

Evaluation of Norges Bank's projections for 2007

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The economic upswing since the summer of 2003 has been stronger and lasted longer than projected by Norges Bank. Growth in the mainland economy in 2007 was the highest since the early 1970s and strong in the light of the advanced phase of the current cyclical upswing. Capacity utilisation in the Norwegian economy in 2007, as measured by the estimated output gap, was higher than projected in 2006 and 2007. Unemployment was lower than expected. Underlying inflation was nevertheless low, broadly in line with that projected. There are several reasons why growth in 2007 was stronger than expected. Improved terms of trade in recent years have probably had a greater effect on demand than anticipated. At the same time, an ample supply of labour and high productivity growth provided a higher-than-expected boost to the economy's potential output. Norges Bank's projections of developments in 2007 were broadly in line with those of other forecasters.

1 Introduction

Norges Bank's projections of inflation and economic developments are an important basis for setting interest rates. Evaluating these projections can give us information about the reasons for deviations between actual and projected developments in the economy. Such deviations may, for example, be related to misinterpretation of the current state of the economy or to unforeseen disturbances. Forecast errors may also be due to insufficient understanding of how the economy works. Evaluations of our projections can therefore provide additional insight into the workings of the economy and possible structural changes. We can use this insight when preparing projections and when developing and improving our analytical instruments.

The Bank's short-term and long-term projections are prepared on different bases. This must also be taken into account when evaluating projections in retrospect. The short-term projections are based largely on interpretation and assessment of incoming data. The projections of economic developments in the somewhat longer run

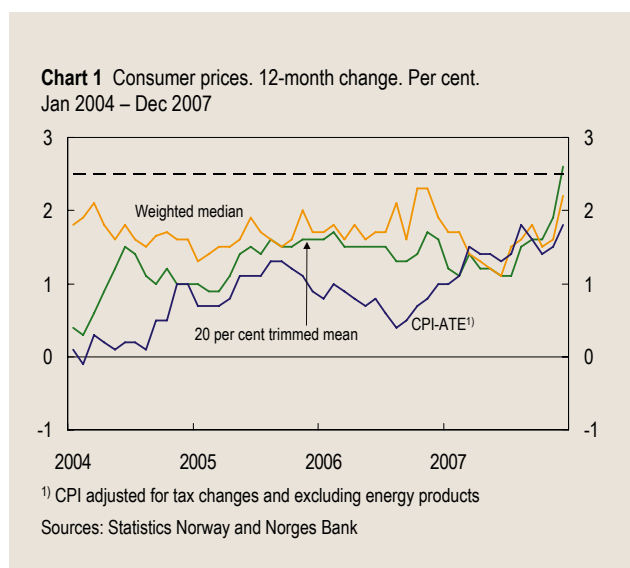
should be assessed in the light of interest rate projections. Norges Bank sets interest rates with a view to stabilising inflation around the target in the medium term. Interest rates must also be set to achieve a reasonable balance between developments in inflation and capacity utilisation.

This article evaluates the projections of economic developments in 2007 published in the *Inflation Reports* in 2006 and the *Monetary Policy Reports* in 2007. We look first at developments in inflation and output in 2007. We then analyse deviations between the projections and actual developments in more detail. Finally, our projections are compared with those of other forecasters, both for 2007 and over a longer period.

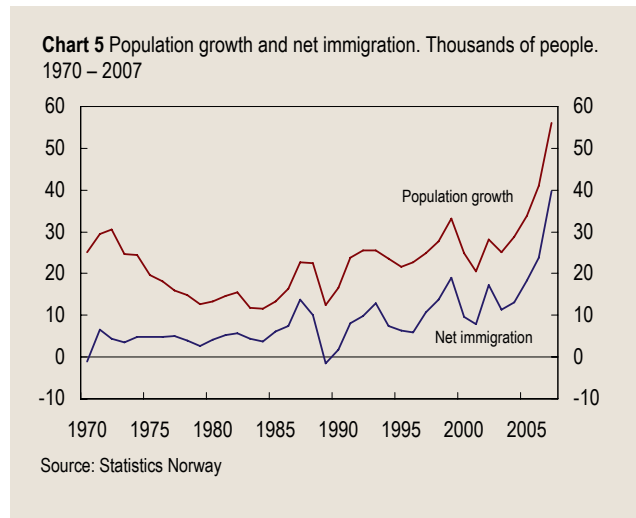
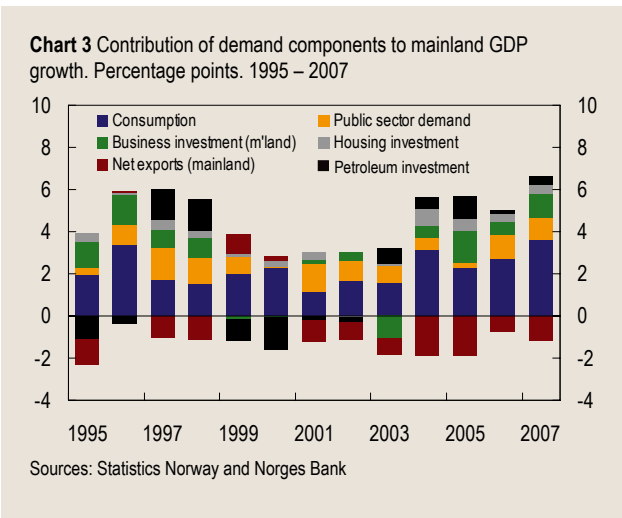
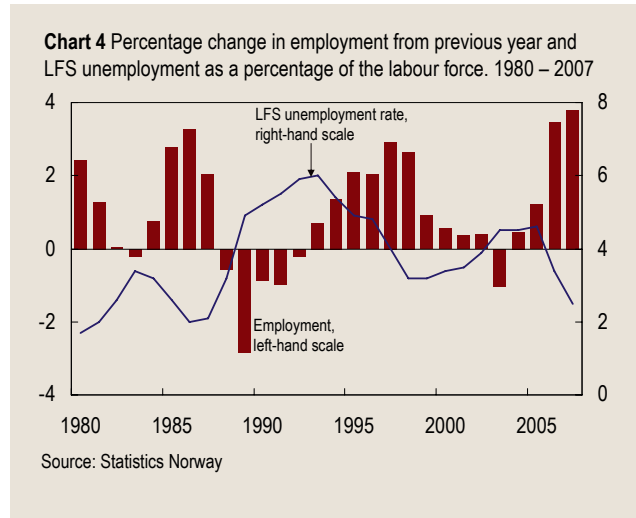
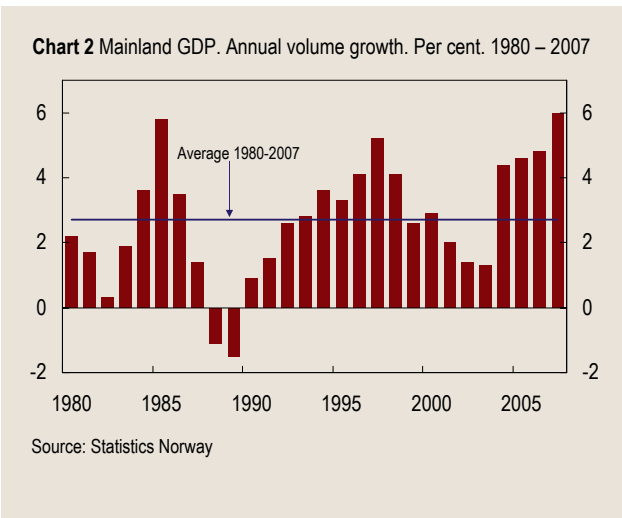
2 Inflation, output and interest rates in 2007

