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Staff Memo

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Einar W. Nordbø, *Norges Bank Monetary Policy*¹

Summary

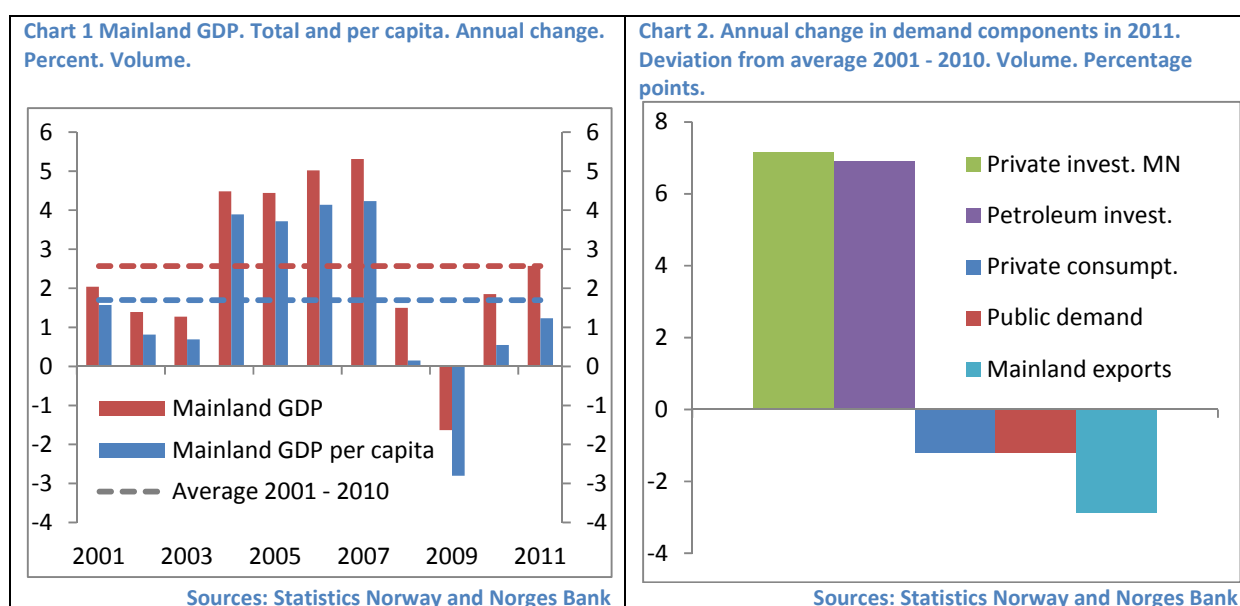
Since the conduct of monetary policy relies on projections for economic developments, it is important to evaluate these projections. In this article, we assess Norges Bank's projections for economic developments in 2011. Mainland GDP growth in 2011 was lower than projected in the October 2010 *Monetary Policy Report* and subsequent *Reports* through 2011. Increasing uncertainty regarding the global economy from summer onward resulted in a marked shift in sentiment and was a likely factor in dampening activity growth in Norway. An average of projections from other forecasters and projections from the Bank's System for Averaging short-term Models (SAM) more closely predicted actual developments in 2011. CPI-ATE inflation was also somewhat lower than expected, though Norges Bank's projections were more accurate than an average of projections from other forecasters.

We have also examined the short-term projections for output and inflation over time. In the past three years, CPI-ATE inflation and mainland GDP growth have been somewhat lower than expected. When we look at projections over a longer period, CPI-ATE inflation has been lower than forecast, while GDP growth on average has been approximately as assumed. While the short-term projections for GDP in the *Monetary Policy Report* have been more accurate than the projections derived from SAM, CPI-ATE projections have been approximately as accurate as the projections derived from SAM.

¹ I am grateful to Kåre Hagelund, Per Espen Lilleås and Marianne Sturød for useful comments. I am also grateful to Mats Bay Fevolden, Aksel Holler Jonassen and Knut Motrøen for assistance with gathering data. Any errors or omissions are the responsibility of the author.

1. Introduction

The conduct of monetary policy relies on projections for economic developments. Evaluating these projections can enhance our insight into the functioning of the economy and help us to improve our forecasting tools. In this article, we address Norges Bank's projections for economic developments in 2011.² First, we provide a brief overview of actual developments in 2011. Then we examine the projections for 2011 in the *Monetary Policy Report* since October 2010. We also compare these with projections from other forecasters.³ In section 4, we perform a more technical analysis of projections for mainland GDP and inflation the first three quarters following publication of the *Report*. We examine whether the projections were unbiased and whether the projections over time were more accurate than those derived from the Bank's System for Averaging short-term Models (SAM).⁴



2. Economic developments in 2011

There has been moderate growth in the Norwegian economy since the trough of the downturn in 2009. In 2011, mainland GDP increased by 2.6 percent on an annual basis, equal to the average growth of the previous ten years (see Chart 1). Low interest rates, a high oil price and record-high inward migration were contributing factors. Measured per capita, mainland GDP growth remains lower than the average of the past decade (see Chart 1).

If we look at developments in various demand components in 2011, we see strong growth in petroleum investment and private investment in the mainland economy (see Chart 2). Investment in housing in

² Norges Bank's projections are evaluated once a year in a separate box in the *Monetary Policy Report* (see the March 2012 *Report* for a discussion of 2011).

