain the different directions the news was pulling.

That worked well in September, which was perhaps the most challenging meeting in 2016. Norges Bank's interest rate path in June was fully in line with a cut in September. News over the summer was, however, clearly on the strong side. There was little doubt that the interest rate path should be revised up, but there was no certain way of saying whether removing the cut would suffice. Still, the market and nearly all analysts concluded that Norges Bank would most likely keep rates on hold, as it did.

Trying to forecast direction of the interest rate path in December based on previous interest accounts would nevertheless have been misleading. News clearly pointed to a cut even when taking into account the higher than expected rise in housing prices. The interest rate path was actually close to unchanged, however.

To explain why it kept the interest rate path unchanged, the Bank introduced a factor called "Financial imbalances and uncertainty" in the interest rate account. Following the logic of the account (how news contributes to changes in the path) this ought to mean that the risk of financial imbalances had increased. But the substance of the account indicated, very indirectly, that this was not the case, at least not the whole case. The factor should also reflect that "the effects of monetary policy are uncertain, particularly when the policy rate is close to a lower bound". That the factor not only reflected changes, but in one way also levels, was clarified at a meeting Norges Bank held with analysts. We think this information is important for Norges Bank's forward guidance and therefore Norges Bank should have explained it in more detail in the report.

Despite the news suggesting a lower path, the decision did not come as a surprise to the market. Norges Bank had stressed the risk and uncertainty connected to low rates. They had also indicated that its risk assessment had changed from a risk of a strong downturn in the economy to one of too strong growth in housing prices. Why, then, exacerbate the sharp upwards turn in the housing market with a possible new cut?

This raises some important questions regarding Norges Bank's communication. The interest rate path still has a bottom at 0.4%. Taken at face value, it should therefore not take much for the Bank to cut rates. Analysts we have spoken to do not believe this to be the case. The financial imbalances factor will be used again to prevent a rate cut, regardless of whether the risk of imbalances has increased or not.

NBW has met with analysts to discuss whether the whole interest rate account should be omitted from the monetary policy reports. The view seems to be that Norges Bank should keep the account, partly because it forces the Bank to act with some degree of consistency. It is also an effective way to communicate Norges Bank's views on what are important disturbances to the output gap and the rate of inflation. But the Bank should clarify the role of the interest rate account.

With increased importance given to verbal communication, Norges Bank should *consider* an old suggestion from Norges Bank Watch, i.e., to publish some kind of minutes from board meetings.

In section 3 we discuss several policy issues Norges Bank should attend to. First, we consider the criteria for an appropriate interest rate path. The Bank introduced the current criteria in MPR 1/2005 and we document some important changes over time in the way the criteria are formulated and explained, and how they are used to explain monetary policy. In particular, inflation targeting has become more flexible over time. In the first set of criteria, Norges Bank stated that the rate of inflation should be stabilized "*within a reasonable time horizon, normally 1–3 years*", but in their recent criteria, the Bank has no mention of any horizon.

In 2005 the Bank had six criteria. By 2012 they were reduced to the three criteria we know today. The first criterion is that Norges Bank achieves the inflation target; the second underscores the flexibility of inflation targeting and the Bank's wish therefore to avoid too large changes in the real economy when bringing inflation back to target following economic disturbances. Most of the discussion in section three relates to the last criterion, however. This criterion tells us that monetary policy should be robust. We document that Norges Bank puts more and more effort into discussing the robustness criterion and we discuss its three main elements: financial stability, uncertainty about economic mechanisms when interest rates are low, and the lower bound on policy rates.

NBW argues that Norges Bank should extend their set of criteria for an appropriate interest rate path with a new criterion advocating financial stability. We argue that financial stability should be an objective in itself and we encourage the Bank to develop further their understanding of the relationship between policy rates and the probability and the strength of a financial turmoil.

NBW is not convinced that uncertainty about the monetary policy transmission mechanism calls for a more cautious reaction by the central bank when policy rates are low. If the central bank fears that the policy rate has a weaker effect on real economic activity than before, they should use the instrument more, not less, we think.

There is a lower bound on policy rates, but the bound is not zero. NBW think Norges Bank should consider computing implied policy rates from the two first criteria, but under the condition of a somewhat negative lower bound. This will help market participants to understand the reaction pattern of the Bank at low rates.

The last issue we cover is the financial stability analysis that is prepared for the Bank's advice on the countercyclical buffer. Financial stability issues are complex and difficult to analyse and NBW welcomes the effort to sum up the analysis in the financial imbalances and buffer guide box, but we encourage the Bank to rethink their gap analysis and discuss other variables. Those variables should be more closely linked to the actual advice.

1. Introduction

This report, Norges Bank Watch 2017, is an evaluation of the conduct of monetary policy in Norway in 2016. In addition, the report raises some policy issues for Norges Bank.

In section 2 we review and comment on Norges Bank's monetary policy in 2016. Most of the comments concern communication, but the report also discusses revisions of the output gap throughout the year and the extent to which Norges Bank puts weight on the two different measures of unemployment in their assessment of capacity utilization.

In section 3 we raise a number of policy issues for Norges Bank. First, we document how the criteria of an appropriate interest rate path has changed over time and in particular how the so-called robustness criterion has evolved. We discuss the interaction between monetary policy and financial stability, issues related to uncertainty regarding the transmission mechanism and its effect on policy, and the lower bound on policy rates. Second, we discuss the box that sums up the analysis behind the advice on the countercyclical buffer.

The committee met with the Ministry of Finance on November 21, 2016, and with Norges Bank on December 20, 2016. We wish to thank Norges Bank, Kyrre Aamdal, Kari Due-Andresen, Martine Holøien, Kjetil Olsen and Arent Skjæveland for help and constructive comments.

2. Monetary Policy and Communication in 2016

2.1 Overview

This section will mainly deal with questions regarding communication and consistency of monetary policy and, consequently, with whether monetary policy is predictable. As we discuss in a later section, inflation targeting in Norway has become more flexible in recent years. In addition to putting weight on avoiding volatility in inflation and the output gap, the Bank has put more and more weight on robustness. Moreover, the nature of the oil price shock also calls for more flexibility. In MPR 1/2016 Norges Bank wrote: "*In an economy marked by restructuring, monetary policy cannot fully counteract the effects on output and employment.*"

The degree of flexibility is most clearly demonstrated by the fact that both the rate of inflation and the output gap end up well below their targets at the end of the forecast horizon in recent MPRs. NBW generally sees this flexible attitude as reasonable, but increased flexibility makes communication harder.

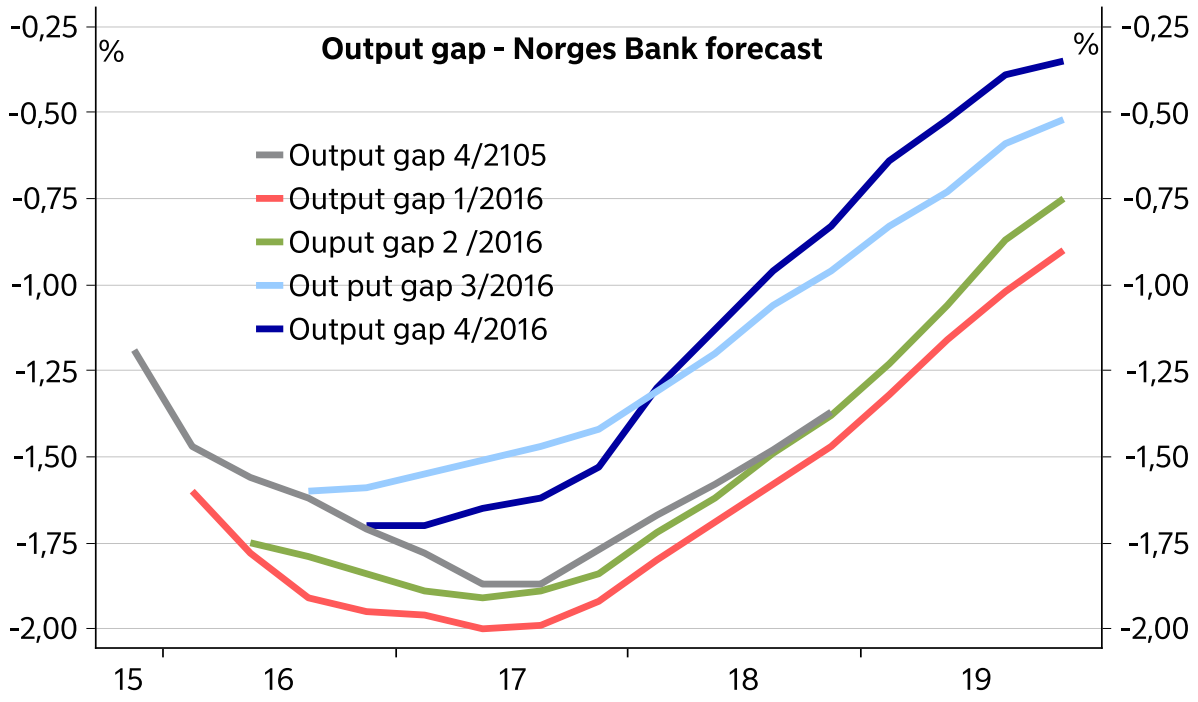
Norges Bank has, in recent years, made a great effort in trying to educate the market on how the Bank's reaction function works. The idea is that the market, by following current developments in the economy, will know how Norges Bank's view on policy rates will change as a result of new information about the state of the economy. This would give more credibility to the Bank's forward guidance and may make monetary policy more effective. It follows from this, however, that the Bank will become less predictable when goals are changed. In 2016, Norges Bank has seemed less concerned about the risk of a hard landing and more concerned about too rapid a growth in housing prices, which could also have made Norges Bank's actions harder to predict. In addition, Norges Bank has been concerned with the risks and uncertainties related to low policy rates, which complicates the picture even further.

In this section, we discuss the extent to which Norges Bank succeeded in communicating with the public in 2016. We start, however, by discussing certain aspects of macroeconomic developments in 2016 and, more specifically, the fact that two key measures of unemployment gave conflicting signals about the outlook for the economy.

2.2 Lower growth, but higher capacity utilization

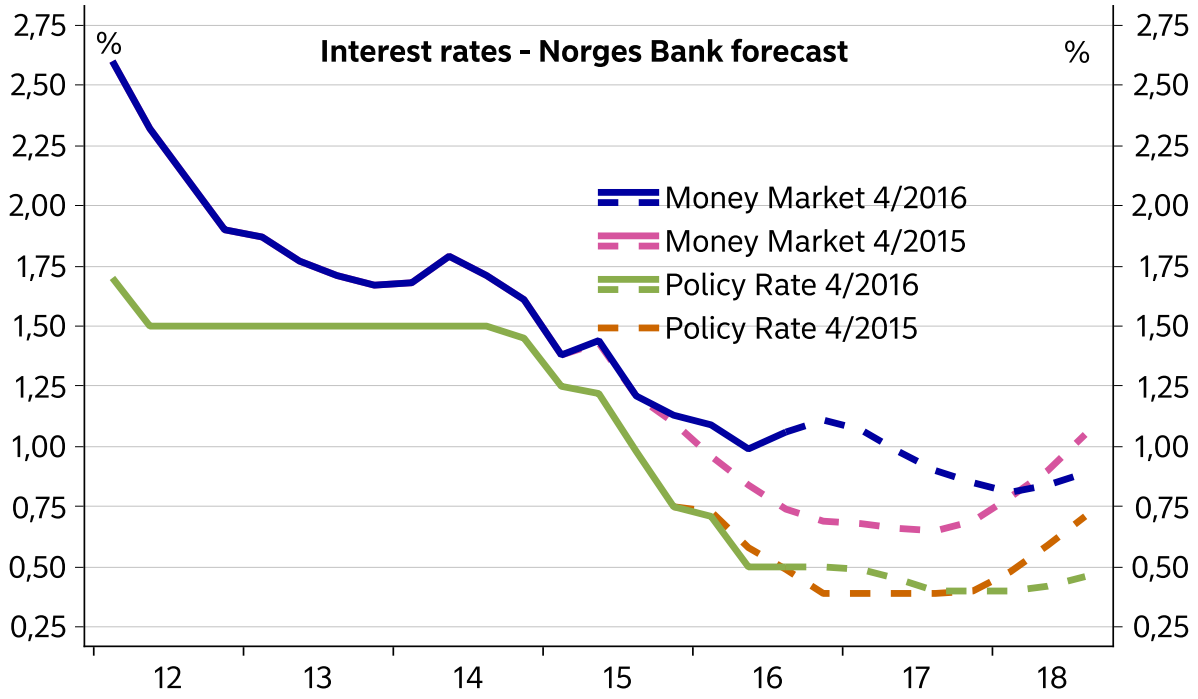
2016 turned out very different from 2015. Throughout 2015 Norges Bank revised the forecasts for growth, the output gap (capacity utilization), and, consequently, policy rates were strongly down. The first months of 2016 started in much the same way as 2015 had ended and Norges Bank revised their forecasts significantly down in the March MPR. Thereafter, however, the picture changed. The forecast for the output gap was revised upwards in the reports, especially in MPR 3/2016. In the MPR at the end of 2016, the forecast for the output gap was significantly higher than the one in late 2015.

