NORGES BANK PAPERS

Experience with the monetary policy framework in Norway since 2001[1]

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[1] In the *Financial Markets Report 2015* presented on 22 April 2016, it was announced that in parallel with the work of the committee that is considering a new Norges Bank Act, the Ministry of Finance would assess the need to modernise the Regulation on Monetary Policy. In this connection, Norges Bank has been asked to assess its experience with the monetary policy framework in Norway since 2001. This paper presents a discussion of the shocks to which the Norwegian economy has been exposed in the inflation targeting period, the monetary policy response to these shocks and the lessons that can be drawn with regard to the challenges and trade-offs monetary policy has. The paper was submitted to the Ministry of Finance on 31 January 2017.

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1. Introduction

Norway introduced an inflation target as part of its monetary policy framework in 2001. Over 15 years of inflation targeting provides a solid basis for assessing the Bank's experience with this monetary policy framework. This paper presents a discussion of the shocks to which the Norwegian economy has been exposed in the inflation targeting period, the monetary policy response to these shocks and the lessons that can be drawn with regard to the challenges and trade-offs monetary policy has faced.

Since New Zealand introduced inflation targeting in 1990, a number of other countries have followed suit. Today, more than 30 countries operate an inflation targeting regime. With the exception of Finland, which has joined the euro area, no country that has introduced inflation targeting has abandoned it.

International experience with inflation targeting is predominantly positive.[2] Among emerging economies there is a clear tendency among countries with inflation targeting regimes of more stable developments in inflation, inflation expectations and output than among countries with alternative monetary policy frameworks. For advanced economies, the differences are less evident. This must be seen in the light of the fact that price stability figures prominently in the monetary policy framework of advanced economies that do not operate an explicit inflation targeting regime. In both emerging and advanced economies, economic growth held up better in countries with inflation targeting both during and following the financial crisis that began in 2008. This may be because the exchange rate had a more pronounced stabilising effect in countries with an inflation target than in countries where the exchange rate was not allowed to float freely.

Inflation targeting as a policy framework has proved to be resilient to major shocks such as the global financial crisis. Inflation targeting was no constraint to a decisive monetary policy response when the crisis hit. Inflation expectations had been well-anchored and enabled central banks to implement extensive measures to put economies back on their feet. More countries operate an inflation targeting regime in the post-crisis period than was the case pre-crisis.

Despite its widespread adoption, inflation targeting has also been the subject of debate. The financial crisis was a reminder that price stability is not sufficient to guarantee financial stability. This has raised the question of whether monetary policy, both in general, and within the framework of inflation targeting, should be utilised to a greater extent to counteract the build-up of financial imbalances that may pose a threat to long-run economic stability.

The marked decline in global real interest rates in recent decades has reduced the room for manoeuvre in monetary policy and the ability to respond to major adverse shocks. In the light of these developments, questions have been raised about whether the numerical inflation targets set internationally are too low. Some have argued that alternative targets for monetary policy, such as price level targeting and nominal GDP targeting, may be better suited to bringing the economy out of a downturn when the lower bound on interest rates limits the room for manoeuvre in monetary policy.[3] Research also suggests that the correlation between inflation and domestic capacity

[2] See, for example, Banerjee, Cecchetti and Hoffmann (2013) and Andersen, Malchow-Møller and Nordvig (2015).
[3] See, for example, Woodford (2012).

utilisation has become weaker in many countries, which in isolation requires a more pronounced impact on output and employment in order to return inflation back to target following a deviation.[4] For this reason, among others, some are of the opinion that output and employment should be given greater weight in monetary policy, eg in the form of a "dual mandate", where price stability and stability in the real economy are given equal consideration.[5]

In practice, inflation targeting internationally has moved in the direction of a more flexible approach, where the horizon for achieving the target is longer than in inflation targeting's early phase.[6] This has also been the case in Norway.

Also for Norway, the main conclusion is that inflation targeting has worked well. It has helped to anchor inflation expectations, enabling monetary policy to stabilise output and employment. The Norwegian economy has been subject to major shocks since 2001. An important experience is that a flexible monetary policy regime has been essential for the ability to make appropriate trade-offs in response to these shocks. The time horizon for achieving the target must be sufficiently long. Another experience is that the exchange rate has played an important role as a shock absorber, especially during the financial crisis and in periods when oil prices have fallen. At the same time, the interest rate level abroad places limitations on the room for manoeuvre in monetary policy in a small open economy like Norway.

2. Background

The primary task of monetary policy is to ensure price stability, in the sense of low and stable inflation. It has been customary to define an operational target for the conduct of monetary policy, primarily to ensure price stability, but also to be able to evaluate monetary policy. Historically, Norwegian monetary policy has involved some form of fixed exchange rate.[7]

After the collapse of the European Exchange Rate Mechanism (ERM) in autumn 1992, a number of countries, including Sweden, Finland and the UK, chose to allow their exchange rates to float freely and to orient monetary policy more directly towards price stability by introducing an explicit inflation target. Inflation targeting was at that time a relatively new, but not untested, framework for monetary policy; New Zealand and Canada had introduced inflation targeting in 1990 and 1991, respectively. However, in Norway, monetary policy continued to be geared towards a stable exchange rate. The most important justification for this was the special division of responsibilities in Norwegian economic policy (the "Solidarity Alternative"). Fiscal policy was given the primary responsibility for economic stabilisation, incomes policy was tasked with addressing competitiveness, and the role of monetary policy was to ensure a stable exchange rate on which the partners in the tradable sector could base wage determination.[8]

In the latter half of the 1990s, the debate on the monetary policy regime intensified. In a period when steadily rising petroleum revenues were being phased into the

[4] See, for example, Gillitzer and Simon (2015).
[5] See, for example, Friedman (2008), Wren-Lewis (2013) and Holden (2016).
[6] Graydon (2006).
[7] See, for example, Alstadheim (2016).
[8] See, for example, Storvik (1998).

economy, it was a challenge for fiscal policy to stabilise the economy. The phasing-in of petroleum revenues resulted in some appreciation pressure against the krone. In periods of appreciation pressure, the key policy rate under an exchange rate targeting regime must be lowered to a sufficient degree to avoid a stronger krone. The effect was pro-cyclical.[9]

The appreciation pressure in 1996 and 1997 was followed by intense depreciation pressure in autumn 1998 in the wake of the Asian crisis and Russian debt crisis. The sight deposit rate was raised to 8 percent in August 1998, and Norges Bank intervened on several occasions during autumn 1998 to prevent a further depreciation of the krone. Experiences from 1998 showed the difficulty of defending a fixed exchange rate when capital flows freely across borders and cyclical developments are out of sync with those among trading partners.

In the 1990s, both the Ministry of Finance and Norges Bank underscored the mutual dependency between a stable exchange rate and stable price and cost inflation.[10] When Svein Gjedrem became Governor in 1999, Norges Bank altered its monetary policy response pattern. Instead of focusing interest rate setting on ongoing movements in the krone exchange rate, the interest rate would be set with a view to meeting more long-term requirements for a stable exchange rate: "*A precondition for maintaining a stable exchange rate against the euro is that price and wage inflation is on a par with that of euro countries over time... At the same time, we must avoid a situation whereby interest rates are so high that monetary policy contributes to a downturn that undermines confidence in the krone"*.[11]

On 29 March 2001, the new Regulation on Monetary Policy was laid down (see excerpt from the Regulation in Box 1).

The new regulation did not entail a material change in the monetary policy response pattern compared with the policy that had been pursued over the previous two years.[12] But the regulation provided a more explicit formal and institutional anchor for monetary policy, which contributed to a greater degree of accountability. Norges Bank commented on the draft regulation and on the consequences for the conduct of monetary policy in a letter to the Ministry of Finance of 27 March 2001.[13] In the letter, Norges Bank wrote that *"[t]here has been confidence in the conduct of monetary policy. The communication of Norwegian monetary policy may nevertheless be facilitated with the Government now quantifying an inflation target, in line with international practice*."

[9] In addition, a procyclical element may be inherent in a fixed exchange rate system, an observation often referred to as the "Walters critique". See Walters (1986).
[10] Revised National Budget for 1994: "*A stable exchange rate can generate expectations of continued low inflation, which in turn influence both price and wage determination. Moderate price and wage inflation is also a necessary condition for a stable exchange rate over time*."
In the speech to FOREX Norway on 28 August 1998, Governor Kjell Storvik said: "I would point to the well-known fact that a lower krone exchange rate may contribute to fuelling inflation expectations and that such expectations may in turn generate expectations of a weakening of the krone exchange rate, thereby reinforcing depreciation pressures. Price expectations may thus prove to be a self-fulfilling prophecy."
[11] Gjedrem (1999).
[12] Kleivset (2012), p. 40: "For the actual setting of the interest rate, the formal reorientation was less important, 'since a response pattern had already been established in monetary policy that was consistent with inflation targeting', as Svein Gjedrem subsequently put it."
[13] http://www.norges-bank.no/en/Published/Submissions/2001/submission-2001-03-27html/

Box 1: Regulation on Monetary Policy Section 1

Monetary policy shall be aimed at stability in the Norwegian krone's national and international value, contributing to stable expectations concerning exchange rate developments. At the same time, monetary policy shall underpin fiscal policy by contributing to stable developments in output and employment.

Norges Bank is responsible for the implementation of monetary policy.

Norges Bank's implementation of monetary policy shall, in accordance with the first paragraph, be oriented towards low and stable inflation. The operational target of monetary policy shall be annual consumer price inflation of approximately 2.5 per cent over time.

In general, the direct effects on consumer prices resulting from changes in interest rates, taxes, excise duties and extraordinary temporary disturbances shall not be taken into account.

