NB:
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Norges Bank has decided that the quarterly publications Economic Bulletin and Penger og Kreditt (Norwegian edition) will no longer be published in print. This is therefore the last issue to be distributed to subscribers. From now on, these publications will only be published on the Bank’s website. Publication frequency will also be changed to twice a year. (Monetary Policy Report and the Financial Stability report will until further notice be printed and distributed as usual to registered Economic Bulletin subscribers.) The next web issue of Economic Bulletin will be published in mid-October 2008.

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Editor: Svein Gjedrem
Editorial officer: Jens Olav Sporastøyl

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Communications regarding the Economic Bulletin should be addressed to:
Norges Bank
Communications Department
P.O. Box 1179 Sentrum
N-0107 Oslo, Norway
Telex: 56 71 369 nbank n
Fax: +47 22 31 64 10
Telephone: +47 22 31 60 00
E-mail: central.bank@norges-bank.no
Internet: http://www.norges-bank.no

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Jarle Bergo: A professional monetary policymaker steps down

Arne Jon Isachsen, professor at the Norwegian School of Management BI, interviews the outgoing Deputy Governor of Norges Bank

Jarle Bergo’s second and last term as Deputy Governor of Norges Bank will be completed on 1 April 2008, close to 40 years after he assumed his first post at this august institution. As a fresh graduate of the University of Oslo – with excellent grades – he was assigned to the post of economist in the Monetary Policy Department in 1969. A year and a half at the Norwegian Institute of International Affairs, a few years at the International Monetary Fund (IMF) in Washington D.C. and a few years at the EFTA Secretariat in Geneva were the only periods Jarle Bergo spent away from his work at the Bank. In April, he returns to the IMF as deputy director of the Nordic-Baltic Office. Has he specialised as deputy? No. During his previous period at the IMF, he was executive director of the office. But the posts are rotated. Today, it is a Swede’s turn to take the helm.

We met him at his spacious, airy and stylish office atop Norges Bank’s impressive building in the city centre of Oslo, an edifice history will show that we were right to have built. His office is half-full of cartons. He is already busy packing. There is also an almost empty fruit basket and a few bottles of sparkling water. And instant coffee.

“It’s a strange time to look back” the retiring Deputy Governor reminisces, “purely in monetary policy terms.

In some respects, we are now back to normal” he continues. “From the collapse of the Bretton Woods System in the period December 1971– March 1973 and up to the 1990s, virtually all countries ‘forgot’ that the overriding task of monetary policy is to provide economic agents with a secure and stable nominal anchor. Monetary policy can never have permanent real economic effects,” Bergo reminds us.

In the first years after the Second World War up to the end of the 1960s, the exchange rate served as an anchor. “People my age,” says Bergo, “remember that the value of the US dollar against the Norwegian krone was fixed for a long period at NOK 7.14. The empirical observation that lower unemployment could apparently be ‘bought’ through higher inflation – as shown by the Phillips curve – became too tempting for politicians. With steadily rising inflation in the anchor currency country the US, the fixed exchange rate system functioned ever less effectively. Other countries that had pegged their currency to the US dollar were forced to accept US inflation rates,” he points out.

But why did the Phillips curve fail to function? Why did this curve not hold? Bergo explains, “Imagine Robinson Crusoe and Friday on their desert island. They fish, gather coconuts and firewood. In this simple economy, if Robinson as governor of the central bank conducted a monetary policy where he started printing more banknotes, would this in itself have resulted in more fish, coconuts or firewood? No. Robinson may for a short period have been able to fool Friday into selling his stock of goods and pay with new money. Prices would have risen. But Friday would have learned.”

The larger picture: You can fool some of the people all of the time, and all of the people some of the time, but not all of the people all of the time, as Abraham Lincoln once said. This is exactly why the Phillips curve does not hold, and why demand management in the 1970s and 1980s had such limited success.

“When the battle against inflation was finally taken seriously, both unemployment and inflation were high. Many countries, including our own, were struggling with stagflation.” Bergo reminds us.

“Why, ” I wonder, “did Norway choose its own little currency basket in 1978, while we had participated in the European snake in the preceding 5–6 years, a system that involved fairly fixed exchange rates between European currencies.” “There were two reasons,” says Bergo. “The need for pound sterling, the Swedish krone and the US dollar to influence the krone’s external value by including them in the basket. In addition, there was

1 Translated by Helle Snellingen, senior translator Norges Bank.
probably a political element, which was that the more binding EMS arrangement was less suitable for Norway after voting against EEC membership in 1972.”

In the ten years up to our last devaluation under Gro Harlem Brundtland’s government in May 1986, Norway devalued its currency as many as ten times,” affirms the Deputy Governor. “The background was higher inflation in Norway than among our trading partners. Over those ten years, the price level in Norway increased by 120 per cent, or more than 8 per cent as an annual average.” Bergo informs us. “The cumulative devaluation of the krone came to a good 20 per cent,” he adds.

An utterly wild environment compared with what we have become accustomed to over the past 12–15 years. If the figures for inflation, which are published on the tenth of each month, were to show an inflation rate of 2.1 per cent over the past 12 months while the market expected 1.9 per cent, it would be big news. A difference of 0.2 percentage point, and no one would have batted an eye a few decades earlier. What has actually happened?

“Monetary policy has again been given a nominal and credible anchor,” the soon-to-be former deputy governor explains patiently. “New Zealand was the first country to introduce an inflation target as early as in 1990. Canada, the UK and Sweden were next. In Norway it took somewhat longer, but when Norges Bank Governor Kjell Storvik stopped exchange market intervention to support the krone in August 1998 and did not find it appropriate to raise the key rate above 8 per cent, it entailed a relaxation of the requirement of day-to-day management geared towards a stable exchange rate when the effects were clearly procyclical,” says Bergo.

With a new central bank governor a few months later, increasing weight was given to low inflation as a means of achieving a stable exchange rate. In March 2001, Norway followed suite with the introduction of an inflation target for our monetary policy. Since that time, Norges Bank has taken quantum leaps and is now among the foremost in practicing inflation targeting. Bergo illustrates this by a concrete example.

“An inflation target requires a perception of the rate of inflation ahead. In the early days of inflation targeting, our inflation forecasts were based on the assumption of a constant interest rate,” he says. “But with liquid markets for different instruments with different maturities, it is easy to calculate market interest rate expectations. Better to use these rates than the assumption of a constant interest rate, Norges Bank thought. No sooner said than done. And we based the interest rate expectations underlying the projection of the price path on forward interest rates. But,” continues the Deputy Governor, “if the central bank did not share with market interest rate expectations, what should we do then?”

What then?

Jarle Bergo

Born 1945, Voss, Norway. Master’s Degree in Economics, University of Oslo, 1969

Work experience:

2002 Reappointed Deputy Governor for a further six-year term, Norges Bank
1996 Appointed Deputy Governor for a six-year term, Norges Bank
1993–1995 Executive Director elected by the Nordic and Baltic countries, IMF, Washington D.C.
1979–1993 Director, Norges Bank
1977–1979 Senior Economist, Norges Bank
1971–1972 Researcher/civilian service, Norwegian Institute of International

Other:

2002–2003 Member of the Committee on Ethical Guidelines for the Government Petroleum Fund
2000–2001 Member of the Board, Oslo Stock Exchange
1999–2000 Member of the Committee on Employment and Growth (‘Holden Committee’) 1996 Chairman of the Expert Group on Globalisation and Competitiveness
1990–1993 Short-term assignments as consultant to IMF (Eastern Europe and former Soviet Union)
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“Rente, prisstigning og kronekurs” (Interest rates, inflation and the krone exchange rate), *Dagsavisen*, 24 August 2003


“Kritikken mot IMF – er den berettiget?” (Criticism of the IMF – is it justified?) *Økonomisk forum*, no. 7 (2002), pp. 7–10

“Vi trenger IMF”, (We need the IMF) *Dagens Næringsliv*, 31 July 2002


“Hvorfor øker Norges Bank renten?” (Why is Norges Bank raising the key rate?) *Dagsavisen*, 22 August 2000


“Vi var uheldige med tidspunktet for liberaliseringen av kredittmarkedet” (We were unlucky with the timing of the liberalisation of credit market). Director Jarle Bergo, Norges Bank. Interviewed by Bent Vale. *Sosialøkonomer*, no. 7 (1988), pp. 13–15

“Beskjeden risiko-utred” (Modest risk analyst), mini-portrait of Jarle Bergo. *Dagens Næringsliv*, 16 November 1988

“Mannen som skal skaffe mer kapital” (The man who is to procure more capital), interview with Jarle Bergo by Per Røste. *Aftenposten*, 11 November 1988
“We projected our own interest rate path” exclaims Bergo, with a hint of pride.

This interest rate path is used to estimate endogenous variables, such as inflation and other variables. This is bold because if the market is right and the central bank wrong, wouldn’t that be a bitter pill to swallow? No. Openness or transparency comes before prestige. Norges Bank finds it more efficacious to explain as well as possible to the market how the bank thinks and assesses conditions.

“As an advocate of such changes, the institution Norges Bank Watch has worked well,” says Bergo. Every year, the Centre for Monetary Economics at the Norwegian School of Management BI appoints a committee of two to four experts – from the academic community or the market, often with one or two foreigners – that scrutinises the central bank’s activities. Does the central bank carry out the tasks assigned to it by the government? Have the interest rate decisions been wise? Has the rationale behind them been communicated effectively? Where do potential improvements in Norwegian monetary policy lie? Openness about the interest rate path is a good example of how the report of Norges Bank Watch has improved Norges Bank’s communication with the market.

A short sigh is heard. “Why,” wonders Bergo, “do the media so gladly take a negative angle on things? After the latest NBW report, which was published in February, the newspapers were very crass even though the report was very satisfied with the central bank, and the central bank with the report.

No news is good news, as the saying goes. In our media world, it may at times seem as if good news is no news. But if something negative can be said, the media willingly fires away.

Jarle Bergo has sat on many important committees.


“Konjunkturvurderinger” (Cyclical assessments). *Aftenposten*, 29 October 1986


“Tilbudssøkonomi, gammel vin på nye sekker?” (Supply-side economy, old wine in new bottles?) *Sosialøkonomen*, no.3 (1982), pp.19–26


“Multinasjonale selskaper: velsignelse eller problem” (Multinational companies: a blessing or a problem). *Norwegian foreign policy studies 8*. Oslo: Universitetsforlaget, 1974


*Et forøk på å estimere parametrene i en dynamisk modell når observasjonene er en kombinasjon av tidsrekke- og tverrsnittsdata* (Attempt to estimate parameters in a dynamic model when the observations are a combination of times-series and cross-section data). Oslo: UiO/USø, 1969
“What is the point of such committees?” I ask. “The purpose is to receive advice about things that were to be done anyway,” says the Deputy Governor, who as outgoing Deputy Governor can take the liberty of using a somewhat freer style than if he were about to come into this noble office.

As secretary to the Interest Rate Commission in the mid-1980s, Bergo played a key role in the gradual liberalisation of credit and exchange rate policy. “Quantitative regulation did not have a future,” says Bergo. “But it was difficult to change things rapidly in a society with strong interest groups,” he continues. “Democracy requires time. Decisions that involve considerable changes must gain acceptance over time. Those who stand to lose with a new system, must not be allowed to block the necessary changes.”

“Perhaps more thought should have been given through the 1970s and 1980s to how a new monetary policy and exchange rate regime should have been designed rather than resisting changes that were nevertheless inevitable?” says Bergo, almost speaking to himself.

The Interest Rate Commission’s work continued intensively over a year and a half. “Were you released from other tasks then?” I ask. No, Jarle Bergo was not. He also had to perform his functions as Director of the Research Department in Norges Bank. “Have you worked too much in your life?” I wonder, “at the expense of other, more important things?” The Deputy Governor pauses to think. Did I hit a sore spot? Or will the answer be “Je ne regrette rien”, as Edith Piaf, or the “Sparrow” as she was called, sang at the end of her career? “No,” the outgoing Deputy Governor eventually replies, “as a general statement, I wouldn’t say that the job has taken too much of my time. “But,” he adds, “in some periods that may have been the case.” A tinge of regret perhaps?

When the authorities established a commission in the 1990s to examine the supply of risk capital in the Kingdom of Norway, Bergo advanced from secretary to chairman. No, the commission concluded, extensive measures to increase the supply of venture capital are not necessary. “As a consolation to those who were of a different opinion, the state-owned fund Norsk Venture was established. This calmed the atmosphere” says the unflappable Bergo.

Through Bergo’s time, Norges Bank has increasingly focused on what the key functions of a central bank should be. “Strange to think that not too many years ago the Bank provided loans to the fishing industry,” Bergo tells us. Business loans do not belong on the balance sheet of a central bank. It was also the Bank’s task to examine the accounts of companies that received support from the Regional Development Fund. This function has also been completely removed from the central bank’s remit, even though providing crisis loans to the fishing industry was at the time a task that had been assigned to the central bank by the Storting (Norwegian parliament).

What about the Petroleum Fund,” I interject, “is it really a central bank’s task to manage the capital of the Norwegian people?” “The Executive Board of Norges Bank is of the view that the Bank has performed this function in a sound manner,” replies Bergo. But I insist, “is it really a key function of the central bank to manage the Government Pension Fund – Global? It was fine to do so in the start phase. The expertise in managing foreign exchange reserves was very useful, as well as the quality stamp that the address Bankplassen 2 provides. Whether the management of the Government Pension Fund – Global will forever remain the responsibility of the head of the country’s monetary policy is far from obvious?” Still my words. Bergo listens. Grumbles a little. He doesn’t directly disagree, the grumbling in my ears tells me.

The interviewer is now warmed up. “How can you defend the interest rate hike in July 2002.” I ask, “in a period when all other countries cut rates? And the result was a surge in the value of the krone that wiped out 30 000 manufacturing jobs over the next few years?”

“Our finest hour,” Bergo answers, but with the calm and substance worthy of Churchill. Norges Bank at its best. “Not only did we raise the interest rate, as you said, we were prepared to raise it even further. But the exchange rate did the work before us. The appreciation of the krone provided a sufficient tightening effect. Why did we do it? Under the monetary policy regime of that time, the central bank’s task was entirely clear. We had made our response pattern known in advance. In order to avoid an inflationary spiral, the interest rate would have to be increased in response to excessively high pay increases. In the wage settlement in spring 2002, pay increases were much too high.”

A long, assertive and coherent stream of words from an otherwise cautious central banker.

The nominal anchor was cast. And at once everyone understood the new division of responsibility in economic policy. Norges Bank has the responsibility for inflation. The fiscal policy authorities for the real exchange rate. And the social partners for employment.

The fragile point in this division of responsibilities is the risk that asset managers in international financial markets drive the krone exchange rate completely off course. On this score, we have both been competent and lucky. Norges Bank’s communication with the market must take some of the credit for a more stable exchange rate than comparable countries can boast.

“There is virtually no doubt that the current division of responsibility functions well,” Bergo maintains.

The real growth in wages that most of us have experienced over the past four-five years is exceptionally high. And that is what counts – the purchasing power of the money we earn. In addition, the labour market has
been more flexible than most people had expected. The problem of rising benefit recipients lowers the score somewhat, however.

But everything hasn’t always been rosy. The Norwegian banking crisis early in the 1990s was so severe that it is also well-known abroad. The Norwegian government did the only right thing. When undercapitalised banks’ owners were no longer willing to put money on the table, the state had to provide the capital. And the private owners’ were zeroed out. With a coy Mona Lisa smile Bergo remembers how he as manager for the Government Bank Insurance Fund signed the check for NOK 5 billion to pay for the government’s purchase of new shares issued by Christiania Bank.

Lastly, “How is it possible,” I say, “year in and year out, to be so concerned with, if not so enthusiastic about, marginal changes in Norges Bank’s key policy rate? A quarter up, a quarter down, or unchanged – can you think of anything less exciting to spend your life on?”

“That’s not the only thing we do,” says Bergo. “The two other core responsibilities – financial stability and investment management – also require considerable time and energy. I also have the pleasure of participating in many exciting events abroad, the most edifying being the annual meetings arranged by the Federal Reserve Bank of Kansas in Jackson Hole, Wyoming, which I attend every other year. This is where the top people in my field meet. The foremost experts in central banking come together the sharpest academics.

When Jarle Bergo soon takes over as the second-in-charge of the Nordic-Baltic Office at the IMF’s headquarters in Washington D.C., the road to Jackson Hole will be shorter.

Have a nice trip to America.
Economic perspectives

Address by Governor Svein Gjedrem at the meeting of the Supervisory Council of Norges Bank on Thursday, 14 February 2008

Introduction

Henrik Wergeland was born 200 years ago. He worked in the vicinity of the central bank in periods. His plays were performed at the Christiania Theatre, which was located at Bankplassen, and as national archivist his office was located at Akershus fortress, a stone’s throw from the central bank.

Wergeland lived near Grønlia below Ekeberg. He travelled to town by rowing across Bjørvika. He moored his boat near Bekkevold’s pub on Skippergata, which is today known as “Grei Kafé”. That is also where he met the proprietor’s daughter, Amalie Sofie, who became his wife.1

Wergeland wrote a poem “Follow the Call”, which includes a well known verse:

“But our world must still be young,
Saga of each race must be
still merely its cradlesong
and its childhood fairy tale.
Creatures from the age of chaos […]” 2

Chaos and fear exploded with full force in the financial markets last autumn. We are again witnessing that market participants suffer from a short memory span.

Crises, imbalances and bubbles

House prices in the US started to fall in 2006 (Chart 1). There were reports of defaults on mortgage loans, but it was generally believed that the loans at risk were confined to a small segment of the market.

The first warning of more severe problems came in winter last year. In the course of summer, it became clear that the losses had spread, and in the first instance to state-owned German banks. Other banks, funds and financial establishments in Europe, Asia and the US also felt the turbulence and gradually losses emerged where we perhaps least expected them.