³ In an appendix, we compare Norges Bank's projections with those from other forecasters over the past ten years.

⁴ For a description of SAM, see Aastveit et al. (2011).

particular increased substantially. Growth was weaker in private consumption, public sector demand and mainland exports.

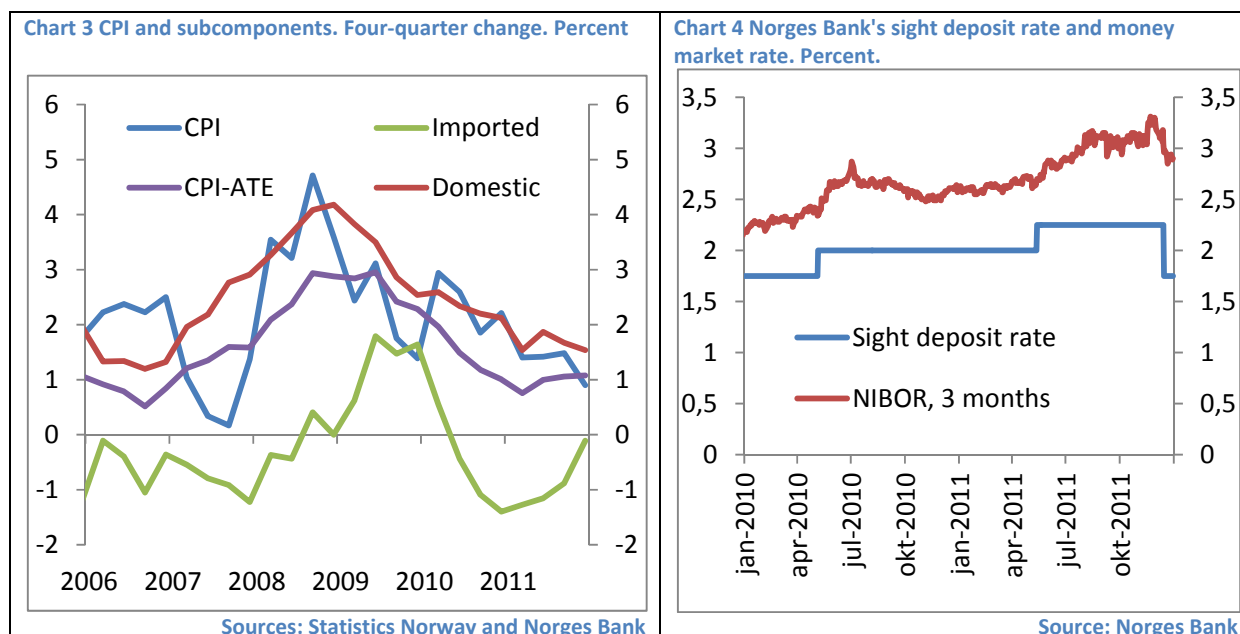
Growth in private consumption in 2011 was low, despite low interest rates, solid real wage growth and a record-high population increase. Increasing uncertainty concerning international developments from summer onward led to greater pessimism also among Norwegian households and enterprises. Lower market growth abroad and further increases in the high Norwegian cost level were reasons that mainland exports of goods and services remained flat from 2010.

Despite moderate activity growth through 2011, there was a clear pickup in the use of labour. The number of employed persons rose by 1.4 percent, with growth approximately the same in terms of person-hours. Consequently, output per hour worked increased only slightly, and the post-financial-crisis trend of low productivity growth continued.

Growth in the labour supply was solid in 2011, largely on account of high inward labour migration. Nevertheless, employment rose more than the labour supply, resulting in a slight decline in unemployment from 2010 to 2011. Registered unemployment declined through winter and spring, but was broadly unchanged the remainder of the year. Average registered unemployment was 2.7 percent in 2011, and according to the Labour Force Survey (LFS), unemployment was 3.3 percent.

Capacity utilisation appeared to be close to a normal level in 2011, and showed little change through the year.⁵ Unemployment was approximately at its average for the past 15 years. According to the Bank's regional network, the share of enterprises with capacity problems is close to the historical average. Low productivity growth may be an indication that enterprises had room to make better use of their existing labour force, but in that case we would not expect employment to have increased as much as it did in 2011.

⁵ For a discussion of Norges Bank's estimation of the output gap, see Sturød and Hagelund (2012).



Inflation was low in 2011. The consumer price index (CPI) rose by 1.2 percent on an annual basis, and adjusted for tax changes and excluding energy products (CPI-ATE), inflation was 0.9 percent. Compared with previous years, the rise in prices for domestically produced goods and services in particular was low (see Chart 3). The rise in prices for domestically produced goods and services slowed from 2010 to 2011, despite higher wage growth. The rise in rents declined from 2010, and the rise in food prices was especially low.

Prices for imported consumer goods continued to fall in 2011 (see Chart 3). This must be viewed against the backdrop of the gradual appreciation of the krone over the past two years. However, price increases for imported consumer goods picked up through the year, partly because a sharp rise in global cotton prices pushed up clothing prices.

