

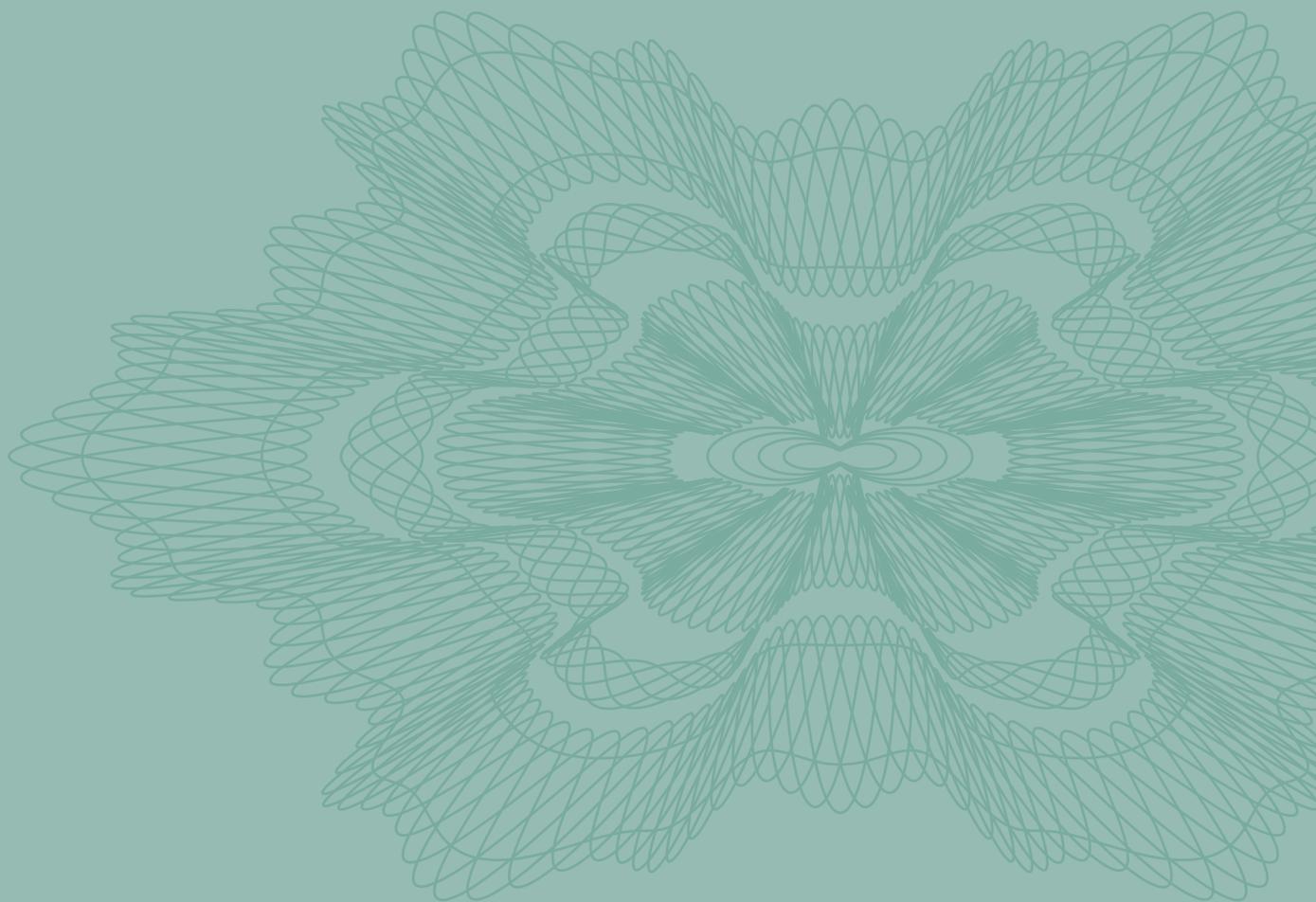
Reports from the Central Bank of Norway  
No. 6/2000



# Inflation Report

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December



# NORGES BANK'S INFLATION REPORT

Pursuant to the Norges Bank Act, the central bank shall be the executive and advisory body for monetary, credit and exchange rate policy. The projections in the *Inflation Report* provide a basis for the Bank's conduct of monetary policy. As the executive authority, Norges Bank shall orient monetary policy instruments with a view to maintaining stability in the krone exchange rate against European currencies. There are two fundamental preconditions that must be fulfilled to achieve this. First, price and cost inflation must over time not exceed the level aimed at by the euro area. Second, monetary policy must not in itself contribute to deflationary recessions.

The *Inflation Report* provides a survey of developments in prices and factors that influence price and cost inflation. It contains an assessment of the outlook for the Norwegian economy and Norges Bank's evaluation of the outlook for price inflation for the next two years. The December *Inflation Report* includes a longer time horizon and highlights the challenges to the Norwegian economy over a period of 4-5 years. Norges Bank's assessment is presented in a leader to the report.

# Interest rate expectations

A fundamental precondition for exchange rate stability against European currencies is that price and cost inflation in Norway is gradually reduced to the level aimed at by the European Central Bank (ECB). At the same time, monetary policy must not in itself contribute to deflationary recessions as this could undermine confidence in the krone.

The labour market is tight. The rate of increase in labour costs has been substantially higher in Norway than in the euro area over several years. This development will continue this year and next. The relative increase in labour costs in Norway is contributing to sustaining price inflation. Over the four years since 1996 consumer prices in Norway have increased about 4 percentage points more than in the euro area, which can partly be attributed to cyclical differences. We must assume that if consumer price inflation in Norway were to remain consistently higher than the aim for the euro area, this would entail a substantial source of exchange rate instability for the Norwegian krone.

On the other hand, the expansion in the Norwegian economy is now moderating, with pressures expected to ease somewhat this autumn and in the spring. At the same time, the effects of the rise in oil prices over the past year will gradually fade and perhaps be reversed. It is thus likely that price and cost inflation will gradually decelerate. The impact of the cyclical turnaround is uncertain. If the turnaround is more pronounced than envisaged, price inflation may decelerate faster than anticipated. A marked appreciation of the krone or higher productivity growth could also result in lower-than-projected price inflation. However, the risk of a deflationary recession is marginal.

Against this background, Norges Bank considers that the probability that the next change in interest rates will be a reduction is the same as the probability of an increase. In mid-December, forward rates implied that agents in the money market expected a significant decline in interest rates. It would appear that these agents have a different perception of the probability of a reduction in interest rates than the one expressed by Norges Bank. The projections in this report indicate that such a significant decline in interest rates would increase the risk of sustaining a relatively high rate of price inflation in the years ahead.

*Svein Gjedrem*



# Inflation Report

## Fourth quarter 2000

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The cut-off date for the Inflation Report  
was 14 December 2000

# 1 | Summary

The Norwegian economy is characterised by high capacity utilisation and high price and cost inflation as a result of the surge in oil prices and a tight labour market. Pressures in the economy and price and wage inflation are expected to moderate over time. There are still no signs of a pronounced cyclical turnaround, but rather a slower rate of growth in the economy. However, growth in the second half of 2000 and the first half of 2001 may be somewhat lower than projected earlier.

Norges Bank projects consumer price inflation at 3% in 2000 and 2001, and 2½% in 2002. Given the underlying assumptions, price inflation is projected at an average 2¼% in 2003 and 2004. The inflation projections are based on the assumption that interest rates move in line with market expectations, as implied by forward rates on 14 December. Market participants expect a fall in money market rates over the next two years. The fall in forward rates has been so pronounced that this has influenced the inflation projections and the economic scenario in this report. Given an interest rate at about the current level, the inflation projection would be a little less than 2% from the end of 2002. The effects of changes in interest rates are discussed further in section 5 and in a separate box in section 3. The underlying rise in consumer prices, excluding changes in electricity prices and indirect taxes, is estimated at 2¾% in 2000 and 2001. In 2002, overall consumer price inflation is assumed to be on a par with the underlying rise in prices. The estimates for 2002 exclude the isolated and temporary effect of a halving of VAT on food with effect from 1 July 2001.

Consumer price inflation is influenced by changes in indirect taxes in 2000 and 2001. The rate of increase in prices is also influenced by the weakening of the krone through the first half of 2000. As a result, the technical assumption of a stable krone exchange rate has the effect of pushing down price inflation to some extent in the years ahead. In addition, the assumption of a decline in oil prices will gradually entail slower consumer price inflation. Compared with the September *Inflation Report*, the inflation projection for the next two years has been revised up by a quarter percentage point.

Growth in the Norwegian economy appears to have abated since the first half of this year, which can to some extent be seen in connection with the already high level of capacity utilisation and the limited supply of labour. Moreover, there are signs of slower growth in domestic demand. The estimates in this report imply a higher household saving ratio over the next two years compared with this year. On the other hand, higher public spending on goods and services will sustain demand growth. Petroleum investment is expected to be higher than projected in September.

Mainland GDP is estimated to grow by 1¼% in 2001, 1¾% in 2002 and an average 2% in the period 2003-2004.

This implies that GDP growth will be somewhat slower and gradually move in line with the underlying output potential in the years ahead. The growth estimate for 2001 remains unchanged compared with the September report, albeit with somewhat more pronounced fluctuations through the year. The growth estimate for 2002 has been revised up by half a percentage point, reflecting a higher growth rate at the beginning of the year and faster growth in private consumption than previously estimated, given the underlying assumptions.

Unemployment is estimated to remain stable at around 3¼% through the projection period. Labour costs are projected to increase by 5% in 2000 and 2001, and 4½% in 2002, with the average for the period 2003-2004 estimated at 4¼%. Productivity is estimated to increase at a somewhat faster pace than in recent years and approximately in line with the average for the 1990s. The growth potential of the Norwegian economy is moderate, particularly as a result of low growth in the labour force. The increase in holiday implies a further reduction in the output potential in 2001 and 2002. The estimates for the underlying output potential in the economy are further discussed in section 3.3.

The projections are based on key assumptions concerning international economic developments, public expenditure, taxes, interest rates and the exchange rate. Furthermore, it is assumed that wage determination will continue to function in line with the experience of the 1990s. Given the technical assumptions concerning interest rate developments ahead, the risks to the inflation projections are considered to be symmetrical. The risks to the projections are discussed further in section 5.

## 2 | Recent developments

### 2.1 Price developments

#### *High consumer price inflation*

So far this year, consumer prices have on average been 3.1% higher than in the same period one year earlier. The twelve month increase in consumer prices has slowed from 3.5% in August and September to 3.2% in November (see Chart 2.1). Energy prices have shown a somewhat weaker rise than expected in the September *Inflation Report*, and have contributed to moderating price inflation.

Norges Bank's indicator of the underlying rise in prices excludes changes in indirect taxes and electricity prices. For 2000, adjustments have also been made for the revision of the house rent index. The transition from a quarterly to a monthly house rent survey has contributed to pushing up the rise in the total index by about 0.1 percentage point this year. The underlying indicator has on average risen by 2.8% so far this year. The underlying year-on-year rise in prices was 3.0% in November.

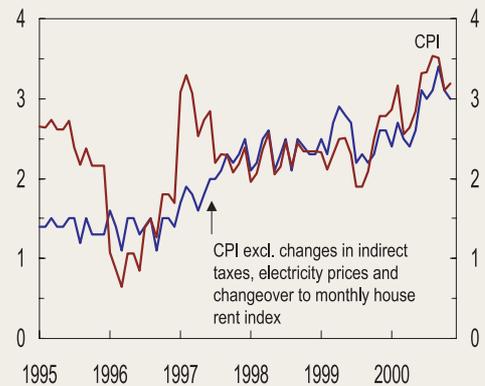
The underlying rise in prices has moved up as a result of the steadily higher rise in service and fuel prices. The rise in service prices where wages are a dominant price factor has quickened from 5.1% in December last year to 6.4% in November 2000. At the same time, a higher rate of increase in prices for transport services, partly due to the increase in oil prices but also to the deregulation of taxi fares, is behind the faster rise in service prices over the last year (see Chart 2.2).

Oil price developments are reflected in the CPI directly through the sub-index for fuels and lubricants. Although petrol prices have edged down this autumn, this sub-index remains about 13% higher than one year earlier. Excluding changes in indirect taxes, electricity and petrol prices and adjusted for the revision of the house rent index, price inflation has averaged 2.3% this year. Over the last three months, price inflation by this measure has hovered around 2.7% (see Chart 2.3).

Prices for imported consumer goods have fallen since the summer of 1999 (see Chart 2.2). In November, prices for imported consumer goods were 0.9% lower than in November 1999.

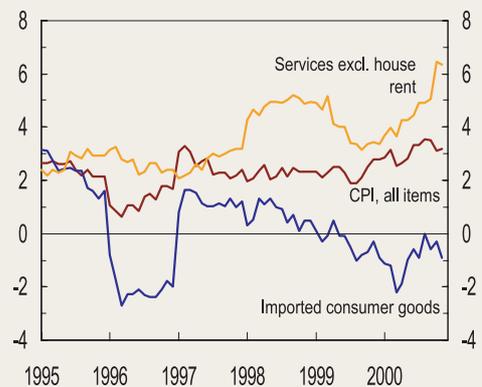
The Harmonised Index of Consumer Prices (HICP) was 3.1% higher in November than in the same month one year earlier. The HICP was broadened from January 2000 and, in Norway's case, now includes 88% of consumer spending in the total index. A comparison of price developments in Norway, Sweden and the euro area from 1997 to date is presented in a separate box.

**Chart 2.1** Consumer prices (CPI). Total and excluding indirect taxes, electricity prices and revision of house rent index. 12-month rise. Per cent



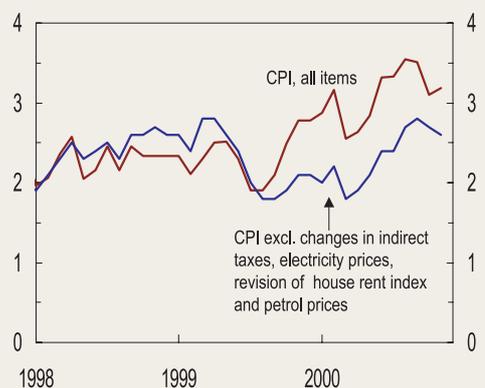
Sources: Statistics Norway and Norges Bank

**Chart 2.2** Consumer prices. All items and by supplier sector. 12-month rise. Per cent



Source: Statistics Norway

**Chart 2.3** Consumer prices (CPI). Total and excluding taxes, electricity prices, the revision of the house rent index and petrol prices. 12-month rise. Per cent



Sources: Statistics Norway and Norges Bank

# Price developments in Norway, Sweden and the euro area

Since 1997, price inflation in Norway, measured by the Harmonised Index of Consumer Prices<sup>1</sup>, has been approximately 1 percentage point higher than in the euro area, and 1¼ percentage points higher than in Sweden. Developments in costs, exchange rates, customs duties and indirect taxes, and different competitive situations are important factors behind differences in price developments. The tables show developments in various sub-indices of the Harmonised Index of Consumer Prices in Norway, Sweden and the euro area.

The Harmonised Index of Consumer Prices consists of twelve sub-indices. Table 1 shows the six sub-indices for which the rise in prices has been stronger in Norway than in the euro area and Sweden. The largest difference is in the sub-index for alcoholic beverages and tobacco. The difference is also greater than the average in the sub-index for food and non-alcoholic beverages. Domestic factors such as indirect taxes, border protection and cost developments will have a clear effect on prices for the goods and services in Table 1. According to OECD calculations, wage growth in the private sector in Norway during this period has been over 3 percentage points higher per annum than in the euro area. The rise in unit labour costs has also been noticeably higher in Norway. High cost inflation in Norway is probably a key factor behind the differences in Table 1.

Table 2 shows that prices for clothing and footwear have fallen in Norway, while they have risen slightly in the euro area and Sweden. In this period, the effective exchange rate in the euro area and in Sweden depreciated more than in Norway. This may partly explain why prices for clothing and footwear have fallen most in Norway. In addition, the effects of liberalisation of trade in textile goods, for instance in connection with the WTO agreement in 1994, may have played a greater role in Norway than in the other countries.

<sup>1</sup> The Harmonised Index of Consumer Prices is compiled by the EU to facilitate international comparison of price developments. It currently covers approximately 90% of the goods in the Norwegian consumer price index.

The fall in prices for communications (postal and telecommunications services) has also been greater in Norway than in Sweden and the euro area. This may reflect that deregulation of the telecommunications sector started earlier in Norway than in Sweden. Over the past year, the rise in prices for telecommunications services has been considerably lower in Sweden than in Norway. Compared with the euro area, the comparison of prices indicates that the effects of the deregulation of the telecommunications sector have been somewhat greater in Norway.