The inflation target was set at 2.5 percent in the new regulation, while the implicit inflation target that the Bank previously followed was the objective pursued by euro area countries, ie approximately 2 percent.[14] Regarding the actual numerical target, in the letter to the Ministry of Finance, Norges Bank wrote: "*The inflation target of 2.5 per cent is slightly higher than similar objectives for Sweden, Canada and the euro area, but corresponds roughly to targets in the United Kingdom and Australia. The target is also approximately in line with the average inflation rate in Norway in the 1990s."*

The choice of 2.5 percent must be viewed in the context of the phasing-in of petroleum revenues, which would result in a real appreciation of the krone. The reason for choosing a slightly higher inflation target than the average rate applied by trading partners was for the real appreciation to take place gradually in the form of a widening gap in the price and cost level between Norway and its trading partners, and not in the form of a nominal appreciation of the krone.[15]

Owing to the time lag in monetary policy, shocks that impact the economy and trade-offs with regard to stability in output and employment, Norges Bank emphasised that monetary policy must be forward-looking: *"If price inflation deviates substantially from the target for a period, Norges Bank will set the interest rate with a view to gradually returning consumer price inflation to the target. Norges Bank will seek to avoid unnecessary fluctuations in output and demand."*

Inflation will often deviate from the target in response to shocks and the trade-offs they entail. In the letter to the Ministry of Finance, Norges Bank stated that *"[i]f there are significant deviations between actual price inflation and the target, the Bank will provide a thorough assessment in its annual report. Particular emphasis will be placed on any deviations outside the interval +/- 1 percentage point".*

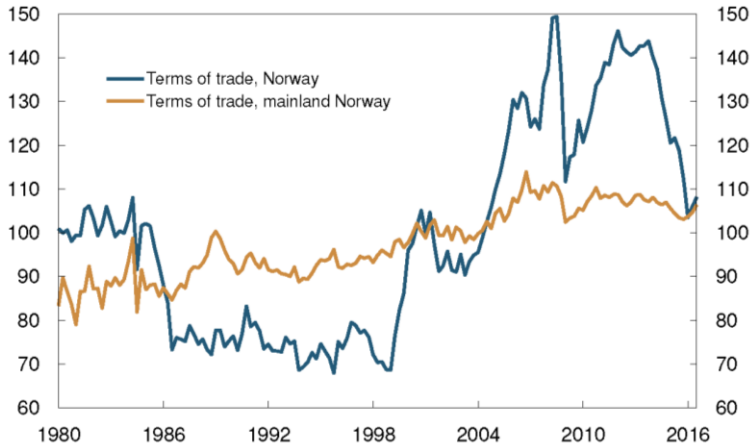
[14] The European Central Bank defined "price stability" as a year-on-year increase in the Harmonised Index of Consumer Prices (HICP) for the euro area of below 2 percent. This was subsequently clarified to "below, but close to 2 percent".
[15] For a discussion of the argument and references to statements, see Torvik (2003).

The introduction of inflation targeting was a part of a redivision of roles and responsibilities between monetary and fiscal policy. Monetary policy was to play a more prominent part in stabilising the economy. Although fiscal policy would be subject to a fiscal rule intended to ensure a gradual phasing-in of petroleum revenues, it would still be an important instrument in stabilising the economy. In the letter to the Ministry of Finance in 2001, Norges Bank wrote: "*Fiscal policy shall continue to have a main responsibility for stabilising developments in the Norwegian economy*." However, in practice, monetary policy was rather quickly given a primary responsibility in managing the business cycle. Since 2009, the Ministry of Finance has referred to monetary policy as the first line of defence against an economic downturn.[16]

3. Shocks to the Norwegian economy during the period of inflation targeting

Since the introduction of inflation targeting, the Norwegian economy has been exposed to several large and persistent shocks. One development in particular involves pronounced changes in Norway's terms of trade. They improved substantially from the beginning of the 2000s partly owing to oil price developments, but also if we look at the mainland economy in isolation, the terms of trade showed some improvement (Chart 3.1).

Chart 3.1 Terms of trade.
Index. 2000 Q1 = 100. 1980 Q1 – 2016 Q3



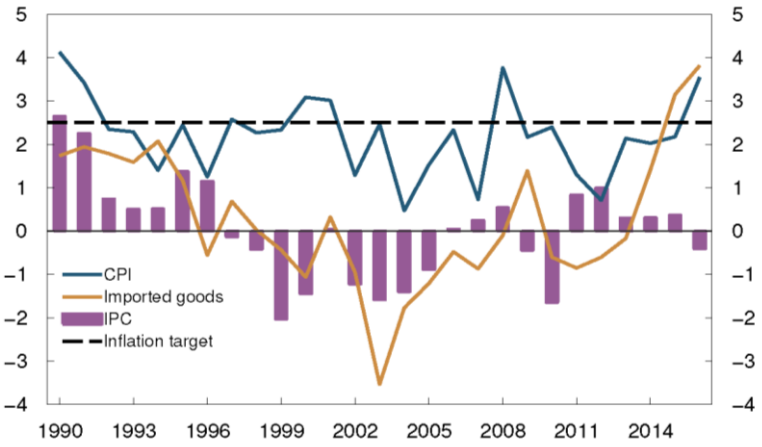
Sources: Statistics Norway and Norges Bank

This reflects the subdued rise in prices for imported goods, especially consumer goods, following China's integration into the global economy. After 2014, the terms of trade worsened considerably as a result of the fall in oil prices.

The subdued rise in prices for imported goods (Chart 3.2) has pushed down consumer price inflation. Returning inflation to target requires an expansionary monetary policy. In isolation, that leads to higher growth and a higher activity level in the real economy. The central bank will then face a trade-off between the speed at which it seeks to return inflation to the target and stability in output and employment.

[16] See, for example, NOU 2015:9, "Fiscal policy in an oil economy – The application of the fiscal rule", p. 17 (Chapter 1 available in English).

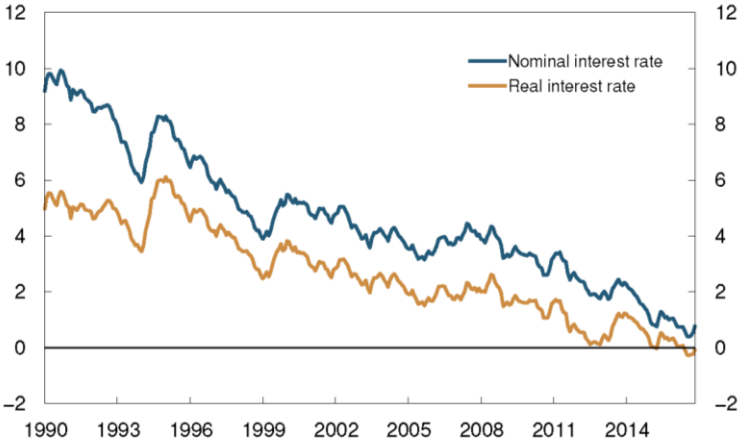
Chart 3.2 CPI, imported goods in the CPI–ATE and the indicator for international price impulses to imported consumer goods (IPC). Annual rise. Percent. 1990 – 2016



Sources: Statistics Norway, Thomson Reuters and Norges Bank

Another feature is the persistent decline in global nominal and real interest rates. The fall in real interest rates has been particularly pronounced in the past 15–20 years (Chart 3.3).

Chart 3.3 Ten–year government bond yields.
14 OECD countries.[1)] Percent. January 1990 – November 2016



1) US, Germany, France, Italy, UK, Japan, Netherlands, Austria, Belgium, Sweden, Denmark, Canada, Switzerland and Norway. Arithmetic average.
Sources: OECD and Norges Bank

There are a number of factors behind the fall.[17] A savings glut in emerging economies, especially China, has been an important factor behind the fall in real interest rates. Saving has probably also increased in many countries as a result of demographic developments and a more uneven distribution of income. In addition, an increase in capital mobility has reduced real interest rate differentials across countries. Since the financial crisis, investment has been sluggish in many advanced countries, and underlying productivity growth has declined. Extraordinary monetary policy measures by many central banks have also pushed down long-term interest rates since the financial crisis.

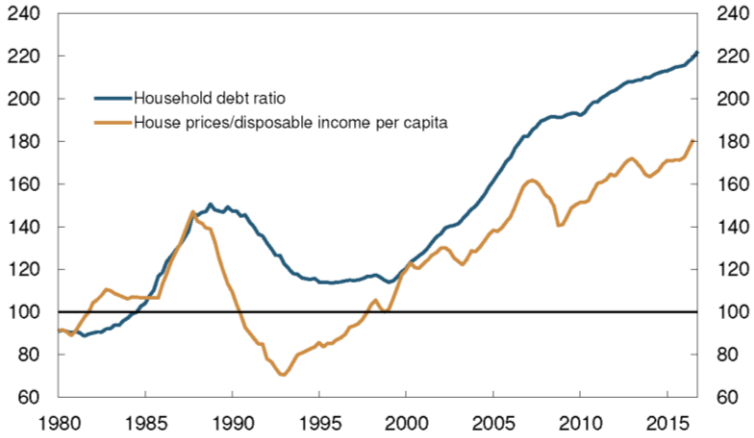
The persistent decline in global interest rates has consequences for monetary policy. The level of the real interest rate that is consistent with balanced developments in the

[17] For a discussion of global interest rate developments and the global neutral real interest rate, see, for example, Rachel and Smith (2015), IMF (2014), Bean, Broda, Ito and Kroszner (2015), Williams (2016) and Special Feature "The neutral real interest rate globally and in Norway" in *Monetary Policy Report* 3/16.

economy has fallen in pace with increased savings and lower demand for capital. This level is usually referred to as the neutral interest rate.[18]

Along with structural changes in financial markets, a lower neutral interest rate has contributed to the generally higher rise in house prices and debt relative to income during the entire period of inflation targeting (Chart 3.4).

Chart 3.4 Household debt ratio.[1] Percent. 1980 Q1 – 2016 Q4
House prices relative to disposable income per capita (aged 15 74).[2]
Index. 1998 Q4=100. 1980 Q1 – 2016 Q3



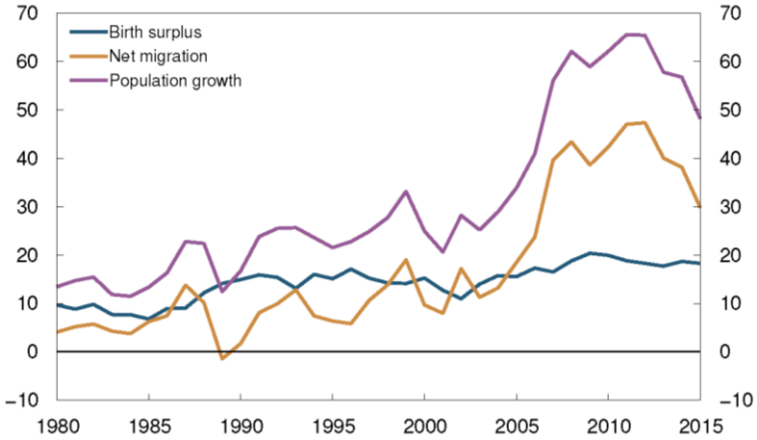
1) Interest expenses and loan debt, respectively, as a percentage of disposable income plus interest expenses.
2) Disposable income adjusted for esimated reinvested dividend income for 2003 – 2005 and redemption/ reduction of equity capital for 2006 Q1 – 2012 Q3. Growth in disposable income excluding dividend income is used for 2015 Q1 – 2016 Q3
Sources: Eiendomsverdi, Finn.no, Norwegian Association of Real Estate Agents (NEF), Real Estate Norway, Statistics Norway and Norges Bank

Experience shows that the build-up of financial imbalances can entail a risk of an abrupt shift in demand further out. Norges Bank has therefore weighed the consideration of stabilising inflation in the near term against the consideration of mitigating the risk of economic instability further out. A somewhat higher interest rate than implied by the consideration of short-term stability in inflation and output can contribute to restraining the build-up of debt and asset prices to some extent. This can reduce the risk of a future sharp fall in demand. The benefit of a higher interest rate must be weighed against the cost in the form of reduced inflation targeting performance in the short term. The extent to which the benefit exceeds the cost will depend on the state of the economy, including the degree of financial imbalances.[19]

A factor that has influenced the supply side in the Norwegian economy is the increase in labour immigration following EU enlargement in 2004 (Chart 3.5).