Norges Bank's key policy rate was raised from 2.0 to 2.25 percent in May, in view of the many positive economic signals through winter and spring (see Chart 4). Through summer and autumn, there was renewed financial market turmoil. Norwegian money market premiums rose substantially, and the outlook for the Norwegian economy weakened. In December, the key policy rate was lowered to 1.75 percent.

3. Deviations from projections in 2011 and comparison with other forecasts

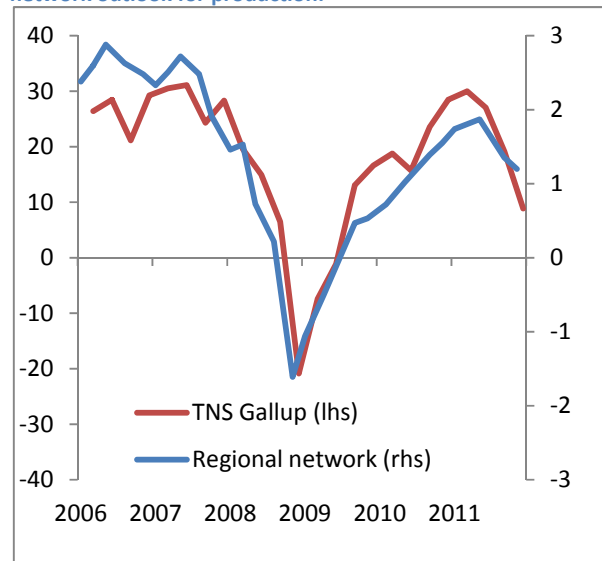
The projections in the October 2010 *Report* were based on the assumption that the global economy had grown somewhat faster than expected but that there was considerable uncertainty regarding developments abroad. Growth in the Norwegian economy remained moderate, but appeared to have gained a firm footing. Inflation was low. There were prospects that the key policy rate would be kept low

in the coming quarters, but that it would be raised in the course of summer 2011 and then increased towards a more normal level.

In the October 2010 *Report*, mainland GDP growth of 3 percent was projected for 2011. Economic developments through winter and spring were generally positive. Unemployment fell, and household and business confidence was rising (see Chart 5). In the March 2011 *Report*, the growth projection for 2011 was revised up by ¼ percentage point. However, from summer onward the increasing uncertainty concerning the global economy led to a marked shift in sentiment in Norway as well (see Chart 5). In the June *Report*, the growth projection for 2011 was lowered by ¼ percentage point, with a further downward revision in October to 2¾ percent. The first published national accounts figures for all of 2011 show mainland GDP growth of 2.6 percent.

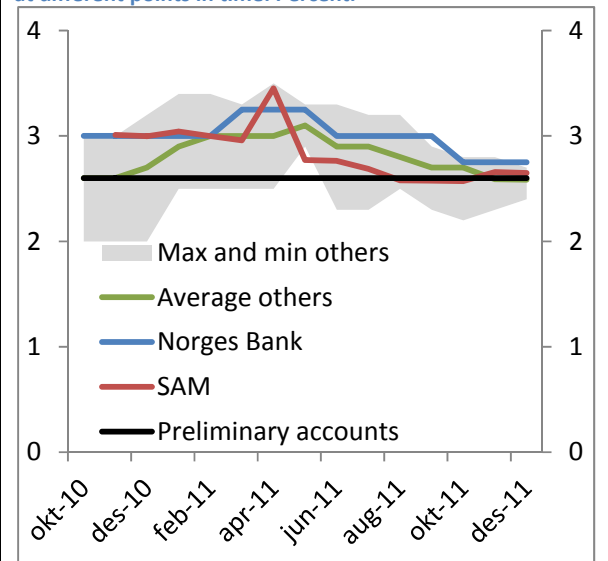
Compared with other forecasters, Norges Bank projected high GDP growth for 2011 (see Chart 6). The Bank also projected stronger growth than the System for Averaging short-term Models (SAM). The relatively high GDP projections were based in part on prospects of high population growth and strong growth in housing and petroleum investment. In these areas, actual developments in 2011 were broadly in line with projections.⁶

Chart 5 TNS Gallup indicator for households and the regional network outlook for production.



Sources: Statistics Norway and Norges Bank

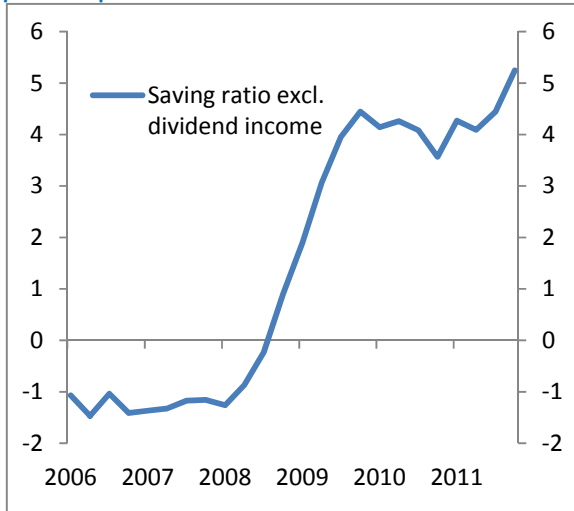
Chart 6 Projections for annual mainland GDP growth in 2011 at different points in time. Percent.



