



Economic Survey

Statistics Norway



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Economic trends

- National accounts for 3 quarter 1998
- Forecasts for the Norwegian economy for 1999 and 2000

Articles

- The Kyoto Protocol and the Norwegian petroleum sector
- Methane emissions and permit prices for greenhouse gases

Economic Survey

Volume 8

4/98

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Economic Survey

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Economic Survey

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Economic trends*

Preliminary national accounts figures indicate that the sharp upturn in the Norwegian economy over the past four years continued through the third quarter of 1998, albeit at a slightly slower pace than earlier. Traditional merchandise exports appear to be increasing far more slowly than the rate recorded in earlier years, and mainland investment is moving on a downward trend. With a virtually cyclically neutral fiscal policy, household consumption and petroleum investment have been the main driving forces this year. The impetus, however, is not strong enough to prevent slightly slower growth in both mainland GDP and employment in 1998 compared with 1997. Because the expansion of the labour force is gradually slowing, unemployment will still decline by a greater margin in 1998 than in 1997. Lower average unemployment has not been recorded since 1987. The pronounced decline in unemployment and generally tight labour market conditions contributed to relatively high pay increases in this year's wage settlements. Combined with an estimated price inflation rate of 2.3 per cent, growth in real wages is set to be the highest in 20 years. The lowest nominal oil price in 23 years along with high imports, partly as a result of extensive investment on the shelf, entail that the current-account balance in 1998 may show a deficit for the first time since 1989.

High wage growth and the deterioration in the current-account balance contributed to a marked depreciation of the Norwegian krone in late summer this year. To counteract this, Norges Bank raised its key rates, and it is now likely that 1998 will end with substantially higher interest rates than the level recorded one year earlier. At the same time, it appears that the international economy is heading towards a cyclical downturn, partly due to developments in Asia but also because growth in the US will be substantially weaker next year. Growth in the UK and the euro area may also slow, and Japan is in a severe recession. These developments point to continued low oil prices and moderate growth in the demand for Norwegian export products. Low price inflation in the euro area implies that interest rates in Europe may fall further, although this is not likely to generate a strong growth impetus to the Norwegian economy.

With a sluggish trend in traditional merchandise exports, a projected decline in both mainland fixed investment and

petroleum investment and high interest rates at the beginning of the year, a pronounced turnaround in the mainland economy is likely in 1999. The level of activity may fall for the first time since 1989, while unemployment will probably resume an upward trend following five years of decline. The cost impetus from wage settlements and the depreciation of the Norwegian krone through 1998 will contribute to slightly higher price inflation in 1999 than in 1998, but real wages will nevertheless continue to show an appreciable rise. Higher petroleum production, combined with a decline in imports, will in turn result in a current-account surplus, but with oil prices expected to remain low the surplus will be considerably smaller than during the current upturn which now seems to be coming to a halt. With slightly stronger growth in the international economy and Norwegian interest rates more on a par with the level in the euro area, activity in the mainland economy will pick up moderately again in 2000. Unemployment, however, may increase further, and real wage growth may edge down.

More unfavourable prospects for the balance of payments and higher wage and price inflation than among our trading partners result in greater uncertainty than previously concerning future movements in the exchange rate and interest rates, and thus for economic developments next year. There is also considerable uncertainty associated with the international situation, and the possibility that demand and commodity prices, including the oil price, will show a weaker rise than assumed in this report cannot be ruled out. This will place considerable demands on flexibility in economic policy.

Main indicators for the Norwegian economy

Growth from previous year. Per cent

	1996	1997	1998	1999	2000
GDP	5.5	3.4	2.4	0.8	2.2
- mainland Norway	4.1	3.7	3.1	-0.3	1.2
Consumption in households and non-profit organizations	4.7	3.4	3.8	1.3	2.2
Unemployment rate	4.9	4.1	3.2	4.0	4.2
Consumer price index	1.3	2.6	2.3	2.8	2.7
Current balance ¹	6.7	5.2	-0.2	2.1	5.7

¹ Per cent of GDP.

* Translated from Økonomiske analyser 9/98 by Janet Aagenæs.

International economy

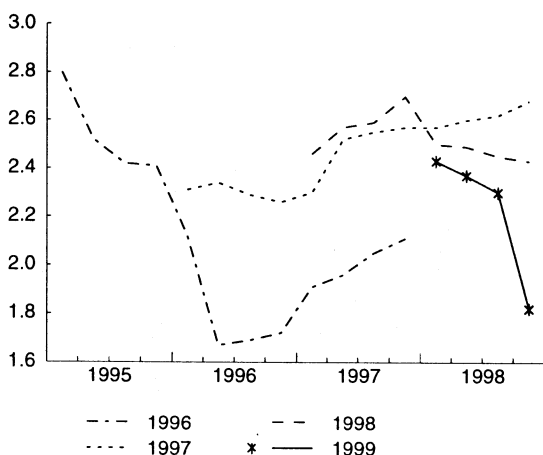
GDP growth among Norway's main trading partners appears to be slowing substantially. After expanding by 2.7 per cent in 1997, growth in 1999 may be less than 2 per cent. The turnaround must be seen in connection with the Asian crisis and its spread to Russia and Brazil, which has resulted in a negative demand impetus to the world economy. It is particularly in the US and the UK where the rate of growth is now slowing, but the forecasts for Germany and France for 1999 have also been revised downwards in recent months. In Japan, which has been severely affected by the Asian crisis and which itself has structural problems in the financial sector, GDP is expected to contract by 2.5 per cent this year. Lower economic activity on a global basis has contributed to a weak trend in commodity prices, especially crude oil prices. Consumer price inflation has also abated substantially and the forecasts point to inflation of about 1.5 per cent in 1999 for Norway's main trading partners, or slightly lower than the result for 1998. Along with the prospect of lower economic activity and the phasing in of EMU, this has already resulted in rate cuts in several countries, most recently as a concerted action of the 11 central banks of Euroland. Short-term interest rates may be further reduced in the period ahead, particularly in the US and the UK.

The US gross domestic product expanded by 3.9 per cent last year, the highest growth rate for nine years. GDP growth in the first three quarters of 1998 averaged 3.5 per cent (annual rate). Negative trade effects from Asia and Latin America, which combined account for nearly half of US exports, have been offset by a continued sharp rise in domestic demand. Private consumption has been stimulated by high income and asset price growth. The saving ratio, however, has fallen sharply, and saving is now turning negative. Fixed investment has expanded consider-

ably throughout the upturn in the 1990s, but there are now indications that investment growth will slow in the period ahead. A tighter credit supply and stricter risk assessment procedures from the financial sector are expected, partly because banks have recorded sizeable losses on investments in Eastern Asia and Russia. After six years of economic expansion, unemployment in the US is now at its lowest level for 25 years, at about 4.5 per cent. In spite of the tight labour market, consumer price inflation has remained subdued during this upturn. Price inflation this year is expected to be as low as 1.5 per cent, helped by a strong dollar and low rise in import prices. Low inflation and the prospect of slower growth in economic activity in the period ahead prompted the Federal Reserve to lower the inter-bank rate three times in October and November, by altogether 0.75 percentage point. Further rate cuts can be expected when clearer signs of an imminent downturn are evident. The forecasts indicate that GDP growth may slow by 1.5-2 percentage points from 1998 to 1999. Consumer price inflation may quicken next year as the price-dampening effects of the appreciation of the dollar and decline in commodity prices diminish. With a saving ratio close to zero, household demand is not likely to expand more than income in the period ahead, and a pronounced downturn in the course of 1999 can therefore not be ruled out.

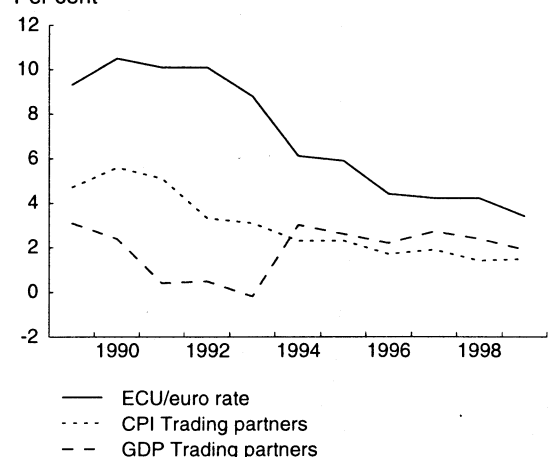
The economic situation in Japan has worsened substantially the past year. Output began to shrink last autumn and the decline continued through the first half of 1998. GDP is projected to contract by 2.5 per cent in 1998, the largest decline in the postwar period. The economic problems among some of Japan's Asian trading partners have had an adverse impact on both exports and financial institutions. Domestic demand has also moved on a sluggish trend this year despite the increase in households' real after-tax income.

GDP-growth forecasts for Norway's main trading partners for 1996 - 1999 given on different dates



Source: Consensus Forecasts.

GDP and consumer price growth for Norway's main trading partners, and 3 month ECU/euro rate
Per cent



Source: Statistics Norway.

me and a decline in interest rates (particularly long-term). This must probably be seen in connection with the problems in the banking sector and the weak trend in the labour market. In an attempt to restore confidence in the financial system, the authorities have just over the past year supplied liquidity to financial institutions equivalent to 12 per cent of GDP. The recession has also contributed to a considerable rise in unemployment, which this summer reached to about 4.5 per cent. Employment, particularly in manufacturing, has declined considerably in recent months, and the ratio of vacancies to job-seekers has fallen to 0.5, the lowest registered level since the index began in 1963.

Developments in the period ahead will partly depend on the effects of the large stimulus packages launched over the past six months, equivalent to about 5 per cent of GDP over a period of two years. Previously announced measures have only been implemented in part and temporary tax cuts seem to be having little effect on demand because market participants know that they will later be countered by a tightening of policy. The central bank's interest rate cannot be reduced further and long interest rates have fallen to an historically low level. In addition, the recent appreciation of the yen has increased the likelihood that the economy will end up in a deflationary spiral. Consumer prices are expected to fall by about 0.5 per cent next year, which may make it even more difficult to stimulate economic activity. This is part of the reason for the launch of the relatively strong fiscal stimulus package in mid-November. Although the package contains measures equivalent to about 4 per cent of GDP, it is doubtful whether growth in Japan's economy will be much higher than zero next year.

Economic activity in EU countries picked up somewhat last year, with GDP showing an average growth of 2.6 per cent. The growth rate is likely to remain high this year, while the forecasts point to a rise in GDP of about 2 per cent next year. Among the large EU countries, it is particularly in the UK that economic growth is expected to slow markedly, but it also appears that GDP in Germany and France will expand at a slightly slower rate next year. Italy has in recent years recorded the lowest GDP growth of all EU countries, but growth is expected to pick up next year, partly as a result of a substantial drop in interest rates. For all other EU countries, the forecasts point to lower GDP growth in 1999.

Higher net exports, fuelled by favourable exchange rate movements, were the driving force behind the expansion in the EU through 1997. This year domestic factors have taken over as the main driving force, while export market growth has tapered off, partly as a result of the financial crisis in Asia. With the prospect of slower growth in the US, the external impetus may be further weakened in the period ahead. Private consumption has picked up markedly in 1998, boosted by an increase in households' real disposable income. Fixed investment has also risen this year, which must be seen in connection with low interest rates

Economic forecasts for Norway's main trading partners

Annual per cent change

	1997	1998	1999	2000
USA				
GDP	3.9	3.5	1.5	2.2
Consumer price	1.9	0.8	1.2	1.9
Unemployment rate ¹ (level)	4.9	4.6	5.0	5.4
Japan				
GDP	0.8	-2.6	0.2	0.7
Consumer price	1.6	0.6	-0.7	-0.7
Unemployment rate ¹ (level)	3.4	4.2	4.6	4.9
Germany				
GDP	2.2	2.7	2.2	2.5
Consumer price	1.9	1.0	1.2	1.3
Unemployment rate ¹ (level)	11.4	11.2	10.8	10.3
France				
GDP	2.3	3.1	2.4	2.6
Consumer price	1.1	0.5	0.9	1.2
Unemployment rate ¹ (level)	12.4	11.8	11.2	10.6
United Kingdom				
GDP	3.5	2.7	0.8	1.5
Consumer price	2.6	2.0	2.8	2.5
Unemployment rate ¹ (level)	6.9	6.5	7.4	8.0
Italy				
GDP	1.5	1.5	2.1	2.6
Consumer price	2.4	2.3	1.8	1.3
Unemployment rate ¹ (level)	12.3	12.2	12.1	11.9
Sweden				
GDP	1.8	2.8	2.2	2.4
Consumer price	2.2	0.8	1.0	1.7
Unemployment rate ¹ (level)	8.0	6.5	6.3	6.0
Denmark				
GDP	3.3	2.4	2.0	1.9
Consumer price	2.2	1.9	2.5	3.0
Unemployment rate ¹ (level)	7.7	6.5	6.0	5.9
The Netherlands				
GDP	3.6	3.8	2.7	2.5
Consumer price	2.0	2.1	2.1	2.3
Unemployment rate ¹ (level)	5.5	4.1	4.2	4.4
Memorandum items:				
GDP trading partners	2.7	2.4	1.9	2.2
CPI trading partners	1.9	1.4	1.5	1.7
ECU interest rate	4.3	4.2	3.4	3.5

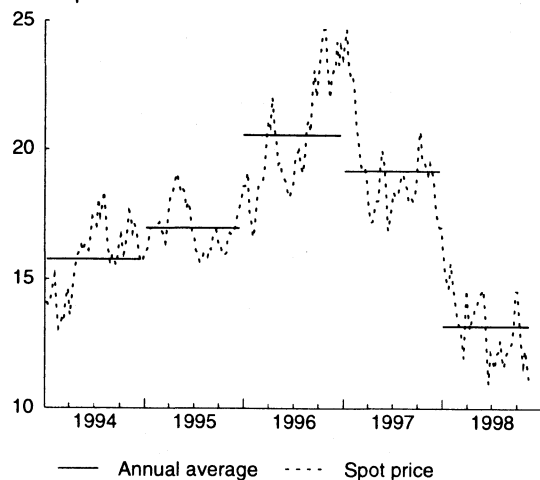
¹ Per cent of labour force.
Source: OECD

and the realization of EMU. Confidence indicators show, however, that both households and firms have become more pessimistic through the autumn of 1998, which may suggest a more sluggish trend for internal demand in the EU area in the period ahead. The recent fall in interest rates points to the opposite.