[18] In some contexts, the neutral real interest rate is referred to as the "natural real interest rate" or the "short-run equilibrium interest rate".
[19] See, for example, Special Feature "Potential costs and benefits of leaning against the wind in monetary policy" in *Monetary Policy Report* 3/16.

Chart 3.5 Labour immigration. In thousands of persons. 1980 – 2015

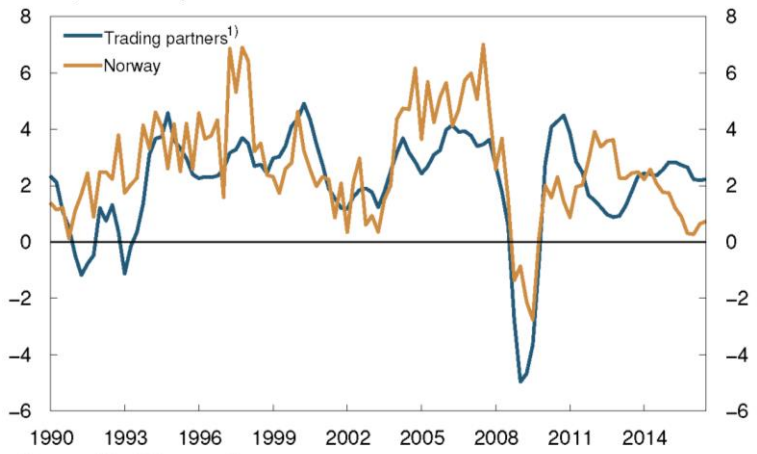


Source: Statistics Norway

Immigration has contributed to average annual population growth in Norway of over 1 percent in the past 12 years, ie significantly higher than in preceding decades. Labour immigration has curbed wage growth in a number of sectors.[20] In addition, it has increased flexibility on the supply side of the economy.

Pronounced international cyclical movements have also affected the Norwegian economy since 2001 (Chart 3.6). First, the economy felt the impact of the global downturn at the beginning of the 2000s, which must be seen in the light of the fall in equity markets in 2000, in particular the sharp decline in ITC equities (dotcom bubble), and the terror attack against the US in 2001. China's entry into the WTO contributed to a sharp rise in commodity prices between 2005 and 2008. The Norwegian economy was later hit by the international financial crisis in 2008 and its legacies.

Chart 3.6a GDP growth.
Four–quarter change. Percent. 1990 Q1 – 2016 Q3



1) Export weights, 25 largest trading partners.
Sources: Statistics Norway, Thomson Reuters and Norges Bank

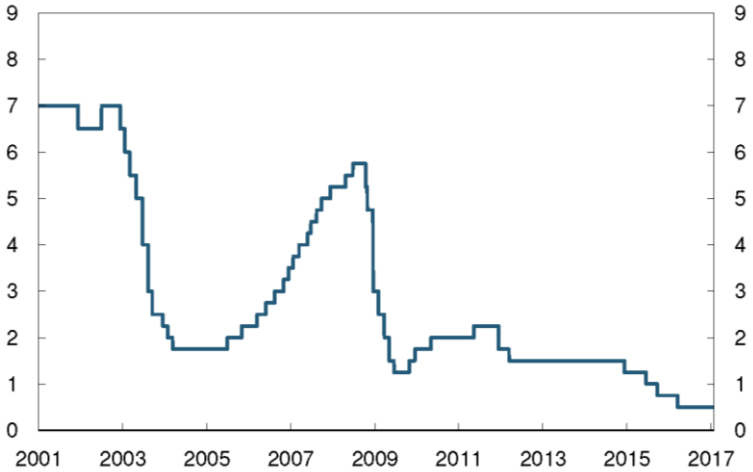
The substantial and persistent shocks that have affected the Norwegian economy have often given rise to a trade-off in the short term between inflation stability and output and employment stability. In a closed economy, pure demand shocks do not given rise to such a trade-off, as the shock pushes both inflation and output and employment in the same direction. By changing the interest rate so that the shock does not affect the activity level, inflation will also stabilise. In the case of a supply shock, the effect on

[20] See, for example, Nordbø (2013)

inflation and output will push in the opposite direction and lead to a conflict in the short term. The central bank must then strike a balance between the consideration of bringing inflation rapidly towards target and the consideration of stability in output and employment. In a small open economy, the exchange rate will normally dampen the effect of the shock. But the exchange rate also results in some degree of conflict in the short term between the two considerations as the exchange rate has an impact on imported inflation.[21] All the shocks that have affected the economy have therefore involved, to varying degrees, having to make monetary policy trade-offs between the consideration of bringing inflation rapidly towards target and the consideration of stability in output and employment.

4. The conduct of monetary policy

Chart 4.1 Key policy rate. Percent. 1 January 2001 – 30 January 2017



Source: Norges Bank

2001-2003: Anchoring of inflation target, appreciation and downturn

The restructuring of the Norwegian economy as a result of the phasing-in of oil revenues was the focus of monetary policy in 2001 and 2002. Norges Bank expected that the real appreciation would translate into both a nominal appreciation and higher wage growth.[22] One of the challenges was to strike a balance between the two mechanisms so as to meet the inflation target.

Although the krone appreciation generated negative impulses to prices, Norges Bank was concerned that high wage growth would persist and that inflation would then overshoot the target of 2.5 percent further out. In response to high wage growth, the key policy rate was increased from 6.5 percent to 7 percent in July 2002 (Chart 4.1).[23]

[21] The reason is that for monetary policy to fully counteract the impact on output and employment of a fall in demand, the interest rate must be lowered to a sufficient degree. This will normally result in a depreciation of the exchange rate and higher imported inflation. In a trade-off between the consideration of bringing inflation back to target and the consideration of stability in output and employment, the interest rate will be reduced somewhat, but not enough to prevent some decline in the activity level, while inflation will edge up owing to the depreciation. See, for example, Røisland and Sveen (2005).
[22] See editorial in *Inflation Report* 2/2002.
[23] Annual wage growth in 2002 was 5¾ percent, while Norges Bank regarded wage growth of about 4.5 percent to be compatible with the inflation target over time. See Special Feature "The Scandinavian model of inflation – revisited" in *Inflation Report* 3/2002.

In the Bank's assessment, anchoring the monetary policy response pattern under an inflation targeting regime with the social partners was crucial to monetary policy's ability to stabilise inflation close to the target without causing substantial changes in output and employment.

The rise in the key policy rate led to a further appreciation of the krone. In addition, the global economy was entering a downturn and interest rates abroad were falling. Oil prices, however, remained elevated and, combined with the high interest rate differential, contributed to the strong krone.

The international downturn and the appreciation of the krone led to an increase in unemployment and inflation below the target. Goods and services exporters were hardest hit. Norges Bank responded by lowering the interest rate from 7 percent in December 2002 to 2.5 percent nine months later.

2004-2007: Positive supply-side shocks and monetary policy trade-offs

Imported inflation had been low for a few years, partly as a result of China's entry into world trade at the beginning of the 2000s, but fell to record-low levels in 2003. At the same time, wage growth had also fallen, so that domestic inflation also proved to be moderated. Oil prices remained high. Combined with falling import prices, this resulted in an improvement in Norway's terms of trade, which in addition to an expansionary monetary policy, contributed to an economic recovery. Even though growth in output and employment was high, inflation was restrained by the low level of imported inflation. Monetary policy faced a trade-off in the near term between returning inflation to target and stability in output and employment. Norges Bank reduced the sight deposit rate to 1.75 percent in March 2004 in order to bring inflation gradually up to 2.5 percent.

As inflation and economic activity picked up, the key policy rate was gradually raised in "in small, not too frequent steps".[24] In 2007, unemployment declined to levels that had not been observed since the strong economic expansion of the 1980s, and inflation began to rise towards the target. Towards the end of 2007, however, uncertainty in the world economy began to increase as the first signs of the impending financial crisis came into clear evidence.

In the period to 2004, Norges Bank applied a horizon for bringing inflation to target that would normally extend over two years. In *Inflation Report* 2/2004, Norges Bank changed its communication about the horizon: *"Norges Bank sets the interest rate with a view to stabilising inflation at the target within a reasonable time horizon, normally 1-3 years"*. In *Monetary Policy Report* 1/2007, the flexibility of the horizon was further increased and the Bank's communication was changed to "*stabilising inflation close to the target in the medium term"*. Norges Bank's inflation projections, however, continued to end up at 2.5 percent at the end of the projection period (about three years) until 2013. Since then, the Bank has often applied a longer horizon for returning inflation to target.

Up to *Inflation Report* 3/2005, Norges Bank's projections for economic developments had been conditional on either an unchanged interest rate or on market interest rate expectations. With a view to making clearer the Bank's response pattern and the trade-offs, Norges Bank began to base its projections on its own interest rate forecast, which was published, starting from *Inflation Report* 3/2005. Norges Bank was the second

[24] See, for example, Svein Gjedrem (2006).

central bank (after the Reserve Bank of New Zealand) to publish its interest rate forecasts. The interest rate forecast had both a positive and normative function: it represented Norges Bank's best projections for future interest rate developments and it represented the Bank's trade-off between the considerations to be given weight in monetary policy. The publication of the Bank's interest rate forecasts was well received by market participants, and the Bank's overall experience with these forecasts has been positive.[25] Publishing the Bank's interest rate forecasts has been one of a number of measures to enhance monetary policy transparency since 2001. Increased transparency has been a prominent element of central bank developments internationally over the past 20 years.

In 2005, the Bank also formulated a set of criteria for an appropriate interest rate path in its inflation reports (see Box 2).

Box 2: Criteria for an appropriate interest rate path

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.

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.[1] The inflation gap and the output gap ahead should not normally be positive or negative at the same time further ahead.

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.

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.

Interest rate setting must also be assessed in the light of developments in property prices and credit. Wide fluctuations in these variables may in turn constitute a source of instability in demand and output in the somewhat longer run.

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.

[1.] The inflation gap is the difference between actual inflation and the inflation target of 2.5%. The output gap measures the percentage difference between actual and projected potential mainland GDP.

[25] See, for example, Øystein Olsen (2014).

Another measure to enhance transparency and improve communication was to publish the "interest rate accounts", which illustrate the contributions from the different factors behind changes in the interest rate forecast from one report to the next.[26] The purpose of the measure was to clarify how monetary policy responds to new information.

2008-2013: Financial crisis and very low interest rates

When the US investment bank Lehman Brothers filed for bankruptcy in September 2008, the global economy entered into a deep recession. Uncertainty about future global economic developments was unusually high. Naturally, the financial crisis also had an impact on the Norwegian economy. Oil prices fell markedly, and the krone depreciated.

Like central banks in other advanced economies, Norges Bank responded by slashing the key policy rate – from 5.75 percent in September 2008 to 1.25 percent in June 2009. In addition, various measures were introduced to increase banks' access to liquidity. Fiscal policy was also steered in a more expansionary direction.