* Institutions contributing to Consensus Forecasts
Sources: Consensus Forecasts, Statistics Norway and Norges Bank

⁶ For example, projected net inward migration for 2011 was revised upward to 45 000 persons in the March 2011 *Report*. Actual net inward migration in 2011 was 47 000 persons.

Chart 7 Saving ratio excl. dividend income. Sum of four previous quarters. Percent

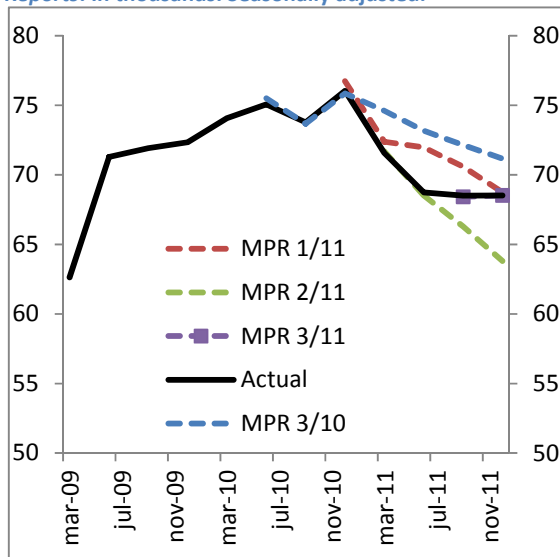


Sources: Statistics Norway and Norges Bank

It was especially weaker-than-projected developments in private consumption and exports that pushed GDP growth lower in 2011 than the Bank projected. Projections for developments in the various components appear in Table 1 in the appendix. The weak growth in consumption must be viewed against the backdrop of growing uncertainty surrounding developments abroad, which prompted greater caution among households. Growth in private consumption was also lower than projected in 2010. The Bank's consumption projections were based on the assumption that low interest rates would lead to lower household saving. Combined with solid income growth, this was expected to result in a marked increase in private consumption. However, the saving ratio remained high after rising markedly in the wake of the financial crisis, climbing further in 2011 (see Chart 7).

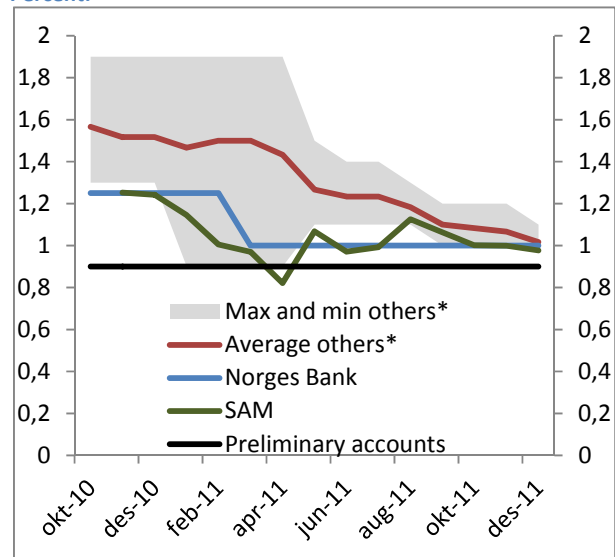
Low export growth in 2011 reflected weaker-than-projected market growth abroad. Moreover, high cost levels may have dampened exports more than assumed. Import growth was clearly lower than projected for 2011. This can be explained to some extent by lower-than-expected growth in overall demand. At the same time, both exports and imports were revised downward somewhat in connection with the main revision of the national accounts in autumn 2011. Public sector demand rose also somewhat less than projected for 2011. Here the Bank's projections were based on published forecasts from the Ministry of Finance.

Chart 8 Projected registered unemployment in various Reports. In thousands. Seasonally adjusted.



Sources: Norwegian Labour and Welfare Service, Statistics Norway and Norges Bank

Chart 9 Projected CPI-ATE inflation at different points in time. Percent.



