Economic Bulletin May 2000
Volume LXXI No. 1

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# Economic perspectives

Annual address by Governor Svein Gjedrem at the meeting of the Supervisory Council of Norges Bank on Thursday 17 February 2000



We have just marked the turn of the millennium. Norway can look back at a century of upheaval – the dissolution of the union with Sweden in 1905, social conflict in the interwar period and the emergence of the welfare state. At the beginning of a new century it is natural to examine some of the threads running through our economic history. This may also shed light on the choices Norway is now facing.

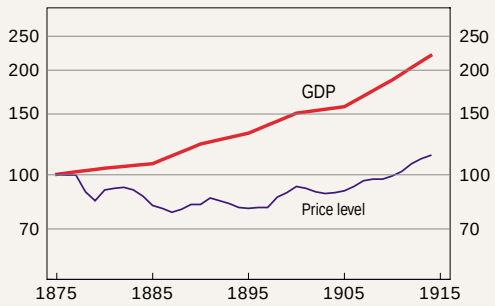
We have experienced periods of inflation and periods of deflationary recession. Vast changes in the world economy have led to shifts in monetary policy and financial markets. Technology has broken down regulations. Patterns of funding and ownership are changing. This creates unrest and uncertainty, but also offers new opportunities for growth and welfare. The welfare state is facing major challenges as a result of the ageing of the population and tax competition among countries. In this year's annual address I will discuss various aspects of monetary policy, financial markets and the welfare state.

## Historical perspective

One of the first endeavours of the Storting (Norwegian parliament) after its establishment in 1814 was monetary reform. In 1816 Norges Bank was founded. The specie daler was Norway's first monetary unit.

From the mid-1800s an increasing number of countries chose to link the value of money to gold. The central banks were under the obligation to convert their currency at a fixed rate into gold on demand. At the same time, there were no import or export restrictions on gold. This gradually resulted in the establishment of an international fixed exchange rate system based on a gold standard.

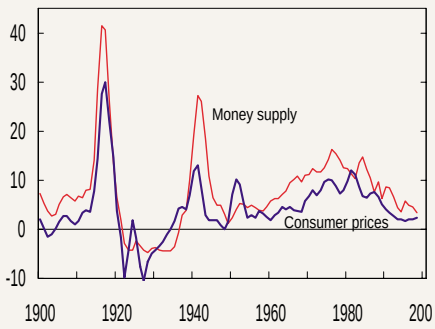
**Chart 1.** The Norwegian economy under the gold standard 1875=100. Logarithmic scale




Source: Statistics Norway

Norway switched from the silver standard to the gold standard in 1874. The krone was introduced as a currency unit and we formed a monetary union with Sweden and Denmark. The gold standard and the monetary union were successful. The world economy and the Norwegian economy were expanding. Price levels were stable. In the 1900s periods of nominal stability, ie price and exchange rate stability, have also coincided with periods of steady and solid economic growth.

**Chart 2.** Consumer prices and money supply. Annual percentage growth. 3-year moving average



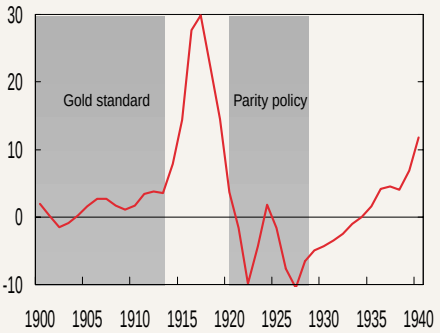

Sources: Statistics Norway and Norges Bank

The money supply is defined as money-holding sectors' stock of Norwegian notes and coins (cash balance), in addition to bank deposits in Norwegian banks and bank certificates. Money-holding sectors are domestic sectors other than the central government and social security administration, state lending institutions and banks.

The experience of the last century shows that consumer price inflation is ultimately associated with high growth in the money supply. However, the causal relationship between money supply and inflation may be unclear.

Norway has experienced four episodes of high inflation in the last century: During and after the two world wars and the Korean War, and a 15-year period from the first half of the 1970s to the second half of the 1980s.

**Chart 3.** Consumer price inflation 1900-1940. Per cent. 3-year moving average



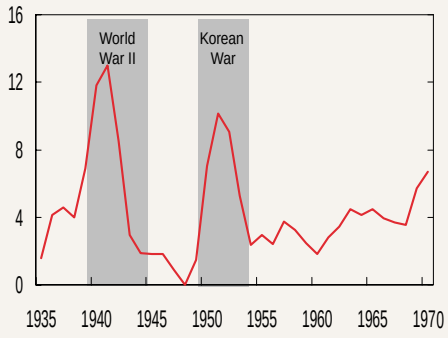

Source: Statistics Norway

During the First World War inflation accelerated sharply. The British war effort was primarily financed by printing

money. Price inflation accelerated in most countries, also in Norway. The gold standard was suspended.

The krone's value against gold and pound sterling fell sharply in the boom during and after the First World War. Price inflation soared, accompanied by a speculative bubble with rising asset prices. When the bubble burst the boom came to an end, followed by a deflationary recession and a banking crisis. The recession was probably exacerbated by the so-called parity policy pursued at that time, which aimed at returning the krone exchange rate to its pre-war value against gold.

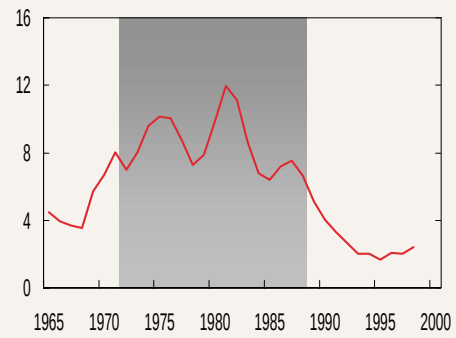
**Chart 4.** Consumer price inflation 1935-1970. Per cent.
3-year moving average




Source: Statistics Norway

Inflation also accelerated during the Second World War. But unlike the interwar period, the years after 1945 were not marked by recession. With the exception of a few years of high price inflation during the Korean War, the post-war period featured low and stable inflation and buoyant economic growth.

**Chart 5.** Cunsumer price inflation 1965-2000. Per cent.
3-year moving average



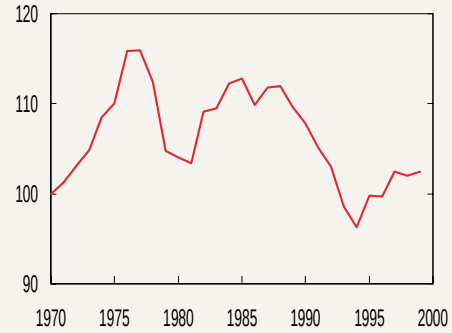

Source: Statistics Norway

The fourth period of high inflation was different from the three previous ones. In the 1970s and 1980s inflation gradually increased. Although inflation rates were not as high as during the two world wars, inflation remained high for a longer period.

The post-war fixed exchange rate system – the Bretton Woods System – collapsed in 1971. A few years later, the Yom Kippur War broke out and OPEC countries suspended oil deliveries, triggering the first oil crisis. The sharp rise in oil prices led to a recession in the western economies. Moreover, inflation took root in most countries. In Europe, only Germany and Switzerland were able to keep inflation more or less at bay.

In Norway, the welfare state and support schemes were rapidly expanded, partly due to expectations of large future oil revenues. Economic policy was oriented towards building a bridge over what was expected to be a temporary downturn in the world economy. This led to a tug of war for real resources between the business sector and the public sector – between the exposed sector and the sheltered sector.

**Chart 6.** Relative labour costs in a common currency
1970=100




Sources: OECD, IMF, Statistics Norway, Ministry of Finance, The Technical Reporting Commitee on Income Settlements and Norges Bank

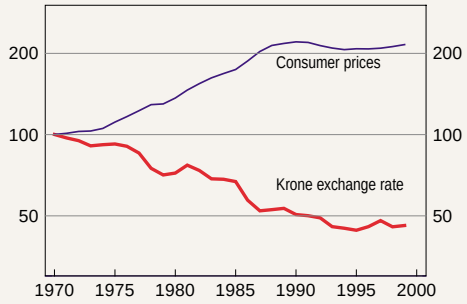
The chart shows wage costs in the manufacturing sector in Norway compared with our trading partners. Wage costs are calculated in a common currency on the basis of developments in the effective exchange rate. The index of the effective exchange rate represents the value of NOK against a weighted average of trading partners currencies (24 countries).

The cost level in manufacturing industry was driven upwards. At the same time, the slowdown in growth proved to be permanent. The sheltered sector continued to expand, while industries exposed to international competition experienced deteriorating profitability and a relative decline. The recession at the end of the 1980s was followed by a period of low wage growth and gains in competitiveness. This may help to explain why the decline in manufacturing employment came to a halt in the 1990s. However, wage costs increased again in the late 1990s. The relative wage level in manufacturing industry compared with trading partners is now back at the level in the 1970s.

Two forces were behind economic developments from the beginning of the 1970s. First, the deterioration in competitiveness was caused by the expansion of the Norwegian welfare state and a transfer of real resources from the exposed sector to the sheltered sector. Second, inflation expectations took root as a result of low administered interest rates and competitive devaluations. Nominal interest rates were kept low although price inflation and the value of tax-deductible interest expenses rose. Frequent devaluations in the period from 1976

were ultimately ineffective with regard to preventing a relative decline in manufacturing industry. On the contrary, the devaluations proved to be self-reinforcing.

**Chart 7.** Norway and Germany. Relative prices and exchange rates. 1970=100. Logarithmic scale




Sources: Statisrics Norway and Norges Bank

The graph shows consumer prices in Norway compared with consumer prices in Germany and the value of NOK against DEM since 1970. In the course of fifteen years, from 1973 to 1988, consumer prices in Norway increased twice as much as in Germany. In the same period, the value of NOK against DEM was almost halved.