Inflation as measured by the consumer price index (CPI) was heavily influenced by a fall in electricity prices in 2007. The CPI rose by 0.8 per cent from 2006 to 2007, down from 2.3 per cent the previous year. The CPI adjusted for tax changes and excluding energy products (CPI-ATE) climbed from 0.8 per cent in 2006 to 1.4 per cent in 2007. Other measures of underlying inflation have also risen since late summer 2007 (see Chart 1). A higher rise in prices of domestically produced goods and services pushed up CPI-ATE inflation from 2006 to 2007, reflecting higher wage growth and slower productivity growth. The rate of increase in prices for imported consumer goods fell in 2007, due partly to a strong krone. Inflation was pushed down by a fall in prices for audiovisual equipment and clothing and footwear.

The economic upswing that has marked the Norwegian economy since the summer of 2003 gained momentum in 2007. Growth in mainland GDP from 2006 to 2007 was the strongest since the early 1970s at no less than 6.0 per cent (see Chart 2).



¹ I would like to thank Anne Berit Christiansen, Kåre Hagelund, Thea Birkeland Kloster, Bjørn Naug, Ingvild Svendsen and other colleagues at Norges Bank for valuable comments and suggestions.



Consumption increased by 6.4 per cent in 2007 and provided the main contribution to growth in aggregate demand for goods and services (see Chart 3). Goods consumption rose by 7.7 per cent, while spending on services rose by 4.6 per cent. Car purchases showed a sharp increase in 2007, accounting for around 1 percentage point of consumption growth. Business investment in mainland Norway also made a significant contribution to overall growth in 2007, and a somewhat larger contribution than in 2006. As in 2006, public sector consumption and investment made a considerable contribution to overall growth.

Strong growth in the supply of labour and a long period of high productivity growth have boosted the underlying potential output of the Norwegian economy. In *Monetary Policy Report 1/08*, potential output was estimated to have increased by 4¼ per cent in 2007. Strong growth in potential output has helped to keep inflation low during the present economic upswing despite rapid economic growth.

The high rate of growth in productivity can be attributed partly to increased specialisation, new technology, better logistics and more efficient organisation of pro-

duction.² The economic upswing may have contributed to further growth in productivity in recent years, partly because there has been a need to make more efficient use of the labour and capital available. This potential is probably now in the process of being exhausted. Productivity growth in the mainland economy fell from 2006 to 2007.

Employment grew by 3.8 per cent in 2007, the highest rate of growth recorded for more than 40 years (see Chart 4). Growth was also strong in 2006 at 3.4 per cent. The record-high employment growth of recent years has led to a sharp fall in unemployment. Unemployment as measured by Statistics Norway's *Labour Force Survey* (LFS) has not been that low since the latter half of the 1980s.

The strong growth in employment has coincided with an ample supply of labour in recent years. The supply of labour from other countries has shown a particularly strong increase since EU enlargement in 2004 (see Chart 5). Foreign labour inflows account for almost half of the growth in the labour force in recent years. Labour force participation in general has also risen, with a particularly strong increase among younger and older age groups.

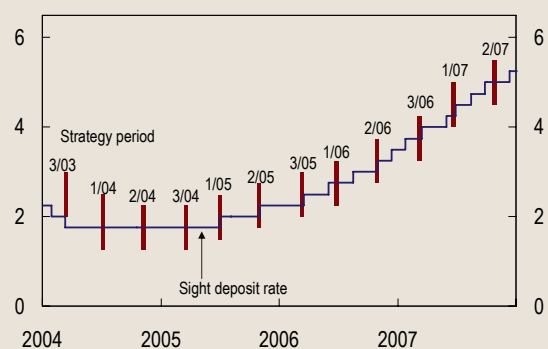
² See box "Developments in productivity growth" in *Monetary Policy Report 2/07* for a more detailed account.