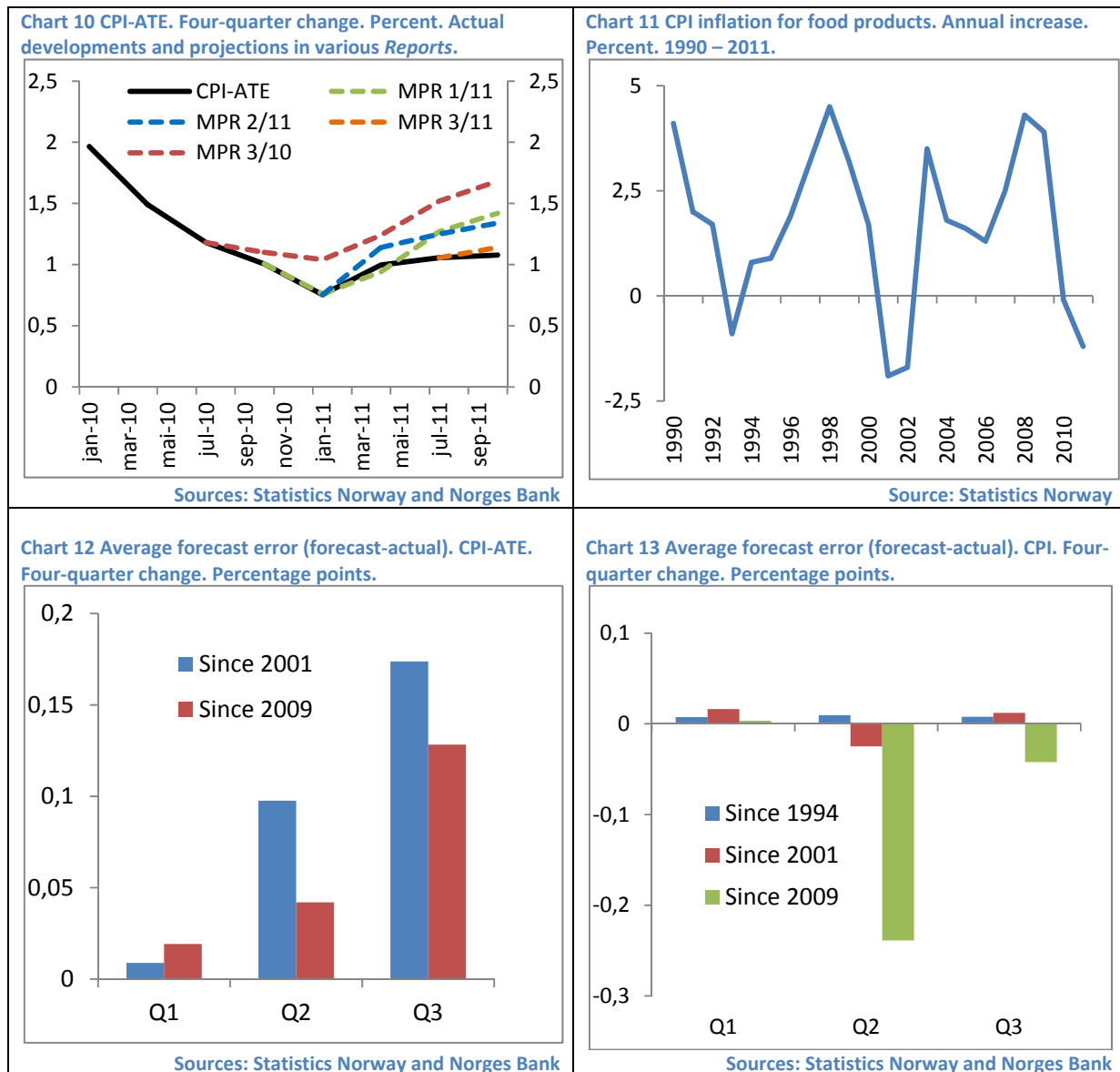
* DnB, Ministry of Finance, Handelsbanken, Nordea, SEB and Statistics Norway
Sources: Statistics Norway, reports from the other forecasters and Norges Bank

Despite the lower-than-projected pickup in mainland economic activity in 2011, the use of labour increased somewhat more than assumed. Consequently, productivity growth in 2011 was clearly lower than projected. In the March 2012 Report, reduced risk appetite, low investment and high inward labour migration were indicated as possible explanations for the low productivity growth. On an annual basis, unemployment in 2011 was broadly as projected in the various reports. Registered unemployment fell somewhat faster than projected through winter and spring, but was approximately unchanged the rest of the year (see Chart 8).

CPI-ATE inflation in 2011 was 0.9 percent. In the October 2010 Report, the Bank projected inflation for 2011 at 1¼ percent, but the projection was revised downward to 1 percent as from the publication of the March 2011 Report. The Bank's projection for CPI-ATE inflation was lower than an average of projections from other forecasters and more in line with actual developments (see Chart 9). Overall CPI inflation in 2011 was also somewhat lower than expected. In addition to a lower-than-projected pickup in inflation adjusted for tax changes and excluding energy products, increases in prices for energy products were also low towards the end of the year.

In the various reports, CPI-ATE inflation was projected to pick up through 2011, owing to an increased rise in prices for domestically produced goods and services. However, CPI-ATE inflation only edged up (see Chart 10), with the pickup due to higher price increases for imported consumer goods. The rise in prices for domestically produced goods and services did not pick up. This reflects to some extent a lower-than-projected pickup in economic activity. Abnormal conditions, such as an unusually low rise in food prices in 2011, were also factors. If we disregard the 50 percent reduction in the VAT on food in summer 2001, we need to go back nearly 20 years to find a similar decline in food prices (see Chart 11).

At the same time, we have also seen previously that it takes some time for inflation to pick up after a downturn.

