

## International economy

Over the past six months, the international economy has been increasingly marked by the so far moderate cyclical downturn that began in the US almost a year ago. This is entirely in keeping with a normal cyclical pattern where cyclical fluctuations in the US – in addition to considerable supply-side shocks in the oil market – are the most common general factor behind changes in production developments in other countries. No major changes compared with the current picture are expected in the oil market. Developments in the US economy will therefore probably be decisive for growth in Norway's export markets along with international interest and exchange rates the next few years.

### Oil prices assumed to remain high

The spot price of Brent Blend averaged about USD 26 per barrel during the first five months of 2001, against a little more than USD 28 per barrel in 2000. Oil prices fell from USD 33 to about USD 22 per barrel between the end of November and end-December last year. At the beginning of June this year, the oil price stood at about USD 29 per barrel.

High oil prices through 2000 must primarily be seen in connection with low figures for stocks of crude oil and finished products in the OECD area. In particular, the low figures for stocks of refined petroleum products in North America, and to some extent Europe, contributed to growing concern about the ability to satisfy future consumption. Stocks of heating oil and crude oil in the US began to increase slightly towards the end of last year, resulting in downward pressures on prices. On the other hand, the high oil price so far this year must primarily be seen in connection with OPEC's decisions in January and March to reduce pro-

duction quotas by 1.5 and 1 million b/d respectively until the end of the year, even though member countries only observe about 50 per cent of the output cuts. Moreover, at the beginning of June Iraq cut off large parts of its exports in the new oil-for-food agreement with the UN because of its dissatisfaction with the stipulation that the agreement was to apply for only one month compared with six months earlier.

As a result of high oil prices, the International Energy Agency (IEA) has continued to lower its estimate for global oil demand this year, at the same time that projected growth in the US has been reduced. The IEA nevertheless projects that high demand for petrol in the US, and to some extent Europe, will have a stimulating effect on oil prices. According to the IEA, stocks of finished products and crude oil in North America are now at the lowest level since 1990.

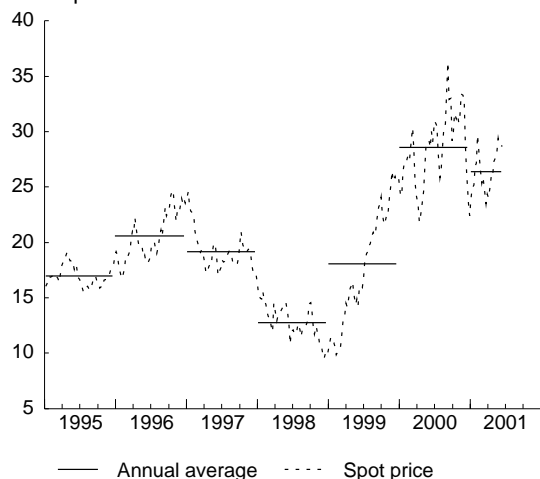
OPEC has the objective of keeping the price of a basket of OPEC oil within an interval of USD 22 to 28 per barrel. If the oil price should rise to more than USD 28 per barrel in the period ahead, which given the current price differential corresponds to a Brent Blend price of about USD 30 per barrel, it is likely that OPEC will increase production to bring prices back to the interval. Given expectations that OPEC will manage to keep oil prices within the target range in the period ahead, the price of Brent Blend has been estimated at USD 27 per barrel.

### The US – a normal downturn would continue to the end of the year

Measured as the deviation from trend, the US economy passed a cyclical peak in the second quarter of 2000. In the following quarters, output growth was

**Spot price, Brent Blend. 1995-2001**

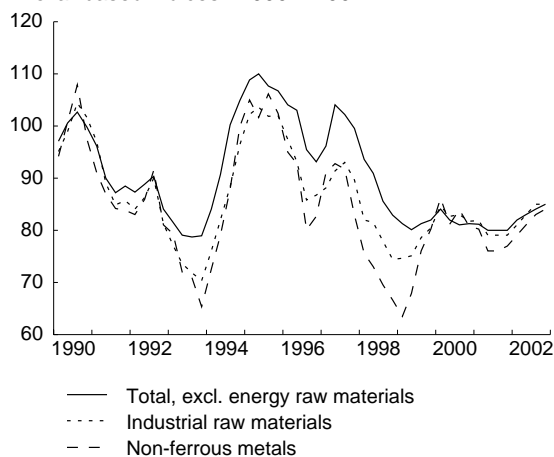
Dollar per barrel



Source: Norges Bank.

**Commodity prices on the world market 1990 - 2002**

Dollar based indices. 1990 = 100



Sources: HWWA-Institut für Wirtschaftsforschung and AIECE.

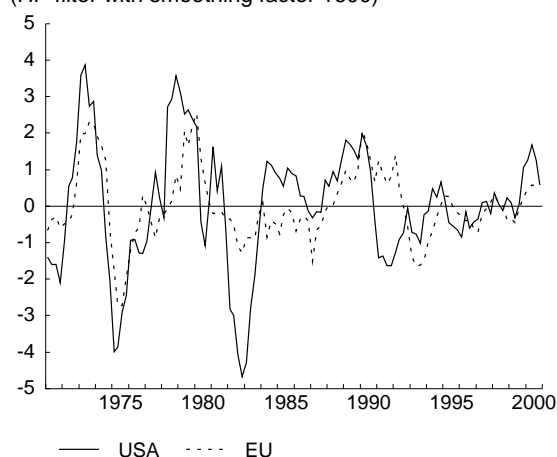
steadily lower than trend growth (this is virtually the case irrespective of how this is measured), but growth still remained positive in the first quarter of 2001. This means that a recession has not yet been registered measured by the widely applied US definition, which in practice implies that production must show negative growth for at least two consecutive quarters. The Federal Reserve, however, has responded to developments by reducing its key rates substantially, and three-month money market rates have fallen by 2 per cent over the last six months, to less than 4 per cent. The dollar has nevertheless appreciated in the same period, by 6 per cent on a trade-weighted basis and by more than 11 per cent against the euro.

In order to explain the steady appreciation of the dollar, many point out that the international integration of capital markets has now advanced to the point that capital flows associated with long-term investments (and thereby the outlook for the return in the long term) are more important than short-term investments. Through its active monetary policy, the Federal Reserve confirmed that it would underpin growth and profitability in enterprises in the years ahead. At the same time, it was evident that lower output growth was spreading to other countries, thereby resulting in the need for lower interest rates outside the US as well.

In step with the decline in actual growth, the projections for annual growth in the US for 2001 according to Consensus Forecasts, which collects projections from a number of forecasters, have been lowered substantially, from 3.7 and 3.0 per cent respectively in September and December last year to 1.9 per cent in May 2001. By way of comparison, growth in 2000 was 3.5 per cent. This is the first time in six years that forecasters have systematically lowered their projections for US output growth; for the years 1996-2000 the projections were systematically revised up over time. The spread between the various projections is also unusually wide in relation to the estimates provided at the same time in previous years (a standard deviation of 0.4 against 0.2-0.3 the previous years). The projection for 2002 has also been revised down, from 3.5 per cent in January to 3 per cent in May.

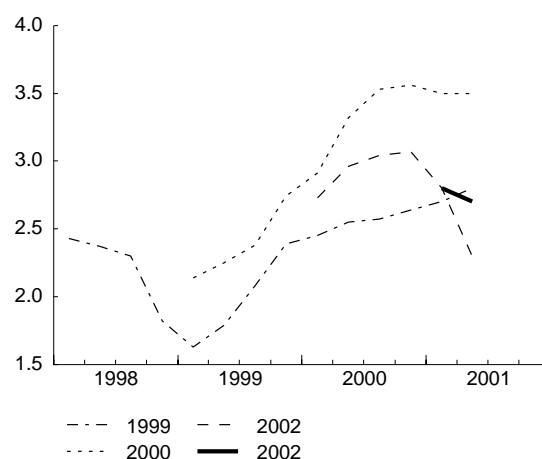
These projections do not provide scope for two quarters of negative growth during 2001; the estimates are, for example, compatible with growth of 1.5 per cent through the remainder of 2001 and 4 per cent growth through 2002. The Consensus perception is thus that the cyclical slowdown in the US ends in a "soft landing". The May projections were obtained before the preliminary accounts figures for the first quarter were revised down from an annualized 2 to 1.3 per cent from the previous quarter. If forecasters decide to maintain their growth projections for the rest of the year and through 2002, this will imply a down-

**Cyclical deviation for GDP for the US and EU**  
1971 - 2000. Percentage deviation from trend  
(HP filter with smoothing factor 1600)



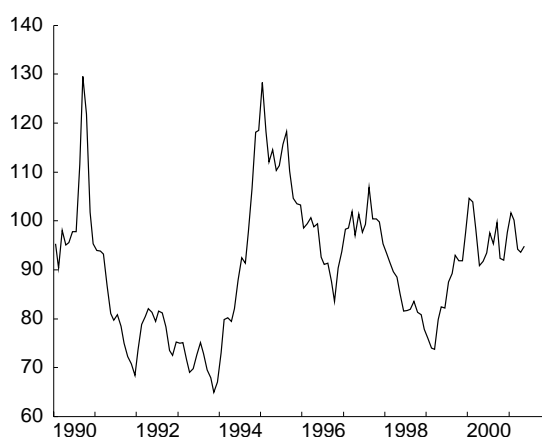
Source: OECD, Bureau of Economic Analysis and SN.

**GDP growth forecasts for Norway's main trading partners for 1999 - 2002 given on different dates**



Source: Consensus Forecasts.

**Aluminium price. 1990 - 2001**  
Dollar based index. 1979=100



Source: Norges Bank.

**Macroeconomic projections according to selected sources**

Annual change in per cent

	GDP-growth				Inflation rate <sup>2</sup>			
	1999	2000	2001	2002	1999	2000	2001	2002
<b>USA</b>								
NIESR	4.2	5.0	1.6	2.3	1.8	2.4	2.1	1.1
OECD	4.2	5.0	1.7	3.1	1.8	2.4	1.9	1.6
ConsF	4.2	5.0	1.9	3.0	2.2	3.4	3.1	2.5
<b>Japan</b>								
NIESR	0.8	1.7	1.0	1.4	-0.7	-0.7	-1.1	-1.3
OECD	0.8	1.7	1.0	1.1	-0.7	-1.2	-0.7	-0.5
ConsF	0.8	1.7	0.9	1.5	-0.3	-0.7	-0.3	-0.3
<b>EMU</b>								
NIESR	2.5	3.4	2.5	2.4	1.1	2.3	2.2	1.9
OECD	2.6	3.4	2.6	2.7	1.2	2.2	2.3	1.9
ConsF	2.5	3.4	2.6	2.8	1.2	2.3	2.4	1.8
<b>Trading partners</b>								
NIESR	2.8	3.5	2.4	2.4	1.0	1.7	1.7	1.5
OECD	2.8	3.5	2.4	2.6	1.1	1.6	1.8	1.7
ConsF	2.8	3.5	2.3	2.7	1.2	2.0	2.1	1.8

<sup>1</sup> NIESR from April 2001, OECD from April 2001 and Consensus Forecasts from May 2001.<sup>2</sup> All the inflation projections from the OECD apply to the consumption deflator and the same applies to NIESR's estimates for the US and Japan.

ward revision of the Consensus projection to 1.7 per cent for 2001.

This scenario is fairly optimistic viewed in the light of the dynamics in a normal business cycle for the US. However, the last decade has also deviated from the normal on important points, primarily because business investment in transport equipment, machinery, equipment and software has been a leading component in the cycle. The normal business cycle in the US, on the other hand, is primarily linked to the dynamic interplay between monetary policy on the one hand and residential construction and private consumption of consumer durables on the other. It is these demand components that are most sensitive to interest rates and which therefore set the pace in the business cycle where monetary policy is the most important policy instrument for stabilizing the economy. Business investment, on the other hand, is not very sensitive to interest rates and primarily reacts to changes in aggregate demand and output, and it therefore tends to lag behind in the cycle, viewed in relation to GDP. With few exceptions, this pattern has given rise to business cycles of 4-5 years' duration through the postwar period as a whole, basically because it takes time before monetary policy has an impact on interest-sensitive factors, it takes time before this has an impact on output and demand and it takes time before this in turn results in a tighter labour market, (fear of) inflationary pressures and hence a resumed tightening of monetary policy.