Over a period of 15 years from 1973 to 1988 consumer prices in Norway rose twice as much as in Germany. In the same period, the value of the krone was virtually halved against the Mark. While we paid around 2 kroner for one Mark in 1973, 15 years later we had to pay close to 4 kroner. Since then the krone has remained relatively stable against the Deutsche Mark. Today the exchange rate is around 4 kroner and 10 øre.

The last devaluation came in 1986 after the fall in oil prices. Thereafter, the krone exchange rate was fixed. The Norwegian economy had to go through a severe economic turnaround. Confidence in the krone had to be restored in order to avoid persistent inflation. This required very high interest rates. The Norwegian economy entered the worst recession experienced since the interwar period. Unemployment rose from about 2 per cent in 1987 to almost 6 per cent in the winter of 1992/1993. Many companies went broke and households were faced with debt problems. The financial sector was hit by crisis.

The fixed exchange rate regime led to a gradual decline in price inflation, but not to deflation as was the case in the 1920s. An improved wage-setting process, in conjunction with an active fiscal policy, contributed to curbing the real economic costs. Hence, the experience of 1986 and the beginning of the 1990s probably provides a realistic picture of the minimal costs associated with stamping out high inflation. At the same time, an active fiscal policy enhanced the credibility of monetary policy because it led to lower unemployment than would have been the case otherwise.

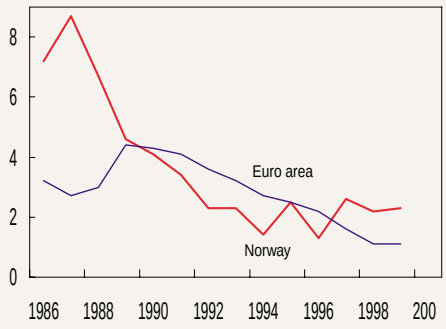
In Norway, high inflation is a war phenomenon and a phenomenon of the 1970s and 1980s. In the aftermath of high inflation, we experienced substantial real economic losses and financial instability. The cost of inflation has been high.

History shows that lower unemployment cannot be achieved in exchange for higher inflation in the long run. A monetary policy that fuels inflation does not generate economic growth. On the contrary, the result is booms and speculative bubbles, which are the precursors of recession and unemployment.

In the absence of nominal stability, employment and production will not show stability either. The economy must be endowed with a nominal anchor. This is the task of monetary policy.

The Norwegian economy was lacking a nominal anchor during the period of low interest rates and devaluations in the 1970s and 1980s. This led to rising inflation and instability. From 1986 the fixed exchange rate regime restored confidence in monetary policy and subsequently laid a foundation for more stable economic developments.

**Chart 8.** Consumer price inflation 1986-2000. Per cent



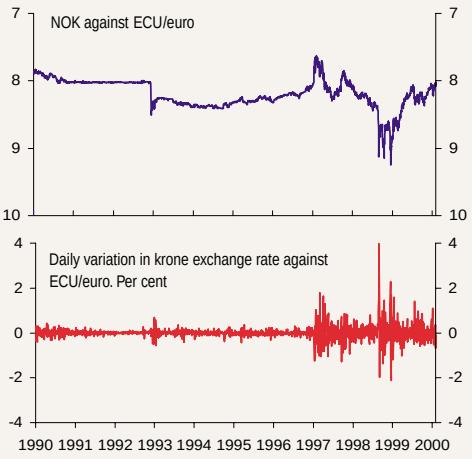

Sources: OECD, Eurostat and Statistics Norway

The chart shows year-on-year increases in consumer prices in Norway and the eleven countries currently forming the euro area. Up to 1990, consumer price inflation in the euro area is based on a weighted average of national consumer price indices (OECD weights). Since 1999, we have used the harmonised consumer price index (MUICP, Monetary Union Index of Consumer Prices).

Through the 1990s, inflation has been on a par with or below inflation in Europe. While the average annual rise in prices was a good 8 per cent in Norway in the 1970s and 1980s, the annual rise in consumer prices has been confined to 2¼ per cent in the 1990s. The subdued rate of increase in consumer prices has coincided with a strong expansion. In 1999, the number of employed was 200 000 higher than in 1990, ie an increase of almost 10 per cent.

We had to abandon our fixed exchange rate policy in December 1992, primarily as a result of the system's inherent weaknesses in a world of free flows of capital and deep international financial markets. When the fixed exchange rate policy was formally abandoned, there was a risk that the Norwegian economy would again lose its nominal anchor. However, the krone exchange rate showed little change and quickly found a new trading range.

**Chart 9.** Krone exchange rate against ECU/euro




Source: Norges Bank

The upper chart shows movements in the value of NOK against the theoretical ECU up to 31 Dec1998 and against the euro from 1 Jan1999. The lower chart shows daily percentage changes in the value of NOK against ECU/euro.

In the first years the krone exchange rate was very stable, also on a daily basis. When we now look back at developments in the Norwegian foreign exchange market in the 1990s, we see no significant change in 1992. On the contrary, we witnessed a pronounced shift in January 1997. It was from this point in time that daily quotations and month-to-month variations in the exchange rate show that the krone is floating.

Wider fluctuations in the exchange rate have improved the functioning of the options market and forward contracts in Norwegian kroner. At a premium, businesses hedge against short-term fluctuations in the krone exchange rate. The fluctuations are not greater than in other countries with a floating exchange rate.

In 1996 and in the autumn of 1998, Norges Bank attempted to attenuate movements in the krone exchange rate through exchange market interventions. On both occasions, interventions prompted a game situation between the central bank and market participants, as was also the case during the currency crisis in the autumn of 1992. When a central bank trades its own currency, market operators make a play for profits on the premise that the exchange rate does not reflect market fundamentals. In a world where capital flows freely, this game situation can quickly trigger large capital movements. The experience of the 1990s shows that Norges Bank does not have the instruments to fine-tune the krone exchange rate.

## Today's monetary policy

The objective of monetary policy is exchange rate stability against European currencies, defined as the euro from 1 January. Norges Bank's mandate – which is the Exchange Rate Regulation - takes into account that the krone may remain outside its normal range. The Exchange Rate Regulation states that "in the event of significant changes in the exchange rate, monetary policy instruments will be oriented with a view to returning the exchange rate over time to its initial range". The concept "significant changes" is not quantified and must be given an economic content. Norges Bank interprets a "significant" change in the exchange rate as a change that fuels expectations of price and cost inflation to the extent that the change in the exchange rate becomes self-reinforcing.

Monetary policy can counter such a self-reinforcing movement in the exchange rate by contributing to low and stable inflation without recession. In its conduct of monetary policy, Norges Bank therefore places emphasis on fulfilling the fundamental preconditions for exchange rate stability against the euro: Monetary policy instruments must be oriented towards bringing inflation down to the level aimed at by the Eurosystem. At the same time, Norges Bank must prevent monetary policy from contributing to a deflationary recession as this may weaken confidence in the krone.

The experience of the 1970s and 1980s shows that monetary policy cannot in the long run steer competitiveness or the size of the exposed sector. If we attempt to do so, monetary policy only contributes to instability. Such real economic fundamentals may, on the other hand, be influenced through fiscal policy and cooperation between the social partners. Norges Bank cannot with open eyes contribute to higher inflation or a deflationary recession. This would contribute to an unstable krone. Hence, there is no conflict between gearing monetary policy instruments towards low and stable inflation and the objective of a stable krone exchange rate over time.

Although monetary policy cannot be used to steer competitiveness, changes in the krone exchange rate may provide an early warning of a weakening – or strengthening – of the exposed sector in the tug of war for real resources. A successful fiscal policy and a well functioning wage formation process provide a sound basis for a stable krone exchange rate. The main difference between Norway and countries that have adopted an inflation target for monetary policy lies in the interaction between monetary policy and fiscal policy. The oil economy and capital exports through the Government Petroleum Fund are also features that are specific to the Norwegian economy.

The most important factor that influences the krone exchange rate is confidence in nominal stability. If such confidence exists, short-term fluctuations in the krone exchange rate may vary without consequences for the exchange rate level over time. However, confidence depends on a number of factors, such as the authorities' will to pursue nominal stability. Under the fixed exchange rate regime, we tied ourselves to the mast by stipulating an exchange rate band for the krone. With a floating

exchange rate regime and wider scope for discretion, transparency concerning analyses and policy response pattern can contribute to bolstering confidence in the nominal anchor. However, this presupposes that the announced policy response pattern is actually followed.

Fluctuations in domestic activity may induce changes in the exchange rate. For instance, strong demand for labour could push up wages and weaken competitiveness. If there is confidence in nominal stability, the deterioration in competitiveness may result in an appreciation of the krone in the short term. A lack of confidence in nominal stability may result in a depreciation of the krone. Both cases may cause fluctuations in the exchange rate.

A shift in public expenditure growth – or one-sided tax cuts - will have an impact on domestic demand, thus prompting movements in the exchange rate. When fiscal policy is used to smooth fluctuations in domestic demand, it will contribute to a stable exchange rate.

International business cycles and financial market unrest may have an impact on the krone exchange rate. Exchange rate variations among major currencies may influence the krone exchange rate measured against individual currencies. Over the last year the euro has depreciated against the US dollar, the yen and the pound sterling. The krone has appreciated against the euro. The effective exchange rate has been more stable.

A situation may arise with a significant shift in economic fundamentals in Norway. A shock of this nature may be due to a permanent change in growth prospects. This may also imply a permanent change in the krone exchange rate. Our experience suggests that this seldom occurs. A sharp and sustained shift in oil prices, as witnessed in 1973 and 1986, may imply that the use of oil revenues will have to change. This may in itself have an impact on the exchange rate.