Table 1. Assumptions and projections for key macroeconomic variables in 2007. From *Inflation Report 1/06* to *Monetary Policy Report 3/07*. Annual rise. Per cent

	IR 1/06	IR 2/06	IR 3/06	MPR 1/07	MPR 2/07	MPR 3/07	Preliminary accounts
CPI	1¾	1¾	1¾	¾	¾	¾	0.8
CPI-ATE	1¾	1½	1¾	1½	1½	1½	1.4
Annual wage growth ¹	4½	4¾	5	5¼	5½	5½	5.6
GDP	3½	3½	3¾	2¾	3¼	3¼	3.5
Mainland GDP	2¾	2¾	3¼	3¾	4¼	5¼	6.0
Potential growth in mainland GDP	2½	2½	2½	3	3¼	3¾	4¼
Output gap, mainland Norway	1¼	1½	2¼	2¼	2½	2¾	3
Employment	1	1	1½	2¼	2¾	3½	3.8
Labour force, LFS	¾	¾	1	1¼	1¾	2¼	2.5
LFS unemployment (rate)	3¾	3½	3	2¾	2½	2½	2.5
Mainland demand	3	3	3¾	4	4½	5¾	6.1
- Private consumption	3	3¼	3½	4	4¾	6	6.4
- Public consumption	1¾	1¾	2¾	3	3	3	3.2
- Fixed investment, mainland Norway	4½	4¾	5½	5¾	6	8¾	9.2
Petroleum investment	0	0	0	2½	7½	7½	6.6
Traditional exports	5	3¾	4½	7	8¼	6½	9.6
Imports	3¾	3¾	4¼	5½	7¼	7¾	8.6
Key policy rate	3½	3¾	4	4¼	4½	4½	4.4
Import-weighted exchange rate (I-44)	93.0	89¼	94¾	92¼	92¼	90½	90.8
GDP, trading partners	2½	2¼	2½	3	3	3	3¼
Oil price, USD/bbl	64.3	72.1	65.4	63.4	67.5	71.9	72.9

¹⁾ Includes estimated costs related to the introduction of mandatory occupational pensions.

Chart 6 Interval for the key policy rate at the end of each strategy period and actual developments. Per cent. 2 Jan 2004 – 31 Dec 2007



Source: Norges Bank

Interest rates were raised further in 2007 (see Chart 6). The key policy rate was 3.5 per cent at the beginning of the year. It was raised in seven increments of 0.25 percentage point, and ended the year at 5.25 per cent.

3 Deviations between projections and actual developments

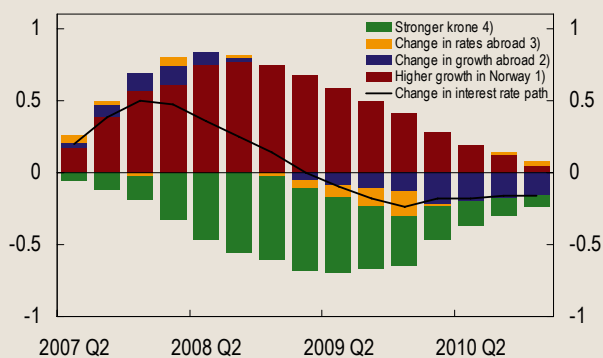
Table 1 shows the key assumptions and projections for 2007 from the three *Inflation Reports* in 2006 and the three *Monetary Policy Reports* in 2007.³ As illustrated, economic growth was stronger than expected, while underlying price inflation was largely as projected.

Interest rates

The key policy rate was higher in 2007 than projected in the reports published in 2006 and 2007. In *Inflation Report 1/06*, the interest rate path indicated a rate of 3.7 per cent in the fourth quarter of 2007. In *Inflation Report 3/06*, it had been revised up to 4.6 per cent. Higher capacity utilisation implied that cost inflation would accelerate, and suggested a higher interest rate path. Lower-than-expected underlying price inflation, in isolation, pointed in the opposite direction during this period. The interest rate path was also revised up in 2007, but to a lesser extent. The upward revision of the interest rate projections from *Inflation Report 3/06* to *Monetary Policy Report 3/07* was due primarily to unexpectedly high capacity utilisation in the Norwegian economy (see Chart 7). Stronger-than-expected growth in the global economy also pushed up interest rate pro-

³ Boxes in the different reports provide a more detailed account of changes in the projections.

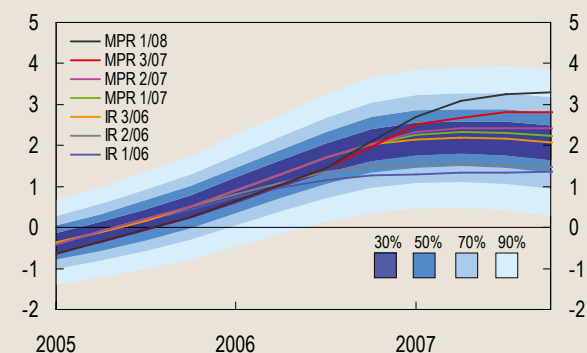
Chart 7 Factors behind changes in the interest rate path from IR 3/06 to MPR 3/07. Percentage points. 2007 Q2 – 2010 Q4



- 1) Reflects effects of unexpectedly high output growth in 2007 and associated effects
- 2) Reflects effects of changes in expected growth in the global economy
- 3) Reflects effects of expectations of changes in key policy rates among our trading partners, through effects on the krone exchange rate
- 4) Reflects effects of krone appreciation over and above effects of changes in interest rate expectations abroad

Source: Norges Bank

Chart 8 Output gap. Projection in the baseline scenario in IR 3/06 with fan chart and projections from other reports. Per cent. 2005 Q1 – 2007 Q4



Source: Norges Bank

jections in 2007. Despite unexpectedly high capacity utilisation, underlying price inflation remained low and was largely as projected. A stronger krone offset the effect of higher domestic inflationary pressures. A more detailed account of changes in the interest rate path in 2007 is provided in Norges Bank's *Annual Report for 2007*.

Output gap

The output gap expresses the relationship between the actual level of output in the economy and the level of output that is consistent with stable inflation over time, i.e. potential output. Our projection for the output gap in 2007 was gradually revised up from 1¼ per cent in *Inflation Report 1/06* to 2¾ per cent in *Monetary Policy Report 3/07*. In *Monetary Policy Report 1/08*, the gap was revised slightly further up to 3 per cent (see Chart 8).

Growth in mainland GDP in 2007 was considerably higher than Norges Bank's projections. In autumn 2006, growth in 2007 was projected at 3¼ per cent, up from a projection of 2¾ per cent before the summer. The single largest upward revision of projected growth came in *Monetary Policy Report 3/07*, when growth was revised up by 1 percentage point to 5¼ per cent. The preliminary national accounts figures for 2007 indicate annual growth of 6.0 per cent.