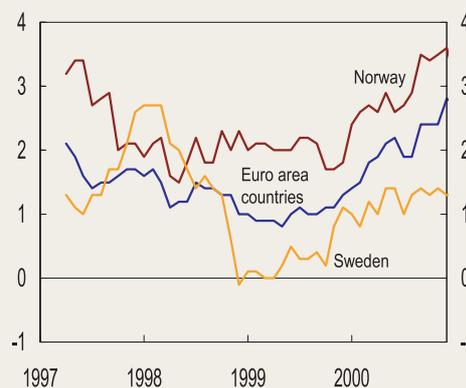
**Table 1** Sub-indices for which Norway has highest average price increases, 1997-2000

	Norway	Euro area	Sweden
Food and non-alcoholic beverages	3.2	0.9	1.0
Alcoholic beverages and tobacco	7.1	2.7	3.3
Transport	3.6	2.3	1.9
Recreation and culture	1.9	0.8	-0.1
Hotels, cafes and restaurants	3.2	2.3	1.6
Miscellaneous goods and services	2.9	1.5	2.2

**Table 2** Sub-indices for which Norway has lowest average price increases, 1997-2000

	Norway	Euro area	Sweden
Clothing and footwear	-1.2	1.0	0.8
Communications	-3.6	-2.7	-1.2

**Chart 1** Price inflation in Norway, Sweden and the euro area countries from 1997 to 2000, measured through the Harmonised Index of Consumer Prices



Sources: Statistics Norway and Eurostat

## 2.2 International developments

### *Higher energy prices fuel international price inflation*

Oil prices have declined somewhat from the peak of USD 36 per barrel early in September to about USD 27 in mid-December. Prices for industrial raw materials in USD terms have declined by 4% since the September *Inflation Report* and are now below the level prevailing at the start of the year (see Chart 2.4). Food prices have edged up since the end of September. World producer prices have shown a pronounced rise so far this year, increasing by 4.8% in the third quarter from the same quarter in 1999.

The sharp rise in international producer prices, combined with the depreciation of the import-weighted krone exchange rate in the first half of 2000, has contributed to a high rate of increase in prices for traditional merchandise imports in the second and third quarter. Prices for traditional imported goods increased by 5.6% in the first three quarters of this year compared with the same period last year. The main contribution has come from petroleum products. Excluding petroleum products, prices increased by a little less than 3% in the same period. However, prices for imported finished goods continued to fall in the third quarter, reflecting price developments for imported consumer goods in the CPI.

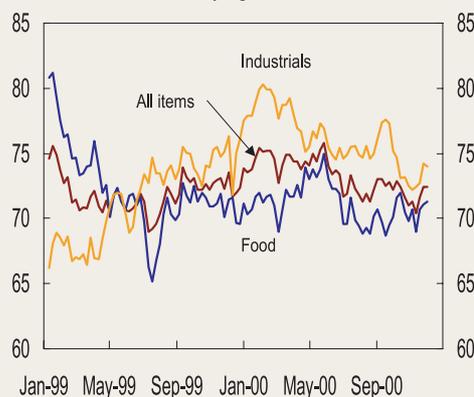
The surge in oil prices has fuelled the rise in consumer price inflation worldwide this autumn. For the euro area, this has been compounded by the depreciation of the euro. Consumer prices in the euro area were 2.7% higher in October than in the same month last year (see Chart 2.5). Excluding energy prices, price inflation was 1.6%. In the US, the year-on-year rise in consumer prices was 3.5% in October. Core inflation, which excludes energy and food prices, was 2.5%. In the UK, price inflation moved up from 2.0% in October to 2.2% in November. In Sweden, price inflation quickened from 1.4% in October to 1.7% in November.

The growth picture for our trading partners has shown little change since the September *Inflation Report*. Preliminary GDP figures for the US, the euro area and the UK for the third quarter indicate some moderation in growth, in line with expectations.

## 2.3 Cyclical developments

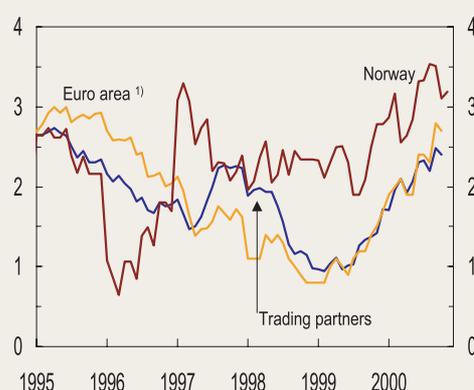
Growth in the Norwegian economy has softened somewhat compared with the first half of the year. According to the quarterly national accounts (QNA) for the third quarter, mainland production and demand showed a seasonally adjusted decline. Sluggish private consumption is the main factor behind slower demand, but investment was also weaker. In addition to a halt in consumption growth, activity in the housing market was also lower, with house prices edging down in the third quarter.

**Chart 2.4** *The Economist's* commodity price index. USD 1995=100. Weekly figures



Source: The Economist

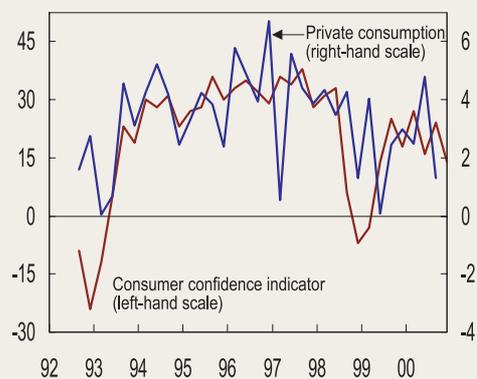
**Chart 2.5** Consumer prices in Norway and abroad. 12-month rise. Per cent



<sup>1)</sup> Price rise in euro area countries measured by the Harmonised Index of Consumer Prices.

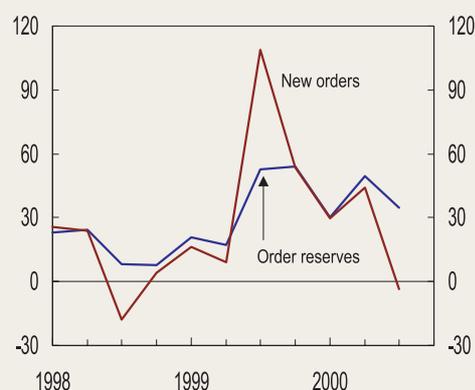
Sources: Statistics Norway, Eurostat and OECD

**Chart 2.6** Consumer confidence indicator and private consumption. 4-quarter growth. Per cent



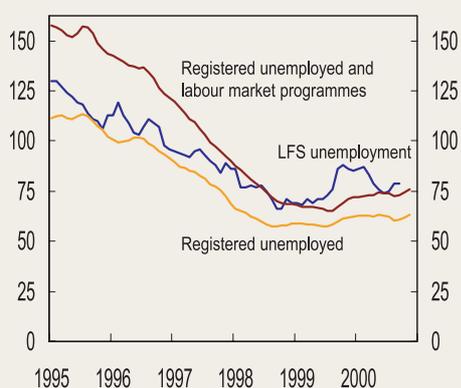
Sources: Statistics Norway and Norsk Gallup Institutt AS

**Chart 2.7** New orders and order reserves for dwellings. Value index. Percentage growth on same quarter previous year



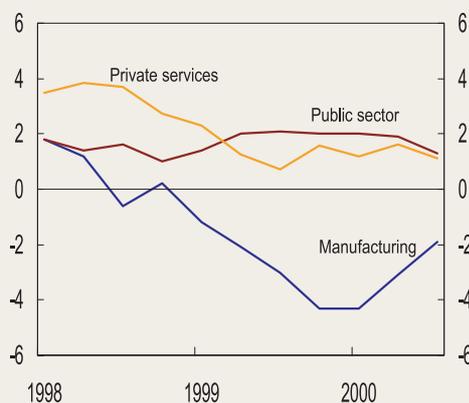
Source: Statistics Norway

**Chart 2.8** Number unemployed (LFS), number of registered unemployed and number on labour market programmes. In thousands. Seasonally adjusted



Sources: Statistics Norway and the Directorate of Labour

**Chart 2.9** Numbers employed by sector. Percentage rise on same quarter previous year



Sources: National Accounts and Statistics Norway

## Weaker growth in household consumption

After rising sharply in the first half of the year, private consumption has shown clear signs of slower growth, with a seasonally adjusted decline between the second and third quarter. So far this year, total private consumption has been 2.9% higher than in the same period last year. Short-term statistics indicate that consumption growth is slowing further. The seasonally adjusted retail sales index fell by 2.4% from September to October. Experience shows that the retail sales index tends to show relatively wide variations, which may indicate that the sharp drop in October was due to random effects.

Norsk Gallup's consumer confidence indicator fell from the third to the fourth quarter (see Chart 2.6), indicating that households are somewhat less optimistic with regard to their own finances and the overall economy than was the case three months ago. Households showed particular pessimism with regard to making major purchases. This is reflected in the weak trend in consumer spending on goods this autumn. The consumer confidence indicator has proved to be a relatively good leading indicator of private consumption over a three-month period. Recent developments may indicate that the annual rate of growth in private consumption will remain low up to the end of the year and into the first quarter of 2001.

According to ECON, house prices fell by 1.7% between the second and third quarter, but have risen by more than 13% over the first three quarters from the same period in 1999.

QNA revisions now show that housing investment was markedly lower in the first half of the year than previously assumed. In the period to the end of the third quarter, housing investment increased by about 2% from 1999. The high level of housing starts through the year may indicate that housing investment will pick up towards the end of the year and through 2001. According to Statistics Norway's construction statistics, the number of housing starts came to 16 500 in the first three quarters, ie an increase of 17% compared with the same period last year. Lower growth in new orders for dwellings in the third quarter may indicate lower growth in housing starts next year (see Chart 2.7).

## Unemployment shows little change

The decline in seasonally adjusted registered unemployment has come to a halt. There has been some increase in unemployment in recent months although the level of unemployment remains low. At the end of November, the number of registered unemployed stood at a seasonally adjusted 63 300 (see Chart 2.8), which represents an increase of around 1 500 compared with one year earlier. The number of persons participating in ordinary labour market programmes has increased steadily through the year to about 15 500 at end-November. The number of registered unemployed and persons participating in labour market programmes made up a seasonally adjusted 3.3% of the labour force, up from 3.0% in the same month last year.

According to the QNA, employment growth has been in line with expectations so far this year. In the first three quar-

ters, employment was about 0.5% higher than in the same period last year. Manufacturing employment has continued to fall, albeit at a slower pace than earlier this year. At the same time, employment growth in the public and private service sector was somewhat slower in the third quarter (see Chart 2.9).

### *Moderate growth in traditional exports and imports*

Traditional merchandise exports have developed broadly in line with the expectations set out in the previous *Inflation Report*. Exports increased by 4.3% in the first three quarters compared with the same period last year. However, prices for traditional export goods have risen by 12%, primarily reflecting high refined petroleum product prices, but also the sharp increase in aluminium prices.

As expected, the growth in imports moderated in the third quarter. So far this year, the volume of traditional merchandise imports has been 4.0% higher than in the first three quarters of 1999. Growth has primarily been driven by consumption. Imports of typical capital goods are still falling.

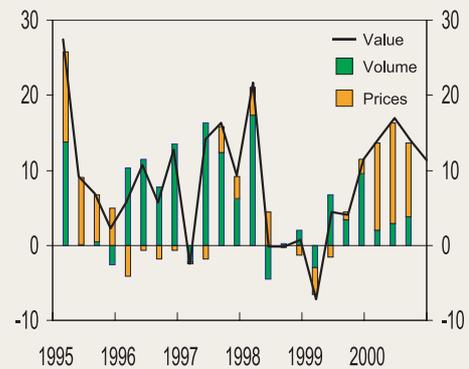
### *Credit growth remains high*

Twelve-month growth in credit from domestic sources (C2) abated in October to 11.6% (see Chart 2.11). Seasonally adjusted monthly growth fell sharply from September to October. The fall in credit growth can probably be seen in connection with the figures from the quarterly national accounts for the third quarter, which show a corresponding slowdown in household consumption. Slower credit growth may also be seen in connection with the slight decline in house prices this autumn. Historically, there has been a tendency for credit growth to shadow the rise in house prices with some lag. Annual growth in household debt remains high, but dropped from 11.1% in September to 10.9% in October.

Growth in total credit from domestic and foreign sources to the mainland Norway (C3 mainland Norway) picked up in the second and third quarters of 2000 (see Chart 2.11). As a basis for assessing cyclical developments in Norway, credit growth from domestic sources (C2) is more indicative than the figures for total credit (C3) because the latter is normally, heavily influenced by random or temporary effects of enterprises' financial transactions. Growth in credit to the enterprise sector in 2000 has probably been substantially influenced by acquisitions of foreign enterprises, which are also debt-financed abroad. To the extent that the higher growth in C3 can be ascribed to inflated figures for enterprises' financial balances, the figures for total credit provide little information about underlying developments in domestic demand. On the other hand, the figures may also reflect a higher degree of debt financing in some business sectors.

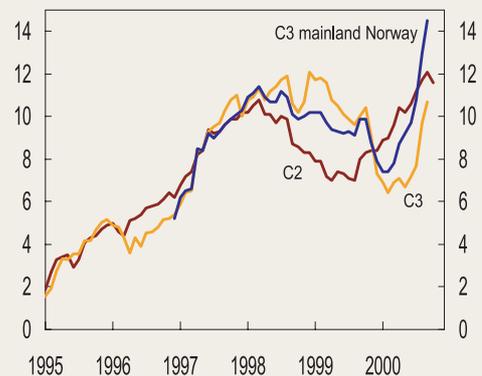
Total credit to the oil and shipping sector is still contracting, partly reflecting lower petroleum investment and very high earnings in these industries. C3 growth is thus substantially lower than C3 growth for mainland Norway.

**Chart 2.10** Traditional merchandise exports according to *External Trade Statistics*. Volume, price and value. Percentage rise on same quarter previous year



Source: Statistics Norway

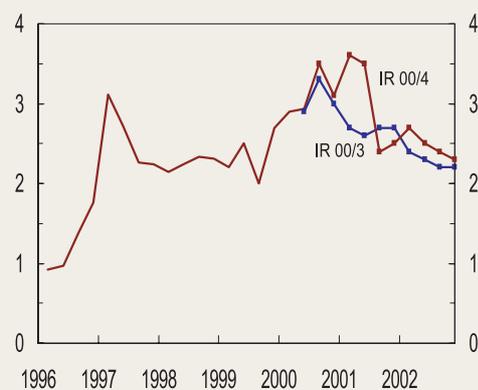
**Chart 2.11** The credit indicator (C2), credit to the non-financial private and municipal sector (C3) and C3 for mainland Norway. 12-month rise. Per cent



Source: Norges Bank

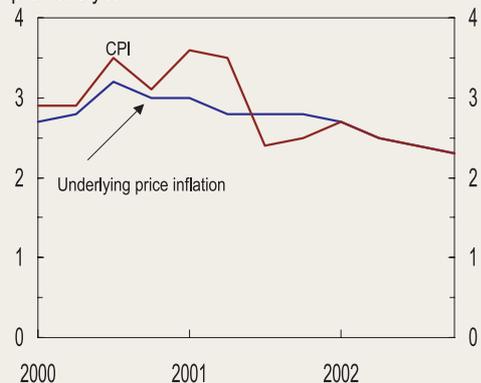
# 3 | Norges Bank's inflation projections

**Chart 3.1** Current and earlier projections for consumer price inflation. Percentage rise on same quarter previous year



Sources: Statistics Norway and Norges Bank

**Chart 3.2** Estimated consumer price inflation. Total and underlying. Percentage rise on same quarter previous year



Sources: Statistics Norway and Norges Bank

## 3.1 Inflation outlook

Norges Bank projects consumer price inflation at 3% in 2000 and 2001 and 2½ per cent in 2002. Compared with the September *Inflation Report*, the estimates for the next two years have been revised up by ¼ percentage point. The upward adjustment for 2001 is primarily attributable to changes in indirect taxes. The upward adjustment of the estimate for 2002 must be seen in connection with a slightly higher rate of economic growth and somewhat stronger pressures in the labour market than previously assumed. In 2003 and 2004, consumer price inflation is projected at 2¼% on average. The inflation projections are based on the assumption that interest rates move in line with market expectations as implied by forward rates in December. The market expects money market rates to fall over the next two years. The fall in forward rates has been so pronounced that this has influenced the projections for price inflation and the economic scenario in this report. Given an interest rate at about the current level, projected price inflation would be below 2% from the end of 2002 (see discussion in section 5). The effects of changes in interest rates are discussed further in a separate box.