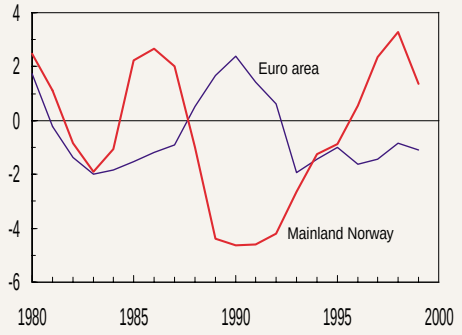
Fiscal policy and the Government Petroleum Fund have proved to be effective in terms of sheltering the mainland economy from more normal variations in oil revenues. A permanent change in the krone exchange rate will occur only if there is an increase in the use of oil revenues through a shift in expenditure growth. In this context, instruments other than those available to Norges Bank must be used to return the krone to its initial range.

Interest rates influence the exchange rate through two channels. The interest rate differential against other currencies has some effect on the exchange rate. The exchange rate is further influenced via the impact of interest rates on domestic price and cost trends. The isolated effect of the interest rate differential on the exchange rate may be of little consequence compared with other factors. According to Norges Bank's calculations, the current interest rate differential against the euro area impacts the krone exchange rate in the order of 20 øre against the euro in the short term. On the other hand, the effect of the interest rate on the exchange rate through the channel of domestic demand and price and wage inflation may in many situations be considerable.

The Norwegian economy may be exposed to shocks or disturbances that both reduce domestic activity and weaken the Norwegian krone. In response, interest rates should not be increased. An increase in interest rates will result in higher unemployment and mounting instability in the domestic economy and the exchange rate. Our economy may also be exposed to disturbances that both increase domestic activity and strengthen the krone. Interest rates should then not be lowered.

In response to the prospect of a downturn in the Norwegian economy, Norges Bank reduced interest rates in the winter of 1999 when the krone was weak against the euro. This contributed to stabilising the Norwegian economy and hence also the krone exchange rate. Along the same lines, a situation may arise with growing pressures in the economy and signs of higher inflation where interest rates will be increased when the krone is strong in relation to the euro.

**Chart 10.** Output gap. Percentage of GDP




Source: OECD

The ouput gap is calculated as the difference between actual output and average production capacity in the economy (product function method).

Over the last 15 years, the business cycle in Norway has been desynchronised in relation to cyclical developments in most European countries. The output gap provides a rough indication of capacity utilisation in the economy. The chart shows a specifically Norwegian upturn in the mid-1980s and a subsequent downturn. While the downturn bottomed out in Norway in 1990, other European economies were booming. Subsequently, cyclical developments have remained desynchronised. The cyclical fluctuations in Norway can to some extent be traced back to the disturbances in the Norwegian economy in the 1980s and the economic shock in Europe in the wake of the fall of the Berlin Wall.

The cyclical desynchronisation is the main reason behind the inflation differential between Norway and euro area countries. The very low rate of inflation in Europe primarily reflects the downturn in the 1990s. A fundamental precondition for exchange rate stability

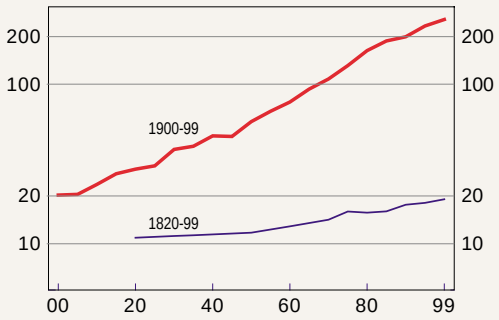
against the euro is that the inflation rate in Norway is brought down to the level aimed at by the Eurosystem, In recent years, the rate of increase in prices has been higher in Norway than in euro area countries, which is reflected in the interest rate differential between Norway and the euro area.

If we were to lower interest rates to the level prevailing in the euro area in the current environment, inflation would rise rapidly in Norway accompanied by exchange rate volatility. Any movements in the krone exchange rate will be thoroughly analysed by Norges Bank. A policy response pattern involving automatic changes in interest rates in response to movements in the exchange rate, as a fixed exchange rate regime would imply, is inappropriate.

## A century of growth

At the turn of the last century GDP per capita was around NOK 20 000 in present-day value. Today the average is around NOK 250 000, or about ten times higher than a hundred years ago. For purposes of comparison, the increase was barely twofold between 1820 and 1900.

**Chart 11** GDP per capita. Thousands of 1998 NOK. Logarithmic scale

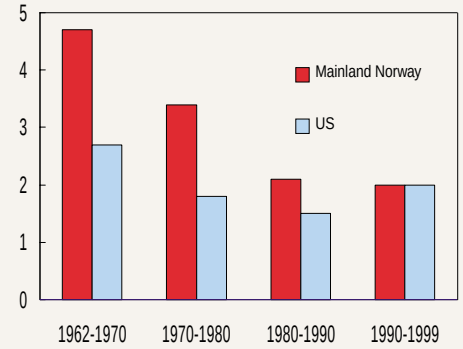



Sources: Statistics Norway and OECD

Economic growth in Norway was particularly strong in the first thirty years following the Second World War, as a result of the introduction of new technology from the US and new products in Europe. Europe has gradually caught up with the US thanks to the import of technology from the US, effective restructuring and the expansion in global trade. This explains why welfare gains have been substantially higher in Norway and other European countries than in the US in the post-war period.

Growth in productivity in mainland Norway was high in the 1960s and 1970s. Since 1980 productivity growth has been more in line with growth in the US. By then we had reached a high level of income. It follows that there was less to gain than earlier from the import of new technology.

**Chart 12.** Productivity in the business sector. Annual average growth. Per cent

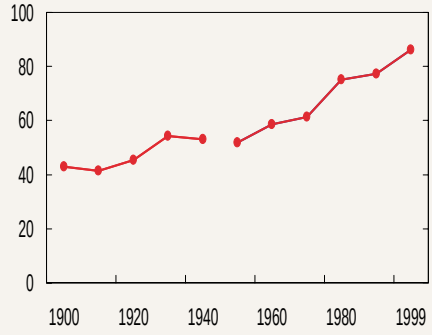



Sources: Bureau of Labor Statistics and Statistics Norway

The chart shows productivity growth in the business sector in mainland Norway and the US since 1962. The mainland business sector is business activity excluding oil and gas and shipping. The business sector in the US is the non-farm business sector. Productivity is calculated as output per hour.

In spite of the boost provided by Norway's oil resources, there is a difference in income between Norway and the US. The income differential is probably to a large extent ascribable to differences in working hours and employment. Labour participation is slightly higher in Norway than in the US, while the average working time in Norway is almost 30 per cent below the US average. Many people in Norway work part-time. But even a full person-year amounts to a good 10 per cent fewer hours than the US average. The income differential primarily reflects that Norwegians have chosen to increase their leisure time.

**Chart 13.** GDP per capita. Percentage of income level in the US




Sources: Statistics Norway and OECD

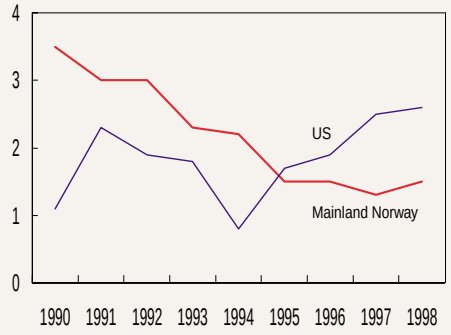
The chart shows GDP per capita in Norway as a percentage of GDP per capita in the US. The numbers are based on purchasing power parities (OECD).

However, the income level in Norway is high compared with other European countries, which is attributable to Norway's petroleum revenues and high level of employment. The relatively high level of income indicates that we have to a large extent closed the technological gap between Norway and the US. This means that we cannot expect growth rates on a par with that of the 1950s and 1960s, ie annual growth rates of up to 5 per cent.

## A new economy

New technology may be a driving force behind structural changes in the economy and lead to high growth rates.

**Chart 14.** Productivity growth in the business sector.
Per cent. 3-year moving average




Sources: Bureau of Labor Statistics and Statistics Norway

The chart shows productivity growth in the business sector in Norway and the US in the 1990s. See comments to chart 12.

The trend in the post-war period, with stronger growth in productivity in Norway than in the US, may have been reversed. Productivity growth has tended to move on a weaker trend in Norway, while rising in the US. Both Norway and the US have enjoyed a long period of sustained expansion in the 1990s. At this stage, productivity growth tends to be low. Signs of higher growth in the US may thus suggest a new trend.

It is probably too early to draw any definite conclusions. We also know that there may be considerable statistical sources of error. However, the new growth trend is supported by evidence of a more anecdotal nature. Major changes are taking place in the US business sector through processes such as mergers and acquisitions. There is an exceptionally rich supply of capital in the stock market. The new technology companies dominate stock exchange developments. In Europe, Sweden and Finland are leaders in developing new technology environments. Norwegian companies may also be at the forefront of developments in some areas.

Securities markets have been a vital force behind these changes. In the course of the last 20 years, a revolution has taken place in global financial markets. Capital restrictions have been removed. Companies around the world are experiencing a wave of mergers, acquisitions and demergers. These transactions reflect a higher required rate of return among all companies and all areas of a business. At the same time, there is an increased willingness to take risk, with a soaring number of start-up companies. This trend has been particularly evident in the US, but European countries are also part of this process.

Increased possibilities for using information improve financial markets' ability to act as a catalyst for profitable restructuring and growth. Companies financed through equities, bonds and commercial paper are continuously monitored through a transparent process. Owners and potential investors follow company performance closely. There are ever-stricter requirements concerning information. A poorly performing enterprise can be acquired by others who feel they can either run it more profitably or use its resources more effectively elsewhere.

One may be sceptical with regard to these developments, which seem to have created a situation where a few keyboard operations can lead to wealth and losses. Financial markets are driven by forces and psychological mechanisms that may result in extreme volatility. Financial bubbles fuelled by unrealistic optimism may lead to the darkest pessimism and fears. The so-called new economy may be a bubble. The concept "new economy" was first introduced prior to the stock market crash in 1929. The authorities carry a particular responsibility for monitoring financial stability and ensuring that the rules of the game are followed.