A European colleague compared the financial turbulence to a film production: It was shot in the US, premiered in Germany and is now playing all over the world. As you know, it also came to small-town cinemas in Norway last autumn.

In addition to German banks, a small Danish bank and a fairly large British mortgage bank were faced with serious problems. At St James’ Park in Newcastle, advertisements for the crisis-hit British bank Northern Rock shine towards us (Chart 2). We are indeed witnessing crises at banks in neighbouring countries.

The turmoil spread to money and credit markets in August. Few knew who was exposed to losses, and banks, funds and financial establishments started to question counterparties’ financial situation, and held on to their money. This resulted in a surge in banks’ premia on short-term interbank rates.

Moreover, banks had to bring back on their books loans from companies they had established, which further reduced their capacity and willingness to provide new loans. Several large foreign banks have received capital infusions from sovereign-wealth funds in the Middle East and Asia to bolster their financial strength.

What began as isolated losses in a small segment of the US home mortgage market led to a confidence crisis, which spread to money and credit markets in many countries in autumn 2007. In the US, there is a risk that the losses will increase in other segments of the property

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market and on ordinary consumer and business credit. Many of the new financial instruments which were forged to diversify risk have proved to be non-viable. It is now difficult for many companies to raise new capital or procure long-term funding. There are also signs that prices and activity in property markets have reversed and are falling in many European countries.

Around the turn of the year, doubts were raised as to the financial strength of some US banks. The new year was ushered in amid fears of a setback in the US and a sharp decline in global equity prices (Chart 3). So far this year, the market capitalisation of the Oslo Stock Exchange has declined by more than 15 per cent, or more than NOK 300 billion.

When the interbank market seized up, many central banks injected extra liquidity. In periods, Norges Bank has also provided additional loans to banks. This has reduced swings in interbank rates.

Norwegian banks borrow dollars short in the European market for their interbank trading. Banks also borrow in foreign markets to finance lending in NOK. The banks raise foreign currency loans, which are exchanged into NOK. The premia on such loans (Chart 4) are passed on to customers that borrow in NOK. This is why the increase in US and European premia has quickly fed through to Norwegian interest rates even though Norwegian banks are profitable, retain confidence and have limited loss exposures.

In recent years, debt accumulation among Norwegian businesses and households has increased markedly. At the same time, Norwegian banks’ foreign short-term liabilities have tended upwards. The banks hedge against the exchange and interest rate risk associated with these loans. But the turbulence in the latter half of last year showed that banks cannot as readily hedge against liquidity risk.

Norges Bank supplies NOK to the Norwegian banking system. In that respect, we can be generous when the markets are seized by fear and uncertainty. But when banks borrow in foreign currency, they are more on their own.

Crises and turbulence are built into the workings of the market. The search for yield and market shares may at times become too intense. A common feature of financial crises is that they are accompanied by considerable changes in the pricing of risk in many markets. Prices for equities and other securities are determined by economic agents’ income expectations. On occasion, these expectations turn out to be unrealistic. Unexpected events can change the economic outlook. When confidence and optimism shift to fear and uncertainty – and this can happen overnight – prices can rapidly plummet.

The current turbulence has deep roots. US household saving fell markedly in the 1990s. When the dotcom bubble burst after the turn of the millennium, the Federal Reserve cut its key rate to low levels. Interest rates in Europe also showed a considerable decline. House prices and investment in real property then rose sharply through most of the Western world, and saving in the US and other Western countries showed a renewed fall.

Low government and personal saving in the US has given rise to large trade deficits (Charts 5 and 6). The saving of the rest of the world is financing the US deficit. In isolation, such a large supply of capital would have required higher interest rates. But even though the US increasingly had to rely on foreign financing, long-term interest rates fell. At the same time inflation remained low, partly thanks to cheap Asian imported goods.

The low level of long-term interest rates can be attributed to the high level of saving in Asia and oil-exporting nations. Surpluses, particularly on China’s foreign trade balance, have soared (Chart 7)

Interest rates are again moving down in the US and a number of other countries. Interest rates are being cut to address weaker economic growth prospects. However, in view of the high level of unsold homes and properties, it is uncertain whether the interest rate weapon will be as powerful as in the past.
Thus, there is a risk that the US economy will enter into a prolonged downturn in spite of the interest rate cuts, drawing with it large parts of the world economy. In the event, the surpluses in Asia will decline as the value of exports falls.

Moreover, there is a risk that low interest rates may in the next round sow the seeds of new bubbles, restrain saving in the US and extend the period of large US current account deficits.

The optimal solution would be to redress this imbalance through an increase in US saving. In order to buoy up growth in the world economy, Asia and Europe must then replace US consumers as the engine of global growth. The prospects for achieving this are perhaps not the best. Inflation is on the rise in both Europe and Asia, and this will necessarily be reflected in economic policy, at least for a period ahead. Moreover, the absence of a social safety net in China creates a strong incentive for Chinese consumers to save rather than spend.

Is the Norwegian economy also at a turning point?

Household saving has also been low in Norway in recent years and corporate earnings have been offset by high investments. Excluding government financial and oil sector surpluses – which are redeployed abroad – Norway recorded a current account deficit of an estimated NOK 150 billion in 2007, or close to 10 per cent of mainland GDP (Chart 8).

The corollary to the deficit on the basic balance is that Norwegian businesses, as well as Norwegian banks, borrow in foreign markets. It is the interaction between high household credit demand and an ample supply of credit that has resulted in low saving and large deficits.

The banks now have to put more effort into procuring deposits and a little less into selling loans. Such a change in banks’ behaviour may contribute to curbing growth in demand and output in the period ahead.
There are now signs of a cooling housing market throughout the country (Chart 9). House price inflation peaked about a year ago when the housing market was marked by euphoria. Several large residential construction projects are now being shelved.

Should weaker developments in the US lead to a broad-based pause in global growth, there may be various repercussions for the Norwegian economy:

First, a downturn in the world economy may adversely affect activity and profitability in export industries and perhaps even the oil sector. It may be more difficult to sell goods in a falling market, and prices for domestically produced goods may fall.

Second, turbulence and weaker growth prospects may increase uncertainty among Norwegian households and businesses. As a result, new projects and investments may be postponed, or enterprises may be reluctant to recruit new employees.

Third, the financial market turbulence has a more direct impact on the business sector. Banks and investors now apply a higher premium and higher prices for providing capital for acquisitions, restructuring and investment, and highly leveraged companies have to pay high loan risk premia.

We still do not know what the full impact of the turbulence will be. The US authorities have taken measures. It remains to be seen whether they will have an impact. At the same time, growth in Norway has been strong and inflation is on the rise.

Monetary policy in Norway is oriented towards keeping inflation low and stable. The operational target is annual consumer price inflation of close to 2.5 per cent over time. The inflation target is an anchor for expectations in the foreign exchange market, the social partners and price-setters in NOK. Buyers and sellers of NOK, businesses and households, price-setters and wage-earners can expect inflation to be close to 2.5 per cent over time.

There is a division of responsibility in economic policy:

- Monetary policy steers inflation in the medium and long term and can also contribute to smoothing fluctuations in output and employment.
- The government budget – growth in public spending – influences the real krone exchange rate and the size of the internationally exposed business sector in the long term.
- Wage formation and economic structures and incentives determine how efficiently labour and other economic resources are used.

Even if inflation fluctuates somewhat from one year to the next, inflation has remained fairly close to target over time (Chart 10). Inflation was particularly low in the years around the turn of the millennium when cheap goods flowed from Asia into our country while productivity in the business sector grew sharply. The rise in prices for domestically produced goods and services was also low.

Interest rates were cut in response to lower inflation (Chart 11). Economic agents could then expect inflation

to gradually move up to target over time. Growth could also remain high for a period without a rapid rise in inflation. Low interest rates made it possible for us to make use of the potential for higher consumption and investment.

Perhaps the most important factor in the increase in activity has been the increase in immigration. There are now signs that price and wage inflation is on the increase. Higher food and energy prices are fuelling inflation in other countries. Thus, we cannot assume that prices for imported goods will continue to fall. Moreover, domestic productivity does not seem to be improving as quickly as earlier. The rise in prices is therefore likely to quicken for goods and services produced in Norway. Since summer 2005, the key policy rate has gradually been raised again to a more normal level in order to prevent inflation from becoming too high.

As mentioned, external interest rates are again moving down and the interest rate differential against other countries has widened recently (Chart 12). This may lead to a stronger krone, but there are also opposing forces in the foreign exchange market.

In the long run, the krone exchange rate is determined by changes in the terms of trade and permanent differences between domestic and external inflation and productivity. But the krone exchange rate also shows monthly and yearly fluctuations. The krone was strong towards the end of the previous cyclical expansion, but depreciated when interest rates declined in 2003. Thereafter, the krone appreciated again as growth in the Norwegian economy recovered.

Over the past two years, the krone has appreciated by close to 5 per cent. Inflation has nevertheless picked up and is now fairly close to 2½ per cent.³

The sizeable basic balance deficit may result in a renewed depreciation of the krone. If the bleak prospects for the world economy translate into lower prices for oil and other export goods, this may also lead to a depreciation of the krone. We have already observed that investors sell NOK in periods of turbulence. If the krone depreciates, the interest rate will then have to be set higher to keep inflation at bay unless a slowdown in activity has a dampening impact on inflation.

The opening of the labour market to the new EU countries has provided us with access to a reserve of labour. There has been a substantial flow of labour into Norway (Chart 13). Labour migrates to locations where potential earnings are highest. Growing numbers of workers are moving to Norway and establishing residence here. Many workers are only here on short-term assignments and will perhaps move on when the job is done and when there is an economic turnaround.

In 2007, Norway’s population increased by about 55 000, with net inward migration coming to 35 000. This is the highest population increase ever registered. Employment has grown rapidly over the past two years, the highest rate recorded over the past few decades (Chart 14). Even though there has been an ample supply of labour, unemployment is low and the number of job vacancies is record high. The labour market is tight.

High pay increases have often been awarded in the

³ Norges Bank uses different measures of underlying inflation. In January, the twelve-month rise in the CPI-AE was 1.9 per cent; a weighted median showed a rise of 2.4 per cent and a trimmed mean 2.9 per cent. The twelve-month rise in the CPI was 3.7 per cent following a sharp increase in energy prices.
late phase of an expansion, and been followed by rising inflation. Employees and businesses have at times looked backwards – and may not recognise that the outlook has changed – when determining wages and conditions that influence employment and profitability. This was the case in 1974 and 1975 and again in 1986 and 1987. It was the case in 1998 and also in 2002. In each case, the result was high interest rates, stagnating production and rising unemployment.

Should the recent sharp rise in employment result in unexpectedly high wage growth, the interest rate will again have to be set at a high level to keep inflation subdued. We may again experience a high interest rate level in Norway relative to other countries over a longer period. This could translate into a pronounced setback in production and employment.

The Norwegian business sector has become increasingly efficient (Chart 15), inducing companies to increase their workforces. During the recovery after the turn of the millennium, productivity growth jumped up again. This resulted in strong growth and low inflation. Rising imports from low-cost countries and high prices for many of our export goods resulted in a substantial improvement in Norway’s terms of trade from the end of the 1990s (Chart 16). Norway’s situation differs from that of our neighbouring Nordic countries in that both Sweden and Finland have recorded a deterioration in their terms of trade. They sell large volumes of high-tech products but at falling prices. Productivity and terms-of-trade gains have provided the Norwegian economy with a historically strong income boost. National income increased by a little more than 30 per cent in real terms between 2003 and 2007.

The real krone exchange rate (Chart 17) measures developments in the value of the Norwegian krone, adjusting for inflation differentials between Norway and its trading partners. This provides an indication of the relationship between the level of external and domestic prices, which in turn reflects developments in cost levels. In real terms, the krone has appreciated by about 10 per cent since the mid-1990s, while labour costs in a common currency have risen by close to 30 per cent more than among our trading partners. This may be partly ascribable to the cyclical expansion and the low level of household saving. But most likely the strong krone reflects the substantial improvement in the terms of trade and productivity. Public spending growth is fuelling demand for goods and services and draining labour from the business sector, albeit not faster than planned. Even though the cost level in Norway has increased and is high, there is full employment. Thus, it seems that our business sector will have to live with – and can live with – the real value of the krone and the current cost level unless a possible downturn has a particularly severe impact on the Norwegian economy.
There was a fundamental shift in Norwegian economic policy in the 1980s and 1990s. Capital and credit markets were liberalised. It became easier to establish and build up new businesses. The EEA and WTO agreements resulted in stronger competition and increased flows of goods and services, labour and capital. As a result of the 1992 tax reform, the welfare state could be funded with reduced impact on wealth creation. The framework conditions for the electricity market, telecom market, aviation and broadcasting were changed. Trade was liberalised. State-owned companies were listed on the stock exchange and new forms of managing public agencies were developed. Industrial policy no longer kept unprofitable enterprises afloat. And last but not least, in Norway as in other countries, norm-based or rule-based monetary and fiscal policy was introduced.

The shift gave a boost to the economy, but in recent years it has been accompanied by a change in the distribution of income between labour and capital. This is probably a result of structural changes in the global economy. A rising share of the global production of goods and services is moving across the Pacific. Cheap Asian labour has changed industry structures and trading patterns in many Western countries, including Norway.

New producer countries are fuelling competition, but are also creating new markets and producing cheap consumer goods. There has been a sustained rise in employment and wealth creation in the West. China, India and other emerging economies have doubled the supply of labour on the global market. This has helped paved the way for strong growth, but has also curbed wages in many occupations in a number of industrialised countries.

Norwegian households have enjoyed lower prices and a broader range of goods. It has been easy to find employment. Norwegian owners and shareholders have also fared very well.

Although the share of value added accruing to wage earners has decreased since the beginning of the 1990s, real wage growth has been high (Chart 18). On average, today’s wage earners earn real wages that are 50 per cent higher than in 1990. This corresponds to annual growth of over 2 per cent. At the same time, employment has risen.

Business and labour market conditions have been unusually favourable in recent years. Should export prices fall, productivity growth slacken and foreign workers return to their home country, the wage share and unemployment will increase and business sector profits will fall. Even in the absence of these developments, low unemployment and high profits may be difficult to sustain. Developments will depend on how far businesses – in their search for qualified labour – will bid up wages.

The economic policy reforms of the 1980s and 1990s set the stage for invention and innovation and the development of a market for equity capital and loans in Norway. This has resulted in restructuring in the business sector, increased productivity, real wage growth and a high level of job creation, but also very high earnings for successful businesspeople and entrepreneurs. We will probably have to learn to live with our entrepreneurs and capital owners, and they must live with the society that has provided them with favourable business conditions.

In Norway, there is a relatively even distribution of income, as illustrated in Chart 19. In the chart, we compare the second-highest decile of wage earners with the lowest decile. Wage differentials are smaller in Norway than in any other OECD country. In the US, the group of wage earners in the second highest decile earn almost five times as much as the lowest decile while in Norway that group only earns twice as much.

Thus, the fundamental shift in economic policy and sharp income growth in Norway have not resulted in substantial wage disparities.

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Median income is the income level at the middle point of the income distribution. When the EU assesses income distribution, low income is defined as less than 60 per cent of median income. Compared with other European countries, the low-income group is small in Norway and the other Nordic countries (Chart 20). In Norway, 11 per cent of the population is defined as low-income earners, while the average for the EU is a good 15 per cent. In addition, the Nordic countries provide a high level of government-financed welfare services.

Analyses of low income do not take into account that income levels in Norway are very high. The threshold for low income in Norway is shown by the line in Chart 21. It is almost as high as median income in the EU, and not that far from the level in Sweden.

Nor does the EU definition of low income capture the considerable rise in median income in Norway over the past 15 years. In relation to the 1994 low income threshold, measured in real terms, the low income group has decreased by more than half, falling particularly sharply in the 1990s when unemployment also exhibited a sharp decline (Chart 22).

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In addition, turnover is high in the low income group. Around a fourth of the group comprises those aged 16–24, while one fifth are aged 64 and over. Many of those with low incomes are students or old age pensioners.

Thus, low income only becomes a social problem when people remain economically inactive for much of their lives. Both labour market developments and short-term financial incentives can lead to this kind of social exclusion. Social security schemes can also over time become poverty traps, locking in many people who would have been unemployed for a period in other countries. A cause for particular concern is the rising number of young people that receive benefits on a permanent basis.

I will now turn from today’s income distribution across groups to the distribution across generations in Norway.

The Norwegian national insurance scheme is a pay-as-you-go system. This means that a given year’s pension payments from the scheme are covered by government budget revenues that year. When the national insurance scheme was introduced in 1967, a fund was established to provide for an expected reduction in private saving. However, pensions were still included in the central government budget at an early stage and financed by current tax revenues. Transfers to the National Insurance Fund were soon discontinued.

Nevertheless, confidence in the pension system has actually remained intact, reflected in a low level of household saving, primarily through home investment. Perhaps there is some element of miscalculation here. A fall in value may occur if many homeowners free up housing capital to cushion old age.

It was only when transfers to the Petroleum Fund were introduced in 1996 that funds were accumulated that could also be used to cover future pension payments. The Fund, which has later changed its name to the Government Pension Fund – Global, has grown to well over NOK 2000 billion (Chart 23). Its rapid growth...
was neither expected nor planned and was due to the abrupt improvement in government finances during the economic upturn in the 1990s. After the turn of the millennium, the rise in oil prices also provided a boost. The size of the Fund is now equivalent to approximately one year’s GDP and may double in the next five to ten years. Total public expenditure is equivalent to less than half of total GDP. If the government spends 4 per cent of the Fund annually – the expected real return – this will finance close to 20 per cent of public expenditure ten years ahead. The return on the Fund will by then have become such an important source of funding that it is difficult to imagine that the government authorities would find any sound arguments for drawing on the accumulated capital. It is also a flow of revenues that does not have an adverse effect on private sector production capacity, unlike taxes.