Chart 1: The output gap revised up throughout 2016



Kilde: Nordea Markets og Macrobond

Chart 2: Key rates about the same – but higher money market rates



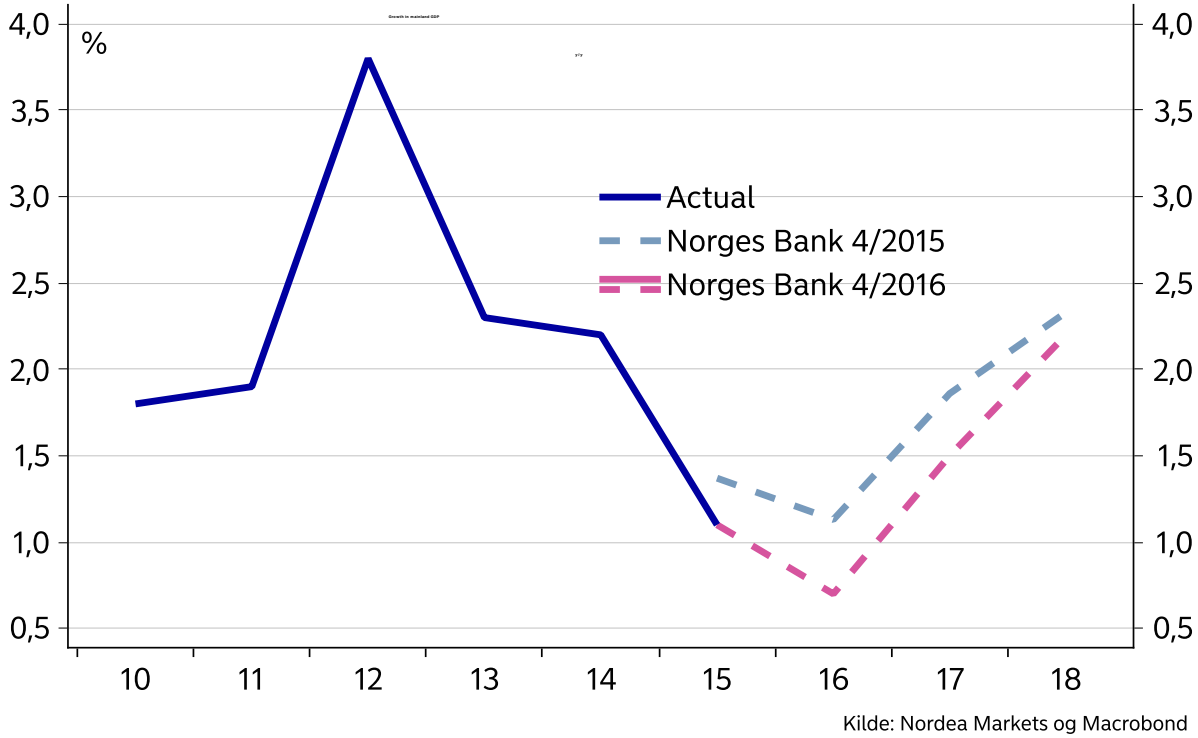
Kilde: Nordea Markets og Macrobond

Consistent with the upward shift in the output gap forecasts, monetary policy was tightened in 2016. This did not show up in the forecasts for the key policy rates (see Chart 2 below), since the development of key policy rates gave a misleading picture of actual monetary policy stance due to increases in money market spreads. The forecasts of money market rates in 2017 were significantly higher at the end of 2016 than in late 2015. In addition, we need to take into account exchange rate forecasts. Compared to the late 2015 forecast, Norges Bank saw NOK growing 3 per cent stronger in 2017.

Actual and predicted tightening of monetary policy can probably be explained mostly by the upward revision of the output gap (i.e. the gap was expected to close faster), though, as we discuss later, we think changes in the risk assessment also played a role. The developments in inflation and wage growth cannot explain the decision to tighten policy, however. Both inflation and wage growth forecasts for 2017 were revised down during 2016 despite the higher output gap.

The real mystery is why the output gap was revised up. Mainland GDP growth, both in 2016 and 2017, was actually revised down significantly through 2016.

Chart 3: Growth revised down



Kilde: Nordea Markets og Macrobond

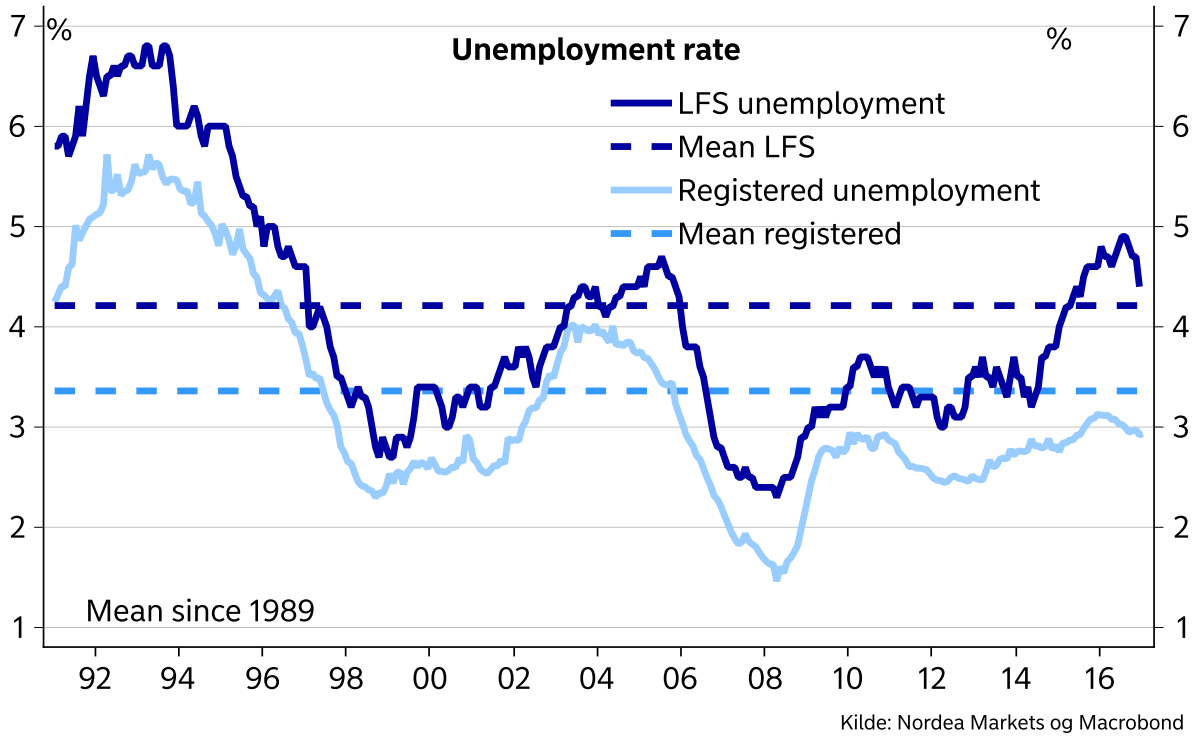
Lower growth combined with a higher output gap means that potential growth was revised down more than the downward revision of actual growth. This is hard to read out of Norges Bank's forecast on important measures of potential growth. Neither productivity growth nor growth in labour supply changed significantly, which means that lower growth should result in more slack in the labour market and higher unemployment. This is in line with Statistics

Norway's Labour Force Survey (LFS) unemployment figures. Unemployment in 2017 is forecast at 4.8%, up from 4.4% one year earlier.

Higher unemployment would normally mean a lower output gap. The reason why Norges Bank still predicted a higher output gap is that Norges Bank does not believe LFS gives a correct picture of the labour market and the output gap. The Bank tends to lend more weight to registered unemployment, that is, people using the Norwegian Labour and Welfare Administration (NAV) to look for work.

Since the drop in oil price in the autumn of 2014, the two unemployment measures have drawn a very different picture of the labour market. According to the LFS, unemployment is up 1¾% points from mid-2014, while registered unemployment is up ¼% points. LFS indicates slack in the labour market, with unemployment well above the average for the last 25 years, while registered unemployment is below average.

Chart 4: What are we to believe, LFS or registered unemployment?



Kilde: Nordea Markets og Macrobond

There are a number of reasons for the differences between the two measures. The LFS is a telephone survey of 24 000 persons. The respondents are unemployed if they say they are out of job, but have actively searched for work lately. Registered unemployment is a full count of those without a job that are seeking work through NAV. LFS unemployment is in general higher than registered unemployment because it consists of active job seekers that are not entitled to unemployment benefits.

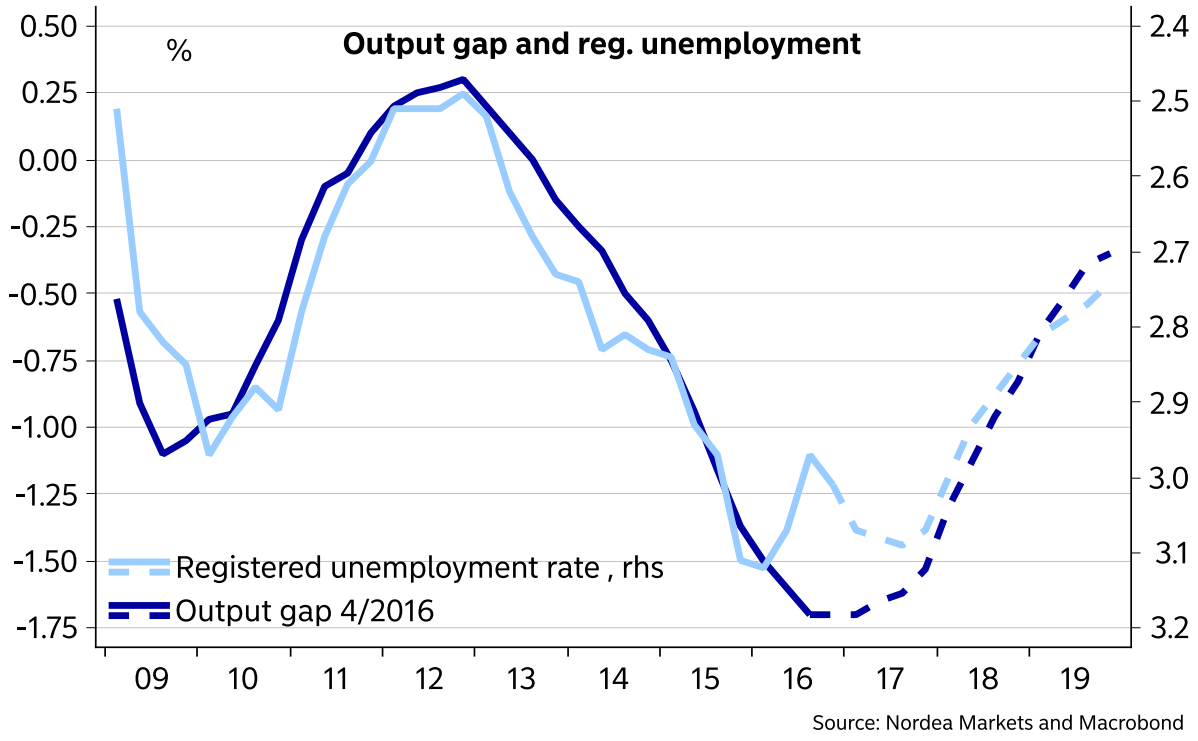
Before 2014 the difference between the two measures was historically quite stable, but with a lot of short-term volatility in LFS unemployment. The two measures gave presented similar pictures of *developments* in the labour market as long as one ignored the short-term noise in

the LFS. This changed after 2014, however, and Norges Bank had to take stance. Which of the measures did the Bank believe gave the relevant picture for monetary policy?

Norges Bank has always given the impression that the preferred unemployment measure is registered unemployment. The Bank is forecasting monthly changes in registered unemployment until the next MPR, but not for LFS unemployment, which already indicates which of them the Bank sees as the most important measure.

Earlier work on the output gap points in the same direction. The output gap is not observable and is based on various sources and on Norges Bank's best judgement. Sturød and Hagelund (2012) – in a Norges Bank Staff memo[1] – emphasized the importance of unemployment to calculations of the output gap. They do not explicitly state that they prefer registered unemployment to LFS, although they do only use registered unemployment in the analysis. Until 2014, Norges Bank could argue that they followed registered unemployment because it gave a better short-term picture. In 2015 and 2016 it became clear, we think, that the Bank also believed registered unemployment gave the best picture of the trend. The chart below demonstrates the clear connection between registered unemployment and Norges Bank's view on the output gap.

Chart 5: The output gap follows registered unemployment



Source: Nordea Markets and Macrobond

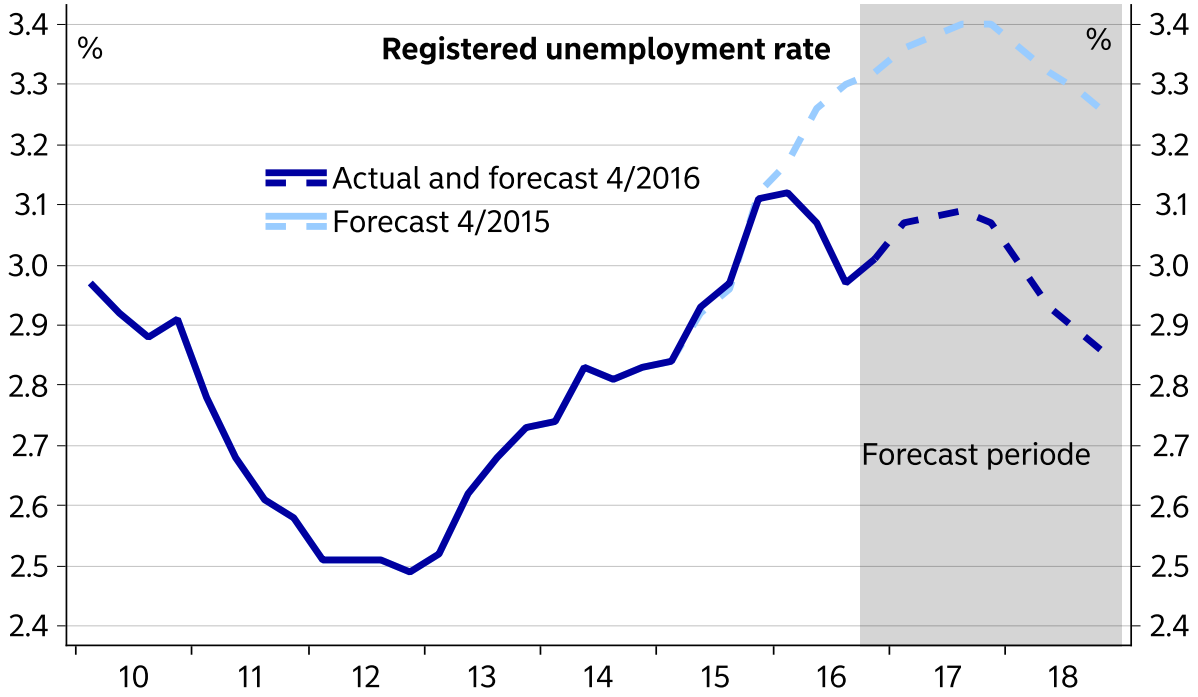
Short-term developments in 2016 and 2017 admittedly do not fit this figure very well. This is partly because the output gap is smoothed, but the output gap is still lower in 2016 and 2017 than implied by registered unemployment alone. According to Norges Bank, this is because

[1] Sturød, Marianne, and Kåre Hagelund (2012), Norges Bank's output gap estimates, Norges Bank Staff Memo 8/2012.

the Bank gives some, though much less, weight to fluctuations in the LFS unemployment rate. This issue is discussed in MPR 4/2016.[2]

It is fair to conclude, we think, that Norges Bank view on the *current state* of the economy relies strongly on developments in registered unemployment. The *changes* the Bank made to their forecasts of the output gap, and, consequently, monetary policy in 2016, depended on the surprisingly strong performance of registered unemployment.