The underlying rise in prices, excluding indirect taxes and electricity prices, is estimated at 2¾% in both 2000 and 2001, as in the previous *Inflation Report*. In 2002 and the following years, it is assumed that overall consumer price inflation for the year as a whole will move in line with the underlying rise in prices. The estimate for 2002 thus disregards the isolated and temporary effect of a halving of VAT on food with effect from 1 July 2001.

The surge in oil prices since the spring of 1999 has had a direct impact on the consumer price index through fuel price increases, and an indirect effect through the rise in prices for goods and services with petroleum products as inputs. It is assumed that the oil price will fall to USD 20 per barrel in the course of the next two years. This will contribute to dampening price inflation. Prices for goods which are imported directly for consumption have continued to fall, despite the rise in oil prices. Strong competition is expected to continue to restrain the rise in prices for imported consumer goods over the next years.

Domestic cost inflation has been considerably higher than in the euro area in recent years. Consumer price inflation has also been higher than in the euro area since 1996. Although wage growth is expected to slow somewhat, the projections in this report indicate that cost inflation will continue to be somewhat higher in Norway the next few years. This reflects a persistently tight labour market. Growth in total labour costs is projected at 5% in 2000 and 2001 and 4½% in 2002. In 2003 and 2004, wage growth is projected at 4¼% on average.

*The import-weighted krone exchange rate is assumed to remain stable in the period ahead*

The krone exchange rate against the euro has depreciated by approximately 1.5% since the previous *Inflation Report*. Over

the past few months, the krone exchange rate against the euro has fluctuated between NOK 7.87 and 8.12. On 14 December, the exchange rate stood at NOK 8.11. The krone exchange rate against the US dollar is somewhat stronger than it was in September, at NOK 9.17 on 14 December. The projections in this report are based on the technical assumption that the exchange rate will remain at the average level recorded in the past three months, measured by the import-weighted krone exchange rate, throughout the projection period. The import-weighted krone exchange rate depreciated up to May this year, but has since appreciated somewhat. The import-weighted krone exchange rate has depreciated by approximately 2½% on average from 1999 to 2000.

### Downward adjustment of interest rate expectations in the money market

As a technical assumption, short rates are assumed to move in line with implied forward rates, calculated on the basis of the yield curve in money and bond markets on 14 December. In the short and medium term, forward rates can be interpreted as market participants' expectations concerning cyclical developments, price developments and the monetary policy stance. The projections in the *Inflation Report* are contingent on interest rates moving in line with these expectations.

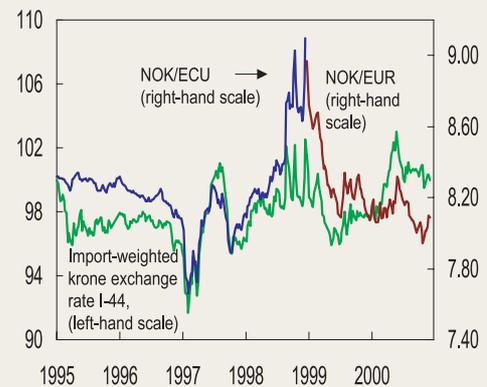
Norges Bank has raised its key rates by a total of 1.5 percentage points in 2000. The deposit rate is now 7.0%. Three-month money market rates were 7.4% in mid-December. Forward rates and the pricing of FRAs indicate that the Norwegian three-month rate is expected to fall by ¾-1 percentage point in the course of 2001 and a further ½ percentage point in 2002. Forward rates indicate that the three-month rate is expected to remain below 6% in 2003 and 2004. According to forward rates, the differential against money market rates in the euro area is expected to narrow from the current level of 2¼ percentage points to around 1 percentage point at the end of 2002 and ¾ percentage point at the end of 2004. The interest rate assumption implies that short-term interest rates throughout the projection period will be approximately ½ percentage point lower than assumed in September (see Chart 3.4). The fall in the forward rate curve is so pronounced that this has influenced the projections for price inflation and wage growth in the economy in the years ahead. Key technical assumptions are shown in Table 3.1. The effects of changes in assumptions about the interest rate path are discussed further in section 5.

## 3.2 International developments

### Oil prices expected to fall

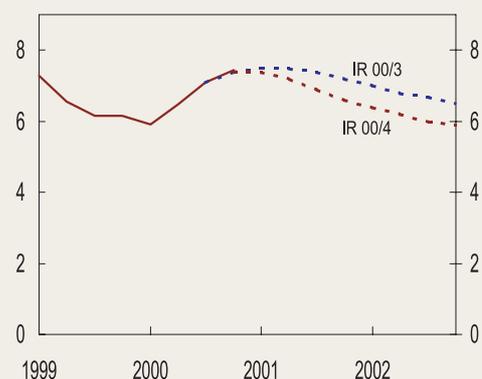
Consumer price inflation in Norway and abroad has been influenced this year by the sharp rise in oil prices. Higher fuel prices have contributed directly to an increase of about 0.5 percentage

**Chart 3.3** NOK/ECU and NOK/EUR exchange rates and import-weighted krone exchange rate against 44 currencies. January 1995=100



Source: Norges Bank

**Chart 3.4** Technical assumption concerning short-term money market rates. <sup>1)</sup> Per cent



<sup>1)</sup> Three-month money market rate up to 14 December. Three-month forward rates are estimated using four money market rates and five government bond yields with different maturities as observed on 14 December.

Source: Norges Bank

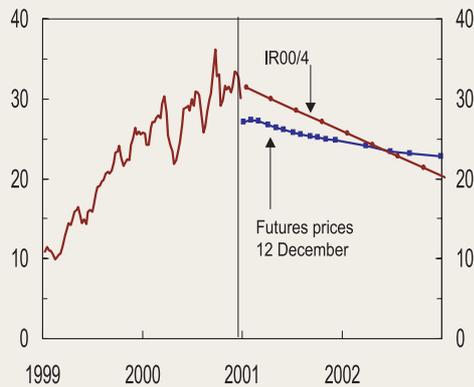
**Table 3.1** Technical assumptions

	2000	2001	2002	2003-2004
3-month money market interest rate (annual average) <sup>1)</sup>	6.8	7.1	6.1	5.7
Import-weighted exchange rate <sup>2)</sup>	2.5	0.2	0	0
Exchange rate measured against euro <sup>2)</sup>	-2.5	-1.1	0	0
Real rise in gov't spending	2¾	2¼	1¾	2
Oil price NOK/ barrel <sup>3)</sup>	255	259	206	186

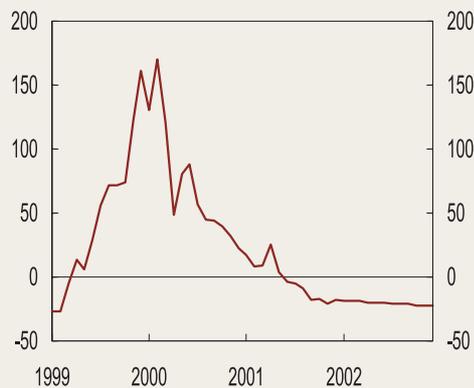
<sup>1)</sup> Interest rates are assumed to shadow market expectations as reflected in forward rates.

<sup>2)</sup> Annual percentage change. The import-weighted exchange rate includes 44 countries.

<sup>3)</sup> It is assumed that the oil price will gradually decrease to USD 20 per barrel.

**Chart 3.5** Oil price, Brent Blend. USD/barrel

Sources: Norges Bank and IPE

**Chart 3.6** Oil price movements. Twelve-month rise. Per cent

Source: Norges Bank

**Chart 3.7** Rise in prices for imported goods. Four-quarter rise. Per cent

Source: Statistics Norway

point in overall consumer price inflation in Norway this year. In addition, the rise in oil prices has led to a higher rise in prices for goods and services with petroleum products as inputs, such as transport services. As in the September *Inflation Report*, it is assumed that the oil price will fall gradually to USD 20 per barrel by the end of 2002 (see Chart 3.5). Lower oil prices, with an attendant drop in fuel prices, will contribute to pushing down the projection for overall price inflation in the next few years. However, the rise in oil prices through 1999 and 2000 is expected to have continued spillover effects on prices for other goods and services, particularly in 2001. When these effects are exhausted, price inflation will slow.

In the short and medium term, movements in oil prices constitute a risk to the inflation outlook both in Norway and among trading partners. So far, the effects on the real economy and price inflation among our trading partners have been considerably smaller than, for instance, in the 1980s. This is partly because industrial countries have reduced their dependence on oil as a result of less energy-intensive technology. In addition, the production of services now accounts for a larger share of GDP. Moreover, expectations of a fall in oil prices are probably contributing to curbing the effects on overall price inflation. However, if oil prices remain high, the result may be higher pay demands and an increase in prices for goods and services with oil-related products as inputs. This would push up the underlying rise in prices. In the somewhat longer term, however, persistently high oil prices and higher price inflation would curb demand growth and would probably be counteracted by a tighter monetary policy internationally.

### *Continued slow rise in prices for imported consumer goods*

All in all, prices for traditional imported goods are projected to rise by 4½% in 2000, 2% in 2001 and 1¼% in 2002. Annual price inflation is expected to be around 1% in subsequent years. High price inflation in 2000 is due primarily to higher oil prices and a weaker import-weighted krone exchange rate in the first half of the year. The assumptions of lower oil prices and an unchanged krone exchange rate imply that the rise in prices for imported goods will slow when this inflationary impetus is eliminated.

The rise in prices for imported goods has a direct impact on movements in the consumer price index through imported consumer goods, and an indirect effect through intermediate goods for production in Norway. Consumer goods account for roughly one third of Norway's imports, while the rest consists of capital goods and intermediate goods. While changes in prices for consumer goods have a swift effect on the consumer price index, it takes longer before changes in prices for imported inputs are reflected in consumer prices. Imported inputs have generally tended up this year, while prices for imported consumer goods have shown a general decline (see Chart 3.7). The fall in prices for imported consumer goods is probably related to stronger competition in global product markets.

Price developments for traditional imported goods, which include both intermediate and consumer goods, may therefore provide a misleading picture of the contribution of import prices to the rise in consumer prices. Prices for imported consumer goods are expected to remain more or less unchanged over the next few years.

The rise in consumer prices among trading partners is estimated at 2¼% in 2000 and 2% the following two years. In addition to a projected fall in oil prices, strong international competition, moderate cost inflation and a monetary policy oriented towards low price inflation are expected to restrain the general rise in prices even if unemployment decreases and capacity utilisation increases.

In the euro area, price inflation in September and October was somewhat stronger than expected. The projection for consumer price inflation in 2000 has therefore been revised up by ¼ percentage point to 2¼%. Price inflation excluding energy remains at a little over 1½%. If oil prices fall from the spring of 2001, price inflation may slow to 2% in 2001 and 1¾% in 2002. In the UK, price inflation has remained below the target level of 2½% for a long period. A gradual increase in consumer price inflation to 2½% is expected, owing to high capacity utilisation. Inflation in Sweden remains subdued as a result of slow wage growth and deregulation, particularly in the telecommunications sector. The estimate for 2000 is 1¼%, but in view of growing pressures in the economy and the effects of the depreciation of the Swedish krona, price inflation may pick up gradually to 1¾% in 2001 and 2¼% in 2002. In the US, lower oil prices and the slowdown in growth are expected to contribute to a gradual reduction in price inflation from 3½% in 2000 to 2½% the next two years. In Japan, consumer prices are expected to rise marginally the next two years, following two years of falling prices.

These estimates are based on the assumption that cost inflation among trading partners will continue to be moderate. So far, there are few signs that the rise in oil prices has translated into higher wage growth or a pronounced rise in market participants' inflation expectations. However, international producer prices have increased. Continued high oil prices and a faster rise in costs represent risks that may lead to higher-than-projected international price inflation.

### 3.3 Domestic developments

The Norwegian economy is currently showing the effects of the vigorous growth in the 1990s, which led to very high capacity utilisation in the economy. The number of registered unemployed has been halved since 1993, and has remained fairly stable the last three years at around 60 000. At the same time, there are approximately 20 000 job vacancies. The strong pressures in the labour market have fuelled higher wage growth in Norway than among trading partners since the mid-1990s (see Chart 3.8). High cost inflation is an important reason why consumer price inflation in Norway has been higher than average consumer price inflation among trading partners in recent years.

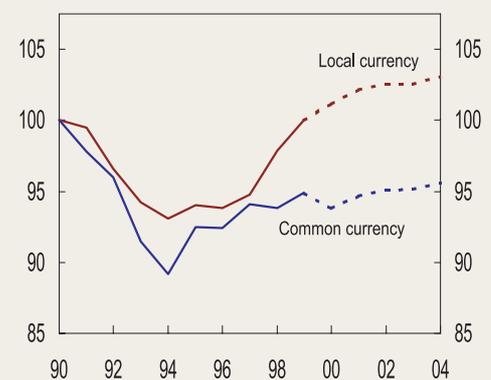
**Table 3.2** Consumer prices. Percentage change from previous year

	2000	2001	2002	2003-2004
US	3½	2½	2½	2½
Japan	-½	¼	½	¾
Germany	2	1¾	1½	1½
France	1¾	1½	1½	1½
Italy	2½	2	1¾	1¾
UK	2	2½	2½	2½
Sweden	1¼	1¾	2¼	2
Norway's trading partners <sup>1)</sup>	2¼	2	2	2
Euro area <sup>2)</sup>	2¼	2	1¾	1¾

1) Import weights

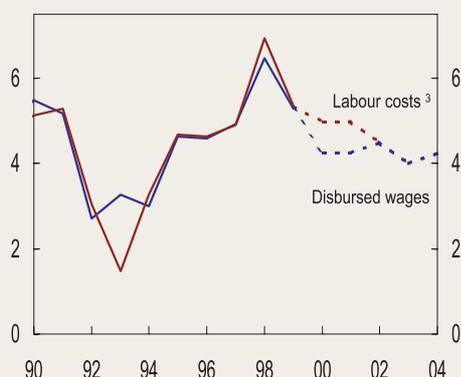
2) Eurostat weights (country's share of euro area's consumption)

**Chart 3.8** Labour costs in Norwegian manufacturing compared with trading partners. Index: 1990=100



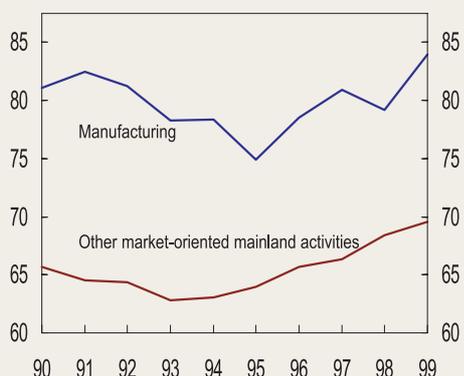
Sources: Statistics Norway, the Technical Reporting Committee on Income Settlements and Norges Bank

**Chart 3.9** Average labour costs and disbursed wages in mainland Norway. Annual percentage growth



Sources: Statistics Norway and Norges Bank

**Chart 3.10** Labour shares by industry. Labour costs as a percentage of factor income



Sources: Statistics Norway and the Technical Reporting Committee on Income Settlements

### *Continued high wage growth*

This year's wage settlement included agreements for centralised pay increases for both 2000 and 2001 for most groups. At the same time, it was decided that a fifth holiday week would be introduced over the next two years. This involves costs for enterprises in the form of holiday pay provisions in addition to disbursed wages already this year (see Chart 3.9). On the basis of the outcome of this year's wage settlement and information regarding wage growth so far this year, total labour costs are projected to increase by about 5% in 2000 and in 2001.

In the period 1994-1999, a growing share of revenues in mainland enterprises was used to cover labour costs (see Chart 3.10). This has weakened enterprises' profitability and their capacity to pay. Over time, wage growth in the economy must be adapted to enterprises' capacity to pay. This, coupled with slower price inflation, will contribute to moderating wage growth. On the other hand, a sustained shortage of labour will have the opposite effect. Nominal wage growth is estimated at 4½% in 2002 and an average of 4¼% in 2003 and 2004. The wage growth estimates are based on the assumption that wage formation will continue to function in the same way as in the 1990s.

There is a tendency for conditions in the sheltered sector to have a greater influence on overall wage growth than previously. If this tendency is amplified, wage growth may be higher than projected in this report. At the same time, the large number of vacancies may be an indication that enterprises are having greater difficulty in recruiting skilled labour than implied by unemployment figures alone.

### *Trend growth in productivity*

Over time, growth in real wages will reflect productivity trends. Productivity gains in some other countries have been substantial in recent years. It has been argued, particularly with regard to the US economy, that new information technology has increased the growth potential of the economy. So far, there have been few signs of such effects in Norway. As measured in the national accounts, productivity in the business sector has stagnated in recent years. However, these figures are uncertain and have previously been subject to considerable revisions.