Irrespective, only a share of future pension payments will be matched by revenues from the Government Pension Fund (Chart 24). Government old-age pension obligations are estimated to increase from around 250 per cent of mainland GDP today to approximately 350 per cent in the course of a few decades. As a result of the pension reform, the increase will be somewhat smaller.

As a major shareowner and bondholder, Norway has received increasing international attention. Many countries have established funds similar to the Government Pension Fund – Global, with substantial assets under management (Chart 25).

We are open about the Fund’s objectives, organisation and investments. This is necessary in Norway because the funds are public funds and because transparency enhances management. Moreover, the transparency of the Fund is also viewed in a favourable light by those countries in which we invest. Internationally, the Government Pension Fund – Global is therefore often cited as a best practice fund. But perhaps we should add that the transparency competition between funds could be enhanced.

The underlying motivation of these investors and whether the investments may be politically motivated have been called into question. Some fear strategic acquisitions of companies that are of considerable national importance. There have been calls for these funds’ investments to be monitored closely.

The management of the Fund is based on two ethical commitments:

First, there is the consideration relating to future generations. The Fund must ensure high capital returns at a moderate risk, by means of professional management with effective control of operational risk.

Second, the Fund must respect the fundamental rights of those affected by the companies in which the Fund has invested. The instruments used here are the exclusion of companies from the Fund’s investment universe and the active exercise of ownership rights.

The Ministry of Finance excludes companies that produce certain types of weapons. They also exclude companies when they identify an unacceptable risk of contributing to gross corruption, severe environmental
degradation, and serious violations of human rights and of fundamental ethical norms. Norges Bank exercises its ownership rights by voting at general meetings and through direct contact with companies. Moreover, priority is given to combating child labour and we look critically at how companies influence the authorities in environmental issues.

Over time, engaging in dialogue with companies is probably a more constructive approach than exclusion. Irrespective, perseverance and patience are required if we are to achieve results. We should not allow the management of the Fund to be ruled by the impulsive and changing priorities that beleaguer so many public programmes and sectors.

When we invest the Pension Fund’s assets, we are guests in our neighbour’s house. The requirements for the exercise of ownership rights cannot therefore be based solely on Norway’s values and culture. We must acknowledge that the dividing lines between politics, ethics and management may be different in other countries. When we point a finger at a company, we are also pointing a finger at the laws, regulations and practices of countries where the company is based and operates – and we are pointing that finger as a representative of the Norwegian state.

Conclusion

When other countries look at Norway, they may agree with another Norwegian poet whose 100th anniversary we are celebrating this year, Olav H. Hauge, when he wrote that “self-esteem grows with the size of your bank account”.7

We have enjoyed great economic prosperity over the past 10–15 years. But perhaps a warning can be found in one of Hauge’s poems. Allow me to recite:

“Too happy by half –
the pot’s boiling over,
the scale arm is pointing sky-high!
I must do something contrary,
throw cold water on the pot,
hang a stone on the scales,
fell the biggest pine I’ve got” 8

Thank you for your attention!

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Collateral for loans from Norges Bank – consequences of changes in the rules

Bjørn Bakke, adviser, Interbank Settlement Department, Knut Sandal, assistant director, Payment Systems Department, and Ingrid Solberg, adviser, Payment Systems Department

Norges Bank requires collateral for all lending to banks. Collateral is provided in the form of securities which are pledged to Norges Bank. The list of eligible securities was changed in 2005. The aim of the changes has been to reduce Norges Bank’s risk while ensuring that the borrowing facilities available to banks remain sufficient for payments to be settled and monetary policy to be implemented effectively. This article presents the changes that have been made and analyses the effects on Norges Bank’s risk and banks’ borrowing facilities. We conclude that the changes in the rules have indeed reduced Norges Bank’s risk, and that the rules still provide for adequate borrowing facilities.

1 Introduction

Banks can raise loans from Norges Bank against collateral in the form of securities. These loans are to help ensure that banks have sufficient liquidity for payments to be settled and monetary policy to be implemented effectively (see Box 1). Norges Bank seeks to avoid losses on its loans to banks and therefore requires that they are collateralised.1 The collateral must meet various requirements. The collateral may be realised if a bank defaults on its obligations to Norges Bank or is placed under public administration. A bank’s borrowing facilities correspond to the market value of the securities pledged less haircuts for various types of risk.

When the requirement of full collateralisation of loans from Norges Bank was introduced in 1999, Norges Bank accepted a wider range of securities than is usual for a central bank. This was due, in part, to few government bonds being issued in Norway. Internationally, government bonds are the most common form of collateral for loans from central banks. Relatively liberal rules on eligible collateral were necessary to ensure that banks had sufficient borrowing facilities. Parts of this eligible collateral entailed a degree of risk for Norges Bank.

In 2005, Norges Bank found that conditions were right for the rules to be amended so that this risk could be reduced. There were several reasons for this. First, banks’ borrowing facilities had grown relative to their borrowing requirements. Second, the Financial Collateral Act of 2004 provided for immediate realisation of collateral, allowing banks’ borrowing facilities to be calculated on the basis of market value rather than nominal value. The use of market value to calculate borrowing facilities reduced Norges Bank’s risk and paved the way for lower haircut rates. For a given volume of pledged securities, reduced haircuts mean increased borrowing facilities. Third, there was reason to believe that banks would gradually begin to use new covered bonds as collateral at Norges Bank.

Box 1. Norges Bank’s lending facilities

Norges Bank’s lending facilities are important instruments in the implementation of its liquidity policy. First, they are to help adjust the supply of liquidity so that Norges Bank’s interest rate decisions influence market interest rates. Through auctions of fixed-rate loans (F-loans), Norges Bank ensures that banks have sufficient liquidity to maintain suitably large deposits in the central bank. This means that short-term money market rates remain just above the key policy rate (the sight deposit rate), which is the interest on banks’ deposits at Norges Bank. Second, the lending facilities are to help ensure that banks have sufficient liquidity for smooth settlement of payments. Banks settle their dues by transferring funds between their accounts at Norges Bank. If a bank has insufficient deposits in its account to settle a payment, it can use Norges Bank’s D-loan facility.1 This serves as an overdraft facility. Intraday loans are interest-free, while overnight loans attract a rate of interest which is 1 percentage point higher than the key policy rate. As a result, banks normally make sure that they repay D-loans before the end of the day, often with funds borrowed from other banks.

F-loans and D-loans are Norges Bank’s ordinary lending facilities. The central bank can also issue loans on special terms (S-loans) to a bank running into acute liquidity problems. No such loans have been issued since the banking crisis of the early 1990s.2


2 For further information on S-loans, see pp. 36–37 of Financial Stability 2/04, Norges Bank.

1 We would like to thank Asbjørn Enge, Andreas Sand and Pål Winje for useful comments. This is a translation of an article published in Penger og Kreditt 4/07, with a few minor updates due to recent market and regulatory developments.

2 This fundamental principle was established in connection with the banking crisis of the early 1990s. For example, Report to the Storting No. 24 (1989–90) states that “the writing down of the central bank’s loans may […] constitute active use of government funds which should be considered by the Storting in advance.”
Some of the changes adopted in 2005 did not enter into force until 1 November 2007. We now have a basis for analysing the consequences of the changes in the rules for banks’ borrowing facilities and Norges Bank’s risk.

During the turmoil in global financial markets in 2007–08, banks in many countries borrowed more than usual from central banks. Demand for central bank liquidity increased because the markets for interbank lending functioned poorly. The turmoil was triggered by uncertainty about which banks might be hit by losses and liquidity problems as a result of difficulties in the US sub-prime mortgage market. Banks were uncertain about both their own and other banks’ future liquidity. To reduce the risk, they therefore sought to limit their lending to other banks. It became harder than usual for banks to raise loans, and interest rates in these markets rose sharply. Many central banks therefore injected additional liquidity into the banking system through market operations and secured loans. Some central banks also extended the range of eligible collateral. Norges Bank ensured a sufficient supply of liquidity to the banking system through a slightly larger allotment of F-loans than usual.3

This article is organised as follows. Section 2 summarises the rules on collateral for loans from Norges Bank and compares them with the rules at other central banks. Section 3 looks at the size and composition of banks’ borrowing facilities and how these have evolved over time. We also analyse the consequences for banks’ borrowing facilities of the changes in the rules adopted two years ago, and the size of banks’ borrowing facil-

Box 2. Main features of the rules

Norges Bank accepts securities issued by public and private issuers in Norway and abroad. Norges Bank also accepts units in funds registered with the Norwegian Central Securities Depository (VPS).

Requirements for all securities
Securities must not be subordinate to other debt or be linked to credit derivatives. They must have prices available and be registered with an approved securities depository. Securities must not be convertible, be linked to an index, or have a capped floating rate. A bank may not pledge securities issued by a company in the same group (excludes covered bonds).

Requirements for securities issued by private Norwegian issuers
Securities issued by private Norwegian issuers must have a minimum volume outstanding of NOK 300 million and be registered on an exchange or other approved marketplace. Securities issued by companies must also have a minimum credit rating of BBB– from Standard & Poor’s or Baa3 from Moody’s. An equivalent credit rating for the issuer may be accepted if the security itself is not rated.

The proportion of securities issued by banks and bank-owned mortgage companies (bank quota) must be no more than 35 per cent of a bank’s overall collateral. The bank quota does not include covered bonds.

Requirements for securities funds
Securities may be registered with VPS or be confined by their rules to investing in securities which are eligible under Norges Bank’s rules. A fund may nevertheless invest in unlisted securities if there is a binding commitment to list the securities on an exchange within 14 days. Fund units are included in the quota of bonds issued by banks and bank-owned mortgage companies if the fund’s rules allow it to invest in such bonds.

Requirements for securities from foreign issuers
Securities from foreign issuers must have a minimum credit rating of A from Standard & Poor’s or A2 from Moody’s. Securities must be denominated in USD, EUR, GBP, SEK, DKK, JPY, CHF, NZD or AUD. The issuer must be domiciled in a country approved by Norges Bank. Securities from private issuers must also have a minimum volume outstanding of EUR 100 million. A maximum of 20 per cent of a loan’s outstanding volume may be pledged by the same bank. Private securities must be listed on an exchange or other marketplace approved by Norges Bank.

Contingency clause
In special cases, Norges Bank may approve other collateral or depart from the requirement for collateral, cf. Section 3 of the Regulation on Banks’ Access to Loans and Deposits in Norges Bank etc. (FOR 2001-04-25 No. 473).

1 A more detailed presentation of the rules can be found on Norges Bank’s website.

3 For further information on liquidity management at Norges Bank and the response of other central banks during the turmoil, see Monetary Policy Report 3/07, Norges Bank.
Economic Bulletin 1/2008

Section 3 describes how Norges Bank's credit risk is compared with their need for credit when settling payments. Section 4 analyses changes in Norges Bank's risk, while Section 5 draws conclusions and looks to the future.

2 The rules and the changes in the rules

Norges Bank accepts many types of securities as collateral. When deciding which assets are eligible, importance is attached to three considerations. First, Norges Bank's risk is to be as small as possible. Even if a loan is collateralised, there will be a risk if the issuer of the pledged securities cannot fulfil his obligations, or if the securities are difficult to sell. Second, the rules should be designed in such a way that banks have sufficient borrowing facilities at Norges Bank. Third, there are operational considerations: the collateral should not necessitate a disproportionate amount of manual follow-up at Norges Bank. Box 2 presents the key features of the current rules.

2.1 Changes in the rules in recent years

In autumn 2005, Norges Bank decided to make changes in the rules. Most of the changes tightened the collateral requirements. This was done to increase the credit quality and marketability of the pledged securities (in other words, reduce credit risk and liquidity risk). Changes were also made to avoid the borrower and the issuer of the collateral belonging to the same sector and therefore potentially running into financial problems at the same time. Some minor changes were motivated by operational considerations at Norges Bank. It was also decided to reduce the haircut rates, which, in isolation, served to increase banks' borrowing facilities. To make it easier for banks to adjust to the changes in the rules, it was decided that some of the changes would
Table 2 Rules on eligible collateral at selected central banks

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<tbody>
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<td>No</td>
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<tr>
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<tr>
<td>Covered bonds</td>
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<td>No</td>
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<td>Yes</td>
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<td>Asset-backed securities1</td>
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<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Credit rating required2</td>
<td>BBB–/–</td>
<td>A– 3</td>
<td>–</td>
<td>A</td>
<td>–</td>
<td>BBB–/AAA</td>
</tr>
<tr>
<td>Foreign currencies</td>
<td>8</td>
<td>0</td>
<td>1</td>
<td>7</td>
<td>1</td>
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<td>No</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Bank quota</td>
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<td>No</td>
<td>–</td>
<td>Yes</td>
<td>–</td>
<td>No</td>
</tr>
<tr>
<td>Minimum volume outstanding</td>
<td>NOK 300/800m</td>
<td>No</td>
<td>No</td>
<td>SEK 100m</td>
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<td>No</td>
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<tr>
<td>Requirement for government account at central bank</td>
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<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>

1 Securities issued by special-purpose vehicles. These vehicles purchase mortgages and other types of debt, often from banks and other financial institutions, and fund these purchases by issuing bonds secured against the portfolio acquired.
2 Where two ratings are given, the first is for domestic securities, and the second for foreign securities.
3 Rating or estimated bankruptcy probability corresponding to such a rating.


not enter into force until 1 November 2007. A number of additional changes relaxing the rules were adopted in autumn 2007, and these also entered into force on 1 November 2007.

Table 1 shows the most important changes which Norges Bank has made in the rules over the last couple of years. The table shows when the changes were adopted, when they entered into force, and what was the reasoning behind them.4

Norges Bank accepts securities issued by public and private issuers in Norway and abroad. Norges Bank also accepts units in funds registered with the Norwegian Central Securities Depository (VPS).

2.2 Rules on collateral at different central banks5

Differences in central banks accept different types of asset as collateral. Table 2 summarises the rules on the provision of collateral for a selection of central banks. Of these selected banks, the Federal Reserve in the US seems to have the most liberal rules, while the Bank of England has the most stringent.6 Sveriges Riksbank in Sweden and the Eurosystem have fairly similar rules to Norges Bank. Some central banks, including the Bank of England, widened the range of eligible collateral during the market turmoil in 2007–08. Table 2 is based on current regulation and not ad hoc crisis measures.

Norges Bank, the Eurosystem, Sveriges Riksbank and the Federal Reserve accept securities issued by banks. Norges Bank and Sveriges Riksbank set a limit on the proportion of the total collateral for which such securities may account. The same four central banks accept corporate securities, covered bonds and asset-backed securities. Danmarks Nationalbank in Denmark does not accept bonds issued by banks or asset-backed securities, but does accept covered bonds. The Eurosystem and the Federal Reserve are the only central banks in the selection which accept bank loans (that is, loans to customers) as collateral.

The rules on eligible collateral need to be seen in the light of the size of the bond market in local currency. Countries with a relatively small local bond market, such as Norway and Sweden, accept securities issued in a variety of currencies. Countries and regions with large bond markets, such as the euro area, the UK and Denmark, accept few currencies other than the local one. The exception is the Federal Reserve, which generally has liberal rules on collateral in connection with the settlement of payments. The size of the bond markets also helps to explain why Norges Bank and Sveriges Riksbank are the only banks in the selection to have a minimum volume requirement to ensure that the collateral is sufficiently liquid.

5 This description is based on available information about the various central banks’ rules on collateral for loans and has not been quality-assured by the central banks in question.
6 Several central banks have different rules on eligible collateral in connection with market operations and lending facilities relating to the settlement of payments. In this comparison, we look at the rules for the equivalent of intraday and overnight D-loans at Norges Bank.
large incoming payments are made to the government on certain days of the year. These are paid via the banks to the government’s account at Norges Bank. The banks need a great deal of liquidity to execute these payments. Banks’ liquidity requirements are therefore greater in countries where the government has an account at the central bank and also has large incoming payments.\(^7\)

### 3 Banks’ collateral at Norges Bank

Banks’ available liquidity at Norges Bank comprises their deposits in sight deposit accounts and unused borrowing facilities at the Bank. The limit on these borrowing facilities applies to F-loans and D-loans combined: borrowing rights used for F-loans cannot also be used for D-loans, and vice versa. Banks have pledged more securities to Norges Bank in recent years, which has increased their aggregate borrowing facilities (Chart 1).

Banks’ liquidity requirements are related to the size of the positions they settle through Norges Bank’s Settlement System (NBO). Developments in average turnover in NBO are an indicator of developments in liquidity requirements.\(^8\)

The fluctuations in turnover illustrate that liquidity requirements vary. Aggregate liquidity comes under most pressure on days when large payments are made to the government. Petroleum taxes have a particular impact when they fall due twice a year.\(^9\) In the period immediately after petroleum taxes fall due, the liquidity available for the settlement of payments is reduced. This is because large parts of banks’ borrowing facilities are used to raise F-loans, with the increased deposits that result then being used to pay the petroleum taxes.

The changes in the rules adopted in 2005 have affected banks’ borrowing facilities. The following discusses the changes in borrowing facilities for different categories of banks. We also look at different banks’ utilisation of available liquidity in NBO on days when liquidity is scarce due to payments to the government.

#### 3.1 Categories of banks

Both borrowing requirements and borrowing facilities normally vary with the size of a bank. To simplify the analysis, we distinguish between small, medium-sized and large banks (see Table 3).