The Norwegian economy was affected by the global financial crisis to a lesser extent than most of the other advanced economies. Even though the unemployment rate rose, it was at its highest 1 percentage point lower than during the downturn in 2003. There are a number of reasons for this. The Norwegian economy was in an upturn when the impact of the crisis was most severe: unemployment was record low, consumer price inflation was somewhat above target and the key policy rate was slightly higher than its normal level. In addition, Norwegian banks were not directly exposed to loss-making financial instruments backed by subprime US housing mortgages. Commodity prices fell, but soon rebounded, largely because growth in the Chinese economy remained firm. The fiscal policy space was considerable as a result of a long period of high oil revenues. A marked depreciation of the krone also supported economic activity in Norway.

Global economic growth remained very low in the post-crisis years, partly as a result of the government debt crisis in Europe in 2010-2012. The lower bound on the interest rate limited the monetary policy room for manoeuvre in many countries, and several central banks launched large-scale asset purchase programmes (known as quantitative easing) to stimulate demand.

The very low level of global interest rates, which also reflected a decline in the neutral real interest rate, contributed to keeping down the interest rate in Norway. At the same time, weak price impulses from abroad and continued high labour immigration contributed to low wage and inflationary pressures. Because of the low interest rate level, house prices and credit continued to rise faster than household disposable income, which increased the risk of a future sharp correction and fall in demand. The consideration of restraining the build-up of financial imbalances gradually became more explicit in the Bank's monetary policy assessments. The title of the monetary policy report was changed to *Monetary Policy Report with financial stability assessment* in 2013. In addition to an assessment of the outlook for the key policy rate, the *Report* also contains an assessment of the need for a countercyclical capital buffer for banks.

[26] The "interest rate accounts" were first published in *Monetary Policy Report* 3/2007.

As a result of very low global interest rates and the risk that a build-up of financial imbalances could lead to future instability, the horizon for the inflation target was extended in 2013 compared with the previous horizon on which interest rate setting had been based.

2014 -2017: Fall in oil prices and restructuring, but continued high house price inflation and credit growth

Oil prices began to fall in 2014, and continued to fall through 2015. At their lowest at the beginning of 2016, oil prices were below 30 percent of the pre-fall level. The impact of the fall in oil prices and the decline in petroleum investment has gradually become evident in the mainland economy. Growth has slowed and unemployment has risen.

Norges Bank reduced the key policy rate from 1.50 percent in October 2014 to 0.50 percent in March 2016. This dampened the decline and facilitated structural adjustments in the Norwegian economy, partly by underpinning the krone depreciation. In addition, low interest rates have contributed to investment in housing and commercial property and have helped to sustain the level of household disposable income.

After the most recent reduction of the key policy rate in March 2016, Norges Bank's Executive Board stated that the possibility could not be excluded that the key policy rate could turn negative if the Norwegian economy should be exposed to new major shocks.[27] The Board also emphasised that the uncertainty surrounding the effects of monetary policy increases as the key policy rate approaches a lower bound, suggesting that the bank should proceed with greater caution in interest rate setting and react somewhat less to news that changes the economic outlook.

After a modest, short-term drop in house prices after the fall in oil prices, house prices continued to rise faster than household disposable income (Chart 3.4).

5. The role of monetary policy since 2001

The operational target of monetary policy is annual consumer price inflation of close to 2.5 percent over time. Monetary policy also aims to stabilise output and employment. The following describes the developments in inflation and in output and employment before and after the introduction of the inflation target.

Economic developments are affected by many other factors in addition to monetary policy. The economy is frequently exposed to unexpected demand-side and supply-side disturbances that affect both inflation and output. At the same time, structural changes could influence how the economy is affected by these disturbances. The contributions from other policy areas may also vary over time. It is therefore demanding to assess monetary policy's contribution to developments.

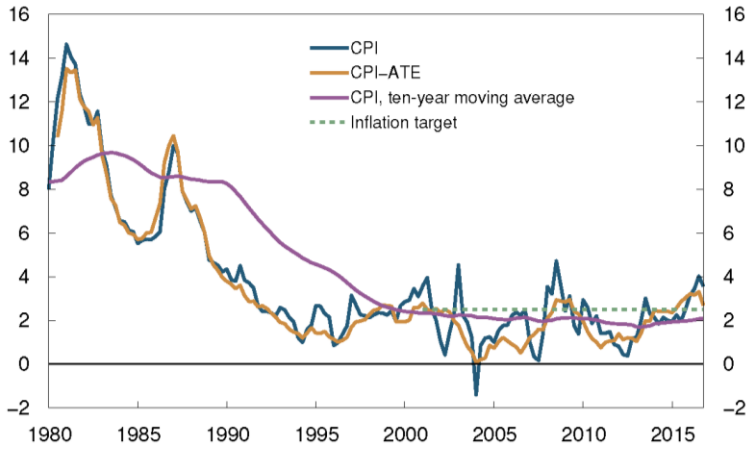
[27] See the Executive Board's assessment in *Monetary Policy Report* 1/16.

5.1. Developments in inflation and inflation expectations

5.1.1. Consumer price inflation

Inflation in Norway stabilised in the early 1990s after falling from a very high level in the previous decade (Chart 5.1), reflecting factors such as increased confidence in monetary policy and supply-side conditions such as wage formation. At the same time, inflation among Norway's trading partners stabilised at a low level. Inflation in Norway has also remained low since inflation targeting was introduced in 2001.

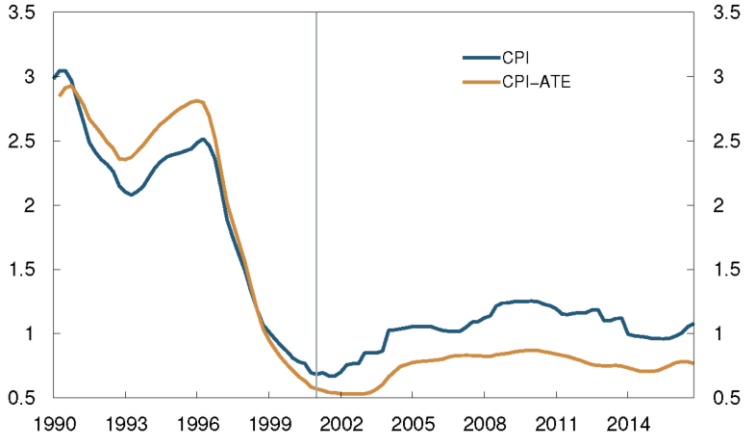
Chart 5.1 Consumer prices.
Four-quarter change. Percent. 1980 Q1 – 2016 Q4 [1)]



1) Norges Bank's estimated series for the CPI–ATE is used for the pre–2003 period.
Sources: Statistics Norway and Norges Bank

Consumer prices, as measured by the CPI, have risen by an annual average of 2 percent since 2001. The deviation from the 2.5 percent target reflects the fact that the Norwegian economy has been hit in particular by shocks that have pulled inflation down (see Section 3). In addition, inflation targeting has been flexible in practice, ie the path for inflation has been assessed against developments in output and employment. In recent years, the consideration of preventing financial imbalances that could increase the risk of an abrupt fall in demand further ahead has also been given weight in interest rate setting.

Chart 5.2 Consumer price volatility. Measured by a ten-year moving average of the standard deviation [1)] of the four-quarter change in inflation.
Percentage points. 1990 Q1 – 2016 Q4

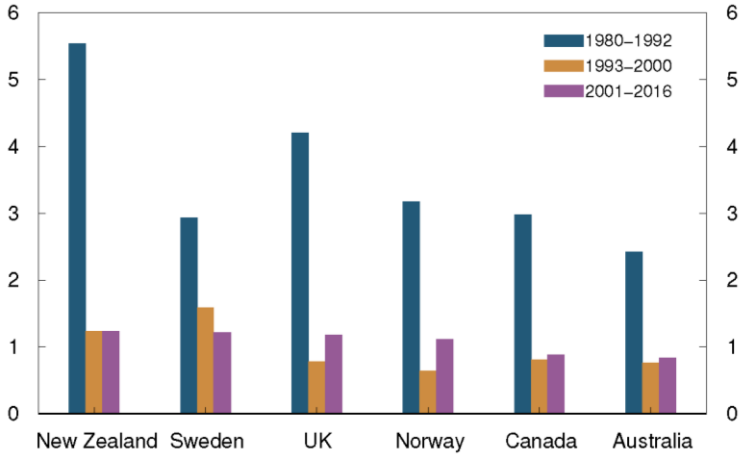


1) The standard deviation is a measure of the spread of values in a time series and provides information on how far the observations on average differ from the mean.
Sources: Statistics Norway and Norges Bank

Inflation has remained fairly stable since 2001 (Chart 5.2). Inflation volatility has been considerably lower than in the 1970s and 1980s. At the same time, consumer price inflation volatility has been somewhat higher since the introduction of the inflation target than in the preceding ten years, reflecting an increase in energy price volatility in this period. Measured by the rise in the consumer price index adjusted for tax changes and excluding energy products, the increase in volatility is more modest. The magnitude of the fluctuations must also be viewed in the context of the shocks to which the economy has been exposed. Even though the fluctuations have been somewhat more pronounced than in the 1990s, they appear to be more transitory after the introduction of inflation targeting. [28]

Inflation volatility since 2001 is roughly on a par with that observed in comparable inflation-targeting countries (Chart 5.3).[29] Inflation volatility since 2001 has also been on a par with the fluctuations of the 1990s in other countries and been considerably lower than in the 1980s.[30]

Chart 5.3 CPI volatility. Measured by the standard deviation of the four-quarter change in inflation. Percentage points. 1980 Q1 – 2016 Q4

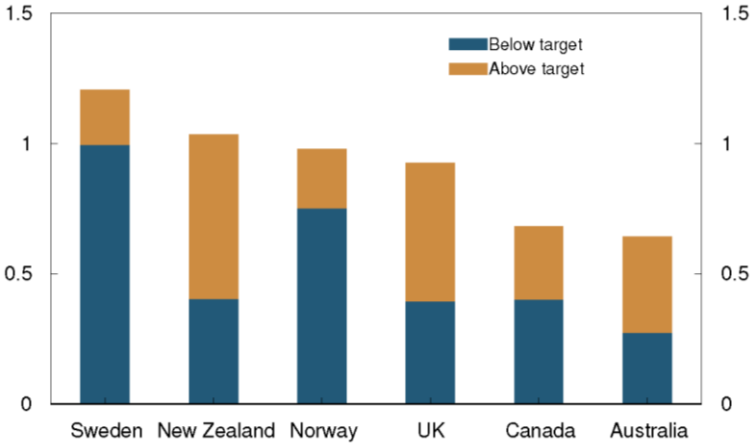


Sources: Thomson Reuters and Norges Bank

The difference between actual four-quarter CPI inflation and the 2.5 percent target has averaged approximately 1 percentage point since 2001 (Chart 5.4). This is in line with the average performance of other inflation-targeting countries. Norway and Sweden differ from the other countries in that the deviation from target has primarily been a below-target deviation. Deviations in other inflation-targeting countries have shown a more even distribution above and below target. This difference may reflect the relatively high cost level in Norway and Sweden and the openness of their economies to international trade, enabling the increased supply of goods from low-cost countries such as China to have a more rapid impact on prices in Norway and Sweden. In Norway, the krone has also appreciated for long periods since 2001.