The 1990s were different. The upturn in the economy in 1992 was fuelled by sharp growth in investment in machinery and equipment, investment which through-

out all of the following years showed double-digit growth rates. During this period, this investment, measured as a share of GDP, grew from 7 to 10 per cent. Measured at constant prices, the level as a share of GDP has doubled. This is naturally related to the composition of this investment, which has largely related to ICT equipment where prices fell markedly through the period, and particularly since 1995. Developments through the 1990s are discussed further in a separate box.

In the traditional business cycle, the cyclical downturn normally lasts six quarters, i.e. the US economy may still record a few weak quarters with growth below trend (possibly with a direct fall in output through the second and third quarters) and a further decline in interest rates (1/4 – percentage point) before the recession comes to an end this time. The approved tax cuts may also contribute to a resumption of growth. However, the low saving ratio in US households – and without any reasonable prospect of a corresponding rise in equity prices as that witnessed in the last half of the 1990s – may imply that the upturn can be sluggish, as was the case in the early 1990s. Since these weak developments do not seem to be in line with consensus perceptions, this may result in a downward revision in expectations for the US economy, with at worst a sharp drop in equity prices and a strong depreciation of the dollar. Most likely, however, this will not occur until the latter part of our projection period, and we have therefore not included this assumption in our forecasts where we assume that the dollar will depreciate against the euro by 15 per cent up to 2003, in line with the estimates from Consensus Forecasts.

### Features of cyclical developments in the US in the 1990s

Developments in the US economy in the 1990s were heavily influenced by the expansion in investment in machinery and equipment which started in 1992 and which increased further during the rest of the decade, particularly in information management, telecommunications, etc. There were probably a number of factors behind the upswing. First, technological developments, which – naturally in conjunction with the expansion in investment – made such products available, with falling prices over time as a result. The investment boom in Japan as early as the end-1980s entailed a sharp shift towards new technology linked to more traditional production means (industrial robots), while the US variant gradually became more dominated by new technology linked to information management, telecommunications and the media. This technology shift had such a substantial influence in the US as a result of particularly favourable conditions, partly due to the supply of skills and capital and partly because US enterprises at the start had a favourable cost competitive position compared with other countries as a result of the weak dollar in the last half of the 1980s and beginning of the 1990s. Enterprises were thus well positioned for a vigorous expansion in a growing international sector, and in general US enterprises also experienced a very sharp rise in exports as early as 1988 and up to 1996. The ability to develop the new technology can partly be seen in connection with the concurrent scaling back of US high-tech military industries as a result of disarmament following the collapse of the Soviet Union, which freed up human resources with high technical know-how; the worldwide Internet was originally a US military invention. Growth in the civilian use of this technology may therefore partly be ascribed to the "peace dividend" that resulted from disarmament. All in all, this upswing must therefore be characterized as a positive supply-side shock for US enterprises, unlike the demand-driven expansion in business investment which is a component of traditional cyclical developments.

Exactly how this technology changes production relationships in enterprises from a macro perspective is not clear. However, the sharp fall in prices for such products will imply a shift of factor inputs from labour to capital, which in itself will stimulate investment and boost labour productivity. So far, it appears that total factor productivity has also increased even though it is difficult to distinguish between the underlying increase and purely cyclical effects, c.f. the fact that growth in labour productivity was negative in the first quarter of 2001. In isolation, higher productivity contributes to both increased profitability and a slower rise in prices, with subsequently low interest rates. All in all, this contributed to the strong boom in the stock market in the last part of the 1990s, which also contributed to strong capital inflows from abroad and hence to the financing of the investment upturn.

In contrast to the expansion in business investment in machinery and equipment, etc., the rise in households' interest-sensitive demand was modest in the first half of the 1990s. This may partly be related to the large postwar baby-boom generation which entered a more active saving phase in these years. Nevertheless, a cycle linked to these demand components in this period can be demonstrated, with a "recession" around 1995-1997 following monetary policy

tightening in 1994-1995. After a weak monetary policy stimulus in 1996 generated a new upswing, this was curbed by a resumed tightening of monetary policy in 1997, and was probably therefore primarily underpinned by pronounced advances in the stock market, which resulted in sharp growth in overall household wealth.

An additional two factors may have contributed to underpinning the upswing. First, the expansion in investment may have contributed to preventing strong bottlenecks in the economy, with subsequent inflation and a tightening of monetary policy. Second, as a result of the Asian crisis in 1998, monetary policy – in response to international financial unrest and not to sluggish domestic demand – shifted to a more expansionary stance for a shorter period. Based on a normal pattern, a reversal of the last upturn in 1999 would be expected. Housing investment also peaked in the second quarter of 1999, while the consumption of durable goods did not peak until the first quarter of 2000 after monetary policy was again tightened through 1999 and into 2000.

Total production now seems to have passed a cyclical peak (measured as deviation from trend) in the second quarter of 2000. At the same time, a corresponding turnaround took place in business investment in machinery and equipment, etc. This has since shown a falling growth rate, with marginally negative growth through the winter months of 2000-2001. The question then arises as to whether this is only an indication of the turnaround in the demand effect on investment in accordance with the normal business cycle or whether it means that the ten-year supply-side driven upswing in this investment is now definitively over. We have no rule of thumb as to how long a supply-driven shock of this type can last because they are too seldom. If we are talking of a phenomenon on a par with earlier "technological revolutions", ten years is not a reasonable limitation. In that case this means that investment may continue to expand in the next few years provided this investment is not restrained by other factors, for example, associated with problems in financing this investment.

This also means that the pronounced shift in monetary policy in an expansionary direction through the first half of 2001 may also be essential for a continued vigorous rise in investment, at least as long as the dollar and capital inflows into the US are not weakened by the reduction in interest rates. Another factor is that even if this investment fails to show a high growth rate over the next few years, this does not necessarily change the growth potential in the short term to any significant extent. On the one hand, this investment is likely to remain at such a high level relative to the capital stock (with a corresponding potential for a decline if the need for increased capital is over), i.e. it may continue to result in an increase in the capital stock and hence potentially high productivity growth and modest inflation in the years ahead. On the other hand, we are still talking about a relatively small component as a share of GDP compared with, for example, private consumption, i.e. the negative demand contribution to GDP of any marginal decline in investment may be relatively modest (at least when we measure at current prices and not constant 1996-prices, as the US does at the moment).

### **Continued downward revision of growth projections for Europe**

Based on a normal lag, Western Europe should pass a cyclical peak two quarters after the US, i.e. in the fourth quarter of 2000. This systematic correlation applies when looking at the period 1960-2000 as a whole, but it particularly applies to the period after the effects of the rise in interest rates following German reunification were exhausted: for the years 1994-2000, the correlation coefficient for the cyclical deviation for EU countries compared with the corresponding deviation for the US two quarters earlier was 0.7-0.9 depending on how smooth a trend is applied; if the calculations are based on a moving average in order to capture possible variations in the time lag, the coefficient reaches 0.9 or higher. Preliminary national accounts figures for important European countries for the first quarter and various short-term statistics and confidence indicators for recent months also show a clear slowdown of growth over the last six months.

In line with the steadily weaker observed growth, the estimates from Consensus Forecasts for growth in euro countries for 2001 have been lowered from 3.1 per cent in November last year to 2.6 per cent in May, and growth in 2002 is now expected to be 2.8 per cent; it is likely that these estimates will be revised down further in the period ahead. The European Central Bank (ECB) has been cautious in reducing its key rates due to inflation, which is noticeably higher than the target range of 0-2 per cent, but more recently seems to have toned down the risk of future inflation. The Consensus projections from May also point to a decline in consumer price inflation from 2.4 per cent in 2001 to 1.8 per cent in 2002. On the other hand, there are no indications that the ECB will opt for a monetary policy strategy that is as active as the one steadily pursued by the Federal Reserve. We have therefore assumed that euro interest rates will only fall marginally through the summer and autumn of this year, followed by a gradual rise through next year.

### **Unpredictable Japan**

For Japan, the estimates from Consensus Forecasts indicate that the subdued growth recorded over the past decade, which has gradually been accompanied by falling consumer prices, will continue. The most common explanations for these developments are structural rigidities in the economy and banks' exposure to bad loans, which is leading to a credit squeeze. The first explanation has the drawback that it does not provide an answer as to how an economy with these built-in rigidities could expand by an average growth rate of 4 per cent through the previous two decades before stagnation began. The disadvantage of the second explanation is that it presupposes that one of the commonly assumed most perfect of all markets in a modern market economy – the capital market – may be out of balance for a period of ten

years. Moreover, the forecasts for Japan for these years have not been particularly accurate.

### **Market growth**

For Norway's trading partners, Consensus Forecasts estimates GDP growth at 2.3 per cent in 2001 and 2.7 per cent in 2002. We have assumed that market growth for Norwegian export enterprises is the same as the estimates from the British institute NIESR, which results in slightly lower GDP growth projections for 2002, partly based on expectations of somewhat weaker growth in the US than the Consensus projection. On this basis, export market growth will fall from 10 per cent in 2000 to 7 per cent in 2001 and 5 per cent in 2002 before picking up to 6 per cent in 2003. Inflation among our most important trading partners, which quickened as a result of the stronger economic upturn following the Asian crisis and high oil prices in recent years, is expected to ease somewhat next year, to a little less than 2 per cent.

## Norwegian economy

### Growth impetus from fiscal policy

In March 2001, the Government presented new guidelines for economic policy, which appear to have received broad political support. It introduced a guideline for the use of revenues from the Petroleum Fund and an explicit inflation target for monetary policy. According to the new rules, the structural, non-oil government budget deficit shall be equal to the expected real return on the Petroleum Fund at the beginning of the fiscal year. Previously, it could be said that fiscal policy was oriented so that the structural non-oil budget deficit should expand over time in step

with mainland GDP trend growth and hence not be influenced by changes in petroleum revenues/wealth. Fiscal policy shall also continue to contribute to stabilizing fluctuations in the economy, a factor that may result in deviations from the level implied by the long-term guideline.