The small banks rarely, if ever, participate directly in settlement in NBO. They therefore have little or no need to borrow from Norges Bank, and so little or no need to pledge securities to Norges Bank. Many small banks have nevertheless retained their borrowing facili-

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### Table 3 Classification of banks with an account at Norges Bank

<table>
<thead>
<tr>
<th></th>
<th>Large</th>
<th>Medium</th>
<th>Small</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number</td>
<td>4</td>
<td>18</td>
<td>104</td>
</tr>
<tr>
<td>Participation in settlement of NICS retail clearing in NBO(^1)</td>
<td>Direct</td>
<td>Direct</td>
<td>Indirect</td>
</tr>
<tr>
<td>Participation in gross settlements at Norges Bank(^2)</td>
<td>Frequent</td>
<td>Daily</td>
<td>Rare</td>
</tr>
<tr>
<td>Account at foreign securities depository</td>
<td>All</td>
<td>Half</td>
<td>Very few</td>
</tr>
<tr>
<td>Credit lines to other banks</td>
<td>Significant</td>
<td>Limited</td>
<td>Limited</td>
</tr>
<tr>
<td>Share of total assets (2006)</td>
<td>Approx. 80%</td>
<td>Approx. 25%</td>
<td>Approx. 15%</td>
</tr>
<tr>
<td>Share of F-loans (Jan–Oct 2007)</td>
<td>93%</td>
<td>6%</td>
<td>&lt;1%</td>
</tr>
<tr>
<td>Share of total borrowing facilities (1 Nov 2007)</td>
<td>80%</td>
<td>16%</td>
<td>4%</td>
</tr>
<tr>
<td>Proportion of category’s collateral registered abroad</td>
<td>87%</td>
<td>57%</td>
<td>20%</td>
</tr>
</tbody>
</table>

\(^1\) Retail payments to be settled between the banks are cleared in the Norwegian Interbank Clearing System (NICS). Clearing results in a net position for each bank. Banks classified as large and medium-sized settle their positions directly at Norges Bank. Small banks have an agreement with a large or medium-sized bank whereby the latter includes the small bank’s position in its own position when settling at Norges Bank. NICS is a clearing house and transaction channel for payments.

\(^2\) Transactions which are settled individually are referred to as gross transactions and are settled continuously at Norges Bank.

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\(^7\) Other factors also affect banks’ liquidity requirements. See, for example, Fidjestøl, A.: “The central bank’s liquidity policy in an oil economy”, *Economic Bulletin* 4/07, Norges Bank.

\(^8\) Banks’ liquidity requirements depend not only on how much they send and receive, but also on the order in which this happens (see Section 3.3).

\(^9\) The Norwegian Ministry of Finance has recently proposed that petroleum taxes fall due six times rather than twice a year, starting on 1. August 2008. If implemented, this would reduce liquidity requirements on extreme days.
ties, probably in order to meet the quantitative liquidity requirement which previously applied.\(^{10}\) To meet this requirement, banks needed to hold 6 per cent of their balance sheet as liquid assets, and unused borrowing facilities at Norges Bank counted as liquid assets. Since the quantitative liquidity requirement was replaced by a qualitative requirement in 2006, several small banks have terminated their accounts and borrowing facilities at Norges Bank.

In an emergency, small banks too may need to borrow from Norges Bank. This might suggest that they should have access to securities which are eligible as collateral for loans from Norges Bank. Banks which settle through a private bank must have an alternative settlement bank which will be used if the settlement bank normally used cannot continue to operate. Banks which wish to use Norges Bank as their alternative settlement bank should own or quickly be able to obtain securities which can be used as collateral for loans from the central bank. Such securities can also be used to raise F-loans from Norges Bank in periods when it is difficult to borrow elsewhere.

The medium-sized banks participate directly in settlement at Norges Bank, and some of them take out F-loans. Around half of the medium-sized banks have an account at a foreign securities depository. Those which do not have, or do not wish to have, such an account must limit themselves to investing in securities registered with VPS.

The large banks participate actively in NBO, raise the largest volumes of F-loans, and extend lines of credit to Norwegian and foreign banks. This means that they have large liquidity requirements. On the other hand, they normally have good access to funding in the securities markets, and they invest in a wide range of foreign-registered securities.

### 3.2 Banks’ borrowing facilities and the impact of the new rules

Banks’ aggregate borrowing facilities have increased in recent years (see Charts 1 and 2). However, there have been major differences between the different categories of banks. While the large banks have generally increased their borrowing facilities substantially, small banks as a whole have reduced theirs. There are also big differences between individual banks (see Chart 3).

The composition of the pledged portfolio has changed. The proportion of foreign-registered securities has risen from 56 to 80 per cent in the last three years (see Chart 2). It is primarily the largest banks which have contributed to this. The proportion and value of Norwegian-registered securities in the pledged portfolio have fallen. This reflects the fact that the tightening of the collateral requirements has had a particular effect on the pledging of Norwegian-registered securities.

It is difficult to gauge the impact of the changes in the rules. First, there is reason to believe that the composition of the collateral would have changed even if the rules had not. The large banks have needed to increase their borrowing facilities,\(^{11}\) and banks of this kind typically invest in bonds registered abroad. Second, banks gradually adapted to the new rules before they entered into force.

Banks’ gradual adjustment is illustrated in Chart 4, which shows the estimated change in the value of eligible collateral assuming that the new rules had been introduced on three selected days prior to 1 November 2007. In other words, the chart shows how much of the collateral would have changed even if the rules had been introduced on three selected days prior to 1 November 2007.

- The first observation (16 November 2004) is from before the changes in the rules were announced. This shows that the three categories of banks had different needs to modify their collateral in order to maintain it at the same level.

\(^{10}\) For information on the new and old liquidity requirements, see Section 4 of Proposition to the Odelsting No. 44 (2005–06), “Nye likviditetskrav for banker” [New liquidity requirements for banks], http://www.regjeringen.no/nb/dep/fin/dok/regpubl/otprp/.

\(^{11}\) The large banks’ borrowing requirements have increased partly as a result of increased petroleum taxes, which have necessitated the raising of larger F-loans than before.
- The second observation (11 July 2007) shows the situation four months before the new rules actually entered into force. The large banks were well prepared, while the smaller banks still had a substantial proportion of securities pledged which would soon no longer be eligible as collateral.

- The third observation (31 October 2007) shows what the banks actually lost in terms of eligible collateral when the rules entered into force the following day. One reason why the reduction was not larger is that Norges Bank actively encouraged the smaller banks to adjust their collateral in the months leading up to November.

When parts of the new rules entered into force in 2005, banks’ borrowing facilities increased considerably. This was a result of haircut rates being reduced immediately following the transition to market value, while the changes tightening the collateral requirements were introduced over a two-year period.

The positive effect of the reduced haircut rates meant that the net reduction in borrowing facilities was smaller than the reduction in collateral as a result of the tightening of the rules (illustrated in Chart 4). If all of the changes in the rules (both the tighter collateral requirements and the reduced haircut rates) had entered into force in November 2004, the banks’ aggregate borrowing facilities would have been cut by 15 per cent (see Chart 5). This figure assumes no adjustments by either banks or issuers.

As mentioned above, the rule changes have impacted differently on the different categories of banks. Smaller banks have been affected more than larger banks. This is because small and medium-sized banks pledge more Norwegian-registered securities than large banks do, and the rule changes have had the greatest effect on Norwegian-registered collateral. Norwegian-registered collateral has been affected particularly by the requirement for minimum volume outstanding. In addition, some Norwegian securities are no longer eligible because they are not listed on an exchange or do not have a sufficiently high credit rating.

### 3.3 Actual use of borrowing facilities

Some banks’ borrowing facilities have been reduced as a result of the rule changes. To see whether this has led to an increased risk of disruption in the settlement of payments in NBO, we have compared banks’ liquidity requirements with their access to central bank liquidity (deposits and borrowing facilities at Norges Bank).

We have calculated how much liquidity each bank needs during the day for the settlement of payments (see Box 3). It is assumed that all transactions are settled immediately. Thus we have not taken account of banks being able to reduce their liquidity requirements by waiting for incoming transactions from other banks.

### Box 3. Liquidity requirements in the settlement of payments

Banks send and receive transactions in NBO throughout the day. A bank’s liquidity requirements will be greatest at the time when the value of transactions sent (outgoing payments) is highest relative to the value of transactions received (incoming payments). Banks’ liquidity requirements therefore depend on the size and order of the transactions they send and receive. If a bank does not have sufficient liquidity, its transactions are queued. The transactions in the queue are settled once the bank receives new transactions or pledges more collateral to Norges Bank.
On days with no large incoming payments to the government, all of the banks have ample access to central bank liquidity. On one such day chosen at random (11 July 2007), 17 of the 22 large and medium-sized banks had more than three times more liquidity than they needed at any time during the day. On days when large tax payments fall due, their liquidity requirements are substantially larger, and the margins smaller.

We have also calculated the large and medium-sized banks’ liquidity requirements on the days in 2007 with the largest incoming payments to the government. For these days, we have looked at the ratio between actual access to liquidity and the maximum need for liquidity during the day. This “liquidity ratio” shows how many times more liquidity the banks have than they actually need. If supply is equal to demand, the ratio will be 1. We have then chosen the lowest liquidity ratio for each of the banks – in other words, the liquidity ratio on the day with the smallest margin between a bank’s access to and need for liquidity (see Chart 6). There is one column for each bank, with the liquidity ratio on the y-axis.

There are major variations between banks. Chart 6 shows that some banks have a relatively small margin on extreme days. However, a liquidity ratio of less than 1 does not mean that a bank failed to settle its transactions on the day in question. When a bank lacks cover for a transaction at Norges Bank, the transaction is queued. The transaction is settled once the bank obtains cover, either through the provision of additional collateral or through transactions received.

While some banks increased their borrowing facilities in the months leading up to 1 November, others reduced theirs, due partly to the tightening of the rules. For most banks, the change in their borrowing facilities had little effect on the liquidity ratio. This is illustrated by the red columns in Chart 6. Here, banks’ actual borrowing facilities on the days in question are adjusted for the percentage change in their borrowing facilities from 11 July to 1 November 2007. With the exception of the bank on the far left of the chart, the banks with the lowest ratios did not reduce their borrowing facilities. This lowers the risk of settlements being disrupted.

4 Norges Bank’s risk
To limit Norges Bank’s risk, the securities which banks pledge as collateral must be of high credit quality and highly marketable even in periods of financial turmoil. In the case of securities denominated in foreign currencies, it is also important that the currency does not depreciate significantly against the Norwegian krone in a short space of time. Banks are increasingly pledging securities denominated in foreign currencies and registered with foreign securities depositories (see Chart 2).

4.1 Foreign-registered collateral
A security’s credit quality can be gauged using a credit rating (see Box 4). All pledged securities from foreign 11 July to 1 November 2007. With the exception of the bank on the far left of the chart, the banks with the lowest ratios did not reduce their borrowing facilities. This lowers the risk of settlements being disrupted.
issuers must have a rating of at least A from Standard & Poor’s or A2 from Moody’s. It has been estimated that the annual probability of default for a security rated A– by Standard & Poor’s or A3 by Moody’s (i.e. slightly below the required rating) is approximately 0.1 per cent.13 The credit quality of securities pledged to Norges Bank is shown in Chart 7. Where securities are rated differently by the two rating agencies, the lower rating is shown.

Approximately 90 per cent of the securities pledged have a credit rating of AA– or higher (see Chart 7). AAA and AA are the highest rating categories. Of the remaining foreign bonds pledged, almost all have a rating of A+. The likelihood of a credit event in the pledged portfolio can therefore be considered very small.

Almost two-thirds of foreign securities pledged as collateral are issued by financial undertakings (see Chart 8). Issuers in this category are often special-purpose vehicles, and a substantial proportion of these bonds are backed by mortgages. As a result of the turmoil associated with US sub-prime mortgages, there has been some uncertainty about special-purpose vehicles as issuers of such bonds. However, a review has shown that only a small number of asset-backed securities pledged to Norges Bank have been downgraded by the rating agencies in connection with the market turmoil since last summer. Though prices of many pledged bonds have fallen during the turmoil, only a small share of pledged bonds have experienced that prices have dropped to below 90 per cent of the issued price.14 Banks have not changed their collateral during the market turmoil in such a way as to reduce the quality of the pledged portfolios.

Even if the issuer of a bond has a high credit rating, Norges Bank may incur a loss if the bond is denominated in a currency which weakens against the Norwegian krone. Norges Bank has therefore set an additional haircut of 3 percentage points for securities which are not denominated in NOK. A review of exchange-rate movements between the krone and eligible foreign currencies in the period from 1994 to 2007 shows that this haircut was sufficient in the vast majority of cases. For the most widely used currency (EUR), the decline in value over a period of one week15 was less than the haircut in 99.7 per cent of cases. The equivalent figure for the currency with the widest fluctuations against the krone (JPY) was 98.3 per cent.

4.2 Norwegian-registered collateral

Securities issued or guaranteed by a government or municipality feature very low credit risk and are highly marketable. Securities from the banking and corporate sectors often feature higher credit risk and are traded less frequently. The low turnover of these securities is due partly to Norwegian securities often having a low volume outstanding.

The requirements adopted in 2005 have improved the quality of Norwegian-registered collateral at Norges Bank. A substantial proportion of the securities issued by the banking and corporate sectors are no longer eligible as collateral. In the case of securities from the banking sector, this is because they do not meet the volume requirement; in the case of securities from the corporate sector, this is because they do not meet the requirement of having a credit rating. This has led to reduced pledging of Norwegian-registered securities issued by banks and companies (see Chart 9). The gradual reduction in the bank quota from 50 to 35 per cent has also contributed to this. On 1 November 2007, less than 30 per cent of Norwegian collateral was from private issuers with a credit rating of BBB+ or below (see Chart 10). The proportion of low-rated collateral fell after the remainder of the new rules entered into force on 1 November 2007.

13 “The single list in the collateral framework of the Eurosystem”, Monthly Bulletin 5/06, ECB.
14 Borrowing facilities are based on daily updated market values, which reduces Norges Bank’s risk.
15 This is a relevant time frame because the realisation of collateral can take a few days.

Economic Bulletin 1/2008
5 Conclusion

The rules on collateral at Norges Bank have been revised in recent years. The main motivation for the changes was to reduce Norges Bank’s risk. This has been achieved. Borrowing facilities are now based on market values which are updated daily. The proportion of securities issued by banks has fallen, while the proportion of securities of high credit quality has risen, and the volume requirement has increased the collateral’s liquidity.

The rule changes adopted in 2005 would have led to a slight decrease in banks’ borrowing facilities if they had chosen to retain their original portfolio of pledged securities after the new rules came into force (based on securities pledged in autumn 2004).

Aggregate borrowing facilities have increased in recent years. Calculations indicate that banks have sufficient liquidity for the settlement of payments. A number of small and medium-sized banks’ borrowing facilities have been reduced. As small banks nearly always settle with the help of another private bank, they have less of a need to borrow from Norges Bank. Small banks which wish to have a contingency account at Norges Bank should hold securities which Norges Bank can accept as collateral.

The market for covered bonds in Norway is in its infancy. If the markets for these bonds in neighbouring countries are anything to go by, this could also become a large market in Norway. If so, it will provide a new source of eligible collateral for Norges Bank in the years ahead.

It was decided in 2005 to lower the quota of bank securities from 50 to 35 per cent, and it was announced that further reductions would follow. Norges Bank will present a schedule for these reductions in 2008.
On commodity derivatives and the Norwegian initiatives to create a fish derivatives market

Gunnvald Grønvik, special adviser, Norges Bank Financial Stability

Hedging against future price movements can be important both for those producing goods and for those buying them. Commodity derivatives may be employed as a hedge against price risk, and this is one of the reasons behind several initiatives to establish fish derivatives markets in Norway. This article discusses the general terms for establishing commodity derivatives markets. There is seldom more than one derivatives market for a commodity. The success of a Norwegian fish derivatives market will depend on global competition between such marketplaces, and this competition will determine whether and what type of initiative that will succeed.

Norwegian (and European) legislation for commodity derivatives appears to be adequate. The markets are well organised and Norwegian legislation ensures that transactions involving standardised products are settled in a clearing house and that netting rules apply. This contributes to ensuring financial security in the commodity derivatives markets. The market positions held by financial institutions are otherwise too small to threaten general financial stability.

1. Introduction

During the past decade, power and freight derivatives markets have developed in Norway and efforts are currently underway to establish a salmon derivatives market. All of these markets are based on the participation of buyers and sellers in many countries. Authorities worldwide are increasingly focusing attention on commodity derivatives markets. In the 1997 Tokyo Communiqué, supervisory bodies from 18 countries recommended standards for the regulation and supervision of commodity derivatives markets. The Markets in Financial Instruments Directive provided the EEA countries with a common standard for regulating these markets (which is in accordance with the Tokyo Communiqué). In Norway, the Directive was implemented through a new Act on securities trading which came into effect in the latter part of 2007. As a basis for discussing such markets, it may be useful to explain how these markets function.

A derivative is a contract to buy and/or sell an asset at a predetermined date at a price determined at the contract date. The asset to be delivered is called the underlying asset for the derivative or simply the underlying. Goods and services are the assets underlying commodity derivatives, whereas other financial instruments or foreign currency are the assets underlying financial derivatives. In principle, the derivative’s underlying asset should be delivered, but most derivatives markets today only involve a financial settlement. In cases where physical settlement of the underlying asset is required, the market usually provides a delivery facility so that purely financial investors can also participate in the market for the purpose of hedging price risk or speculation.

In derivatives markets, the most common types of forward contracts are futures and forwards. The most important difference between futures and forwards is how the contracts are settled. Both contracts involve a future purchase where the price, quantity and quality of goods and the time and place of delivery are predetermined. The value of a futures contract is set daily at market value and buyers and sellers are credited or debited daily in relation to changes in value. In a forward contract, the entire settlement takes place when the contract matures.

We also differentiate between derivatives that are traded directly in an organised market (exchange traded) and over-the-counter (OTC) derivatives. When derivatives are traded in organised markets, the product is fully specified. The contracts traded are the same size, the maturity date is the same, and counterparty risk is eliminated since all transactions go through a clearing house which is the central counterparty, etc. This may be compared to the purchase of off-the-shelf items in a supermarket (e.g. 1 kg of sugar). With an OTC transaction, the product can be specially adapted just as the customer can customise a product to our wishes when we go to the cheese counter and ask for a small piece of Gouda. The market participants offering OTC contracts are usually brokers, and trading directly in the organised market where they can reduce the risk of their OTC transactions is often an element of their risk management. Therefore, successful marketplaces for commodity derivatives often live in symbiosis with brokers dealing in OTC contracts.