[28] Akram and Mumtaz (2015).
[29] Variability in inflation and output across countries must be seen in the context of factors such as the degree of openness and the magnitude of changes in a country's terms of trade. A more open economy, where exports and imports account for a relatively large share of aggregate output, will be more vulnerable to price and demand volatility in international markets. Compared with other inflation-targeting countries, Norway has a relatively open economy and terms-of-trade fluctuations have been relatively large.
[30] In this paper, developments in Norway are not compared with developments in non-inflation targeting countries. For such a comparison, see, for example, Banerjee, Cecchetti and Hofman (2013).

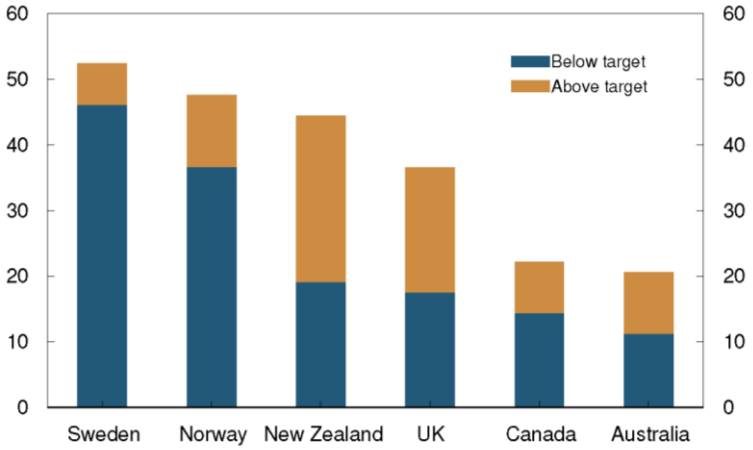
Chart 5.4 Average absolute deviation from inflation target.[1)]
By above- and below-target deviation. Percentage points. 2001 Q1 – 2016 Q3



1) According to the inflation target index for each country. A point target of 2.5 percent has been selected for Australia.
Sources: Thomson Reuters, national statistical agencies and central banks, and Norges Bank

When inflation targeting was introduced, Norges Bank referred to historical experience, which implied that inflation would remain within an interval of +/- 1 percentage point around the target for four out of five years.[31] Inflation has varied more than envisaged by Norges Bank in 2001. For almost half of the period, inflation has deviated from the target by more than 1 percentage point (Chart 5.5). This is a somewhat larger part of the period than for most of the other comparable inflation-targeting countries.

Chart 5.5 Deviation from the inflation target. Percentage of time inflation has been one percentage point or more above or below target.[1)] Percent. 2001 Q1 – 2016 Q3



1) According to the inflation target index for each country. A point target of 2.5 percent has been selected for Australia.
Sources: Thomson Reuters, national statistical agencies and central banks, and Norges Bank

5.1.2. Inflation expectations

Anchoring inflation expectations has in itself a stabilising effect on inflation and allows the central bank to contribute to stabilising the path for output and employment. When inflation expectations are anchored, a change in the key policy rate will also result in a stronger and more predictable change in the real interest rate, which is the most important rate for most economic decisions.

[31] See for example Norges Bank's *Annual Report* for 2003. Norges Bank emphasised in the report that this projection was based on experience gained during a period of low and stable inflation in OECD countries.

Inflation expectations are anchored when the public's expectations with regard to medium- and long-term inflation are stable close to the inflation target. Survey-based inflation expectations have remained close to 2.5 percent since 2001 (Chart 5.6).[32] In this period inflation expectations have averaged 2.6 percent at the five-year horizon and 2.4 percent at the two-year horizon.

Chart 5.6 Expected consumer price inflation two and five years ahead.[1)]
Percent. 2005 Q1 – 2016 Q4

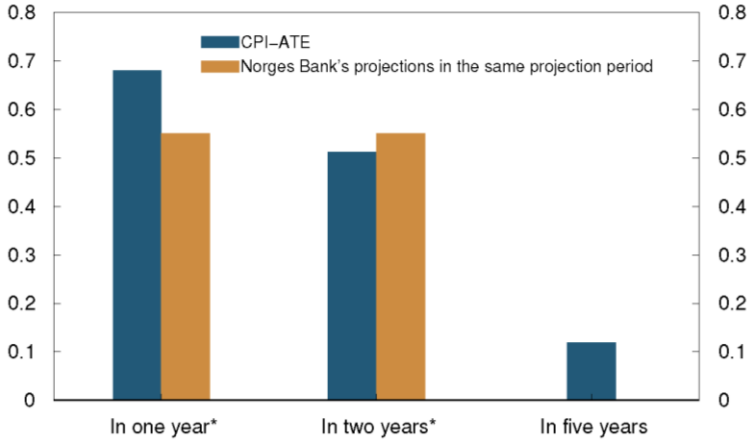
1) Average of expectations of the social partners and economists in the financial industry and academia.
Sources: Epinion and Norges Bank

Inflation expectations are most commonly assessed to be anchored when long-term inflation expectations are not affected, or only slightly affected, by current inflation developments. Survey-based inflation expectations at the five-year horizon have shown little variation since 2001 and have no statistically significant relationship with current consumer price inflation (Chart 5.7).[33] This may indicate that expectations are firmly anchored at the target.

[32] Epinion's expectations survey, Consensus Economics, the Technical Calculation Committee for Wage Settlements (TBU), Norges Bank's regional network and Statistics Norway's business tendency survey collect data on Norwegian inflation expectations. Of these, the largest is the expectations survey, which is conducted by Epinion, a market research company, on behalf of Norges Bank on a quarterly basis. In this survey, households, business leaders, academics, the social partners and financial economists are asked questions about their expectations with regard to inflation and other aspects of the economy in the short and medium term. The discussion of inflation expectations in this paper is based on this survey.

[33] The correlation with inflation expectations at the five-year horizon is not statistically significant (at the five percent level). That is, given the size of the sample, the actual correlation may be zero, even if the measured correlation is slightly greater than zero.

Chart 5.7 Correlation[1] between inflation expectations[2] and CPI–ATE and between inflation expectations and Norges Bank's projections[3].



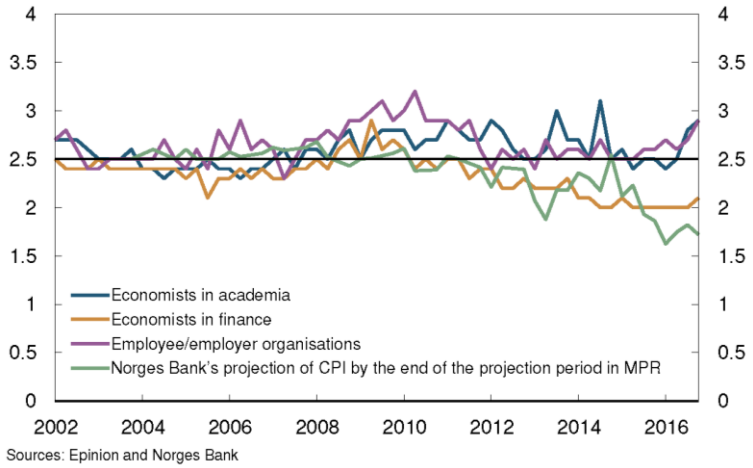
1) Correlation is a measure of the correlation between two variables and is measured as a coefficient from +1 (positive correlation) to –1 (negative correlation).
2) Average expectations of the social partners and economists in the financial industry and academia.
3) Correlation between projections for inflation 12 months ahead and inflation expectations at the one–year horizon, and correlation between projections for inflation 24 months ahead and inflation expectations at the two–year horizon.
* Indicates that the correlation is significant at the one percent level.
Sources: Epinion and Norges Bank

Inflation expectations within horizons of up to two years correlate with current inflation. Inflation will periodically deviate from 2.5 percent, partly as a result of transitory shocks and partly as a result of monetary policy trade-offs. It will often take time before inflation is expected to return to target. Therefore, even when there is confidence in monetary policy, economic agents may base their decisions on an inflation rate other than 2.5 percent in the near term.

Inflation expectations within periods of up to two years also correlate closely with Norges Bank's projections for inflation within the same horizons (Chart 5.7).

In the past couple of years, Norges Bank's projection for consumer price inflation at the end of the projection period has been somewhat lower than 2.5 percent (Chart 5.8).

Chart 5.8 Expected consumer price inflation five years ahead and Norges Bank's projection for CPI inflation at the end of the projection period in the monetary policy reports. Four-quarter change. 2002 Q1 – 2016 Q4



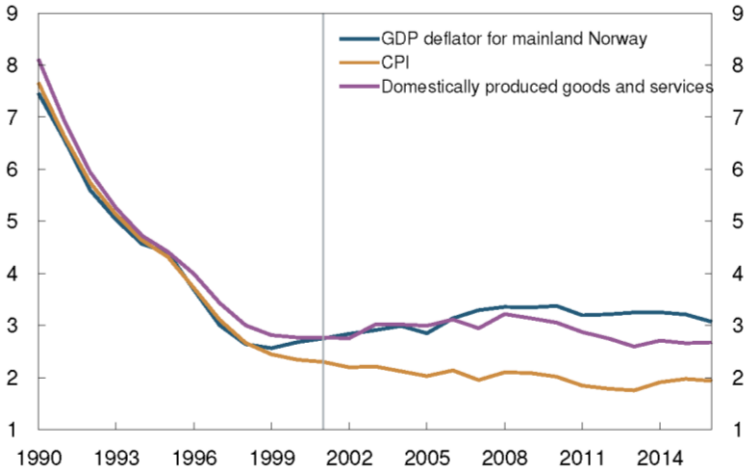
Sources: Epinion and Norges Bank

This does not seem to have affected overall long-term inflation expectations. For financial industry economists, however, survey-based inflation expectations have fallen somewhat since 2012. Expectations for this group five years ahead have been close to Norges Bank's longest-term projection in this period.

5.1.3. Other measures of nominal stability

The consumer price index compiled by Statistics Norway is a cost-of-living index showing the income an average household would need to compensate for changes in prices for goods and services so as to maintain their standard of living. The index captures changes in prices for both domestically produced and externally produced goods and services.