Chart 6: Registered unemployment – the big surprise of 2016



Source: Nordea Markets and Macrobond

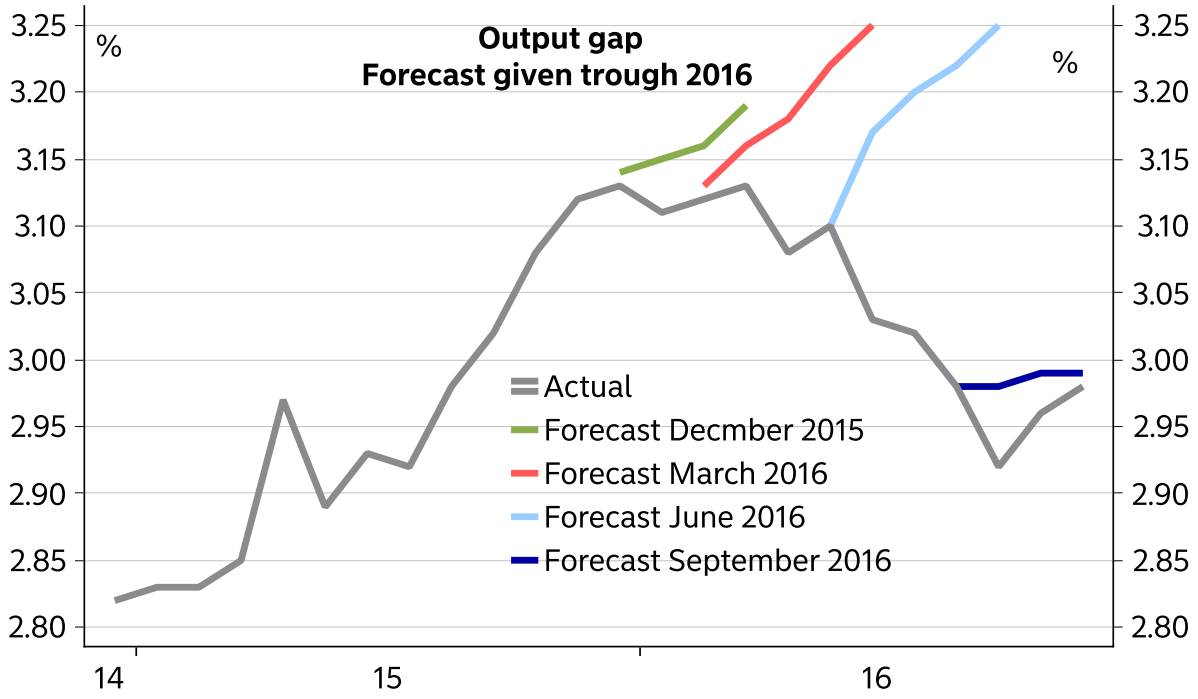
It is also interesting to see how Norges Bank's *forecast* of registered unemployment changed in light of *current* developments in registered unemployment. This is best illustrated by the change in the forecast between March 2016 and September 2016. After a rather sharp increase through 2015, unemployment levelled out in early 2016 in contrast to the forecast of late 2015. In the March report, Norges Bank concluded that this was too good to be true and continued to forecast higher unemployment. But unemployment actually fell in the spring, without Norges Bank revising its view.[3] In the June report, Norges Bank was still forecasting a rise in unemployment, but this time too, unemployment surprised on the downside. In

[2] It is not clear from this discussion whether Norges Bank means registered unemployment gives a more reliable picture of unemployment, a view we will argue, or whether the relationship between LFS unemployment and the output gap has changed

[3] In line with Norges Bank we use uses registered unemployment excluding those on labour market measures. In part, the increase in people participating on labour market measures can explain the drop in registered unemployment through 2016 and one could argue it gives a too rosy picture. Including people on labour market measures registered unemployment moved sideways through 2016.

September, Norges Bank was finally convinced by actual unemployment figures and forecasted unchanged unemployment.

Chart 7: The output gap – forecasts in 2016



Source: Nordea Markets and Macrobond

The Bank's reliance on registered unemployment raises two questions. Was the Bank right in giving registered unemployment much more weight than LFS unemployment figures, and did it communicate its position sufficiently clearly? It falls outside the scope of NBW to evaluate all possible reasons for the difference between the two measures of unemployment, but generally, we find it reasonable to give most weight to registered unemployment. The sharp rise in LFS unemployment throughout 2015 surprised many observers, because it partly came down to an increase in labour market participation.

Registered unemployment is a full count of actual people seeking jobs through NAV, but there are no registered labour supply figures. If we combine registered unemployment and employment, we can estimate labour supply (idea from Einar W. Norbø (2016)[4]) . The result is shown in the figure below.

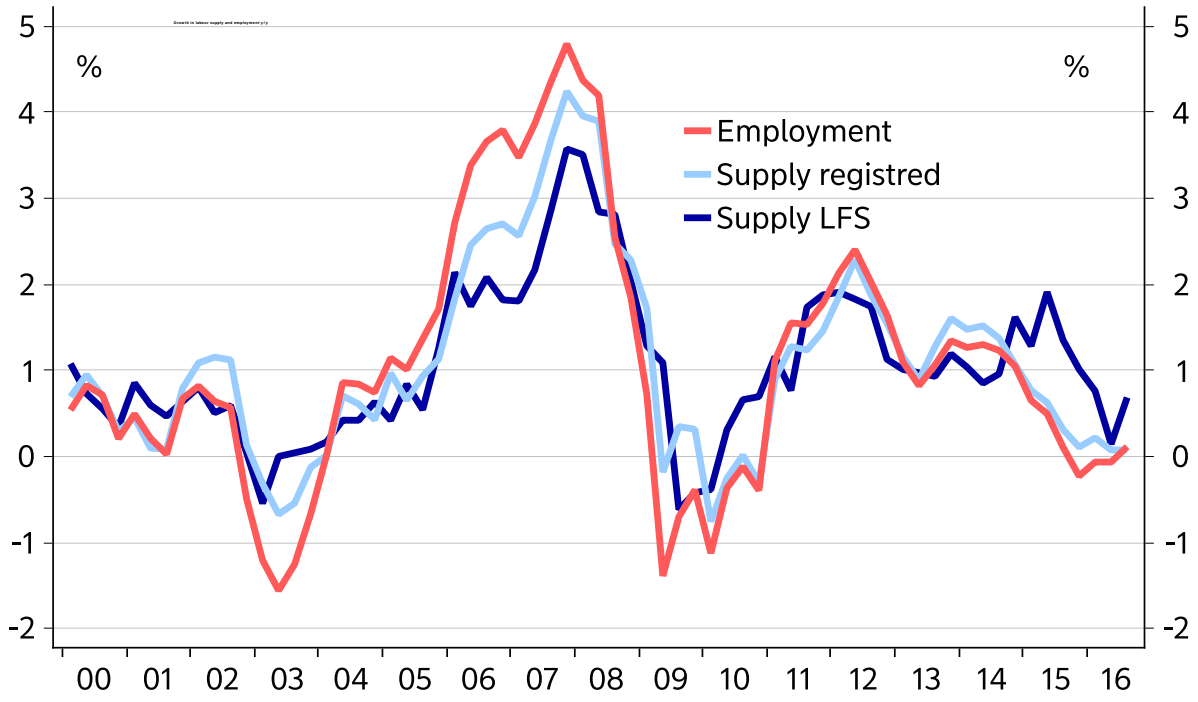
The implicit labour supply gives a more credible picture of labour supply than the LFS supply the previous years. Growth in the labour supply slows in line with the slower pace of growth in employment, as one would expect given the historical pattern. According to the LFS, supply growth actually increased in 2015.

It might be that registered unemployment gives too low a figure for the rise in unemployment among the youngest, but this is far from enough to explain the difference between the two

[4] Nordbø, Einer W. (2016), How many are unemployed?, Norges Bank Economic Commentaries 9/2016.

measures. We tend to give most weight to registered unemployment in line with Norges Bank's view. LFS is a survey based on a rather limited selection and the share of non-respondents is quite high. We have, however, discussed the question with other economists, and they tend to give greater credence to the LFS survey, so it is far from an uncontroversial conclusion.

Chart 8: Labour supply and employment



Source: Nordea Markets and Macrobond

The second question concerns how Norges Bank communicated its reliance on registered unemployment in 2016. The Bank had previously indicated preference for registered unemployment, but it was unclear whether it was because it gave a more stable short term picture. Banks officials did issue statements in 2015 indicating the Bank believed registered unemployment gave the best picture. In 2016, when the gap lasted, there seems to have been more doubt. Norges Bank addressed the question in a rather vague way. In MPR 1 2016 the Bank wrote: *"the wide gap between registered and LFS unemployment may suggest a somewhat greater degree of slack in the economy than unemployment figures from the Norwegian Labour and Welfare Administration (NAV) in isolation indicate"*. In MPR 2/2016 the Bank repeated the entire statement, but without the word "somewhat", which could indicate increased reliance on the LFS figure. In MPR 3/2016, "somewhat" was back again. Moreover, Norges Bank then pointed to the fact that other sources for labour market slack and capacity utilization pointed in the same direction as registered unemployment. It was in this report Norges Bank revised up the output gap significantly. Not only the wording, but also the change in the forecast, made it clear that registered unemployment was the measure to use.

In October, Norges Bank published the signed economic commentary "How many are unemployed", which we cited above. Registered unemployment, the author argued, gives a more reliable picture of recent years' developments in the labour market. The official view

came in MPR 4/2016. The report contained a thorough discussion of the connection between the output gap and the labour market. The focus was not so much on which source gave the best picture of the labour market, but on whether the relationship between the output gap and LFS unemployment figures had changed. A higher LFS unemployment rate now possibly meant a higher output gap than before, the report indicated.

The conclusion had strong implications. For Q3 2016, Norges Bank's official output gap was 0.85% points lower than implied by registered unemployment, but it was 2.30% higher than implied by LFS unemployment. This illustrates how much weight the Bank gave to registered unemployment compared to LFS unemployment. The clarification is helpful for outsiders who want to measure the output gap if the two unemployment measures continue to give a different picture.

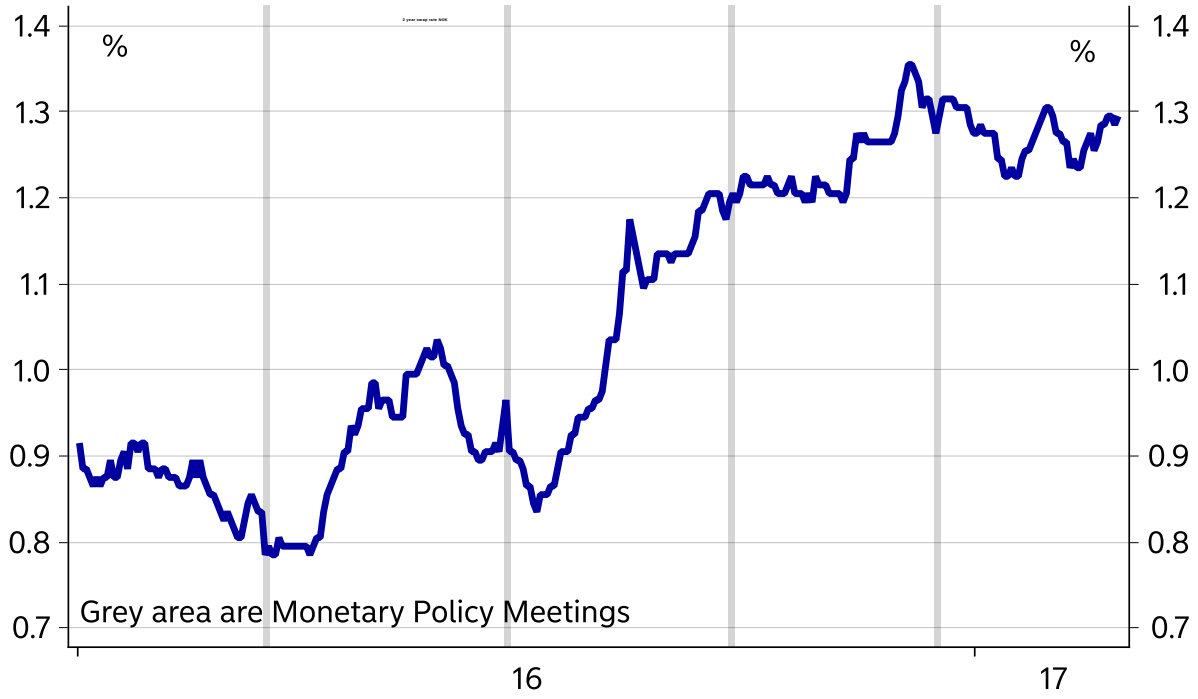
Uncertainty about the weight the Bank gave to the LFS survey made it harder to predict Norges Bank's actions in 2016, a view shared by analysts monitoring the Bank. Clarification came too late, possibly because Norges Bank was in doubt and averse to signalling anything as long as they did not have a clear view. This, however, was possibly the most crucial question concerning the state of the economy in 2015 and 2016. We therefore find it hard to understand why the Bank did not spend more time at an earlier date to discuss the question more thoroughly.

The body of the MPR is, largely, a listing of news with little in the way of substantive discussions of problems and uncertainties. Although the Bank does address these questions in the MPR boxes occasionally, the NBW thinks such themes should be given greater attention.

2.2 Monetary policy through the year

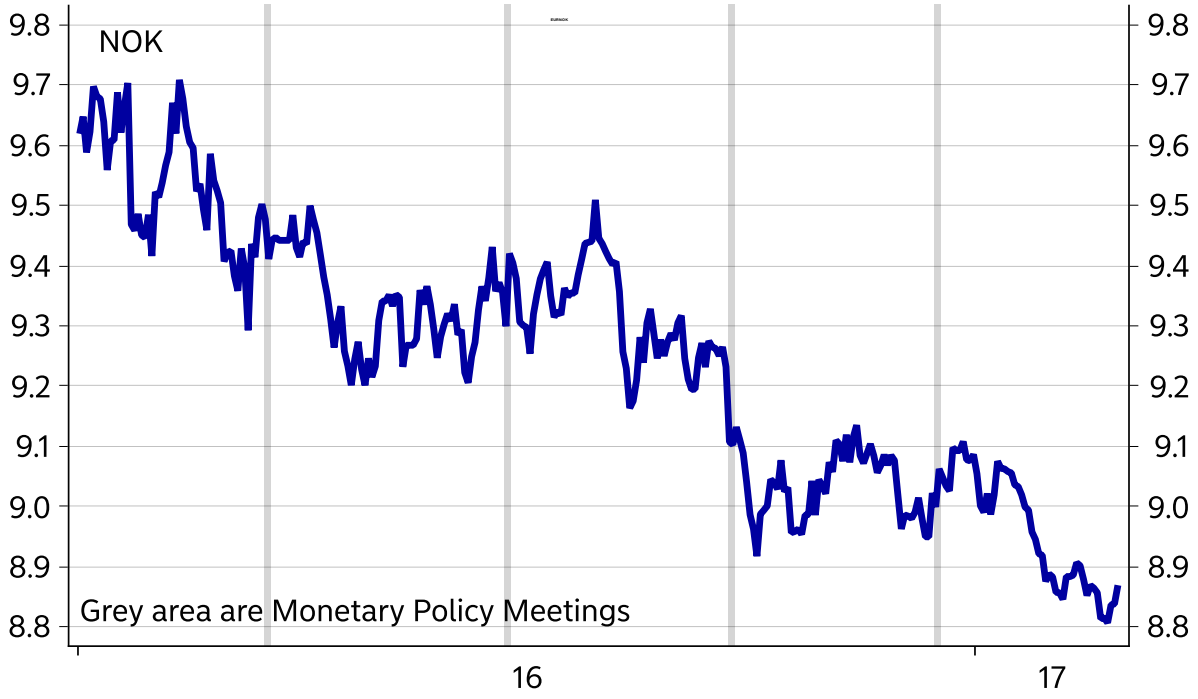
At the **March MPC meeting** Norges Bank cut rates as expected to 0.5%. The Bank had already signalled the probability of a March cut at the December 2015 meeting, and the economic news tended to imply lower rates. In addition, and in line with economic developments, Norges Bank lowered the bottom of the rate path from 0.39% to 0.20%. Market analysts interpreted this as "100%" probability of a cut to 0.25% and a further "20%" probability for a cut to zero. The rate path indicated, however, that Norges Bank would bide its time before they cutting again, and a cut in June was given rather low probability, while the path was fully consistent with a cut in September. The rate path was probably lower than expected, and longer forward rates fell somewhat.