It is estimated that productivity growth may return to the average level recorded in the 1990s. It is assumed that enterprises will be able to adapt the additional holiday days to seasonal and cyclical patterns of production. This may result in a slight increase in productivity per person-hour worked.

### *Sustained pressures in the Norwegian economy facilitate feed-through of higher costs to prices*

Capacity and demand in the economy influence price-setting in the business sector. If demand is high in relation to production capacity, it is easier for enterprises to pass on higher labour costs to prices. The output gap, which measures the deviation between actual output and trend output, can serve as an indicator of pressures in the economy. The projections in this report are based on

the assumption that enterprises are in a better position to maintain their profit margins and pass on cost increases to prices when the output gap is positive than when there is idle capacity in the economy.

Chart 3.11 shows the estimated output gap on which the projections in this report are based. The output gap is calculated using the production function method. Potential output is determined by inserting the trend levels of labour, capital and available technology in a further specified production function<sup>1)</sup>. Trend growth in the labour supply is set equal to growth in the demographic supply in the period ahead.

At the same time, we have taken into account that the introduction of a fifth holiday week over the next two years will reduce the potential labour supply measured in hours. The period of slower growth in the economy between the summer of 1998 and the summer of 1999 contributed to reducing the output gap somewhat. On the assumption that productivity growth will pick up, that the labour supply will increase in step with the potential supply indicated by demographic factors, and that unemployment will remain at about the current level, the output gap is estimated to remain relatively stable over the next few years.

### 3.4 Inflation expectations

Given the way in which prices and wages are determined in the market, inflation expectations will have an effect on future price inflation. At the same time, expectations concerning future inflation and the degree of confidence in monetary policy will influence the use of instruments necessary to attain the objectives of monetary policy.

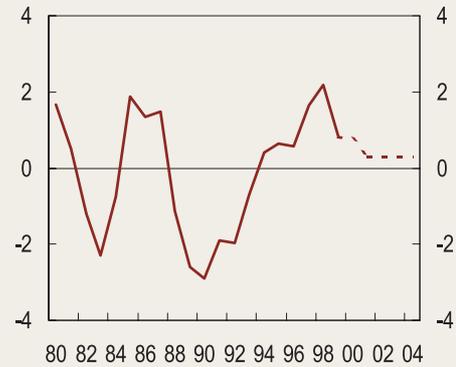
We have few direct measures of inflation expectations in Norway. Long-term rates can, however, provide information concerning confidence in overall economic policy and inflation expectations in the long term. In addition, they are a reflection of global long-term interest rates. The yield on Norwegian government bonds with a ten-year maturity is somewhat lower than the level prevailing in September. Long-term rates in the US and Germany have also fallen somewhat. The yield differential against corresponding German bonds is about 1.0 percentage point.

Long-term forward rates in Norway have increased somewhat since September. The differential against comparable German forward rates has also widened somewhat and is about  $\frac{3}{4}$  percentage point. There may be several reasons for this. One possible explanation is that uncertainty concerning future price inflation in Norway is greater since the economy is operating close to capacity limits. The differential against German forward rates is somewhat higher for Norway than for the other Nordic countries (see Chart 3.12).

Consensus Forecasts' December projections for the Norwegian economy show that market observers have adjusted their price inflation expectations upwards for this year and next compared with September. On average, a selection of market observers expect the consumer price index to increase by 3.1% in 2000 and 2.6% in 2001 (see Table 3.3). This is 0.1 percentage point higher for 2000 and 0.2 percentage point higher for 2001 compared with the September estimates.

<sup>1)</sup> see box in March 2000 Inflation Report for further details.

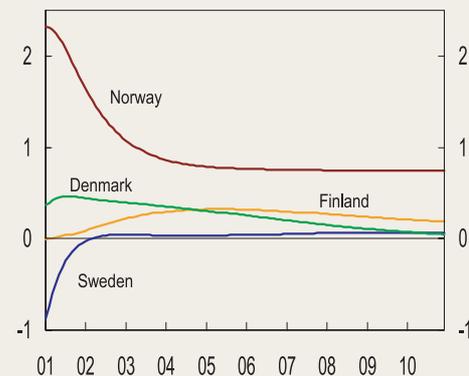
**Chart 3.11** The output gap<sup>1)</sup>. Mainland Norway. Per cent



<sup>1)</sup> The output gap is the difference between actual GDP and trend GDP as a percentage of trend GDP.

Sources: Statistics Norway and Norges Bank

**Chart 3.12** Forward rate differentials against Germany 14 December 2000. Percentage points



Source: Norges Bank

**Table 3.3** Various institutions' projections for consumer price inflation in Norway in 2000 and 2001). Percentage change from previous year

	2000	2001
Norges Bank	3	3
Ministry of Finance	3	2 $\frac{3}{4}$
Statistics Norway	3.1	2.5
OECD <sup>2)</sup>	3.0	2.8
IMF	3	2.5
Consensus Forecasts <sup>3)</sup>		
Highest estimate	3.2	3.0
Average	3.1	2.6
Lowest estimate	3.0	2.3

<sup>1)</sup> Latest official projections from the various institutions.

<sup>2)</sup> Consumption deflator

<sup>3)</sup> December 2000

Source: Norges Bank

# Effects of a change in interest rates

The level of and changes in Norges Bank's interest rates influence activity in the economy and inflation through a number of channels. The box discusses how interest rates affect the Norwegian economy and Norges Bank's approach to these effects in its inflation reports.

The effects of an interest rate change generally depend on the situation prevailing at the time of the change and how the interest rate change is perceived in each concrete case. The effects will also vary over time. Several factors come into play with regard to the impact of interest rates on demand and inflation:

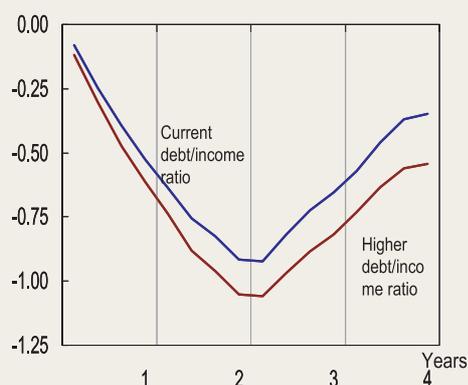
- *Debt and assets in the private sector*

The household sector's overall net debt (debt less interest-bearing assets) currently amounts to about 60 per cent of disposable income, excluding pension rights and insurance funds. In such a situation, an increase in interest rates means that household interest expenditure will increase to a greater extent than interest income. An increase in interest rates will thus reduce total disposable income and thereby reduce consumption. The effects depend on the magnitude of household net debt.

Moreover, an interest rate increase implies that fixed investment and debt-financed consumption becomes more expensive, with an attendant rise in the saving ratio. In addition, an interest rate increase has a negative impact on household wealth by, for example, reducing the value of housing. Historically, this induces households to save a larger share of their income to compensate for wealth losses. Even this effect will be greater, the higher the level of household net debt is.

Historical data for Norway and other countries show that interest rate changes affect aggregate demand fairly quickly. Using the RIMINI model, we have estimated the effects of a 1 percentage point increase in interest rates over a period of two years. Chart 1 shows that in isolation, an interest rate increase of this magnitude reduces, mainland GDP by ¾-1 per cent after two years. We have excluded other factors such as the exchange rate and how the interest rate affects the formation of expectations. During the 1990s, household net debt was reduced to about 60 per cent of disposable income after rising sharply in the latter half of the 1980s. Chart 1 also illustrates the effects of an interest rate increase in a situation where household net debt is at the level prevailing in 1988, ie about 80 per cent of disposable income. In that situation, the income effects would have been greater and mainland GDP could have been reduced by more than 1 percentage point after two years.

**Chart 1** The effect of the interest rate on the household debt/income ratio for various scenarios. Mainland GDP. Percentage change from baseline scenario. (Based on the RIMINI model)



The effect of the interest rate depends on debt exposure. Household net interest-bearing debt as a share of disposable income increased sharply in the latter half of the 1980s, but declined somewhat in the first half of the 1990s. The chart shows that the effect of a 1 percentage point higher interest rate over two years depends on the household debt/income ratio. The chart compares the effect today with a situation in which household net debt increases to about the peak level in 1988.

## • Capacity utilisation in the economy

Demand influences prices partly through wage formation and partly through corporate profit margins. Higher interest rates and lower demand normally reduce wage pressures and profit margins in the enterprise sector. The magnitude of the effects depends on the prevailing level of wage and price pressures. The impact of interest rates on wage and price inflation in the economy thus depends on overall capacity utilisation.

Chart 2 compares the effects of higher interest rates over two years on consumer price inflation in two different situations – one where unemployment is at the current level, ie around 3%, and one where the situation in the labour market is the same as in 1993 when the sum of registered unemployed and persons participating in labour market programmes stood at 9% of the labour force. The chart only takes into account the effects of changes in the real economy. We have again excluded the effects via other factors such as the exchange rate and the direct effect of interest rates on expectations formation. The effects are different because changes in the real economy do not pass through to prices to the same extent when there is substantial slack in the economy. When the economy is operating at full capacity, a change in demand will have a much greater impact on prices.

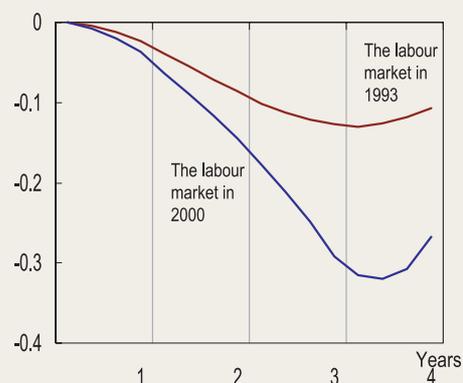
## • The situation in the foreign exchange market

A more direct channel through which a change in interest rates has an effect on price and cost inflation is the exchange rate. The effect of interest rates on the exchange rate are uncertain and generally depend on the causes of the change in interest rates.<sup>1)</sup> If the main cause lies in domestic developments, one could expect a temporary appreciation of the krone exchange rate when interest rates rise. If interest rates are increased in response to a depreciation of the exchange rate, the effects may be the same, but the relationship will be difficult to identify in retrospect. Partly because of Norway's long history of a fixed exchange rate regime, it is difficult to determine the historical relationship between interest rates and the krone exchange rate.

As a rule, higher interest rates will make krone positions more attractive than positions in other currencies. All other things being equal, this will lead to a strengthening of the krone with an associated decrease in prices for imported goods, which in turn will have a dampening impact on price and cost inflation. A stronger krone exchange rate will also favour imported goods at the expense of domestically produced goods and reduce demand for Norwegian export goods. The exchange rate channel will then have a direct price-dampening effect and an indirect effect through reduced demand.

Chart 3 illustrates the effect of a possible impact on the exchange rate. It is assumed that the exchange rate changes

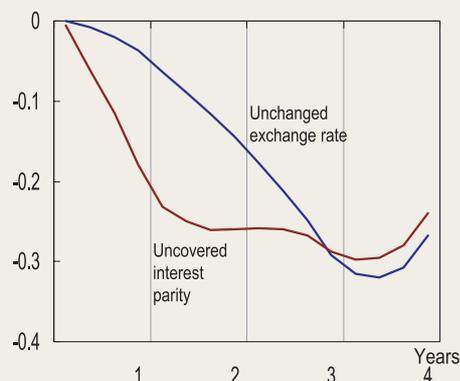
**Chart 2** The effect of the interest rate for various unemployment scenarios. Change in consumer price inflation. Percentage points (Based on the RIMINI model)



A change in the interest rate will have a stronger effect on the CPI when there are strong pressures in the labour market than when there is high unemployment. The chart shows that the effect of a 1 percentage point higher interest rate over 2 years, with the current unemployment level of a good 3 per cent differs from the situation in 1993, when the total number of unemployed and persons on labour market schemes amounted to 9 per cent of the labour force. The exchange rate remains unchanged here.

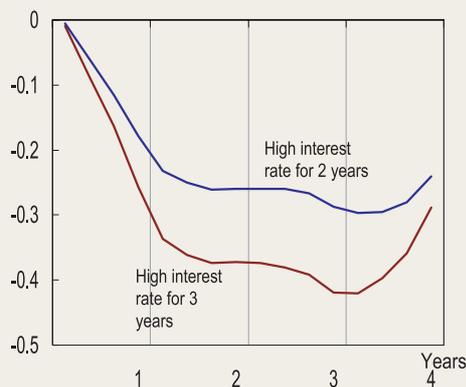
<sup>1)</sup> See for example Zettlemeyer (2000) for an empirical study of impact of monetary policy shocks on the exchange rate.

**Chart 3** The effect of the interest rate for various exchange rate scenarios. Change in consumer price inflation. Percentage points (Based on the RIMINI model)



The effect of the interest rate depends on the situation in the foreign exchange market. The chart illustrates the effect of a 1 percentage point higher interest rate over two years with an unchanged exchange rate, and when the exchange rate changes according to uncovered interest parity.

**Chart 4** Change in consumer price inflation for different scenarios for the duration of an increase in interest rates. Percentage points. (Based on the RIMINI model)



The effect on the exchange rate, and thus on consumer price inflation, is intensified when the change in interest rates is expected to persist. The chart illustrates the effect of a 1 percentage point higher interest rate for two and three years when the exchange rate changes according to uncovered interest parity.

in accordance with uncovered interest parity (UIP).<sup>2)</sup> The chart illustrates that the impact on price inflation occurs at an earlier stage when the exchange rate appreciates at the same time compared to a situation where the interest rate only operates through the real economy. As the effects via the exchange rate recede, the effect via the real economy will dominate. The possible direct effects on inflation expectations are still disregarded.

In practice, the exchange rate is influenced by many factors. Evidence supports the validity of purchasing power parity in the long term.<sup>3)</sup> This implies that a particularly high level of price inflation in Norway will over time result in a depreciation of the krone. However, in the short term factors such as international risk assessments<sup>4)</sup>, economic policy credibility, oil prices and the terms of trade could influence the exchange rate. The baseline scenario in the inflation reports are usually based on the assumption of an unchanged exchange rate from the level prevailing in preceding months. However, we are still able to capture the effect of the interest rate on the exchange rate because a change in the interest rate that has an effect on the exchange rate will be reflected in a change in the exchange rate assumption from one inflation report to another.

• *Expected duration of an interest rate change*

Normally, economic agents do not know the exact duration of an interest rate increase or an interest rate reduction. It would seem likely that the impact of an interest rate increase will be stronger if the various operators believe that the interest rate will remain high for a longer period than if they anticipate a swift decline. Chart 4 shows the effect on consumer price inflation given different durations for an interest rate increase. According to the theory of uncovered interest parity, an interest rate increase of a longer duration will result in a stronger immediate depreciation of the exchange rate and a return to the initial level will take somewhat longer.

• *Expectations formation*

Expectations play a paramount role with regard to monetary policy effects. Norges Bank's monetary policy decisions and announcements can influence expectations concerning future interest rate developments and the outlook for the Norwegian economy. An increase in interest rates that raises expectations of further interest rate increases may have a substantial negative impact on demand. An interest rate increase that is smaller than expected may have the opposite effect.

<sup>2)</sup>When the interest rate is raised by 1 percentage point for two years, UIP here implies an instantaneous 2 per cent appreciation of the krone exchange rate, followed by a gradual depreciation to the initial level over the two-year period.

<sup>3)</sup>See for example Akram (2000).

<sup>4)</sup>See Bernhardsen and Røisland (2000).

Furthermore, the objective of monetary policy could influence the way interest rates operate. Compared with the period when interest rates were politically determined, interest rates now appear to reflect to a greater extent expectations concerning price developments and prospects for the Norwegian economy. Expectations therefore play an inevitable role in the assessment of monetary policy effects.

The historical data partly refer to a period when interest rates played a different role in the economy. Up to the mid-1980s, interest rates were regulated. Furthermore, over a long period monetary policy was oriented towards a fixed exchange rate on day-to-day basis. This does not mean that interest rates were without influence on household and business expectations during these periods. However, expectations now clearly tend to have a greater impact on price formation than earlier.

The significance of expectations formation can be illustrated using simulations on a calibrated theoretical model where expectations are explicitly incorporated in the model. Through a simple dynamic structure, expected inflation plays a paramount role in determining actual inflation<sup>5)</sup> (see also separate box in the September *Inflation Report*). The parameters in the model have been chosen so that the effect of the interest rate on production and consumer price inflation approximately corresponds to the RIMINI model when we assume that expectations are 90 per cent backward-looking and 10 per cent forward-looking in the calibrated model.