Consumer price inflation has slowed in most EU countries the past year, including countries that have recorded sharp GDP growth. In Germany and France, inflation is now

Spot price, Brent Blend

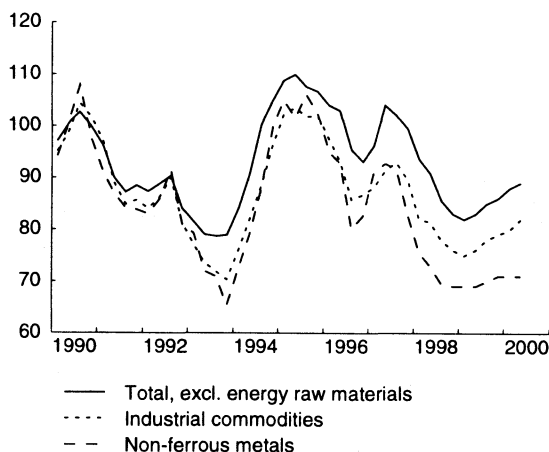
Dollar per barrel



Source: Petroleum Intelligence Weekly.

Commodity prices on the world market

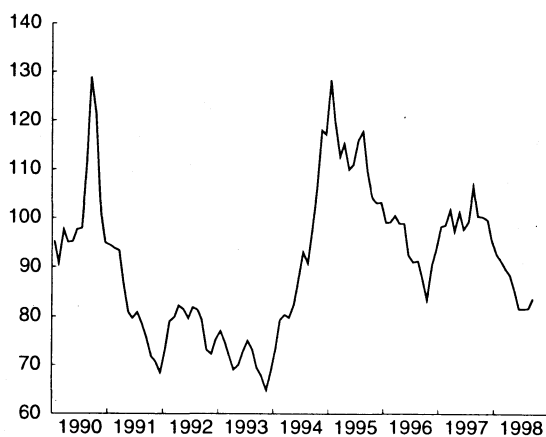
Dollar based indices. 1990 = 100



Source: HWWA-Institut für Wirtschaftsforschung.

Aluminium price

Dollar based index. 1979=100



Source: World Metal Statistics.

down to a year-on-year rate of 0.5-1 per cent. This must be viewed in connection with the slower rise in import prices in many countries as a result of the Asian crisis and the fall in crude oil prices. In addition, there is little domestic inflationary impetus. Despite a slight decline in unemployment in many countries, the unemployment rate is still high and wage growth is moderate in most EU countries. Consumer price inflation is expected to remain subdued in the period ahead.

January 1999 will mark the beginning of European Monetary Union, consisting of 11 EU countries. This means that all these countries will have the same interest rate level, controlled by the European Central Bank (ECB). Against this background, a number of euro countries have cut their interest rates considerably. In the beginning of December, most Euroland central banks lowered their base rates to 3 per cent. The ECB has announced that the objective of monetary policy will be to keep inflation (measured by the harmonized price index) below 2 per cent. As euro countries still expect very low price inflation in the period ahead, the ECB may find it desirable to reduce interest rates further in 1999. In the UK, the central bank has lowered interest rates in two steps this autumn, most recently by half a percentage point at the beginning of November. The central banks in both Denmark and Sweden have also lowered their key rates this autumn by 0.65 and 0.75 percentage point, respectively, in response to lower consumer price inflation.

Recent years' endeavours to qualify for EMU have left their mark on economic developments in continental EU countries. The 11 members of EMU recorded an average general government budget deficit equivalent to nearly 5 per cent of GDP in the period 1991-1995, whereas figures from Eurostat show that the deficit was reduced to 2.3 per cent in 1997. With EMU in place, the economic and political motives for further fiscal tightening are somewhat reduced. General government consumption and investment have also picked up in the first half of 1998. Sweden and Denmark are among the few EU countries with financial surpluses, while the UK is set to record a higher deficit next year as a result of weaker economic growth and a more expansionary fiscal policy.

Oil market

After falling from \$ 20 a barrel in November last year to about \$ 12 a barrel towards the end of March 1998, the spot price of Brent Blend has hovered between \$ 10 and \$ 15. As an average for the first 11 months of 1998, the price has been a little higher than \$ 13, which is below the average nominal price recorded in 1986.

The most important factor behind the sharp decline in the oil price through the first quarter of 1998 was the combination of OPEC's decision to raise quotas in November last year and reduced demand from Asia as a result of the substantial economic problems in the region. A mild winter in the OECD area also contributed to low demand for heating

oil. Furthermore, Iraq concluded a new and expanded agreement with the UN up to the end of November 1998. The combination of increased supply from OPEC and reduced demand resulted in an increase in oil stocks of a little more than 2 million b/d through the first half of 1998.

In May and June OPEC and a few other countries decided to implement production cuts of about 3 million b/d. Even though it appears that OPEC has succeeded in fulfilling more than 90 per cent of its approved reductions, the measure has not managed to boost the price of crude oil. Because the cartel previously raised quotas and Iraq increased its exports by about 1 million b/d within the expanded agreement with the UN, OPEC's total production on an annual basis may be slightly higher in 1998 than in 1997. Moreover, production in non-OPEC countries, particularly in Latin America, has edged higher.

Oil prices began to drift up towards \$ 15 in September, but this was primarily ascribable to a period of high demand for petrol in the US and a temporary halt in production in Nigeria, Colombia and the Gulf of Mexico. The oil price is now less than \$ 10 a barrel.

If we experience a normal, cold winter this year, oil stocks may be reduced by a little more than 1 million b/d in this period. According to the IEA, however, this is not sufficient to push up the oil price. At its ordinary ministerial meeting in Vienna in November, OPEC did not decide to extend the existing production limitations beyond the first half of 1999. Moreover, the UN has renewed its food-for-oil agreement with Iraq for an additional six months, and some increase in production can also be expected if the country gains access to spare parts. If OPEC does not adopt further production cuts relatively early in 1999, oil prices are likely to remain low in the period ahead.

Commodity prices

Commodity prices, excluding energy, peaked in May last year and have since fallen by more than 25 per cent. The decline must be viewed in connection with the Asian crisis and its spread to other regions, resulting in reduced demand for commodities in the global market. Prices for food and beverages and metals showed the steepest drop, falling by about 30 per cent, while prices for agricultural raw materials declined by 20 per cent in the same period. Timber prices have also moved on a weak trend so far this year, probably as a result of the sluggish construction market in Western Europe, particularly in Germany. Developments in the period ahead will partly depend on to what extent the reductions in interest rates will offset the negative demand impetus from the housing market in a number of countries. In its October report, the AIECE projects that commodity prices will level off and gradually rebound in 1999. This estimate is based on the assumption that GDP growth in the OECD area will remain approximately unchanged from 1998 to 1999, an assumption which now seems too optimistic.

Norwegian economy

Developments in 1998

Preliminary figures from the quarterly national accounts (QNA) and other economic data indicate that the prolonged upturn in the Norwegian economy continued through the third quarter of 1998, albeit at a slower pace than in earlier years. On the demand side, household consumption and petroleum investment were the main driving forces. So far this year, traditional merchandise exports have expanded far more slowly than in previous years, while mainland investment, according to preliminary seasonally adjusted figures, shows a decline. Figures on retail trade in October and car sales in October and November indicate that high interest rates are now contributing to reducing growth in household demand. With this trend and a continued decline in mainland investment, growth in mainland output and demand may be slightly lower in 1998 than in 1997. The positive trend in several labour market indicators so far in the fourth quarter illustrates, however, that the expected turnaround in the Norwegian economy is not yet clearly visible in the current statistics.

Whereas monetary policy over the past five years and up to the end of the first quarter of 1998 has generally had an expansionary effect, developments in interest rates and the exchange rate in the second, third and fourth quarters are expected to contribute to curbing growth in the Norwegian economy in the period ahead. In order to counteract growing appreciation pressures on the Norwegian krone, Norges Bank raised its key rates for banks by as much as 4.5 percentage points between end-March and mid-September. Money market rates increased by the same margin, and the three-month rate has stayed a little below 8 per cent since the end of August, a good 3.5 percentage points above the corresponding ECU rate. Financial institutions' lending and deposit rates have shadowed movements in the money market rate with a slight lag, and the average lending rate in private financial institutions rose from about 6.2 per cent at the end of the second quarter this year to 9.4 per cent at the end of the third quarter. With price inflation in the range of 2.5 to 3 per cent, this interest rate level will result in a real after-tax interest rate of about 3.5 to 4 per cent, i.e. about the same as in 1994 and 1996.

The sharp increase in Norges Bank's key rates has so far not been sufficient to bring the krone exchange rate back to a level which is compatible with the Exchange Rate Regulation's objective of a stable exchange rate. In the last three months the Norwegian krone has on average been 4 per cent cheaper against the ECU than the level which, according to the regulation, can be accepted over time, even though Norges Bank lately has intervened extensively in the exchange market.

Several factors probably contributed to the depreciation pressure on the Norwegian krone this year and the low exchange rate in the third and fourth quarters. The uncer-

tainty surrounding the future stance of fiscal policy has been emphasized as one possible explanation, but the importance of this in terms of future movements has probably been reduced following the budget compromise between the Government coalition parties, the Conservative Party and the Party of Progress. The rise in labour costs over the past few years may have played a role because, in isolation, this contributes to a substantial deterioration in Norwegian producers' cost competitiveness and thereby lower current-account surpluses than would otherwise have been the case. So far, however, the sharp fall in oil prices has had the most visible impact on Norway's external account, reinforced by a decline in the volume of oil and gas exports. These were the two main factors behind the decline in the current-account surplus, from NKr 47 billion in January-September 1997 to less than NKr 4 billion in the same period this year.

In contrast to monetary policy, fiscal policy has contributed to curbing growth in the economy over the past few years. According to the Ministry of Finance's fiscal policy indicator, however, the tightening effect has been reduced each year during the ongoing upturn. It nevertheless appears that general government demand will show slower growth this year than in the previous two years. This is being more or less offset by a sharp growth in minimum pensions and by the introduction of cash grants for families with one-year-olds, both of which contribute to boosting household income.

Over the past four years household demand has generated a considerable impetus to growth in the Norwegian economy. The sharp rise in households' purchases of goods in the second and third quarter this year imply that this will very likely be the case in 1998 as well. In the third quarter, however, these purchases grew at a slightly slower pace than in the second quarter, partly as a result of a moderate decline in purchases of private cars. Figures on new car registrations in October and November indicate a marked decline in the fourth quarter. Movements in the retail sales index for October also point to a levelling off or a moderate decline in consumer demand at the end of the year, after adjusting for normal seasonal variations. Household consumption is nevertheless set to rise by nearly 4 per cent at an annual rate, i.e. slightly more than in 1997.

Consumption trends towards the end of this year must be seen in connection with the sharp rise in interest rates the last few months. Higher interest rates make it more costly to own cars and other consumer durables, and therefore also have the effect of curbing demand for such goods. In isolation, the rise in interest rates also contributes to reducing growth in household real disposable income because Norwegian households have far higher debt than financial assets with a floating interest rate. A very sharp rise in wages and employment and the higher transfers to social

security recipients and families with small children nevertheless entail that growth in household real disposable income will in 1998 be about twice as high as the average for the last 20 years. This may push up the household saving ratio further from the high and relatively stable level recorded since the start of the cyclical upturn in 1993.

In the third quarter we saw the first indications that the rise in interest rates would contribute to curbing the brisk rise in house prices that we have witnessed the past five years. True, prices for existing owner-occupied dwellings rose further between the second and third quarter of 1998 on a national basis, but prices for existing cooperative dwellings stagnated, and both the Norwegian Realtors' Association and OBOS reported a slight decline in their prices in

this period. The fall in housing investment continued from the second to third quarter of 1998, and even though the negative trend in the figures on housing starts through the first half of the year may appear to have come to a halt in the last four months, this investment category is set to show a decline on an annual basis.