When a clearing house participates in a transaction as central counterparty, it acts as an intermediary between the buyer and seller. Both parties sign contracts with the central counterparty rather than with each other. In this way, all market participants only have counterparty risk in relation to the clearing house. The clearing house performs this service for a small fee but also demands collateral for its activities either in the form of a daily margin payment in accordance with the contract’s daily margin payment in accordance with the contract’s daily

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* I would like to thank Trude Myklebust and colleagues at Norges Bank for providing useful comments to this work. Any remaining errors are the responsibility of the author. The views expressed are my own and should not be interpreted as views held by Norges Bank.

price movements or a guarantee which covers the maximum loss on the portfolio of contracts held by the market participant.

Central banks focus most heavily on financial derivatives and in particular exchange rate and interest rate derivatives. These are clearly the largest derivatives markets and are also the markets that can have the most substantial impact on central bank activities in the areas of monetary policy and financial stability. Nevertheless, there is also considerable activity in the area of equity derivatives and credit derivatives. The standard of good practice for central counterparties involved in securities trading, which has been developed by central banks, the Basel Committee on Banking Supervision and supervisory authorities, also applies to clearing houses involved in commodity derivatives trading, cf. CPSS (2004).

Internationally, there is a large group of derivatives whose underlying assets are commodity prices. Contracts similar to today’s commodity derivatives contracts were first traded in the 1100s. The first organised derivatives markets where the underlying assets were agricultural products appeared around 1850. The participants included farmers and their sales cooperatives (future buyers) and the food and canning industry (future sellers). For both parties, security surrounding future prices had an independent value – the farmers increased the security of payment for seed grain and fertilizer while the canning industry increased the security of its pricing strategy and sales efforts. Commodity derivatives markets provide a hedge against unfavourable price movements and this has an independent value for both parties. Consequently, the transaction is more than a zero-sum game. The value of this hedge depends on the extent of the commodity’s price fluctuations.

Markets have developed in pace with demand, and at present there are global commodity derivatives markets with a range of underlying commodities. One large group of underlying commodities is agricultural products (grain, coffee, beef, food oil, orange juice, etc). Another group is metal and semi-finished goods (aluminium, copper, rubber, etc.). The group of underlying that receives most attention in Norway is energy products (crude oil, electricity). A number of indices (credit risk, equity indices, freight indices in shipping) are also used as the underlying. Some of these index products are naturally classified together with financial derivatives.

2. On the development of new commodity derivatives markets

In addition to the traditional commodity derivatives markets, new markets are also being developed. There was little knowledge of commodity derivatives markets in Norway before the liberalisation of the electricity markets through a new Energy Act. In 1995, Nord Pool established a financial market for derivatives based on wholesale electricity prices. The market for hedging energy price risk is now well established and is regulated by changes made in the Securities Trading Act in 2001. A Norwegian marketplace for shipping freight derivatives, Imarex, was established in 2000.

Both of these markets have experienced dramatic events.

- There was a dramatic increase in electricity forward contracts, considerable need for hedging and particularly extensive trading on Nord Pool at the end of April 1999. Because price movements were abnormally volatile, Nord Pool increased margin requirements and accepted wider deviations between the market makers’ bid and offer prices. Nevertheless, one of the market makers reneged on his obligations. The others continued their activity and thus the market continued to function so that it was still possible to hedge price risk.

- A Greek market participant with substantial positions on Imarex went bankrupt and could not meet his obligations to NOS Clearing in June/July 2004. The loss amounted to nearly NOK 60 million and led to a critical situation for NOS. The Financial Supervisory Authority of Norway (hereafter FSA Norway) demanded the introduction of measures to improve financial strength. The owners also recognised the need to improve the company’s capital backing. Early in 2005, a new share issue raised nearly NOK 65 million. Subsequently, the activities of Imarex and NOS Clearing ASA could continue.

It appears now that both Nord Pool’s power derivatives market and Imarex’s shipping freight derivatives market are securely established.

At present, there are several initiatives to establish a fish derivatives market. The need to hedge the risk of fluctuations in salmon prices is the primary reason for establishing a new market. International sales of various kinds of frozen white fish (blocks) are also considerable and a derivatives market for frozen white fish is also conceivable.

Another possibility is timber which is also important in Norway and the Nordic countries. One of the reasons that there is no derivatives market for timber, may be that Norwegian forest owners used to own the processing industry. Thus, the security that a derivatives market can provide existed internally in the value chain. However, around 1990, the direct ownership of the processing industry ceased as the industry became
The Baltic Exchange is a London-based marketplace for freight rates. They gather information daily on completed contracts and maintain a code of conduct for market behaviour. For additional information, refer to their website: http://www.balticexchange.com/default.asp?action=article&ID=1

More international. A market for futures contracts in wood pulp already exists in Chicago where the standard unit is 20 (metric) tonnes of wood pulp and the price is based on a European price index. Whether this market covers all relevant hedging needs is uncertain.

Demand for this kind of hedging requires that price fluctuations are so extensive that there is a genuine need for protection. Certainty about future prices thus has an independent value. Development of a commodity derivatives market requires a clearly defined price against which the derivative can be settled. This will be explained in the next paragraph. The hedging product supplied by the market must be inexpensive and the counterparty risk must be low. The contracts must be standardised so that the market can become liquid. Achieving this requires organised trading, formulation of contracts and a settlement system.

The final settlement price is usually standardised against a spot market for the underlying commodity. The size and quality of the lot to be secured must be clearly defined. For example, there are a number of derivatives for various kinds and qualities of grain. Prices from the grain exchange for the physical delivery of the grain are used as the underlying for the derivatives. The expiry date of the derivatives contract (once a month or the like) must be specified. To guarantee execution of the contracts, the exchange requires collateral or completion of the contracts through a clearing house which requires a margin payment as collateral. In CPSS (2004), recommendation no. 4 is that margins shall cover losses in all normal market situations, and that the parameters used to calculate margin requirements should be based on risk and reassessed regularly.

Some commodity derivatives are not based on an underlying commodity that is traded in a market. The price against which the derivatives contract is settled is an index that has been established in such a way as to provide enough security that market participants are willing to purchase hedging products against the index. This is the case, for example, for freight indices which are traded on Imarex. Imarex uses the Baltic Exchange6, among others, to establish settlement prices.

### Table 1. Prices for forward freight agreements (FFA) from Saudi Arabia to Japan on Imarex

<table>
<thead>
<tr>
<th>Items</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clearing House</td>
<td>NOS</td>
</tr>
<tr>
<td>Underlying Index</td>
<td>Baltic Exchange Dirty Tanker Route 3 – TD3 (620,000 metric tonnes of non heat crude from Ras Tanura to Chiba)</td>
</tr>
<tr>
<td>Lot (contract) Size for trading and clearing</td>
<td>1,000 metric tonnes</td>
</tr>
<tr>
<td>Minimum Price Fluctuation</td>
<td>0.25 WorldScale points</td>
</tr>
<tr>
<td>Minimum lots size for trading and clearing</td>
<td>0.1 lots = 100 metric tonnes</td>
</tr>
<tr>
<td>Mark-to-market and daily settlements</td>
<td>All contracts are marked-to-market using the IMAREX forward curve which is set in Oslo (GMT+1) at 18:30 CET. Mark-to-market credits and debits are payable daily at the latest by 15:00 CET the following business day.</td>
</tr>
<tr>
<td>Trading Hrs</td>
<td>Electronic trading: 24 hours</td>
</tr>
<tr>
<td></td>
<td>Market place service: Oslo: 08:00 – 18:00</td>
</tr>
<tr>
<td></td>
<td>Singapore: 09:00 – 22:00</td>
</tr>
<tr>
<td></td>
<td>Houston: 07:00 – 16:00</td>
</tr>
<tr>
<td>Trading Hours on Last Trading Day</td>
<td>N/A</td>
</tr>
<tr>
<td>Last Trading Day</td>
<td>Trading terminates at the close of business on the 20th day of a given month, the last day of the first month of a quarter and the last day of the first month of a calendar contract. If the last trading day falls on a weekend or public holiday, the last trading day will be the nearest trading day prior to the last trading day.</td>
</tr>
<tr>
<td>Margins</td>
<td>Margin requirements are determined by NOS. Initial margins can be paid by cash or by Letter of Credit (LoC), whilst variation margins are settled in cash at the end of each trading day.</td>
</tr>
<tr>
<td>Final Settlement</td>
<td>Financial only. All contracts settle on the last day of the period using the average value of all index days in the period. For a list of non-index days please refer to the IMAREX holiday calendar.</td>
</tr>
</tbody>
</table>

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6 The Baltic Exchange is a London-based marketplace for freight rates. They gather information daily on completed contracts and maintain a code of conduct for market behaviour. For additional information, refer to their website: http://www.balticexchange.com/default.asp?action=article&ID=1
Specifications of the underlying commodity, a standard contract including collateral requirements for settlement, are available on the marketplaces’ websites. Table 1 shows the prices for forward freight agreements on Imarex’s website.

The marketplace must establish a product that is clearly defined and suited for trade. It must also ensure sufficient activity to generate enough liquidity that prices are so clearly established that the portfolio may be rebalanced without huge expense. Efforts to acquire liquidity are particularly important in the start-up phase because this determines whether the market is attractive enough to be profitable. In marketplaces where all interest is focused on one product, the life expectancies of the market and the product are the same. In some of the major marketplaces for commodity derivatives (London, New York and Chicago), several products are traded. Products are listed and de-listed on the basis of interest and profitability for the marketplace. As a result of global financial integration, the liquidity of a product has largely been gathered in one or a few global marketplaces. If a market survives the first hurdle, one can assume that it will attract business from everyone globally who needs to hedge the specific price risk traded on that market. When seemingly similar products are traded, they are often in reality different. The difference may lie in the geographic area of delivery or in the quality of the commodity. This is the case, for example, with various oil derivatives and grain derivatives.

To establish the initial activity, the initiators have close contact with those who are assumed to be natural users. They will be large manufacturers or large consumers of the commodity. Like stock markets, commodity derivatives markets have members who receive information from the market and have access to trade in the market. Unlike stock market members, many members of commodity derivatives markets are often end users. The system of having a fixed group of members also contributed to settlement security at one time. Today, international recommendations on the use of a clearing house are usually followed. This reduces risk and allows markets to be accessible to more participants. Among these participants are speculators who take positions on the basis of their assessments of future prices. Such speculation increases liquidity and has a positive effect on the establishment of deep, liquid markets. Contracts that oblige particular market participants to quote bid and offer prices for a certain minimum volume on a continuous basis, is one important way of securing liquidity. Markets that have such market-makers are by definition liquid. In commodity derivatives markets, it is the marketplace that must take the initiative to find market participants who are willing to take on these obligations. In financial derivatives markets, also the issuer of the underlying may take the initiative as they also have an interest in deep and liquid markets for their security.

3. Regulating commodity derivatives markets
In Norway (and the Nordic countries), commodity derivatives have been defined as financial instruments for a number of years. With the MiFID, which by now is implemented throughout the entire EEA, this is the European standard. Therefore, in most European countries, the same supervisory authority that supervises the securities markets also supervises the commodity derivatives markets and their activities. Commodity derivatives markets are also strictly regulated in the US, Canada and Japan. In these countries, there are special organisations that supervise these activities. These countries and the European regulations follow the standards that were established in the Tokyo Communiqué.

The first Norwegian regulation came in 2001 and was based on a proposal from the commodity derivatives committee (NOU 1999:29). This committee based its proposal on the fact that the need for an organised and well-functioning market which had the confidence of the general public indicated that the activity must be regulated by legislation. The committee chose a general regulation rather than a specific regulation for power derivatives, where the need for regulation was most pronounced, because they could not dismiss the possibility that other commodity derivatives would be developed. The possibility of salmon derivatives contracts was mentioned in particular.

In accordance with the proposal from the committee, commodities derivatives were defined as financial instruments in the Securities Trading Act. Initially, only some of the provisions in the Act were in force. These included the netting rules, which contributed to keeping the bilateral positions of market participants at a low level. It was also decided that the use of a clearing house would be required for all investment firms trading in regulated marketplaces. This reduced financial risk. The commodity derivatives committee stated that commodity derivatives activity cannot in itself have an impact on financial stability.

Commodity derivatives are also defined as financial instruments in the new Securities Trading Act. This means that the rules in the new Stock Exchange Act also apply. Thus, firms operating a regulated marketplace for commodity derivatives must be licensed as a regulated market or stock exchange and only investment firms can operate as an organised intermediary. The

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7 Prices are clearly established when there is little difference between purchase price and sales price.
8 The EU committees ESC (European Securities Committee) and CESR (Committee of European Securities Regulators) deal with commodity derivatives issues.
9 The laws are the Securities Trading Act and Act on regulated markets (Stock Exchange Act) respectively. Both acts were adopted on 29 June 2007 and came into force on 1 January 2008.
10 Providing investment services such as buying and selling commodity derivatives for the general public requires authorisation. Nevertheless, both the old law (Section 7–1) and the new law (Section 9–2) allow for the participation of specialised commodity brokers in the market. The new law does not require authorisation for firms where “the main activity is own-account trading of commodities or commodity derivatives assuming that the firm is not part of a group where the main activity is providing other investment services or banking services.”
ordinary rules of behaviour in the Securities Trading Act, the requirement of good business practice and the rules on supervision and sanctions also apply for commodity derivatives trading.

Rules prohibiting insider trading were among those that were not put into force in connection with the initial legislation. The rules were not adopted in part because the definition of inside information at that time did not suit commodity derivatives.

The difficulty of defining inside information for a commodity derivative may, for example, be illustrated by a plan for extensive maintenance of hydro-electric power stations. In general, one must assume that such a plan may have an impact on the market for electricity and power derivatives. Knowledge of these plans would qualify as inside information and employees at the power company would be privy to this information. However, if there is perfect competition in the energy market, other energy producers will change their production schedule in order to realise the gain that results from higher prices in the spot market. Consequently, the equilibrium price will remain unchanged. This means that there will be no net effect on the spot price or on forward prices against which the derivatives market is designed to provide a hedge. Information that can affect prices in the commodities market is not necessarily information that is relevant to prices in the commodity derivatives market. Knowledge of the maintenance plan may therefore be called inside information in the underlying commodities market, but this market is not regulated by the Securities Trading Act. This knowledge will only be inside information for prices in the financial forward market if the market for the underlying commodity does not function perfectly.

Nevertheless, there may be other information with limited distribution that can provide an unreasonable information advantage. One example might be knowledge of planned changes in the regulation in force (due to climate changes or the like). It is not the distributor or producer of the underlying commodity but the employees at the regulatory authorities who may have access to such information before it becomes public information. It is important to prevent misuse of such information. Clarification of the rules indicates that FSA Norway would categorise trading in financial instruments by individuals with this type of information as insider trading. With regard to salmon prices that are listed in Norway, knowledge of changes both in the Norwegian regulations and in the trade regime for salmon (maximum prices to the EU, ban on sales to Russia or opening up for trade with the US) qualifies as inside information. This indicates that the public authorities should also have strict rules to ensure that market-relevant information reaches the market in an appropriate manner. In this area, the Norwegian authorities must also cooperate with the authorities in other countries.

In 2005, a specific definition of inside information for commodity derivatives was given and the rule prohibiting insider trading was applied. This was an adaptation to Directive 2003/6/EC of the European Parliament and of the Council of 28 January 2003 on insider dealing and market manipulation (market abuse) and the rule has been implemented in the new act. Whether the new rules solve the actual difficulties of defining inside information for commodity derivatives is not clear.

Investment firms’ transactions in financial instruments (including commodity derivatives) in a regulated marketplace must be settled in a clearing house (Section 10–8 of the new Securities Trading Act). The same requirement does not apply to other market participants but companies that are not subject to an authorisation requirement (cf. note 10) will not have substantial activity aimed at the general public. The clearing house will be the central counterparty in derivative settlements and they will calculate and charge the necessary margins. The legislation on netting still applies. The settlement requirements, which are in accordance with international recommendations, contribute to opening up markets for a larger number of participants. Since the netting rules apply, the clearing houses can operate with very limited risk, and this will also make it easier to make arrangements with market-makers.

The two Norwegian initiatives to establish a salmon derivatives market received authorisation for their activities under the old Stock Exchange Act with the status of authorised marketplaces. The authorisations were converted to apply to regulated markets under the new Stock Exchange Act. When the word “stock exchange” is not used, the regulation regime is simpler. One important difference is that there is no ban on ownership exceeding 10 per cent of the share capital for regulated markets as there is for stock exchanges. In regulated markets, advance notice to FSA Norway concerning such acquisitions is required. FSA Norway can stop the acquisition if the buyer is considered to be fit and proper.

4. New Norwegian initiatives to establish a marketplace for seafood derivatives

For some time, there has been interest in establishing a salmon derivatives market in Norway. The commodity derivatives committee explained the potential to the Ministry of Fisheries and Coastal Affairs (see NOU 1999:29, p 10). Subsequently, the matter was followed up by Øiulfstad (2004), among others. The newspapers have reported on initiatives to establish such market-

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11 Refer to item 3.1.4 in FSA Norway’s Circular no. 14/2005 “Securities Trading Act – some comments to Chapters 2 and 3”.

12 Section 3–2 (4) of the new act states: “(4) Inside information concerning commodity derivatives means precise information that is not publicly available or generally known and which directly or indirectly concerns one or more commodity derivatives and which participants in the market where commodity derivatives are traded will expect to receive in accordance with that which FSA Norway considers to be accepted market practice in the market concerned. Information which participants will expect to receive means information that is normally available for market participants or information that is to be announced as a result of legislation, including private-law (civil) regulations and practice in the commodity derivatives market involved or the underlying commodity market. The Ministry may stipulate more detailed rules on inside information in connection with commodity derivatives and accepted market practice in regulations.
places in three Norwegian cities. The status is as follows:

- **Oslo:** European Fish Exchange has given up its attempts to establish a market.