If enterprises and households become more forward-looking, the effects of monetary policy will come into evidence sooner. As a result, interest rates would have a stronger impact on output and price inflation. Chart 5 illustrates the effects on consumer price inflation where expectations are both backward-looking and forward-looking. For example, forward-looking expectations at 10 per cent imply that 90 per cent of expectations are based on historical developments. Forward-looking expectations are 10, 20 and 30 per cent respectively. Chart 6 shows the corresponding effect on mainland GDP. An increasing degree of forward-looking expectations intensifies the effect of the interest rate on consumer price inflation because expectations change more quickly. The differences in the curves in Charts 5 and 6 illustrate the uncertainty associated with expectations formation.

## Conclusion

The above analysis illustrates the uncertainty associated with the impact of interest rates on the Norwegian economy. On the whole, the various analyses give rise to an uncer-

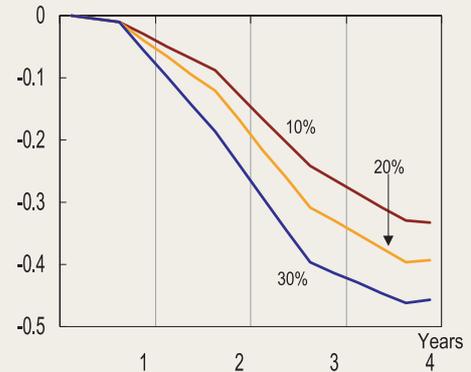
<sup>5)</sup>The model is a recalibrated version of a model presented in Leitemo, Røisland and Torvik (2000). The main equations in the model (somewhat simplified) are:

$$(1) y_t = \rho[\theta_y y_{t-1} + (1-\theta_y)E_t y_{t+1}] - \alpha_y r_t$$

$$(2) \pi_t = \theta_\pi \pi_{t-1} + (1-\theta_\pi)E_t \pi_{t+1} + \gamma y_{t-1}$$

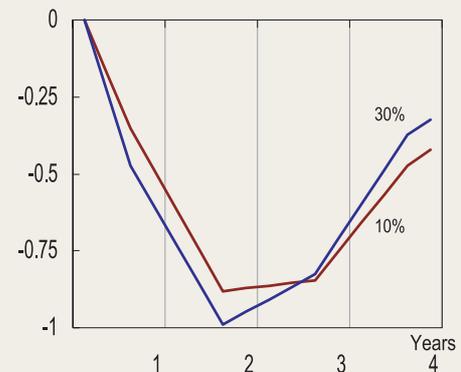
where  $y_t$  is the output gap in year  $t$ ,  $r_t$  is the real interest rate in year  $t$  and  $\pi_t$  is inflation in year  $t$ .  $E_t$  denotes model-consistent expectations concerning the future variable. By varying between  $\theta$  and 1, we show the varying degrees of forward-looking expectations.  $\theta = 1$  is consistent with 100% backward-looking expectations, while  $\theta = 0$  is consistent with 100% forward-looking expectations.

**Chart 5** Change in consumer price inflation for different degrees of forward-looking expectations. Percentage points

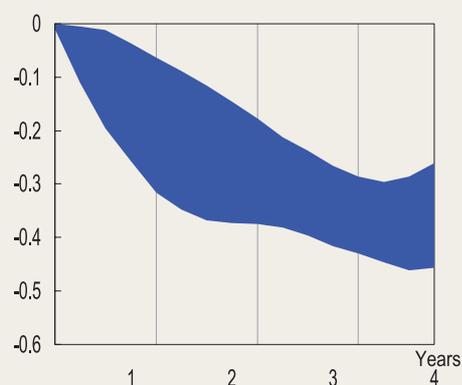


The effect of the interest rate may depend on the formation of expectations among households and the enterprise sector. The model has been chosen so that a 10% forward-looking expectation corresponds to approximately the effect in the RIMINI model. The exchange rate remains unchanged. A higher degree of forward-looking expectations of price formation may have a stronger effect on consumer price inflation.

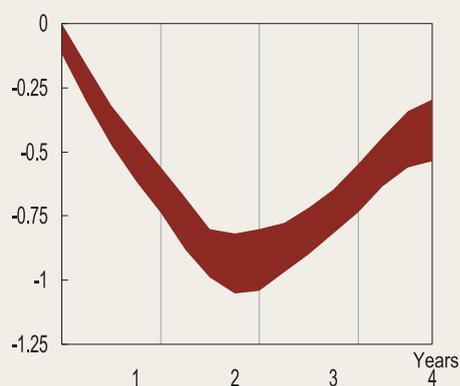
**Chart 6** Mainland GDP. Percentage deviation from the baseline scenario for various degrees of forward-looking expectations (see Chart 4).



**Chart 7** Effects of a 1 percentage point increase in the interest rate. Change in consumer price inflation. Percentage points



**Chart 8** Effects of a 1 percentage point increase in the interest rate. Percentage change in mainland GDP



tainty interval for the interest rate's effect on total production and consumer price inflation. Normally, the RIMINI model is used to assess interest rate effects. The model provides information concerning historical relationships but can also be used as a tool for interpreting analyses from several models. For example, there is evidence suggesting that more forward-looking expectations tend to intensify interest rate effects relative to those implied by our historical data. We also place emphasis on analyses from other models when using the RIMINI model.

In practice, it is often difficult to determine how long the interest rate will be kept at a high or low level. The associated effects, eg on the exchange rate, will inevitably change if the interest rate is changed for a shorter or longer period than in our analysis. The time it takes for a change in interest rates to have an impact will also vary. For example, the interest rate increases in 1998 had an impact on wage growth as early as the following spring. In other situations, it may take longer before the effects transpire.

On the basis of the discussion above, we have summarised the uncertainty considered in this box in Charts 7 and 8. We find that an interest rate increase of 1 percentage point over two years reduces total mainland GDP by  $\frac{3}{4}$ -1 percentage point after two years. The effect is thereafter reversed. The inflation rate is reduced by an estimated 0.20-0.35 percentage point after two years and 0.30- 0.40 percentage point after three years. The above discussion and all the estimates are based on the assumption of unquestioned monetary policy credibility. If, say, an interest rate decrease reduces credibility, the impact on the exchange rate and inflation may be substantially stronger than indicated here. However, it is impossible to quantify these effects. Sizeable interest rate changes could theoretically influence monetary policy credibility. The above estimates are therefore based on smaller interest rate changes. Interest rate changes of a greater magnitude could have a different impact than described here.

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# 4 | Economic developments

## 4.1 Main features

It now appears that growth developments in the Norwegian economy will be slightly more pronounced than projected in the September *Inflation Report*. Following relatively high activity levels in the first half of 2000, there are now signs of slower growth, with lower growth impulses into next year. Growth is expected to pick up again in the second half of 2001. These developments must be seen in connection with the interest rate increases this year and the marked fall in interest rates that is incorporated as a technical assumption for the projections. Less pronounced changes in interest rates would result in somewhat steadier economic activity. All in all, mainland GDP is projected to expand by 2% this year, 1¼% next year, 1¾% in 2002 and around 2% on average in 2003 and 2004. The estimates imply that growth will be in line with the estimate for growth in production capacity from 2002.

The estimates for mainland GDP growth remain unchanged for 2001 and have been revised up by half a percentage point for 2002. In relation to the September *Inflation Report*, growth next year will be underpinned by somewhat higher growth in public spending and increased petroleum investment compared with the September projections, while the effects of the interest rate increases in 2000 and the tax programme for 2001 will, in isolation, have a dampening effect on growth. The upward revision of the estimates for 2002 is primarily ascribable to somewhat faster growth around the beginning of the year and higher growth in private demand through the year. The calculations indicate that growth in private consumption will pick up as a result of the assumption concerning lower interest rates and a somewhat higher estimate for household disposable income. The projection for total GDP growth has been revised down by 1¼ percentage points in 2000, primarily reflecting lower oil production.

Unemployment is likely to remain stable around the current level over the next years. Labour market pressures may prove to be slightly stronger than previously assumed, partly as a result of slightly higher employment in the public sector.

The world economy is experiencing a period of strong expansion. World trade is set to expand by 13% this year, the highest growth rate for almost 30 years. The robust growth in trade has contributed to high product prices and favourable growth conditions in most export-oriented manufacturing sectors and other Norwegian export industries. However, growth in export industries is being restrained because many enterprises are already producing at near capacity limits, particularly in the processing industry. Growth in Norway's traditional exports is considerably lower than the expansion in world trade would imply. Manufacturing production is falling in spite of the expansion in the world economy, partly reflect-

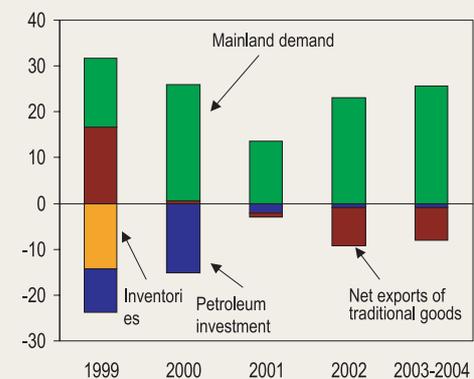
**Table 4.1** Key aggregates for Norway, 2000-2004. Percentage change from previous year

	2000	2001	2002	2003-2004
Mainland demand	2¾	1½	2¼	2½
Private consumption	2½	1½	2½	2¾
Public consumption	2½	3	2	2
Fixed investment 3¾	-1¼	2¼	1¾	
Traditional exports	3½	3¼	3¾	4
Traditional imports	4	2½	4	3¾
GDP	2¼	2	1¾	1¾
Mainland GDP	2	1¼	1¾	2
Employment	½	¾	½	½
Registered unemployed and on labour market programmes <sup>1)</sup>	¾	¾	¾	¾
Consumer prices	3	3	2½	2¼
Labour costs	5	5	4½	4¼
Annual wages	4¼	4¼	4½	4¼

<sup>1)</sup> Percentage of labour force

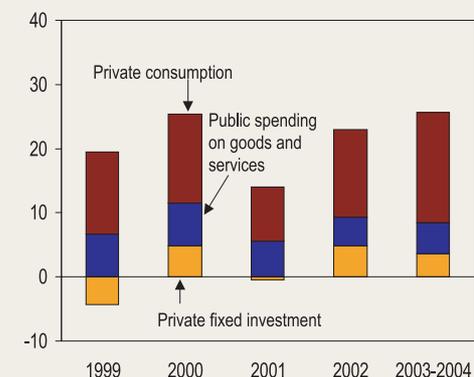
Sources: Statistics Norway, the Technical Reporting Committee on Income Settlements and Norges Bank

**Chart 4.1** Contributions to overall demand. Changes in billions of NOK from previous year. Constant 1997 prices



Sources: Statistics Norway and Norges Bank

**Chart 4.2** Components of domestic demand. Changes in billions of NOK from previous year. Constant 1997 prices



Sources: Statistics Norway and Norges Bank

**Table 4.2** GDP estimates. Percentage change from previous year

	2000	2001	2002	2003 2004
US	5¼	3	3	3½
Japan	1¾	2	2	2
Germany	3¼	2¾	2½	1¾
France	3	2½	2¼	2¼
Italy	2½	2½	2¾	2½
UK	3	2½	2½	2¼
Sweden	3¾	3¾	2¾	2
Norway's trading partners <sup>1)</sup>	3½	3	2¾	2¼
Euro area <sup>2)</sup>	3¼	3	2¾	2¼

<sup>1)</sup> Weighted by export weights

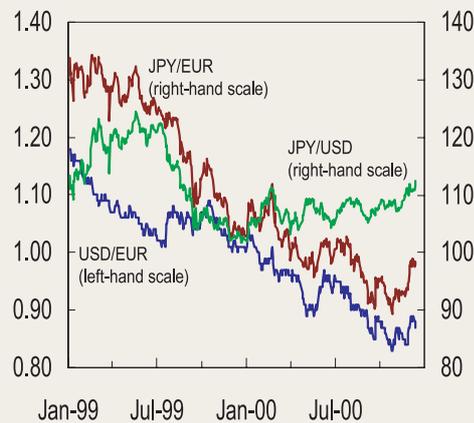
<sup>2)</sup> Weighted by the IMF's GDP weights adjusted for purchasing power

Source: Norges Bank

ing the high rise in costs in recent years and the decline in petroleum investment.

Manufacturing employment is expected to decline at a somewhat slower pace than previously projected as a result of a more moderate fall in petroleum investment the next few years. This implies that the contraction in oil-related industries may be less pronounced than assumed earlier. On the other hand, growth in the world economy is likely to be slower over the next year, which will probably result in reduced growth impulses to export industries and lower prices for cyclically sensitive export products. However, the contraction in manufacturing employment is being offset by higher employment in service industries, particularly in the public sector. On balance, employment is expected to increase approximately in pace with demographically determined growth in the labour force over the next few years.

**Chart 4.3** Exchange rates



Source: Norges Bank

## 4.2 The international environment

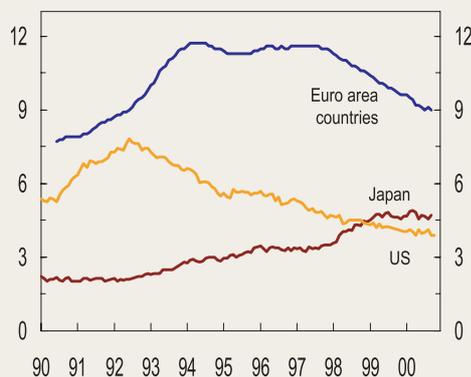
### *Strong but abating world economic growth*

Total GDP growth among our trading partners is estimated at 3½% this year, which is the highest growth in over 20 years. GDP growth among our trading partners is projected to slow to 3% in 2001 and 2¾% in 2002. The estimates imply slower world economic growth. Third-quarter GDP figures for the US, the UK and some countries in the euro area indicate that this softening has begun, which is further confirmed by weaker confidence indicators. There is considerable uncertainty surrounding the amplitude of a slowdown at the turnaround stage. High oil prices and a slower rise in asset prices are expected to curb demand growth, but this will be partly offset by a more expansionary fiscal policy in some countries.

The uncertainty surrounding future oil prices is substantial. Strong growth in the world economy fuels brisk demand for oil and oil-related products. In the short term, there are production constraints on a world basis. A further rise in demand, for example as a result of a cold winter or supply disturbances, could have a substantial impact on prices. However, oil production has now reached such a high level that a marked fall in prices, for example as a result of a pronounced international cyclical downturn, cannot be ruled out.

The oil price shocks in 1973-1974 and 1979-1980 put a halt to the international cyclical upturn. So far, the contractionary effects of high oil prices have not hampered the strong growth in the world economy. Industrialised countries have reduced their dependence on oil. Technology is less energy-intensive and the production of services has taken on greater importance.

**Chart 4.4** Unemployment as a percentage of the labour force in the US, Japan and the euro area countries



Source: OECD

### *Estimates for some regions and countries*

Third-quarter GDP figures for the US economy indicated continued strong growth in private consumption, private investment and exports. However, public spending and hous-

ing investment have moved on a weaker trend. We estimate GDP growth at 5¼% this year, ie the same rate as in the September *Inflation Report*. The effects of interest rate increases earlier this year and the decline in equity prices are expected to restrain domestic demand in the period ahead. GDP growth is thus projected to slow to 3% the next two years (see Chart 4.5). Given the estimate for growth potential in the interval 3½-4%, this implies a gradual decline in pressures in the US economy.

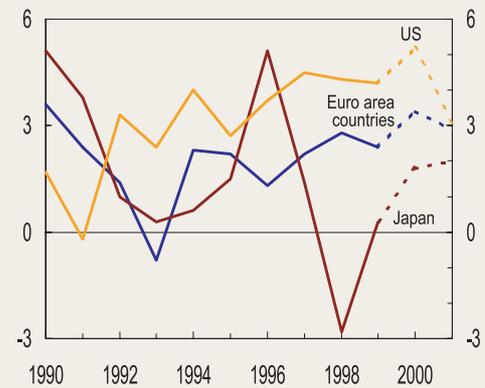
In the euro area, the depreciation of the effective exchange rate and robust growth in world trade have led to strong growth in exports. In addition, private investment has been relatively high. Private and public consumption have shown a moderate increase. Growth was strong in the first six months of the year, while developments in the latter half of 2000 suggest a moderate slowdown in activity. Employment growth is expected to boost household disposable income ahead even though wage growth is moderate in the largest countries. Combined with a fiscal stimulus – primarily in the form of tax reductions – of about ½% of GDP, this is expected to buoy private demand. A weak exchange rate is still underpinning the high growth in exports. Production is estimated to increase at a faster rate than production capacity and unemployment is expected to fall. On balance, we expect somewhat slower growth in the euro area this year and next. Growth is expected to moderate from 3¼% in 2000 to 3% in 2001 and 2¾% in 2002.