Our projection of the output gap increased far less than our mainland GDP projections. This is because our assessment of potential growth also changed. The projection of potential growth in 2007 was first revised up in *Monetary Policy Report 1/07* from 2½ per cent to 3 per cent. Potential output was gradually revised up in the subsequent reports, and potential growth in 2007 was estimated at 4¼ per cent in *Monetary Policy Report 1/08*.

The influx of foreign labour has increased the Norwegian economy's growth capacity and was much higher in 2007 than we anticipated in *Inflation Report 3/06*. Labour force growth was then projected at 1 per cent, whereas the LFS data now indicate growth of almost 3 per cent. Labour immigration probably accounted for around half of the growth in the labour force in 2007, while increased labour force participation can explain a third.

The increase in labour immigration was difficult to predict. Figures from the Central Office – Foreign Tax Affairs and the Norwegian Directorate of Immigration indicated a sharp increase in labour immigration into Norway from 2004. Compared with earlier, the number of labour immigrants was already at a high level in 2006. In mid-2006, we projected an unchanged level of foreign labour from 2006 to 2007, following estimated growth of more than 11 000 persons from 2005 to 2006. The use of foreign labour was expected to remain relatively high as a result of high levels of activity in the construction sector. However, figures from the Directorate of Immigration show that no fewer than 21 000 more work permits were issued in 2006 than in 2005, with a further increase of 26 000 permits in 2007. There has been a growing tendency for new labour immigrants to choose to settle in Norway. They therefore constitute a more permanent resource and have pushed up the underlying rate of population growth. Growth in the population aged 15–74 was 1.4 per cent last year. At the end of 2006, population growth was projected at 1.0 per cent in 2007.

Compared with the projections published at the beginning of 2006, growth in all of the demand components of mainland GDP in 2007 was higher than expected (see Table 1). The unexpectedly strong growth in demand was due largely to unexpectedly high growth in consumption. Household income grew faster than antici-

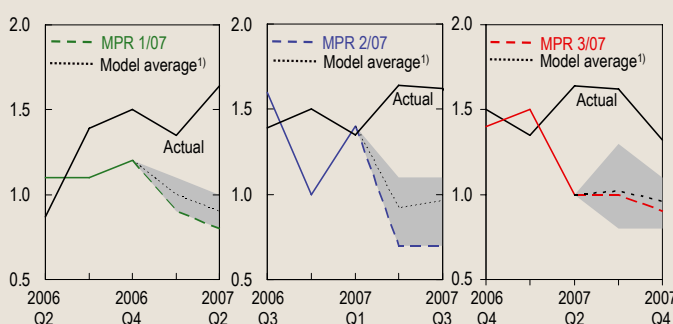
Short-term models for GDP growth in mainland Norway

We use a number of different models in our work on projecting growth in mainland GDP in the coming quarters.¹ These models differ in that they are based on different sets of information and different methods for using the statistical properties of the series included. The short-term models are used as an aid in projecting economic growth in the current and following quarters. In the context of this evaluation, it may be interesting to explore the degree to which these models have captured the surprisingly strong growth in the Norwegian economy.

Chart 9 shows the projections of seasonally-adjusted GDP growth in the next two quarters published in the three *Monetary Policy Reports* in 2007 compared with the average of the predictions from the various short-term models. At the beginning of 2007, all of the models indicated that growth would slow in the first and second quarters of 2007. The difference between the quarterly predictions from the models increased in the period to *Monetary Policy Report 2/07*. However, all of the models pointed to lower quarterly growth in the second quarter after stronger-than-expected quarterly growth in the first quarter. In November, the difference between the various models in terms of growth in the following quarter was considerable. Some of the models indicated higher growth rates from the second to the third quarter, while others indicated slower rates. On average, the projections for the third and fourth quarters were around 1 per cent.

¹ See box "Short-term forecasts for mainland GDP in Norway" in *Inflation Report 2/06* for a presentation of the different models.

Chart 9 Mainland GDP excluding electricity production. Growth on previous quarter. Seasonally adjusted. Per cent. Quarterly figures



¹ Average quarterly predictions from the following short-term models: ARIMA, VAR, BVAR, monthly indicator and regional network. The highest and lowest predictions from these models are indicated by the grey interval. See box "Short-term forecasts for mainland GDP in Norway" in *Inflation Report 2/06* for a presentation of the various models.

Sources: Statistics Norway and Norges Bank

The model-based projections are based on the first preliminary quarterly figures for mainland GDP. As shown in the chart, there were extensive revisions to the national accounts data.

None of the short-term models predicted that growth would be as strong as indicated by the preliminary national accounts figures for 2007. On average, the model-based projections were slightly higher than the projections published in the three reports in 2007, and thus reflected actual developments slightly better. In the published projections, we made allowance for the fact that the model calculations are based on current economic indicators and do not fully capture the effects of higher interest rates, capacity limitations and increased import ratios. However, the availability of resources turned out to be greater than expected.

pated as a result of both higher employment growth and slightly higher wage growth than expected.

The strong growth in consumption must also be seen in the light of a drop in the saving ratio (both including and excluding dividends). The fall in the household saving is probably related to the considerable improvement in the terms of trade in recent years.⁴ Lower import prices and higher export prices have resulted in substantial terms-of-trade gains for Norway. Higher export prices led to improved corporate profitability, higher wage income, stronger equity prices and increased transfers to the Government Pension Fund – Global. Together with greater job security, this may have caused households to raise their expectations of future income. This may have contributed more than expected to moving forward household consumption.

Other factors may also explain the fall in the saving

ratio. The key policy rate has been raised since summer 2005, but long-term interest rates remained low. As a result, households may not have expected large increases in interest rates in the future. Furthermore, it took some time for the key rate increases to be fully reflected in banks' lending rates to households. There have also been changes in household loan markets, with a greater prevalence of interest-only loans and a longer average term. Together with a sharp increase in house prices, this has made it easier for households to debt-finance consumption.