Chart 9: Monetary policy meetings and effect on interest rate expectations



Source: Nordea Markets and Macrobond

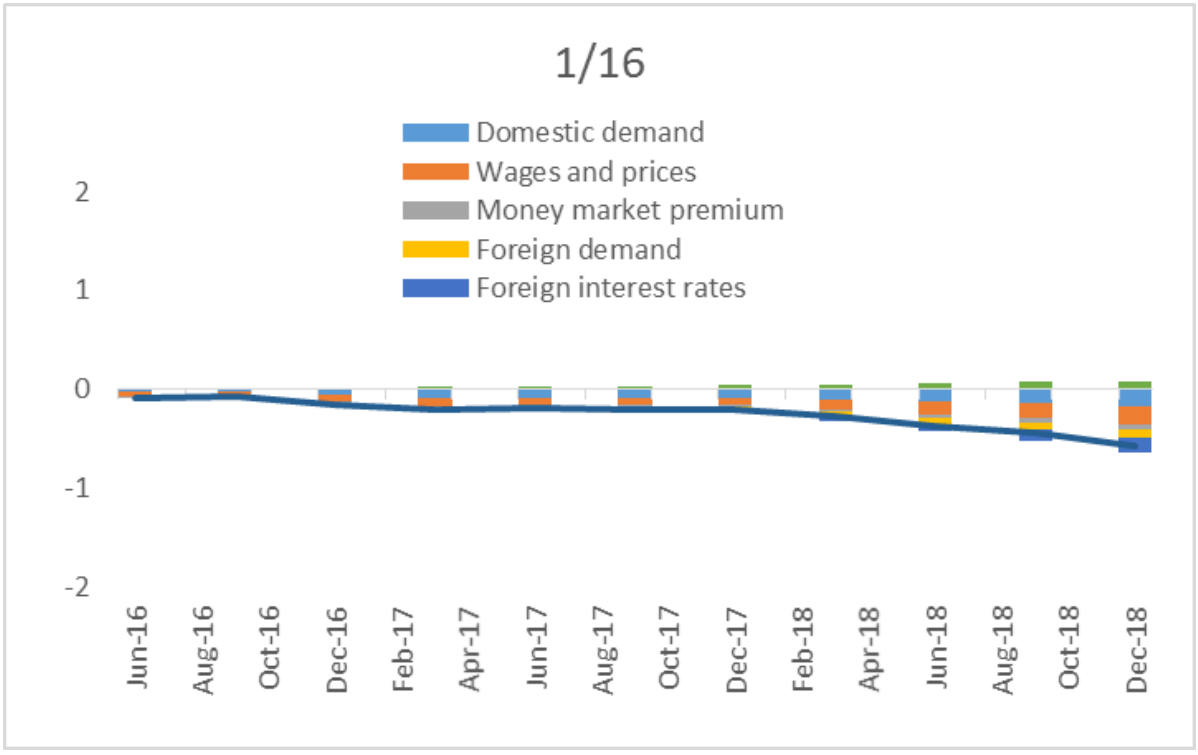
Chart 10: Monetary policy meetings and effect on EURNOK



Source: Nordea Markets and Macrobond

Focusing on the rate path as the most important indicator of forward guidance at the March meeting would be misleading. In its assessment, Norges Bank's board gave what turned out to be a very important monetary policy signal: *"Lower interest rates could increase financial system vulnerabilities. As the key policy rate approaches a lower bound, the uncertainty surrounding the effects of monetary policy increases. This now suggests proceeding with greater caution in interest rate setting"*. Norges Bank's board appeared to see a positive correlation between the risks and costs of cutting rates the lower the rates were cut and the Bank would, in particular, try to avoid negative rates. However, the board would not make too strong a commitment: *"Should the Norwegian economy be exposed to new major shocks, the Executive Board will, however, not exclude the possibility that the key policy rate may turn negative"*. Still, zero was assumed to represent a kind of floor and it would take a lot for Norges Bank to go beyond that. The statement also indicated the board would be happy to avoid approaching the lower bound. This reluctance to go too low with rates was to some degree in contrast to the rather sharp lowering of the rate path and the "100%" probability of a further cut.

Chart 11: Interest rate account MPR 1/2016

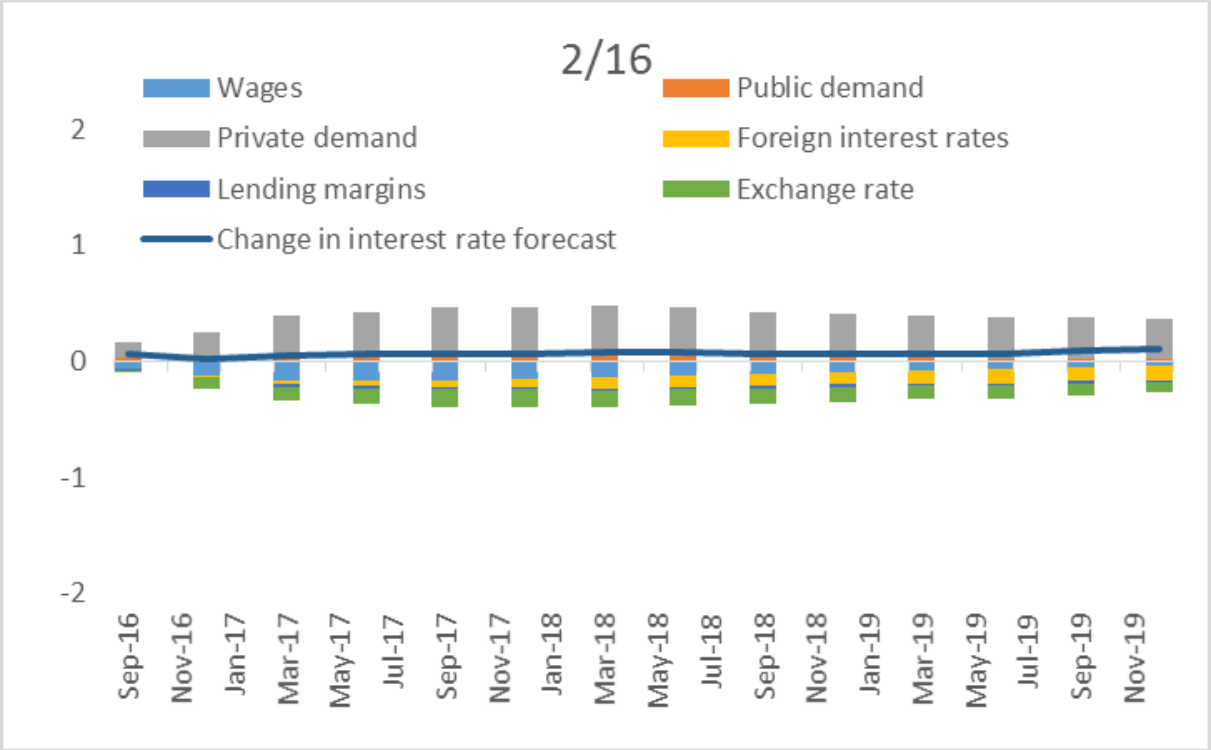


How to unite the Bank's reluctance to go too low with its desire to be transparent about the reaction function is not easy. In each report, Norges Bank states the impact of different economic events on revisions of the interest rate path ("the interest rate account"). The idea is to give an indication of how new information will change the interest rate path going forward. Of course, Norges Bank's understanding of how the economy works, its interpretations of events etc., will never be fully known to outsiders. Nevertheless, given that news sensitivity and contribution to the change in the interest rate path is relatively stable, it

should make it easier to forecast monetary policy. Moreover, interest rate forecasts will become more credible if the changes are well understood.

If the costs and the risks involved in lowering policy rates rise with lower rates, then old sensitivities will no longer be valid. Norges Bank made this clear: *"as the key policy rate is approaching a lower bound, monetary policy is now responding somewhat less than usual to news that pushes down on the interest rate path".* The interest rate account was very much in line with this. Since December 2015, news has pulled interest rates down, but the downward contribution was unusually small, at least for the first years of the forecast horizon. It seemed as if Norges Bank reduced the negative contributions to avoid lowering the path more than necessary. Norges Bank did not say how much the risk and uncertainty connected to low rates had influenced the path so the interest rate path does not explain why the path looked like it did. At the same time, Norges Bank clearly said the interest rate account gave no reliable forward guidance, since it was *"not an exact expression of Norges Bank's response pattern ahead"*. So why publish the interest rate account, one started to wonder. It did not explain Norges Bank's reaction and did not contain any forward guidance, a question to which we return later.

Chart 12: Interest rate account MPR 2/2016



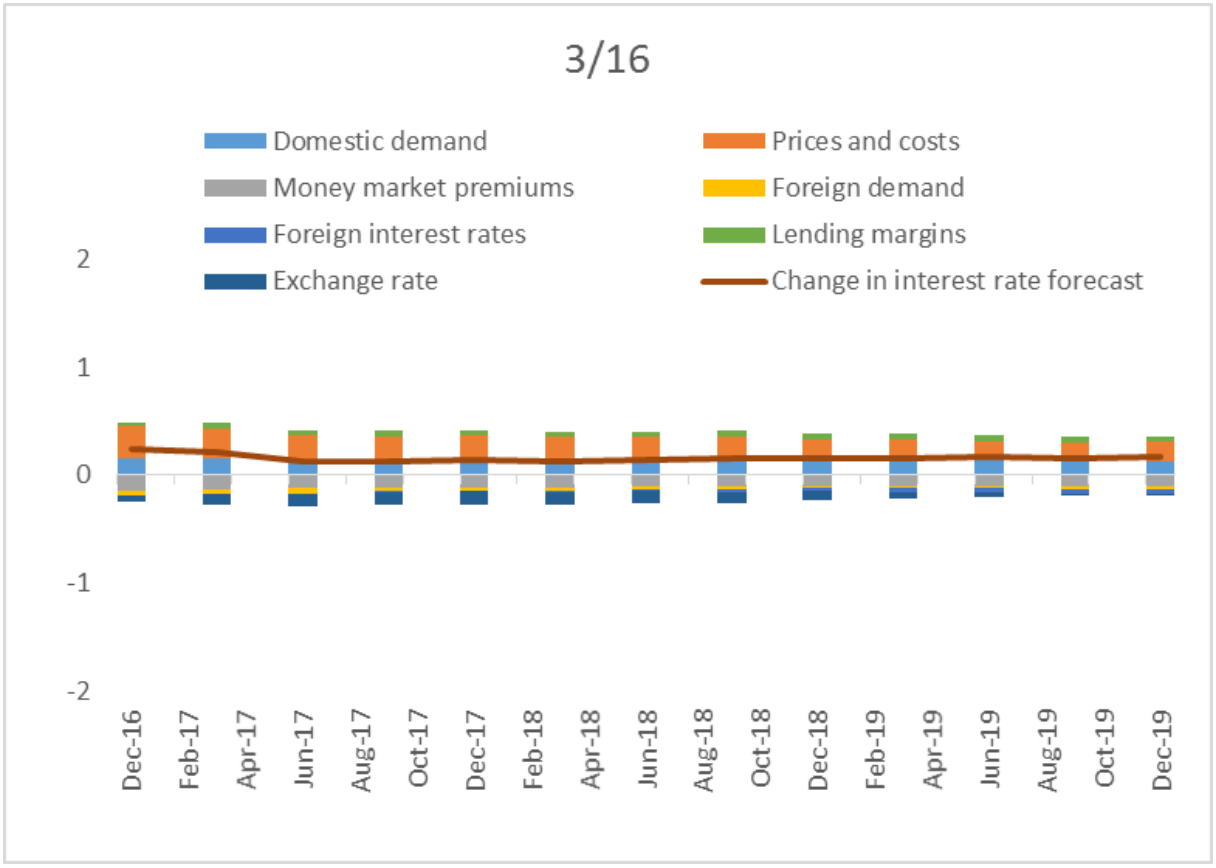
At the June **MPC meeting,** Norges Bank kept its key policy rates unchanged as widely expected and in line with the rate path from March. There were some rather abrupt moves in the NOK exchange rate that day, but they were due to the same day's Brexit vote. The rate path kept a "100%" chance of a rate cut in September, but the bottom in the path was raised from 0.2% to 0.25%. In other words, it removed the small probability of a further cut. This way of signalling Norges Bank's decision not to cut policy rates after the September cut, was possibly more aggressive than most analysts had expected. A stronger outlook for private demand due

to higher housing and oil prices was one of the reasons for the upward revision. However, this time there were factors pulling the other way as well, such as a stronger NOK and outlook for lower wage growth. The interest rate account looked more "normal" this time with seemingly stronger sensibilities to news. Since the news pulled in various directions, in contrast to the situation in March, the Bank, one suspected, would keep to a normal reaction pattern and only change the path marginally. Of course, this did not help outsiders understand how the reaction function was evolving.

After being revised down at every MPR since late 2014, the upward revision of the interest rate path in June was something new. Reading between the lines, the MPR could indicate a change in the risk assessment with less weight on the risk for a downturn and more on financial instability. Norges Bank published a figure showing that the risk of a recession had fallen below 10%. The same figure in March showed a probability of about 50%. At the same time, the board said in its assessment that growth in housing prices had accelerated and grew more than expected, in contrast to March when prices grew less than expected.

At the September MPC meeting, Norges Bank kept policy rates on hold despite the clear signal in the June report. This was no big surprise: 14 out of 16 analysts asked by Reuters expected rates to remain unchanged. It seems the interest rate market was well prepared, with a rather marginal rise in forward rates. NOK, however, strengthened by 1¼% against the euro.