The Swedish economy is expanding at a brisk pace, primarily fuelled by private domestic demand and exports, while growth in public expenditure is being limited by an adopted ceiling on spending. Low interest rates and higher real disposable income as a result of tax reductions, increased employment and real wage growth have provided a strong impetus to growth in private demand. An expansionary fiscal policy in the period ahead is expected to support high growth next year. However, growth is expected to moderate somewhat in 2002.

The UK is also experiencing capacity constraints after a longer period of expansion. GDP growth is expected to soften the next few years. The estimates are based on the assumption that growth in private consumption will slow to provide room for the approved increases in public consumption.

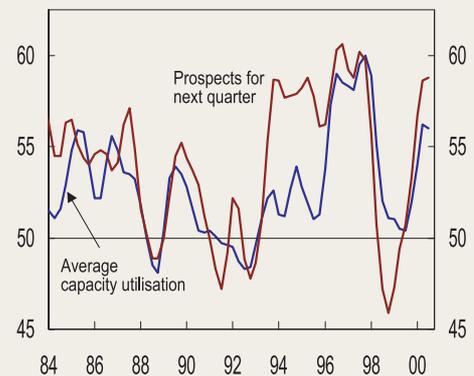
In contrast, the Japanese economy has been in a slump in recent years. Growth in the first half of the year was stronger than expected, however. The improvement has primarily occurred in enterprises that have benefited from falling labour costs and high export demand. This has led to higher capacity utilisation. However, there are few signs of an attendant increase in household demand. Overtime pay is rising, but employment has not picked up. There is still considerable uncertainty as to the robustness of the upswing in the Japanese economy. Exports depend on developments in the world economy, particularly in the rest of Asia. A new fiscal package is planned with a view to maintaining public sector demand. Japan's general government budget deficit is now substantial. Growth is projected at about 1¾% in 2000, followed by rates of close to 2% in the following two years.

**Chart 4.5** GDP growth in the US, Japan and the euro area countries



Sources: OECD and Norges Bank

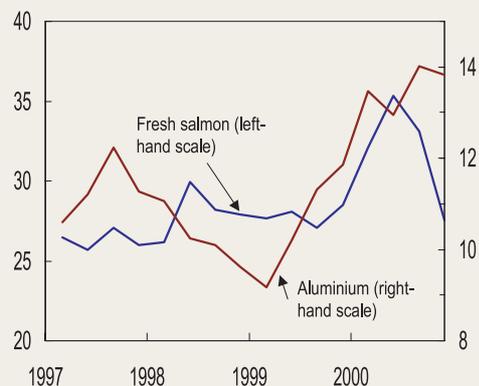
**Chart 4.6** Expected developments in capacity utilisation in manufacturing and industrial leaders' expectations of next quarter. General business tendency survey. Diffusion indices<sup>1)</sup>. Smoothed



<sup>1)</sup> An index of over 50 implies that in general industrial leaders expect higher capacity utilisation, or an improved outlook in the next quarter.

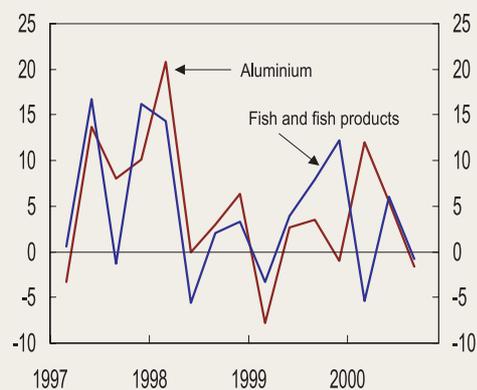
Source: Statistics Norway

**Chart 4.7** Prices for fresh salmon (NOK per kilo) and aluminium (1000s of NOK per tonne)<sup>1)</sup>



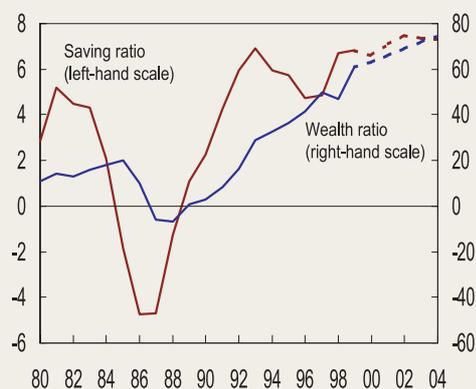
<sup>1)</sup> The most recent observation is for October  
Source: Statistics Norway

**Chart 4.8** Export goods. Percentage rise on same quarter previous year



Source: Statistics Norway

**Chart 4.9** Household saving and net financial wealth. Percentage of disposable income



Sources: Statistics Norway and Norges Bank

## 4.3 The balance of payments

### *Moderate growth in traditional exports*

Solid growth in the world economy is generating positive impulses to the Norwegian export industry. In spite of this, growth in traditional merchandise exports has been moderate. This may be because many export-oriented enterprises are now producing at full capacity. According to Statistics Norway's general business tendency survey, many business leaders in traditional export-oriented industries cited capacity problems as the main constraint on production. Combined with high labour costs relative to trading partners and gradually slower demand growth abroad, growth in traditional merchandise exports is set to be moderate through the projection period.

According to external trade statistics, price increases have accounted for about 80% of the overall rise in the value of traditional merchandise exports so far this year. The sharp rise in prices primarily reflects the high level of prices for refined petroleum products, although the rise in aluminium prices has also been substantial (see Chart 4.7). The rise in prices for traditional merchandise exports is estimated at 11% this year, with oil prices accounting for about 8 percentage points. As a result of the assumption concerning a drop in oil prices, the rise in prices is projected to slow in the period ahead. Export prices are now estimated to rise by 2% in 2001 and then fall slightly in 2002. The estimates are partly based on a slower rise in commodity prices from 2001 to 2002. Commodity and export prices are expected to show a stable and subdued rate of increase towards the end of the period.

Growth in traditional imports is estimated at 4% this year. Imports of consumer goods are rising, while imports of typical capital goods are falling. Subdued growth in private consumption and a decline in investment are expected to push down import growth next year. As consumption growth and investment pick up later in the period, import growth is also expected to increase somewhat.

### *Smaller current account surpluses from 2002*

High oil prices and declining deficits on the traditional merchandise balance are expected to result in a record-high current account surplus this year. As a result of weaker oil exports and a faster rise in import prices than previously estimated, the estimate in the September *Inflation Report* has been revised down somewhat. The current account surplus is now projected at about NOK 190 billion in 2000. Next year the surplus is estimated at NOK 225 billion. For both years, the surpluses are estimated to be equivalent to around 15% of GDP. Weaker growth in oil exports and the assumption of a decline in oil prices imply somewhat lower current account surpluses in 2002-2004. The current account surplus is projected at around 10% of GDP in this period.

## 4.4 Domestic demand

### *Moderate consumption growth in the year ahead*

Household decisions concerning consumption and saving are heavily influenced by the level of interest rates. The quarterly national accounts showed that consumption growth slowed from the second to third quarter, which must partly be seen in connection with the 1½ percentage point increase in interest rates this year. Statistics Norway's retail sales indicator fell sharply in October. Consumption growth is now estimated at 2½% this year, which is half a percentage point downward revision compared with the September report.

Consumption growth is expected to remain low the next six months. In line with the assumption of a decline in interest rates, growth in private consumption is expected to pick up towards the end of next year. Consumption growth is projected at an average 1½% in 2001. In 2002, consumption growth is estimated to reach 2½%, partly reflecting the assumption of a further decline in interest rates and higher real income. The saving ratio is projected to edge up the next two years. In 2003 and 2004, private consumption is projected to rise by about 2¾%, in line with growth in real disposable income.

Resale home prices have fallen slightly this autumn. Autumn is usually a quiet period in the housing market, but it would also appear that the interest rate increases have had a dampening effect on activity. As a result of a sharp rise in prices in the first half of the year, resale home prices are estimated to show a rise of about 12% this year. Despite some increase in new housing projects, it is likely that there will continue to be surplus demand for dwellings in the larger cities. Against this background, the rise in real prices for existing dwellings is still expected to be moderate in the years ahead (see Chart 4.10).

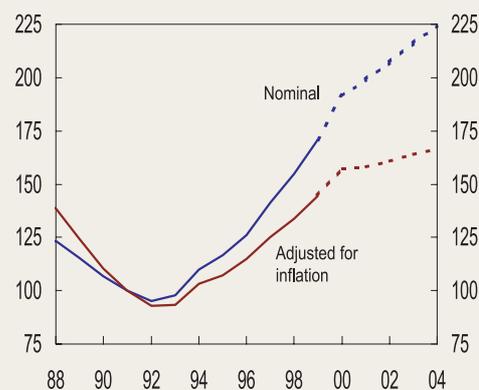
Growth in credit to households remains high. Historically, there has been a tendency for credit growth to shadow the rise in house prices with some lag. Growth in credit to households is therefore expected to level off and gradually abate in line with a slower rise in house prices.

The steep rise in prices for existing dwellings in recent years has made it more profitable to build new dwellings. Following two years of declining housing investment, it now appears that construction activity is picking up. This year, housing investment is expected to rise by about 4%. A high level of housing starts through the year points to stronger growth in housing investment towards the end of the year and into next year. According to a report from the Byggenæringens Landsforbund et al, a shortage of sites, lengthy processing periods for building applications and a shortage of labour are the factors that are limiting starts. Moreover, the increase in interest rates may be having a dampening effect on building activity. Given the assumptions underlying this report, housing investment is projected to show moderate growth in the period 2002-2004.

### *Petroleum investment*

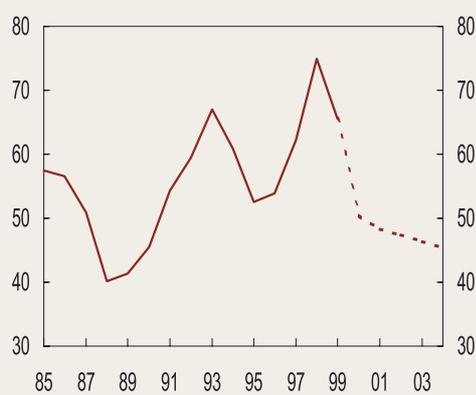
After contracting sharply this year, petroleum investment is expected to decline slightly each year in the projection period

**Chart 4.10** Resale home prices. Nominal and adjusted for inflation. Yearly averages. Index 1991=100



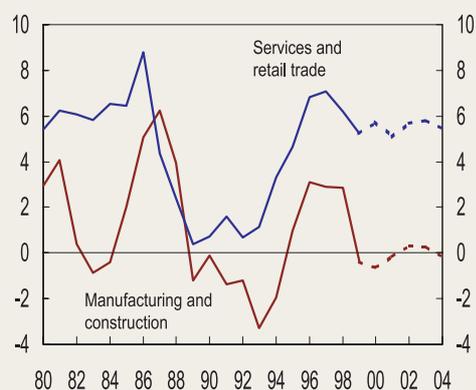
Sources: Statistics Norway, ECON and Norges Bank

**Chart 4.11** Gross investment in petroleum activities. In billions of NOK. Constant 1997 prices



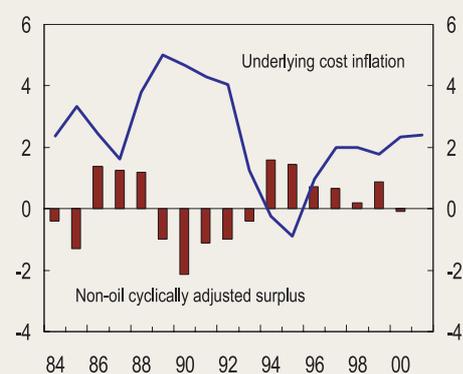
Sources: Statistics Norway and Norges Bank

**Chart 4.12** Net fixed investment rate. Investments less capital consumption as a percentage of value added



Sources: Statistics Norway and Norges Bank

**Chart 4.13** Non-oil cyclically adjusted government surplus and real underlying cost inflation



The surplus is change on previous year, expressed as a percentage of mainland GDP. Cost inflation is percentage change from previous year.

Sources: Norges Bank 2001, Ministry of Finance

(see Chart 4.11). The decline in petroleum investment must be seen in connection with the very high level of investment towards the end of the 1990s. However, the increase in oil prices has contributed to large cash flows for oil companies. This is expected to lead to many smaller investments in both new and existing fields. The estimate for petroleum investment in 2001 has been revised upwards to a considerable extent.

### *Contraction in business investment*

Lower petroleum investment and a low level of activity in the shipbuilding industry are influencing the overall situation for manufacturing industry. Manufacturing production fell by 3% and investment by about 20% last year. So far this year, the contraction in both production and investment has been moderate. Manufacturing output has nevertheless been somewhat weaker than expected compared with the September *Inflation Report*. Even though prices for traditional export goods have shown a sharp rise in recent months, this has probably not fully translated into higher profitability for mainland enterprises as a whole. High oil prices are resulting in increased costs for many mainland enterprises.

Manufacturing industry continues to be marked by considerable differences across the various sectors. According to Statistics Norway's general business tendency survey, industries such as industrial chemicals, pulp and paper, metals and timber report production growth, high capacity utilisation and solid profitability. As a result of capacity problems and high profits, many new and relatively large investment projects are being planned in the processing industry.

The situation is different for many technology enterprises. In this sector, which is far more labour-intensive, the sharp rise in costs over several years has gradually eroded cost competitiveness. In addition, the steep decline in petroleum investment has led to downsizing in the engineering industry's offshore activities.

On the whole, manufacturing investment is projected to remain relatively stable over the next years. This must be seen in connection with the new depreciation rules that increase the price of capital employed.

The stock of capital in the private service and retail sector is substantial following the high level of investment in the 1990s. The need for further capacity expansion is probably limited. The supplementary payroll tax for commercial buildings, which will apply from next year, could also push down investment. However, it seems likely that some of the planned projects will come at a later stage. Low growth in consumption over the next year further suggests some decline in investment in this sector in 2001. As a result of the removal of the special tax on buildings in 2002 and higher growth in private consumption, investment is projected to expand later in the projection period.

### *High growth in public expenditure*

Over the last five years growth in public expenditure has been between 1.1 and 2.2 percentage points higher than assumed in

the national budget. The evaluation of projections in our inflation reports shows that the figures in the national budgets have been an important source of error for our projections. For 2001, emphasis has been placed on the fiscal programme that is outlined in the National Budget for 2001 and the budget compromise in the Storting (Norway's parliament). However, we have incorporated moderate slippage in public consumption in relation to the estimates in the National Budget. This slippage is estimated at a little less than half of the average slippage the last five years.

Against this background, total public consumption is projected to rise by about 3% next year, whereas the estimate in the National Budget was 2.4%. Total public consumption amounts to NOK 270bn. Our projection is thus NOK 1.3bn higher than estimated in the National Budget. This deviation has been allocated to local government consumption in our calculations. The estimates thus entail a stable deficit in the local government sector from 2000 to 2001 of about NOK 11bn, compared with an estimated decline in the local government sector's deficit to about NOK 9.5bn in the National Budget.

Applying national accounts definitions, real growth in total public expenditure is estimated at 2¼% next year. Our estimates for real underlying spending growth in the government budget and the non-oil, cyclically adjusted budget surplus net of interest payments are based on the estimates in the National Budget.

Later in the projection period, we have assumed in the baseline scenario that the total growth in public expenditure will be in line with trend growth in mainland GDP. Section 5 discusses possible effects of higher growth in public spending on goods and services.

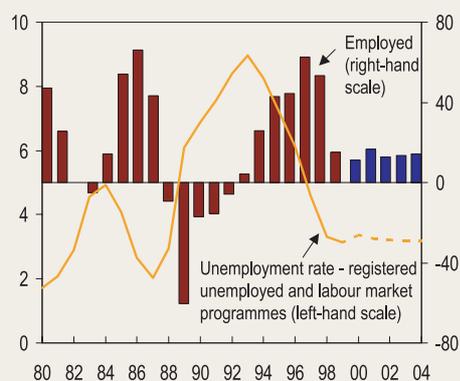
## 4.5 The labour market

### *Labour market remains tight*

The decline in registered unemployment through the first half of the year has come to a halt. In recent months, unemployment has exhibited a slight increase, primarily reflecting the decline in employment in oil-related industries. However, most sectors of the Norwegian economy are experiencing labour shortages, particularly the health sector, schools and the construction industry. So far, the situation has been eased to some extent by labour from other Nordic countries. However, new job opportunities in these countries have prompted many to return home. Labour market pressures are expected to be somewhat stronger in the period ahead than projected earlier.