Many of the factors affecting household saving behaviour have probably also affected developments in the housing market. Housing investment has been higher than expected. However, the strong growth in housing investment must also be seen in the light of strong growth in the population and labour immigration.

⁴ See box "Household saving" in *Monetary Policy Report 3/07* for a more detailed account.

High oil prices and the prospect of persistently high prices contributed to strong growth in petroleum investment. There was particularly strong growth in investment in exploration activity, with the gradual emergence of supply shortages. Other manufacturing industries also enjoyed favourable prices and high profitability. This was partly a reflection of brisk international demand for goods produced in Norway, especially commodities. Export growth was stronger than expected, even when account is taken of somewhat faster-than-expected global economic growth in 2007 than that assumed at the end of 2006. This may be due partly to a strong increase in demand and prices for several of Norway's most important export goods. There were growing capacity problems in more and more sectors. Together with a favourable outlook, this led to a greater need for enterprises to increase capacity. Business investment increased more than expected.

Inflation

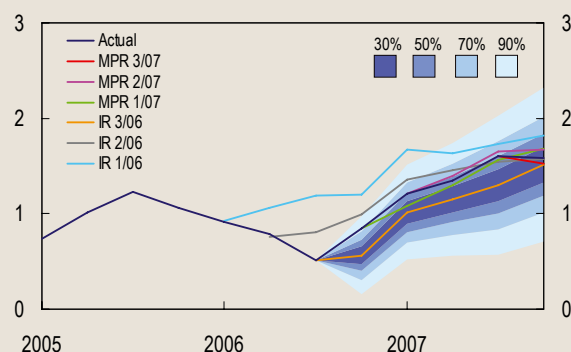
CPI-ATE inflation in 2007 was broadly in line with Norges Bank's projections in 2006 and 2007 (see Chart 10). The projection for the year was between 1¼ and 1¾ per cent in 2006 and 1½ per cent in all of the reports in 2007. A rising rate of inflation during the year was projected in all of the reports.

The small overall forecast error for the CPI-ATE conceals slightly greater forecast errors when inflation is broken down into imported consumer goods and domestically produced goods and services (see Chart 11).

Prices for imported consumer goods fell by 0.9 per cent from 2006 to 2007, or slightly more than projected in 2006 and in the first two reports in 2007. One important reason for this was that the krone did not move as expected (see Chart 12). After weakening during the second half of 2006, the krone strengthened in 2007. At the same time, the rise in the prices for imported consumer goods, measured in foreign currency, was slightly lower in 2007 than projected at the end of 2006.

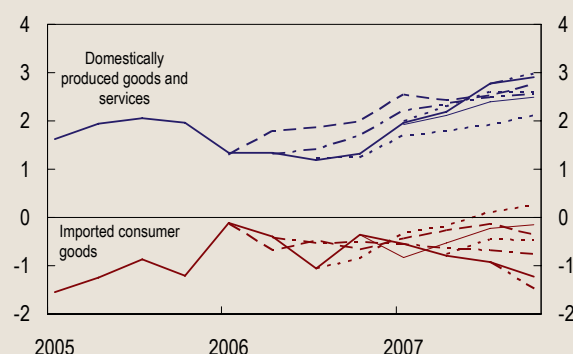
Prices for domestically produced goods and services rose by 2.5 per cent in 2007. After a period of deceleration in 2006, the rise in prices moved up at the beginning of 2007. At that time prices were projected to rise further during the year. However, prices rose faster than expected, probably owing to a higher-than-expected increase in the output gap. Unemployment fell further than expected, and wage growth was slightly higher than forecast. Prices for some goods, such as food and building materials, increased relatively sharply due to the rapid rise in many commodity prices. Book prices also climbed sharply in the second half of 2007.⁵

Chart 10 CPI-ATE. Projections from different reports and actual developments. Fan chart from IR 3/06. Per cent. 4-quarter change. 2005 Q1 – 2007 Q4



Sources: Statistics Norway and Norges Bank

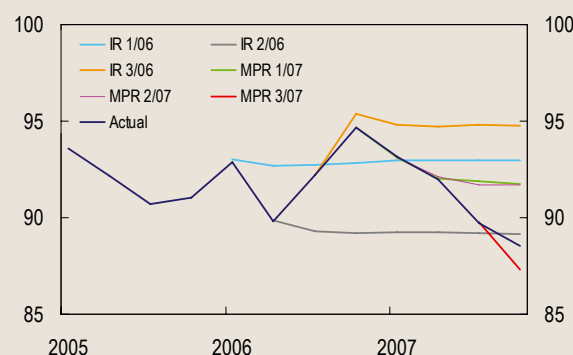
Chart 11 CPI-ATE¹⁾ by supplier sector²⁾. Projections from IR 1/06 to MPR 3/07 and actual developments. 4-quarter change. Per cent. 2005 Q1 – 2007 Q4



¹⁾ CPI-ATE: CPI adjusted for tax changes and excluding energy products
²⁾ Norges Bank's own estimates

Sources: Statistics Norway and Norges Bank

Chart 12 Import-weighted exchange rate (I-44). Actual and projected. Index. 2005 Q1 – 2007 Q4



Sources: Statistics Norway and Norges Bank

⁵ This must be seen in the light of the restructuring of the sub-index for books in the CPI with effect from August 2007.

4 The fan charts for the CPI-ATE projections

Norges Bank presents its projections of key economic variables as fan charts. Here, we evaluate whether the fan charts for the CPI-ATE in the various reports provided a reasonable probability distribution for the projections.⁶ In the evaluation of the projections for 2006, the fan charts for the CPI-ATE projections from Inflation Report 2/01 to Inflation Report 3/06 were assessed.⁷ In this evaluation, we have updated this analysis with the projections from the various reports in 2007 and actual price movements. The new points are shown as red dots in Chart 13.