Chart 5.9 CPI, GDP deflator for mainland Norway and domestically produced goods and services in the CPI. Annual change. Ten-year moving average. Percent. 1990 – 2016



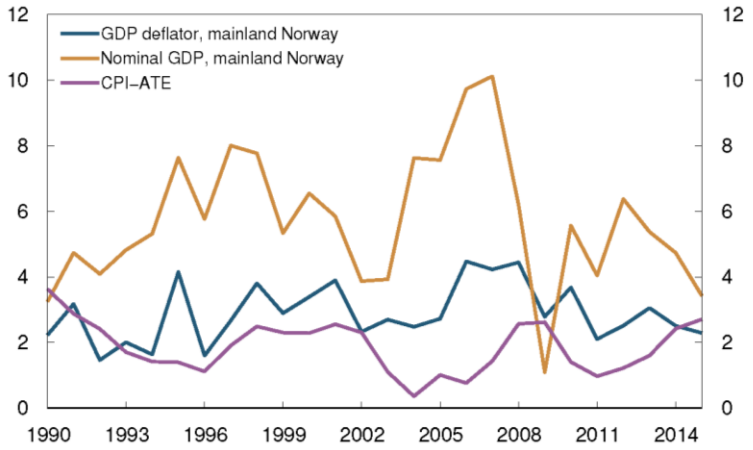
Sources: Statistics Norway and Norges Bank

Over time, the rise in prices for domestically produced goods and services in the consumer price index is closely linked to cost developments for Norwegian firms. These prices are therefore more closely correlated with the domestic cyclical situation than overall consumer price inflation. Prices for domestically produced goods and services have increased by an annual average of 2.7 percent since 2001 (Chart 5.9). This is about 0.7 percentage point higher than average CPI inflation. The difference reflects the fall in prices for imported consumer goods, which has averaged 0.3 percent annually in this period.

Another measure of domestic inflation is the GDP deflator, which measures developments in prices for all domestically produced goods and services. These prices have increase by an annual average of 3.1 percent since 2001. The rise in prices in parts of the economy has thus been higher on average than the rise reflected in consumer prices for domestically produced goods and services. This must be viewed in the context of the improvement in Norway's terms of trade in the period to 2014 and high profitability in the oil service industry.[34]

[34] See, for example, Nordbø and Stensland (2015).

Chart 5.10 CPI–ATE, GDP deflator for mainland Norway and nominal mainland GDP. Annual change. Percent. 1990 – 2015



Source: Statistics Norway

Low underlying consumer price inflation has in periods coincided with high nominal GDP growth (Chart 5.10). This was particularly the case in the periods 2004-2007 and 2011-2013. Both of these periods featured an improvement in Norway's terms of trade, a krone appreciation and low imported inflation. To avoid substantial fluctuations in the real economy, Norges Bank chose in these periods to bring inflation back to target over a longer horizon.

5.2. Developments in output and employment

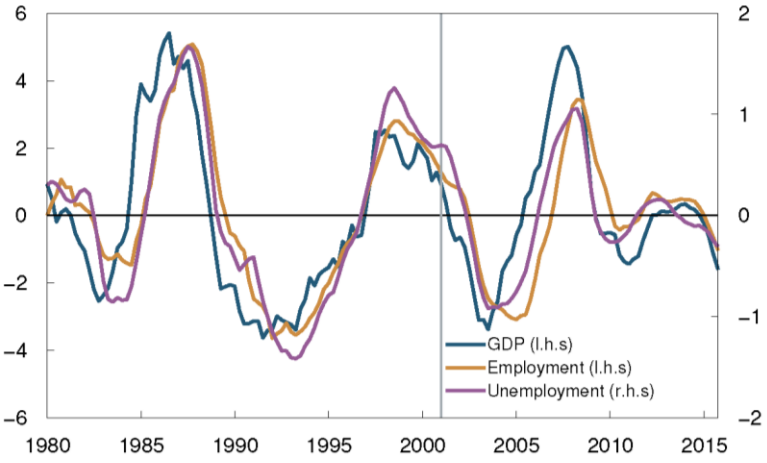
The Regulation on Monetary Policy states that the objective of monetary policy is to contribute to stable developments in output and employment.

Over time, the potential output of the economy increases as a result of labour force growth and higher productivity. Stabilising the level of activity entails avoiding wide divergences from this potential output. The difference between the actual level of output and potential output is referred to as the output gap or the level of capacity utilisation in the economy. Potential output cannot be observed. Norges Bank bases its assessments of potential output on a broad range of analytical tools, including trend estimates of GDP, employment and unemployment. [35] While there have also been substantial fluctuations in the economy after the inflation targeting regime was introduced, economic volatility since the financial crisis has been relatively limited (Chart 5.11). [36]

[35] See Sturød, and Hagelund (2012) and Special Feature "Unemployment and capacity utilisation" in *Monetary Policy Report* 4/16.

[36] The potential levels are estimated using an HP filter with lambda = 40000. For GDP, this is in line with Statistics Norway's estimates of deviations from trend (see Box 2.3 in *Økonomiske analyser* 4/2014 (Norwegian only)). An alternative to measuring the variation in the output gap might be to measure the variation in annual growth. However, such estimates can be strongly influenced by developments in a particular year. The marked, but transitory, decline in output in Norway in 2009 dominates such estimates for the period 2001-2015.

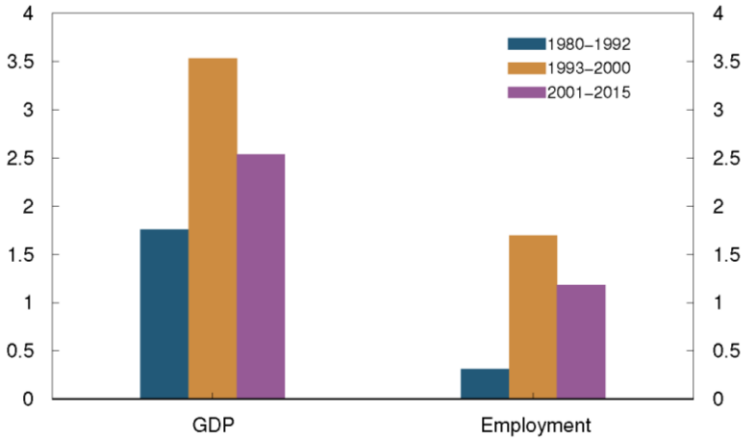
Chart 5.11 Output, employment and registered unemployment. Deviation from trend[1]. 1980 Q1 – 2015 Q4



1) Trend estimated using an HP filter with lambda = 40 000. Estimated based on series from 1978 Q4 – 2016 Q3. Deviation from trend is smoothed three quarters.
Sources: Norwegian Labour and Welfare Administration (NAV), Statistics Norway and Norges Bank

Growth in the Norwegian economy was high between 1993 and 2000 (Chart 5.12), reflecting factors such as a recovery in output and employment following the banking crisis, solid productivity growth and higher prices for a number of exports. The economy continued to grow at a strong pace until the onset of the financial crisis, reflecting a marked rise in oil prices and higher labour immigration. Since the cyclical peak at the turn of 2007/2008, growth in the economy has on the whole been lower, partly owing to the financial crisis and the fall in oil prices.

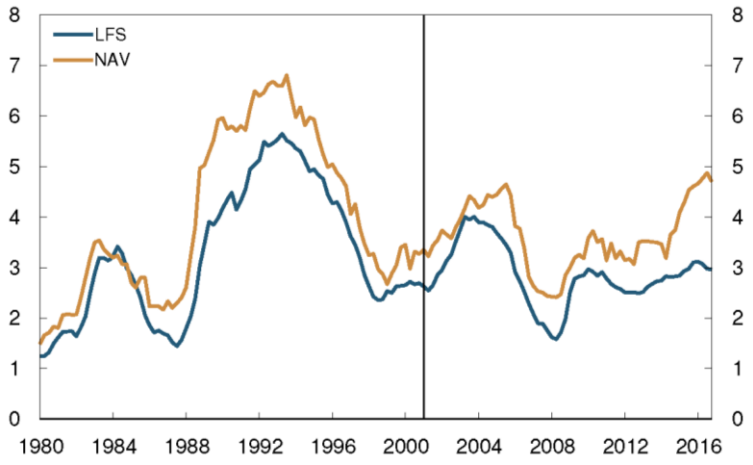
Chart 5.12 Average annual growth in GDP and employment for mainland Norway. 1980 – 2015



Sources: Statistics Norway and Norges Bank

Unemployment has hovered around a relatively low level since 2001 (Chart 5.13). Registered unemployment has averaged 2.9 percent, while LFS (Labour Force Survey) unemployment has been 3.6 percent. This is clearly lower than in the 1990s.

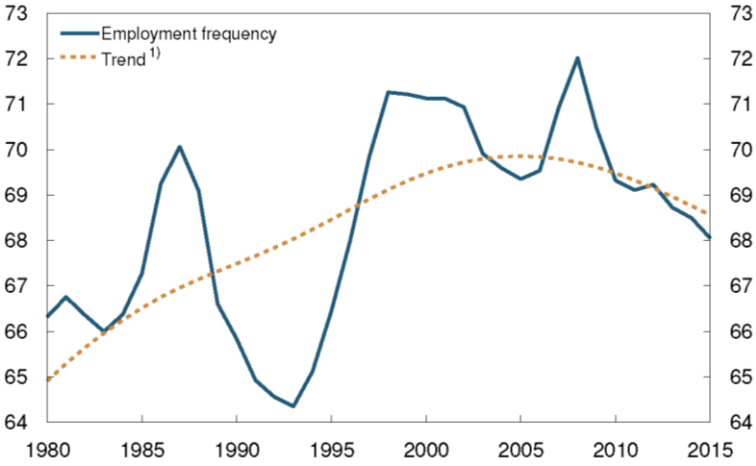
Chart 5.13 Unemployment.
As a percentage of the labour force. 1980 Q1 – 2016 Q4



Souces: Norwegian Labour and Welfare Administration (NAV) and Statistics Norway

The employment rate showed a rising trend in the period to the mid-2000s (Chart 5.14), reflecting a higher employment rate for women. In the past decade, the trend has been falling, partly owing to an ageing population. Labour force participation is lower among older age groups. The employment rate has fluctuated around trend in pace with cyclical developments. However, the variation in this rate appears to have been relatively limited since 2001.

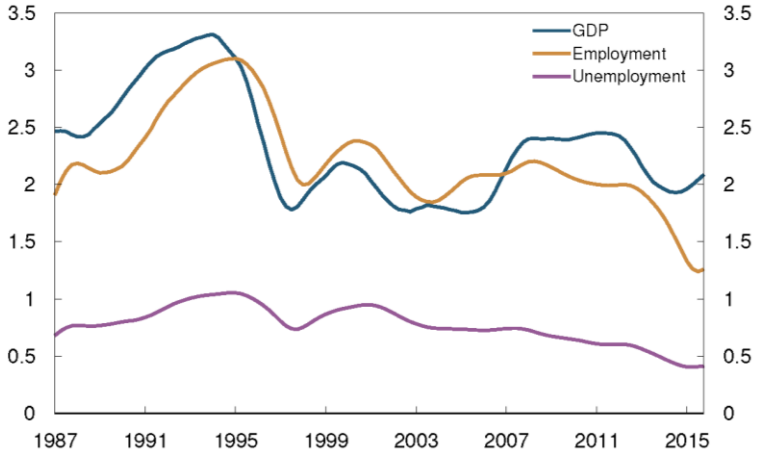
Chart 5.14 Employment as a share of the population in the age group 15-74.
1980 – 2015



1) Trend estimated using an HP filter with lambda = 1000. Estimated based on series from 1972 – 2019. Projections for 2016 to 2019 from MPR 4/16.
Sources: Statistics Norway and Norges Bank

Measured as the deviation from trend, developments in the real economy as a whole appear to have become somewhat more stable since inflation targeting was introduced (Chart 5.15). The average employment and unemployment variability has been reduced somewhat. Output has fluctueted approximately to the same extent as in the latter part of the 1990s, but picked up temporarily ahead of the financial crisis.