The new guidelines for economic policy imply that the impetus from fiscal policy will be somewhat stronger in 2002 than assumed in our earlier analyses, a more expansionary stance due not least to high petroleum revenues in recent years. The Revised National Bud-

### Macroeconomic indicators 1999-2001

Growth from previous period unless otherwise noted. Per cent

	1999	2000	Seasonally adjusted			
			00.2	00.3	00.4	01.1
<b>Demand and output</b>						
Consumption in household and non-profit organizations	2.2	2.4	0.0	-0.1	-0.5	2.0
General government consumption	3.3	1.4	0.1	0.5	0.5	0.1
Gross fixed investment	-8.2	-1.1	-8.0	-5.7	-0.7	1.9
- Mainland Norway	-2.6	1.4	0.4	-2.8	2.8	-1.9
- Petroleum activities <sup>1</sup>	-19.9	-17.1	-32.7	-1.8	-2.9	9.1
Final domestic demand from Mainland Norway <sup>2</sup>	1.5	1.9	0.1	-0.5	0.3	0.8
Exports	2.8	2.7	-1.4	1.8	4.1	1.5
- Crude oil and natural gas	-0.1	6.4	-5.4	4.4	5.0	2.2
- Traditional goods	3.2	2.1	2.8	-1.9	1.2	5.0
Imports	-1.6	2.5	-1.8	-2.0	-1.5	0.9
- Traditional goods	-1.3	1.7	4.6	-1.2	-0.9	1.4
Gross domestic product	1.1	2.3	-0.9	0.8	0.1	0.2
- Mainland Norway	1.0	1.8	0.4	0.1	-0.3	0.5
<b>Labour market<sup>3</sup></b>						
Man-hours worked	0.4	-0.8	0.7	-1.2	-0.9	1.3
Employed persons	0.6	0.5	0.4	-0.3	0.1	0.3
Labour force	0.5	0.8	0.0	-0.2	0.3	0.2
Unemployment rate, level <sup>4</sup>	3.2	3.4	3.2	3.4	3.6	3.4
<b>Prices</b>						
Consumer price index <sup>5</sup>	2.3	3.1	2.9	3.5	3.1	3.6
Export prices, traditional goods	0.0	13.8	4.0	1.5	2.3	-1.9
Import prices, traditional goods	-2.3	6.0	0.6	1.4	1.1	3.9
<b>Balance of payment</b>						
Current balance, bill. NOK	47.3	203.6	40.3	56.9	66.3	60.5
<b>Memorandum items (Unadjusted, level)</b>						
Money market rate (3 month NIBOR)	6.4	6.6	6.4	7.0	7.4	7.3
Average borrowing rate <sup>6</sup>	8.4	8.2	7.7	8.3	8.9	9.1
Crude oil price NOK <sup>7</sup>	141.2	251.7	236.0	272.6	277.8	229.4
Importweighted krone exchange rate, 44 countries, 1997=100	101.1	103.6	104.9	104.0	103.6	102.2
NOK per ECU/euro	8.31	8.11	8.20	8.10	8.04	8.20

<sup>1</sup> Figures for petroleum activities now covers the sectors oil and gas extraction proper, transport via pipelines and service activities incidental to oil and gas extraction.

<sup>2</sup> Consumption in households and non-profit organizations + general government consumption + gross fixed capital formation in Mainland Norway.

<sup>3</sup> Figures for 1999 and 2000 are from national accounts. The quarterly figures are from Statistics Norway's Labour force survey (LFS), since the new quarterly national accounts series for employment are too short for seasonal adjustment.

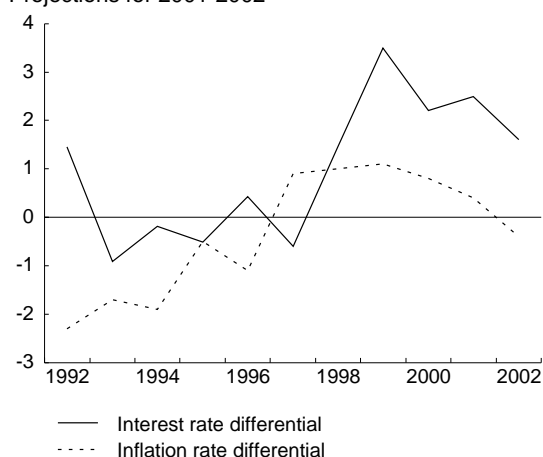
<sup>4</sup> According to Statistics Norway's labour force survey (LFS).

<sup>5</sup> Percentage change from the same period the previous year.

<sup>6</sup> Household's borrowing rate in private financial institutions.

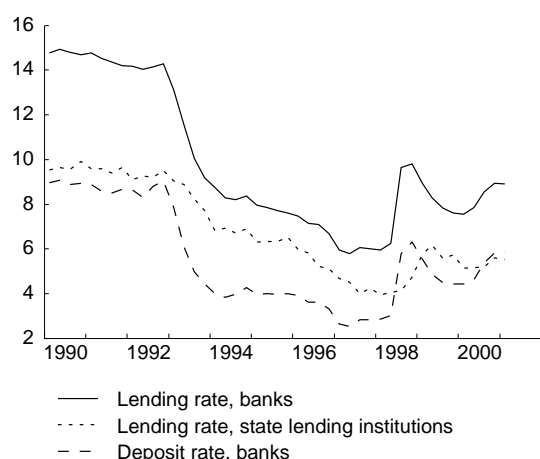
<sup>7</sup> Average spot price, Brent Blend.

**Interest rate and inflation differential between NOK, and the ECU/euro. 1992-2002**  
Projections for 2001-2002



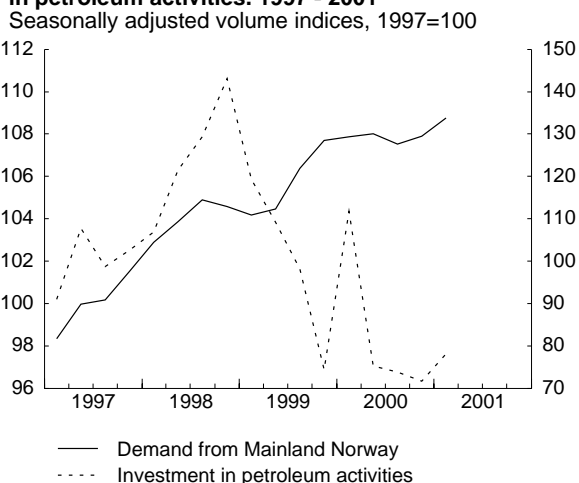
Sources: Norges Bank and Statistics Norway.

**Lending rate and deposit rate**  
Per cent



Source: Norges Bank.

**Demand from Mainland Norway and investment in petroleum activities. 1997 - 2001**



Source: Statistics Norway.

get (RNB) estimates the structural non-oil budget deficit at NOK 16.8 billion in 2000 and NOK 20.4 billion in 2001. The expected real return on the Petroleum Fund is estimated in the RNB at NOK 25.2 billion at the end of 2001 and NOK 34.0 billion the following year. If oil prices remain at a high level and the Petroleum Fund increases sharply, the stimulus from fiscal policy might increase further in 2003.

In the forecasts, the orientation of fiscal policy for 2001 is in line with the RNB, which may be characterized in cyclical terms as fairly neutral or mildly expansionary. In keeping with the new guideline for the use of petroleum revenues, we have thereafter allowed fiscal policy in 2002 and 2003 to assume a somewhat more expansionary stance, with an approximately equal distribution on higher expenditure and reduced revenues. General government consumption and investment as a whole are assumed to increase in volume by 2.4 per cent in 2002, nearly per cent more than our projection for mainland GDP trend growth. Moreover, the continuation of the revision of the VAT system with effect from 1 July this year, with a halving of VAT on food and introduction of VAT on a number of services, combined with a reduction in fuel taxes, implies that this year's indirect tax programme will have an expansionary effect again next year; the tax and excise duty programme is otherwise adjusted for inflation. All in all, this implies an indirect tax relief for households in the order of NOK 3-4 billion next year. In 2003, general government consumption and investment as a whole increases in volume by 2.9 per cent, with excise duties being adjusted for inflation, while direct taxes are reduced by the same magnitude as the indirect tax relief in 2002.

**Money market rates and exchange rates**

Our assumptions concerning foreign and Norwegian money market rates as well as exchange rates are based on the estimates in Consensus Forecasts from May. For exchange rates, the estimates imply a slight depreciation of the krone against the euro, while the euro appreciates substantially more against the dollar over the next year. This means that the Norwegian krone appreciates against the US dollar. However, since the publication of these estimates exchange rates have moved in the opposite direction of that implied by these forecasts. All in all, the estimates imply that the import-weighted krone exchange rate will appreciate somewhat in 2001 and marginally in 2002 and then remain approximately unchanged in 2003.

The estimates for money market rates now indicate that no decline in Norwegian rates can be expected this year as many observers had assumed earlier. A number of market participants consider an increase in interest rates in Norway to be more probable in the short term. However, we have assumed unchanged interest rates until the end of the year. We have thereafter assumed a slight decline in nominal interest

rates, although the interest rate differential against the euro will remain substantial in both 2002 and 2003 despite the moderate inflation differential. The estimates for interest rates and exchange rates presented here, and which are thus reasonably in line with the Consensus estimates, do not deviate to any extent from what we would have assumed if we had applied the interest rate equation that is modelled for Norwegian money market rates for the period when the policy objective was a fixed exchange rate against the euro. The calculations also show that these assumptions result in an inflation rate in 2003 that is within the target range for Norges Bank, and hence compatible with the objective of monetary policy.

### Nevertheless modest impetus from petroleum investment?

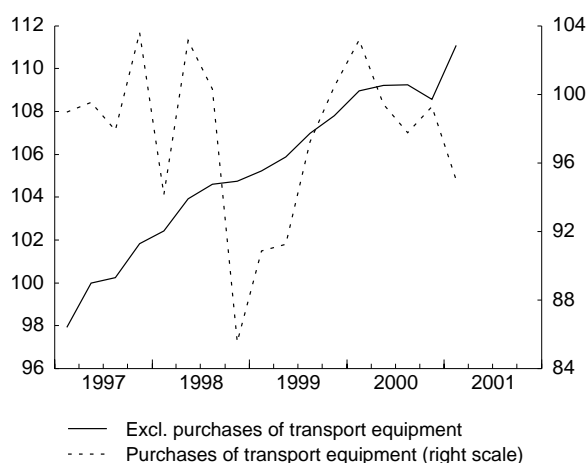
Seasonally adjusted figures from the quarterly national accounts show that the investment peak was reached in the fourth quarter of 1998. In the wake of low and falling oil prices through 1998, petroleum investment fell sharply through 1999, but also to some extent through 2000. Seasonally adjusted quarterly national accounts figures from the first quarter of 2001 indicate that this contraction, at least temporarily, has come to a halt. The increase in oil prices during the previous two years and the prospect of continued high prices are expected to contribute to a slight pick-up in petroleum investment through the remainder of 2001 and into 2002. Due to the sharp decline in petroleum investment last year, petroleum investment on an annual basis may nevertheless fall slightly this year. It is assumed that in 2002 petroleum investment will expand by a good 5 per cent at an annual rate followed by zero growth in 2003.

In recent years there has been a clear tendency to reduce the development of new fields, but to increase investment in fields that are already on stream. On the basis of the oil companies' reported estimates for Statistics Norway's investment statistics, this tendency is expected to continue in the period ahead. Investment in onshore installations and pipeline transport was at a historically low level in 2000 and is assumed to remain subdued in 2001 and next year. It appears that exploration investment will remain at last year's level in the period ahead.

### Rising consumption growth and high saving

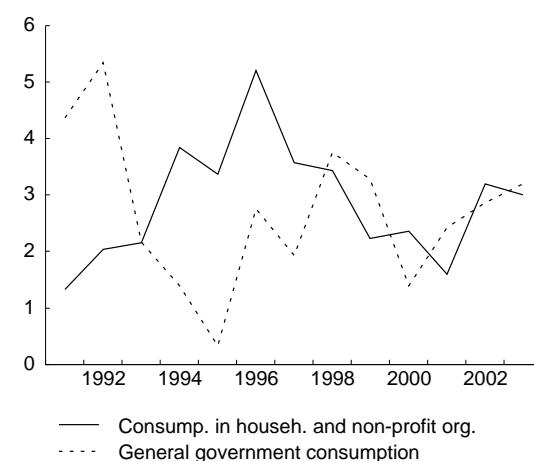
New figures from income accounts in the national accounts for 2000 show a considerable upward adjustment of household disposable income and saving compared with the figures published in *Economic Survey 1/2001*. The household saving ratio in 2000 was above 7 1/2 per cent, which is the highest saving ratio observed in many decades. Several factors have contributed to the high saving ratio, with the high real after-tax interest rate representing an important element. In the next few years, we assume that the real interest rate (also after tax since we do not assume

**Consumption in households, 1997 - 2001**  
Seasonally adjusted volume indices, 1997=100



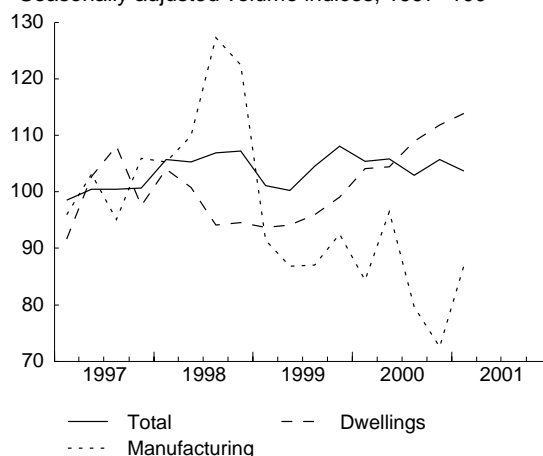
Source: Statistics Norway.