The alternative to open securities funding is bank credit. This type of financing is traditionally based on a close relationship between banks and borrowers. Banks gain access to extensive information concerning the borrower and often exert influence over business decisions.

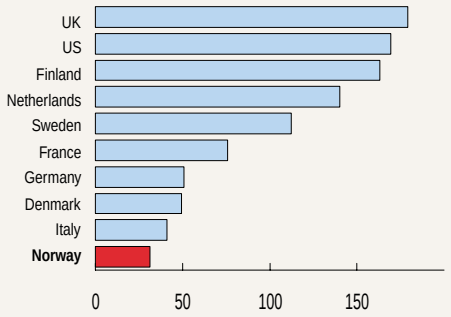
This type of arrangement has long been preferred in many European countries as it was very difficult to obtain adequate information about individual companies and time-consuming to analyse the information that was available.

This situation has changed with the advent of new information technology. Financial markets are now more effective in terms of channelling capital to investments that yield the highest returns.

Germany is the country in Europe where banks and borrowers have been the most dependent on each other. In addition to providing loans, banks have large shareholdings in companies and big companies have a large stake in private banks. The tax system has locked in this cross-ownership. Owners have had to pay about 50 per cent in taxes on capital gains on share transactions. The German government has announced that this tax will be eliminated from 2001. This is expected to prompt a restructuring, first in the ownership of German banks and enterprises and subsequently in production.

The business sector is dependent on both a smoothly functioning securities market and banks with a close relationship to borrowers. Small and medium-sized enterprises are particularly dependent on the expertise and guidance offered by banks. Funding in securities markets is too expensive for the smallest enterprises.

**Chart 15.** Market value of listed shares. Percentage of GDP October 1999




Sources: European Stock Exchange Statistics, New York Stock Exchange and OECD

The chart shows total market value of shares quoted on the stock exhange at end-October 1999 in per cent of estimated GDP 1999.

The securities market plays less of a role in Norway than in other European countries and the US. The market for equity capital is particularly small in Norway. Norwegian companies often rely on foreign funding for new projects. The thin market for securities capital in Norway may be an obstacle to the development of the business sector.

This means that it is essential that the banking system function smoothly.

When they function, the strength of financial markets lies in their transparency and adaptability. Capital which is tied up in unprofitable activity can be freed up for other activities. Competition for capital contributes to creative destruction.

Structural changes also take place within individual companies. One example is NOKIA. Thirty years ago, the forerunners of the world's leading producer of cellular telephones were primarily producing telephone cables, rubber boots and tyres. At that time, the electronics division accounted for 3 per cent of NOKIA's turnover and employed 460 persons. However, research and product development led to a wider range of products. In 1988, NOKIA was the third largest producer of television sets in Europe and the largest producer of cellular telephone equipment in the Nordic area.

NOKIA experienced a deep crisis in the beginning of the 1990s, as did many Finnish companies. NOKIA decided to concentrate on telecommunications. The split-up of the group was initiated from within the company. Non-core activities were spun off and sold. This allowed NOKIA to free up capital for the most profitable activities of the company. Today the company has more than 50 000 employees. At the end of last year, the market value of NOKIA was about NOK 1 700 billion, which is four times the market value of all the companies listed on the Oslo Stock Exchange.

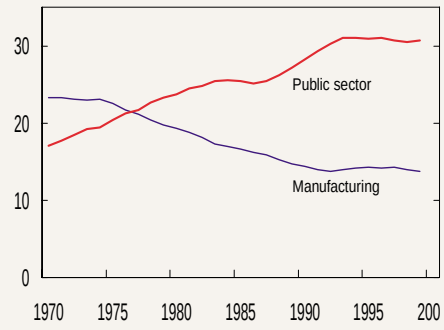
The economy needs creative destruction to develop. The tendency may have been for the Norwegian authorities to provide various type of support to businesses and industries that have existed for some time. When the government intervenes, the authorities tread a fine line between business development and conservation. It is thus important to tread carefully, so that capital and labour are not tied up in less profitable activity.

The required rate of return and the need for restructuring in the business sector often conflict with the need for stability and security for the individual employee. Local communities may suffer. The answer is not to oppose restructuring. The best solution is to develop and take advantage of skills and expertise. This also requires extensive adaptability and labour mobility.

## The welfare state

The restructuring that we are facing in the Norwegian public sector is hardly of less significance than the changes in the business sector. During the last decades the Norwegian welfare state has expanded rapidly. Household income and consumption have also shown steady and strong growth. We have also witnessed a sharp expansion in the production of services in both the public and the private sector.

**Chart 16.** Employment by sector. Percentage of overall employment



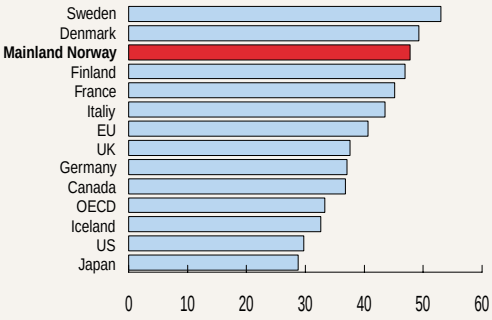

Source: Statistics Norway

Employment growth in the service industries increased while declining in primary industries and manufacturing, with a redistribution of real resources between sectors. The transfer is the result of a steeper increase in demand for services than for goods when income rises.

Taxes were increased to finance the expansion of the welfare state. Excluding the petroleum sector, the tax level has increased from 41 per cent of mainland GDP in 1970 to around 48 per cent today.

The tax burden in mainland Norway is among the highest in the OECD countries. Only Sweden and Denmark have a higher tax burden. There are many rea-

**Chart 17.** Tax level. 1998. Percentage of GDP




Source: Statistics Norway

The chart shows total tax income in per cent of GDP in 1998. Figures from 1997 are used for the United States and Canada. The tax level in mainland Norway is calculated as total tax income excluding oil and gas taxes in per cent of mainland GDP.



sons why further tax increases would put the Norwegian welfare state in jeopardy. Tax competition among countries is intensifying. Several countries have attracted new business by reducing taxes. Enterprises, capital and labour base their choce of location on tax considerations.

In principle, it is conceivable that higher taxes only affect the household sector, so that the business sector is not exposed to a heavy tax burden. However, it is difficult to find direct or indirect taxes that do not also affect the business sector. Higher direct and indirect taxes may lead to demands for higher income, which will be easier to achieve the tighter the labour market is. However, companies exposed to strong international competition have limited scope for passing on higher costs to households.

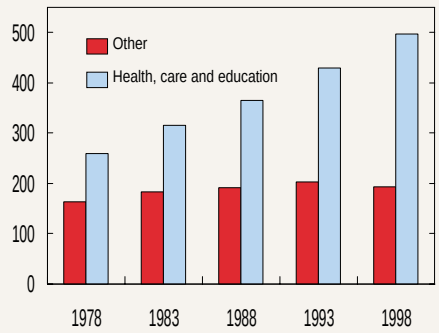
A high tax level is particularly dependent on an efficient tax system. High tax rates promote tax planning and hamper the growth capacity of an economy. Low, broad-based tax rates are preferable to high tax rates with a narrow base. Norway made headway with the tax reform of 1992. There is still room for considerable improvement in the Norwegian system.

Many public services are of considerable economic importance. Infrastructure, education, sound legislation and a solid judicial system are necessary for the economy to function and grow. Public services may be important in order to secure equality and security. At the same time, the public sector is so large that it affects the economy at large. This means that requirements concerning efficiency and adaptability must also apply to the public sector.

Over a twenty year period, the number of employed in the health, care and education sectors has increased by 240 000, which accounts for about 60 per cent of the increase in overall employment in Norway. The number employed in the health and care sector has more than doubled in twenty years. More people are now working in this sector than in the whole of manufacturing.

Nevertheless, every day we receive reports of personnel shortages at hospitals, in elderly care, or at schools. The authorities constantly signal increases in appropriations in order to remedy these problems. Norway

**Chart 18.** Public sector employment by sector. Thousands of persons



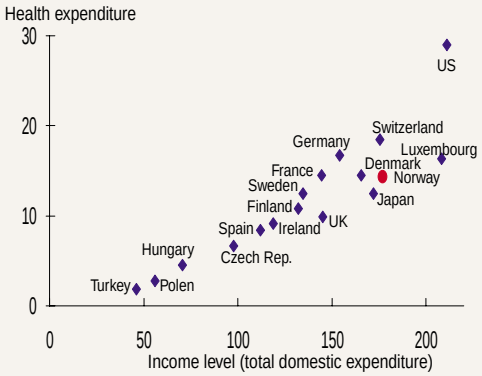

Source: Statistics Norway

The chart shows the distribution of public employment by sector. From 1978 to 1998, the number of employed in health, care and education increased by 240 000. In the health and care sector, employment rose by 182 000, to 340 000 in 1998. In the education sector, employment rose by 57 000, to 158 000 in 1998.

imports labour from other countries to cover its resource shortages. What are the reasons behind this situation?

Demand for health and care services rises sharply when incomes increase. The chart shows income on the horizontal axis, and health expenditure on the vertical axis. Norwegian health service expenditure is on a par with or higher than that of other western countries, with the exception of the US, Germany and Switzerland. However, as a percentage of income, health expenditure in Norway is still not particularly high.