Over the past four years mainland fixed investment has made a contribution to growth in total demand equivalent to about 2 per cent of mainland GDP. For 1998, however, this demand component is likely to show virtually zero growth, following a seasonally adjusted decline through the last three quarters. In addition to housing investment, it appears that investment in private service industries has exhibited a weak trend this year, while manufacturing investment continues to expand. Statistics Norway's invest-

Macroeconomic indicators

Growth from previous period unless otherwise noted. Per cent

	1996	1997	Seasonally adjusted			
			97.4	98.1	98.2	98.3
Demand and output						
Consumption in households and non-profit organizations	4.7	3.4	1.0	0.5	1.8	1.4
General government consumption	3.2	3.0	1.0	0.9	0.2	0.4
Gross fixed investment	9.6	12.6	2.1	0.8	1.4	1.3
- mainland Norway	11.0	9.7	1.8	-2.3	-0.4	-1.3
- petroleum activities ¹	1.5	15.5	8.9	0.4	18.8	5.5
Final domestic demand from mainland Norway ²	5.4	4.5	1.1	0.0	1.0	0.6
Exports	9.8	5.8	0.3	2.4	-3.0	-2.3
- crude oil and natural gas	15.6	2.3	3.4	-0.7	-1.6	-8.0
- traditional goods	10.0	8.0	-0.4	3.7	-4.3	2.9
Imports	8.3	12.3	3.0	4.7	-2.7	0.5
- traditional goods	10.0	8.6	5.5	2.2	1.3	0.6
Gross domestic product	5.5	3.4	1.5	-0.2	0.4	-0.1
- mainland Norway	4.1	3.7	1.3	-0.1	1.1	0.6
Labour market³						
Man-hours worked	2.1	2.3	1.9	1.5	0.3	-0.9
Employed persons	2.5	2.9	0.5	0.8	0.1	0.5
Labour force	2.1	2.4	0.3	0.4	0.1	0.2
Unemployment rate, level ⁴	4.9	4.1	3.8	3.4	3.4	3.1
Prices						
Consumer price index ⁵	1.3	2.6	2.2	2.1	2.2	2.3
Export prices, traditional goods	-1.2	0.5	0.2	-0.7	0.0	-0.8
Import prices, traditional goods	0.1	-1.1	-1.8	0.7	0.9	0.0
Balance of payment						
Current balance, bill. NKR	68.6	55.8	9.7	8.0	0.0	-4.1
Memorandum items (unadjusted, level)						
Money market rate (3 month NIBOR)	4.8	3.6	3.8	3.8	4.4	6.5
Average borrowing rate ⁶	7.1	6.0	6.0	6.0	6.1	7.7
Crude oil price NKR (level) ⁷	133.1	135.6	133.9	106.7	100.0	95.2
Importweighted krone exchange rate	100.7	100.3	100.3	102.8	103.4	105.2
Norges Bank's ECU-index	102.5	100.3	100.1	102.5	103.5	106.7

¹ 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.

² Consumption in households and non-profit organizations + general government consumption + gross fixed capital formation in mainland Norway.

³ Figures for 1996 and 1997 are from the national accounts. The quarterly figures are from Statistics Norway's Labour force survey (LFS), since the new quarterly national account series for employment are too short for seasonal adjustment.

⁴ According to Statistics Norway's labour force survey (LFS).

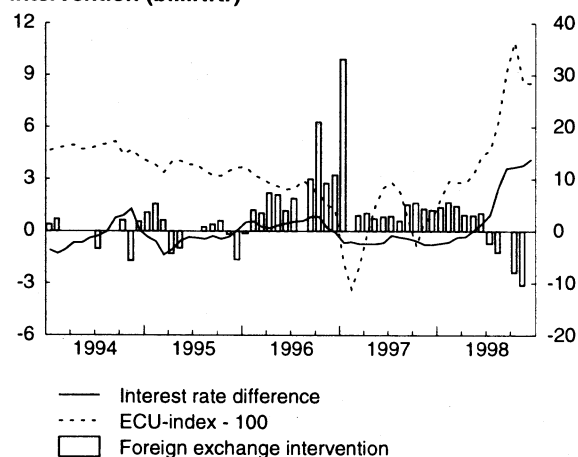
⁵ Percentage change from previous year.

⁶ Households' borrowing rate in private financial institutions.

⁷ Average spot price, Brent Blend.

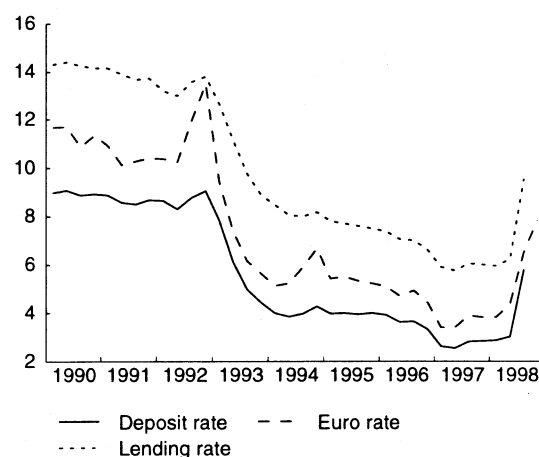
Sources: Statistics Norway and Norges Bank.

Interest rate difference and exchange rate against ECU and Norges Bank's foreign exchange intervention (bill.NKr)



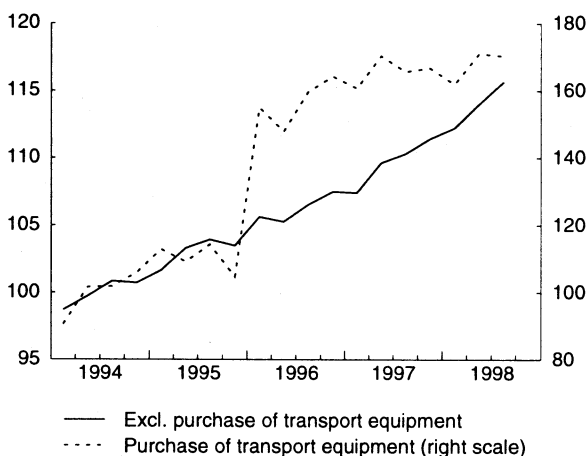
Source: Norges Bank.

Average deposit and lending rate in private financial institutions and 3 month NKr euro rate



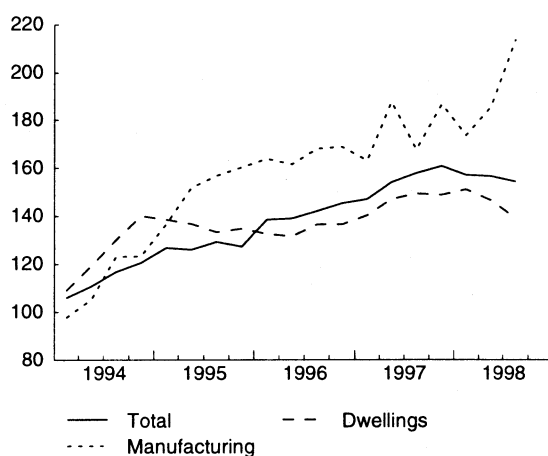
Source: Norges Bank.

Consumption in households
Seasonally adjusted volume indices, 1994=100



Source: Statistics Norway.

Gross fixed capital formation, mainland Norway
Seasonally adjusted volume indices, 1994=100



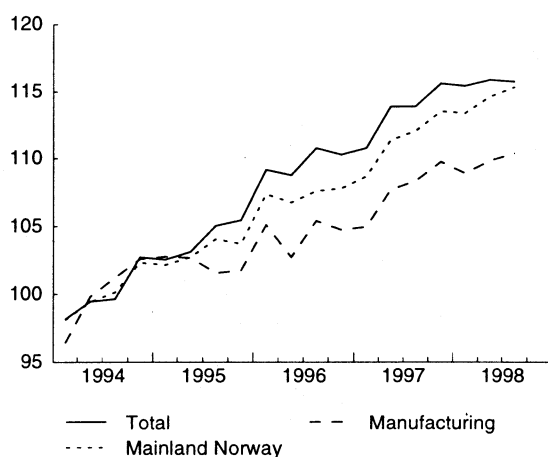
Source: Statistics Norway.

Exports
Seasonally adjusted volume indices, 1994=100



Source: Statistics Norway.

Gross domestic product
Seasonally adjusted volume indices, 1994=100



Source: Statistics Norway.

ment intentions survey for the third quarter of 1998 points, however, to a noticeably weaker trend in manufacturing investment next year, and the downward trend in commercial building starts indicates that construction investment in the business sector will also edge down in 1999.

Investment in petroleum activities has expanded markedly through 1998. Even though the authorities have called for postponing some field development projects until after 1 July next year, this investment component is set to rise very sharply again this year, according to Statistics Norway's investment statistics. The contribution to growth in total demand will probably be about 1.2 per cent of mainland GDP.

Despite pronounced growth in the volume of traditional merchandise exports in the third quarter, these exports are likely to generate a noticeably weaker growth impetus to the Norwegian economy in 1998 than in 1996 and 1997. For the first three quarters of the year, the average volume of traditional merchandise exports was only 4 per cent above the average level in the same period one year earlier, and it now appears that growth on an annual basis will be of about the same magnitude. The slower export growth must be seen in connection with accelerating increases in costs for Norwegian producers, which have only been partly offset by a weaker krone exchange rate, and developments in demand in Norwegian export markets. True, external trade statistics for the first ten months of 1998 show a sharp rise in exports of traditional goods to the UK and France compared with the level in the same period last year, as well as a reasonably favourable trend in exports to Germany, Sweden and the US. Exports to Japan and other countries in Asia, on the other hand, have exhibited a very sluggish trend this year. This reversal of last year's pattern primarily reflects major economic problems in important Asian economies, but also illustrates that the recession in Asia has so far not had significant negative effects on the level of activity among Norway's main trading partners.

Prices for Norway's traditional merchandise exports have fallen moderately through 1998, but the average for the first three quarters of the year were still slightly higher than the average level for last year. The Asian crisis, however, is now becoming visible in prices for exports of metals and chemical and mineral products. When we disregard refined oil products, where prices have edged down in step with the crude oil price, prices for the commodity-based component of Norwegian exports have fallen far more slowly over the past year than the spot price of metals and industrial raw materials. This may be because some export products are sold at contractual prices stipulated in US dollars, which have not yet been adjusted. The depreciation of the Norwegian krone of between 4 and 5 per cent against an export-weighted basket of currencies of our main trading partners has also contributed to maintaining export prices measured in Norwegian kroner.

The volume of oil and natural gas exports was slightly lower in the first three quarters of 1998 than in the same

period one year earlier. Production also showed a decline in this period. The weak trend in petroleum production and exports is partly related to delays in the completion of several development projects on the continental shelf, but must also be viewed in the light of the production limitations implemented from May of this year. Many OPEC countries have also reduced their oil production this year, without this being sufficient to halt the fall in crude oil prices. For the first eleven months of the year as a whole, the spot price of Brent Blend averaged \$ 13.10 a barrel, 32 per cent below the average for 1997. Lower nominal oil prices have not been recorded since 1975.

Measured at constant prices and adjusted for normal seasonal variations, traditional merchandise imports have continued to rise from one quarter to the next this year. On an annual basis, the growth may be of about the same magnitude as in the previous three years. The growth rate for traditional imports, however, has also slowed through 1998. This supports the impression of slower growth in domestic demand, but is also related to reduced export growth, which contributes to curbing the rise in production and thereby the demand for intermediate goods. Prices for traditional merchandise imports have shown little change during the last three to four years, and on a seasonally adjusted basis the level in the period to end-September 1998 was approximately on a par with the level in the same period last year. The stability of import prices over the past years must be seen in connection with subdued inflation among Norway's main trading partners and the fact that the appreciation of the import-weighted exchange rate from 1994 to 1995 was not reversed until this year.

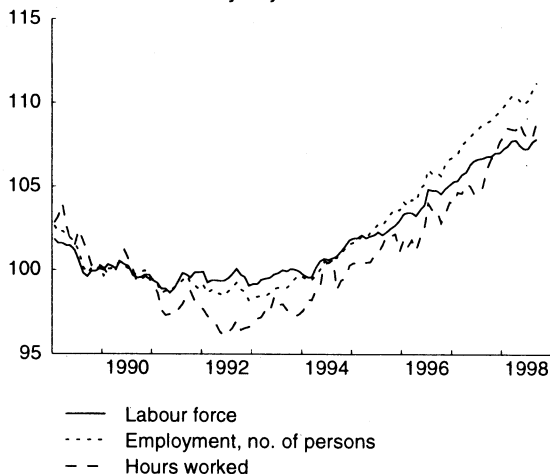
Preliminary QNA figures show a pronounced decline in petroleum production and slower mainland GDP growth so far in 1998. On an annual basis, growth rates are likely to be lower than in 1997, a development which will probably also apply to all main industries. The GDP figures must also be seen in connection with imports, which are growing at a faster pace than domestic use, and with developments in demand.

Employment growth has been very strong for most groups during this upturn. Signs that growth was levelling off, as indicated by Statistics Norway's Labour Force Survey (LFS) in the second quarter of 1998, were replaced by further gains in the third quarter. It nevertheless appears that employment on an annual basis will increase by a smaller margin than in the previous two years, in line with developments in mainland production. As during the upturn in the mid-1980s, the growth in employment in private service industries has been brisk the past few years. Unlike the previous upturn, however, manufacturing employment has also risen sharply, while the growth in public sector employment has been relatively modest.