**Consumption**  
Percentage growth



Source: Statistics Norway

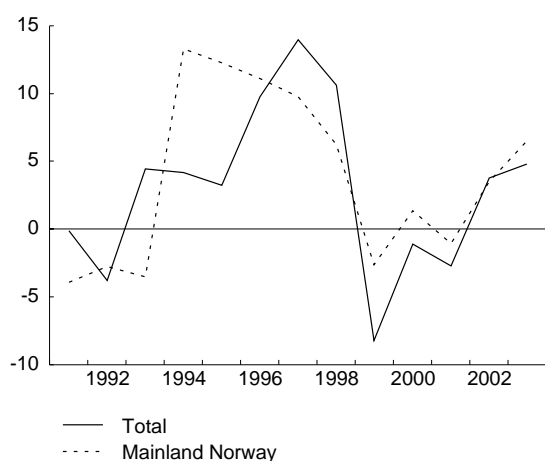
**Gross fixed capital formation, Mainland Norway, 1997 - 2001**  
Seasonally adjusted volume indices, 1997=100



Source: Statistics Norway.



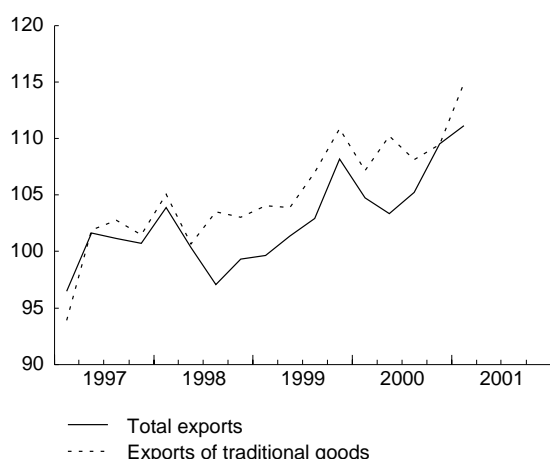
**Gross fixed capital formation**  
Percentage growth



Source: Statistics Norway

**Exports. 1997 - 2001**

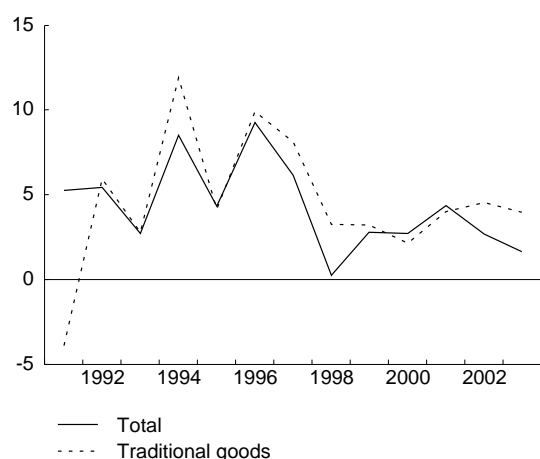
Seasonally adjusted volume indices, 1997=100



Source: Statistics Norway.

**Exports**

Percentage growth



Source: Statistics Norway

that the tax rate on ordinary income will change) is approximately constant. It may increase slightly next year as a result of a projected lower inflation and a slight decline in nominal interest rates, but all in all, according to our forecasts, there will be no new impulses from interest rate policy to any particular extent. Slightly higher interest rates in the period ahead than assumed earlier are expected to contribute to this and are due to our assumption that attempts will be made to counter the increased fiscal stimulus through higher interest rates. In isolation, this will contribute to maintaining the saving ratio at a high level.

In 2001, preliminary first-quarter figures show fairly high growth in household consumption. Part of the growth, however, is influenced by high electricity consumption due to climatic conditions and therefore in isolation do not indicate an increase in consumption growth. Household disposable income is increasing relatively moderately this year due to high consumer price inflation and an increase in vacation days. As a result, our projection for growth in real wages per normal man-year is now 1.3 per cent, with the number of normal man-years increasing only marginally. The downward adjustment compared with earlier is primarily due to the upward revision of our projection for total consumer price inflation due to higher energy prices than assumed earlier. The estimate for growth in household consumption is slightly weaker than income growth and thus entails a slightly higher saving ratio than in 2000.

The revision of economic policy, with somewhat greater fiscal policy stimulus than assumed earlier, will contribute to stronger growth in household income and consumption than in earlier calculations. In 2002, growth in the mainland economy will be slightly higher than estimated earlier. This will result in higher employment and wage growth and hence higher disposable income as a whole even though nominal interest rates will also be higher than assumed earlier. Whereas in *Economic Survey 2000* it was estimated that unemployment might edge up in the years ahead, it is now assumed that unemployment will fall marginally compared with the level in 2000. This will boost income growth and hence household consumption as well. Consumption growth is therefore estimated at about 3 per cent in 2002 and 2003.

Housing investment showed appreciable growth through 2000 and growth has continued into 2001 in spite of high interest rates. The reason is that prices in the resale market have continued to rise so that the price of building new dwellings has fallen relative to the price of buying an existing dwelling. Income growth and the likelihood that it will continue to be easy to find employment will increase households' willingness to debt-finance house purchases and

residential construction. It is therefore assumed that housing investment will continue to expand in the years ahead in spite of high interest rates. House prices are also expected to rise in real terms in the period ahead, but at a noticeably slower pace than was the case in 2000.

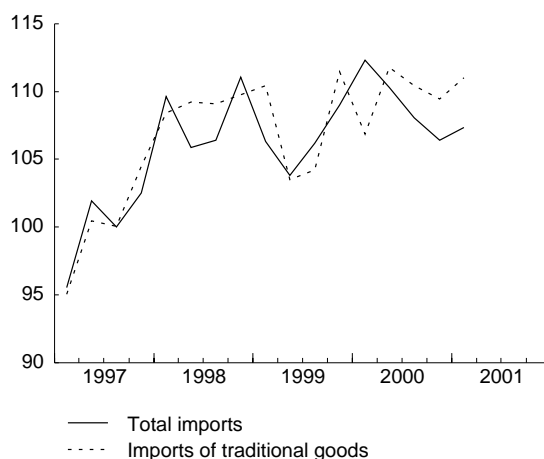
### Manufacturing investment is rising, other enterprises following

Mainland business investment contracted through the autumn of 2000 and up to the first quarter of this year, and it is assumed that investment will continue to fall during the remainder of 2001 before picking up in 2002. However, manufacturing investment – which has been declining since 1998 – was reversed as early as the first quarter of 2001, and Statistics Norway's investment survey indicates that this expansion will continue through the year and increase further next year, particularly in commodity-oriented industries. Investment in service industries, which has shown signs of levelling off at a historically high level the past year, is estimated to exhibit a sluggish trend through the remainder of 2001 and then expand the next two years, albeit at a noticeably slower pace than manufacturing. Continued uncertainty as to if and when the investment tax will be removed next year in itself points to a postponement of investment from 2001 to 2002; in our calculations, however, we have not assumed that the tax is actually eliminated.

### Mixed picture for enterprises

Stronger cost inflation than among our competitors has contributed to considerably slower growth in traditional merchandise exports than growth in export markets in recent years. Admittedly, exports picked up markedly in the first quarter of 2001, but this primarily reflected a sharp rise for metals and pulp and paper products. According to the quarterly national accounts, the counterpart to this was in particular a decline in the domestic use of these products including inventories; current production was not affected to any significant extent. Moreover, commodity-oriented manufacturing is the segment of industries exposed to international competition that can best hold its own in the cost-squeezed situation now facing these industries as they are not very labour-intensive. In the years ahead, this pressure is expected to continue to result in markedly slower growth in traditional merchandise exports than international market growth. An equivalent loss of market shares will take place to an even greater extent on the domestic market. Admittedly, traditional merchandise imports have expanded only marginally in recent years, but this is primarily due to the pronounced slowdown in demand – including the effect of the decline in petroleum investment – which all in all has been reflected in a decline in manufacturing output of about 3 per cent per year over the last two years. Norwegian manufacturing enterprises are expected to continue to lose market shares in coming years, with imports

**Imports. 1997 - 2001**  
Seasonally adjusted volume indices, 1997=100



Source: Statistics Norway.

growing at a substantially higher rate than domestic market growth.

Despite growth in both export and domestic markets, the varying sensitivity to stronger cost inflation in Norway than in other countries will result in highly varying developments for the different sectors of the economy.

Following a contraction in recent years, the accounts figures for the fourth quarter of 2000 and first quarter of this year indicate a turnaround in manufacturing output. However, the calculations indicate that growth in the period ahead will be modest, with an uneven distribution among the various sectors; it is estimated that some commodity-oriented manufacturing sectors will record the strongest growth. On the other hand, non-manufacturing industries, which are generally less exposed to competition from foreign enterprises, will in general show appreciable growth. In these industries, growth also remained relatively high during the cyclical slowdown of recent years. The service sector, which recorded annual output growth of 2 - 3 per cent the last two years, is expected to continue to expand at the same pace in 2001 and the next two years, whereas growth in the construction sector is estimated to be above this interval. It may appear surprising that growth in service production will not be even stronger in the period ahead in view of the general upswing in domestic demand that has been assumed, but this can be ascribed to the effects of a lower VAT on food and the introduction of VAT on services. Both factors contribute to shifting demand from services to goods.

### Total production – stronger than it appears

Mainland GDP growth, which came to 1.0 per cent in 1999 and 1.8 per cent in 2000, is estimated at 1.0 per cent in 2001, 2.1 per cent in 2002 and 2.5 per cent in 2003. However, these figures are heavily influenced