- **Tromsø:** On 2 March 2007, FishEx ASA was licensed to operate an authorised marketplace for trading of salmon derivatives. At the same time, Nord Pool Clearing ASA’s authorisation was broadened to include clearing of salmon derivatives.

- **Bergen:** On 11 May 2007, Fish Pool ASA was licensed to operate an authorised marketplace for trading of salmon and seafood derivatives. On 19 April 2007, a press release announced that Fish Pool ASA had entered into an agreement with NOS Clearing ASA to handle settlements.

In other words, there are two companies with settlement agreements in two different clearing houses that have been authorised to operate regulated marketplaces. They each have contact with their clearing houses which have been granted broader authorisations to cover netting and settlement of such derivatives. The one firm has been engaged in OTC trading for more than a year and the other firm started organised electronic trading of standardised products in autumn 2007. Based on information from and direct contact with the company, the following picture emerges:

**FishEx in Tromsø** has been established primarily to create more predictable conditions for the fish farming industry by offering products that hedge the risk of fluctuations in salmon prices. The company received authorisation as an “authorised marketplace for commodity derivatives based on fish and seafood as the underlying commodity”. FSA Norway demanded an increase in the capital base before the company could start up operations, and a capital increase was completed recently. Following this capital increase, the ownership structure is as follows: Sparebank 1 Nord-Norge Invest 22%, KapNord Fond (owned by banks and the business sector in Northern Norway) 19%, Marininvest (i.e. Råfisklaget), 16% Troms Kraft Invest 16%, Oslo Børs 9%, SR Investering (i.e. Sparebank 1 Rogaland) 9%, Sildinvest (i.e. Sildesalgslaget) 8%.

FishEx began its trading activities during the last week of October 2007 when they decided that they had the necessary minimum of paying members, and additional members have joined since the marketplace opened. Members pay an annual fee of 750 euros and participation in the market also requires a clearing agreement with a guarantee of 20 000 euros. The Norwegian members are producers or buyers who purchase for further distribution, whereas the foreign members represent the salmon processing industry. Nearly all members have a solid foundation in the underlying salmon market, but recently an ordinary securities firm has become a member. Some of the members have previously hedged price risk in the OTC market through FishPool or Direct Hedge, a Danish-Swiss company that was the first to offer OTC trading in salmon derivatives. Since the market opened, trading and settlement have according to their own statements, run smoothly.

The product traded in this marketplace is a forward contract at an average price per week. The contract covers the price of one metric ton of salmon delivered in a week referred to here as D (for delivery week). FishEx believes that week contracts provide the most satisfactory hedge against volatile prices. For example, in December the price fluctuations between the weeks before Christmas and the period between Christmas and New Year dominate, and month contracts would not capture this fundamental uncertainty. The price in the settlement will be based on price figures from Statistics Norway’s export statistics. Thus, domestic sales of fish will not be part of the basis for the index. From the beginning, FishEx listed forward contracts for salmon prices every week for a period of six to seven months ahead. At all times, there will be forward contracts for individual weeks covering the next four to seven-week period. Weeks further ahead will be collected in blocks of four weeks. Thus, as many as twelve forward contracts will be listed, and all trading on FishEx will be in these standardised products. The trades are executed anonymously which means that the clearing house acts as central counterparty for both parties involved in the transaction.

The contracts refer to the average price for trading in week D. It is possible to enter into contracts at this price until Friday of week D-1 and the price is announced when Statistics Norway publishes its statistics on Wednesday of week D+1. The settlement will go to the settlement bank on Thursday of week D+1 and since the transaction was in forward contracts, the entire settlement will be concluded at once. The contracts will be listed in euros and the clearing house, Nord Pool Clearing, will use the same settlement system for both electricity and fish derivatives. The exchange rate will be the average rate at 2:15pm during the week of delivery.

Turnover on FishEx during the first weeks is not known and so far the market can hardly be referred to as liquid. Establishing an open, liquid market requires a larger number of participants. At the very least, commodity brokers and/or investment firms must be members and the general public must be informed about prices and turnover in the market.

The company has not explained whether or how they will publish market information. Due to competition, they have been cautious about public announcements. The market participants receive information on the volume of various contracts, offer price and highest bid and offer price. Two companies, both of which are in the industry, are market makers and quote bid and offer

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13 The name and terminology from the new act will be used here.
14 From http://www.fishex.no/ and http://www.fishpool.eu respectively.
15 For more information about the system of netting and settlement, see Nord Pool’s website: http://www.nordpool.no/nordpool/clearing/index.html.
prices with a small spread. The binding volume underlying the prices is generally low. FishEx has an agreement with the market makers for all listed contracts. It is likely that interest will be highest for three- to six-month forward contracts. Market makers pay a lower transaction fee, but otherwise have no advantages in relation to the other members.

The company’s first priority now is to attract more members and increase the liquidity of already existing products. Later, the company will focus on adapting salmon derivatives to market demands. It may be attractive to list seasons that consist of three blocks making it possible to hedge prices up to one and a half years ahead. Subsequently, the company may consider expanding their product range to include derivatives based on other types of fish. Forward contracts on herring, mackerel and other white fish may be of interest.

FishEx is convinced that there will be no problem of inside information about salmon prices at regulators. If the company begins trading in contracts based on white fish or other fishing products, knowledge of quotas and quota allocations may lead to problems relating to regulators with inside information.

**Fish Pool in Bergen** aims at creating a global marketplace for hedging the risk of price fluctuations for fish and seafood products. The company was initially established by important participants in the business sector, including the financial industry in Bergen. In February 2007, Imarex NOS ASA purchased 34.3% in a share offering and at the same time secured the right to increase their shareholding to 50.1%. Their website also lists the following shareholders: Bergen Energi AS (20.4 %), GC Rieber AS (11.7 %), Sparebanken Vest (5.8 %), DnB NOR Bank ASA (5.3 %), Nordea Bank Norge ASA (5.3 %), Fana Sparebank (5.2 %), Holberg Fondene (3.8 %), Sparebanken Sogn og Fjordane (2.5 %).

Fish Pool started trading in April 2006. Since then, Imarex NOS ASA purchased a large share of the company. Fish Pool publishes daily reference prices for contracts. Fish Pool reports a steady flow of new members since start-up. The first member joined shortly after the marketplace opened, and at present Fish Pool has more than 130 members. They include fish farming companies, fish processing companies and financial brokers. There is no membership fee, but companies must provide a credit rating or a special settlement guarantee. The membership list is not public information due to competition.

Fish Pool trades futures contracts for the average monthly price in NOK. In many respects, Fish Pool may be described as an intermediary, and in autumn 2007 contracts and interest in contracts until summer 2009 were mapped out. Interest is highest in the shortest contracts, i.e. a half year ahead. Interest in hedging against price fluctuations further ahead has fallen. In October 2007, Fish Pool announced that a number of contracts expiring at the end of 2007 and year contracts for 2008 had been traded. They had not executed any trades in futures contracts with expiration dates in 2009. Prices for these contracts are partly based on registered interest for these contracts and partly on Fish Pool’s own estimates. The reference price used in the settlement of these contracts has been calculated on the basis of a detailed specification which ensures that the quality of the underlying product does not change. A special committee supervises the calculation of this price.

A one-month contract may be entered into until the last day of the month of expiry. At that time, the basis for the price is generally known so there is limited trading towards the end of the month. The reference price is stipulated on the 15th of the month following the expiration of the contract. Fish Pool currently offers trades that are netted through a clearing house and trades that are settled directly between the buyer and seller. Since the trades that are settled through the clearing house are futures contracts, margins are paid in on a daily basis. Therefore, the final settlement of the contracts often involves only a small sum and is executed on the 16th of the month. For contracts that do not go through a clearing house, Fish Pool sends out a letter with the reference price and the settlement amount. This letter will serve as a voucher in the private billing of such contracts.

Fish Pool does not publicise sales figures due to competition. On their webpage in March 2008, however, Fish Pool announced record turnover in February, with contracts for more than 1200 metric tons of salmon. They stated that the contract value of the month passed NOK 1 trillion. Compared with the news-letters released a few months ago, it appears that activity has increased considerably.

Fish Pool uses the same electronic trading system that is used by Imarex. This system is also used by commodity derivatives markets in other countries. Due to limited activity and know-how about the system, many members place their orders by phone, fax or e-mail and Fish Pool’s employees place the orders into the electronic trading system. Whether parts of the market can today be called liquid is a matter of opinion. The majority of trades involve futures contracts with expiry dates in the next twelve months. In efforts to establish a liquid market, the marketplace has close contact with market participants to map out hedging needs and price assessments.

One way to strengthen liquidity would be to establish a market maker system. Fish Pool would like to have such a function connected to the marketplace. So far, however, they have been unable to find anyone willing to take on the risk of continuously quoting two-way prices with a minimal spread between bid and offer prices. Regulatory uncertainty is considered to have little impact on price movements. Price movements are driven by fundamental changes in supply and demand.
In those cases where a clearing house does not execute the settlement, the parties must approve each other. Settlement of the trade is based on mutual credit limits which may, for example, be based on bank guarantees. When the clearing house (NOS Clearing) is involved, they will make daily calculations and require regular margin payments. Fish Pool provides daily closing prices for this market settlement. The information concerning price and trading volume distributed by Fish Pool to all market participants is based on all trades regardless of whether they have been netted through the clearing house or not.

5. Conclusions and future perspectives

Commodity derivatives markets provide a means of hedging against the risk of unfavourable fluctuations in prices for a particular commodity. For some commodities, this protection has in practice proved to be important for the development of the value chain from production to final sale to end users. Since this is a private, organised market that provides hedging products, the government budgets are not affected. The public authorities make their contribution by establishing an adequate regulatory framework which ensures that markets are well-organised and that the threat of collapse is reduced. The application of netting rules and adequate financial soundness and supervision of the clearing houses connected with derivatives trading are particularly important for financial stability.

In Norway, the marketplaces for power and freight derivatives have been in operation for twelve and seven years respectively. After experiencing dramatic episodes, both marketplaces have established their activities as a useful means of hedging price risk. It is important for international users of the marketplaces that regulation and supervision of these activities in Norway are in line with good international standards. As a result of the legislative decisions in 2001 and implementation of the MiFID, the legal framework – both in Norway and the EEA – is now in place. FSA Norway has six years’ experience as a supervisory body and is thus well qualified to ensure that such markets develop in Norway without destructive scandals or dramatic events.

With regard to the development of fish derivatives markets in Norway, the activity surrounding the two initiatives appears to indicate a need for products that hedge the price of salmon. Competition between the two marketplaces has not been clarified, but a great deal will probably be in place soon.

The authorities need not be concerned about the outcome of this competition. The existence of a market-based system to hedge price risk may be an advantage since it would probably reduce the need for other measures initiated by the authorities. The authorities should have a relaxed attitude about the creation or loss of investor values as long as the regulatory framework or supervision is not responsible for creating or destroying assets. One area where some public agencies may require training is information processing. If financial markets for additional commodity derivatives are developed, equal access to relevant information will be a critical factor. With new underlying commodities, new public agencies may come into the “line of fire”. Since well-functioning procedures already exist in parts of government administration, the necessary skills development should not pose any particular problems.

Those with interest in the initiatives to establish a market for fish and seafood derivatives, can on a day-to-day basis monitor the success of their initiative (and assess their possibility for a financial loss). Observers outside the industry can at the same time follow the future of the two initiatives and the potential market. If a lasting market is established it will be proof that the possibility for a price hedge for salmon is a useful contribution to the industry.

References


The effects of economic news on Norwegian market interest rates

Knut Eeg, assistant director, Market Operations and Analysis Department

Interest rates and other financial asset prices are based on expectations about economic developments. Asset prices react to new information. In this article, we explore the effects of news about key macroeconomic variables, external impulses, Norges Bank’s interest rate decisions and the communication of monetary policy on Norwegian interest rates.

1 Introduction

An overview of the days with the largest movements in markets rates since the beginning of 2001 shows that interest rates react strongly to certain news or surprises (see Table 1). These “large” changes, which all occurred in the period up to February 2004, reflected either surprising interest rate decisions, monetary policy signals in speeches or at monetary policy meetings, surprising CPI figures or in a few cases international interest rate movements. None of the observations on the list is from the past three years. Have market participants been exposed to fewer surprises over the past three years, or do they react less to surprising macroindicators or monetary policy signals than earlier? It is relevant to investigate this in the light of the changes in monetary policy frameworks in Norway and internationally through the period.

The monetary policy objective of most central banks is price stability. Monetary policy operates with a lag, i.e. it takes time for changes in official policy rates to influence real economic variables and prices, and central banks’ interest-rate setting will therefore reflect the outlook for output, employment and inflation. Information about the current situation in the economy is an important source of information when assessing future prospects. Central banks and market participants follow current developments in macroindicators. If they contain new information about the outlook, this affects interest rate expectations. A number of international studies confirm that key figure releases influence interest rate expectations. US key figures have a particularly strong impact on US interest rate expectations, but also on interest rate expectations in other countries.

Market participants do not fully understand how central banks assess the economic situation or how they will react to new information. Market interest rate expectations are thus also influenced by actual interest rate decisions and by central banks’ communication of the monetary policy strategy ahead. The monetary policy framework in Norway and many other countries has changed considerably. A common feature is the shift to greater monetary policy transparency. Mervyn King, Governor of the Bank of England, has described this as a development where “mystery and mystique have given way to transparency and openness”. With greater openness about monetary policy the degree of asymmetric information between central banks and the public has been reduced. Monetary policy has become more predictable, which has reduced the uncertainty about future interest rate developments. In tandem with the emphasis on transparency, there has been an international tendency towards a more gradualist approach to interest rate setting, perhaps best illustrated by the Federal Reserve’s rate hikes from June 2004 in 17 increments of 0.25 percentage point. These changes have contributed to reducing the volatility of short-term interest rates and market participants have been less surprised by central banks’ interest rate decisions than earlier.

Table 1. Days with large interest rate changes. Ranked according to change in 12-month money market rate in the period 1 January 2001–30 June 2007. Interest rate changes in basis points

<table>
<thead>
<tr>
<th>Date</th>
<th>Interest rate change</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>03.06.2003</td>
<td>–42</td>
<td>Speech by central bank governor</td>
</tr>
<tr>
<td>25.06.2003</td>
<td>–30</td>
<td>Monetary policy meeting and inflation report</td>
</tr>
<tr>
<td>19.09.2001</td>
<td>30</td>
<td>Monetary policy meeting</td>
</tr>
<tr>
<td>18.09.2001</td>
<td>–28</td>
<td>Interest rate cuts by FED and ECB</td>
</tr>
<tr>
<td>20.02.2003</td>
<td>–27</td>
<td>Annual address 2003</td>
</tr>
<tr>
<td>12.12.2001</td>
<td>–26</td>
<td>Monetary policy meeting</td>
</tr>
<tr>
<td>17.12.2003</td>
<td>–26</td>
<td>Monetary policy meeting</td>
</tr>
<tr>
<td>10.02.2004</td>
<td>–25</td>
<td>Consumer Price Index</td>
</tr>
<tr>
<td>10.07.2003</td>
<td>–23</td>
<td>Consumer Price Index</td>
</tr>
<tr>
<td>23.01.2002</td>
<td>22</td>
<td>Monetary policy meeting</td>
</tr>
<tr>
<td>13.08.2003</td>
<td>–22</td>
<td>Monetary policy meeting</td>
</tr>
<tr>
<td>03.12.2002</td>
<td>–21</td>
<td>Speech by central bank governor</td>
</tr>
<tr>
<td>11.12.2002</td>
<td>–21</td>
<td>Monetary policy meeting</td>
</tr>
<tr>
<td>01.08.2003</td>
<td>20</td>
<td>International interest rate increase</td>
</tr>
</tbody>
</table>

Source: Norges Bank

1 We thank colleagues in Norges Bank for useful input. In particular, we would like to thank Ida Slettahjell, who in the summer of 2006 systematised a large share of the data used in the article.

2 Bernanke (2004) underscores the uncertainty of the effects of interest rate changes and the importance of not destabilising financial markets as the two most important arguments for gradualism in monetary policy.
We examine how Norwegian interest rate expectations, as measured by implied forward rates, react to macroeconomic news and monetary policy decisions, and whether these relationships have changed as a result of the shift to greater transparency in the conduct of monetary policymaking. The analysis is based on data that we have collected about news and market reactions, an overview that includes the most relevant news since the beginning of 2001.

Section 2 provides a review of the relevant literature in the field. Our selection of data and modelling strategy is explained in section 3, while the findings are discussed in section 4. Section 5 concludes.

2 Existing literature

Several international studies have examined how interest rates and other asset prices react to the publication of key macroeconomic figures, central banks’ interest rate decisions and communication.

An often cited finding in the literature is that news about US key macroeconomic variables have a strong impact on financial data in the US and in other economies. Goldberg and Leonard (2003) find that news about the US labour market, GDP growth and consumer confidence influence US yields, while European key figures have little impact on US interest rates. In many cases, US key figures have a stronger impact on European interest rates than European key figures. Goldberg and Leonard argue that this phenomenon probably reflects a view among market participants that developments in the US are important for global growth and that the economic situation in different countries has become more synchronised. Moreover, the European Central Bank points out that US key figures are normally published earlier than European figures, giving the former the role of leading indicators for European financial markets (ECB, Monthly Bulletin, 2006).

Most studies analyse the effects of news on a single instrument, e.g. short-term forward rates or long-term forward rates. However, Fleming, Piazzesi and Remolona (2003) analyse the effect of macroeconomic news on the entire US yield curve. They find that strongest effects on interest rates in the maturity segment one to five years, with a peak at two to three years and declining thereafter. This has been referred to as the hump-shaped yield reaction with regard to term structure.