The bulk of the employment growth in the last five years has its counterpart in an expansion of the labour force, partly as a result of a growth in the working-age population

Labour force and employment

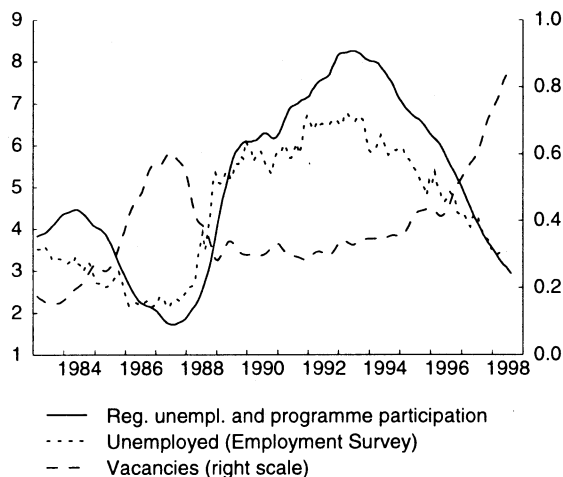
1990=100. Seasonally adjusted and smoothed



Source: Statistics Norway.

Unemployed and vacancies

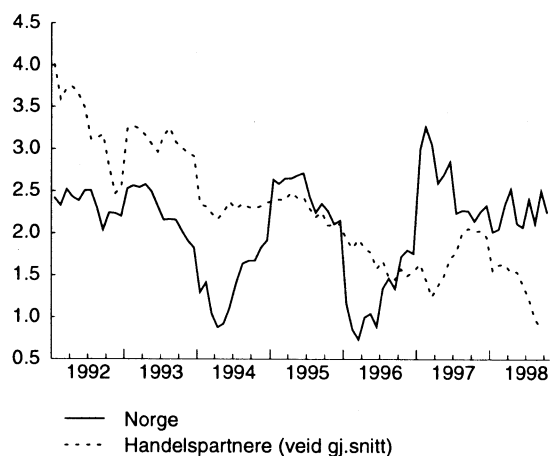
Trend. Per cent of labour force



Sources: The Directorate of Labour and Statistics Norway.

Konsumprisindekser

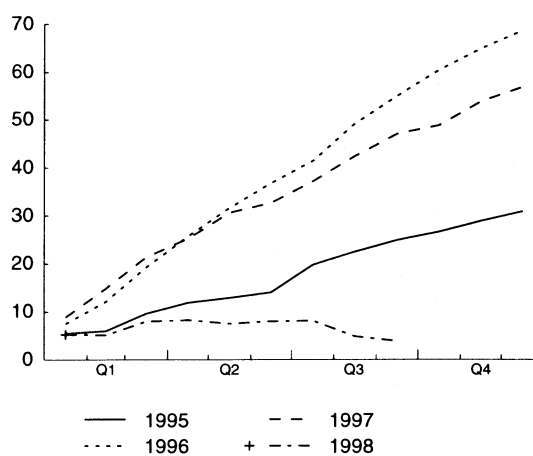
Prosentvis endring fra samme måned året før



Kilde: Statistisk sentralbyrå.

Current external balance 1995-1998

Cumulative figures in Nkr billion month by month



Source: Statistics Norway.

and partly as result of a sharp rise in participation rates, particularly for women. As an average for the first three quarters of 1998, as much as 73.4 per cent of the population in the age group 16-74 years was in the labour force, 5 percentage points more than in the trough year 1993.

The unemployment rate has been reduced by almost half in the same period, and according to the LFS stood at 3.3 per cent as a seasonally adjusted average for the first three quarters of 1998. Changes in the sum of registered unemployed according to the Directorate of Labour and persons participating in ordinary labour market measures up to end-November point to a further decline in LFS unemployment in the fourth quarter, entailing that unemployment on an annual basis may be reduced further. The number of vacancies at employment offices has moved on a sharp upward trend over the past two years, and the level in the third quarter of this year corresponded to as much as 28 per cent

of the number unemployed. The substantial regional differences in changes in the ratio of the number of vacancies to the number of unemployed indicate that we have also experienced growing regional imbalances in the labour market the last few years. Figures for October and November show, however, a slight decline in the number of vacancies, and may be the first indication that the labour market will be less tight in the period ahead.

The decline in unemployment the past few years has contributed to accelerating wage growth. The results of this year's settlements indicate a growth in wages per normal man-year of close to 6 per cent. This is between one and one and a half percentage points higher than the results for 1996 and 1997. So far, however, higher wage growth has not had a clearly visible effect in the form of accelerating price inflation. On a 12-month basis consumer prices rose at a slower rate in the first ten months of 1998 than in the same period last year, on average 2.2 and 2.6 per cent,

respectively. This decline, however, can primarily be ascribed to lower prices for clothing and electricity. So far this year, inflation in Norway has been nearly 1 percentage point higher than among our trading partners, whereas in the five-year period 1992-1996 it was generally a good half a percentage point lower. Developments in exchange rates and wage rates thus far in 1998 indicate, in isolation, that the inflation differential between Norway and our trading partners may widen slightly in the period ahead.

About two thirds of the decline in the current-account surplus of Nkr 43 billion from January-September 1997 to the same period this year has its counterpart in the reduced value of oil and gas exports, whereas the balance of goods and services, excluding sales of crude oil and natural gas, deteriorated by a good Nkr 17 billion. The deficit on the interest and transfers balance was, however, reduced by Nkr 3.5 billion primarily as a result of a pronounced rise in net interest income from abroad. With oil prices projected to remain low throughout the fourth quarter, the current account is now set to record a small deficit for the year as a whole.

Outlook for 1999 and 2000

Following a sustained upturn in the Norwegian economy, our calculations point to far slower growth in the period ahead, particularly as a result of a turnaround in investment. In addition, high interest rates and a somewhat tighter fiscal policy will curb growth in domestic demand. The estimates for international economic growth have been revised downwards during the autumn, pointing to a weaker trend for traditional merchandise exports in the period ahead. This also points to lower output and employment growth, which may result in a resumed rise in unemployment. As a result of the depreciation of the krone, price inflation will be slightly higher in the years ahead than in 1998, while real wage growth may remain high. Even though lower domestic demand will curb imports and contribute to improving the balance of payments position in 1999, low oil prices entail that the current-account balance is unlikely to show a large surplus.

Uncertain international prospects

There is now considerable uncertainty surrounding developments in the world economy. The effects of the crisis in many Asian countries have proved to be far greater than expected and have been amplified by the situation in Russia. After the IMF supplied considerable financial resources, however, there is some hope that a major financial crisis can be avoided. In line with this, we have in our calculations assumed a normal cyclical slowdown in the OECD area in 1999, with GDP growth of 1.5 per cent for the area as a whole and a little less than 2 per cent for Norway's main trading partners. Against this background, we have lowered our estimate for market growth among Norway's trading partners by about one percentage point in 1999, while the projection for growth in 2000 has only been revised downwards by a small margin.

Inflation among Norway's trading partners is now down to a year-on-year rate of about 1.5 per cent. The inflation rate is expected to rise only moderately through 1999 and into 2000. A weak rise in commodity prices is an important factor behind the moderate price inflation in the OECD area, not least thanks to low oil prices. With weaker demand growth in 1999, it is not very likely that oil prices will rise sharply in the near future. We have, however, assumed that the oil price will edge up through 1999, measured in dollars. The price measured in Norwegian kroner will increase less due to a projected krone appreciation through the coming winter months.

Against the background of subdued price inflation and the prospect of slower growth in the level of activity, a number of central banks have lowered their key rates this autumn. Interest rates are expected to fall further in the period ahead, particularly in the US and the UK. In the EU, interest rates have moved down to the level in Germany and France in those countries that will participate in EMU from 1 January 1999, and most of the central banks of these countries recently lowered their base rates to 3 per cent. We have assumed that the common 3 months euro rate will be about 3.4 per cent at the beginning of 1999. It is unlikely that this interest rate will change substantially in the period ahead, unless there is a major international recession.

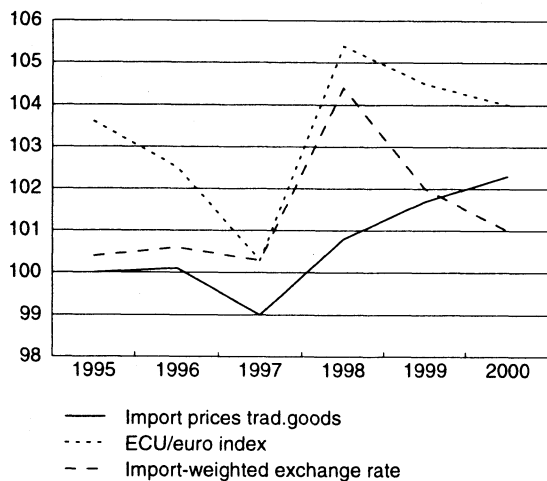
Interest and exchange rates in Norway

In recent months the money market rate in Norway has been fairly stable at about 8 per cent. The krone exchange rate against the ECU has varied considerably. At the end of November the ECU index stood at 108.1, entailing a depreciation of the krone of 6.8 per cent from the end of 1997. The import-weighted exchange rate largely shadowed changes in the ECU index during the first half of 1998, but has since depreciated slightly less. Measured in this way, the krone exchange rate at the end of November was 105.8, entailing a depreciation of 4.7 per cent from the end of 1997.

Now that the government budget for 1999 has been adopted, some of the uncertainty concerning economic policy has been eliminated, which may help to strengthen the krone exchange rate in the period ahead. A more important factor influencing changes in the krone exchange rate is probably the prospect of an improvement in the current-account balance even with low oil prices. As the high growth in domestic demand is gradually curbed, a factor which will contribute to lower growth or even a decline in imports, the current-account deficit from the second half of 1998 will be reversed to a surplus. A further improvement will take place should export earnings again rise, for example as a result of higher oil prices and/or higher oil production.

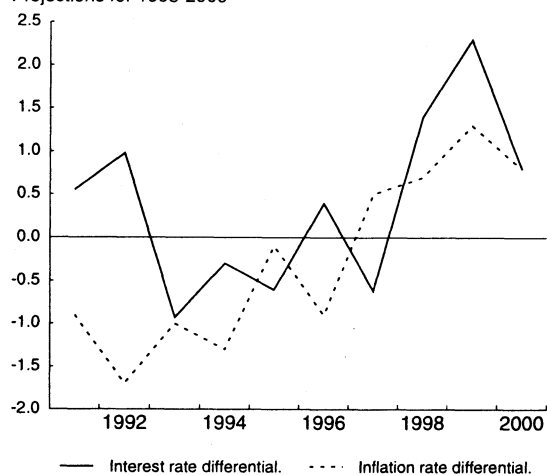
We project that the krone exchange rate will return to the mid-point in the existing band of fluctuation for the krone exchange rate against ECU (which is 104) and that Norges

Import prices and exchange rates 1995-2000
Indices



Source: Statistics Norway

Interest rate and inflation differential between Nkr, and the ECU/EURO, 1991-2000
Projections for 1998-2000



Source: Central Bank of Norway and Statistics Norway.

Bank will then start to lower its key rates. It is likely that interest rates will be reduced gradually, but the pace of this reduction is uncertain. According to our projections, Norwegian money market rates will fall to 4.2 per cent at the beginning of 2000. This entails an interest rate differential against the euro of 0.8 percentage point, approximately the same as the inflation differential. As illustrated in a figure, the interest rate and inflation differentials between Norway and the ECU/euro area have generally shadowed each other for a number of years. As an annual average, the Norwegian krone is expected to appreciate by 0.9 per cent against the ECU in 1999, while the depreciation in 1998 is estimated at 5.2 per cent.

The US dollar and pound sterling are expected to depreciate against the ECU/euro in the period ahead, in line with developments observed over a period. Projected lower economic growth and falling money market rates in the US and the UK are important factors behind this. A change in

the exchange rate between the dollar and pound sterling on the one hand and the euro on the other has consequences for the import-weighted krone exchange rate. It is assumed that this exchange rate measure will appreciate slightly more in the period ahead than the krone appreciation against the ECU, thereby returning the krone to the level recorded in the period 1995-1997 in the course of 1999.

Compared with the projections in our last quarterly survey, the rise in import prices has now been revised downwards substantially. As noted, this is ascribable to the assumed return of the import-weighted krone exchange rate in the course of 1999 to the level prevailing during 1995-1997, while in our previous report we allowed the import-weighted exchange rate and the ECU/euro index to shadow each other in the period ahead. This change in the assumed movement of the import weighted krone exchange rate entails a substantially lower inflationary impetus to the Norwegian economy in 1999 than assumed in our last report.

Moderate tightening of fiscal policy in 1999

The approved government budget for 1999 entails some tightening of fiscal policy in relation to 1998. The tightening, however, was somewhat less than called for by the Government in its original government budget proposal, partly because the proposed tax increases were not approved. The adopted budget entails cuts in allocations for civilian, central government programmes of about Nkr 1 billion compared with the Government's original proposal and supplementary allocations to defence of about Nkr 0.5 billion. Some tightening of the social security budget was also approved. All in all, the approved proposal entails that our projection for growth in general government consumption has been revised downwards by half a percentage point compared with the last quarterly survey, and that the projection for general government gross investment has been revised downwards by slightly more.