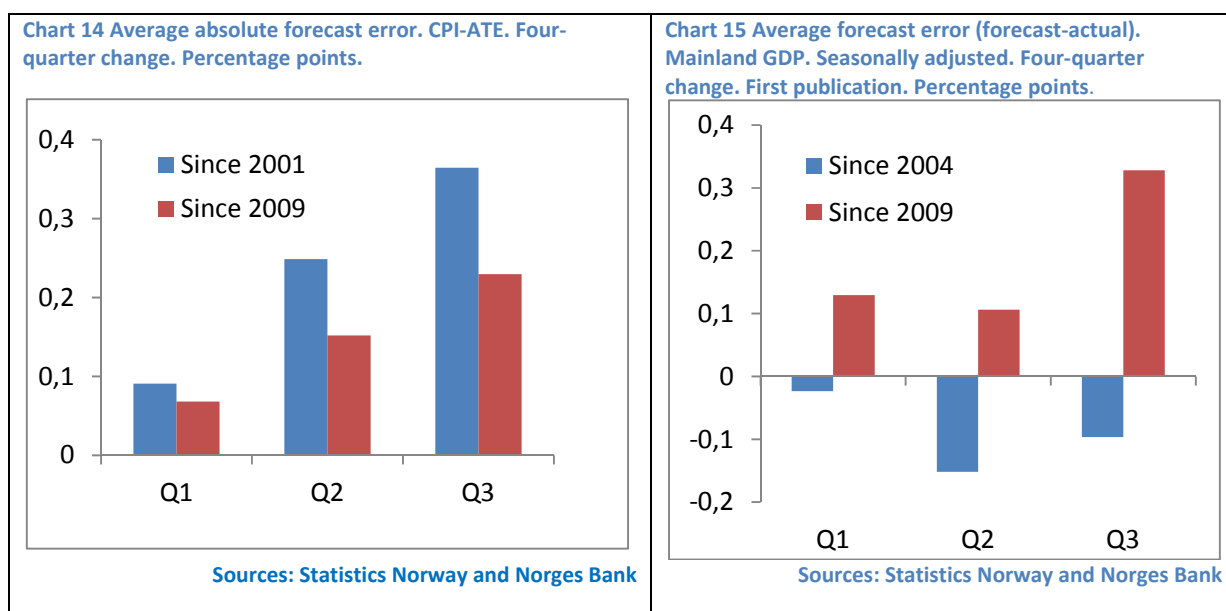


4. Short-term projections over time

Economic projections ought to be unbiased. Over time, the average forecast error should be close to zero. Since the March 2009 Report, inflation adjusted for tax changes and excluding energy products (CPI-ATE) has been somewhat lower than assumed during the first three quarters following the reports (see Chart 12). However, the bias in recent years' projections has been less than when we look at the period since 2001 as a whole. It should also be noted that the short-term projections for headline inflation (CPI) have been broadly unbiased. Both in the period since 2001 and as far back as since 1994, the average deviation from actual CPI inflation is close to zero (see Chart 13). This reflects the fact that

unexpectedly low CPI-ATE inflation has been counterbalanced by higher-than-assumed increases in energy prices. Over the past three years, overall inflation in the short term has been somewhat higher than projected.

Besides being unbiased, projections should be as close as possible to actual developments from quarter to quarter. Measured in absolute terms, the four-quarter rise in the CPI-ATE in the third quarter following the *Report* deviated on average by 0.2 percentage point from the projections in the past three years (see Chart 14). The CPI-ATE projections have been more accurate in the past three years than in the period since 2001 as a whole (see Chart 14). Deviations from projections were especially wide in 2003 and 2004.