High-frequency data can be used to examine how quickly interest rates react to the release of key figures. Fleming and Remolona (1997) find that most of the response is completed within two minutes. Most studies confirm that new information has a rapid effect on yields.

In recent years, central bankers and others have analysed how the link between information and yield reactions has changed as a result of the shift towards more independent and transparent central banks. Kohn and Sack (2003) find that for the US communication in connection with interest rate decisions and Congressional testimonies have a significant impact on US interest rate expectations, and that communication has a greater impact on interest rate expectations in the longer term than the actual interest rate decisions.

Conelly and Kohler (2004) investigate, among other things, how interest rates respond to communication by the central banks of Australia, Canada, the euro area, New Zealand, the UK and the US. They find that the predictability of actual interest rate decisions is about the same for all the countries. This indicates that the central banks are fairly similar in terms of communicating the monetary policy strategy ahead. They find that the main central bank communication channels are comments on interest rate decisions, monetary policy reports and testimonies before national parliaments.

Most studies assume that interest rate changes reflect changes in interest rate expectations and therefore disregard changes in risk premiums in markets. Using affine term-structure modelling on US rates, Beechey (2007) demonstrates that macroeconomic news announcements influence both forward rates and term premiums. At short horizons, changes in interest rate expectations account for most of the rate changes. At longer horizons, changes in term premiums account for most of the changes in forward rates.

3 Data and model

Our data for Norway comprises 1 637 daily observations between 1 January 2001 and 30 June 2007. For each day, the data set contains information about changes in Norwegian forward rates and any news released that day. News announcements include what is assumed to be the most important macroeconomic variables published monthly and all of Norges Bank monetary policy meetings. In addition, we have included the Governor’s annual address and two additional speeches. The data set is compiled using Norges Bank’s ongoing internal reporting on market reactions to key macroeconomic variables, monetary policy meetings and other events of importance for market rates. We have also included euro-area interest rates as a representative of international news.

Key macroeconomic variables

Key macroeconomic variables include five variables for the Norwegian economy; the consumer price index adjusted for tax changes and excluding energy products (CPI-ATE), two unemployment measures, one figure for retail trade sales and a credit indicator. These are key figures that are published monthly and that market participants have been shown to monitor closely. The variables are further described in Table 2.

The news component (or surprise) of the release of key figures is calculated as the difference between

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3 In two of the speeches delivered in the period 2001–2007, the introduction stated “an assessment of some new aspects of economic developments is also presented”. The two speeches in question were given on 3 December 2002 and 3 June 2003.
actual outcomes and the anticipated value of the key aggregate. Expected value is set equal to the average survey-based market expectation, measured by expectations surveys.4

News components are standardised by dividing the difference between actual outcome and expected value by the series’ standard deviation.5 As a result, the series with the different key variables’ surprises can be compared. Descriptive statistics for the key variables are shown in Table 3. In addition, a complete overview of all the deviations between expected and actual CPI-ATE through the period is provided in Chart 1.

In the period since the beginning of 2001, changes in the CPI-ATE and registered unemployment have on average been slightly lower than expected, while the changes in retail sales and C2 have been higher. Retail sales are considerably more volatile than the other key variables because the projections for retail sales are less accurate than for the other key variables.

In the time series for each key variable, the value is set equal to the standardised surprise on release days and zero on all other days.

External news

Earlier studies have shown that US key figures influence global interest rate expectations, including in the euro area. Experience indicates that Norwegian interest rates, particularly long-term interest rate are heavily influenced by European interest rates. We assume that international news in the form of key macroeconomic key variables, monetary policy decisions and communication, etc., is continuously incorporated in Europeans financial asset prices so that short-term and long-term euro area interest rates capture the most relevant international news for Norwegian interest rate expectations. Daily changes in three-month money market rates and

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**Table 2: Description of key variables**

<table>
<thead>
<tr>
<th>Key variables</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consumer price index, CPI-ATE</td>
<td>12-month increase in consumer prices index adjusted for tax changes and excluding energy products (CPI-ATE). The index is published monthly by Statistics Norway and comprises personal consumer goods and services in Norway.</td>
</tr>
<tr>
<td>Unemployment, LFS</td>
<td>The unemployment rate according to the labour force survey (LFS). Measured as a seasonally adjusted moving average and published monthly by Statistics Norway. The LFS includes all persons in the age group 15–74 registered as resident in Norway.*</td>
</tr>
<tr>
<td>Registered unemployment</td>
<td>Published monthly by the Norwegian Labour and Welfare Administration and based on registered unemployed and job-seekers.</td>
</tr>
<tr>
<td>Retail sales</td>
<td>Retail sales index published monthly by Statistics Norway and describes retail sales growth in value terms.</td>
</tr>
<tr>
<td>Credit indicator, C2</td>
<td>The credit indicator (C2) is published monthly by Statistics Norway and measures 12-month growth in private gross domestic debt.</td>
</tr>
</tbody>
</table>

* Prior to 2006 the age group 16–74 was defined as age at year-end. From 2006 age is defined as age at the survey’s reference date and the lower age for inclusion was reduced to 15.

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**Table 3: Domestic key variables, Norges Bank’s interest rate decisions and external interest rate variables.**

| Number Average Standard- Mini- Maxi- |  |
|--------------------------------------| | |
| Domestic key variables:             |  | |
| Consumer price inflation 78 –0.04 0.21–0.60 0.40  |
| Retail sales 67 0.16 1.19–3.80 3.50  |
| Unemployment (LFS) 67 0.01 0.11–0.20 0.30  |
| Registered unemployed 65–0.02 0.09–0.20 0.20  |
| Credit growth 72 0.13 0.30–0.60 1.00  |
|  |  |  |
| Interest rate decisions1) 58 0.00 0.10–0.42 0.38  |

**External:**

| Number Average Standard- Mini- Maxi- |  |  |
|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|
| 3-month euro rate 1637 0.00 0.03–0.35 0.15  |
| 10-year euro rate 1637 0.00 0.04–0.14 0.22  |

Average and standard deviation are estimated based on actual surprises.

1) Change in one-month money market rate in the first hour following publication of interest rate decision.

Source: Norges Bank
ten-year interest rates in the euro area are therefore included in the data set.

**Norges Bank’s monetary policy meetings and other monetary policy communication**

In the period 1 January 2001 to 30 June 2007, interest rate decisions and other important changes in the use of instruments have been taken at the Executive Board’s scheduled monetary policy meetings, normally every sixth week. The interest rate decisions are published at 2pm and a press conference is held at 2:45pm, where the central bank explains the interest rate decision. Monetary policy reports (MPR) (previously called inflation reports (IR)) are published three times annually – in February/March, June and October/November. In the relevant period all reports have been published at the same time as Norges Bank’s interest rate decisions, with one exception on 8 March 2001.

The news component of Norges Bank’s interest rate decision is measured by changes in the one-month money market rate in the course of the first hour after publication of the interest rate decision. The one-month money market rate is used because it matures before the coming monetary policy meeting and is therefore not influenced by any signals from the central bank as to the monetary policy ahead. Alternatively, the news component could be measured in the same as for key macroeconomic figures, i.e. by comparing interest rate decisions with consensus among market participants. It is assumed that the interest rate effects measure the actual surprise more accurately than a measure based on expectations surveys. One reason for this is that the interest rate impact measures the surprise directly ahead of the monetary policy meeting, while expectations surveys are often conducted earlier.

The information or surprise component linked to monetary policy communication by the central bank is naturally difficult to measure. News about monetary policy strategy can be published in the form of press release statements or press conferences in connection with monetary policy meetings, monetary policy reports, speeches, lectures or media interviews.

We have chosen to construct two “communication series”. The first series captures monetary policy communication on monetary policy meeting days, i.e. communication in monetary policy reports and press releases about interest rate decisions, as represented by the first three lines in Table 4. The other series includes the annual addresses of the central bank governor, which is given in February every year, and two other speeches. Based on market participants’ reactions, among other things to macroeconomists’ comments in reports and the media, and our own assessments, we have set the communication variable at –1(+1) if communication was in the form of a more (less) expansionary monetary stance than expected by markets. If communication is assessed to be neutral, the variable is set equal to 0, which is also the value assigned to the variable on days without monetary policy communication. The variables necessarily involve discretion and comprise very different news or surprises for market participants. In the model section below, an alternative approach to treating communication variables is discussed, i.e. an approach which reduces the subjective element in the construction of the variables.

**Interest rate data**

We want to measure the effects of key figures on market interest rate expectations. Interest rate expectations cannot be observed directly. In practice forward rates or implied forward rates are used as a measure of interest rate expectations. Forward contracts, e.g. FRAs, are liquid instruments that react quickly to news about interest rate developments ahead. Norwegian FRA rates only cover a period of 1–1½ years ahead, however. In order to assess whether news affects interest rate expectations for longer horizons, we have chosen to use changes in implied interest rates in the analysis.

Implied forward rates are short-term interest rates at a future point in time derived from spot interest rates in the market. Norges Bank calculates the forward interest rate using four money market rates with maturities between one to twelve months, and nine swap rates with maturities from two to ten years. The calculation of forward interest rates is based on a parametric method developed by Svensson (1995). The method is often referred to as the “extended Nelson Siegel method”, as it is based on Nelson and Siegel (1987).

Forward rate volatility is highest from nine months to about three years, while it is lower for shorter and longer horizons (see Table 5). At the longest end of the curve, forward rate volatility increases again. Experience shows that the estimates for forward rates at the end points of the curve are the most uncertain, i.e. at the shortest horizons (less than 3 months) and for horizons longer than 9 years.

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6 See footnote 3.
7 Interest rate on interest swap contracts.
8 We have used interest rate series from Reuters (EcoWin).
9 See Myklebust (2005) for a detailed description of Norges Bank’s approach.
The model

The data consist of daily observations covering the period 1 January 2001 to 30 June 2007, or a total of 1 637 observations. We estimate the effect of macroeconomic and monetary policy news on interest rate expectations using the following model:

1) \[ \Delta r_t = \alpha_0 + \sum_{i=1}^t \beta_i m_{it} + \sum_{i=1}^t \gamma_i f_{it} + \lambda_i \text{rb}_{it} + \sum_{i=1}^t \mu_i \text{kn}_{it} + e_t \]

In the equation, \( k \) denotes the horizon of the forward interest rates: 3, 6, 9, 12 months and 2, 3, 4, 5 and 7 years. The relationship posit that changes in the forward interest rate at horizon \( k \) is determined by five domestic macroindicators \( m \), two euro interest rates \( f \), interest rate decisions \( \text{rb} \), communication by Norges Bank in the two variables \( \text{kn} \) and a residual term. The equation is used to determine the average effects of the news variables.

Empirical modelling of interest rate changes most often reveals the time-varying volatility of interest rate changes. Typically, certain periods feature high volatility, while others feature low volatility. This relationship can be incorporated in the GARCH model.\(^{10}\)

2) \[ e_t = \nu_t h_t^{1/2} \sim (0, (h_t)^{1/2}) \]

3) \[ \nu_t = \frac{v_t}{h_t} \sim iid(0,1) \]

4) \[ \ln(h_t)^2 = a_\nu + \sum_{m=0}^{\infty} a_m (\delta_m \nu_{t-m}^{2} + \delta_m v_{t-m}^{2}) + \sum_{n=1}^{\infty} b_n \ln(h_{t-n}^2)^2 + \sum_{n=1}^{\infty} c_n D_{nt} \]

2) states that the residuals from the level equation 1) can be expressed by the standard deviation of the residuals \( h_t \) and the standardised residuals \( \nu_t \). The variance of the residuals \( h_t \) is modelled in 4) as a function of separate lagged values, lagged values of the standardised residuals and any other explanatory variables \( D_{nt} \). We apply an exponential GARCH (EGARCH). A further description of the model we have used is provided in the annex to the article.\(^{11}\)

The effects of Norges Bank’s communication are more difficult to model than the other news variables because the news component in communication cannot be quantified in an unambiguous manner. In several cases, for example, it is difficult to determine whether the signals in a speech or a press release are neutral or not. Moreover, market participants do not always have the same interpretation of the signals from the central bank. Macroeconomists’ comments following monetary policy meetings and speeches may be also be influenced by interest rate effects following the events.

We use macroeconomists’ comments to assess the news component in Norges Bank’s communications. The communication variables thus have a tendency to be determined ex post based on their impact on the market, and not ex ante as is the case for the macroeconomic news variables in the data set. The problem linked to the discretionary assessment of monetary policy signals motivates an alternative method for shedding light on the effects of monetary policy communication.

An alternative to estimating the level effect of communication on forward interest rates is to estimate the effect on the volatility of interest rates. If the variance of forward interest rates is higher on days with monetary policy communication than on other days, this would indicate that communication on average contains new information for the market.

We have therefore chosen to estimate news effects using two methods. In the first alternative, the communication variables are included in equation 1) together with the other news variables. If our discretionary determination of the communication series is correct, we will obtain a good picture of how monetary policy signals on average affect forward interest rates. In this case, the communication variables are not included in the volatility equation 4).

In the other alternative, we remove the communication variables from the level equation. We create two dummy variables for monetary policy communication and incorporate them in the volatility equation 4). The first dummy variable has value one on days with monetary policy meetings and zero otherwise, and the other has value one on days with speeches\(^{12}\) and zero otherwise.

4 Results

The detailed results of the estimation of the level equation are shown in Table 6 in the Annex. All the estimated coefficients are included for all forward rate horizons. In other words, we have not reduced the model by removing non-significant variables. Coefficients significantly different from zero at the 10 per cent, 5 per cent and 1 per cent levels are marked with 1, 2 or 3 stars.

The results of the estimation of the volatility equation 4), which includes the communication variables, are shown in Table 7 in the appendix. Significant coefficients are marked in the same way as in the level equa-

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\(^{10}\) Garch estimation is proposed by, among others, Bollerslev (1986).

\(^{11}\) See also Conolly and Kohler (2004) for a further description and use of a comparable model.

\(^{12}\) Includes nine speeches, cf. description above.
tion. The lower section of Table 7 shows the estimated average standard deviation for the period as a whole and standard deviations for days when monetary policy is communicated, both measured in basis points.

Chart 2 shows the results for the macroindicators that have a significant effect on interest rates. The CPI-ATE has a significant effect on forward rates at all maturities. The effect is strongest on forward rates in the 1–2 year maturity segment, where a deviation from the expected value of 0.2 percentage point (equivalent to one standard deviation) results in a 7 basis-point change in interest rates. Retail sales and the two indicators for unemployment have some effect on forward rates in the ½–3 year segment, in the area of 1–2 basis points. These macroindicators thus have a considerably weaker effect on interest rates than the CPI-ATE. The credit indicator is not included in the chart as it only has a significant effect on 1–2 year forward rates, and the coefficients for some of the maturities have the opposite sign from that expected.

The relatively greatest effect on forward rates occurs in the 1–3 year segment. This hump shape has been shown in other studies of, for example, the US bond market, cf. Fleming, Piazzesi and Remolona (2003). These authors interpret the hump shape as an expression of the market’s assessment of the balance kept by the central bank between two different monetary policy considerations: the desire to make rapid policy changes on the basis of economic news, and the desire to adjust the interest rate in measured steps (interest rate smoothing). The hump shape may indicate that monetary policy strategy is assumed to be relatively fixed in the short term, so that new information will only influence interest-rate setting over time.

The strong effect of surprises in the CPI-ATE may be due to a level of inflation that has been considerably below the target in some of the period under consideration here. For given surprises in consumer prices, the interest rate impact appears to be greater in periods when the CPI-ATE deviated more than one percentage point from the inflation target (red triangles in Chart 3) than in periods when the CPI-ATE was closer to the target (blue squares).

New external information, contained in the financial variables from the euro area, have a significant effect on Norwegian interest rates. The impact of short-term euro rates is strongest for forward rates out to the two-year horizon, while long-term euro rates have the strongest impact over one-year horizons.

Norges Bank’s interest rate decisions have a considerable impact on forward rates at horizons below one year. If Norges Bank raises the interest rate by 25 basis points, while the market has been expecting that the interest rate would be kept unchanged, the results show that three-month forward rates will rise by 17 basis points. The effect unwinds relatively quickly and is no longer significant at the two-year horizon. Market interest rate expectations thus change less than the surprise element in the interest rate decision. This may indicate that surprising interest rate changes have primarily occurred when there has been uncertainty as to monetary policy timing. In these cases, market expectations further ahead will naturally be affected to a lesser extent than expectations in the very short term.

13 Reeves and Sawecki (2005).
If an unexpected interest rate increase is combined with signals of further increases, the impact on forward rates will be stronger.14 The total impact can be illustrated by the sum of the blue and red lines in Chart 4. Three-month to one-year forward rates change in this case by 15–25 basis points.

Communication from Norges Bank following monetary policy meetings has a significant effect on forward interest rates out to the five-year horizon. The effect is strongest in the ½–2 year segment and the curve illustrating this effect has a hump shape. The interpretation of the coefficients for communication in Table 7 is different from that of the other variables since the communication variables can only have the values −1, 0 and +1. The coefficients thus indicate the estimated average effect on forward rates on days when new monetary policy signals are communicated.

The results of the volatility equation, where communication variables are included, are shown in Chart 5 and Table 8 in the Annex. The results indicate that communication in connection with monetary policy meetings affects volatility out to two-year forward rates. In this segment, volatility is about twice as high on monetary policy meeting days as on other days. The results of the volatility equation confirm the findings from the level equation: communication from Norges Bank in the form of press releases about key policy rate decisions and in monetary policy reports contains significant information for interest rate instruments. Some speeches also have a strong impact on forward rates. However, it must be emphasised that only nine speeches are included in the data set, and that some of these contained relatively clear signals about changes in monetary policy strategy. The results are therefore not assumed to be representative for this type of monetary policy communication.