**Main economic indicators 2000-2002. Accounts and forecasts**

Percentage change from previous year unless otherwise noted

	Accounts 2000	Forecasts							
		2001			2002			2003	
		SSB	MoF	NB	SSB	MoF	NB	SSB	NB
<b>Demand and output</b>									
Consumption in households and non-profit organizations	2.4	1.6	1.6	1 1/2	3.2	2.6	2 1/2	3.0	3
General government consumption	1.4	2.4	2.3	3	2.9	2.1	2	3.2	2
Gross fixed investment	-1.1	-2.7	0.7	-3/4	3.8	1.3	3/4	4.8	1/4
Petroleum activities	-17.1	-1.8	-1.2	0	5.4	0.0	-2	0.0	-2
Mainland Norway	1.4	-1.1	0.3	-1	3.5	0.5	1 1/2	6.5	1
Firms	1.8	-3.6	-0.8	-1 1/4	2.7	0.2	1 1/2	5.9	1 1/4
Housing	12.2	8.7	6.8	4	7.5	0.9	4 1/2	11.3	2 1/2
General government	-7.9	-1.6	-2.2	-4 1/2	2.1	1.1	-1 1/2	3.2	-1 1/2
Demand from Mainland Norway <sup>1</sup>	1.9	1.3	1.5	1 1/4	3.2	2.2	2 1/4	3.7	2 1/2
Stockbuilding <sup>2</sup>	0.8	-0.5	0.1	..	0.0	0.0	..	0.0	..
Exports	2.7	4.3	4.9	4 1/4	2.7	5.1	3	1.6	2 1/4
Crude oil and natural gas	6.4	5.4	8.2	6	0.3	6.9	2	-0.8	0
Traditional goods	2.1	4.0	3.2	3 1/4	4.5	4.5	3 3/4	4.0	3 3/4
Imports	2.5	1.7	3.1	2 1/4	6.3	3.7	4	5.5	3 3/4
Traditional goods	1.7	3.8	3.5	2 3/4	5.3	4.2	4	6.1	3 3/4
Gross domestic product	2.3	1.4	2.4	2	1.9	2.8	1 3/4	1.9	1 1/2
Mainland Norway	1.8	1.0	1.5	1 1/4	2.1	1.8	1 3/4	2.5	2
<b>Labour market</b>									
Employed persons	0.5	0.6	0.5	3/4	0.5	0.7	1/2	0.6	1/2
Unemployment rate (level)	3.4	3.3	3.3	3 1/4	3.3	3.2	3 1/4	3.3	3 1/4
<b>Prices and wages</b>									
Wages per standard man-year	4.3	4.6	4 1/2	4 1/4	4.2	..	4 3/4	4.1	4 1/2
Consumer price index	3.1	3.3	3	3	1.8	2 1/4	2 1/2	2.2	2 1/4
Export prices, traditional goods	13.8	2.4	0.2	2	-2.0	0.0	-1/4	0.4	0
Import prices, traditional goods	6.0	3.6	1.8	1 3/4	-0.9	1.4	0	-0.1	1
Real prices, dwellings	13.7	5.5	..	4	6.6	..	4	5.7	4
<b>Balance of payment</b>									
Current balance (bill. NOK)	203.6	214.0	221.8	195	202.3	193.8	155	184.3	120
Current balance (per cent of GDP)	14.3	14.4	15.0	13	13.2	12.8	10	11.6	8
<b>Memorandum items:</b>									
Household savings ratio (level)	7.7	8.8	6.3	7 1/4	9.6	6.4	7 1/2	10.2	7 1/4
Money market rate (level) <sup>3</sup>	6.6	7.3	7.3	7.2	6.6	7.1	6.3	6.4	5.9
Average borrowing rate (level) <sup>4</sup>	8.2	9.2	..	..	8.8	..	..	8.5	..
Crude oil price NOK (level) <sup>5</sup>	252.0	236.0	225	230	227.0	194	200	221.0	..
Export market indicator	10.3	7.5	..	..	5.8	..	..	6.2	..
Importweighted krone exchange rate (44 countries) <sup>3, 6</sup>	2.5	-2.0	..	-1.0	-0.4	..	0.0	-0.1	0.0

<sup>1</sup> Consumption in household and non-profit organizations + general government consumption+ gross fixed capital formation in Mainland Norway.<sup>2</sup> Change in stockbuilding. Per cent of GDP.<sup>3</sup> The NB figures are technical assumptions. The interest rate forecast reflects the implicit expectations of the market participants.<sup>4</sup> Households' borrowing rate in private financial institutions.<sup>5</sup> Average spot price Brent Blend.<sup>6</sup> Increasing index implies depreciation.

Sources: Statistics Norway (SN), Ministry of Finance, Revidert nasjonalbudsjettet 2001 (MoF), Norges Bank, Inflasjonsrapport 1/2001 (NB).

by a number of "random" factors. First, the unusual precipitation situation last year contributed to exceptionally high electricity production, a phenomenon we assume that will not recur. Excluding electricity production, mainland GDP expanded by 1.4 per cent in 2000, and the corresponding estimate for 2001 is 1.6 per cent, i.e. a slight increase. The second special factor is the effects of changes in the number of working days from year to year, either as a result of calendar effects and/or as a result of the phasing in of two new

vacation days in both 2001 and 2002. The maximum effect of this on the number of working days can be estimated at nearly 1 per cent for 2000, nearly 1 1/2 per cent for 2002, nearly 1 per cent for 2002 and nearly 1/2 per cent for 2003. Not all employees and production enterprises will be affected by these changes in the number of working days, but they probably contribute to keep GDP growth down in each of these years.

**Productivity growth is higher**

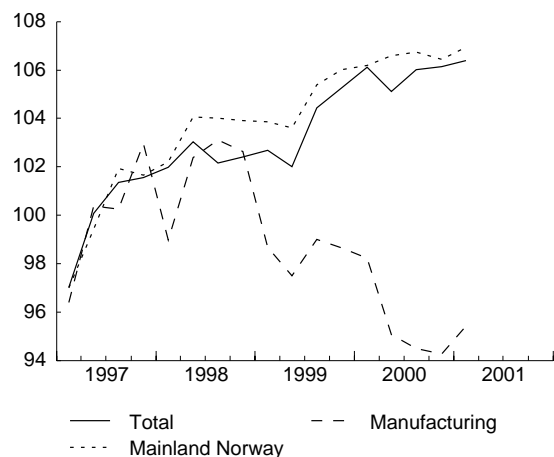
Through the last half of the 1990s, productivity growth in the private sector of mainland Norway fell after having remained at a very high level in the first part of the decade. In 2000, productivity growth again increased markedly and was a good 3 per cent. Part of this growth, however, reflects temporary conditions associated with high electricity production. Preliminary figures also indicate robust growth in labour productivity again this year, despite a decline in electricity production. Our estimates imply that productivity growth will be about 2.5 per cent in the years ahead, which is approximately the same as in 2000 when adjustments are made for random factors. These developments reflect in part normal growth in total factor productivity, the use of other factors of production to replace the use of labour as well as normal cyclical conditions. A separate figure shows growth in labour productivity in the private sector of mainland Norway along with a curve for the output gap measured as the deviation of output from its trend value. The figure shows that when the economy has entered a period of strong expansion (1985-1987 and 1996-1999), productivity growth falls and is particularly low towards the end of this period. Depending in part on how steep the contraction is, productivity growth in the actual cyclical downturn is fairly high. Declining productivity growth in the period 1996-1999 was therefore an entirely normal phenomenon. If anything, productivity growth in 2000 seems to have been unusually high taking into account that output growth was lower than trend growth, with the Norwegian economy close to trend at the beginning of 2001. Given that the economy in the period ahead will not expand at a rate that is very different from trend growth, it is likely that labour productivity will also rise at a rate close to its trend value, which is about 2.5 per cent annually.

**Stable unemployment**

After passing a trough at the beginning of 1999, unemployment, according to the Labour Force Survey, has risen slightly. However, part of the increase in the period to the beginning of 2000 reflects random factors. In the following quarters, the unemployment rate was approximately constant, but the most recent figures may point to a slight decline again in unemployment. This also applies to seasonally adjusted figures for registered unemployment according to the labour market authorities. Unemployment is therefore estimated to edge down in 2001, whereas we previously projected a slight increase. It is particularly the estimates for the supply of labour that explain the change in projected unemployment.

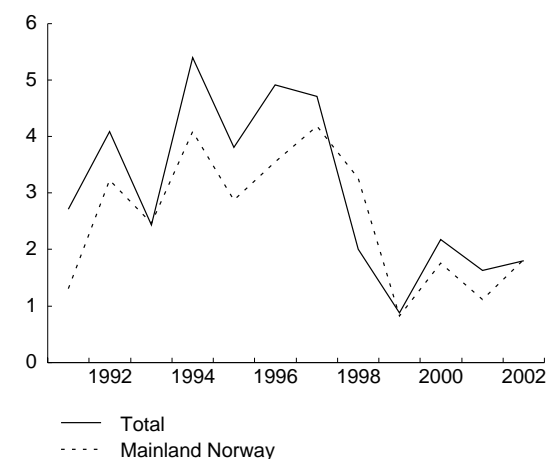
For 2002, our estimates for both growth in the economy and employment growth have been revised upwards to some extent. The growth estimates are now close to mainland GDP trend growth. Admittedly, growth in labour productivity is also approximately at

**Gross domestic product. 1997 - 2001**  
Seasonally adjusted volume indices, 1997=100



Source: Statistics Norway.

**Gross domestic product**  
Percentage growth



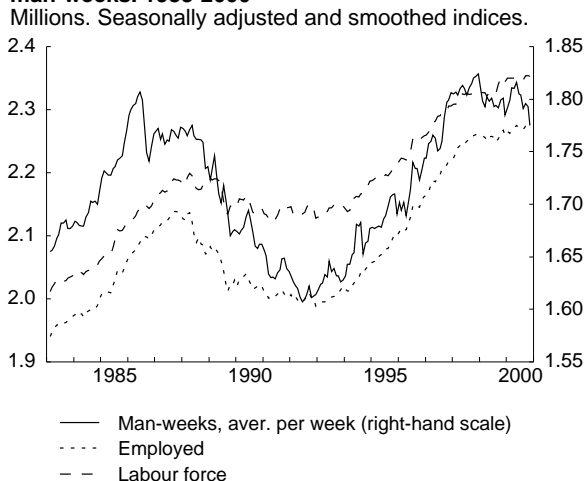
Source: Statistics Norway

**Productivity and Output Gap**  
Per cent



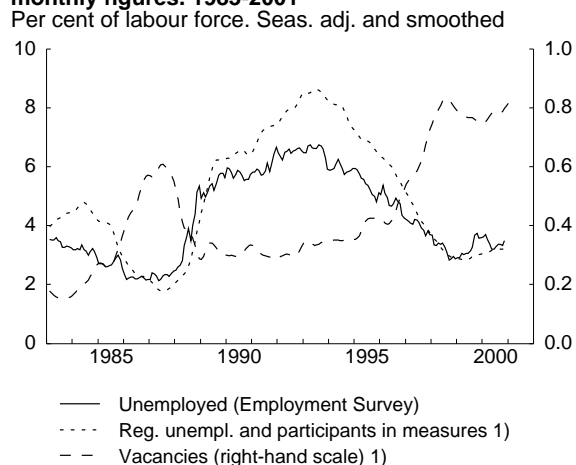
Source: Statistics Norway.

**Labour force, employment and number of man-weeks. 1983-2000**



Source: Statistics Norway.

**Unemployed and number of vacancies, monthly figures. 1983-2001**



1) Backwards adjusted for breaks in the series from January 1999.  
 Sources: The Directorate of Labour and Statistics Norway.

**Labour market**



1) Adj. for stat. rev. from 1996.  
 Source: Statistics Norway

its trend level, a factor which curbs employment growth. However, growth in the labour supply is estimated to be relatively moderate. Demographic conditions are an important factor underlying these developments. This means that unemployment will continue to remain at a low level in 2002. The same factors will also apply in 2003 at approximately the same magnitude as in 2002.

With such low levels of unemployment as implied by these forecasts, positive demand shocks or policy changes that reduce the supply of labour will normally contribute to a substantial increase in wage growth. For example, a reduction in unemployment from 3.5 to 3.0 per cent will push up the level of real wages by 2.3 per cent in the course of a few years. If unemployment were to be reduced further to 2.5 per cent from 3.0 per cent, real wages would increase by a further 2.7 per cent. With unchanged import prices, nominal wage changes would be approximately doubled.

**Sizeable variation in consumer price inflation but stable wage growth**

After the year-on-year rise in the consumer price index (CPI) was reduced to 1.9 per cent in August 1999, the rate of inflation has moved on a clear upward trend. The most recent measurement as of 15 May 2001 showed that price inflation reached 4.3 per cent, the highest rate of increase in nearly 10 years. The increase in inflation has largely been fuelled by higher energy prices, but increases in excise duties, higher interest rates (through higher house rents) and high wage growth have also contributed. The usual seasonal decline in electricity prices through the spring months has so far this year not materialized and is not likely to occur in the period ahead. In May, electricity prices were 36 per cent above the level in May last year. In May, the CPI excluding energy goods was 3.1 per cent higher than one year earlier; the increase in excise duties is estimated to have contributed about 0.6 percentage point to this rise.

According to figures from the quarterly national accounts, import prices rose substantially for a number of consumption-related groups. In spite of this, the rise in consumer prices for imported goods has been subdued; in recent months, the rate of increase for these goods has been further reduced, which may partly be due to a stronger krone. A further appreciation of the krone as well as continued low inflationary impulses from trading partners will contribute to a falling trend in import prices, and hence to a slower rise in Norwegian prices in the period ahead.