The fan charts for Norges Bank's projections illustrate an interval within which actual developments are expected to lie with a 90 per cent probability. This means that nine out of ten outcomes are expected to lie within the fan, and the outcomes are expected to be evenly dispersed across the entire fan over time. The chart indicates that the fan around the CPI-ATE projections seems to have provided a relatively accurate picture of the probability of the various outcomes in the earliest quarters. For the quarters further ahead, most of the outcomes have been below the midpoint of the fan, and a considerable proportion have been outside the fan.

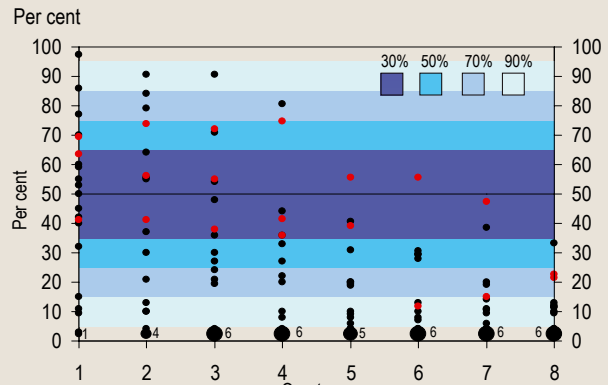
The chart shows that the projections for CPI-ATE inflation in 2007 were closer to actual developments than was the case for projections in other years. This can be seen from the larger proportion of red dots, which show how the actual outcomes for 2007 were distributed in the various fans, falling in the dark blue area. None of the projections for 2007 fell outside the fan. This indicates a reduced tendency towards underestimating inflation.

5 Comparison of projections for 2007 from Norges Bank and other forecasters

In this section, we compare Norges Bank's projections for 2007 with those of other forecasters. Comparisons with other forecasters can help shed light on the degree of accuracy of the Bank's projections, given the information available when the projections were made, and whether there were events that none of the forecasters predicted. In this context, however, we must take account of the fact that the projections from the various institutions are not constantly adjusted but revised with varying frequencies and at different points during the year. The projections will therefore be based on different information.

Charts 14–18 below show the projections for mainland GDP, LFS unemployment, annual wage growth, CPI-ATE inflation and CPI inflation in 2007 published by Norges Bank and other forecasters in 2006 and

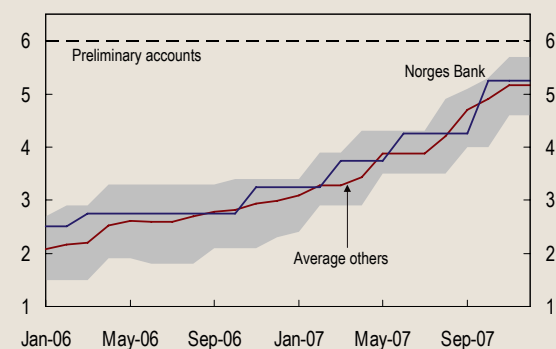
Chart 13 Fan chart and outcomes for CPI-ATE.¹⁾ IR 2/01 – MPR 3/07.



¹⁾ The dots indicate the distribution of actual outcomes in all of the fan charts from IR 2/01 to MPR 3/07. The red dots show the distribution of actual outcomes for 2007 in the various fan charts. The larger dots indicate that a number of outcomes (figure shows how many) have been outside the fan.

Sources: Statistics Norway and Norges Bank

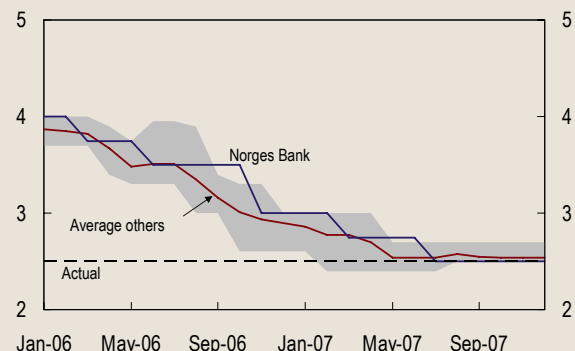
Chart 14 Mainland GDP. Projections of annual growth in 2007 published at different times.¹⁾ Per cent. Jan 2006 – Dec 2007



¹⁾ The highest and lowest projections from forecasters other than Norges Bank are indicated by the grey interval. The red line is an average of the other forecasters' projections.

Sources: Norges Bank and reports from the different forecasters

Chart 15 LFS unemployment. Projections for 2007 published at different times.¹⁾ Percentage of labour force. Jan 2006 – Dec 2007