**Chart 19.** Income level and health expenditure. Thousands of 1997 NOK per inhabitant




Source: OECD

The chart shows income level (total domestic expenditure) per capita on the horisontal axis and health expenditure per capita on the vertical axis. The figures are from 1997 and based on purchasing power parities

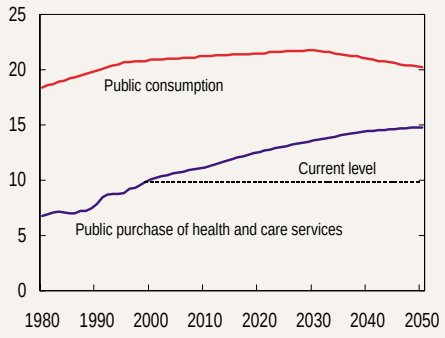
A further reason for the situation outlined above might be the composition of the population. We know that in a few years health expenditure will rise sharply because of an ageing population. However, current demographic trends do not indicate particularly strong pressures.

The challenges will increase considerably in the years ahead. Continued growth in incomes and an ageing population will boost demand for health and care services.

Moreover, it will be possible to offer services and forms of treatment that are not available today.

All this has to be provided for within tight personnel and budget constraints. The increase in social security expenditure on pensions will lay claim to a steadily increasing share of overall central government expenditure. Even with sizeable government financial assets, these resources will primarily be used to finance the increase in pension expenditure associated with the ageing of the population. Taxes cannot be increased without a weakening of the position of the business sector. Therefore, it would be inappropriate to base policy decisions on the assumption that growth in public expenditure items other than pensions can exceed GDP growth.

**Chart 20.** Health, care and public consumption. Percentage of mainland GDP




Sources: Statistics Norway, Ministry of Finance, and Norges Bank

The chart shows the development in public consumption as a share of mainland GDP, as estimated in the Long-Term Programme 1998-2001, and Norges Bank's estimate of public expenditure on health and care. Current level of public expenditure on health and care is estimated on the basis of total production of health and care services excluding the share financed by the private sector. The estimate is based on an income elasticity in line with historical figures. In addition, the estimate is based on the assumption that demand for and production of health and care services will increase due to demographical factors.

Allow me to illustrate this. The chart shows Norges Bank's estimates for public purchases of health and care services. The estimate is based on the assumption that the public sector will finance the same share of public services as today. The source for the estimate for public consumption is the Government's Long-Term Programme, and the estimate is based on unchanged tax rates.

The fundamental problem is that demand for health and care services is growing faster than tax revenues. There will be a limit on the extent to which the state can reduce appropriations for other important social objectives such as education, research and the judicial system. Something has to give.

Even after all the structural changes of recent years, there is probably still room for efficiency gains in the health and care sector. However, this is hardly sufficient to fully address the challenges. Users may therefore have to finance a substantially greater share of these services, whether the services are provided by public or private operators. There are limits on the extent to which the public sector should and can impose user fees without creating unacceptable distributional effects. A private insurance system is not a foolproof solution.

It seems obvious that there is a need for a clearer definition of the public sector's core activities in the health and care sector, and in other areas. There is a need for delimiting what the public sector should finance by means of tax revenues.

## The main challenge

At this time last year, oil prices stood at USD 10 a barrel. The Norwegian economy had experienced a turnaround, with a risk of a deflationary recession. Indeed, this particular risk now would seem less prominent. Oil prices have risen to almost USD 30 a barrel. The period of sluggish growth now appears to be transient. European economies are expanding while the US economy is still booming. Even after a year of slower growth, economic activity in Norway is still high.

Over the last decade, inflation has been subdued in Norway. The economy has expanded at a rapid pace and the business sector and public enterprises have created new jobs. Technology and the competition for capital are engendering structural changes, unrest and uncertainty, but also provide opportunities for renewed growth. At the same time, the stock market shows some features that may prove to be a source of future instability.

Economic policy must draw on the lessons of the boom and bust cycles of the past. The most important task of monetary policy is to secure a nominal anchor for the economy. Fiscal policy and monetary policy must be complementary. Fiscal policy determines the distribution of labour and other real resources between the business sector and public sector activity – between exposed and sheltered industries.

Norway's state finances are solid and will be further strengthened in the years ahead. However, government savings will hardly exceed the requisite level implied by pension expenditure over the next decades. Considerations relating to the business sector and the supply of labour set limits on how fast the public sector can expand. Given the current structure and pricing of public services - and the many tasks assumed by the public sector - it will become increasingly difficult as each year goes by to make ends meet in both central and local government budgets in an environment of growing demands and expectations. This probably represents the greatest challenge to economic policy in the years ahead.

Thank you for your attention.

# Evaluation of Norges Bank´s projections

By Anne Sofie Jore, senior economist in the Economics Department, Norges Bank*

**This article analyses Norges Bank's projections for 1998, published in autumn 1996 and autumn 1997 respectively. Compared with earlier articles on this subject, we go one step further in the analysis by examining projections with a two-year horizon. It is also important to be able to analyse economic developments further ahead because decisions on economic policy will influence the economy more than one year ahead. The evaluation focuses on the contributions from erroneous assumptions concerning exogenous variables, such as public demand and externally generated inflation. A comparison with two-year projections from Statistics Norway is also included.**

**All in all, our forecast errors for 1998, presented in autumn 1997, were smaller than the forecast errors for earlier years. There is no clear evidence that the projections would have been substantially better if we had known actual movements in exogenous variables in advance. The forecast errors increase for some variables and are reduced for others.**

**In principle, one would expect the forecast errors in the projections presented at the end of 1996 to be greater than the errors in the projections presented at the end of 1997. This is confirmed for important real variables such as mainland demand and employment. For wage and price inflation, however, the forecast errors are smallest in the earliest projections.**

**The projections for 1998 show a larger forecast error in the projection for consumer price inflation than in earlier years as a result of lower-than-expected imported price inflation. Towards the end of 1998 it was evident that consumer price inflation was lower than implied by exchange rate movements. In the consumer price equation, we have since 1999 used an expanded import-weighted exchange rate index, which includes the currencies of several countries in Asia. The actual forecast error is largely due to the fact that the effects of the crisis in Asia were erroneously evaluated in two ways. First, the crisis had a surprisingly strong effect on international prices. Second, the depreciation of Asian currencies contributed to a stronger effective krone exchange rate than implied by traditional exchange rate indices.**

**Analyses of forecast errors are an important part of the work aimed at making the projections more accurate. At the same time, continuous efforts are made to improve the analyses, in the form of both short-term cyclical analyses and further development of the model. The analysis of forecast errors in the projections for 1998 confirms that there is a potential for improving the RIMINI model. Various types of shock, such as international financial turbulence and fluctuations in the oil price, will nevertheless continue to be a source of uncertainty in economic developments.**

Norges Bank's analyses of developments in the Norwegian economy are published in the inflation reports four times a year. Projections for developments in the Norwegian and international economy are an important basis for the formulation of monetary policy. In addition, the analyses are used as a basis for advice on the orientation of economic policy in general. The macroeconomic model RIMINI, developed in Norges Bank's Research Department, has been the principal tool for the Bank's analyses since 1994. RIMINI is an econometric model with nearly 400 equations. About 70 of the equations are estimated on the basis of historical data, while the remaining equations are definitional relationships.

Norges Bank aims to produce the best possible projections for the Norwegian economy. It is important that errors are revealed in order to improve the model and the way in which the model is used. This in turn will result in more accurate projections. We also wish to compare Norges Bank's projections with those of other institutions.

Norges Bank places considerable emphasis on transparency and the availability of its forecast work. This work also includes analyses of earlier projections. The projections are based on a model that is publicly known, and the Bank's use of the model is published. The purpose is to provide others with the basis for evaluating how we have arrived at our projections and how accurate they are. Systematic evaluation also places greater demands on consistency and documentation of the projections in the *Inflation Report*, which in itself will improve the quality of the analysis.

Norges Bank intends to publish analyses of its projections annually. So far, such analyses have been published in articles in *Economic Bulletin* 1998/1 (Jore 1997) and 1999/2 (Jore 1999). In addition to detailed analyses of Norges Bank's projections, these articles presented summary measures of forecast errors for the Ministry of Finance and Statistics Norway, showing that the three institutions' projections were almost equally accurate. The articles also showed that the amplitude of the cyclical upturn was considerably underestimated by all the institutions. In an article published in *Penger og Kreditt* 1996/1 (Madsen 1996), Norges Bank's projec-

*With thanks to my colleagues at Norges Bank for their useful comments.

tions for the years 1987-1994 were compared with those of other institutions. This article also concluded that Norges Bank's forecasts were about as accurate as projections from other institutions.

The article in Economic Bulletin 1999/2 primarily analysed the projections for 1997. The projections for 1998 were examined briefly on the basis of preliminary national accounts figures for 1998. This article is based on revised national accounts figures published in September and provides a more thorough analysis. This time the analysis has been expanded to include forecast errors in the projections presented at the end of 1996.

Finally, we compare Norges Bank's projections two years ahead with corresponding projections from Statistics Norway.

## Sources of forecast errors

The macroeconomic model RIMINI has been the main tool for Norges Bank's projections since 1994. In the model, important economic relationships are represented by quantified empirical relationships. The model also ensures consistency in that demand equals supply in the various markets.

There are important sources of forecast errors in an economic model. The model's coefficients are quantified on the basis of historical data. There are uncertainty intervals around each coefficient, and the interaction between many equations in a model increases the uncertainty around each variable. Changes in the functioning of the economy may not be captured in the quantification of coefficients. Finally, there are areas where the model does not sufficiently take into account important economic relationships.

These factors require the use of some degree of discretion, particularly for the shortest projections. The interpretation of current statistics is an important basis for these discretionary evaluations. In practice, the evaluations are taken into account by adjusting the add factors in each equation. Erroneous adjustments of add factors therefore represent another important source of forecast errors. However, correct adjustments result in better forecasts.

Norges Bank's projections provide our assessment of the most probable developments, given some key assumptions concerning fiscal policy, interest rates and the exchange rate. This is a suitable starting point when projections are to be used to analyse the orientation of economic policy. Often, however, forecast errors will arise because economic policy or the exchange rate deviated from the path assumed. This was particularly the case in 1998.