It is assumed that the year-on-year rise in the CPI will be reduced as early as next month. Petrol prices showed a steep rise from May to June last year – which has probably not been the case this year – and there are many indications that the pronounced rise

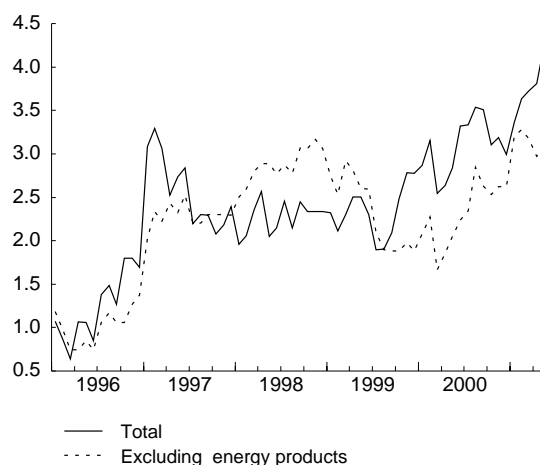
in food prices in May will be reversed in June. The rate of consumer price inflation is expected to show far greater changes from June to July when the effect of a halving of VAT on food, a lower fuel tax and the introduction of VAT on some services as a whole are expected to reduce the CPI by about 1 percentage point. The year-on-year rise in the CPI may be less than 2 per cent towards the end of the year. On an annual basis, it is estimated that the consumer price index will show a rise of 3.3 percentage points this year.

At the beginning of 2002, it is assumed that the inflation rate will be reduced further as the direct effect of the increase in the general VAT rate from 1 January this year will then have been exhausted, and we assume that VAT on food will remain low and that there will be no real changes in excise duties. A projected normal seasonal decline in electricity prices through the spring months of next year is expected to contribute to a further reduction in price inflation. In our forecast, the rate of increase is reduced to 1.0-1.5 percentage points in the second quarter of 2002 compared with the same period one year earlier. In the second half of the year, all the direct effects of excise duty changes will have been exhausted and the inflation rate will then increase markedly and again be more than 2 per cent. In our calculations, both the indirect tax relief and developments in energy prices contribute to reducing the annual rate of increase in the CPI to 1.8 percentage points. It is likely that the rise in the CPI may be around 2-2.5 per cent in 2003 and that changes in energy prices may again contribute to pushing down price inflation that year as well.

Recent developments in energy prices, and particularly electricity prices, illustrate how difficult it is to draw up inflation forecasts. The upward adjustment of our inflation projection for 2001 from 2.5 per cent in February to 3.3 per cent in June may virtually in its entirety be ascribed to the erroneous assessment of changes in electricity prices. However, there are also a number of other uncertain factors, including Norges Bank's changes in interest rates: if interest rates are increased this year on the grounds that inflation in the future will otherwise be too high and if this increase in interest rates does not result in an appreciation of the krone, this may result in higher inflation one or two years ahead, partly because house rents will increase. It takes time before the contractionary effect of higher interest rates translates into a lower rise in the CPI, according to our calculations.

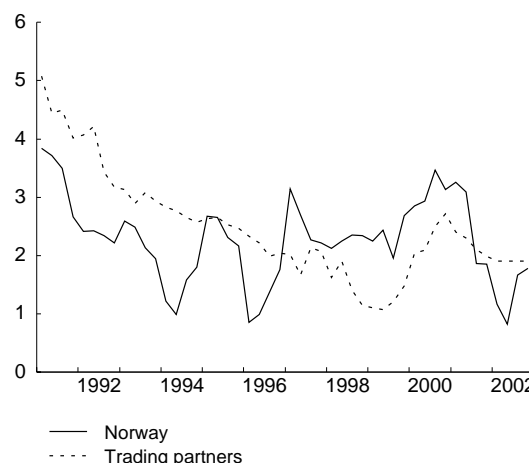
According to the national accounts, wages per normal man-year rose by 4.3 per cent last year. The wage carry-over into 2000 for all groups combined was estimated at 1.3 per cent by the Technical Reporting Committee for Income Settlements. In this year's first report from the Committee, the carry-over into 2001 was estimated at about 2 per cent. In isolation, the

**The consumer price index**  
Percentage change from the same month the previous year



Source: Statistics Norway .

**The consumer price index**  
Percentage change from the same quarter the previous year



Source: Statistics Norway and Norges Bank.

higher carry-over points to higher wage growth in 2001 than in 2000. However, the fact that this year's wage increases for most groups were agreed last year and that these increases were lower than in 2000 points to the opposite. High consumer price inflation and continued pressures in the labour market may, however, contribute to high wage drift. It is estimated that wage growth per normal man-year at an annual rate will be slightly higher this year than in 2000. We nevertheless assume that the wage carry-over into 2002 will be lower than in 2001, which in conjunction with far lower price inflation will contribute to lower wage growth even though a main settlement will take place that year. According to our calculations, wage growth will be at approximately the same level as the previous year. The increase in vacation days in 2001 and 2002 combined with one less working day this year than in the previous year implies

that wage growth per hour will be noticeably higher than per normal man-year in these years.

Compared with our previous report, the estimates for wage growth in both 2001 and 2002 have been revised up. This can largely be ascribed to the prospect of somewhat increased pressures in the labour market and the higher rate of price inflation we have witnessed and will record compared with the estimates in the February report.

### **Large current account surpluses**

In the first quarter of 2001, Norway recorded a current account surplus of a good NOK 60 billion, compared with NOK 40 billion in the same period last year. As a result of valuation changes in foreign assets and liabilities, however, Norway's net assets only increased by a good half of the current account surplus and amounted to NOK 360 billion at the end of the quarter. The estimates for oil prices along with high exports of oil and gas will contribute to a current account surplus of NOK 214 billion for 2001 as a whole, which is even slightly higher than the record from 2000. Even though import prices are expected to rise slightly more in 2001 than export prices as a whole, the difference is not substantial. This means that the record terms-of-trade gain recorded by Norway in 2000 will largely be maintained in 2001 and continue to be the case over the next two years. Admittedly, oil prices are expected to edge down measured in krone terms because the Norwegian krone will appreciate slightly against the dollar, but this will also contribute to a fall in import prices in the period ahead.

Growth in domestic demand will contribute to stronger growth in imports in the period ahead, while the loss of market shares will contribute to moderate growth in traditional exports. Growth in total oil and gas exports is assumed to show little change over the next two years. Oil exports are projected to fall marginally, while gas exports will increase. All in all, the trade surplus, measured at current prices, is therefore expected to fall by about NOK 20 billion each year after 2001, when the estimate is a good NOK 214 billion. The current account surplus is projected at a good NOK 184 billion in 2003. Norway's net foreign assets are estimated at about NOK 900 billion at the end of 2003 when the effects of possible valuation changes are disregarded.

*“Productivity isn’t everything, but in the long run it is almost everything.”*  
Krugman (1992, p. 9)

# Beaten by the Swedes?

## A comparison of productivity growth in Norwegian and Swedish manufacturing\*

Pål Boug and Bjørn E. Naug

*National accounts figures indicate that in the last 20-25 years Norwegian manufacturing has recorded far lower productivity growth than manufacturing in our trading partner countries. These comparisons, however, are very uncertain as the underlying data and calculation methods may vary in the national accounts of different countries. Moreover, the overall figure for manufacturing may provide a distorted picture because Norway’s manufacturing structure differs from that of our trading partners. In this article, productivity changes in Norwegian and Swedish manufacturing are compared for the period 1993-1999, based on disaggregated data and applying a new common national accounting standard. The figures show that Norwegian manufacturing as a whole recorded average annual productivity growth of 0.6 per cent in the period analysed, compared with annual growth of 5.1 per cent in Swedish manufacturing. The growth differential to some extent reflects the fact that Sweden has a higher share of manufacturing industries with a potential for high productivity growth than Norway. Swedish productivity growth is thus dominated by the industry producing Radio, television and communications equipment, an industry that has a different structure and is of far less importance in Norway. Productivity growth in Norway is reduced in particular by developments in the industries Publishing, printing and reproduction and Food products, beverages and tobacco, where many activities are protected against foreign competition. The calculations indicate that the difference in productivity growth between Norwegian and Swedish manufacturing is virtually eliminated when the aforementioned industries are excluded and adjustments are made for the two countries’ differing manufacturing structure. The figures also show that many export-oriented manufacturing sectors in Norway recorded (appreciably) stronger productivity growth between 1993 and 1999 than the same sectors in Sweden.*

### Introduction

Productivity growth plays an important role for the Norwegian economy in the short and long term. In particular, the economy’s ability to increase value added per employee is crucial for long-term developments in living standards in Norway. Productivity growth is also an important factor behind developments in employment, the structure of the economy and the Norwegian business sector’s competitiveness. In other words, there are several reasons for studying

productivity changes in the Norwegian economy. This article looks more closely at productivity growth in manufacturing.

International comparisons indicate that Norwegian manufacturing as a whole has systematically recorded lower productivity growth than manufacturing in our trading partner countries. These comparisons, however, are very uncertain. According to NOU (1996:4), it is likely that some of the difference in estimated productivity growth reflects the use of different measurement methods in different countries. It is therefore natural to question the reliability of earlier studies. Moreover, average figures for manufacturing may provide a distorted picture as Norway has a manufacturing structure that differs from that of its trading partners. In this article, productivity growth in Norwegian and

**Pål Boug** is Research Fellow in the Division for Macroeconomics. (pal.boug@ssb.no)

**Bjørn E. Naug** is Research Fellow in the Division for Macroeconomics. (bjorn.naug@ssb.no)

\* The article is based on the appendix concerning labour productivity in *Økonomiske analyser* 1/2001. Pål Boug was responsible for the work on the article (including calculations and text). Naug’s suggestions and comments were quite extensive, however, so we considered it appropriate to include him as co-author of the article. Enquiries concerning the analysis should be addressed to Pål Boug. Our thanks to Knut Moum, Svein Longva, Ådne Cappelen and Per Richard Johansen for their useful suggestions and comments.



Swedish manufacturing is compared for the period 1993-1999 based on disaggregated data and using a new – common – national accounting standard.

The rest of the article is organised as follows: the next section discusses further the uncertainty of earlier analyses. This is followed by a presentation of the data the framework and the main results. The conclusion provides a summary of what we have learned.

### The uncertainty of earlier analyses

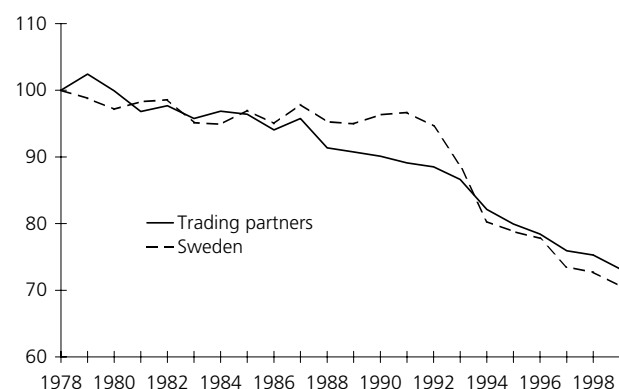
In keeping with common practice, we focus on developments in labour productivity, defined as value added at constant prices divided by the number of hours worked.<sup>1</sup> The national account figures indicate that, measured in this way, productivity growth in manufacturing has been appreciably lower in Norway than among our trading partners. According to recent figures compiled by the US Bureau of Labor Statistics,<sup>2</sup> relative productivity was reduced by a good 25 per cent from 1978 to 1999 (see Figure 1). A corresponding deterioration is found in a separate comparison of Norwegian and Swedish manufacturing for the same period.