Substantial fall in petroleum investment ahead

Petroleum investment is set to expand by about 19 per cent from 1997 to 1998. For 1999, we now expect investment to decline by about the same margin. Measured as a share of mainland GDP, this corresponds to a fall in demand of 1.4 per cent.

Low oil prices and sizeable cost overruns for many projects have reduced profitability in oil activities considerably during 1998. Against this background, there is reason to assume that oil companies are now reassessing their investment plans both for 1999 and for subsequent years. Continued low oil prices in the period ahead will probably prompt companies to postpone investment projects, which may result in a continued, sharp decline in investment in 2000. We have assumed a further decline in petroleum investment of 16 per cent from 1999 to 2000.

Main economic indicators

Percentage change from previous year unless otherwise noted

	Accounts		Forecasts			
	1997	1998	1999		2000	
		SN	SN	MoF ¹	NB ²	SN
Demand and output						
Consumption in households and non-profit organizations	3.4	3.8	1.3	2.7	2	2.2
General government consumption	3.0	2.4	0.7	1.1	1 1/2	2.2
Gross fixed investment	12.6	4.7	-11.1	-6.6	-6 3/4	-5.8
-petroleum activities ³	15.5	18.8	-18.7	-12.5	-10	-16.0
-mainland Norway	9.7	0.8	-9.2	-4.9	-6	-2.6
-firms	9.1	1.6	-11.7	-7.5	-9	-4.9
-housing	9.0	-2.1	-7.0	3.8	-2 3/4	2.6
-general government	12.1	0.8	-3.0	-3.8	1	0
Demand from mainland Norway ⁴	4.5	2.9	-0.8	..	1/4	1.4
Stockbuilding ⁵	0.6	0.5	0.0	0.2	..	0.0
Exports	5.8	1.3	4.6	6.6	4 1/2	5.4
- crude oil and natural gas	2.3	-1.7	8.5	10.5	6 1/2	7.9
- traditional goods	8.0	3.6	2.6	4.7	4	3.3
Imports	12.3	5.9	-2.4	0.5	-3/4	1.1
- traditional goods	8.6	8.6	-1.9	1.6	0	-0.1
Gross domestic product	3.4	2.4	0.8	2.6	2	2.2
- mainland Norway	3.7	3.1	-0.3	1.3	1 1/4	1.2
Labour market						
Employed persons	2.9	2.2	-0.5	0.7	1	0.2
Unemployment rate (level)	4.1	3.2	4.0	3.2	3	4.2
Prices and wages						
Wages per standard man-year	4.6	5.9	5.1	5	6 1/2	4.1
Consumer price index	2.6	2.3	2.8	3 1/4	3 1/4	2.7
Export prices, traditional goods	0.5	1.0	0.8	1.9	3	2.3
Import prices, traditional goods	-1.1	1.8	0.9	1.9	3 1/4	0.6
Real price, dwellings	5.8	7.7	0.4	..	..	7.2
Balance of payment						
Current balance (bill. Nkr)	56.8	-2	24	32.5	30	69
Current balance (per cent of GDP)	5.2	-0.2	2.1	2.8	2 1/2	5.7
Memorandum items:						
Household savings ratio	6.6	7.3	7.0	7.0	6 3/4	6.6
Money market rate (level)	3.6	5.6	5.8	..	8	4.2
Average borrowing rate (level) ⁶	6.0	7.3	8.1	..	..	6.2
Crude oil price Nkr (level) ⁷	136	96	93	110	104	109
International market growth	6.8	5.2	4.5	..	..	5.9
Importweighted krone exchange rate ⁸	-0.5	4.2	-2.4	-1.5 ⁹	2.2	-1.0

¹ MoF: Ministry of Finance's forecasts. Revised national budget 1999.² NB: Forecasts according to Norges Bank. Penger og Kredit 1998/3.³ Oil and gas extraction proper, pipeline transport and service activities incidental to oil- and gas extraction.⁴ Consumption in households and non-profit organizations + general government + gross fixed capital formation in mainland Norway.⁵ Change in stockbuilding. Per cent of GDP.⁶ Households' borrowing rate in private financial institutions.⁷ Average, Norwegian oil production.⁸ Increasing index implies depreciation.⁹ Manufacturing trade weights.

Investment in the petroleum sector over the next two years is expected to shift towards major direct deliveries from abroad. The negative impetus from this will thereby be slightly greater than the investment figures would indicate in isolation.

Norwegian oil production has exhibited a sluggish trend in 1998, partly due to approved production limitations. Oil production is expected to be higher in 1999 as capacity increases. Gas production is also expected to rise, with

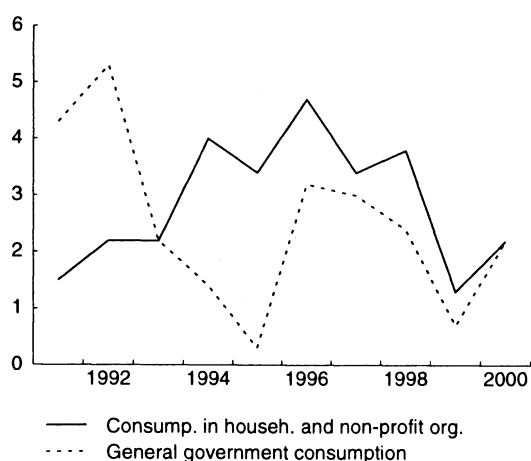
growth continuing into 2000, while oil production is then expected to remain relatively stable.

Zero growth in the mainland economy in 1999?

Mainland GDP growth in 1998 can be estimated at 3.1 per cent, slightly lower than in the previous year. The low growth in petroleum production entails that growth in total GDP is now estimated at 2.4 per cent in 1998. As in our previous quarterly survey, growth in the mainland econo-

Consumption

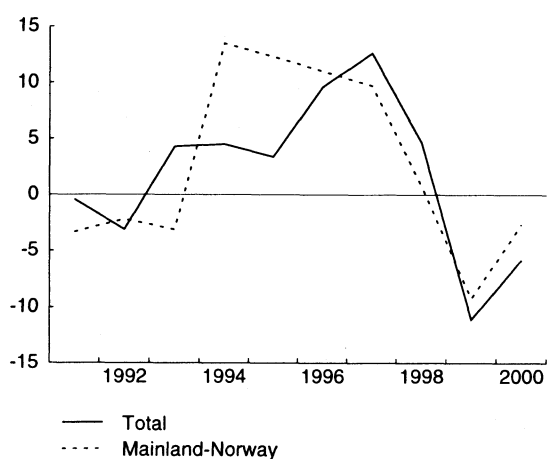
Percentage growth



Source: Statistics Norway

Gross fixed capital formation

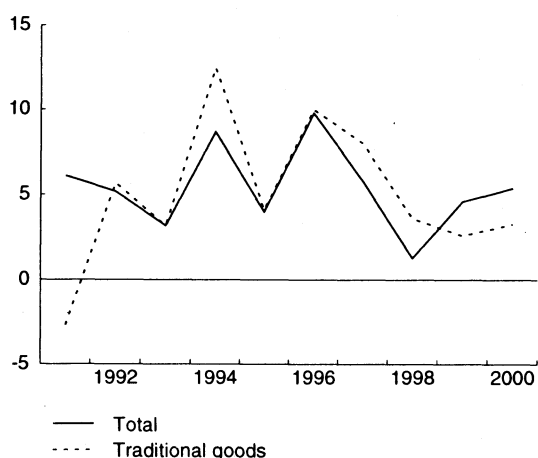
Percentage growth



Source: Statistics Norway

Exports

Percentage growth



Source: Statistics Norway

my is expected to be substantially lower in 1999 and perhaps even negative. The downward adjustments in growth projections for 1999 are primarily related to the assumption of a slightly tighter fiscal policy, a weaker growth stimulus from the international economy and from petroleum-related activities as well as the effects of a stronger import-weighted krone exchange rate.

Even though only parts of the mainland economy are showing signs of a decline in investment at the moment, we still project that investment will be the main factor behind a cyclical turnaround next year. A fall in general government investment, housing investment, manufacturing investment and petroleum investment will contribute to this. Along with the completion of a number of major projects which have received considerable attention in recent years, we now project a decline in gross fixed investment of as much as 11.1 per cent next year. For petroleum activities, manufacturing and the power supply sector, our assumptions concerning investment are generally in line with the companies' own estimates, but we have assumed a slightly smaller investment decline in manufacturing than the level indicated by the companies. Housing investment has already fallen through 1998 and figures on housing starts indicate a further fall in 1999. As a result of the increase in interest rates, residential construction is not expected to show any increase until the end of next year. Housing investment may then resume an upward trend in 2000. Investment in private services is also projected to decline substantially next year. The completion of a number of major projects will contribute to this, but the decline will level off somewhat through 1999 as the sharp downturn in the economy is curbed and production again increases.

The investment projections for 2000 are more uncertain, particularly for the petroleum sector. Low oil prices have prompted oil companies to reassess their projects with the aim of cutting costs and possibly postponing projects. The longer oil prices remain low in 1999, the more projects will be postponed and the more difficult it will be to avoid a substantial decline in investment also in 2000. As noted earlier, petroleum investment is projected to decline by 16 per cent in 2000. However, investment in the power supply sector may rise considerably in 2000 through the construction of gas-fired power stations.

Household consumption appears to be expanding by about 4 per cent in 1998, although there are signs that growth is levelling off. Car sales have fallen noticeably the last two months and retail sales are flat, albeit following sharp growth. The household saving ratio is set to increase by about half a percentage point in 1998 to an historically very high level. Markedly lower growth in households' real income next year will curb consumption growth in 1999. High interest rates will also contribute to this.

Traditional merchandise exports have exhibited little growth through 1998 and are now showing clear signs of stagnation. This is not unexpected in view of the weak

economic outlook internationally. International market growth is estimated at 4.5 per cent in 1999, against 5.2 per cent in 1998. The weak growth in traditional exports is therefore expected to continue through 1999. The depreciation of the krone since the summer has, in isolation, enhanced competitiveness for export-oriented industries and is offsetting the effect of relatively high wage growth in Norway in 1998. However, if the krone again appreciates, as we have assumed, cost levels will contribute to reducing export growth in the period ahead and market shares will be lost. The deterioration in competitiveness will, in isolation, also contribute to increasing import shares.

Our projections for mainland GDP for 1999 show a slight decline compared with the estimate for 1998. This entails a downward revision of three quarters of a percentage point compared with our last report. The growth projection for total GDP has been revised down by almost one percentage point as it is now assumed that exports of oil and gas will show slower growth than earlier. The construction industry in particular will notice the effects of the turnaround in the Norwegian economy as a result of the sharp fall in investment. This sector, however, has been one of the "winners" during this cyclical upturn which now seems to be coming to a halt. Direct and indirect suppliers of other investment goods to, for example, the petroleum sector will find themselves in a similar situation. A lower growth in consumption, however, will also have a negative impact on domestic trade and service industries.

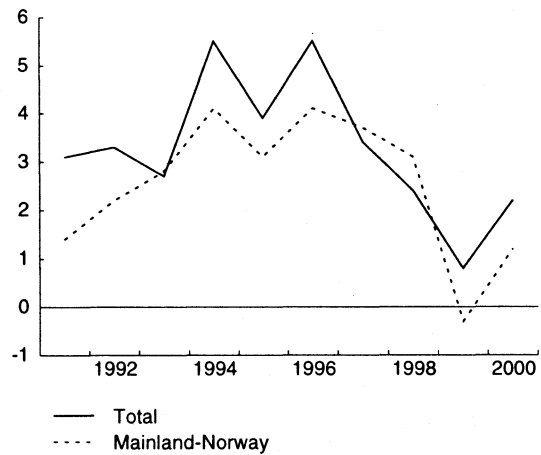
The mainland economy is expected to show weak growth in 2000. We assume that fiscal policy will be approximately neutral as the decline in general government investment comes to a halt, general government consumption again expands and tax rates are only adjusted for price and wage inflation. This will generate a small positive impetus compared with fiscal policy in 1999. As a result of lower interest rates, consumption growth will pick up and the decline in housing investment will be reversed to an expansion so that domestic demand from mainland Norway again increases. Our projection for GDP growth in 2000 will thus be more in line with the estimate presented in the last quarterly survey.

Higher unemployment next year?

Without the prospect of output growth in 1999, employment growth will come to a halt, and both man-hours worked and the number employed may edge down next year. With a weaker labour market, the supply of labour will also decline markedly, but unemployment will probably start to increase as early as the beginning of next year. Usually a shift towards higher unemployment will push up unemployment more quickly than the decline recorded during a boom. This is also the case for our projections next year, entailing that unemployment as an annual average will be higher than in 1998.