In addition to forecast errors ascribable to incorrect assumptions concerning economic policy and other exogenous variables, model deficiencies and the use of the model are an important source of forecast errors. The projections are also influenced by changes in the national accounts. Due to the recently implemented main revision to the national accounts, it has not been possible to make a thorough analysis of forecast errors stemming from the model and its use. In order to be able to identify errors in such a way that they provide useful information on the model and its use, the model's equations must be quantified on the basis of the revised national accounts. So far, most equations have been quantified on the basis of the old national accounts. New national accounts figures are "recreated" by calibrating the equations' add factors. The work on a complete remodelling and reestimation of the model is now drawing to a close so that more complete analyses can gradually be made.

In this article we analyse the forecast errors for 1998 using the same method as in earlier articles. First, errors stemming from incorrect economic policy assumptions are eliminated, followed by errors ascribable to deviations of other exogenous variables from actual developments. The errors remaining after adjusting for incorrect forecasts of policy variables and other exogenous variables are due to random effects, incorrect model use or model deficiencies. The projections are evaluated against the preliminary national accounts published in September 1999. Revisions to the national accounts are also made after this time, but are usually minor.

## Errors in forecasts for 1998

### *Projections presented in December 1996*

*Economic Bulletin* 1996/4 presented projections for 1997, whereas the projections for the years 1998-2000 were presented as an annual average. We will nevertheless look more closely at the projections for 1998, which are found in our background material, in order to permit a more thorough analysis of forecast errors for longer term projections. Annual projections with a time horizon of two years have been published since *Economic Bulletin* 1997/4. Perceptions of developments a few years ahead are important in formulating economic policy. It often takes time before economic policy decisions influence economic developments. The need to draw up the best possible projections is therefore equally important in making forecasts with a two-year time horizon as for projections with a time horizon of one year.

In December 1996, Norges Bank projected continued high, albeit slower growth the next few years. The cyclical upturn had then lasted for three years. A rising household saving ratio, a levelling off of fixed investment and lower growth in traditional exports were cited as the most important reasons for the more sluggish trend.

In *Economic Bulletin* 1999/2, we discussed how these projections underestimated economic growth in 1997. A substantial portion of the forecast errors was due to incorrect assumptions concerning exogenous variables, particularly general government demand and petroleum investment.

**Table 1. Projections for 1998 made in December 1996, and actual figures for 1998 (as at September 1999) Percentage increase on previous year unless otherwise indicated**

| 1998 | Projection | Actual | Forecast error |
|---|---|---|---|
| Mainland demand | 2¼ | 3.1 | ¾ |
| Private consumption | 2½ | 3.1 | ½ |
| Public consumption | 1¾ | 3.7 | 2 |
| Fixed investment | 2 | 2.4 | ½ |
| Petroleum investment | 4 | 21.3 | 17¼ |
| Exports | 3¼ | 0.5 | -2¾ |
| Oil, gas and pipeline transport | 2¼ | -3.5 | -5¾ |
| Traditional goods | 4½ | 3.4 | -1 |
| Imports | 4 | 9.1 | 5 |
| Traditional goods | 4 | 9.6 | 5½ |
| GDP | 2¼ | 2.1 | -¼ |
| Mainland GDP | 2¼ | 3.3 | 1 |
| Employment | 1 | 2.3 | 1¼ |
| Annual wages | 5 | 6.5 | 1½ |
| Consumer prices | 2½ | 2.3 | -¼ |
| LFS unemployment | 3¾ | 3.2 | -½ |

Sources: Statistics Norway *(Economic Survey 3/99)* and Norges Bank *(Economic Bulletin 1996/4)*

The projections for some key variables for 1998 are presented in Table 1 along with actual figures presented in the national accounts published in September 1999. The table shows that economic growth in 1998 was also underpredicted two years earlier. Mainland demand was estimated at 2¼ per cent, while the national accounts figures put growth at 3.1 per cent. All of the domestic demand components were underestimated. However, growth in both traditional exports and exports of oil and gas was overpredicted. Petroleum investment was considerably higher than projected. For 1997 and 1998 combined, petroleum investment was projected to expand by 12 per cent, while growth proved to be more than 50 per cent. The underestimated growth in demand is reflected in underpredicted projections for import growth, mainland GDP growth and employment growth. Unemployment was half a percentage point lower than we projected.

We assumed that the tight labour market would make it difficult to achieve moderate wage growth in the years ahead. This turned out to be correct. The labour market was tighter than implied by our projections, and wage growth in 1998 was therefore even higher than we assumed. However, this did not result in higher-than-expected consumer price inflation. On the contrary, price inflation was a quarter percentage point lower than our projection. This must be seen in connection with the Asian crisis, which contributed to a fall in prices for a number of imported consumer goods in 1998.

**Table 2 Forecast error in 1998 and the effect of changes in assumptions. Positive figures denote underprediction. Percentage points. Forecasts from December 1996**

| | Mainland GDP | Employ-ment | Wage growth | Consumer price inflation | Private con-sump-tion | Mainland business fixed investment |
|---|---|---|---|---|---|---|
| Aggregate error | 1 | 1¼ | 1½ | -¼ | ½ | ½ |
| Error after changes in policy assumptions | 0.1 | 0.6 | 0.4 | -1.0 | -0.1 | -3.2 |
| - and after incorporation of correct estimates for all exogenous variables | 0 | 0.3 | 0.1 | -1.1 | 0 | -3.5 |

Source: Norges Bank

The contribution of inaccurate exogenous assumptions to forecast errors is found by incorporating actual growth rates for the variables determined exogenously. The first line in Table 2 shows the forecast errors for some of the variables in Table 1. The second line shows how large the forecast errors are after incorporating correct economic policy assumptions in 1997 and 1998. This includes public expenditure, the money market rate and the exchange rate. The projections for 1997 and 1998 were, as usual, based on technical assumptions regarding the exchange rate and the money market rate. This entailed an average appreciation of 1 per cent from 1996 to 1997 and an unchanged exchange rate thereafter. The appreciation turned out to be 0.5 per cent in 1997, while there was a depreciation of 4.5 per cent from 1997 to 1998. The money market rate was assumed to be 4.3 per cent in both 1997 and 1998, while actual interest rates averaged 3.7 per cent in 1997 and 5.8 per cent in 1998.

If the economic policy assumptions for 1997 and 1998 had been correct, the estimates for some of the key variables would have been more accurate, but the forecast errors are also seen to increase for some variables. Correct policy assumptions result in a substantial overprediction of mainland fixed investment growth, while the projection for growth in private consumption is fairly close to the mark. Output growth in mainland Norway is then also accurate, while the forecast errors in the projections for growth in employment and wages are substantially reduced.

Projected consumer price inflation rises to 3.3 per cent, 1 percentage point too high. The main reason for higher consumer price inflation is the weaker krone exchange rate. In the RIMINI model, a depreciation of 4.5 per cent results in an increase of about ½ per cent in price inflation the same year. During 1998, however, it turned out that the import-weighted krone exchange rate was less indicative of externally generated price impulses than earlier. This was due to the strong depreciation of a number of Asian currencies in the autumn of 1997.

These countries were not represented in the various effective krone exchange rate indices, partly because they have been of relatively limited importance to Norwegian trade. However, as a result of a significant change in these countries' exchange rates, the rise in prices for Norwegian imports of consumer goods was very low, thereby restraining general price inflation in Norway. Furthermore, Norway imports a relatively higher share of consumer goods from Asia than the level indicated in the model's aggregated import price equation. The RIMINI model would therefore never be fully able to capture the effect of the Asian crisis on Norwegian consumer prices. Since Inflation Report 1999/1 we have looked at movements in an expanded import-weighted exchange rate index, which includes a greater number of Asian countries.

When growth in all exogenous variables is incorporated, the forecast error for employment and wage growth is further reduced, while the error for mainland fixed investment growth rises slightly. The forecast error for other variables shows little change.

The errors remaining after correct assumptions concerning economic policy and other exogenous variables are incorporated are due to erroneous estimates for 1996 and 1997, a change in the base year, a break in the national accounts and shortcomings in the model and its use. In later analyses of forecast errors we will also examine the last two reasons for forecast errors.

## *Projections presented in December 1997*

Forecast errors in the projections for 1998, presented in Economic Bulletin 1997/4, were provisionally analysed in the article in Economic Bulletin 1999/2. The projections were compared with the preliminary national accounts figures for 1998, published in February 1999.

**Table 3. Projections for 1998 made in December 1997, and actual figures for 1998 (as at September 1999) Percentage growth on previous year unless otherwise indicated**

| 1998 | Projection | Actual | Forecast error |
|---|---|---|---|
| Mainland demand | 3¼ | 3.1 | -¼ |
| Private consumption | 4 | 3.1 | -1 |
| Public consumption | 2 | 3.7 | 1¾ |
| Fixed investment | 2½ | 2.4 | 0 |
| Petroleum investment | 2 | 21.3 | 19¼ |
| Exports | 7¾ | ½ | -7¼ |
| Oil, gas and pipeline transport | 13½ | -3.5 | -17 |
| Traditional goods | 6 | 3.4 | -2½ |
| Imports | 4¾ | 9.1 | 4¼ |
| Traditional goods | 5 | 9.6 | 4½ |
| GDP | 5 | 2.1 | -3 |
| Mainland GDP | 3¼ | 3.3 | 0 |
| Employment | 2 | 2.3 | ¼ |
| Annual wages | 5 | 6.5 | 1½ |
| Consumer prices | 2¾ | 2.3 | -½ |
| LFS unemployment | 3¼ | 3.2 | 0 |

Sources: Statistics Norway *(Economic Survey 3/99)* and Norges Bank *(Economic Bulletin 1997/4)*

Our projections underpredicted economic growth in the years 1994 to 1997. The projections concerning mainland economic developments for 1998 were more accurate (see Table 3). Once again, external factors contributed to forecast errors. This particularly applies to all aspects of the petroleum sector. Fixed investment in this sector rose substantially more than projected, while production and exports of oil and gas were considerably weaker than assumed. The oil price showed a substantially steeper fall than predicted, thereby resulting in a current account deficit instead of the large surplus projected.