Chart 13: Interest rate account MPR 3/2016



During the summer, registered unemployment had fallen, while Norges Bank had forecast an increase; inflation was ¾% points above the forecast and housing prices continued to grow by 1% on a monthly basis. In addition, with Norges Bank's hesitance to lower rates below a threshold, many thought it would not take much for the Bank to remove a future cut from the interest rate path. This was so despite the fact that Norges Bank in their June report clarified that they would react less not only to downside news, but also to upside news.

Norges Bank lifted its forecasts for the output gap, wage growth and inflation quite significantly in the September report. A box in the MPR ("Technical model-based interpretation of new information") demonstrated how new information since June had raised the forecast for the output gap and inflation significantly. However, the bottom of the rate path was only raised by 0.15% points to 0.40%, still indicating a 40% chance of a cut. This upward revision of the path was rather small given the significantly stronger view on inflation and output gap, even when taking into account the clarification from June that it would react less also to upside news.

The message from the September report was thus a bit mixed. On the one hand, it gave a much more optimistic picture. As discussed above, this was the report in which Norges Bank accepted unemployment had peaked and at a much lower level than expected. It was also clear that the acceleration in housing prices was not temporary. Many concluded that Norges Bank was finished cutting rates and that it would take a lot to bring interest rate cuts back onto the agenda. On the other hand, a "40%" probability of a cut is a signal that it would not take that much before a cut was on the agenda again.

The exchange rate had strengthened quite significantly since June. EUR/NOK had gone from 9.30 at the last MPC meeting to 9.10 before the meeting. Despite most expecting unchanged rates, it could go further if Norges Bank left rates unchanged. Giving a rather high probability of a future cut could prevent the NOK from strengthening too much.

Whatever reason, this mixed message was tested at the **December meeting**. The news leading up to the December meeting was clearly in sum on the downside. Inflation fell back below forecast. A survey of wage expectations clearly showed that Norges Banks wage forecast for 2017 was way too high and the oil investment survey pointed to significantly lower oil investments in 2017 than forecast. In addition, the NOK was stronger than expected. News since September seemed to point towards a lower path. Housing prices continued to grow strongly, however, although the difference with forecasts was moderate.

If one tried to forecast the interest rate path based on the interest rate account it was obvious that the path should be revised down. It was hard to argue against a lowering of the bottom in the path by more than 0.03% points to below 0.37%, even when taking into account the smaller than normal impact of the news. In that case Norges Bank's signal would have been that a cut in 2017 was the most likely outcome.

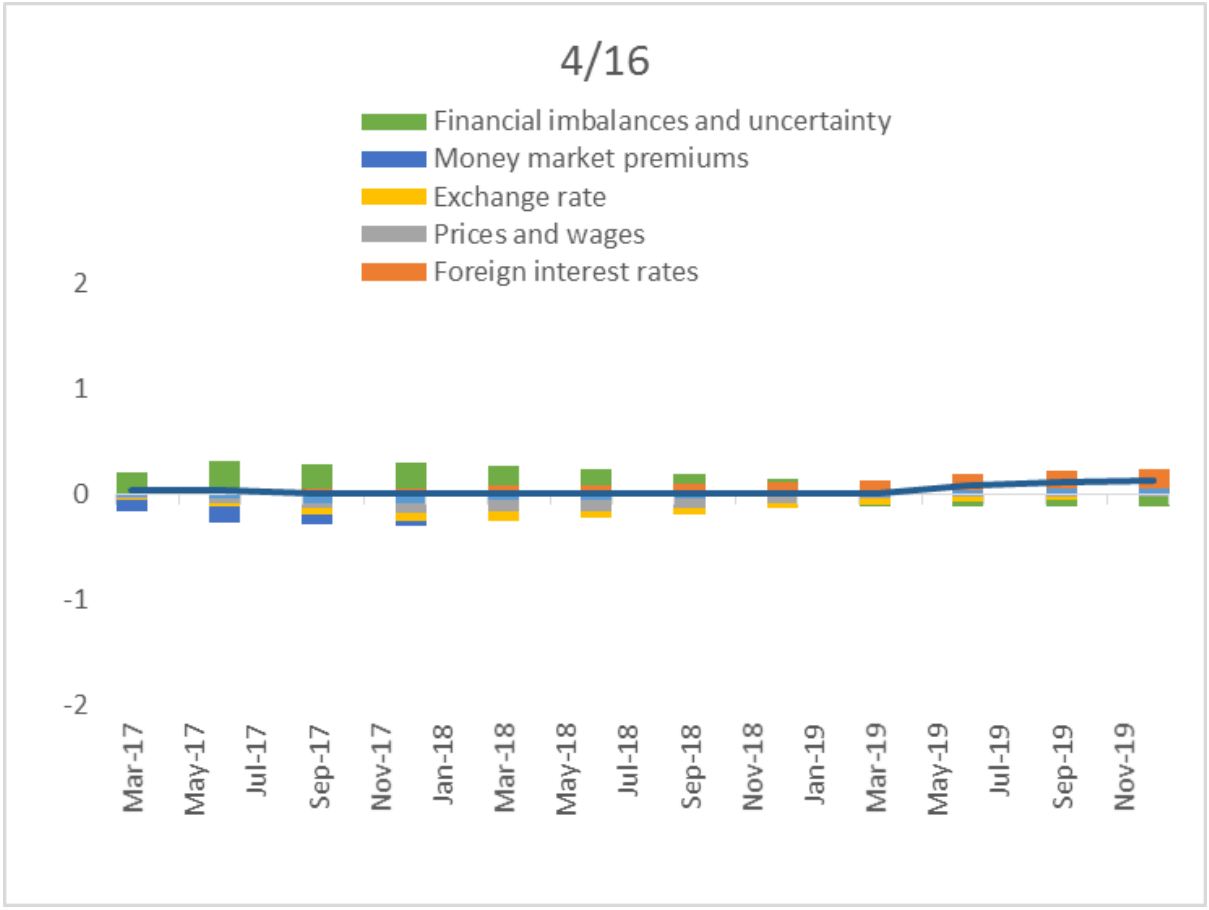
We doubt many expected a path with a bottom below 0.37%. It was especially the outlook for inflation that was lowered and Norges Bank had long ignored that inflation ended well below the target. There had also been some discouraging news concerning growth, but the overall picture was that the worst was behind us. Norges Bank had participated in what turned

out to be surprisingly smooth handling of the oil downturn. Why then risk pouring more fuel on the strong upturn in housing prices by cutting further?

The rate path was in line with the last reasoning. The path had an unchanged bottom at 0.4% to be reached in six months as in the September path, which actually meant a small upward revision over the short term. Norges Bank shared the view that news since the last meeting was on the downside. To explain that the Bank still kept the path about unchanged, a factor called "Financial imbalances and uncertainty" was introduced into the interest rate account.

How the new factor in the interest rate account should be interpreted was unclear. The intention of the interest rate account is to explain how news, i.e. events that differ from expectation, contributes to changes in the path. The intuitive interpretations of the new factor was that the risk of financial imbalances had increased more than expected, for example because housing prices had increased more than expected. But the text indicated that this was not the case, at least not the whole case. The factor should also reflect that "the effects of monetary policy are uncertain, particularly when the policy rate is close to a lower bound". It is unclear to us why Norges Bank's view on this uncertainty had changed since September.

Chart 14: Interest rate account MPR 4/2016



That the factor not only reflected changes, but in a way also levels, was clarified at a meeting Norges Bank held with analysts. But the exact interpretation is still unclear to NBW and to analysts we talked to.

The question concerns the degree to which the factor indicates a general reluctance on the part of the bank to change rates or increased risk related to housing prices and household debt. We have asked ourselves and other analysts what if housing prices and household debt developed as expected, but news indicated a worse outlook for inflation and output gap, would Norges Bank lower the interest rate path? The answer is no, at least to a point (which nobody knows). It will keep a path which leaves a less than a 50% probability of a cut. In other words, Norges Bank will accept a worse outlook for inflation and the output gap even if the risk of financial imbalances develops as expected. That is what we learned at the December meeting.

The year ended with two conflicting signals from Norges Bank. On the one hand, based on its wording and actions, it will take a lot for the Bank to cut rates or signal that a cut was highly likely. On the other hand, the interest rate path suggests that the Bank wouldn't need much pushing to cut policy rates.

2.3 Conclusions

All rates decisions in 2016 were in line with most analysts' expectations. They include the decision not to cut in September, contrary to signals given in June. Additionally, neither the decision nor the forward guidance triggered major market movements. The one exception was NOK's rapid strengthening on the September meeting, but as long as reactions in interest rates were rather moderate, one should probably not see this as a big surprise.

One could therefore argue that Norges Bank's forward guidance in 2016 worked rather well. Still, Norges Bank's communication was not really tested in 2016. Verbal statements were very much about the lower bound and risk connected to too low interest rates. Since news rather pointed to higher rather than lower interest rates throughout the year, the lower bound was never tested with the potential communications problem that could have arisen.

Our concern relates to the seemingly very precise communication system Norges Bank has built up over the years. If Norges Bank follows a rather strict target for the output gap and the rate of inflation, it is easy to imagine its view on policy rates changes in a rather predictable way. It is reasonable to try to educate the market about the reaction function. For by quantifying how various factors have contributed to changes in the interest rate path (the interest rate account), the market would obtain meaningful information about how views on rates would change in the future.

This model work less well when there is more flexibility, however. The robustness criterion has long been problematic. How the criterion evolves and what triggers changes in the criterion have to our knowledge never been explained. Still, we believe most economists would say that, until last year, the interest rate account has been a valuable tool in trying to understand Norges Bank. It gives at least some indication about how its views on rates change when factors that are important for inflation and growth change.

It is, however, possible to argue that the interest rate account gave less information in 2016. The uncertainty connected to effectiveness and possible side effects of very low rates implied

that the use of the account for forward guidance was limited. The interest path was much easier to understand and predict if one gave verbal communication more weight. This gave the impression that changes in the risk picture, from less weight on the short-term risk for an economic downturn to more weight on the longer-term problems connected to strong growth in housing prices, made a lowering of the path unlikely.

NBW has discussed with analysts whether the interest rate account should be omitted from the monetary policy reports. The view seems to be that Norges Bank should keep the account, partly because it could force the Bank to act consistently. It is also an effective way to communicate Norges Bank take on what is driving changes in the output gap and the rate inflation. But it needs to clarify its role.

When Norges Bank in December chose to include a stability concern in the interest rate account it should have clarified in writing how it should be interpreted. Norges Bank should use press conferences and meetings with analysts to perform such clarification, but vital information of this nature should be available to all in the written material.

Norges Bank has ended 2016 with mixed signals. On the one hand, an interest rate path makes a rate cut highly likely, while, the impression created by the December meeting that makes a cut in rates much less likely. We think this is problematic for a central Bank that sets such store by its forward guidance.

Increased flexibility and changes in the risk picture suggest to us that the normal tools used for forward guidance such as the interest path and the interest rate account function less. That means more weight to verbal communication. While enhancing verbal communication, Norges Bank should also *consider* an old suggestion in earlier NWBs, to publish some kind of minutes from board meetings. It is not necessary to publish every word in a full report, but a description of topics discussed, noting different approaches might make it easier to understand and anticipate changes in views and risk assessments.

3. Policy Issues for Norges Bank

In this section we discuss the criteria Norges Bank has applied when setting an appropriate interest rate path, criteria that have played a central role in explaining monetary policy tradeoffs since they were first introduced some twelve years ago. We document some important changes in both how the criteria are formulated and explained, and how they are used to explain monetary policy. In particular, we consider and discuss the three main components of the so-called robustness criterion: financial stability, cautiousness due to changes in the monetary policy transmission mechanism when interest rates are low, and the lower bound on policy rates. Last, we raise some issues regarding the criteria and the buffer guide, both of which are important for the countercyclical buffer requirement. The Ministry of Finance sets the buffer, so the tool is not in Norges Bank's toolbox. Norges Bank prepares the decision basis and advises the Ministry on the buffer, however.

3.1 The criteria for an appropriate interest rate path

In their first inflation report, in 2005, the IR 1/2005, Norges Bank published their criteria for the interest path for the first time. Later the same year, Norges Bank also started publishing their interest rate forecasts as the second central Bank in the world. The criteria helped observers understand the tradeoffs faced by the central Bank when deciding upon a strategy for monetary policy.

Criteria for an appropriate future interest rate path (IR 1/2005)

1. If monetary policy is to anchor inflation expectations around the target, the interest rate must be set so that inflation moves towards the target. Inflation should be stabilised near the target within a reasonable time horizon, normally 1-3 years. For the same reason, inflation should also be moving towards the target well before the end of the three-year period.
2. Assuming that inflation expectations are anchored around the target, the inflation gap and the output gap should be in reasonable proportion to each other until they close. The inflation gap and the output gap should normally not be positive or negative at the same time further ahead. If both gaps are positive, for example, a path with a higher interest rate would be preferable, as it would bring inflation closer to the target and contribute to more stable output developments.
3. Interest rate developments, particularly in the next few months, should result in acceptable developments in inflation and output also under alternative, albeit not unrealistic assumptions concerning the economic situation and the functioning of the economy.
4. The interest rate should normally be changed gradually so that we can assess the effects of interest rate changes and other new information about economic developments.
5. Interest rate setting must also be assessed in the light of developments in property prices and credit. Wide fluctuations in these variables may constitute a source of instability in demand and output in the somewhat longer run.
6. It may also be useful to cross-check by assessing interest rate setting in the light of some simple monetary policy rules. If the interest rate deviates systematically and substantially from simple rules, it should be possible to explain the reasons for this.

The first two criteria (maybe combined with the fourth) are often referred to as flexible inflation targeting. The Bank's main objective of the central Bank is to provide a nominal anchor, but when achieved, the Bank would trade off fluctuations in inflation against fluctuations in real economic activity (maybe without too much volatility in policy rates). The third and the sixth criteria are related to robustness. The interest path is constructed using a

core macroeconomic model and therefore depends quantitatively on the economic mechanisms in that model. The idea of the robustness criterion (3) is therefore to make sure the interest rate path does reasonably well also in alternative models. Cross-checking will have a similar effect, as these simple policy rules typically do reasonably well across many types of models (see, e.g., Levin and Williams (2003) for an analysis of robust policy with non-nested reference models).[5] Taylor and Williams (2010) explain the intuition elegantly. "[S]imple monetary policy rules are designed to take account of only the most basic principle of monetary policy of leaning against the wind of inflation and output movements. Because they are not fine tuned to specific assumptions, they are more robust to mistaken assumptions." If actual policy does not deviate too much from these simple rules, that policy is taken to be robust.[6] The fifth criterion is related to leaning-against-the-wind policy. The Bank relates volatility in property prices and credit to the possibility of future instability in demand and production, so it seems to suggest that financial stability is not an objective in itself.