The model explains about 1/3 of the daily variation in forward rates. This is on a level with findings in previous studies.15

We have not discussed the relationship between interest rate expectations and risk premiums. Beechey (2007) argues that both interest rate expectations and risk premiums for US forward rates are affected by news. She finds that movements in short-horizon forward rates are typically due to changes in expected interest rates, and that movements in distant-horizon forward rates are mainly due to changes in risk premiums. It cannot therefore be ruled out that the relatively strong impact of the consumer price index and monetary policy communication on forward rates at relatively long horizons is more a result of changes in risk premiums than of changes in interest rate expectations.

**Has news affected interest rates differently since 1 July 2004?**

In the period since the beginning of 2001, the communication of monetary policy has changed both internationally and in Norway. There has been a trend towards increased monetary policy transparency and more gradual changes in key rates. Since 2003 the Federal Reserve has commented on the probable monetary policy strategy ahead in connection with its key rate decisions. Other central banks have also to a greater extent signalled their intentions prior to monetary policy meetings. The emphasis given to gradual interest rate changes is reflected in the almost exclusive use of ¼ percentage point changes in recent years.

The shift towards greater monetary policy transparency and more gradual changes in key rates have had an impact on international fixed income markets. It has

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14 The surprise element in interest rate decisions is positively correlated with the news series for monetary policy communication following monetary policy meetings. The coefficient estimates described here and shown in Table 7 are from the alternative where both of these news variables are included in the level equation. If the communication series is excluded from the level equation and included in the volatility equation, we find that the impact of unexpected interest rate decisions is stronger.

15 Connolly and Kohler (2004) find that the same type of model can explain between 0.14 and 0.61 of the variation in rates for Australia, Canada, the euro area, New Zealand, the UK and the US.
been suggested that this is an important reason behind the marked fall in volatility of short-term rates (Chart 6), and perhaps also somewhat lower volatility of more long-term interest rates.\footnote{BIS (2006) discusses how changes in the conduct of monetary policy in many countries have played a role in reducing volatility in financial markets. The authors point out that the drop in volatility occurred around the time that forward-looking communication was introduced by central banks in a number of countries.} Relatively low interest rate volatility in this period is probably also ascribable to low key rates in a number of countries and low long-term interest rates internationally. It is normally assumed that volatility measured in basis points is positively correlated with the interest rate level, and there was little uncertainty as to the direction of interest rate changes ahead when key rates were low. It is therefore not a given that the reduction in volatility will be a permanent phenomenon.

Norway introduced an inflation target for monetary policy on 29 March 2001. There have been substantial changes in monetary policy communication since then. Norges Bank has published strategy intervals for the key policy rate for the next strategy period since 1 July 2004. This date has been chosen as the dividing date in the analysis. However, changes in communication have occurred gradually. Since November 2005 Norges Bank has published its own forecast for the interest rate in the monetary policy reports. As a result, the market receives considerably more information about the central bank’s monetary policy strategy than in the initial years of inflation targeting. In addition, it must be assumed that in the course of this period market participants have increased their knowledge of Norges Bank’s response pattern.

The predictability of Norges Bank’s interest rate decisions has been considerably higher since July 2004 than in the preceding period. Chart 7 shows the immediate relationship between interest rate decisions in Norway and the impact on one-month rates, as a measure of the surprise component in interest rate decisions. Since 2004 the effect on short-term money market rates has been small; with a few exceptions, decisions have been as expected. In the few cases where money market rates have shown a marked reaction, there has been some uncertainty in the market as to the timing of the interest rate decision. For example, it was said that prior to the monetary policy meeting in April 2007 market participants were uncertain whether the interest rate would be raised in April or May.

Reduced volatility in financial markets and the move towards greater monetary policy transparency may have changed the relationships between news and movements in forward rates. The relationships in the two periods before and after 1 July 2004 have been estimated separately. A problem in the interpretation of the data is that the interest rate declined through most of the first period, while it rose in the second. The findings referred to below can therefore also be interpreted as showing the difference in market response when the interest rate falls and when it rises. In this article, it is assumed that the results are related to changes in transparency.

Chart 8 shows the coefficient estimates for four of the macroindicators. The calculations indicate that the effect of surprises in the CPI-ATE has declined somewhat for short-term forward rates, while the effect from one year and onwards is about the same in the two periods. The coefficient for registered unemployed has the wrong sign for several horizons in the first period, but is significant with the right sign in the last period. This may reflect the historically low levels of unemployment in recent years and the greater weight given by market participants to labour market developments as a leading inflation indicator. Surprises in retail trade seem to have had less effect on forward rates in the last period. For the Labour Force Survey (LFS), the effect is marginal and the differences between the two periods are small. (This also applies to C2, which is not included in Chart 8.)

Macroindicators’ influence on forward rates is also hump-shaped in the last period, cf. the description of the results for the period as a whole.

The effect of monetary policy communication following monetary policy meetings has been examined using

\begin{table}[h!]
\centering
\begin{tabular}{|c|c|c|c|}
\hline
\textbf{Macroindicators} & \textbf{Coefficient Estimates} & \textbf{Significance} \\
\hline
\text{ CPI-ATE } & -0.05 & \text{ Significant } \\
\text{ Retail trade } & 0.03 & \text{ Marginally Significant } \\
\text{ Registered unemployed } & 0.02 & \text{ Not Significant } \\
\text{ Labour Force Survey } & 0.01 & \text{ Not Significant } \\
\hline
\end{tabular}
\caption{Coefficient Estimates for Macroindicators}
\end{table}
The estimated rise in volatility on monetary policy meeting days is illustrated in Chart 9. One of the panels in the chart shows the increase in volatility following monetary policy meetings that include the publication of a monetary policy report. The other panel shows the corresponding increase following other monetary policy meetings. In the first period, volatility at the one-year horizon rose by about 20 basis points following the publication of a monetary policy report. Following other monetary policy meetings, volatility rose by 10 basis points. In the last period, volatility was considerably lower. This may indicate that communication in this period conveyed more gradual changes in monetary policy or that market participants were more prepared for the signals provided, which may indicate that their interpretation of Norges Bank’s response pattern has improved.

The effect on forward rates further ahead is greater...
in the last period than in the first. This may reflect the longer horizon encompassed by central bank communication, for example through the publication of Norges Bank’s own interest rate forecast.

Chart 10\(^\text{17}\) illustrates the variation in forward rates that can be explained by different types of news before and after 1 July 2004. News variables as a whole explain a greater proportion of the variation in forward rates in the 1–3 year segment in the last period. This must be seen in the context of lower volatility of forward rates in the last period. Less noise in daily interest rate changes result in lower explained variance.

All in all, Norwegian macroindicators explain a greater share of the variability in forward rates in the last period. This is partly due to somewhat more unexpected consumer price figures in this period than in the preceding period. Surprises in the indicator for registered unemployed also seem to have a stronger effect on forward rates in the last period, cf. above.

Interest rate decisions explain a considerably smaller share of the variability in short-term forward rates in the last period. The main reason for this is that interest rate changes in this period have not surprised market participants to any great extent.

Changes in euro area market rates explain a greater share of the variability in Norwegian forward rates in the last period than in the first.

5 Summary

We have examined the effect of different types of news on market interest rate expectations, as measured by implied forward interest rates. We find that Norwegian forward rates are affected by monetary policy news, external impulses and macroeconomic news, particularly consumer prices. The relationships we find between news and interest rate changes are generally consistent with earlier findings for other countries. One exception is that while real economic indicators seem to have the strongest influence on interest rates in the US and other countries, consumer prices have had the greatest impact on Norwegian interest rates. This may be due to the low level of CPI-ATE inflation in parts of the period since 2001.

Key macroeconomic figures and signals from the central bank have the largest effect on forward rates in the 1–3 year segment. The impact of news on forward rates can be described as a hump-shaped curve, a phenomenon earlier studies have also found for other countries.

Greater monetary policy transparency and a tendency towards more gradual interest rate changes have probably contributed to a reduction in interest rate volatility internationally, particularly for short-term rates. Reduced volatility in financial markets must also be seen in the context of low key rates in many countries and low long-term interest rates internationally. Low volatility may therefore be a temporary phenomenon.

We find that key macroeconomic figures, particularly consumer price figures, and external impulses through changes in euro area interest rates explain a greater share of the variation in Norwegian interest rates in the last three-year period than in the period from the beginning of 2001 up to July 2004. In the last three-year period, Norges Bank’s interest rate decisions have with few exceptions been in line with market expectations, and explain a considerably smaller share of the variability in forward rates in this period.

Norges Bank’s monetary policy communication following monetary policy meetings seems to have affected short-term forward rates to a lesser extent after 1 July 2004, when Norges Bank started publishing strategy intervals for the key policy rate for the next strategy period. However, there are indications that monetary policy communication also affects long-term market interest rate expectations to a greater extent than previously.

References


Bernanke, Ben S. (2004): “Gradualism”, remarks at an economic luncheon sponsored by the Federal Reserve Bank of San Francisco (Seattle Branch) and the University of Washington, DC, May 20

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17 The chart shows estimated marginal contributions from the various news variables with respect to explained variance in daily forward rate changes. Under this method, the order in which the variables are included may affect the results. In our calculations, we first included foreign interest rate changes, then macroindicators and interest rate decisions. However, changes in the order do not have a significant effect on our results.
The model is described in section 3 and consists of equation 1) and 4), reproduced below:

1) \[ \Delta r^k_t = \alpha^k_t + \sum_{j=1}^{p} \gamma^k_j \Delta n_{k,j} + \sum_{q=1}^{Q} \chi^k_q \epsilon_{k,q} + \sum_{j=1}^{p} \mu^k_j \ln(n_{k,j}) + \epsilon^k_t \]

4) \[ \ln(h_j^s) = \alpha^s_t + \sum_{j=1}^{m} \delta^s_j \Delta \epsilon_{s,j} + \delta^s_0 \epsilon_{s,0} + \sum_{q=1}^{Q} \beta^s_j \ln(h^s_{j,q})^{\gamma} + \sum_{w=1}^{W} \lambda^s_w D_{s,w} \]

We have examined whether lagged values of the news variables were significant in level equation 1). We found a significant lag for long-term euro rates, while the other news variables did not exhibit significant lags. The coefficient estimates for the level equation are shown in Table 6.

The volatility equation 4) is specified as an exponential GARCH where the conditional volatility depends on its own lagged values, the standardised residual’s lagged values and any other variables. We found that standardised residuals occur with two significant lags, i.e. that \( p \) equals 2 in equation 4). Lagged values of the conditional volatility were not significant for forward rates at most horizons. We have therefore set \( q \) equal to zero in equation 4). The volatility equation is thus estimated by an EGARCH \((0.2)\) for forward rates at all horizons.

It is usually assumed that volatility measured in basis points is positively correlated with the interest rate level. We have therefore included the level of forward rates in the volatility equation. The interest rate level affects volatility in forward rates with a horizon up to one year, and to some extent forward rates with a five to seven year horizon.

The coefficient estimates for the volatility equation are shown in the upper section of Table 7. The lower section of Table 7 shows the estimated average standard deviation for the period as a whole and standard deviations for days when monetary policy is communicated, both measured in basis points.
### Table 6: Effect of news on forward interest rates. Level equation. Change in basis points

<table>
<thead>
<tr>
<th>Horizon (in years)</th>
<th>0.25</th>
<th>0.5</th>
<th>0.75</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Domestic variables</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CPI</td>
<td>3.5***</td>
<td>5.2***</td>
<td>6.2***</td>
<td>6.6***</td>
<td>6.6***</td>
<td>4.4***</td>
<td>2.9***</td>
<td>2.1***</td>
<td>1.4***</td>
</tr>
<tr>
<td>LFS</td>
<td>-0.6</td>
<td>-0.8**</td>
<td>-0.7***</td>
<td>-0.8*</td>
<td>-0.4</td>
<td>-0.3</td>
<td>-0.1</td>
<td>0.0</td>
<td>0.2</td>
</tr>
<tr>
<td>Registered unemployed</td>
<td>-0.3</td>
<td>-0.4</td>
<td>-1.0*</td>
<td>-0.9</td>
<td>-1.5**</td>
<td>-1.2*</td>
<td>-0.6</td>
<td>-0.3</td>
<td>0.3</td>
</tr>
<tr>
<td>Retail trade</td>
<td>0.4</td>
<td>0.8***</td>
<td>1.1***</td>
<td>1.6***</td>
<td>2.2***</td>
<td>1.5***</td>
<td>0.8***</td>
<td>0.1***</td>
<td>-0.1</td>
</tr>
<tr>
<td>Credit growth</td>
<td>1.3</td>
<td>-0.4</td>
<td>-0.3</td>
<td>0.5***</td>
<td>1.2***</td>
<td>0.3</td>
<td>-0.3</td>
<td>-0.3</td>
<td>-0.2</td>
</tr>
</tbody>
</table>

| **Abroad:** | | | | | | | | | |
| 3-month euro rate | 0.7 | 0.5*** | 0.4*** | 0.5*** | 0.5*** | 0.3*** | 0.2* | 0.1*** | 0.2 |
| 10-year euro rate | 0.0 | 0.5*** | 1.0*** | 1.5*** | 2.9*** | 2.9*** | 2.5*** | 2.3*** | 2.2*** |
| 10-year euro rate (t–1) | 0.5*** | 0.7*** | 0.8*** | 0.9*** | 0.7*** | 0.9*** | 1.1*** | 1.1*** | 1.1*** |

| **Monetary policy:** | | | | | | | | | |
| Interest rate decision | 6.9*** | 4.8*** | 3.3*** | 2.0*** | -0.1 | -0.4 | -0.4 | 0.0 | -0.4 |
| Communication following monetary policy meetings | 5.8 | 8.3*** | 9.2*** | 10.0*** | 9.5*** | 6.8*** | 4.2*** | 1.9*** | -0.4 |
| Other communication | 12.9 | 19.4*** | 22.1*** | 22.8*** | 15.2*** | 8.0*** | 4.7** | 4.4** | 6.4*** |

R² | 0.22 | 0.35 | 0.41 | 0.40 | 0.40 | 0.39 | 0.35 | 0.32 | 0.30 |

1) Impact on interest rate by surprise of standard deviation for domestic variables, abroad and interest rate decisions. For communication variables: interest rate impact of non-neutral monetary policy signals.

### Table 7: Effect of monetary policy communication on forward interest rates. Volatility equation

<table>
<thead>
<tr>
<th>Horizon (in years)</th>
<th>0.25</th>
<th>0.5</th>
<th>0.75</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Constant</strong></td>
<td>1.1***</td>
<td>1.4***</td>
<td>2.0***</td>
<td>2.6***</td>
<td>3.2***</td>
<td>3.0***</td>
<td>2.6***</td>
<td>2.2***</td>
<td>1.7***</td>
</tr>
</tbody>
</table>

| **Standardised residuals:** | | | | | | | | | |
| v(1–1) | 0.1 | -0.1 | -0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| v(t–1)| 0.6*** | 0.6*** | 0.5*** | 0.4*** | 0.3*** | 0.4*** | 0.4*** | 0.4*** | 0.4*** |
| v(t–2) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| v(t–2)| 0.3*** | 0.3*** | 0.3*** | 0.3*** | 0.2*** | 0.2*** | 0.2*** | 0.1* | 0.1 |
| Interest rate level | 0.3*** | 0.3*** | 0.2*** | 0.1** | 0.0 | 0.0 | 0.0 | 0.1** | 0.2*** |
| Monetary policy meetings | 1.4*** | 1.6*** | 1.6*** | 1.6*** | 1.3*** | 0.5* | 0.1 | 0.1 | -0.2 |
| Speeches | 3.4*** | 3.2*** | 3.1*** | 3.0*** | 2.1*** | 1.3*** | 0.8* | 0.7* | 0.7 |

| **Volatility in basis points:** | | | | | | | | | |
| Average | 4.1 | 4.5 | 4.7 | 5.1 | 5.4 | 4.7 | 4.3 | 4.2 | 4.4 |
| Monetary policy meeting days | 8.3 | 9.8 | 10.6 | 11.3 | 10.4 | 5.9 | 4.5 | 4.4 | 4.4 |
| Other monetary policy communication days | 22.7 | 21.9 | 22.4 | 22.5 | 15.0 | 9.2 | 6.3 | 6.0 | 6.3 |

1) Coefficients from EGARCH(0.2) estimation of equations 1) and 4).
Evaluation of Norges Bank’s projections for 2007

Raymond Lokshall, adviser, Economics Department, Norges Bank

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).

I would like to thank Anne Berit Christiansen, Kåre Hagehund, 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 4½ 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 production. 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.

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

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. 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-

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<table>
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<th>IR 2/06</th>
<th>IR 3/06</th>
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<td>8½</td>
<td>6½</td>
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<td>4.4</td>
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<td>2½</td>
<td>3</td>
<td>3½</td>
<td>3½</td>
<td>3.4</td>
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<td>Oil price, USD/bbl</td>
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<td>65.4</td>
<td>63.4</td>
<td>67.5</td>
<td>71.9</td>
<td>72.9</td>
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³ Boxes in the different reports provide a more detailed account of changes in the projections.
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 2¼ 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, whereas the LFS data now indicate growth of 1.3 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 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.

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.

\(^1\) See box “Short-term forecasts for mainland GDP in Norway” in Inflation Report 2/06 for a presentation of the different models.

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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 ratio 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.

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 1½ 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

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5 This must to 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. 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. 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

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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.

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 institutions 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

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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.
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. 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. 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

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<tr>
<td></td>
<td>MAE</td>
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<td>0.98</td>
</tr>
<tr>
<td></td>
<td>MSE</td>
<td>0.85</td>
<td>1.34</td>
</tr>
<tr>
<td>CPI/CPI-ATE inflation</td>
<td>ME</td>
<td>–0.25</td>
<td>–0.35</td>
</tr>
<tr>
<td></td>
<td>MAE</td>
<td>0.51</td>
<td>0.58</td>
</tr>
<tr>
<td></td>
<td>MSE</td>
<td>0.41</td>
<td>0.54</td>
</tr>
</tbody>
</table>

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 on a 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.