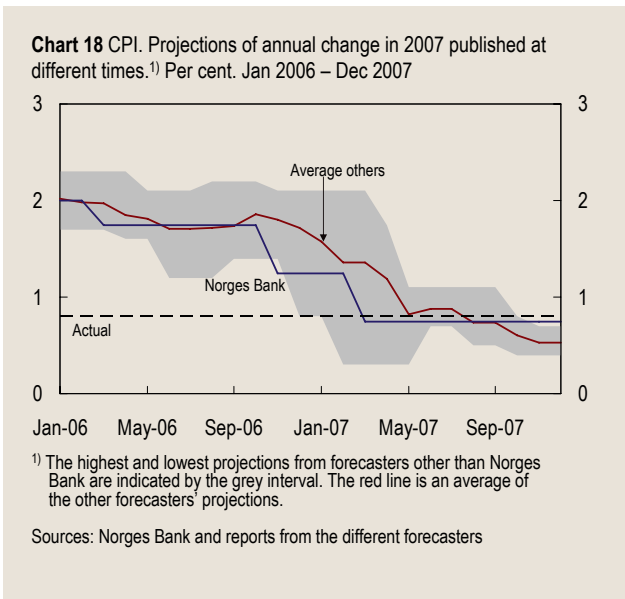
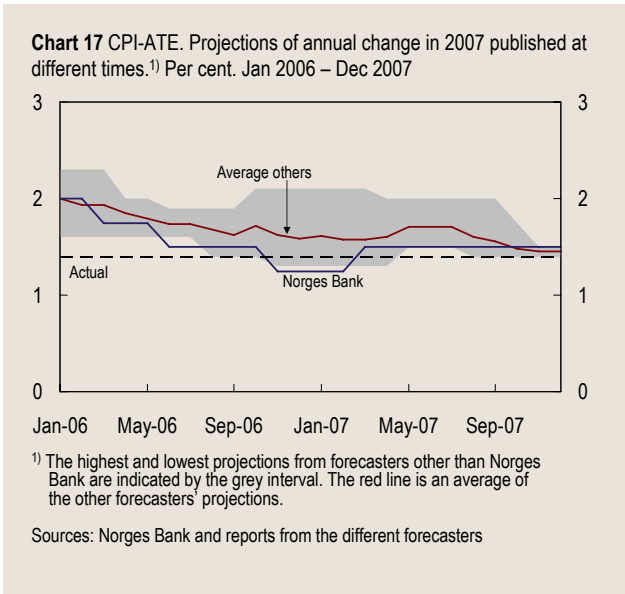
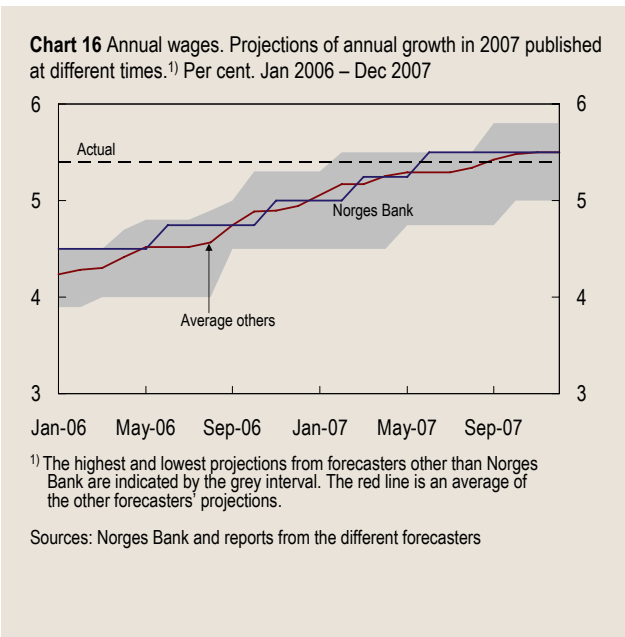


¹⁾ The highest and lowest projections from forecasters other than Norges Bank are indicated by the grey interval. The red line is an average of the other forecasters' projections.

Sources: Norges Bank and reports from the different forecasters

⁶ The method used to produce the fan charts has changed slightly over time. Up to and including *Inflation Report 2/05*, the fan charts were based on Norges Bank's historical forecast errors. Since *Inflation Report 3/05*, the fan charts have been produced using a small macroeconomic model based on historical disturbances to the economy.

⁷ See *Economic Bulletin 2/07* "Evaluation of Norges Bank's projections for 2006" for a more detailed account.



2007.⁸ We compare our projections at different times with the average, highest and lowest projections from the other forecasters at that same time.

Economic growth in 2007 was stronger than expected. At the beginning of 2006, all the forecasters were nowhere close to projecting GDP growth of 6.0 per cent from 2006 to 2007 (see Chart 14). The largest upward revisions of growth projections were made in late 2007, and the average projection at the end of the year was just over 5 per cent. Norges Bank's projections were generally slightly above the average for the other forecasters in 2006 and the first half of 2007. When *Monetary Policy Report 3/07* was published, the other institutions had already increased their growth forecasts for 2007 substantially, as did Norges Bank in that report, when our growth projection was slightly higher than the others. However, the actual outcome was even higher.

As a result of stronger-than-expected growth, unemployment proved to be considerably lower than predicted by all of the forecasters. Unemployment fell from 3.4 per cent in 2006 to 2.5 per cent in 2007. At the beginning of 2006, the projections ranged between 3.7 and 4.0 per cent (see Chart 15). The forecasts from the various institution were largely the same, and their unemployment projections were gradually revised down during the course of 2006 and the first half of 2007. Norges Bank was generally slightly behind in its downward revisions relative to the average for the other forecasters.

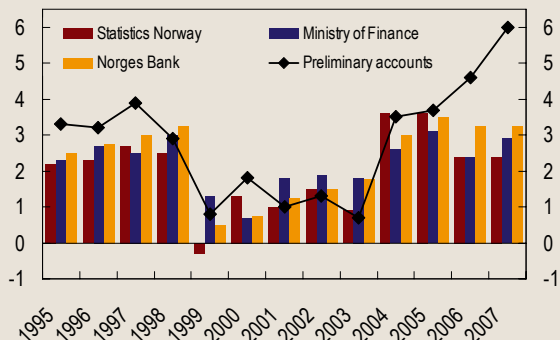
At the beginning of 2006, all of the forecasters projected markedly lower wage growth than the actual outcome of 5.4 per cent, partly because unemployment was also overestimated. Norges Bank projected higher wage growth in 2007 than most other forecasters at the beginning of 2006 (see Chart 16). The projections from Norges Bank and the other forecasters were gradually revised up to an average of 5½ per cent at the end of 2007. However, our projection includes an estimate of costs related to the introduction of mandatory occupational pensions, which added 0.2 percentage point. Adjusted for this, we were slightly below the average for the other forecasters at the end of 2007.

At the beginning of 2006, Norges Bank projected CPI-ATE inflation of 2 per cent, which was approximately the same as the average for the other forecasters (see Chart 17). Actual inflation was 1.4 per cent. Norges Bank revised its projections down during 2006 and was generally slightly ahead in its downward revisions relative to the average for the other forecasters. The Bank projected CPI-ATE inflation of 1½ per cent in all of the Monetary Policy Reports in 2007. These projections were nearer the mark than those of the other forecasters.