Overpredicted growth in private consumption was offset by underpredicted spending growth in the public sector, so that mainland demand was approximately as projected. Traditional merchandise exports were higher than assumed.

The projection for mainland GDP growth was accurate, while growth in total GDP was substantially lower than our projections due to lower oil production. As a result of the sharp increase in fixed investment in the petroleum sector, imports were also higher than projected.

The projection for employment growth was fairly accurate, in contrast to previous years when there were large forecast errors in the projections. This may to some extent be seen in connection with the experience of earlier years. In the work on the projections for 1998, it was taken into account that there has been fairly systematic underestimation of employment growth and overestimation of productivity growth in the past.

Despite the fact that wage growth was underestimated and the exchange rate was weaker than the technical assumption, consumer price inflation was overpredicted. The main reason for this is that imported price inflation was considerably lower than anticipated, despite the weakening of the exchange rate. As noted earlier, this may be ascribed to the fall in foreign producer prices as a result of the Asian crisis.

**Table 4. Forecast error in 1998 and the effect of changes in assumptions. Positive figures denote underprediction. Percentage points. Forecasts from December 1997**

| | Mainland GDP | Employment | Wage growth | Consumer price inflation | Private consumption | Mainland business fixed investment |
|---|---|---|---|---|---|---|
| Aggregate error | 0 | ¼ | 1½ | -½ | -1 | 0 |
| Error after changes in policy assumptions - and after incorporation of correct estimates for all exogenous variables | -0.5 | 0 | 1.0 | -0.9 | -1.0 | -3.3 |
| | -0.9 | -0.5 | 0.9 | -0.8 | -1.0 | -3.0 |

Source: Norges Bank

Table 4 shows forecast errors that are due to incorrect estimates for exogenous variables. The first line in the table shows the forecast errors for some of the variables in Table 3. The second line shows the magnitude of the forecast errors after correct economic policy assumptions for 1998 are incorporated. As previously, this includes general government expenditure, the money market rate and the exchange rate. The projections presented in December 1997 were, as usual, based on technical assumptions concerning the exchange rate and the money market rate. These entailed approximately unchanged exchange and interest rates from the end of 1997. At the end of 1998, the import-weighted exchange rate had depreciated by 4.5 per cent from 1997 to 1998, and average interest rates had risen from 3.7 per cent in 1997 to 5.8 per cent in 1998.

In contrast to the analysis of forecast errors in the projections presented in December 1996 and earlier analyses of forecast errors, correct developments in exogenous variables do not provide more accurate forecasts. On the contrary, the projections are, on the whole. less accurate.

The projection for mainland GDP growth would have been overpredicted by 0.5 percentage point if correct policy assumptions had been incorporated. This is due to higher demand growth as a result of sharper growth in general government demand and improved competitiveness due to a weaker krone exchange rate. A higher money market rate does not offset this.

The forecast error for employment growth disappears when correct policy assumptions are incorporated, and the error for wage growth is reduced from 1.5 per cent to 1 per cent. This contributes to an even greater forecast error for consumer price inflation. The main reason for this is again in part that the model "misinterprets" the weakening of the exchange rate and partly that we have not taken account of the effects of the Asian crisis on world market prices. As noted, the transition to an expanded import-weighted exchange rate index as from Inflation Report 1999/1 may solve part of this problem. Norges Bank is also evaluating the impact of exchange rates through import prices on consumer prices, among other things in the light of the experience of 1998.

Forecast errors in the projections for mainland GDP growth and employment growth increase when correct developments in all exogenous variables are incorporated. High growth in petroleum investment is part of the reason for this. For other variables there are only small changes in the forecast errors.

This analysis can be used to illustrate important aspects of the work on forecasts without carrying out a complete analysis of the model and its use. The fact that the projections are basically fairly accurate and that the forecast errors for main aggregates increase when correct exogenous estimates are included can also be interpreted to mean that Norges Bank's forecasts for developments in the Norwegian economy were relatively accurate despite considerable errors in the exogenous estimates. This may to some extent be ascribed to adjustments of add factors in the model's equations. Examples of this include:

- For projections with a short time horizon of only one year the interpretation of current statistics provides a basis for discretionary evaluations. Such evaluations contributed, for example, to fairly accurate projections for GDP and employment growth even though total demand was underpredicted.
- If we look more closely at the projections after incor porating correct exogenous variables, we find that growth in the sum of mainland GDP and total imports is very close to actual growth. It is therefore the distribution between domestic production and imports that is inaccurate. The model's equations have a tendency to underestimate import growth, and it has therefore often been necessary to revise import growth upwards by adjusting the add factor in the import equation.

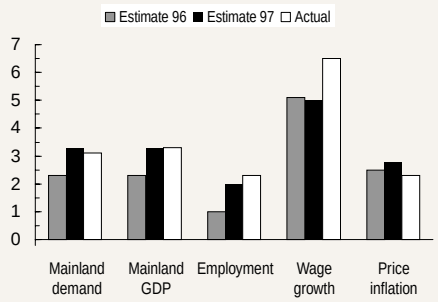
## Comparison of Norges Bank's projections for 1998 published at different times

The uncertainty in forecasts of economic developments increases with the time horizon. Chart 1 shows projections for 1998 for some main aggregates published in December 1996 and December 1997 respectively.

The chart can illustrate several points. First, projections for important real variables with a short time horizon are more accurate than projections with a longer time horizon. The opposite is true for nominal variables; projections published in 1996 were slightly more accurate that the projections published one year later. The relative forecast errors for the 1996 projections were greatest for real variables. This also changes in the forecasts published one year later, where the error was greatest for nominal variables.

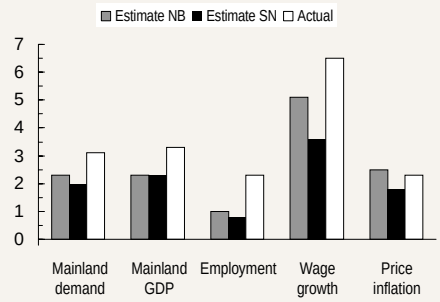
Real variables generally show wider fluctuations than nominal variables. Normally, forecast errors will therefore be greatest for real variables, as was the case for the projections from 1996. There are several reasons why the forecast errors for wage and price inflation were greatest in the projections from 1997. The error is reduced after correct exogenous variables are incorporated, but the relative forecast error remains high. In the RIMINI model, wage growth in manufacturing and construction determines wage growth in other sectors. The background material for the projections shows that the forecast error for the projections for wage growth in this sector was considerably smaller than the forecast error for total wage growth. Underpredicted wage growth in public and private services was the main reason for underpredicted total wage growth. This was partly due

**Chart 1.** Estimates for some key variables for 1998 made at various times. Annual increase. Per cent




Sources: Statistics Norway and Norges Bank

**Chart 2.** Estimates for some key variables for 1998 made in 1996 by Norges Bank (NB) and Statistics Norway (SN). Annual increase. Per cent




Sources: Statistics Norway and Norges Bank

to the adjustment of wage growth in the public sector to a lower level than a normal use of the model implied when making the projections, in line with actual developments since the mid-1980s. The tendency for wage growth in the public sector to be lower than in the private sector was not captured in the wage equations. In 1998, there was a break in this trend when wage growth in the public sector was higher than in the private sector. Wage growth in private services was also substantially underpredicted, but this cannot be ascribed to our use of the model.

The reason for the high relative forecast error for the inflation projections was the persistent fall in foreign producer prices. As discussed further in an earlier section, most forecasters did not foresee this development.

## Comparison of forecasts produced by Statistics Norway and Norges Bank in December 1996

In December 1996, Statistics Norway was the only large institution to produce detailed forecasts for 1998. Norges Bank produced forecasts in the form of averages for several years. We have used the background material for Norges Bank's forecasts from December 1996 to analyse the forecasts for 1998. The Norwegian Bankers' Association and the Ministry of Finance have also published average forecasts for 1998, but they were published earlier in the year. As a result, it is only possible to compare Norges Bank's forecasts and the forecasts published by Statistics Norway.

Chart 2 shows the projections for 1998, published in December 1996, for some key aggregates. The projections for real variables are essentially the same for the two institutions. Even though both Statistics Norway and Norges Bank underpredicted wage growth, Norges Bank's projection was markedly higher than that of Statistics Norway. This is reflected in the projections for consumer price inflation.

## Conclusion

The analysis of the projections for 1998 show, as expected, that the forecast errors are greater for the projections published at the end of 1996 than for projections published one year later. A further conclusion is that Norges Bank's projections for the main aggregates were more accurate than those published in earlier years.

Although the forecast errors in the projections for 1998, published in December of the previous year, proved to be closer to the mark than projections for earlier years, a number of sub-components featured substantial errors. The overprediction of growth in private consumption was offset by the underprediction of growth in public consumption. A clear underprediction of petroleum investment was reflected in an underprediction of imports, with the result that the forecast for mainland GDP growth was fairly accurate. Erroneous forecasts for public demand and petroleum investment have prevailed in recent years. As a result, Norges Bank has changed its forecasting routines for these variables. Public demand is now forecast on the basis of expected developments in local government finances, expected movements in public expenditure through the year and estimates in government budget documents. Furthermore, we collect broader information on developments in petroleum investment.

The projections for 1998 show higher forecast errors for consumer price inflation than in previous years, reflecting lower-than-expected increases in import prices. Towards the end of 1998, it was clear that consumer price inflation was lower than implied by exchange rate developments. A broadened import-weighted exchange rate index, which was introduced in 1999, includes the currencies of several Asian countries. The forecast error primarily stems from our evaluation of the Asian crisis. The error relates to two points. First, the crisis had an unexpected strong impact on international price developments. Second, the depreciation of Asian currencies resulted in a stronger effective

krone exchange rate that implied by the traditional exchange rate index.