Chart 5.15 Variation in the output, employment and unemployment gaps.[1)]
Measured as a ten-year moving average of the standard deviation.[2)]
1987 Q1 – 2015 Q4



1) Trends are estimated using an HP filter with lambda = 40 000.
2) The moving average is centered on the most recent quarter.
Sources: Norwegian Labour and Welfare Administration (NAV), Statistics Norway and Norges Bank

Developments in the real economy have also become somewhat more stable in other countries since inflation targeting was introduced (Chart 5.16). In Sweden, output variability has remained approximately unchanged. In the UK, after a clear decline in the initial period after the inflation target was introduced, output volatility has increased over the past 15 years. Australia leads the field, with very stable developments in output. The average variation in the GDP gap in Norway has been broadly in line with an average of the other countries.

Chart 5.16 Variation in the output gap.[1)]
Standard deviation. Percentage points. 1980 Q1 – 2015 Q4

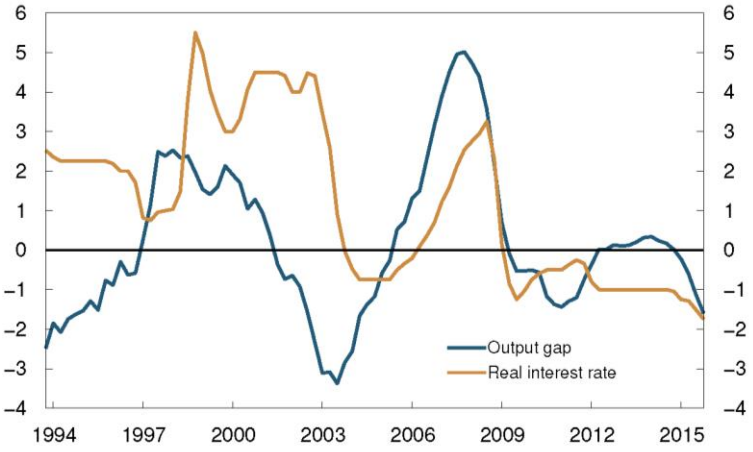
1) Trends are estimated using an HP filter with lambda = 40 000. Estimated based on series from 1978 Q1 – 2016 Q3.
Sources: OECD, Statistics Norway and Norges Bank

On the whole, monetary policy has had a stabilising effect on output and employment. Stabilising inflation will normally require stability in the real economy. In Norway, the interest rate has largely been countercyclical, particularly since 2005 (Chart 2.17). The key policy rate was reduced rapidly and sharply during the financial crisis. Following the fall in oil prices in 2014, the rate was reduced further from a low level. The low key policy rate underpinned the marked depreciation of the krone exchange rate. Partly owing to firmly anchored inflation expectations, the krone depreciation did not result in demands for wage compensation or considerably higher inflation.

In the years 2002-2005, monetary policy may have amplified the fluctuations in the real economy. In 2002, the key policy rate was kept high because wage growth was higher than the rate assessed to be compatible with the inflation target over time. In the period 2004-2005, capacity utilisation increased, while the key policy rate was kept low in the interest of bringing inflation back to target within a reasonable time horizon.

Fluctuations in the real economy are affected by many other factors in addition to monetary policy. As mentioned above, the economy has been hit by large shocks since 2001. At the same time, the economy's capacity to absorb economic shocks may have improved. Higher labour immigration, for example, may have enhanced labour supply flexibility. Fiscal policy may have contributed to stability in the real economy to a greater degree than previously. During the financial crisis and after the fall in oil prices in 2014, fiscal policy has made a contribution to dampening the decline in activity.

Chart 5.17 Output gap[1] and real interest rate[2].
Percent. 1993 Q4 – 2015 Q4

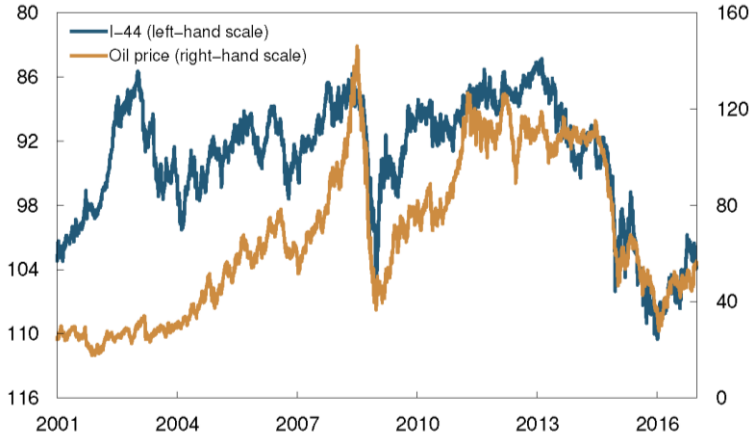


1) Gap is estimated using an HP filter with lambda = 40 000. Gap is smoothed three quarters.
2) 2.5 percentage points below the sight deposit rate.
Sources: Statistics Norway and Norges Bank

5.3. Developments in the krone since 2001

Norges Bank does not have a specific target for the level of the krone exchange rate. Developments in the krone exchange rate are nonetheless of considerable importance in interest rate setting because the exchange rate influences inflation and output.

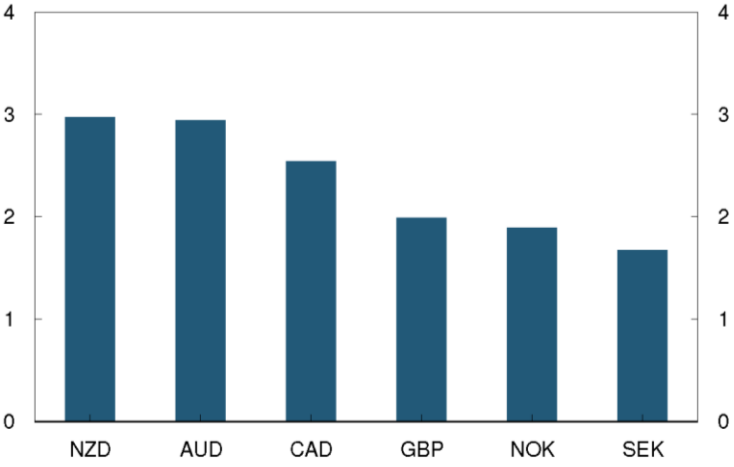
Chart 5.18 Oil price[1] and import-weighted exhange rate index (I-44)[2].
1 January 2001 – 31 December 2016



1) USD/barrel.
2) A positive slope denotes a stronger krone exchange rate.
Sources: Bloomberg and Norges Bank

Since the introduction of the inflation target in 2001, the krone has cushioned the effect of the shocks that have hit the Norwegian economy. After a pronounced depreciation through 2003, the import-weighted krone exchange rate strengthened gradually in the years preceding the financial crisis (Chart 5.18). The marked depreciation of the krone through 2008 bolstered competitiveness and supported inflation. Some of the krone depreciation was quickly reversed as oil prices rebounded. The krone strengthened gradually up to winter 2013 and was then at its strongest levels since before the 1986 devaluation. In addition to the improvement in Norway's terms of trade, a positive interest rate differential against other countries led to increased demand for NOK. The fall in oil prices in 2014 led in turn to a marked krone depreciation.

Chart 5.19 Exchange rates. Standard deviation for monthly changes in effective exchange rates. Percent. 1992 – 2016



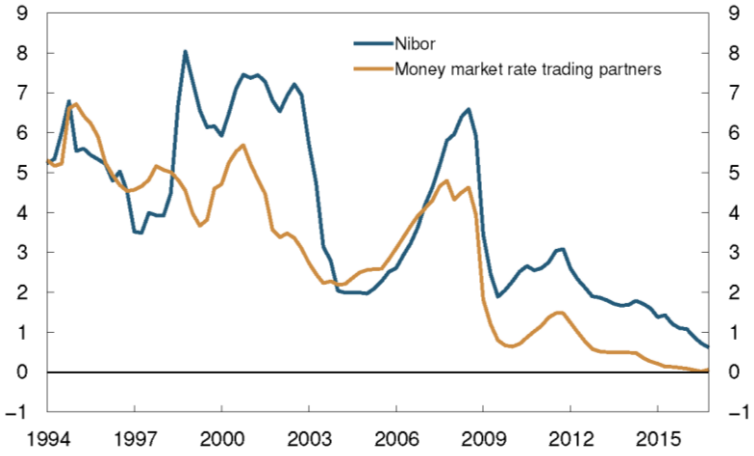
Sources: Bloomberg and Norges Bank

Krone exchange rate volatility seems to have increased somewhat since the 1990s. The krone exchange rate cannot be characterised as particularly volatile (Chart 5.19). Compared with other typical commodity currencies, such as the Australian and New Zealand dollar, the krone displays relatively low volatility, approximately on a level with the volatility of sterling and the Swedish krona.

The interest rate is set to stabilise developments in the Norwegian economy. At the same time, the key policy rate in Norway is influenced by the level of interest rates abroad, particularly through the krone exchange rate. A wide interest rate differential

can lead to large movements in the exchange rate, making it difficult to stabilise inflation and output. The widest interest rate differential between Norway and other countries occurred at an early stage in the inflation targeting period (Chart 5.20). The Norwegian money market rate was then close to 4 percentage points higher than trading partners' money market rates. Since 2003, the interest rate differential has remained within the interval -0.6 – 2.0 percentage points.

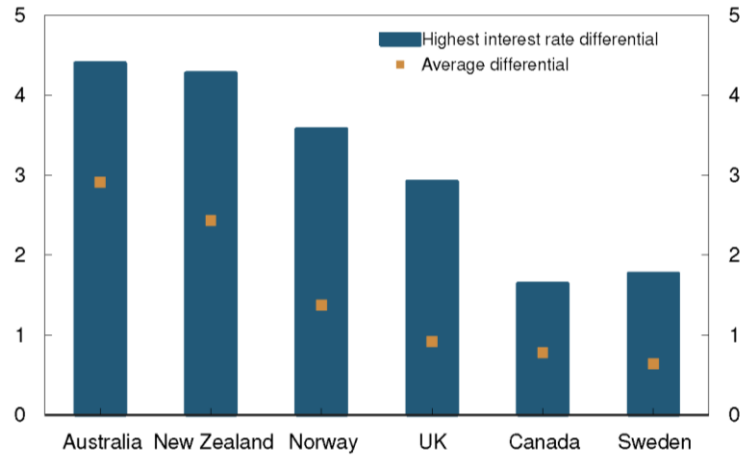
Chart 5.20 Three–month money market rates among trading partners[1] and in Norway (Nibor). Percent. 1994 Q1 – 2016 Q4



1) Aggregate for trading partner's money market rates is described in *Norges Bank Papers* 2/2015.
Sources: Thomson Reuters and Norges Bank

The interest rate differential between Norway and trading partners has been in line with the average observed for other inflation-targeting countries (Chart 5.21). At the same time, there is a relatively wide difference in interest rate differentials across countries. While Sweden's interest rate has closely tracked interest rate developments abroad, the interest rate differential between Australia and its trading partners has averaged close to 3 percentage points.