CPI inflation in 2007 was much lower than all of the forecasters anticipated at the beginning of 2006. Norges Bank was quicker than the others to revise down its projections (see Chart 18). The Bank projected inflation

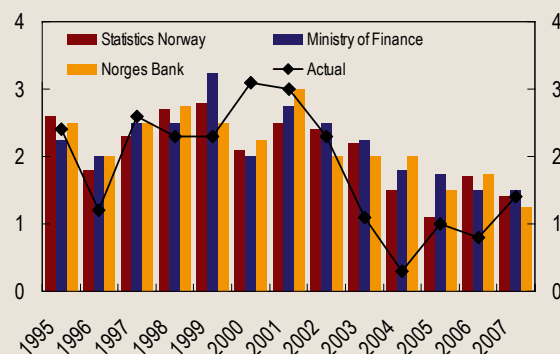
⁸ The forecasters in question are the Ministry of Finance, Statistics Norway, DnB NOR, Nordea, Fokus, Skandinaviska Enskilda Banken (SEB), the Confederation of Norwegian Enterprises (NHO) and Handelsbanken.

Chart 19 Mainland GDP growth. Projected and as per preliminary accounts. Last projection published the previous year. Per cent. 1995-2007



Sources: Norges Bank, Statistics Norway and Ministry of Finance

Chart 20 Consumer price inflation¹⁾. Projected and actual. Last projection published the previous year. Per cent. 1995-2007



¹⁾ CPI until 2001. CPI-ATE from 2002.

Sources: Norges Bank, Statistics Norway and Ministry of Finance

of ¾ per cent in all of the reports in 2007, and was thus closer to the actual outcome of CPI inflation of 0.8 per cent compared with the other institutions.

Overview of projections for 1995–2007

In the following, we look at the accuracy of projections from the Ministry of Finance, Statistics Norway and Norges Bank in their last publication of the preceding year for each of the years from 1995 to 2007.⁹ This

may help to reveal whether any systematic errors have been made, and whether errors have become larger or smaller over time. We have looked at the projections for mainland GDP growth, wage growth and consumer price inflation.¹⁰

Table 2 illustrates the three institutions' mean forecast error (ME), mean absolute forecast error (MAE) and mean square forecast error (MSE) for the different variables. The mean error is a measure of forecast bias, while the other two are alternative measures of forecast accuracy. Large forecast errors are given more weight in the mean square error than in the mean absolute error.

All of the institutions have, on average, underestimated actual mainland GDP growth in the following year. Chart 19 shows that there were particularly large forecast errors in 2006 and 2007. Norges Bank's projections for these years, and for the whole period, captured actual developments slightly better than those of the other institutions. Projections of wage growth from both Statistics Norway and the Ministry of Finance have been too low on average since 1995, whereas Norges Bank's projections have been slightly higher than actual wage growth. All of the institutions have overestimated consumer price inflation. Statistics Norway's inflation forecasts have been the most accurate, but there is little difference between the three institutions. Chart 20 shows that inflation was overestimated particularly in 2003 and 2004, and that all three institutions were relatively close to the mark in 2007.

Table 2. Mean forecast error (ME), mean absolute forecast error (MAE) and mean square forecast error (MSE). Projections from Statistics Norway (SSB), the Ministry of Finance (FIN) and Norges Bank (NB). 1995–2007

	SSB	FIN	NB
Mainland GDP growth			
ME	0.82	0.59	0.50
MAE	0.89	1.07	0.78
MSE	1.77	1.73	1.07
Wage growth			
ME	0.46	0.72	-0.03
MAE	0.74	0.98	0.71
MSE	0.85	1.34	0.58
CPI/CPI-ATE inflation			
ME	-0.25	-0.35	-0.34
MAE	0.51	0.58	0.54
MSE	0.41	0.54	0.50

Sources: Norges Bank, Statistics Norway and Ministry of Finance

⁹ Statistics Norway's projections are from Economic Survey. The Ministry of Finance's projections are from the budget balancing proposal from 1994 to 1996, from the supplementary budget proposal in 1997, and from the National Budget for 1999 onwards. The three institutions publish their projections at different times, and the projections are thus based on slightly different information. In recent years, Statistics Norway has published its last projections for the coming year in December, Norges Bank in late October/early November, and the Ministry of Finance in late September/early October.

¹⁰ National accounts figures may be subject to extensive revision, and it is not obvious which version of the national accounts should be used when evaluating the projections. Here, we have chosen to compare the projections with the first national accounts figures published in February/March of the year after the year for which the projections were made. This is partly because definitions in the national accounts have been changed during this period so that the projections and the final figures do not relate to the same measurement system. Statistics Norway projects wage growth per normal person-year. This is also a national accounts variable, and we have therefore used the figures from the first publication of the following year. The Ministry of Finance and Norges Bank project annual wage growth on the basis of definitions from the Technical Reporting Committee on Income Settlements. Here, we have used the final figures.

6 Conclusions

Mainland GDP growth in 2007 was considerably higher than projected by Norges Bank and other forecasters. An appreciable improvement in the terms of trade in recent years has probably boosted households' income expectations. This may have induced households to advance spending and reduce saving. Norges Bank also revised up its projection of potential growth. The influx of foreign labour has increased sharply. Labour force participation in general has also risen more than expected. Although capacity utilisation was higher than anticipated, underlying inflation remained low and was largely as projected. A stronger krone offset the effect of somewhat higher-than-projected domestic inflation.

Norges Bank's short-term projections of mainland GDP growth in 2007 were generally slightly below the predictions from our short-term models. Our projections were partly based on the assumption that capacity constraints would curb growth. However, the supply of resources turned out to be larger than expected. Structural changes on the supply side are difficult to predict, and are not captured particularly well by short-term models. Our short-term models also underestimated growth. Norges Bank is working on improving its models for predicting short-term developments in the real economy and inflation. Among other things, work is under way on developing a system for weighting the predictions from different models as effectively as possible. The aim is to enhance the quality of our short-term projections.

In the work on Monetary Policy Report 1/08, a macro-economic model called NEMO (Norwegian Economy Model) was used as the basis for the long-term projections. NEMO has a consistent theoretical framework which makes it possible to interpret relationships and mechanisms in the light of economic theory. With NEMO as the basis for our projections, we can analyse more consistently the reasons why economic developments do not turn out as expected. Among other things, we will be able to analyse the effects of structural changes in the economy, such as the impact of globalisation.