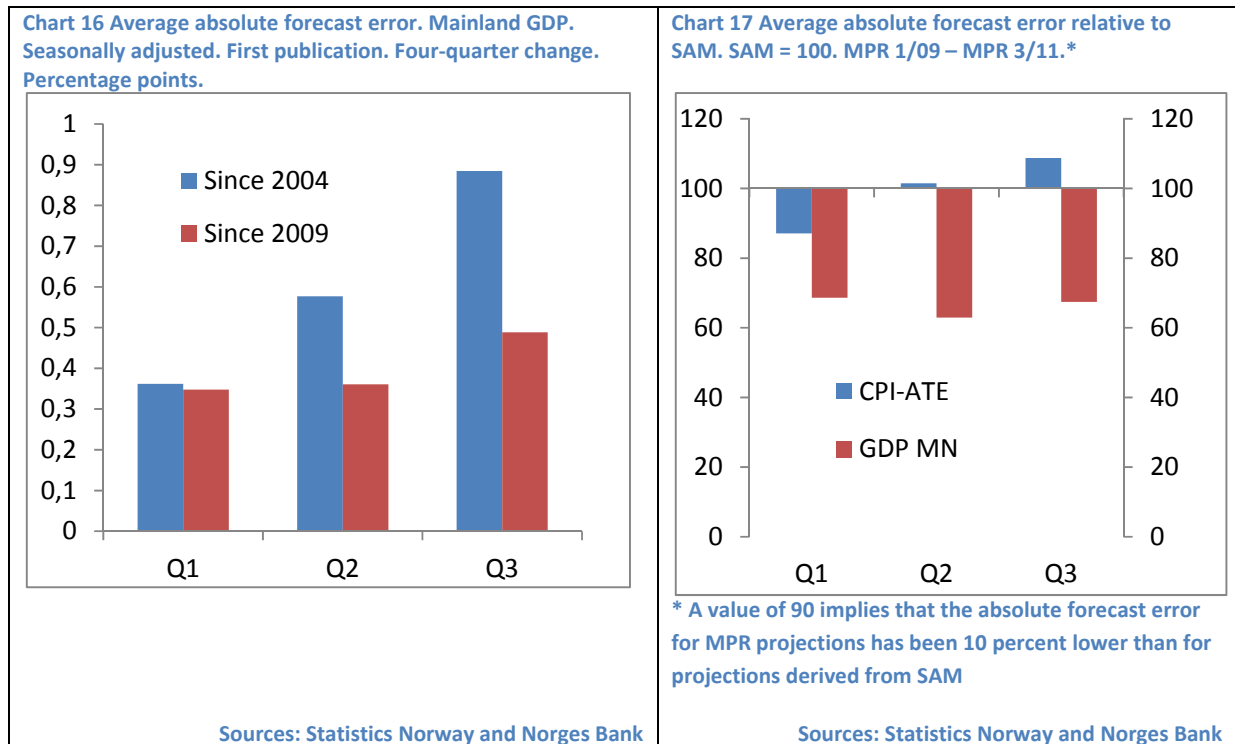


In the past three years, mainland GDP growth has also been lower than expected. Three quarters ahead, the average four-quarter change in mainland GDP has been approximately 0.3 percentage point lower than projected (see Chart 15). One important reason is that private consumption did not pick up as forecast in this period.

Lower-than-projected activity growth may be a factor in explaining the past three years' lower-than-expected CPI-ATE inflation. However, it cannot explain the forecast errors in the CPI-ATE in earlier periods. When we look at all projections for mainland GDP since 2004, the actual change has been broadly as assumed (see Chart 15).⁷ As discussed in an appendix to this article, annual GDP projections over time have also been broadly as assumed. Even though GDP growth has been somewhat lower than expected during the past three years, there is no indication of a bias if we consider a somewhat longer time period.

⁷ Norges Bank has published only quarterly projections for mainland GDP growth since the June 2008 *Report*. Report projections used in this comparison back to 2004 have been taken from Jore (2012).

Three quarters ahead, the average absolute forecast error for the four-quarter rise in mainland GDP has been approximately 0.5 percentage point since 2009 (see Chart 16). Like the projections for CPI-ATE inflation, the GDP projections more accurately predicted developments over the past three years than if we look at the period since 2004 as a whole.



The short-term projections for GDP and prices in the *Monetary Policy Report* are based on the Bank's System for Averaging short-term Models (SAM). On the basis of other information about and assessments of economic developments, report projections may deviate from SAM. Over time, these supplementary assessments ought to reduce forecast error. Since the publication of the March 2009 *Report*, the Bank's inflation projections were broadly as accurate as projections derived from SAM, while mainland GDP projections forecast actual developments better than SAM (see Chart 17). It was especially through 2009 that the GDP projections in the *Monetary Policy Report* were more in line with actual developments than projections derived from SAM. The accuracy of projections derived from SAM is discussed in detail in Jore (2012).

5. Summary

In this article, we have evaluated Norges Bank's projections for economic developments in 2011. Mainland GDP growth in 2011 was lower than projected in the October 2010 *Report* and subsequent *Reports* through 2011. Projections from an average of other forecasters and the Bank's System for Averaging short-term Models (SAM) were more accurate. It was assumed that the situation in the

global economy would gradually improve. Instead, market turbulence picked up from summer onward, raising interest rate premiums and leading to a marked shift in sentiment also in Norway. In particular, developments in private consumption and non-oil exports were weaker than projected. Growth in private consumption was also weaker than projected in 2010. We may have underestimated the effect on household demand of persistent uncertainty regarding developments abroad combined with high debt burdens.

Inflation adjusted for tax changes and excluding energy products in 2011 was somewhat lower than assumed in the October 2010 *Report*, though annual growth projections published through 2011 were fairly accurate. Nevertheless, inflation was somewhat lower than expected at the end of 2011. Norges Bank's projections for inflation in 2011 were more in line with actual developments than an average of projections from other forecasters.

We have also looked at the short-term projections for output and inflation over time. For the past three years, both CPI-ATE inflation and GDP growth were somewhat lower than expected. The projections for CPI-ATE inflation were also too high in previous periods. There is nothing to indicate systematic biases in the projections for headline (CPI) inflation. Unexpectedly low CPI-ATE inflation was balanced by a higher-than-projected rise in energy prices. The GDP projections also appear to have been broadly unbiased, when viewed over a somewhat longer horizon.

The short-term GDP projections in the *Monetary Policy Report* have been more accurate than the projections derived from SAM during the past three years. Consequently, the information used in addition to the projections derived from SAM has reduced the forecasting error for GDP. The short-term projections for CPI-ATE inflation were broadly as accurate as the projections derived from SAM.