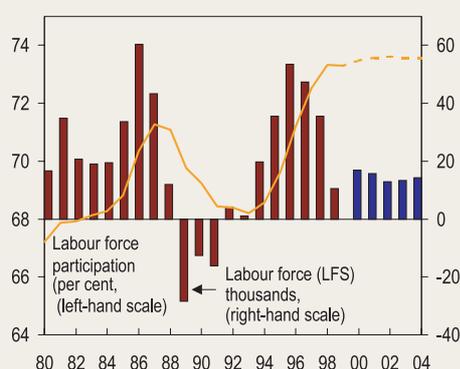
Manufacturing employment has fallen since the second half of 1998. The shipbuilding industry has been particularly hard hit by the sharp contraction in petroleum investment. According to Statistics Norway's general business tendency survey, however, there are wide differences across manufacturing sectors. Some sectors report difficulties in recruiting skilled labour and consider this to be a growing problem. Manufacturing employment is expected to show a continued

**Chart 4.14** Change in numbers employed from previous year (in thousands) and unemployment rate



Sources: Statistics Norway and Norges Bank

**Chart 4.15** Change in labour force from previous year and labour force as a percentage of working age population (labour force participation)



Sources: Statistics Norway and Norges Bank

decline in the years ahead, but probably at a slower pace than previously estimated. This is partly because the level of petroleum investment is expected to be higher than assumed in the September report.

The decline in manufacturing employment has so far been more than offset by the increase in employment in private and public services, reflecting the high level of public and private consumption. Growth in demand for labour in the sheltered sector is expected to continue. Total employment growth is estimated at  $\frac{3}{4}\%$  next year, while growth is estimated at around an annual average of  $\frac{1}{2}\%$  later in the projection period. The estimate for the next two years has been revised up by a quarter percentage point. Higher public consumption in 2001 will be offset by lower private demand. However, public consumption is more labour-intensive so that growth in total employment will be somewhat higher. The upward adjustment in 2002 reflects higher growth in private demand and a higher level of public sector employment.

There is little potential for growth in the labour force in excess of the level implied by demographic trends. Labour force participation rates have been stable, albeit at a historically high level, over the last three years (see Chart 4.15). Labour force participation rates are not expected to increase to any extent from the current level.

Unemployment is estimated to remain low in the years ahead. Registered unemployment is estimated at about  $2\frac{3}{4}\%$  in 2000, with persons participating in ordinary labour market programmes accounting for  $\frac{1}{2}\%$  of the labour force. On the basis of the National Budget, the number of persons participating in labour market programmes is expected to edge down next year, while little change is expected in registered unemployment. On balance, the number of registered unemployed and persons participating in ordinary labour market programmes is estimated to account for about  $3\frac{1}{4}\%$  of the labour force throughout the projection period.

## 5 | Risks and challenges

The projections in the *Inflation Report* are based on key assumptions concerning interest rates, the exchange rate and fiscal policy. In addition, the projections are based on the assumption that wage determination will remain unchanged in relation to that of recent years. The uncertainty associated with the inflation projections is partly due to the uncertainty concerning these key assumptions. Moreover, there is uncertainty with regard to how well our economic models and our use of them capture changes in the economy.

Different types of risks to Norges Bank's inflation projections are discussed in a separate box in this report. Using historical information concerning the accuracy of Norges Bank's inflation projections, we have calculated a probability distribution around the estimates (see Chart 2 in the box). Given the technical assumptions concerning interest rate movements underly-

ing the projections in this report, the risks to the inflation projections are considered to be symmetrically distributed.

It is uncertain to what extent and how quickly monetary policy measures affect the economy. The effects via expectations formation are particularly uncertain. These effects may be stronger than assumed earlier and could therefore imply a faster decline in price and cost inflation than currently projected. The turnaround in the Norwegian economy may also prove to be more pronounced than currently envisaged for other reasons, for example in the event of an international cyclical downturn. This could also result in lower price inflation than projected in this report. Another factor that might bring down price inflation faster than expected is higher-than-projected productivity growth.

On the other hand, there are several factors that may contribute to higher-than-projected price and cost inflation. In recent years, there has been a pronounced increase in sickness absence and the number of disability pensioners. If this trend continues, labour market pressures may be stronger than projected. Moreover, public spending growth may turn out to be higher than assumed in this report. In addition, labour shortages in the public sector and private service sector may mean that service industries will increasingly become wage leaders.

Substantial changes in the assumptions concerning oil prices or the exchange rate could also influence price inflation ahead.

In the sections below, we look at the possible effects of changes in some of the key assumptions underlying our projections.

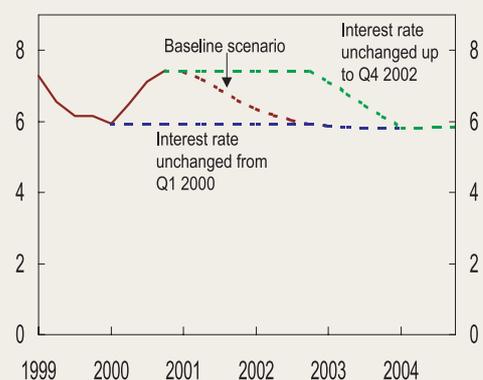
### *Effects of changes in interest rate assumptions*

The yield curve in money and bond markets in December indicates that the three-month money market rate is expected to fall by  $\frac{3}{4}$ -1 percentage point through 2001 and decline further by about  $\frac{1}{2}$  percentage point through 2002. If interest rates remain higher for a longer period than currently expected, price and cost inflation may slow at a faster-than projected pace.

Chart 5.1 illustrates two alternative interest rate scenarios. In the first scenario, the sight deposit rate is kept unchanged at the current level until the end of 2002 and then declines gradually towards the baseline scenario. The other scenario illustrates possible effects if Norges Bank had not raised interest rates through 2000. In this scenario, the interest rate is kept unchanged at the level prevailing in the first quarter of 2000.

The estimates illustrate that price inflation may be reduced to a little less than 2% at the end of 2002 by keeping interest rates at the current level two years ahead (see Chart 5.2). A high interest rate over a longer period will make it more attractive to maintain krone positions. It is therefore assumed that this alternative interest rate scenario will lead

Chart 5.1 Various forward rate scenarios



Source: Norges Bank

# Uncertainty associated with inflation projections

The projections in the *Inflation Report* will initially reflect various sources of deviation between projections and actual developments. The projections depend on key assumptions regarding the interest rate, the exchange rate and fiscal policy, among other factors. These assumptions are shrouded in uncertainty. There is also uncertainty regarding the extent to which economic models and their use capture changes in the economy. On the other hand, experience and systematic evaluation of previous projections provide insight into how corrections can be made for some types of uncertainty.

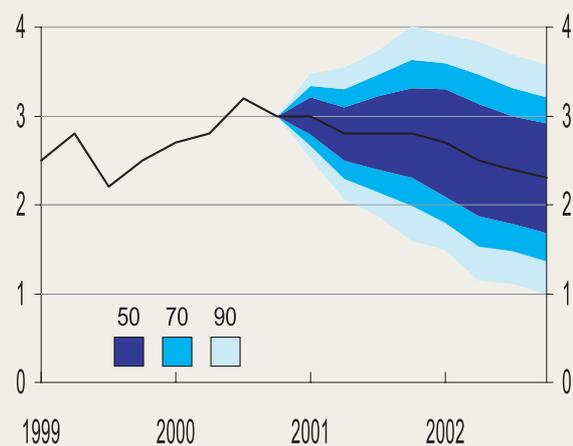
The RIMINI model is an important forecasting tool. There will be a difference between the model's predictions and actual developments from one quarter to the next. Given the underlying assumptions, the deviations will normally be relatively small, and distributed around zero. By way of illustration, Chart 1 shows the probability distribution around the projection for underlying inflation in this *Inflation Report*<sup>1)</sup>. This distribution may be an indication of the uncertainty inherent in the normal deviations in the model itself. The chart shows that the further ahead the projections, the greater the uncertainty.

Experience to date indicates that the overall uncertainty associated with Norges Bank's projections may be less than the uncertainty associated with the actual model calculations. The differences between Norges Bank's projections and actual developments in recent years illustrate this point. Since 1996, Norges Bank's *Inflation Report* has presented projections for consumer price inflation eight quarters ahead, and we have used these to compare the projections with actual consumer price inflation. Although we overestimated consumer price inflation just after the Asian crisis, there is no clear tendency towards a systematic over- or under-prediction in the quarterly projections. As expected, the further ahead the projections, the larger the deviations tend to be. In Chart 2, by way of illustration, this uncertainty is drawn around the projection for underlying inflation in this report. As mentioned, the uncertainty in this calculation is somewhat less than in Chart 1. The calculations in Chart 1 are as noted based on forecast errors for the past

four years. In time, more observations will provide a broader basis for quantifying this uncertainty.

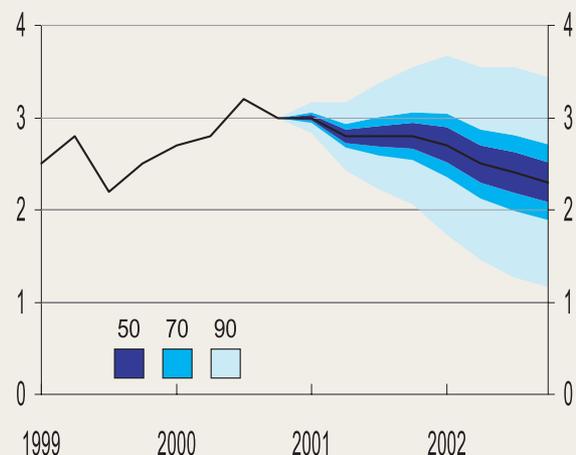
The illustrations of uncertainty are based exclusively on historical data. In both cases, uncertainty is symmetrical around the projection for underlying price inflation in the period ahead.

**Chart 1** Uncertainty associated with inflation projections. Various probabilities for developments in underlying consumer price inflation, based on uncertainty in the RIMINI model



Uncertainty in the projection for underlying inflation, illustrated through historical variance in the add factors in the RIMINI model. Calculations are based on Monte Carlo simulations of the add factors in the model.

**Chart 2** Uncertainty associated with inflation projections. Various probabilities for developments in underlying consumer price inflation, based on historical deviations in the projections



<sup>1)</sup> The calculations are based on Monte Carlo simulations of the add factors in the RIMINI model. The model has been simulated 1000 times, with the add factors in all the 70 estimated equations subtracted from the distribution the add factors have had in periods in the past. Thus the calculations do not take account of any parametric uncertainty. Norges Bank has also shown the results of similar calculations previously, for example in the June 1995 *Inflation Report*.

to an appreciation of the effective krone exchange rate. As a technical assumption, we have assumed that the exchange rate changes in line with the theory of uncovered interest parity. A higher interest rate for the krone is then met by an immediate appreciation and thereafter a steady depreciation so that the return on NOK positions is unchanged.

The estimates also illustrate that price inflation could have been about 2½% in 2003 if monetary policy had not been tightened in 2000. It has then been assumed that in the short run this would have resulted in a weaker krone than would otherwise be the case. This in itself would have contributed to higher price inflation.

The difference between the two interest rate scenarios may be looked upon as an illustration of the effects of an increase in the sight deposit rate by 1.5 percentage points in 2000. In this calculation, it has not been taken into account that a continuation of low interest rates might have eroded confidence in Norway's monetary policy, resulting in a change in the long-term equilibrium exchange rate for the Norwegian krone. The effect of raising interest rates would in that case be substantially greater than indicated in Chart 5.2

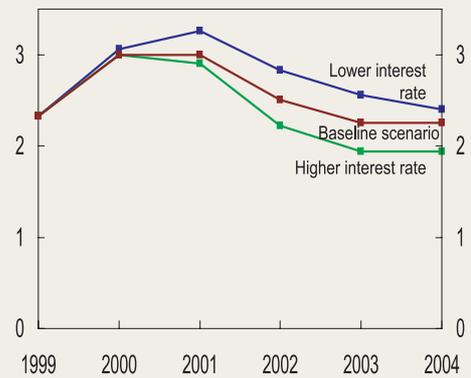
### *Changes in international impulses*

Persistently high oil prices may prompt higher pay demands and lead to an increase in prices for goods and services where oil-related products are used as inputs. Historically, however, oil prices tend to fluctuate widely over time. Should oil prices fall more rapidly than expected, price inflation may abate more quickly than projected.

Derivatives prices provide information about expectations in the oil market. Oil futures prices are expected to decline to USD 25 per barrel over the next year and further down to USD 23 two years ahead. Under given assumptions, probability distributions for future oil prices are derived from observed option prices (see Chart 5.3). The chart indicates that a 50% probability of an oil price between USD 22-30 per barrel at the end of next year has been factored in.

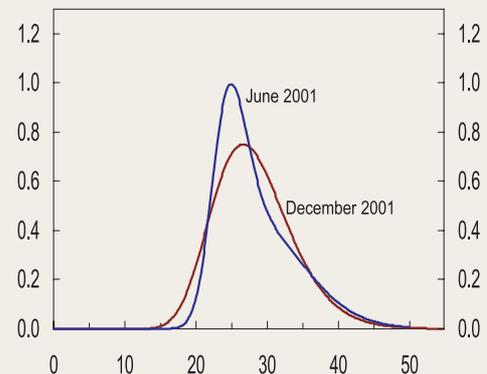
A pronounced international cyclical downturn is another risk factor. The current account deficit in the US appears to have stabilised at around 4½% of GDP. The deficit is primarily being financed through direct investment and foreign purchases of private securities in the US. These capital flows are largely based on expectations that the high underlying growth in the US will contribute to continued high returns. The gradual upward revision of the estimates for the growth capacity of the US economy is allaying fears of a major stock market correction. However, the estimates for the growth potential are uncertain. If growth capacity proves to be lower than estimated, the perception of future returns on investments in the US may change and trigger a decline in equity prices, a substantial depreciation of the US dollar and a sharper drop in demand in the US. World economic growth will then be affected by reduced US demand for imports and deteriorating competitiveness. In conjunction with weak growth and mounting volatility in global stock markets, this may increase the prob-

**Chart 5.2** Annual consumer price inflation for various interest rate scenarios. Per cent



Sources: Statistics Norway and Norges Bank

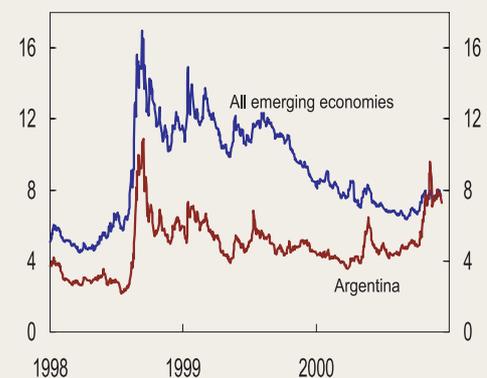
**Chart 5.3** Probability distribution<sup>1)</sup> for the oil price in June and December 2001 (per USD 0.1)



<sup>1)</sup> Implied probability distributions for "Light, Sweet Crude Oil", based on option prices as at 7 December 2000

Sources: New York Mercantile Exchange and Norges Bank

**Chart 5.4** Yield spreads between bonds in the US and in emerging economies and Argentina. Percentage points



Sources: Bloomberg and Datastream

# Evaluation of Norges Bank's projections for 1999<sup>1)</sup>

Norges Bank places considerable emphasis on transparency and the availability of its forecast work. Analyses of earlier forecast errors are important for making better and more accurate projections through improvements to our model and our use of the model. Systematic evaluation also places greater demands on the preparation of the projections in the *Inflation Report*, and ensures consistency between projections published at different times.

In recent years, evaluations of Norges Bank's projections have shown that a substantial portion of forecast errors can be attributed to growth in public consumption and petroleum investment, which proved to be higher than expected when the projections were prepared. Although growth in the real economy has generally been underestimated, the projections for wage and price inflation have not shown any significant systematic errors. The evaluations also illustrate that the after-effects of the Asian crisis were an important reason why price inflation was lower in 1999 than was estimated towards the end of 1997.

The chart shows projections for 1999 for some key variables published in December 1997 and December 1998 respectively.

The projections in the December 1997 *Inflation Report* indicated that the cyclical upturn would continue to gather momentum over the following two years. A cyclical turnaround was projected in the year

2000, with stagnating employment and rising unemployment. This scenario was associated with a projected deterioration in cost competitiveness as a result of high wage growth and an expected decline in investment in the petroleum sector.

The cyclical analysis in the December 1997 *Inflation Report* resulted in major forecast errors for 1999, but the expected cyclical turnaround materialised. However, the after-effects of the Asian crisis contributed to a turnaround that came earlier than our analyses indicated at the time.