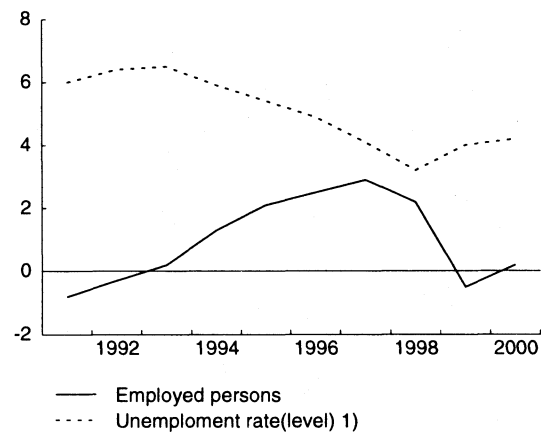
There is uncertainty associated with how much unemployment will rise next year. This is partly because the decline

Gross domestic product
Percentage growth



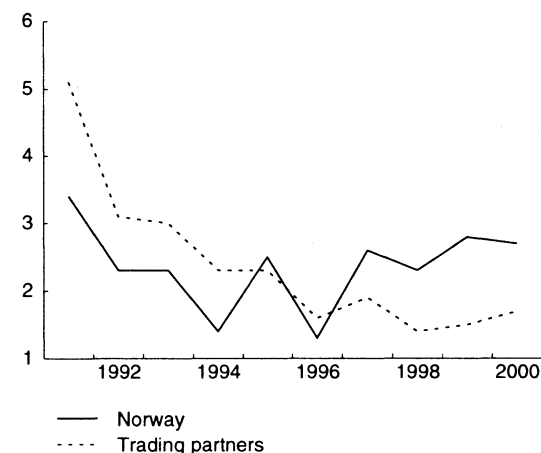
Source: Statistics Norway

Labour market
Percent



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

Consumer price indices
Percentage growth



Source: Statistics Norway

in production will have a severe impact on the construction industry where the proportion of foreign labour has increased during the upturn. When the downturn starts, it is conceivable that foreign workers are the first to be dismissed so that the decline will have less of an effect on observed unemployment in Norway. The introduction of cash grants in 1998 and the expansion of the scheme in 1999 may reduce the supply of labour slightly. In addition, the early retirement scheme is being used by an increasing number of older and younger employees entailing that labour force participation for persons over the age of 62 is falling. Our model for labour force participation by sex and age only captures a small part of such policy changes and entails that the estimates for the labour force and therefore unemployment are particularly uncertain next year.

Higher price inflation and lower wage growth ahead

Consumer price inflation has remained low in 1998 and is now set to be 2.2-2.3 per cent as an annual rate, i.e. slightly lower than in 1997. Low electricity prices are one of the reasons for the surprisingly low inflation rate in 1998. So far, there have been few signs that the weak krone exchange rate has fed through to consumer prices. An important factor here is that the import-weighted krone exchange rate has not depreciated as much as the ECU rate. Furthermore, high wage growth in 1998 has so far not had much effect on consumer price inflation. However, this is consistent with previous experience which shows that it takes time before higher costs feed through to consumer prices.

The government budget for 1999 entails a small downward adjustment in excise duties from the turn of the year. This means that the contribution to inflation from indirect tax changes will be reduced by half a percentage point from the turn of the year, a factor which, other things equal, should contribute to a decline in year-on-year consumer price inflation in January 1999. On the other hand, there is reason to assume that higher costs due to the wage settlements in 1998 along with higher import prices will, in isolation, push up price inflation. Our calculations therefore indicate that price inflation will only rise moderately from the beginning of 1999. Cost impulses, however, will gradually feed through to price inflation, and it is unlikely that electricity prices will continue to fall. Hence, consumer price inflation may edge up through 1999, and the consumer price index is expected to increase by 2.8 per cent for the year as a whole. This estimate is 0.8 percentage point lower than in our last quarterly survey, primarily reflecting lower projections for the rise in import prices both for the end of 1998 and for 1999.

With a lower projection for consumer price inflation in 1999, wage growth may also be slightly lower than we assumed earlier. We now believe that wage growth may be a good 5 per cent next year compared to about 6 per cent in 1998. Slower wage growth in manufacturing industry, along with higher unemployment and the fact that there will be no main settlement next year, will contribute to

this. All in all, our projections entail that real wage growth next year will be a little higher than 2 per cent. This growth will contribute to an increase in household income and thereby counteract the negative contribution from the fall in employment.

Current-account surplus as early as 1999

As a result of low oil prices this autumn, the current-account balance is likely to show a small deficit in 1998. As noted, there is considerable uncertainty concerning oil prices in the period ahead and the possibility that oil prices will remain low in 1999 cannot be ruled out. However, we project a slight rise in prices through next year. An increase in oil and gas production, weaker domestic demand and a slower rise in import prices imply that Norway will again record a current-account surplus next year. This is considered an important precondition for an appreciation of the krone and a decline in interest rates through 1999.

National accounts: Final expenditure and gross domestic product

At fixed 1995 prices. Million kroner

	Unadjusted		Seasonally adjusted							
	1996	1997	96.4	97.1	97.2	97.3	97.4	98.1	98.2	98.3
Final consumption exp. of housh. and NPISHs ¹	479888	496319	121670	121417	124208	124744	125949	126608	128893	130643
Household final consumption expenditure	456574	472933	115854	115589	118356	118893	120094	120801	123105	124869
Goods	261607	270914	66560	66004	67533	68294	69083	69140	71555	72638
Services	191119	196411	48189	48529	49260	49070	49551	49994	50083	50721
Direct purchases abroad by resident househ	18844	20731	4700	4873	5361	5263	5234	5379	5247	5471
-Direct purchases by non-residents	-14996	-15124	-3595	-3817	-3799	-3734	-3774	-3712	-3780	-3962
Final consumption exp. of NPISHs	23315	23386	5816	5828	5852	5851	5855	5808	5788	5774
Final consump. exp. of general government	200797	206781	50501	51301	51421	51766	52292	52754	52844	53038
Final consump. exp. of central government	80085	82027	20148	20477	20343	20487	20720	20866	20786	20865
Central government, civilian	58726	59735	14787	14920	14806	14933	15077	15251	15292	15327
Central government, defence	21358	22292	5362	5558	5536	5554	5643	5615	5494	5538
Final consump. exp. of local government	120713	124754	30352	30824	31078	31279	31573	31888	32058	32173
Gross fixed capital formation	211084	237777	57391	56407	59970	60076	61324	61802	62692	63516
Petroleum activities	48667	56206	14993	12781	14933	13638	14854	14913	17712	18686
Ocean transport	6113	10124	2210	2946	2405	2768	2005	3444	1709	2125
Mainland Norway	156303	171447	40188	40680	42632	43670	44465	43445	43271	42705
Mainland Norway ex. general government	125301	136709	32063	31921	33689	35044	36055	33944	34064	34303
Manufacturing and mining	17175	18270	4376	4226	4865	4345	4835	4498	4803	5534
Production of other goods	12762	12995	3291	3127	3261	3375	3233	3374	3254	3264
Dwellings	26149	28497	6650	6824	7160	7270	7242	7350	7136	6763
Other services	69215	76946	17746	17745	18403	20054	20744	18722	18871	18742
General government	31002	34738	8125	8759	8943	8626	8410	9501	9207	8402
Changes in stocks and stat. discrepancies	22049	23917	3917	3586	6818	5115	8398	8366	6522	6283
Gross capital formation	233133	261693	61308	59993	66788	65191	69721	70168	69214	69799
Final domestic use of goods and services	913818	964793	233479	232712	242416	241702	247963	249530	250952	253480
Final demand from mainland Norway ²	836989	874546	212359	213399	218260	220181	222707	222807	225009	226386
Final demand from general government ³	231799	241519	58626	60060	60363	60393	60702	62255	62051	61440
Total exports	388209	410702	100284	99818	103939	103323	103622	106083	102927	100555
Traditional goods	157809	170493	40187	40005	43654	43511	43322	44944	43002	44251
Crude oil and natural gas	130894	133959	33410	31837	35300	32855	33967	33714	33169	30523
Ships and oil platforms	8862	9896	2922	4315	1276	2240	2066	2998	2374	1512
Services	90644	96354	23765	23661	23709	24717	24267	24426	24381	24269
Total use of goods and services	1302028	1375495	333762	332530	346355	345025	351585	355613	353879	354035
Total imports	322470	362209	87648	85312	92266	90940	93692	98108	95451	95898
Traditional goods	223147	242355	58332	56155	61280	60784	64136	65562	66430	66829
Crude oil	1059	1235	461	457	216	315	247	456	295	344
Ships and oil platforms	17010	23179	7522	6770	6473	5549	4388	7246	4273	3896
Services	81255	95440	21333	21929	24297	24292	24921	24844	24453	24829
Gross domestic product ⁴	979557	1013286	246115	247218	254090	254085	257893	257505	258428	258137
Mainland Norway (market prices)	822300	853090	206371	208108	213196	214465	217321	217052	219374	220736
Petroleum activities and ocean transport	157257	160196	39744	39111	40894	39620	40572	40453	39053	37401
Mainland Norway (basic prices)	713616	740206	178754	180880	184815	186097	188414	189060	190505	191340
Mainland Norway ex. general government	561604	584407	140564	142288	146043	147011	149064	149410	150845	151499
Manufacturing and mining	115478	119000	28934	28997	29755	29926	30322	30089	30347	30493
Production of other goods	76648	80611	18791	19210	20373	20448	20580	20786	20390	20648
Service industries	369478	384796	92839	94081	95915	96637	98163	98535	100109	100358
General government	152013	155799	38189	38592	38772	39086	39349	39651	39660	39842
Correction items	108684	112883	27618	27227	28381	28368	28907	27991	28869	29396

National accounts: Final expenditure and gross domestic product

At fixed 1995 prices. Percentage volume change from previous period

	Unadjusted		Seasonally adjusted							
	1996	1997	96.4	97.1	97.2	97.3	97.4	98.1	98.2	98.3
Final consumption exp. of housh. and NPISHs ¹ . . .	4.7	3.4	1.1	-0.2	2.3	0.4	1.0	0.5	1.8	1.4
Household final consumption expenditure	4.9	3.6	1.1	-0.2	2.4	0.5	1.0	0.6	1.9	1.4
Goods	6.2	3.6	1.8	-0.8	2.3	1.1	1.2	0.1	3.5	1.5
Services	2.9	2.8	0.4	0.7	1.5	-0.4	1.0	0.9	0.2	1.3
Direct purchases abroad by resident househ.	4.7	10.0	-2.9	3.7	10.0	-1.8	-0.5	2.8	-2.5	4.3
-Direct purchases by non-residents	0.1	0.9	-1.7	6.2	-0.5	-1.7	1.1	-1.6	1.8	4.8
Final consumption exp. of NPISHs	0.3	0.3	0.0	0.2	0.4	-0.0	0.1	-0.8	-0.3	-0.2
Final consump. exp. of general government	3.2	3.0	0.5	1.6	0.2	0.7	1.0	0.9	0.2	0.4
Final consump. exp. of central government	3.2	2.4	0.4	1.6	-0.7	0.7	1.1	0.7	-0.4	0.4
Central government,civilian	3.3	1.7	0.6	0.9	-0.8	0.9	1.0	1.2	0.3	0.2
Central government,defence	3.0	4.4	-0.3	3.7	-0.4	0.3	1.6	-0.5	-2.1	0.8
Final consump. exp. of local government	3.2	3.3	0.5	1.6	0.8	0.6	0.9	1.0	0.5	0.4
Gross fixed capital formation	9.6	12.6	8.8	-1.7	6.3	0.2	2.1	0.8	1.4	1.3
Petroleum activities	1.5	15.5	26.4	-14.8	16.8	-8.7	8.9	0.4	18.8	5.5
Ocean transport	63.8	65.6	41.7	33.3	-18.4	15.1	-27.6	71.8	-50.4	24.3
Mainland Norway	11.0	9.7	2.2	1.2	4.8	2.4	1.8	-2.3	-0.4	-1.3
Mainland Norway ex.general government.	12.9	9.1	2.3	-0.4	5.5	4.0	2.9	-5.9	0.4	0.7
Manufacturing and mining	9.4	6.4	0.4	-3.4	15.1	-10.7	11.3	-7.0	6.8	15.2
Production of other goods.	-3.9	1.8	5.1	-5.0	4.3	3.5	-4.2	4.3	-3.5	0.3
Dwellings	-1.2	9.0	0.1	2.6	4.9	1.5	-0.4	1.5	-2.9	-5.2
Other services	24.7	11.2	3.1	-0.0	3.7	9.0	3.4	-9.7	0.8	-0.7
General government	3.7	12.1	1.9	7.8	2.1	-3.5	-2.5	13.0	-3.1	-8.7
Changes in stocks and stat. discrepancies	-19.6	8.5	-51.1	-8.4	90.1	-25.0	64.2	-0.4	-22.0	-3.7
Gross capital formation	6.0	12.3	0.9	-2.1	11.3	-2.4	6.9	0.6	-1.4	0.8
Final domestic use of goods and services	4.7	5.6	0.9	-0.3	4.2	-0.3	2.6	0.6	0.6	1.0
Final demand from mainland Norway ²	5.4	4.5	1.1	0.5	2.3	0.9	1.1	0.0	1.0	0.6
Final demand from general government ³	3.3	4.2	0.7	2.4	0.5	0.0	0.5	2.6	-0.3	-1.0
Total exports	9.8	5.8	3.9	-0.5	4.1	-0.6	0.3	2.4	-3.0	-2.3
Traditional goods	10.0	8.0	3.0	-0.5	9.1	-0.3	-0.4	3.7	-4.3	2.9
Crude oil and natural gas	15.6	2.3	-0.4	-4.7	10.9	-6.9	3.4	-0.7	-1.6	-8.0
Ships and oil platforms	-16.2	11.7	125.9	47.7	-70.4	75.6	-7.7	45.1	-20.8	-36.3
Services	5.2	6.3	4.9	-0.4	0.2	4.3	-1.8	0.7	-0.2	-0.5
Total use of goods and services	6.2	5.6	1.8	-0.4	4.2	-0.4	1.9	1.1	-0.5	0.0
Total imports	8.3	12.3	8.5	-2.7	8.2	-1.4	3.0	4.7	-2.7	0.5
Traditional goods	10.0	8.6	3.2	-3.7	9.1	-0.8	5.5	2.2	1.3	0.6
Crude oil	-5.5	16.6	126.2	-0.9	-52.8	45.8	-21.3	84.3	-35.3	16.5
Ships and oil platforms	31.7	36.3	112.9	-10.0	-4.4	-14.3	-20.9	65.1	-41.0	-8.8
Services	0.6	17.5	4.1	2.8	10.8	-0.0	2.6	-0.3	-1.6	1.5
Gross domestic product ⁴	5.5	3.4	-0.4	0.4	2.8	-0.0	1.5	-0.2	0.4	-0.1
Mainland Norway (market prices)	4.1	3.7	0.2	0.8	2.4	0.6	1.3	-0.1	1.1	0.6
Petroleum activities and ocean transport.	13.4	1.9	-3.4	-1.6	4.6	-3.1	2.4	-0.3	-3.5	-4.2
Mainland Norway (basic prices).	3.1	3.7	-0.0	1.2	2.2	0.7	1.2	0.3	0.8	0.4
Mainland Norway ex. general government.	2.9	4.1	-0.2	1.2	2.6	0.7	1.4	0.2	1.0	0.4
Manufacturing and mining	2.3	3.1	-0.6	0.2	2.6	0.6	1.3	-0.8	0.9	0.5
Production of other goods	-1.5	5.2	1.6	2.2	6.1	0.4	0.6	1.0	-1.9	1.3
Service industries	4.1	4.1	-0.4	1.3	1.9	0.8	1.6	0.4	1.6	0.2
General government	3.7	2.5	0.6	1.1	0.5	0.8	0.7	0.8	0.0	0.5
Correction items.	11.3	3.9	1.6	-1.4	4.2	-0.0	1.9	-3.2	3.1	1.8