NBW 2006 applauded the publication of the criteria. This was viewed as "contributing to a further understanding of which factors that Norges Bank considered to be of particular importance" and thereby to increase transparency. It also helped observers understand the interest rate path, which was published for the first time in the third inflation report in 2005. This was an important step and clearly helped the Bank in its efforts to communicate with the financial market and the public. NBW 2006 included the following appraisal: *"Norges Bank is a good communicator. The Bank has taken a number of steps to improve its communication with the market and the public at large over the years, and continues to do so. This reflects – as we see it – a genuine commitment to transparency and openness."*

Norges Bank revised the criteria two years later in the first monetary policy report of 2007. The first criterion no longer referred to a "normal" horizon of 1–3 years; instead, *"[t]he interest rate should be set with a view to stabilising inflation close to the target in the medium term."* The criterion also states that the horizon will depend on *"disturbances to which the economy is exposed…"*. The second criterion was also revised, referring now to a reasonable balance between the path for inflation and the path for capacity utilisation. NBW 2008 found *"the new criteria [to] better reflect the underlying principles of conducting monetary policy and better show that the Bank is conducting a flexible inflation targeting regime, caring not only about inflation but also about capacity utilization"*. We agree and see these changes as reasonable steps towards making inflation targeting more flexible as the Bank gained credibility for the regime.

In the first set of criteria it was unclear whether stable property prices and credit were independent objectives for monetary policy or only mattered because financial instability might influence future capacity utilization and inflation. The new set of criteria seemed to eliminate this doubt. The original fifth criterion was abolished with Norges Bank writing instead, *"[i]n the assessment, potential effects of asset prices, such as property prices, equity prices and the krone exchange rate on the prospects for output, employment and inflation are*

[5] The two main approaches of modelling monetary policy are simple instrument rules and optimal policy. The former typically a description of how interest rates should be set based on a few key variables.
[6] Ilbas et al. (2012) argue that the central bank should extend the loss function with a term that punishes deviations from the so-called Taylor rule.

also taken into account." This was no longer an independent criterion and seemed to suggest the Bank saw it as a naturally inherent to a flexible and dynamic inflation-targeting regime.

The last revision of the criteria related to interest rate smoothing. The (new) fourth criterion stated that interest rate adjustments should normally be gradual and consistent with previous response patterns. This was a minor revision, but during the financial crises it was important for the Bank to signal that it was not pursuing a "wait and see" approach.

Criteria for an appropriate interest rate path (MPR 2/2010)

1. The interest rate should be set with a view to stabilising inflation at target or bringing it back to target after a deviation has occurred.
2. The interest rate path should at the same time provide a reasonable balance between the path for inflation and the path for overall capacity utilisation in the economy.

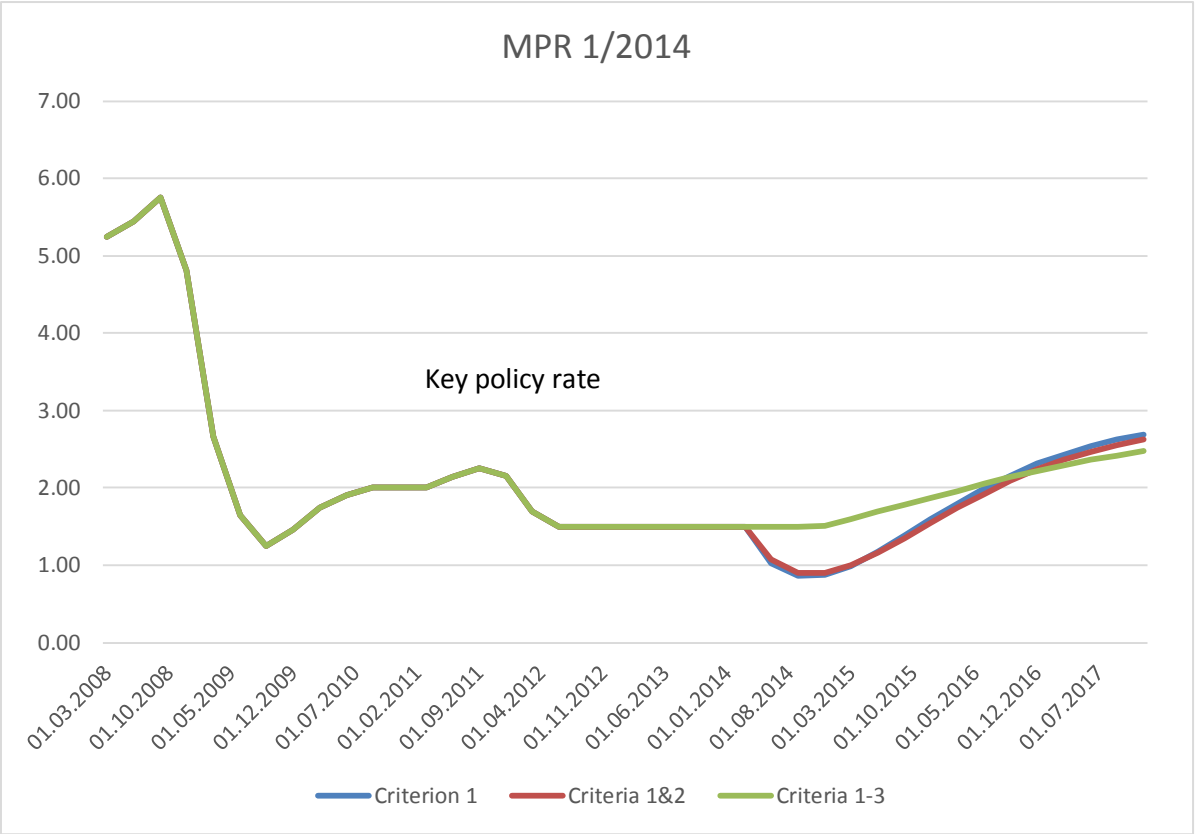
In the assessment, potential effects of asset prices, such as property prices and equity prices, and the krone exchange rate on the prospects for output, employment and inflation are also taken into account. Assuming the criteria above have been satisfied, the following additional criteria are useful:

3. Interest rate adjustments should normally be gradual and consistent with the Bank's previous response pattern.
4. Interest rate developments should result in acceptable developments in inflation and output also under alternative assumptions concerning the economic situation and the functioning of the economy. Any substantial and systematic deviations from simple, robust monetary policy rules should be explained.

The next set of changes in the criteria occurred in the second monetary policy report of 2010. The wording of the first criterion was shortened and extended in the second. The latter change made it clear that the Bank would bring inflation back to target in a way that gave a reasonable tradeoff between inflation stability and stability in overall capacity utilization. The third criterion concerns interest rate smoothing, while the fourth is concerned with both robustness and model uncertainty, and cross checking with simple rules.

The main innovation in this report was that the Bank published a so-called loss function and forecasts of key macroeconomic variables based on different weights in the loss function. More precisely, the Bank offered four forecasts for three key variables: the policy rate, the output gap, and the rate of inflation. The first case showed the forecasts under the assumption that the Bank only cared about inflation; the second and third case also put weight on the output gap and on interest changes, respectively. The last case was the baseline scenario. Compared to case 3, this forecast also puts weight on deviations from a simple policy rule.

Chart 15: Example of alternative forecasts (from MPR 1/2014)



NBW 2011 welcomed the alternative scenarios and wrote*: "These are useful, as they explain how the interest rate forecast could be changed by altering the various criteria that monetary policy should take into account"*. However, the authors also suggested that *"Norges Bank makes it clearer as to how the issues of major concern in financial stability influence monetary policy decisions in practice."*

NBW 2012 echoed the concern about weighting financial stability and asked if it was given any weight in 2011. There was no mention of financial stability worries in the criteria, the authors wrote, despite the concerns published in press releases that interest rates could stay low for too long.

Norges Bank changed the criteria again in the first monetary policy report of 2012. The two last criteria were merged into one, and the three criteria were given the titles we know it today. One important change in comparison with the earlier set of criteria, was that the Bank again mentions financial stability explicitly. The Bank will not only focus on inflation and the real economy, but also set rates in order to mitigate the risk of financial imbalances building up.

Criteria for an appropriate interest rate path (MPR 1/2012)

1. **The inflation target is achieved:** The interest rate should be set with a view to stabilizing inflation at target or bringing it back to target after a deviation has occurred.

2. **The inflation targeting regime is flexible:** The interest rate path should provide a reasonable balance between the path for inflation and the path for overall capacity utilisation in the economy.

3. **Monetary policy is robust:** The interest rate should be set so that monetary policy mitigates the risk of a buildup of financial imbalances, and so that acceptable developments in inflation and output are also the likely outcome under alternative assumptions about the functioning of the economy.

NBW 2013 welcomed clarification on financial stability, but was uneasy with the description of monetary policy in the loss function. Before this report, Norges Bank had four terms in its loss function. The first two, volatility of inflation and the output gap, were linked to flexible inflation targeting. The third term expressed the Bank's wish to avoid large variations in the policy rate, while the last term highlighted the need to avoid setting the policy rate too far away from the "natural interest rate". NBW 2014 echoed this disquiet about the interest rate term, with the authors urging the Bank to *"continue avoiding the reference to the analytical formulation… and communicate more explicitly to the public the overall concern regarding financial stability."*

In the fourth monetary policy report in 2014 the Bank amended the following comment to the robustness criterion: *"The consideration of robustness is not an objective in itself, but is included because in an uncertain world taking robustness into consideration may yield improved performance in terms of inflation, output and employment over time."* We return to this below.

2016 saw a major change in the use of graphical analysis related to the criteria. This had started in the 2015 monetary policy reports. In MPR 2014/4, the graphs showed three different scenarios: the first based on criterion 1, the second based on criteria 1 and 2, and the last based on all three. In the first report in 2015, the Bank omitted the first scenario. We are sympathetic to this change, as we think the counterfactual outcome of strict inflation targeting is not very interesting from a practical monetary policy point of view. The first scenario is now what we would call flexible inflation targeting, which seems like a natural benchmark. We also think this benchmark would naturally involve some degree of interest rate smoothing, although it is not entirely clear whether the first scenario (named criteria 1 and 2) includes smoothing. The two first criteria do not mention interest rate smoothing, but in the short passage before criterion 3 the Bank writes that uncertainty in the monetary policy transmission mechanism would call for a gradual approach.

In the last report in 2015 the Bank renamed the two scenarios and called them "baseline" and "alternative". From the description in the text, the difference between the new and the old benchmarks is unclear, but it might just be a cosmetic change. What is more important is that

the difference between the two scenarios was significant. At the end of the forecast horizon, the benchmark gave a rate of inflation and an output gap of about 2.3 and -0.2, respectively. In the baseline, the corresponding numbers were 1.9 and -1.4. Taken at face value, the effect of leaning against the wind was apparently quite substantial. The benchmark analysis ignored the lower bound on nominal interests, however, and the analysis did not take account of a possibly different monetary policy transmission mechanism at low – or negative – interest rates. The Bank pointed this out in the report.

In the first report of 2016, the comparisons between the alternative benchmark and the baseline are omitted. The Bank explains why. Since the last report, the economic outlook had worsened and the Bank decided to lower rates from 0.75 to 0.5 and push the interest rate path significantly downwards. According to the forecast, the policy rate would drop further by the summer of 2016 where it would stay until the end of 2017. In this situation, the Bank argued, the benchmark analysis would not be useful. *"The analytical framework does not take into account the existence of a lower bound for the key policy rate and that the effects of monetary policy may change as the key policy rate approaches the lower bound."*

Instead of the benchmark analysis, the Bank showed baseline forecasts for inflation and the output gap in the same figure. The figure shows that the Bank expected both the output gap and the rate of inflation to deviate from their targets at the end of the forecast horizon. The extent to which these deviations are due to the normal robustness criteria such as leaning is, however, unclear, since they result from both a deliberate policy choice and the limitations due to the (negative) lower bound and low effectiveness at low policy rates.

Criteria for an appropriate interest rate path (MPR 4/2016)

1. **The inflation target is achieved:** The interest rate path should stabilise inflation at target or bring inflation back to target after a deviation has occurred.

2. **The inflation targeting regime is flexible:** The interest rate path should provide a reasonable balance between the path for inflation and the path for capacity utilisation in the economy.

3. **Monetary policy is robust:** The interest rate path should take account of conditions that imply a risk of particularly adverse economic outcomes and of uncertainty surrounding the functioning of the economy. A build-up of financial imbalances may increase the risk of sudden shifts in demand further out. A robust monetary policy should therefore seek to mitigate the risk of a build-up of financial imbalances. Uncertainty surrounding the effects of monetary policy normally suggests a cautious approach to interest rate setting. This may reduce the risk that monetary policy will have unintended consequences. In situations where the risk of particularly adverse outcomes is substantial, or where confidence in the nominal anchor is in jeopardy, it may be appropriate in some cases to pursue a more active monetary policy than normal.

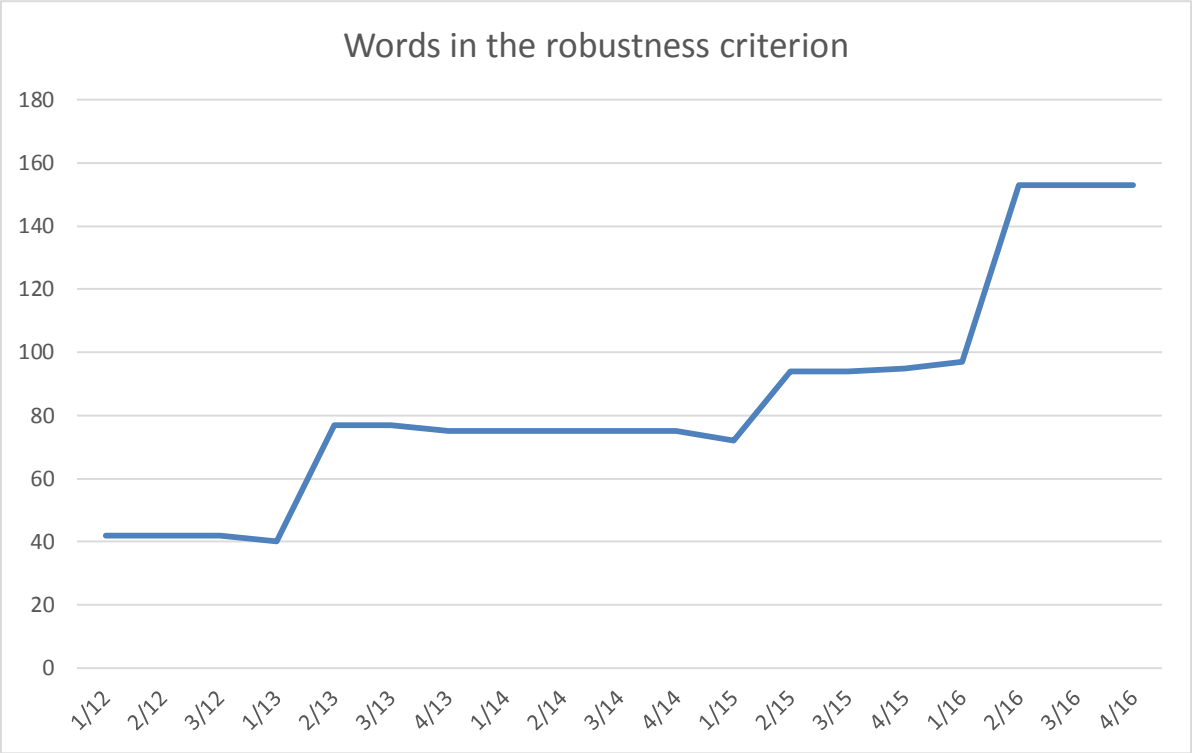
The consideration of robustness is not an objective in itself, but is included because it may yield improved performance in terms of inflation, output and employment over time…

The Bank show this graph in MPR 2 and 3, but omitted the graph in MPR 4.[7] We welcome the change, since it was not clear why the Bank would focus on those two variables only. It would

[7] We still, of course, find the forecasts with error bands in the monetary policy section of the report.

have been more interesting to visualize some of the information in their robustness criterion in a graph.