In contrast to the projections published in earlier years, overall forecast errors increased after incorporating correct growth rates for exogenous variables. This illustrates that evaluations of current statistics can improve forecasts, but also indicates that there is room for improving the RIMINI model. The model was remodelled last autumn and reestimated on the basis of the new national accounts. We will focus on the model's properties with regard to the composition of the supply side when testing the new model, which will be used from the year 2000.

## References


Jore, Anne Sofie (1997): "Evaluation of Norges Bank's Projections from 1994 to 1996", *Economic Bulletin* 1998/1

Jore, Anne Sofie (1999): "Evaluation of Norges Bank's Projections", *Economic Bulletin* 1999/2

Madsen Robert (1996): "Norges Bank's prognoser 1987-94: hvor godt traff de?" (Norges Bank's forecasts for 19987-94: how accurate were they?), *Penger og Kreditt* 1996/1

# New Working Papers from Norges Bank

**Norges Bank's Working Papers *(Arbeidsnotater)* present research projects (not necessarily in their final version), and are published among other reasons to enable the author to benefit from the comments of colleagues and interested parties. Only Working Papers published in English are listed below. Subscriptions are available free of charge and individual copies may be obtained from Norges Bank's Library. Postal address: PO Box 1179 Sentrum, N-0107 Oslo, Norway.**

*Øistein Røisland and Ragnar Torvik:* "Optimum curency areas under inflation targeting". *Arbeidsnotat 1999/10.* 24 pp. ISSN 0801-2504. ISBN 82-7553-148-9.

Several countries face the choice between targeting inflation independently and entering into a monetary union that targets inflation. The present paper extends the theory of optimum currency areas to deal with this choice. In contrast to the conventional theory, it is shown that the more asymmetric supply shocks are, the more countries form an optimal currency area.
*JEL classification:* E52, F33, F42.
*Keywords:* monetary union, common currency, asymmetric shocks, output stability.

*Eirik Gaard Kristiansen:* "Explicit and implicit incentives in fund management". *Arbeidsnotat 1999/11*. 38 pp. ISSN 0801-2504. ISBN 82-7553-149-7.

Fund managers compete to attract new investors. Competition and fund management contracts provide implicit and explicit incentives, respectively, for fund management. A study is made of the combined effect of these two types of incentives on i) investors' search for talented fund managers and on ii) talented fund managers' use of private investment signals. It is shown that a moderate level of competition yields less efficient use of private investment signals and lower average rate of return than in the case of either a high or a low level of competition in the fund management industry. Furthermore, it is shown that although explicit incentives improve managers use of private information, they may harm new investors' search for talented fund managers. Explicit incentives may improve current performance, but detract from the prospective performance of the fund industry.
*JEL classification:* D83, G23, L15
*Keywords:* competition, fund managers, incentives, performance, selection.

*Randi Næs and Bernt Arne Ødegaard:* "Equity trading by institutional investors: To cross or not to cross? The case of the Norwegian Government Petroleum Fund". *Arbeidsnotat 1999/12.* 23 pp. ISSN 0801-2504. ISBN 82-7553-150-0.

The costs to institutional investors of trading equities are of obvious practical as well as academic interest. The current academic literature on this issue shows that there are large unresolved issues, both regarding the components of the costs (implicit/explicit costs, costs of non-trading, market impact), and their magnitude. To date, the empirical academic literature has concentrated on data from equity trading at organised exchanges. This paper adds to the extant research by including evidence on using alternative mechanisms for facilitating equity trading, so called crossing. In this paper we use equity trades of one large institutional investor, the Norwegian Government Petroleum Fund, to investigate the costs of trading equities using alternative trading venues. The results show that for trades that were crossed, the average implicit and explicit costs were lower than those found in similar cases in the academic literature. We do, however, find that the orders that did not get crossed were special. Using as a benchmark the date of the desire to order, we find that they have a negative cost. We view this difference between crosses and market orders as promising issues for further research.
*JEL classification:* G10, G23.
*Keywords:* costs of equity trading, trading mechanisms, crossing, institutional equity trading.

*Kai Leitemo:* "Targeting inflation by constant interest rate forecasts". *Arbeidsnotat 1999/13.* 28 pp. ISSN 0801-2504. ISBN 82-7553-151-9.

The paper reviews the concept of constant interest rate inflation forecast targeting employed by several central banks with inflation targets. It provides a new method for constructing such forecasts in the context of models with forward-looking variables. It furthermore explores a standard closed-economy macromodel in the context of forecast targeting. The analysis suggests that the main reason for choosing a relatively long forecast horizon lies in the monetary authorities' objective of smoothing interest rate movements and not the desire to stabilise inflation and output variability. A strongly forward-looking inflation process brings the outcome of forecast targeting closer to the optimal discretionary policy, whereas a back-

ward-looking process may lead to model instability.
*JEL classification:* E52, E43, E37.
*Keywords:* monetary policy, inflation targeting, forecast targeting.

*Steinar Holden:* "Wage setting under different monetary regimes". *Arbeidsnotat 1999/14.* 40 pp. ISSN 0801-2504. ISBN 82-7553-152-7.

Under centralised wage setting, the monetary regime affects the trade-off between consumer real wages and employment and profits faced by the wage setters. Thus, in contrast to the standard view, the monetary regime affects the outcome of the wage negotiations, and consequently also the equilibrium level of unemployment. An exchange rate target (and participation in a monetary union) is likely to involve lower wages and higher employment in the traded sector, and higher wages and lower employment in the non-traded sector, than does a price target. An exchange rate target also involves higher prices on non-traded goods relative to traded goods.
*JEL classification:* J5, E5.
*Keywords:* wage bargaining, monetary union, inflation target, monetary regime, equilibrium unemployment.

*Kai Leitemo:* "The interaction between fiscal and monetary policy under an underlying inflation target for a small, open economy". *Arbeidsnotat 1999/15.* 24 pp. ISSN 0801-2504. ISBN 82-7553-153-5.

The coordination of fiscal and monetary policies is studied in a model of a small open economy when the monetary policymaker pursues an underlying inflation targeting policy. It is shown that in a Cournot equilibrium, fiscal policy will contribute to macroeconomic instability which the monetary policymaker will need to respond to with a stronger use of its instrument. This will result in higher interest and exchange rate variability. If monetary policy is transparent, a Stackelberg game may be implemented, given that fiscal policy can commit to the optimising strategy. In this game setting, fiscal policy will contribute to stability. For certain preferences and parameter values, monetary policy can become passive as fiscal policy becomes directed towards attaining the inflation target.
*Keywords:* fiscal policy, monetary policy, inflation target, procyclical policy, contracyclical policy.

*B. Gabriela Mundaca:* "The effect of interventions on realignment probabilities". *Arbeidsnotat 1999/16.* 42 pp. ISSN 0801-2504. ISBN 82-7553-154-3.

The expected future change of the exchange rate within its currency band and the expected realignment rate are estimated using the Regime-Switching Model. There exists an unobserved variable, st, which characterises the equilibrium state of the expected future change of the exchange rate within its currency band at any time t with certain probabilities. Different values of st correspond to states with a high or low risk of realignment, respectively. The probabilities of switching between one regime and another depend on central bank intervention in the foreign exchange market. Daily data on intervention by Norges Bank (the central bank of Norway) are used.

The data contain relatively few actual realignments, and the sample distribution of realignments may not be representative enough to capture the discrete changes in the exchange rate caused by a non-zero subjective probability of realignment (even when no realignment has in fact taken place). This causes the very well known "peso problem" in the estimation. An alternative approach to the "drift adjustment method" is presented, which takes care of the peso problem and provides consistent estimates of the expected rate of realignment.
*JEL classification:* F31
*Keywords:* Currency bands, realignments, drift adjustment method, regime switches, risk premium.

# Overview of announcements, speeches, etc. that have been made available on the Internet in the last six months

Norges Bank's web site (www.norges-bank.no) features the Bank's publications, statistics, announcements, speeches and more. An overview of announcements, speeches and articles which have been made available on the Internet in the last six months is provided below.

## Announcements

Norges Bank's submission on economic policy for 2000. Norges Bank's submission to the Ministry of Finance on 21 October 1999.
In this submission Norges Bank states its position on the implementation of monetary policy and presents its views on the overall stance of economic policy for 2000. (http://www.norges-bank.no/english/publications/data/submission.html)

## Speeches

(http://www.norges-bank.no/english/speeches/)

### *Economic Perspectives*

By Central Bank Governor Svein Gjedrem. The Annual Address at the meeting of the Supervisory Council of Norges Bank, 17 February 2000, Oslo.

### *Monetary policy experiences and challenges for the Central Bank*

By Deputy Governor Jarle Bergo, 27 January 2000, Gausdal, Norway.

### *Risk and efficiency in the payment system*

By Deputy Governor Jarle Bergo, the Banks' Payment System Conference, 11 November 1999.

### *Current and future financial and monetary outlook*

By Harald Bøhn, Executive Director, Central Bank of Norway. Investing in Norway, Oslo Stock Exchange Seminar, 5 November 1999, New York.

### *Financial stability - experiences and challenges*

By Central Bank Governor Svein Gjedrem, The annual meeting of the Norwegian Savings Banks Association, Sandefjord 21 October 1999.

## Articles

(http://www.norges-bank.no/english/publications/data/articles.html)

### *Monetary policy challenges*

Central Bank Governor Svein Gjedrem's article for the Foundation for Research in Economics and Business Administration Yearbook 1999.

## Reports

(http://www.norges-bank.no/english/publications/data/articles.html)

### *Norges Bank´s annual report on payment systems for 1998*

The report is presented in a .pdf file.