As discussed in NOU (1996:4), there are several sources of bias and/or uncertainty in such comparisons:

- The underlying data for the national accounts and methods for deflating value added appear to vary across countries, factors that influence the estimated productivity figures. It is therefore doubtful whether the figures are comparable.<sup>3</sup>
- The overall figure for manufacturing may provide a distorted/incomplete picture when comparing productivity growth between countries that have (very) different manufacturing structures. The reason is that the various manufacturing industries have a different potential for productivity growth, partly for technological reasons.
- Productivity figures may be influenced by short-term cyclical fluctuations that do not occur at the same time across countries.

Against this background, the discussion in NOU (1996:4) concluded with two specific recommendations for future analyses. The first recommendation was that one should look more closely at the methods used for constructing constant-price estimates for value added in Norway and among our trading partners. The second recommendation was that one

**Figure 1. Labour productivity in Norwegian manufacturing relative to manufacturing in Sweden and among trading partners<sup>1</sup>. Index 1978=100**



<sup>1</sup> Figures for trading partners are calculated as a weighted geometric mean using competitiveness weights (IMF weights for 1994) as weights. Sources: Bureau of Labor Statistics (USA) og NOU (2000:25).

should study, on the basis of more disaggregated figures, to what extent differences in the manufacturing structure can explain lower productivity growth in Norwegian manufacturing. These recommendations form the basis of this article.

### Data and framework

Through the EEA Agreement, Norway is obligated to follow the European System of Accounts (ESA95), the EU's new standard of national accounting. This standard aims at reducing measurement problems of the type described above, through use of common definitions and methods.<sup>4</sup> In particular, the standard states that value added at constant prices shall be calculated by first deflating production and intermediate consumption individually and then taking the difference (so-called double deflating). Whereas Norway has for a long time followed this practice in its national accounts, the work on converting the accounts to the new standard has not come very far in most EU countries. There is thus limited access to comparable figures on productivity growth.

Norwegian national account figures based on the new standard have now been calculated back to 1970. Of Norway's three most important European trading partners, Germany, the UK and Sweden, only Sweden has figures for value added and hours worked based on the new standard. These figures are only available for the years 1993-1999. We therefore compare productivity growth in Norwegian and Swedish manufacturing from 1993 to 1999. In order to study whether differen-

<sup>1</sup> Value added is the value of production less the value of intermediate consumption. Hours worked is the sum of man-hours worked by employees and self-employed. The concepts labour productivity and manufacturing productivity are used interchangeably in the following.

<sup>2</sup> See Bureau of Labor Statistics (2000).

<sup>3</sup> The question of the quality of productivity figures was raised in Norwegian newspapers last autumn. In an article in the Norwegian daily *Aftenposten* on 4 November 2000, economists from the Norwegian Confederation of Trade Unions and the Confederation of Norwegian Business and Industry questioned the quality of the productivity figures that were compiled by the US Bureau of Labor Statistics. The quality of productivity figures was also questioned in an article in *Finansavisen* on 23 September 2000.

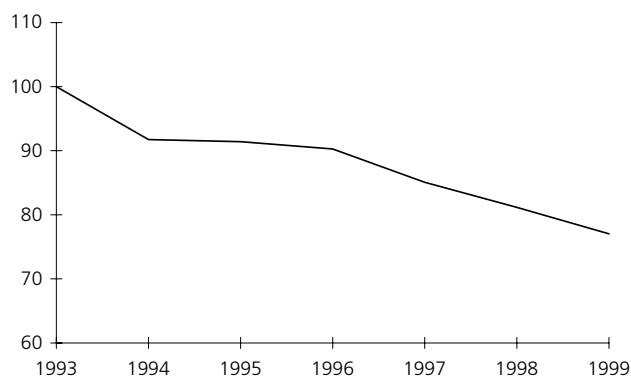
<sup>4</sup> The importance of any remaining measurement problems is discussed in *Økonomiske analyser* 1/2001.

**Table 1. Productivity growth and man-hour shares in Norwegian and Swedish manufacturing**

Industry	Average percentage growth in productivity, <sup>1</sup> 1993-1999		Man-hour shares in per cent. 1993	
	Norway	Sweden	Norway	Sweden
Manufacturing total	0.6	5.1	100.0	100.0
Food products, beverages and tobacco	-1.5	2.7	18.2	9.7
Textiles, wearing apparel and leather	0.1	2.8	3.2	2.6
Wood and wood products	-0.6	3.3	5.7	5.2
Pulp, paper and paper products	5.7	0.8	3.8	6.4
Publishing, printing and reproduction	-1.7	3.9	11.5	8.0
Refined petroleum products	0.8	15.2	0.7	0.4
Chemicals and chemical products	2.9	0.6	5.5	4.6
Rubber and plastic products	-0.2	2.8	2.0	3.0
Other non-metallic mineral products	-0.4	0.8	2.9	2.7
Basic metals	4.2	3.1	5.7	4.8
Fabricated metal products	0.3	1.0	5.5	8.7
Machinery and other equipment	3.2	2.8	8.4	12.8
Office machinery and computers	15.4	9.3	0.4	1.1
Electrical machinery and apparatus	-1.7	0.4	3.7	3.3
Radio, television and communications equipment	4.9	38.4	1.7	4.1
Medical and optical equipment	2.7	3.9	2.0	3.0
Motor vehicles, trailers and parts	3.8	6.8	1.0	8.6
Other transport equipment	0.4	-2.4	14.2	3.0
Furniture and other manufacturing	0.6	10.2	4.0	7.8

<sup>1</sup> Geometric mean.

Sources: Statistics Norway and Statistics Sweden

**Figure 2. Labour productivity in Norwegian manufacturing relative to Swedish manufacturing. Index 1993=100**

Sources: Statistics Norway and Statistics Sweden.

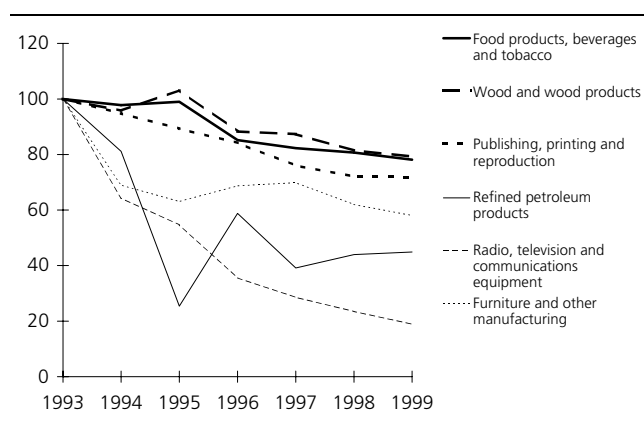
ces in manufacturing structure can explain any differences in productivity growth between Norway and Sweden, we have obtained data for 19 manufacturing industries. The level of detail is thus so high that it is possible to adjust for differences in productivity growth that are due to a differing manufacturing structure in the two countries. We shed light on this issue by calculating what Norwegian productivity growth would have been if Norway had the same manufacturing structure as Sweden. Box 1 provides a further account of the calculations.

## Main results

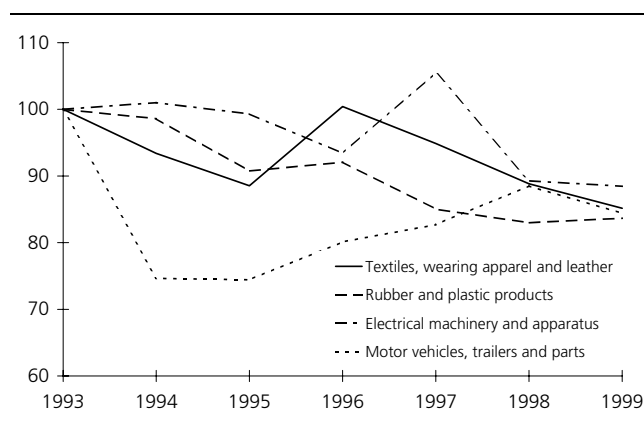
The data show that Norwegian manufacturing as a whole recorded appreciably lower productivity growth than Swedish manufacturing in the period 1993-1999 (see Figure 2 and Table 1). Annual productivity growth in Norwegian manufacturing averaged 0.6 per cent in this period, compared with annual growth of 5.1 per cent in Swedish manufacturing. Norwegian manufacturing productivity was reduced by about 23 per cent relative to manufacturing productivity in Sweden between 1993 and 1999. The decline was particularly strong from 1993 to 1994, partly reflecting different cyclical stages for Norwegian and Swedish manufacturing in these years. Both Norwegian and Swedish manufacturing experienced a cyclical recovery from 1993 to 1994, but the upturn appears to have been far stronger in Sweden than in Norway.<sup>5</sup> The cyclical turnaround contributed to an increase in Swedish manufacturing productivity of as much as 9.8 per cent from 1993 to 1994, while productivity in Norwegian manufacturing only rose by 0.7 per cent. Average productivity growth for Sweden is reduced to 4.1 per cent if 1993 is excluded from the period analysed.

The lower productivity growth in Norwegian manufacturing as a whole is also reflected in lower productivity growth than Swedish manufacturing in 13 of the 19 manufacturing industries (see Table 1 and Figures 3-5). It is particularly the industries Publishing, printing and reproduction and Food products, beverages

<sup>5</sup> The sharp upturn for Sweden must be seen in the light of the very strong downturn in the period 1991-1993, cf. OECD (1999, p. 178).

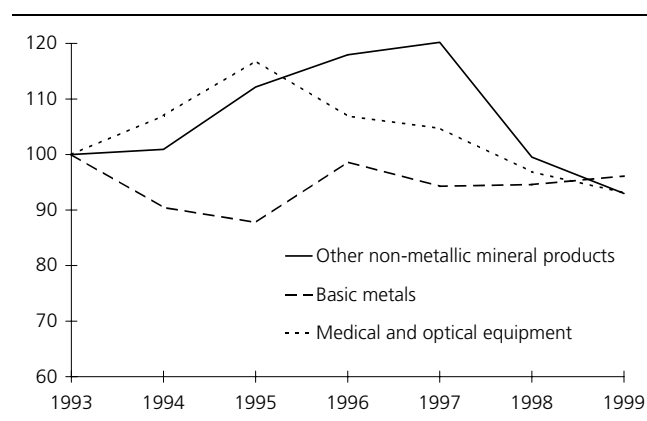
**Figure 3. Labour productivity in Norwegian manufacturing relative to Swedish manufacturing. Index 1993=100**

Sources: Statistics Norway and Statistics Sweden.

**Figure 4. Labour productivity in Norwegian manufacturing relative to Swedish manufacturing. Index 1993=100**

Sources: Statistics Norway and Statistics Sweden.

and tobacco – with a total share of manufacturing employment of 30 per cent and average productivity growth of about –1.5 per cent – that reduce productivity growth in Norwegian manufacturing. A substantial proportion of activities in Food, beverages and tobacco is protected against foreign competition through trade policy measures.<sup>6</sup> Similarly, many activities in Publishing, printing and reproduction are

**Figure 5. Labour productivity in Norwegian manufacturing relative to Swedish manufacturing. Index 1993=100**

Sources: Statistics Norway and Statistics Sweden.

characterised by *natural* protection against foreign competition. Weak productivity developments in these industries have thus only to a limited extent contributed to reducing the manufacturing sector's competitiveness. From a living standards point of view, this is little consolation. The other manufacturing industries as a whole recorded average productivity growth of 1.4 per cent in the period 1993-1999 (see Table 2).

Productivity changes in Swedish manufacturing are dominated by the exceptional rise in productivity in the industry producing Radio, television and communications equipment. This must be seen in connection with the strong growth in Ericsson's telecom product activities, which are activities that encounter limited competition from Norwegian enterprises. Swedish manufacturing excluding Radio, television and communications equipment recorded average productivity growth of 2.9 per cent in the period 1993-1999. If all three industries mentioned above are excluded from the analysis, the difference in average productivity growth (between Norway and Sweden) is reduced from 4.5 percentage points to 1.5 percentage points.