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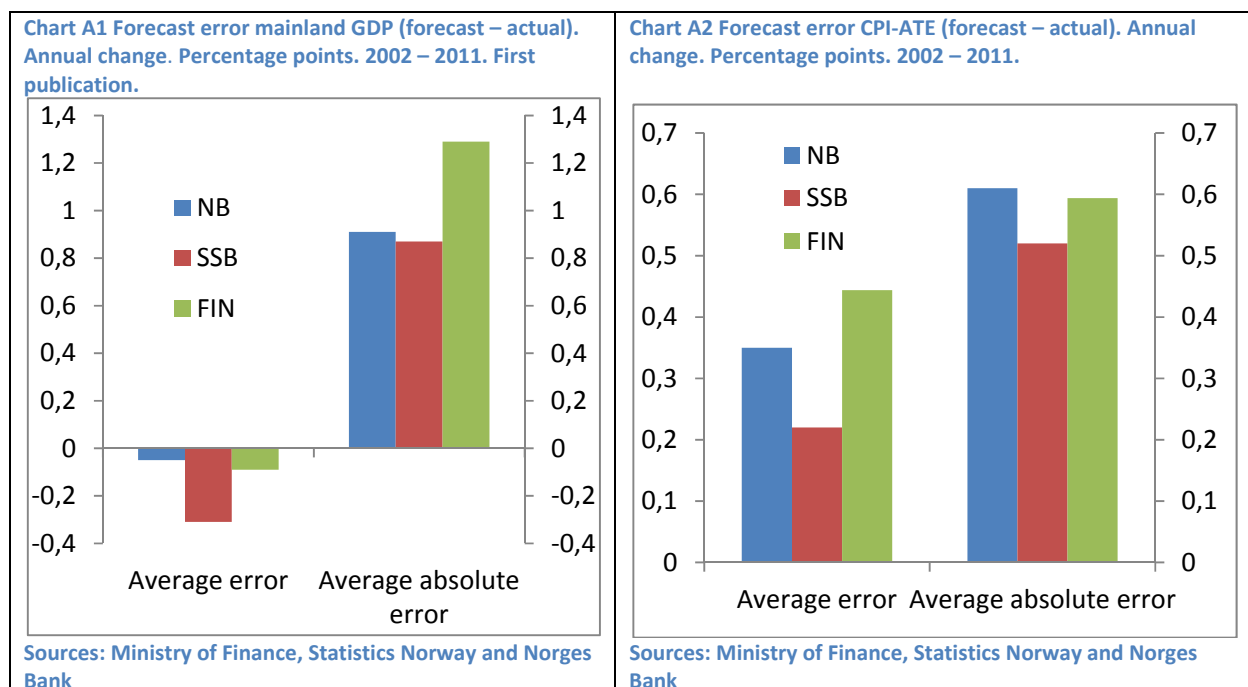
Appendix 1. Historical comparison with other forecasters

In this section, we compare Norges Bank's projections for economic developments with forecasts from the Ministry of Finance and Statistics Norway. We focus on the last published projections for annual mainland GDP growth and CPI-ATE inflation in the period from 2002 to 2011.

The projections were published at different times of the year, for which reason the informational content on which the projections were based differed. In recent years, Statistics Norway has been publishing the year's last forecasts at the beginning of December and Norges Bank has been publishing the year's last projections at the end of October, while the Ministry of Finance's projections have been presented at the beginning of October.

Norges Bank's projections for mainland GDP growth have been, on average, broadly in line with actual growth in the ten-year period we have looked at in this *Staff Memo* (see Chart A1). Consequently, there are no indications that the Bank has systematically misjudged growth prospects in this period. With regard to year-to-year accuracy as measured by mean absolute error, Norges Bank's projections have been approximately as accurate as projections from Statistics Norway, but more accurate than projections from the Ministry of Finance (see Chart A1).

In the period from 2002 to 2011, all forecasters projected CPI-ATE inflation that on average was too high. Actual CPI-ATE inflation averaged between 0.3 and 0.4 percentage points lower than Norges Bank's projections (see Chart A2). Statistics Norway's projections had the least bias, and Statistics Norway also performed somewhat better than the Ministry of Finance and Norges Bank when we look at the mean absolute error (see Chart A2).



Appendix 2: Projections for main economic aggregates for 2011. Percentage change from 2010 (unless otherwise stated).

	MPR 3/10	MPR 1/11	MPR 2/11	MPR 3/11	Preliminary accounts
Prices and wages					
CPI	1¼	1½	1¾	1½	1.2
CPI-ATE	1¼	1	1	1	0.9
CPIXE	1½	1¼	1¼	1¼	1.1
Annual wage growth	3¾	4	4¼	4¼	4.2
Real economy					
GDP	2	2½	1¾	1½	1.6
Mainland GDP	3	3¼	3	2¾	2.6
Output gap, mainland Norway (level)	-¼	0	0	0	-0.1
Employment, persons, QNA	1	1¼	1¼	1	1.4
Labour force, LFS	1	1¼	1	¾	1
LFS unemployment (rate, level)	3½	3½	3¼	3¼	3.3
Registered unemployment (rate, level)	2¾	2¾	2½	2¾	2.7
Demand					
Mainland demand	4	4¼	3¾	3½	3.1
- Private consumption	3¾	3½	3½	2¾	2.2
- Public consumption	2	2½	2	2	1.5
Mainland gross investment	10	9¾	8¼	8	8.2
Petroleum investment	7	12½	15	12¾	11.4
Mainland exports	2¾	6¼	2¼	1½	-0.1
Imports	6	6¼	8¾	7	2.5
Interest rate and exchange rate					
Key policy rate (level)	2¼	2¼	2¼	2¼	2.1
Import-weighted exchange rate (I-44)	90¾	88¾	88	88	88.1
International economy and oil price					
Trading partners' GDP	2½	2½	3	2½	2.3
External price impulses	0	-¼	¼	½	0.7
Oil price, USD per barrel (level)	85	112	114	110	111