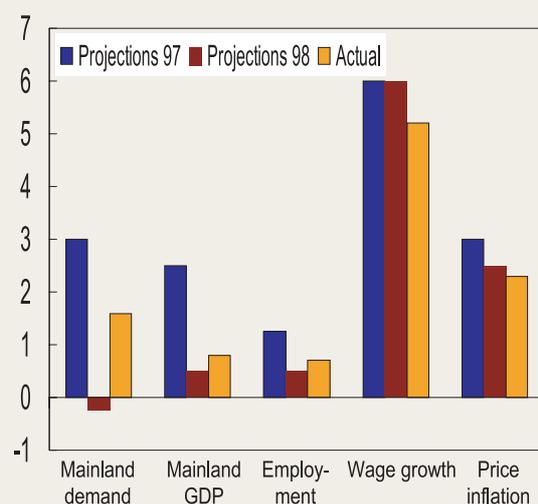
Developments through 1998 and 1999 were substantially different than assumed towards the end of 1997. First, there were the after-effects of the Asian crisis. The turbulence in international financial markets spread to Europe, and contributed, along with deteriorating cost-competitiveness as a result of sharp increases in labour costs, to a depreciation of the krone and higher money market rates. Growth in the global economy slowed, leading to a drop in international producer prices. The fall in the oil price through 1998 contributed to the general fall in prices. On the other hand, petroleum investment was substantially higher than assumed both in 1998 and 1999.

Price and wage inflation was more moderate than expected, but growth in real wages was in line with projections. International price developments were the main cause of forecast errors. Coupled with the fall in producer prices in both 1998 and 1999, the depreciation of many Asian currencies against the Norwegian krone led to a fall in prices for imported consumer goods in 1999. Imports from a number of Asian countries also account for a higher proportion of consumer goods than the average for Norwegian imports. In combination, these factors were more than sufficient to offset the effect of factors that should imply higher-than-expected price inflation, such as the depreciation of the krone against the US dollar and European currencies, and higher-than-expected wage growth in 1998.

Economic growth in 1999 was significantly slower than projected at the end of 1997. Growth in domestic demand was only 1.6%, against the projected rate of 3%.

The December 1997 *Inflation Report* presented several examples of how changes in key assumption might cause economic developments to deviate from Norges Bank's projections. One example was a 5% depreciation of the krone in the first half of 1998, combined with an interest rate increase of 3 percentage points, triggered partly by rising wage growth. This scenario was highly consistent with actual developments in the spring and summer of 1998.

**Chart 1** Projections for some key variables for 1999 published at various times. Annual increase. Per cent



Sources: Statistics Norway and Norges Bank

<sup>1)</sup> Norges Bank's projections for 1999, published in *Inflation Report* 1997/4 and *Inflation Report* 1998/4, are evaluated in an article that will be published in *Economic Bulletin* 2001/1.

At the end of 1998, global economic trends looked relatively gloomy. A pessimistic mood gained ground, and was reflected in expectations of slower growth in Europe. The Norwegian krone (measured in terms of the I-44 import-weighted index) had depreciated by 4% since the end of 1997, and money market rates had increased from 4% to 8% during the same period.

Against this background, Norges Bank projected in the December 1998 *Inflation Report* that the Norwegian economy would enter a period of slower economic growth, while cost inflation would remain high.

However, the turnaround was not as pronounced as our projections indicated. Apart from the projections for growth in mainland demand and petroleum

exports, the projections were nevertheless relatively accurate. The price inflation projection was  $\frac{1}{4}$  percentage point too high. This primarily indicates that nominal variables are more stable, or slower to reflect change, than demand and production. It takes time for changes in demand and production to influence wage growth through labour market tightness.

Demand, particularly private consumption, picked up faster than expected for several reasons. The effects of the Asian crisis faded faster than feared, the oil price doubled in the course of 1999, and higher government expenditure reduced the effects of the intended fiscal policy tightening. The decline in money market rates through the first half of 1999 was reflected more rapidly in both private consumption and fixed investment than implied by our projections.

ability of turbulence in international financial markets. In Latin America, and particularly in Argentina, government bond yields are rising (see Chart 5.4). Turkey has experienced financial unrest with record-high interest rates. Developments similar to those following the Russian debt crisis in the autumn of 1998 are not very likely, however.

Substantial changes in the krone exchange rate may also influence price inflation ahead. Chart 5.5 shows estimates of the isolated effects on consumer price inflation of a permanent 5% change in the import-weighted krone exchange rate from 2001. According to the RIMINI model, this will contribute  $\frac{1}{4}$  percentage point to consumer price inflation in 2001 and about  $\frac{1}{2}$  percentage point in each year from 2002.

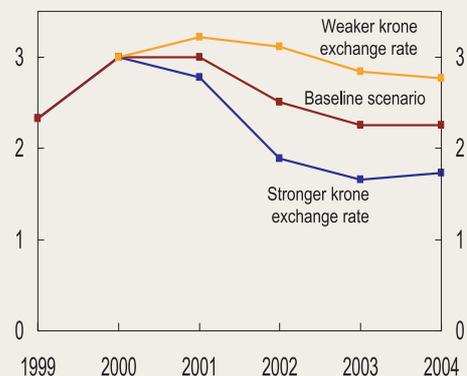
### *Higher productivity growth may result in lower price inflation*

Although we have seen limited effects of the new economy on productivity developments, such effects may come into evidence in the years ahead. Chart 5.6 illustrates the possible effects on consumer price inflation of a permanent 1 percentage point increase in productivity growth in the mainland economy. This positive “productivity shock” will initially contribute to reducing the increase in prices as a result of rising corporate profitability. Real wage growth will then also pick up because of enterprises’ increased capacity to pay. Over time, the increase in real wages will limit the reduction in price inflation and then reverse it, so that wage shares in the business sector return to the initial level. However, the price-restraining effects will dominate the first few years. The estimates shown in Chart 5.6 imply that consumer price inflation may be reduced by about  $\frac{1}{4}$  percentage point each year in the projection period.

### *Slower growth in the labour supply*

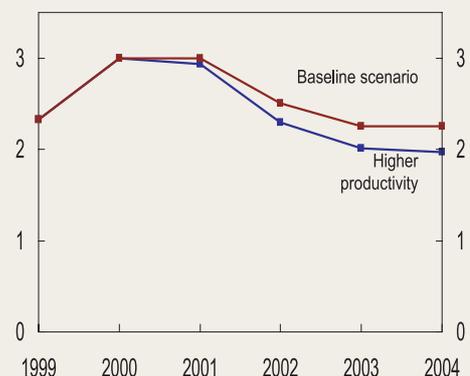
The supply of labour will limit the growth potential of the Norwegian economy in the years ahead. A number of fac-

**Chart 5.5** Annual CPI with a 5 per cent change in the import-weighted krone exchange rate from the first quarter of 2001. Per cent



Sources: Statistics Norway and Norges Bank

**Chart 5.6** Annual consumer price inflation for 1 percentage point higher productivity growth 2001-2004. Per cent



Sources: Statistics Norway and Norges Bank

tors point to low growth in the effective supply of labour. Labour force participation rates have reached a historical peak. In 2000, the labour force is made up of close to 74% of the population between the age of 16 and 74. Only Iceland has a higher participation rate than Norway in the OECD area. After rising sharply in the 1990s, the labour force participation rate has remained relatively stable over the last three years.

Measures such as cash grants to families with small children, additional holiday and early retirement schemes may enhance welfare, but also provide an incentive to withdraw from the labour force. A sharp increase in the number of disability pensioners in recent years has also reduced the supply of labour. About 10% of the population between the age of 18 and 67 were disability pensioners last year. On a net basis, 12 000 new disability pensioners were registered last year.

In the estimates, we have assumed approximately unchanged labour force participation rates in the years ahead. This means that, adjusted for demographic conditions, we have assumed that the number of persons participating in these schemes will not continue to rise. Over the next few years, the number of persons in the age group 55-61 will increase by 20 000-25 000 annually. The number in the age group 62-66 will rise by 4 000-5 000 annually. This implies a continued increase in the number of disability pensioners of about 10 000 a year and a slightly lower growth in the number opting for the contractual early retirement scheme than in the last two years. Sickness absence has shown a sharp increase since 1995 after declining each year between 1989 and 1994. An unchanged level of sickness absence throughout the period has been assumed. If sickness absence instead increases, corresponding to about 5 000 person-years each year ahead, our projection for the growth in the supply of person-hours is reduced by ¼% each year, other things being equal. By way of comparison, the National Budget estimated that in recent years the annual increase in sickness absence has corresponded to about 10 000 person-years.

### *Higher public expenditure will amplify the duality in the Norwegian economy*

In recent years, public expenditure growth has tended to be higher than the level originally adopted during the budget deliberations. This reflects the fairly strong underlying pressures on expenditure.

Using the RIMINI model, we have estimated the effects on domestic demand and consumer price inflation of growth in public purchases of goods and services that is 1 percentage point higher in each year of the projection period from 2001. Transfers are held unchanged in real terms compared with the baseline scenario. It is assumed that higher public consumption results in an equivalent percentage rise in public sector employment. This implies that transfers of real resources from exposed to sheltered activities will increase through the projection period.

Charts 5.7 and 5.8 show the estimated effects on domestic demand and consumer price inflation of the above increase in public expenditure. Growth in domestic demand could be about 1 percentage point higher in 2004, with price inflation gradually increasing in the course of the period. In 2004, price inflation could be about  $\frac{3}{4}$  percentage point higher than in the baseline scenario, which is a reflection of high capacity utilisation and the difficulty associated with boosting employment in the public sector to any extent without an attendant acceleration in wage growth.

These calculations are shrouded in considerable uncertainty, particularly with regard to how fast wage growth translates into higher prices. Inasmuch as service prices in the public sector are generally not market-based, the feed-through from wages to prices will primarily come through the effects on aggregate demand and employment.

### *The duality in the economy intensifies pressures on wage determination*

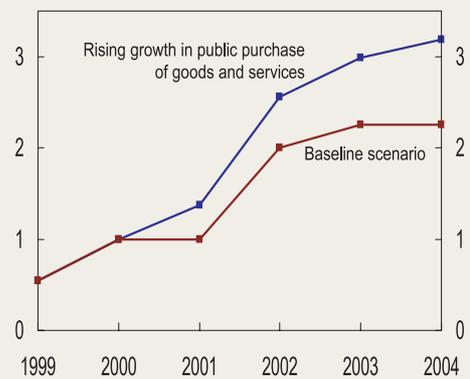
With a persistently higher rate of increase in prices and costs than among trading partners throughout the projection period, manufacturing industry's cost competitiveness will continue to deteriorate. There is a risk that the two divergent trends in the Norwegian economy, with falling manufacturing employment on the one hand and continued growth in employment in public and private service sectors on the other, may become even more pronounced than projected in this report. A lower-than-projected labour supply and higher-than-projected public expenditure growth will have a similar effect. It is uncertain how wage determination will function in the light of the extensive restructuring across sectors in the economy. Tension between sectors may lead to changes in wage determination, with the sheltered sector playing a more prominent role in determining overall wage growth.

The projection for wage and price inflation is based on the assumption that wage growth in manufacturing is a benchmark for wage settlements in the sheltered sector. The wage estimates in the RIMINI model are influenced by the high wage growth of recent years and the fact that enterprises' labour costs as a share of their revenues have increased to a historically high level. In the baseline scenario this has a moderating effect on wage growth in all sectors in each year of the projection period.

Chart 5.9 illustrates a possible path for wage and price inflation as a result of a change in wage determination where high wage shares in manufacturing do not moderate wage developments to the same extent.<sup>2)</sup> This means that wage growth is largely determined by the tightness in today's labour market. Wage growth may then be 1 percentage point higher in each year from 2002. This scenario implies that consumer price inflation could reach close to 2 $\frac{3}{4}$ % in 2003-2004.

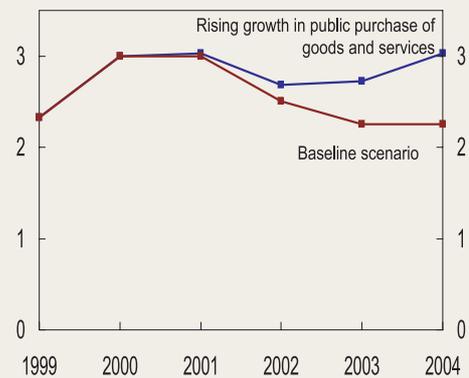
<sup>2)</sup> Technically, the results are obtained by raising the equilibrium wage share in the long-term wage equations to the estimated level in the baseline scenario in 2002.

**Chart 5.7** Annual growth in domestic demand with increased growth in public purchase of goods and services 2001-2004. Per cent



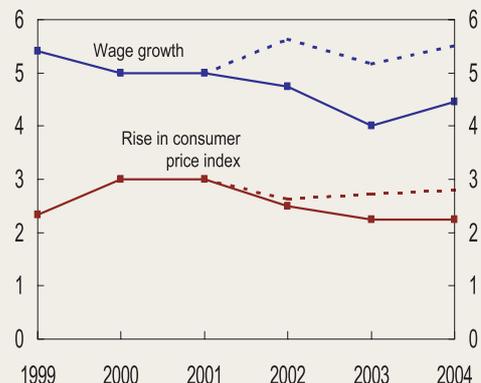
Sources: Statistics Norway and Norges Bank

**Chart 5.8** Annual consumer price inflation with increased growth in public purchase of goods and services 2001-2004. Per cent



Sources: Statistics Norway and Norges Bank

**Chart 5.9** Annual wage and price inflation with changed wage formation. Per cent



Sources: Statistics Norway and Norges Bank

## MAIN MACROECONOMIC AGGREGATES

	<i>NOKbn</i> <i>1997 prices</i>		<i>Percentage change from previous</i> <i>year unless otherwise stated</i>			
	1999	1999	2000	2001	2002	2003-04
<b>Real economy</b>						
Private consumption	550.7	2.4	2½	1½	2½	2¾
Public consumption	232.7	2.7	2½	3	2	2
Total gross investment	251.7	-5.6	-3¼	-1¾	1¼	1
- Petroleum activities	65.5	-12.6	-23	-4	-2	-2
- Mainland Norway	175.9	-2.1	3¼	-1¼	2¼	1¾
Enterprises	106.1	-3.3	3½	-3¼	3¼	2½
Dwellings	29.5	-2.2	4	10	4	2¾
Gen. government	40.3	1.3	1¾	-4½	-1½	-1½
Mainland demand <sup>1)</sup>	959.4	1.6	2¾	1½	2¼	2½
Total domestic demand <sup>2)</sup>	1024.8	0.6	1	1	2	2¼
Exports	457.1	1.7	4	4¼	3	2¼
- Crude oil and natural gas	157.6	-0.1	7	6	2	0
- Traditional goods	179.3	2.6	3½	3¼	3¾	4
Imports	388.1	-3.1	1¾	2	4	3¾
- Traditional goods	256.6	-2.0	4	2½	4	3¾
GDP	1127.9	0.9	2¼	2	1¾	1¾
- Mainland Norway	930.3	0.8	2	1¼	1¾	2
<b>Labour market</b>						
Employment		0.7	½	¾	½	½
Labour force, LFS		0.5	¾	¾	½	½
Registered unemployed (rate)		2.6	2¾	2¾	2¾	2¾
Registered unemployed and on labour market programmes (rate)		2.9	3¼	3¼	3¼	3¼
<b>Prices and wages</b>						
Consumer prices		2.3	3	3	2½	2¼
Annual wages <sup>3)</sup>		4.9	4¼	4¼	4½	4¼
Labour costs <sup>4)</sup>		6	5	5	4½	4¼
Import prices, traditional goods		-2.3	4½	2	1¼	1
Export prices, traditional goods		0.1	11	2	-½	¾
Crude oil price in NOK		141	255	259	206	186
Resale home prices <sup>5)</sup>		10.6	12	3¾	4	4¼
<b>External account<sup>6)</sup></b>						
Trade surplus, NOKbn (level)		71.8	220	240	170	130
Current account surplus, NOKbn (level)		46.9	190	225	160	140
Current account surplus, % of GDP		3.9	14	15	11	9
<b>Memorandum item</b>						
Household saving ratio		6.8	6½	7¼	7½	7¼

<sup>1)</sup> Private and public consumption and mainland gross fixed investment

<sup>2)</sup> Private and public consumption, mainland gross fixed investment and petroleum investment

<sup>3)</sup> Annual wage growth is based on the Technical Reporting Committee on Income Settlements' definitions and calculations. According to Statistics Norway, wages per normal person-year increased by 5.2% in 1999.

<sup>4)</sup> When costs associated with additional holiday are included, the rise in labour costs in 2000 and 2001 is estimated to be 0.8 percentage point higher than growth in disbursed wages

<sup>5)</sup> ECON's house prices index with Norges Bank's weight set

<sup>6)</sup> Current prices

Sources: Statistics Norway, ECON, the Technical Reporting Committee on Income Settlements and Norges Bank