Chart 16: The use of words in the robustness criterion



The figure above shows an interesting development, namely the number of words in the robustness criterion. The third criterion dates back to MPR 1/2012. In that report, the Bank used about 40 words to explain what they meant by robust monetary policy. About one year later, in MPR 2/2013, they used 75 words, but the difference was mainly that financial stability was said not to be an objective in itself. The number of words in the latest report is 150, about 50 words up on the first report this year. For comparison, in MPR 1/2012 the Bank used 49 words to explain the first two criteria, while they needed 43 words in their latest report.

We think this illustrates an important fact. Monetary policy is now much less about the traditional tradeoff between inflation stability and stability in capacity utilization. Instead, the tradeoffs are much vaguer – they consist of changes in probabilities of financial distress, in unknown lower bounds for the nominal interest rate and an unknown monetary policy transmission mechanism when rates are low. We encourage the Bank to provide some quantitative guidance regarding these factors.

3.2 Inflation targeting and financial stability

When analysing and discussing the interaction between financial stability and monetary policy, it is useful to start with a simple stylized model following Woodford (2012). Open-economy issues may certainly play a role in financial stability, but we omit that complication here and focus on a closed economy.

We start by specifying aggregate demand. It is given by:

$$x_t + \chi\Omega_t = E_t(x_{t+1} + \chi\Omega_{t+1}) - \frac{1}{\theta}(i_t - \mathrm{E}_t\pi_{t+1} - \rho) + u_t^x, \quad (1)$$

where x_t is the output gap, i_t is the nominal interest rate and π_t is the rate of inflation. Furthermore, the variable Ω_t is related to the financial wedge between financially constrained and unconstrained agents (households and firms), and u_t^x is a demand shock. Last, E_t is the expectational operator and $E_t(x_{t+1})$ therefore denotes the expected value in *t* of the variable x in period *t*+1. All parameters χ, θ, and ρ are positive.

The equation has the following interpretation. We assume that Ω_t is small (zero, say) in normal times. The relationship therefore reduces to a standard intertemporal IS equation. A reduction in real interest rates ($i_t - \mathrm{E}_t\pi_{t+1}$) increases current output gap (relative to the output gap next period) and the size of the interest channel to aggregate demand is measured by $\frac{1}{\theta}$. By changing the nominal interest rate, the central Bank may therefore influence aggregate demand.[8]

The new part (compared to the canonical new Keynesian model) is the Ω-terms. If the economy moves into financial distress (a financial crisis), Ω will increase. To understand the intuition, consider the case of a one-period financial distress. In this case, we see that the output gap falls. The reason is that, for a given average nominal interest rate, some households and firms are not able to borrow and hence they will reduce consumption and investment demand.

The second equation we need to introduce is the new Keynesian Phillips curve:

$$\pi_t = \beta E_t\pi_{t+1} + \kappa x_t + \kappa_\Omega\Omega_t + u_t^\pi, \quad (2)$$

where u_t^π is a cost-push shock and κ and κ_Ω are positive parameters and $0 < \beta < 1$ is the discount factor. This equation again has the standard interpretation. An increase in the output gap is inflationary because it increases the use of labour, which increases wage demand. Moreover, since firms have constant capital stocks in the short run and thereby decreasing returns to scale, their marginal cost will increase. The Ω-term now comes in due to higher cost of cash credit.

[8] The nominal interest rate is not the policy rate, but the average rate faced by borrowers and lenders. We will not follow this here, but simply assume that the central bank can influence this rate by the policy rate.

The next thing we need to do is to say something about how Ω depends on the other macroeconomic variables. We do so as in Woodford (2012):

- For simplicity, we assume the economy has two states: a normal state where Ω is low, and a crisis state where Ω is high.
- We let the economy move between the two states in a stochastic way. The probability of entering a crisis (from a normal state) is denoted γ and δ is the probability of moving out of a crisis state.
- We assume that $\gamma_t = \gamma(L_t)$, where leverage, L_t, depends on economic activity as follows: $L_t = \rho_L L_{t-1} + \xi x_t + v_t$. Here $0 < \rho_L < 1$ is the persistence of leverage over time and ξ measures the extent to which leverage depends on real economic activity.[9] The last variable, v_t, is a shock to leverage.

The last equation we need to specify describes the preferences of the central Bank. We let the period loss function be given by

$$L_t = \pi_t^2 + \lambda_x x_t^2 + \lambda_\Omega \Omega_t^2, \tag{3}$$

where λ_x and λ_Ω are the relative weights on stabilizing the output gap and the financial wedge, respectively.[10] The first two terms are standard and relate to flexible inflation targeting.[11] Roughly speaking, the two terms correspond to the first two criteria above.

The last term relates to financial stability. It enters the loss function for the following reason. For a given level of output (and inflation), an increase in the financial wedge will make the economy less efficient, since some financial trade will not take place (even though that would be beneficial to both borrower and lender). In particular, it means that more of the investment projects do not get financed, even though they would be profitable.

The model we have just described has a number of interesting implications. The first regards the loss function. Woodford argues that financial stability is a concern in itself. We think this is important and do not understand why Norges Bank repeatedly claims that it is not. The reason is as follows. A financial turmoil will have real costs even if the central bank were able to stabilize the output gap (and the rate of inflation) completely with a low policy rate. This is because when there is a large financial wedge, many profitable investment projects will lack

[9] Alternatively, we might assume that the real interest rate affects the leverage level directly and not only indirectly through the output gap.

[10] For simplicity, we have assumed that the inflation target is zero. Importantly, the model assumes that the central bank minimizes the expected discounted sum of current and future period losses. This is standard and we will not pursue this further here.

[11] In applied work, researchers often add a term that penalise variations in the nominal interest rate, see, e.g. Svensson (2000).

financing. Efficiency is not restored by replacing those profitable investments by other and less profitable projects and by consumption demand.

Leaning against the wind (of leverage) will tend to be beneficial as long as other macro- and microprudential tools do not completely remove the distortions associated with a financial crisis. Empirical analysis of debt and business cycles (see Jordà et al. 2013, Hansen and Torstensen 2016) suggests that high debt to GDP ratios increase the probability of financial crisis and that recessions that follow after loose credit are deeper and more long lasting. In our simple model, we pick this up by assuming $\gamma'(L_t) > 0$ (higher leverage increases the probability of a financial crisis).[12] How do the financial stability issues affect optimal monetary policy? This depends on the marginal crisis risk, which measures the increase in expected crisis costs when there is an increase in leverage. The optimal degree of leaning will then depend on:

- … how leverage depends on economic activity (ξ) and how persistent leverage is (ρ_L),
- … the extent to which leverage increases the risk of a financial crisis, and
- … how much damage a financial crisis will do.

We can also use our simple model to understand and discuss the potential limitations and perils of leaning. In a (large) number of papers, Svensson has argued that the costs of leaning are larger than the benefits (see, e.g., Svensson 2017). It is clear from our simple model that leaning is essentially an intertemporal decision. All other things being equal, the central bank would set the nominal interest rate somewhat higher today to reduce the output gap and in that way reduce the chance of a financial crisis in the future. The costs are a lower output gap (i.e. higher unemployment) and lower inflation (than the target), while the gain – in our model – is a reduction in the probability of a financial crisis.[13] Not surprisingly, the dispute between Svensson (and others[14]) and those in favour of leaning (e.g. Adrian and Liang 2016 and the BIS[15]) is related to two main issues. First, there is disagreement about the degree to which monetary policy affects the probability of a future financial crisis. In our model this relates to the parameter ξ, that is, how strongly leverage reacts to the current output gap (and to how persistent leverage is) and to the derivative of the γ-function, that is, how much an increase in leverage increases the probability of a crisis. Svensson and others argue that this effect is "small", while Adrian and Liang and others argue that it is "large". Second, there is disagreement about the policy effect on the magnitude of the crisis. In our simple model, a financial crisis means a large Ω, while many authors will argue (see, e.g., Jorda et al. 2013) that

[12] In addition, we might want to allow for $\delta'(L_t) < 0$ – higher leverage decreases the probability of getting out of financial distress – but we omit this here.

[13] The governor illustrated this point nicely in the last CME speech. There he showed that leaning reduces tail risk.

[14] Most notably the IMF staff (2015) and the U.S. Federal Open Market Committee (2016).

[15] See, e.g., the annual report of the Bank of International Settlements (BIS) in 2014.

an increase in leverage would not only increase the probability of a crisis, but also make the crisis more severe. Our simple model may therefore understate the benefits of leaning.[16]

Another strand of the literature – also starting with work by Svensson (2013) – argues that leaning might be counterproductive. In our simple model, we assumed leverage was a simple function of the output gap. In reality, policy makers care about debt relative to income – typically the debt-to-GDP ratio – in which case the relationship between financial stability and the interest rate might be more complicated. Some authors have argued that the debt ratio might in fact increase following a monetary policy tightening. The reason is quite simple. If the central bank engineers an increase in the real interest rate, it will presumably reduce both real debt and real GDP.[17] In order to make the debt ratio fall, the effect on debt must therefore be larger than the effect on GDP. In a recent paper, Gelain et al. (2015) analyse leaning in a setting where households amortize their mortgages gradually, i.e., debt is long term. The authors argue that for a reasonable calibration, the monetary policy impact on short-run debt is small and therefore the debt ratio increases in the short run, while it falls only in the medium run. Moreover, the authors argue, if the central bank reacts to increases in the debt ratio by increasing interest rates, the result might be counterproductive and actually lead to larger fluctuations in the debt ratio.

Our simple model will pick up something similar if we let $L_t^x \equiv L_t - x_t$ denote the leverage ratio and assume that our γ-function is given by $\gamma_t = \gamma(L_t^x)$. This will clearly reduce the gain from leaning and complicate the analysis. In the short run, leaning might actually increase the probability of a financial crisis, but it will still reduce the medium-term probability. We think these issues are important.

3.3 Uncertainty surrounding the effects of monetary policy

Monetary policy authorities need to take into account that parameters in their macroeconomic models are not known with certainty. Norges Bank underscored this already in their first set of criteria and in the recent monetary policy reports, uncertainty is discussed under the robustness criterion. The Bank argues that uncertainty normally suggests a cautious approach to interest rate setting, but also stresses that "situations where the risk of particularly adverse outcomes is substantial, or where confidence in the nominal anchor is in jeopardy, it may be appropriate in some cases to pursue a more active monetary policy than normal."

[16] Gerdrup et al. (2016) analyse costs and benefit of leaning when "credit bites back", i.e. when high credit growth might give a worse outcome in the crisis. They argue that in their model, which extends a standard DSGE model with regime shifts, the cost of leaning is smaller than the benefits when the endogenous effect on the crisis is taken into account.

[17] There is also the possibility that real debt might increase in the short run. This will be so if the price level falls faster than the nominal level of debt.

The theoretical underpinning of reacting cautiously is found in Brainard (1967). The governor explained the logic in his October 2016 CME speech, but we repeat it here for completeness. First, for simplicity, we ignore both inflation and financial stability issues and let the loss function and the IS curve be given by:

$$L_t = E_t[x_t^2], \tag{4}$$

$$x_t = -\alpha_t r_t + u_t^x, \tag{5}$$

where r_t is the real interest rate (measured as a deviation from its long-run average). The idea of the two equations is as follows. The authorities dislike variations in the output gap and can use the real interest rate to smooth out the effects of demand disturbances on the gap.

Notice that we have assumed that policy has an unknown effect on the economy, that is, the parameter in the IS equation is stochastic. We follow the derivation in Olsen's CME speech and assume

$$\alpha_t = \bar{\alpha} + \varepsilon_t, \tag{6}$$

where $\bar{\alpha}$ is the average value of the interest rate sensitivity and ε_t is normally distributed with zero expected value and variance equal to σ^2. In this case, optimal interest rate policy is given by:

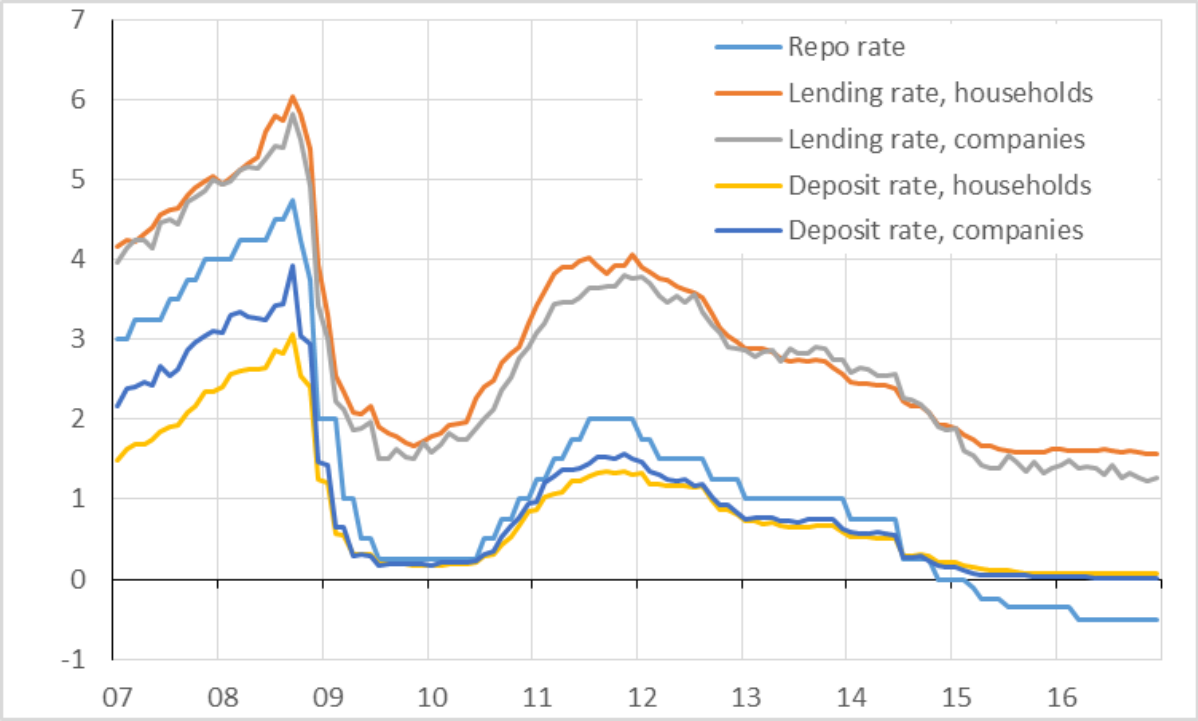
$$r_t = \frac{u_t^x}{\bar{\alpha} + \sigma^2/\bar{\alpha}}. \tag{7}$$

The equation implies that the central bank should react less to demand shocks if there is uncertainty in parameter α_t. The intuition is as follows. In equation (5), there are two possible reasons why there might be volatility in the output gap: the demand shock, u_t^x, or mistakes in policy. The more uncertain parameter α_t is, the more important it is that the central bank keeps the policy rate close to zero (i.e. the natural level). By being cautious, the central bank avoids policy mistakes creating volatility in the output gap.