The discussion above illustrates that the use of aggregated productivity figures to analyse manufacturing

**Table 2. Productivity growth in Norwegian and Swedish manufacturing. Average percentage growth<sup>1</sup>. 1993-1999**

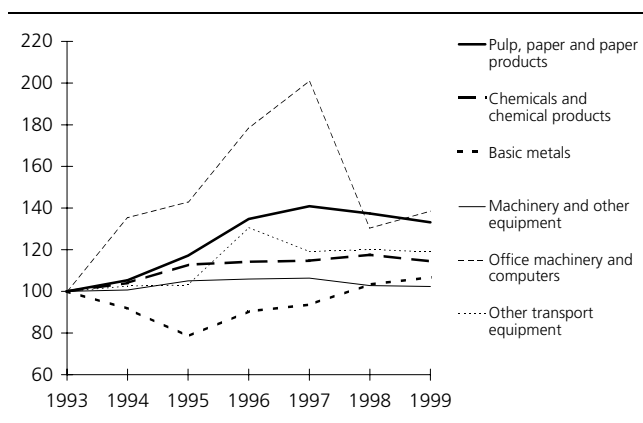
Industry	Norway	Sweden
Manufacturing total	0.6	5.1
Manufacturing excluding Publishing, printing and reproduction and Food products, beverages and tobacco	1.4	5.3
Manufacturing excluding Radio, television and communications equipment	0.5	2.9
Manufacturing excluding Publishing, printing and reproduction and Food products, beverages and tobacco and Radio, television and communications equipment	1.3	2.8

<sup>1</sup> Geometric mean

Sources: Statistics Norway and Statistics Sweden.

6 See Fæhn and Hægeland (1996), Jørgensen *et al.* (1999) and Fæhn *et al.* (2001).

**Figure 6. Labour productivity in Norwegian manufacturing relative to Swedish manufacturing. Index 1993=100**

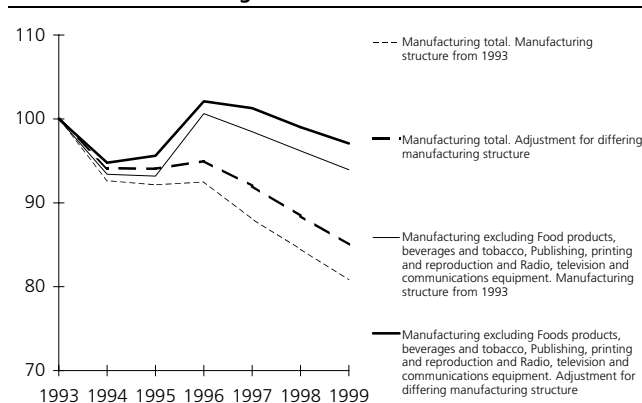


Sources: Statistics Norway and Statistics Sweden.

competitiveness may provide a distorted/incomplete picture. This is also illustrated by the fact that important segments of Norwegian manufacturing recorded *stronger* productivity growth in the period 1993-1999 than the same sectors in Sweden (see Table 1 and Figure 6). More specifically, this was the case for Basic metals, Machinery and other equipment, Pulp, paper and paper products, Chemicals and chemical products, Office machinery and computers and Other transport equipment<sup>7</sup>, industries that account for about half of the manufacturing sector's exports and more than a third of manufacturing employment in Norway. Norwegian and Swedish manufacturers in these industries recorded average productivity growth of 2.6 and 1.6 per cent, respectively, per year in the period under review.

A closer study shows that changes in the manufacturing structure only explain a limited portion of productivity growth in Norwegian and Swedish manufacturing as a whole: the average growth figures become 0.8 per cent and 4.5 per cent, respectively, if the coun-

**Figure 7. Labour productivity in Norwegian manufacturing relative to Swedish manufacturing with fixed manufacturing structure<sup>1</sup> and adjustment for differing manufacturing structure<sup>2</sup>. Index 1993=100**



<sup>1</sup> See formula 2 in box 1.

<sup>2</sup> See formula 3 in box 1.

Sources: Statistics Norway and Statistics Sweden.

tries are given the 1993 manufacturing structure throughout the period (see Table 3). The relative deterioration in Norwegian manufacturing productivity measured in this way was 19 per cent in the period from 1993 to 1999 (see Figure 7).

Table 1 shows that Norway and Sweden have a different manufacturing structure. The lower productivity growth in Norwegian manufacturing may therefore to some extent reflect the countries' production of different products with a different potential for productivity growth. This possibility is examined by using the Swedish manufacturing structure from 1993 for calculating productivity growth for Norwegian manufacturing (see last column in Table 3). The calculations indicate that Norwegian manufacturing, with this structure, would have recorded annual productivity growth of 1.7 per cent in the period 1993-1999. The total deterioration in relative productivity is now 15 per cent (see Figure 7), compared with a reduction of 19 per cent in the calculations based on a fixed and country-specific manufacturing structure. The conclu-

**Table 3. Productivity growth in Norwegian and Swedish manufacturing. Average percentage growth<sup>1</sup> with fixed manufacturing structure and adjustment for differing manufacturing structure. 1993-1999**

	Norway with Norwegian manufacturing structure from 1993 <sup>2</sup>	Sweden with Swedish manufacturing structure from 1993 <sup>2</sup>	Norway with Swedish manufacturing structure from 1993 <sup>3</sup>
Manufacturing total	0.8	4.5	1.7
Manufacturing excluding Food products, beverages and tobacco, Publishing, printing and reproduction and Radio, television and communications equipment	1.7	2.7	2.2

<sup>1</sup> Geometric mean.

<sup>2</sup> See formula 2 in box 1.

<sup>3</sup> See formula 3 in box 1.

Sources: Statistics Norway and Statistics Sweden.

7 The industry Other transport equipment includes the production of ships and oil platforms.

sion is therefore that a good 1/5 of the difference in productivity growth can be attributed to a manufacturing structure in Norway which differs from that of Sweden.<sup>8</sup>

The differences in productivity growth are thus considerable even after adjustments are made for differing manufacturing structures. This conclusion, however, changes when we (in line with the discussion above) omit Publishing, printing and reproduction, Food products, beverages and tobacco and Radio, television and communications equipment from the analysis. Calculations excluding these industries actually show that the difference in productivity growth is virtually eliminated when adjustments are also made for a differing manufacturing structure (see Table 3 and Figure 7).

### What have we learned?

This article has looked more closely at productivity growth in Norwegian and Swedish manufacturing on the basis of disaggregated data. The data show that Norwegian manufacturing as a whole recorded appreciably lower productivity growth than Swedish manufacturing through the period 1993-1999. Part of the difference in productivity growth reflects that the countries have different manufacturing structures. Sweden has a higher proportion of manufacturing sectors that recorded very strong productivity growth in the period analysed, primarily the telecommunications industry. Norway, on the other hand, features traditional (and perhaps "ageing") industries with a more limited potential for productivity growth. However, the difference in productivity growth is considerable even after adjustments are made for the countries' differing manufacturing structure.

Norwegian productivity growth is reduced in particular by the industries Publishing, printing and reproduction and Food products, beverages and tobacco. One possible explanation is that many of the activities in these industries are protected against foreign competition. At the same time, this protection implies that the industries have so far not had to face the competitive consequences of low productivity growth. This may change in the future if the protection is removed. Productivity growth in Swedish manufacturing is dominated by the industry producing Radio, television and communications equipment. This reflects the sharp growth in Ericsson's telecom product activities, which are activities that encounter limited competition from Norwegian enterprises. Calculations excluding these three industries show that the difference in productivity growth between Norwegian and Swedish manufacturing is virtually eliminated when adjust-

ments are also made for the countries' differing manufacturing structure. The analysis also shows that many export-oriented manufacturing sectors in Norway recorded (appreciably) higher productivity growth in the period 1993-1999 than the same sectors in Sweden.

### References

- Aftenposten (4 November 2000): Norsk industri på jumboplass (Norwegian manufacturing in last place).
- Bureau of Labor Statistics (2000): *International Comparisons of Manufacturing Productivity and Unit Labor Cost Trends*, NEWS United States Department of Labor, October 2000.
- Finansavisen (23 September 2000): Produktivitet og produktivitet, hummer og kanari? (Productivity and productivity, neither fish nor fowl?)
- Fæhn, T. and T. Hægeland (1996): *Effektive satser for næringsstøtte 1994* (Effective rates of assistance to industries 1994), Rapport 96/18, Statistics Norway.
- Fæhn, T., J.-A. Jørgensen, B. Strøm and T. Åvitsland (2001): *Effektive satser for næringsstøtte 1998* (Effective rates of assistance to industries 1998), to be published in the series Rapport 98, Statistics Norway.
- Jørgensen, J.-A., B. Strøm and T. Åvitsland (1999): *Effektive satser for næringsstøtte 1996* (Effective rates of assistance to industries 1996), Rapport 99/14, Statistics Norway.
- Krugman, P. (1992): *The Age of Diminished Expectations: U.S. Economic Policy in the 1990s*, The Washington Post Company, USA.
- NOU (1996: 4): *Om grunnlaget for inntektsoppgjørene 1996* (The basis for the income settlements 1996).
- NOU (2000: 25): *Etter inntektsoppgjørene 2000* (After the income settlements 2000).
- OECD (1999): *OECD Historical Statistics 1960-1997*. OECD Statistics, OECD.
- Økonomiske analyser (1/2001) *Økonomisk utsyn over året 2000* (Economic Survey 2000), Statistics Norway.

<sup>8</sup> In *Økonomiske analyser* 1/2001, the countries' differing manufacturing structure explained about half of the growth differential. The different results are due to the fact that Sweden was given Norway's manufacturing structure from 1993. (The industry producing Radio, television and communications equipment has a far higher share of employment and productivity growth in Sweden than in Norway. Sweden therefore shows a sharp decline in estimated productivity growth when the country is given Norway's manufacturing structure.)

**Box 1. A closer look at the calculations**

The calculations are based on the formula for labour productivity (LP) in manufacturing as a whole:

$$(1) \quad LP_t^i = \frac{\sum_j Q_{jt}^i}{\sum_j L_{jt}^i} = \sum_j \frac{L_{jt}^j}{\sum_j L_{jt}^j} \cdot \frac{Q_{jt}^i}{L_{jt}^i}, \quad \begin{array}{l} i = \text{Norway, Sweden} \\ j = \text{industry } j \\ t = 1993, \dots, 1999 \end{array}$$

where Q is value added measured at constant prices and L is the number of hours worked. The last part of the equation states that LP<sup>i</sup> is a weighted average of productivity in each industry with industry shares of hours worked as weights. In the text, man-hour shares are denoted as "manufacturing structure". The following formula is used to isolate the effect of industry productivity for total manufacturing productivity in each country:

$$(2) \quad LP_t^i = \sum_j \frac{L_{j(93)}^j}{\sum_j L_{j(93)}^j} \cdot \frac{Q_{jt}^i}{L_{jt}^i}, \quad \begin{array}{l} i = \text{Norway, Sweden} \\ j = \text{industry } j \\ t = 1993, \dots, 1999 \end{array}$$

The manufacturing structure in 1993 is consequently kept fixed in the calculations. The calculation of a differing manufacturing structure is quantified with the help of the formula:

$$(3) \quad LP_t^i = \sum_j \frac{L_{j(93)}^{\text{Sweden}}}{\sum_j L_{j(93)}^{\text{Sweden}}} \cdot \frac{Q_{jt}^i}{L_{jt}^i}, \quad \begin{array}{l} i = \text{Norway, Sweden} \\ j = \text{industry } j \\ t = 1993, \dots, 1999 \end{array}$$

Sweden's manufacturing structure, measured by man-hour shares in 1993, is thus applied for calculating productivity growth in Norwegian and Swedish manufacturing. The calculations in *Økonomiske analyser* 1/2001 were based on the reverse problem, i.e. Norway's manufacturing structure was applied for calculating productivity growth in Swedish manufacturing. The figures reported here are therefore not directly comparable to corresponding figures in *Økonomiske analyser* 1/2001