National accounts: Selected price indices

1995 = 100

	Unadjusted		Seasonally adjusted							
	1996	1997	96.4	97.1	97.2	97.3	97.4	98.1	98.2	98.3
Final consumption exp. of households and NPISHs ¹	101.4	103.9	102.5	103.3	103.6	104.0	104.6	105.7	106.5	106.5
Final consumption exp. of general government . . .	103.0	105.8	104.7	104.3	105.4	106.6	106.9	107.9	109.9	112.0
Gross fixed capital formation	102.6	105.1	103.7	103.3	104.5	106.3	106.2	108.0	109.1	109.6
Mainland Norway	102.4	103.5	103.3	102.7	102.4	104.2	104.4	105.7	107.5	107.7
Final domestic use of goods and services	102.0	104.5	102.6	104.5	104.3	104.5	104.7	106.8	108.3	107.8
Final demand from mainland Norway ²	102.0	104.3	103.2	103.4	103.8	104.7	105.1	106.2	107.5	108.0
Total exports	106.7	109.0	111.8	109.2	105.8	111.0	110.0	102.7	100.8	100.1
Traditional goods	98.8	99.3	99.8	97.9	96.6	101.2	101.4	100.6	100.7	99.9
Total use of goods and services	103.4	105.8	105.4	105.9	104.8	106.5	106.2	105.6	106.1	105.6
Total imports	101.2	102.4	102.1	101.2	101.0	104.5	102.9	103.6	104.7	103.9
Traditional goods	100.1	99.0	100.4	99.1	97.1	100.8	99.0	99.6	100.6	100.5
Gross domestic product	104.1	107.1	106.5	107.5	106.1	107.1	107.5	106.4	106.7	106.2
Mainland Norway	101.5	104.4	102.8	103.4	104.0	104.4	105.8	107.0	108.2	108.7

National accounts: Final expenditure and gross domestic product

Percentage change from previous period

	Unadjusted		Seasonally adjusted							
	1996	1997	96.4	97.1	97.2	97.3	97.4	98.1	98.2	98.3
Final consumption exp. of households and NPISHs ¹	1,4	2,5	0,7	0,8	0,3	0,4	0,6	1,0	0,8	0,0
Final consumption exp. of general government . .	3,0	2,7	1,0	-0,4	1,1	1,1	0,3	0,9	1,9	1,9
Gross fixed capital formation	2,6	2,5	1,1	-0,3	1,1	1,8	-0,2	1,7	1,1	0,4
Mainland Norway	2,4	1,1	1,1	-0,6	-0,2	1,8	0,2	1,2	1,7	0,3
Final domestic use of goods and services	2,0	2,4	0,5	1,8	-0,1	0,2	0,2	2,0	1,4	-0,5
Final demand from mainland Norway ²	2,0	2,3	0,9	0,2	0,4	0,8	0,5	1,0	1,2	0,5
Total exports	6,7	2,1	4,3	-2,3	-3,1	4,9	-0,9	-6,6	-1,9	-0,7
Traditional goods	-1,2	0,5	2,0	-1,9	-1,4	4,7	0,2	-0,7	0,0	-0,8
Total use of goods and services	3,4	2,3	1,7	0,5	-1,0	1,6	-0,2	-0,6	0,5	-0,5
Total imports	1,2	1,2	1,8	-0,9	-0,2	3,5	-1,6	0,7	1,1	-0,8
Traditional goods	0,1	-1,1	1,2	-1,3	-2,0	3,8	-1,8	0,7	0,9	-0,0
Gross domestic product	4,1	2,8	1,8	0,9	-1,2	0,9	0,3	-1,0	0,3	-0,4
Mainland Norway	1,5	2,8	1,0	0,6	0,6	0,4	1,3	1,2	1,1	0,5

Technical comments on the quarterly figures

Footnotes:

¹ NPISHs: Non-profit institutions serving households.² Defined as total final consumption expenditure plus gross fixed capital formation in mainland Norway.³ Defined as general government final consumption expenditure plus gross fixed capital formation.⁴ Gross domestic product is measured at market prices, while value added by industry is measured at basic prices.

Quarterly calculations: The calculations are made on a less detailed level than the calculations for the annual national accounts, and are based on more simplified procedures.

The Kyoto Protocol, the price of CO₂ permits and consequences for the Norwegian petroleum sector*

Lars Lindholt

The Kyoto Protocol sets limits on CO₂ emissions from Annex B countries. The Kyoto targets can be achieved with the help of sufficiently high prices for tradeable emission permits. This study tries to calculate both the international price of emission permits and the Kyoto Protocol's implications for Norway's oil and gas wealth. The results presented here indicate a permit price which rises from about \$14-24 per tonne CO₂ in the year 2010 to \$36-57 in 2030. Emission limitations will result in reduced demand and lower producer prices for fossil fuels, thereby reducing Norway's oil and gas wealth. An implementation of the Kyoto Protocol may result in a reduction in oil wealth of 15-30 per cent and a reduction in gas wealth of about 20 per cent. Both the level of the permit price and the loss of oil wealth depend on OPEC's market power.

Introduction

The Kyoto Protocol to the Framework Convention on Climate Change (FCCC) was completed in December 1997. The most prominent feature of the Kyoto Protocol is the quantified emissions limitation and reduction commitments of greenhouse gases (GHGs) in Annex B countries¹. The combined result of individual country targets is estimated to lead to an overall reduction in Annex B parties' GHG emissions by 5.2 per cent from the 1990 levels by the commitment period 2008-2012 (averaged across the period).

The most important GHG is carbon dioxide. The main source of anthropogenic CO₂ emissions is the combustion of fossil fuels, such as oil, natural gas and coal. The point of departure in this study is that emissions of CO₂ shall be reduced by 5.2 per cent in the Annex B area. As CO₂ accounts for most of the GHG emissions in the region, it may be reasonable to assume that the reduction of CO₂ does not deviate substantially from the emission reduction targets for all six GHGs.

Under a system with tradeable permits, CO₂ emissions will be reduced until the cost of further emission reductions is equal to the price of the permits. With a tax system, the emissions are reduced until the cost of further emission reductions is equal to the tax on CO₂ emissions. An efficient international tradeable permit market will result in a permit price which corresponds to the tax required to

achieve the same emission reductions. Under certain assumptions, taxes and tradeable permits will therefore produce the same result. In this study, we look at the taxes or permit prices necessary in order to fulfill the Kyoto Protocol commitments, based on different assumptions concerning OPEC's behavior. We will also analyse to what extent emission reductions will result in reduced demand and lower producer prices for oil and gas, and thereby the consequences for Norway's revenues from petroleum resources.

Petroleum wealth is often defined as the present value of future petroleum rent. Petroleum rent refers to the difference between production revenues and the costs of oil and gas production. Oil and gas extraction normally provides an excess return to capital compared with other economic activity because they are non-renewable resources.

The size of petroleum wealth is naturally dependent on the prices received by those producing oil and gas. If an international CO₂ tax (or a system with tradeable permits) results in a reduction in these prices, petroleum wealth will be reduced. It is therefore interesting to study the potential effects on oil and gas prices of the introduction of a CO₂ tax. At a given point in time a CO₂ tax will usually result in both a lower producer price (crude oil price) and a higher oil price for consumers (end-product price). If the supply of oil or gas varies substantially with a change in prices, the effect on the consumer price will be greatest whereas the price for producers will be affected to a lesser extent. Taxes will in that case have a considerable influence on the volume sold and thus a substantial impact on CO₂

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¹ This is OECD-countries (except Mexico, Korea and Turkey), Russian Federation, Ukraine, Estonia, Latvia, Lithuania, Bulgaria, Croatia, Czech Republic, Hungary, Poland, Romania, Slovakia, Slovenia, Liechtenstein and Monaco.

Description of the model

The PETRO model is described in Berg et al. (1996, 1997). Compared with Berg et al., the model has been expanded to include an extra region on the demand side consisting of the Russian Federation, the Ukraine, and the former Central and Eastern European countries. See also Lindholt (1998) for new numerical specifications as a result of this.

The model has a long time horizon and describes international markets for oil, gas and coal. As fossil fuels are finite and non-renewable resources, the extraction of one unit today will reduce the availability of the resource in the future. Producers will therefore demand an excess return to capital for selling the resource today. It is assumed that producers have perfect knowledge, and in the model they therefore take account of not only existing prices and market conditions, but also future movements in these variables. The supply of fossil fuels is a function of both historical facts and expectations concerning the future. Producers attempt to extract their resources at a rate which results in maximum petroleum wealth. Consumer demand, on the other hand, is assumed to depend only on income and prices in each period.

There are four demand regions in the model: OECD-Europe, Rest of OECD, a region consisting of the former Central and Eastern European countries, the Russian Federation and the Ukraine and a region consisting of the rest of the world (Non-Annex B). The model specifies three fossil fuels: oil, gas and coal. The demand for a fossil fuel declines with the price of this fuel and increases with the price of the other two fuels. Demand rises over time due to economic growth, which is determined exogenously for each region. Annual GDP growth is highest in Non-Annex B. A rise in income outside the OECD area results in a slightly higher increase in demand than in the OECD. A carbon-free, alternative energy source (backstop technology) exists at a specific cost at any given time. Due to technological progress, this cost is reduced over time. There will be no consumer demand for a fossil fuel if the price of the fuel is higher than the price of the alternative energy source. It is available in unlimited quantities and is a perfect substitute for oil.

The relevant consumer price of a fuel in a region is the sum of the producer price, delivery costs and existing taxes and subsidies. The CO₂ tax comes in addition to delivery costs and existing taxes. The CO₂ taxes are imposed on the con-

sumption of fossil fuels and vary with the carbon content of the fuel.

The price of the alternative energy source less these taxes and delivery costs represents a ceiling for the producer price of each fuel at any given time, and will in the following be referred to as the *maximum producer price*.

The oil market is divided into two groups of producers: OPEC, which has low costs, and a fringe of high-cost countries. In order to examine the importance of market power, two different situations are studied. In the first model version, OPEC acts as a cartel and takes into account that their own production influences prices. They consider production from the fringe as given. The fringe is a competitive producer, deciding production on the basis of the given price. In the second version, the entire oil market is a competitive market. The prices and volumes which satisfy the maximization problem of both types of producers are the equilibrium solution. Initial unit costs are set equal to \$3.30 and \$10.90 per barrel of oil for OPEC and the fringe, respectively. The unit costs of producers are assumed to rise as oil resources are gradually depleted. Moreover, technological progress in the extraction of oil is assumed.

The market for natural gas is divided into three regions: OECD-Europe, Rest of OECD, and Non-OECD. Because gas is costly to transport, no trade takes place between the regions. The producers' cost structure is modelled in the same way as for the oil market. All three regions are modelled as competitive markets. Since we are studying the consequences for Norway, we focus on the results for OECD-Europe. Initial unit costs are set equal to \$7.00 per barrel of oil equivalents for OECD-Europe.