The result above builds crucially on the assumption that the uncertainty about the interest rate sensitivity is two-sided, but this seems hard to justify in the present situation with a low interest rate. There are three reasons why there might be more uncertainty regarding the monetary policy transmission mechanism at low interest rates, according to Olsen. The first relates to the pass-through of interest rates in the banking sector. The effectiveness of monetary policy depends on the extent to which policy rates affect interest rates that influence economic decisions, i.e., lending and deposit rates faced by households and firms. There is reason to suspect that the pass-through will slow down as policy rates approaches and fall below zero. The reason is that banks might be unwilling to offer negative rates to their depositors, which might also affect other bank rates.

In Sweden, the repo rate is negative and has been negative since early 2015. It might therefore be interesting to see what has happened to lending and deposit rates in our neighbouring country. The figure shows lending and deposit rates to households and firms, together with the Swedish policy rate (the repo rate). A break seemed to appear in the pass-through when the Riksbank moved their rate into negative terrain. Deposit rates stopped close to zero and eventually the lending rates also stopped reacting to policy changes. Interestingly, the pass-through to interbank rates has remained high throughout the period (not shown in the graph), and the exchange rate channel therefore seems well and alive even at negative rates.

Chart 17: Swedish interest rates.



All in all, the experience in Sweden seems to suggest the policy rate will be less effective as it approaches and drops below zero. In our simple model, this would imply a reduction in the parameter α_t.

Another reason why low rates might change the transmission mechanism is precautionary behaviour by households. As interest rates fall, households get a lower return on their savings accounts and therefore their savings will lose some of their insurance value (see Holm 2017). This implies that the expansionary effect of lower interest rates falls as interest rates become lower. And again, we would capture this as a reduction in the parameter α_t.

What is the implication of a potential drop in α_t? To illustrate what the optimal policy response would be in this case, let us consider a simple example. We start in a situation where $\alpha_t = 1$, and, for simplicity, we assume that uncertainty in the parameter is negligible. In this

case, the central bank should let the real interest rate react one-to-one with changes in u_t^x. This will stabilize the output gap completely. Let us next assume the bank thinks that α_t might have fallen. More specifically, let us assume the bank puts a 50% probability on the possibility that α_t has fallen to 0.5, and 50% probability on the case where the parameter is unchanged. In expected value, α_t now equals 0.75. Using this as their reference value would suggest the central bank should set the real rate as: $r_t = \frac{4}{3} * u_t^x$. This would be wrong, however, since there is uncertainty regarding α_t. The correct policy response is to react less, namely to let real rates be given by $r_t = \frac{7}{6} * u_t^x$. The point is, however, that this still implies a strong reaction compared to the one-to-one reaction above. It is optimal to react *more* to new information (about u_t^x) when the central bank fears the interest rate has a smaller effect on the economy than before.

There are other factors which may make uncertainty regarding the effect of monetary policy "more two-sided". In his speech, the governor mentions a prominent candidate, namely the so-called risk-taking channel of monetary policy. The idea is that low interest rates could increase risk-taking behaviour.[18] In a recent Norges Bank working paper, Karapetyan (2016) analyses the risk-taking channel in corporate borrowing in Norway. He finds statistically significant effects, but economically they are not very important.[19] The author also finds that Bank balance sheets are important for their lending strategies. Less capitalized banks are more likely to grant loans to risky firms. This seems to suggest that the risk-taking channel, at least in banks, is best dealt with using appropriate microprudential policies.

In the speech mentioned above, the governor asks if uncertainty regarding the effects of the policy rate is now greater than normal because policy rates remain low. He concludes that section of the talk as follows: *"Over the past year, Norges Bank has therefore reacted somewhat less to new information, whether the information has pulled in the direction of a lower or a higher policy rate, than it would have done in a more normal situation. It has been appropriate to proceed with caution."* We are not sure if such a conclusion warranted.

3.4 The lower bound on nominal interest rates

The last main point discussed in the robustness criterion is the (negative) lower bound on nominal interest rates. Only some years ago, the common view in the economics literature was that the lower bound was zero (on deposit rates and somewhat positive for lending rates). Experience of other countries has shown us, however, that this is not true, or – at least – not the whole truth. As we mention above, Sweden lowered its policy rate below zero in early 2015 and the rate cuts that followed also seem to have had some expansionary effect. Domestic deposit and lending rates changed largely according to the zero-lower-bound

[18] For an overview of how the risk-taking may be at work in different sectors, see, e.g., Adrian and Liang (2016).
[19] In fact, the effect is smaller what Dell'Ariccia et al. (2016) report for the U.S., which by some is considered to be economically insignificant, see Svensson (2017).

intuition, but the interbank rates did not. The latter rates followed the policy rates and became negative.

It is unclear if – and to what extent – current rates are influenced by a negative lower bound. One possibility is that the Bank computes the implied policy rates from the two first criteria (as in MPR 4/2015), but under the condition of a zero (or somewhat negative) lower bound.[20] We believe this would help clarify the extent to which the Bank is leaning against the wind and could help the market perform a simple what-if analysis.

3.5 The countercyclical capital buffer

In October 2013, the Government issued the regulation on the countercyclical capital buffer. Norges Bank prepared an analysis for the decision and advised the Ministry of Finance, which sets the buffer four times annually. Starting in 2013 the monetary policy report has included "*a financial stability assessment*" with the Bank giving its first advice on the buffer in December of that year. The buffer is meant to "*bolster banks' resilience to an impending downturn and counter possible procyclical effects of banks' lending practices*". To understand its assessment, the Bank provides a set of criteria for the buffer and a "*buffer guide*".

Criteria for an appropriate countercyclical capital buffer

The countercyclical capital buffer should satisfy the following criteria:

1. **The Banks should become more resilient during an upturn**
2. **The size of the buffer should be viewed in the light of other requirements applying to banks**
3. **Stress in the financial system should be alleviated**

According to the first criterion, the buffer should be countercyclical. The idea is that it should increase in upturns, and, in particular, when the debt level (relative to GDP) increases. The aim is to make "*banks … tighten lending to a lesser extent in a downturn*". This is the last criterion. The second criterion is a reminder that authorities regulate banks using more instruments than the countercyclical buffer. If those regulations or requirements change, it might influence the countercyclical buffer.

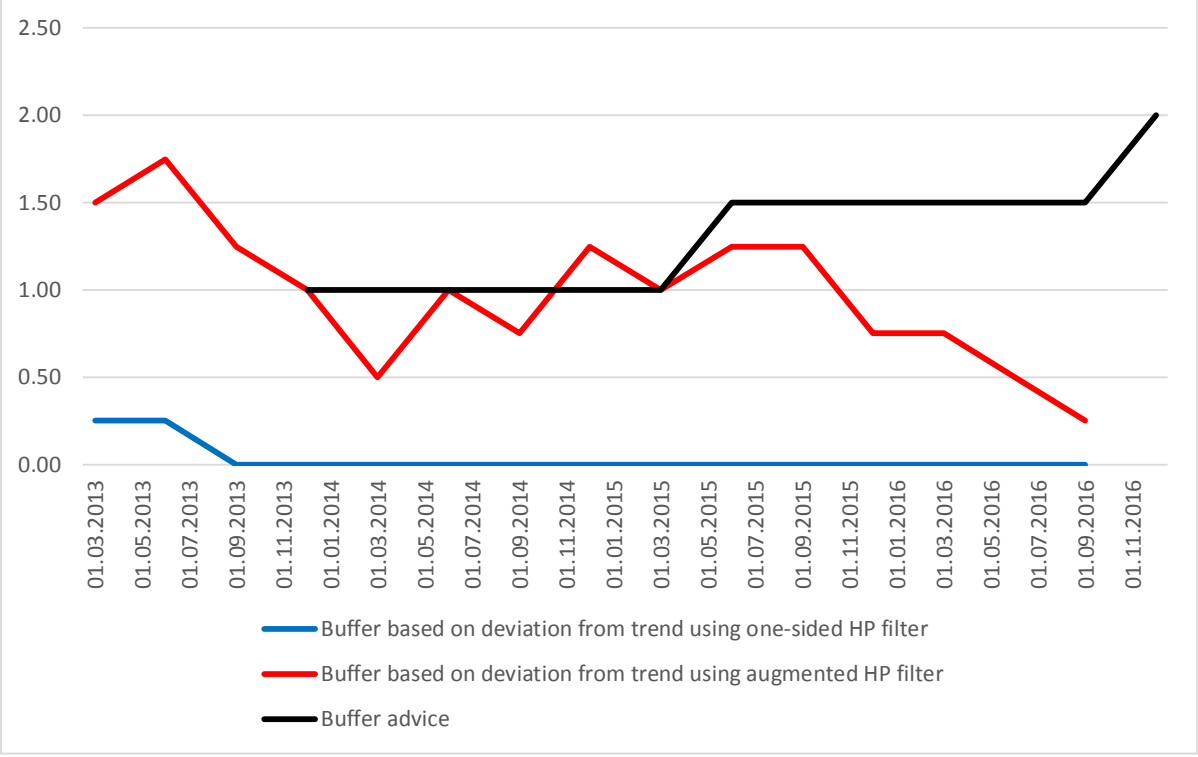
The criteria are silent about possible costs of changing the capital buffer and, more generally, are vague about the typical tradeoffs between costs and benefits. On the benefit side, macroprudential policy seeks to reduce both the probability of a financial crisis and its real

[20] It is not obvious how this should be done, but one possibility is to follow the same procedure as what is currently done for the unchanged-interest-rate-path forecast. This was a technical innovation in MPR 2/2016 and shown in a separate box in that report (and in both reports after that).

effects (the depth of the crisis), but what are the costs of an increase in the buffer? Do we want to increase the buffer gradually, and if so, why?

As a summary of their analysis, Norges Bank prepared a box called "*Measuring financial imbalances and buffer guide*". The discussion is mainly based on four indicators: i) the credit-to-GDP ratio, ii) the house-prices-to-disposable-income ratio, iii) real commercial property prices and iv) wholesale funding shares. The Bank mostly discusses the gap of those variables, measured as deviation from a trend, but in some cases the level as well (relative to some historical average). One important variable is the so-called reference rate. This is a simple estimate of the appropriate buffer rate based on a method suggested by the Basel Committee on Banking Supervision. It takes the credit-to-GDP gap as a starting point and relates it to the level of the buffer in the following simple way. If the gap is 10% (or more), the buffer should be at the maximum level of 2.5%. If the gap is 2% (or less), the buffer should be set to zero. For values of the gap between 2% and 10%, there is a linear relationship between the gap and the buffer. This implies that the reference buffer is 1% when the gap is 5.2% and 2% when the gap is 8.4%. The gap is computed using the HP filter with a smoothing parameter of 400 000. In addition, the Bank computes the reference buffer using their adjusted HP filter. In the last MPR in 2016, the two reference rates were 0 and 0.25%, respectively, whereas the actual buffer was 1.5% and the Bank advised the ministry to raise it to 2%. The figure shows the development of the actual buffer compared to the reference rates.

Chart 18: Actual buffer and reference rates



As we read it, the figure appears to give a clear message. The credit gaps are not important to understand the advice on the buffer. At the end of their financial stability assessment, the Bank writes: *"High house price inflation and a continued rise in household debt ratios are signs that financial imbalances have built up further."* The financial imbalances and buffer guide box suggests a different picture. The credit gaps are low and have fallen considerably since the financial crisis, with the house price gap and funding gap going in the same direction. The only exceptions are property prices and household credit. The development of the latter two variables is, however, not sufficient to make the crisis probability increase noteworthy. Crisis probability is a summary statistic "based on a large number of combinations of explanatory variables and trend estimation methods".

Financial stability issues are complex and difficult to analyse. It is therefore hard to condense the analysis into a small set of summary statistics. But that is precisely what the financial imbalances and buffer guide box are trying to do. We encourage the Bank to rethink their gap analysis and possibly discuss other variables that are more closely linked to the actual advice.

3.6 NBW view

We think Norges Bank should add to the set of criteria for an appropriate interest rate path a new criterion advocating financial stability. We think it is natural to treat financial stability as an objective in itself.

We welcome the work of Norges Bank's staff to enhance our understanding of the relationship between the credit-to-GDP ratio – and other key asset prices such as house prices – and financial stability, but more work is needed. We need a better understanding of the relationship between policy rates and the probability and the strength of a financial turmoil. Moreover, we need to know whether changing policy rates curbs credit expansions and how far monetary policy might be counterproductive in the short run.

We are not convinced that uncertainty about the monetary policy transmission mechanism calls for a more cautious reaction by the central bank when policy rates are low. If the Bank fears the policy rate is having a weaker effect on real economic activity than before, they should use the instrument more and not less. How much more depends on uncertainty, however.

There is a lower bound on policy rates, but the bound is not zero. We think Norges Bank should consider computing implied policy rates from the two first criteria (as in MPR 4/2015), but under the condition of a somewhat negative lower bound. This will help observers understand the reaction patterns of the Bank at low rates.

We welcome the effort to sum up the analysis on financial stability in a box, but encourage the Bank to rethink their gap analysis and possibly discuss variables that are more closely linked to the actual advice.

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