Chart 5.21 Absolute interest rate differential against other countries.[1] 2001 – 2016

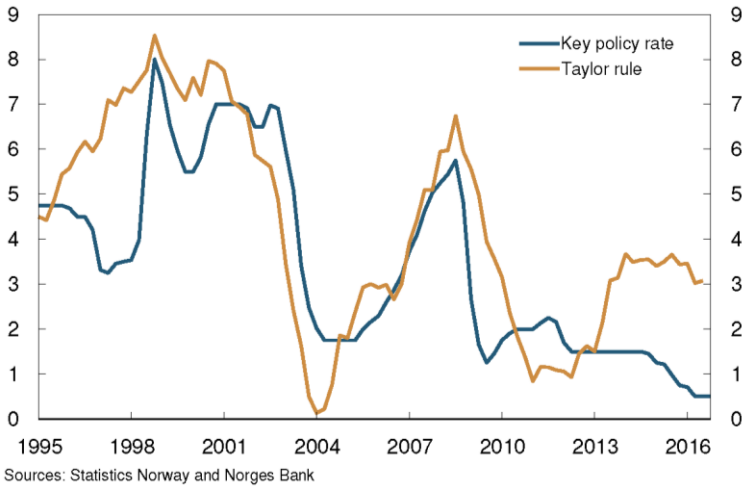


1) Difference between the three–month money market rate and the rate for a trading partner aggregate.
Sources: Thomson Reuters and the central banks of the selected countries

6. Has monetary policy been sufficiently geared towards inflation and the real economy?

In the conduct of monetary policy, the central bank must often strike a balance between stabilising inflation and stabilising output and employment. There is no objective guideline for striking an appropriate balance and that could be used to evaluate monetary policy ex-post. In the literature, however, the so-called Taylor rule is often used as a normative guideline.[37] The Taylor interest rate is not an expression of "optimal" monetary policy, but can be viewed as an indicator for a robust monetary policy that contributes to stabilising inflation and output with the aid of limited information. The rule is based to a lesser degree on specific assumptions and is therefore in principle more robust to erroneous assumptions than monetary policy in practice.[38] [39] Such a rule can therefore be a useful cross-check of the monetary policy stance. Central banks' policy rates will generally deviate somewhat from the Taylor interest rate, because monetary policy is based on considerably more information and assumptions that the Taylor rule. However, substantial and persistent deviations in the interest rate from the Taylor rate can be an indication that the interest rate has not been sufficiently geared towards the domestic economic situation.

Chart 6.1 Key policy rate and the rate obtained by the Taylor rule.
Percent. 1995 Q1 – 2016 Q4



Sources: Statistics Norway and Norges Bank

Chart 6.1 shows developments in the Taylor rate and the actual key policy rate.[40] The relationship between them has been fairly close through much of the period, although the key policy rate has been closer to the Taylor rate in the post-2001 period than before the inflation target was introduced. Two periods of substantial deviation stand out. Between 1995 and 1998, the key policy rate was clearly lower than the Taylor

[37] The Taylor rate can be written as: $i = \pi^* + r^* + 1.5 \cdot (\pi - \pi^*) + 0.5 \cdot y$, where i is the nominal interest rate, r^* is the neutral real interest rate, π^* is the inflation target, π is actual inflation and y is the output gap.

[38] However, the rule requires estimates of the neutral real interest rate and output gap. Such estimates are uncertain and must be based on some assumptions.

[39] See Taylor and Williams (2010). Hoen (2012) and Mæhlum (2012) analyses the robustness characteristics of simple rules such as the Taylor rule with regard to model uncertainty based on models of the Norwegian economy.

[40] The neutral real interest rate, r^*, is based on Norges Bank's published projections of the neutral nominal rate minus inflation. The estimated equilibrium inflation rate, π^*. π^* follows the inflation target of 2.5 percent as from 2001. Before 2001, the equilibrium rate was estimated at 2 percent. The output gap, y, is calculated as developments in trend GDP. The Taylor rate is adjusted for the money market premium, which is given by the premium in the Norwegian three-month Nibor rate.

rate. In this period, monetary policy became more expansionary than domestic conditions would imply owing to the exchange rate target.[41]

The key policy rate has also been markedly lower than the Taylor rate in recent years. The simple rule is based on current developments in inflation and output and does not take account of projections of future economic developments. Inflation gained momentum through 2013 and has since been close to and somewhat above 2.5 percent. At the same time, the forces driving inflation further ahead have been moderate. This has been given weight in interest rate setting, but is not captured by the simple rule. The Taylor rate has fallen recently, reflecting decelerating inflation.

The deviation from the Taylor rule in recent years can also be regarded as an illustration of the challenges unusually low global interest rates pose for monetary policy in a small open economy.

7. Experience

The monetary policy framework has been effective. The inflation target has anchored inflation expectations. At the same time, the scope for flexibility and the exercise of judgement has been sufficient to enable monetary policy to dampen the impact on output and employment of the shocks that have occurred, particularly in the years since 2005.

The shocks that have hit the Norwegian economy have primarily originated abroad. There have been substantial changes in Norway's terms of trade and Norway has felt the effects of pronounced international cyclical fluctuations. There has been a persistent decline in interest rates abroad and labour immigration to Norway has been high. Facing these kinds of shocks and developments, the conduct of monetary policy has had to involve a trade-off between stabilising inflation and stabilising output and employment. In addition, the risk that financial imbalances could lead to an abrupt shift in demand further ahead has entailed a trade-off with regard to the appropriate horizon for returning inflation to target.

To achieve a reasonable balance between the various monetary policy considerations, a sufficiently long and flexible horizon for the inflation target is crucial. When inflation targeting was introduced, Norges Bank decided on a horizon that would normally extend over two years. The horizon was thereafter changed to one to three years and subsequently to "medium-term". The trend towards a longer and more flexible time horizon has also been evident among other inflation-targeting central banks, and it does not seem to have weakened the anchoring of inflation expectations in Norway.

Inflation has largely been low and stable since 2001. Average annual consumer price inflation has been close to, albeit somewhat below, 2.5 percent, reflecting the fact that of the shocks that have occurred, more have exerted downward pressure than have exerted upward pressure on inflation. In addition, Norges Bank decided to bring inflation back to target over a longer horizon in order to contribute to stability in output and employment. Inflation volatility has been lower than was the case in the 1970s and 1980s, at about the same level as in other inflation-targeting advanced economies. The deviations in inflation from the 2.5 percent target have nonetheless been larger than anticipated by Norges Bank when the inflation target was introduced.

[41] For further discussion, see Section 2.

This reflects the greater severity of more recent economic shocks than of those occurring in the 1990s, and the more difficult trade-offs made in the context of developments such as substantial changes in the terms of trade and the build-up of financial imbalances.

Against the background of Norway's experience since 2001, some variability around the inflation target must be expected in the future. As long as there is confidence that the central bank will gradually bring inflation back to target after a deviation has occurred, some variability in inflation is not likely to involve appreciable costs to society. Such fluctuations will to some extent reflect the monetary policy objective of stabilising output and employment in addition to inflation.

Employment has consistently been more stable since 2001 than in the 1970s and 1980s. In spite of severe shocks, output volatility has not been higher than in the relatively stable 1990s. There have also been challenges related to the phasing-in of oil revenues and real appreciation in much of this period. Monetary policy has had a stabilising effect on output and employment. Even though there have been long periods when monetary policy has had to strike a balance between achieving the inflation target and stabilising output and employment, monetary policy has had a clear tendency to dampen cyclical fluctuations. This was particularly apparent during the financial crisis and in the wake of the fall in oil prices in 2014. As confidence in the inflation target has become more firmly established, it has been possible to give more weight to stabilising output and employment.

There has been an international trend towards lower interest rates, and in a number of countries the room for manoeuvre in monetary policy has been constrained by the lower bound on the interest rate. A prolonged period of very low interest rates may lead economic agents to underestimate risk and based their decisions on a belief that interest rates will remain very low for a long time. Persistently low interest rates may lead to asset price inflation and debt growth that could increase the vulnerability of households and enterprises. Experience shows that high house price inflation and credit growth can increase the risk of future financial crises.

Monetary policy cannot assume the main responsibility for counteracting financial imbalances. Regulation and monitoring of financial institutions should be the first line of defence against shocks to the financial system. The effect of macroprudential instruments and other more targeted measures is, however, uncertain, and the active use of such instruments may involve a variety of costs. Situations may therefore arise where monetary policy should also contribute to counteracting the build-up of financial imbalances, to the extent these situations are assessed as a threat to stability in inflation, output and employment further ahead.

In a world of high capital mobility and extensive trade, monetary policy's room for manoeuvre in a small open economy such as Norway is limited. With a floating exchange rate, the domestic interest rate can differ from interest rates abroad, but an interest rate differential that becomes too wide can have such substantial effects on the exchange rate that it gives rise to instability in inflation, output and employment. Thus, the domestic interest rate will also be influenced by external rates to a large extent under an inflation-targeting regime. The room for manoeuvre in monetary policy will be further constrained in periods when external interest rates are close to or below zero.

Even though the domestic interest rate cannot differ too widely from trading partners' rates, the exchange rate has an important role in cushioning the effect of shocks – particularly when there are changes in the terms of trade. In periods when oil prices

have fallen and the economy has entered a period of contraction, the krone exchange rate has depreciated, strengthening competitiveness and preventing inflation from becoming too low. As long as economic agents have confidence in the inflation target, monetary policy can support changes in the krone exchange rate that have a stabilising effect on the business cycle. At the same time, developments in the krone exchange rate have been relatively stable compared with other inflation-targeting countries that are heavily reliant on commodity-based exports.

Monetary policy's main task is to provide the economy with a nominal anchor. When inflation is firmly anchored, monetary policy can also contribute to stable developments in the real economy. But experience has shown that monetary policy alone cannot fully counteract economic fluctuations, especially when the economy is affected by substantial shocks from abroad. The extent to which monetary policy in a small open economy can contribute to counteracting financial imbalances is also limited. Experience from the 1970s and 1980s shows that the nominal anchor can slip if monetary policy is expected to place too great an emphasis on pursuing objectives other than low and stable inflation.

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