The coal market is modelled as a global competitive market. Due to substantial international coal reserves, extraction today is not assumed to increase costs at a later time. Producers will therefore focus on each individual period. Technological progress result in lower costs over time. Initial unit costs are set equal to \$8.80 per barrel of oil equivalents.

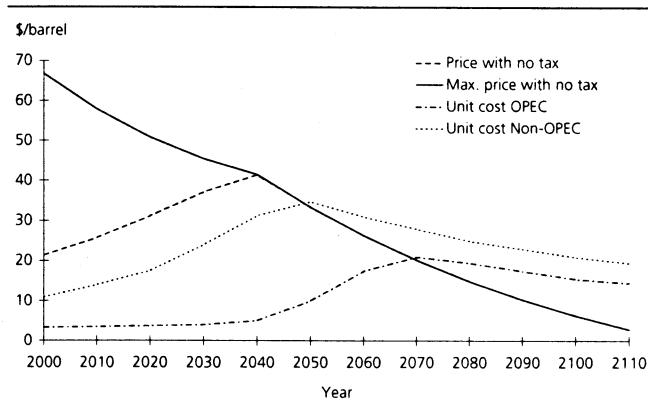
The model extends to 2130 with periods of 10 years. For example, the result for the year 2010 can be interpreted as an average for the period 2005-2015.

emissions. As fossil fuels are non-renewable resources, producers will take into account that extraction today will reduce the availability of the resource in the future. The distribution of the burden between consumers and producers may therefore change over time.

A model for oil, natural gas and coal markets (PETRO model) is used in this study in order to analyze the effect of CO₂ taxes on the supply of and demand for fossil fuels, thereby allowing us to assess the impact on Norway's oil and gas wealth. The PETRO model is a dynamic model

which takes into account (expectations concerning) future market conditions.

The study is a follow up of Berg et al. (1996 and 1997), which looks at how a CO₂ tax of \$10 per barrel of oil equivalents influences the petroleum wealth of oil and gas producers. The PETRO model has now been expanded to include an additional region on the demand side in order to study the Annex B area. In addition, this study looks at the CO₂ taxes (permit prices) which are necessary to fulfill the specified emission reduction commitments *over time*. The

Figure 1. Oil producer price and unit costs with OPEC as a cartel

Source: Statistics Norway.

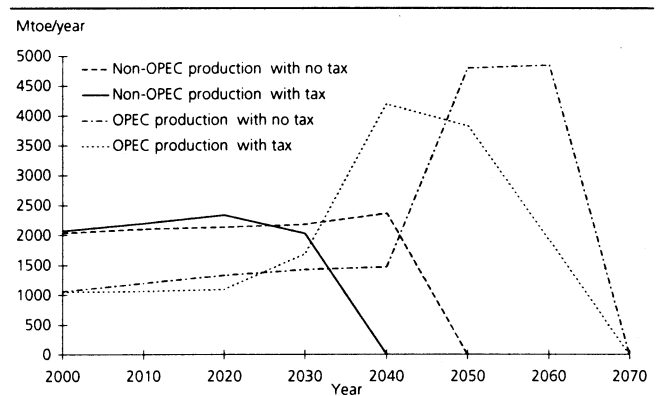
main focus will be on the oil market, but the gas market in OECD-Europe will also be discussed. The model is described in a text box.

Even though developing countries were not subject to any commitments in the Kyoto Protocol, these countries may be facing emission reduction requirements at a later stage. We will therefore also look at a scenario with global emission targets. In the scenario involving additional emission reduction targets, it is assumed that the entire world shall achieve the Kyoto targets by reducing emissions by 5.2 per cent in 2010. Furthermore, global emissions shall be 20 per cent lower than the 1990 level in the year 2020. In both scenarios it is assumed that emissions are held constant when the targets have been reached.

We will first look at the reference scenario with no CO₂ tax in the model version where OPEC acts as a cartel. We will then look at the effects of an implementation of the Kyoto Protocol before examining the consequences of a more extensive climate treaty. This will be followed by a discussion of the effect of perfect competition in the oil market. This is done because the assumption concerning the situation in the oil market will influence both the level of the CO₂ permit price and the loss of oil wealth as a result of a climate treaty. Due to differing carbon content, a tax of \$1 per barrel of oil equivalents will correspond to \$0.71 per barrel of oil equivalents for gas and \$1.24 per barrel of oil equivalents for coal.²

Reference scenario with OPEC as a cartel

Figure 1 shows the model's projections of movements in the oil price and unit costs for OPEC and the fringe, in the scenario without emission reduction targets and where OPEC acts as a cartel. The oil price in the year 2000 is about \$21 per barrel. This is considerably higher than the current oil price. In the current situation, it cannot be said

Figure 2. Oil production with and without Kyoto targets, and with OPEC as a cartel

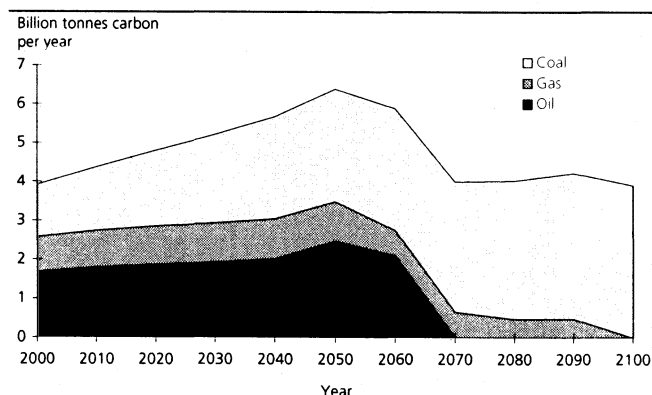
Source: Statistics Norway.

that OPEC is acting as a coherent cartel where participants have coinciding interests. In reality, members of the cartel will be less willing to reduce production to achieve a higher price. Moreover, the model provides a long-term price path, entailing that short-term changes are not captured. The current low price of oil partly reflects the prevailing market, with lower demand for oil due to the crisis in Asia.

The price rises from about \$21 per barrel in the first period until it reaches a peak of \$41 in 2040. Starting with this period, the producer price is at its maximum level, determined by the price of the alternative energy source, existing taxes and delivery costs. After this time, the producer price is reduced due to technological progress for the alternative, carbon-free energy source. The figure shows that unit costs increase faster in the fringe. The reason is that they produce more than the cartel in the first periods while, at the same time, OPEC has greater resources which can be extracted at lower costs.

Figure 2 shows production in the fringe and OPEC prior to the introduction of taxes. The fringe produces approximately twice as much as the cartel in the first period. Because higher production in a period increases costs in the future, both OPEC and the fringe have incentives to limit production. The cartel has market power and takes into account that higher production results in a lower price in the same period. This is the reason why OPEC produces less than the fringe, even though costs are lower. The fringe produces the first 50 years before unit costs reach the maximum producer price between 2040 and 2050. Further extraction is then no longer profitable. OPEC also increases production somewhat in the first periods before the cartel takes over the entire market. The cartel stops extracting oil in 2070 when it is no longer profitable for the cartel to produce oil, as the alternative energy source has become sufficiently low.

² In the scenario with Kyoto targets, the tax is imposed on consumption *outside* Annex B in 2040. This must be done in the model for technical reasons. It may nevertheless be realistic, as it is likely that emission reduction targets will gradually also apply to the rest of the world.

Figure 3. Carbon emissions from oil, gas and coal in Annex B, with OPEC as a cartel

Source: Statistics Norway.

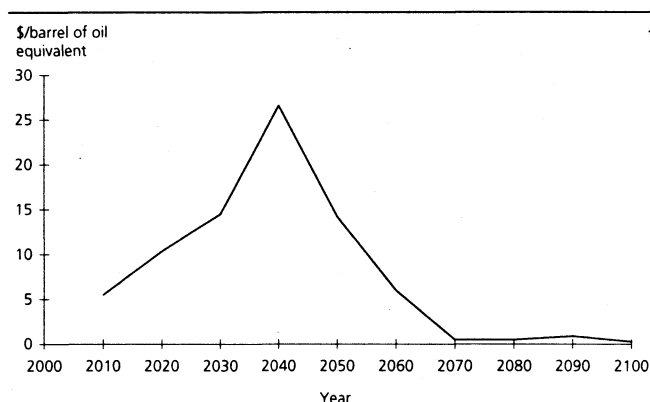
Developments in gas markets vary between regions. The producer price of gas in OECD-Europe rises from a little less than \$10 per barrel of oil equivalents until it reaches its maximum level of \$24 in 2070 in the reference scenario with no taxes. Production is relatively stable until gas production is no longer profitable in 2080, and the alternative energy source takes over. The year 2050 is the last year with production in Rest of OECD, while gas is produced and consumed until 2090 in Non-OECD. Production extends over a longer period here because the region has considerable gas resources with lower extraction costs and taxes.

Coal is produced and consumed throughout the whole period and will not be replaced by the alternative energy source due to low prices and low existing taxes on coal.

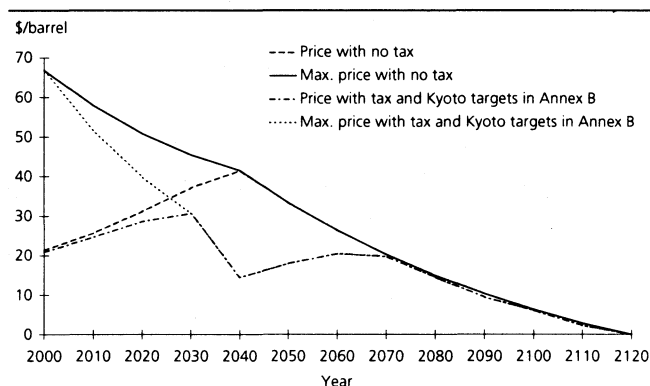
Figure 3 shows carbon emissions in Annex B in the reference scenario with no taxes when OPEC operates as a cartel. Emissions rise from 3.9 billion tonnes of carbon a year in 2000 and reach a peak of 6.4 billion in 2050. Carbon emissions from coal more than double in the period to 2050. Oil consumption will gradually be replaced by the carbon-free, alternative energy source from 2050 to 2070 because the cost of the alternative energy source falls over time. Total emissions will therefore be reduced in this period. Inasmuch as the consumption of coal increases somewhat after this time, emissions rise slightly until the alternative energy source has displaced gas in 2100.

Effects of an implementation of the Kyoto Protocol

In order to achieve the Kyoto emission reduction targets, Annex B countries must reduce emissions to 3.77 billion tonnes of carbon from 2010. It is presupposed that emissions are kept at this level in subsequent periods. The tax is now imposed on the consumption of fossil fuels in each period, given the emission reduction targets in the Kyoto Protocol. Because the tax level in a period also influences

Figure 4. Time-path of a CO₂ tax with Kyoto targets in Annex B and OPEC as a cartel

Source: Statistics Norway.

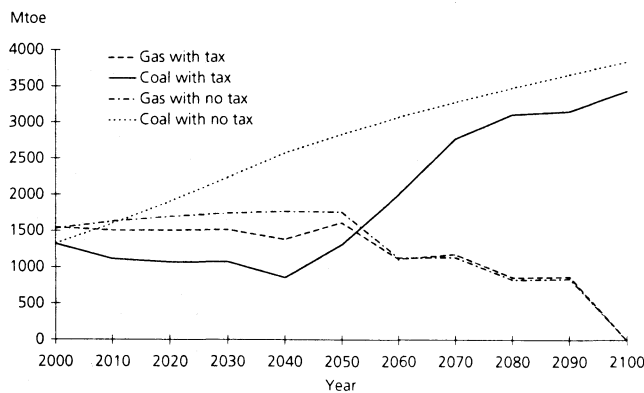
Figure 5. Oil producer price with and without Kyoto targets, and with OPEC as a cartel

Source: Statistics Norway.

emissions in other periods, the taxes must be introduced simultaneously in the model. In order to limit steadily rising emissions in the first periods, as shown in figure 3, it seems reasonable that the tax will first rise. As emissions gradually decline, it also seems reasonable to assume that taxes may be reduced. Figure 4 shows the development in the CO₂ tax per barrel of oil equivalents over time, which is necessary if Annex B countries are to fulfill the commitments in the Kyoto Protocol. It is assumed that the tax is first introduced in 2010.³ When OPEC functions as a cartel, the tax must increase from about \$6 in the year 2010 to \$15 in 2030, thereafter rising to a peak level of \$27 in the year 2040. The tax then declines slightly to just under \$1 in 2070. It is then no longer profitable to produce oil because the carbon-free energy source has become very cheap.

Figure 5 shows changes in the producer price after the tax has been introduced. Since the maximum producer price is the price of the alternative energy source less taxes, the maximum producer price is reduced by the entire tax in each period. We see that the effect on the producer price is minimal at the beginning. In the year 2000 the price is

3 If the tax was introduced in 2000, this would have resulted in a marginally lower tax level in the first two periods.

Figure 6. Gas and coal consumption in Annex B

Source: Statistics Norway.

reduced marginally because the tax is not introduced until 2010. In the year 2010 the producer price is reduced by only \$1.10. The tax is \$6.20, which means that the consumer price rises by \$5.10. Consumers will thus bear almost the entire tax burden at the beginning. The introduction of the tax entails that the oil price reaches its peak level in 2030, one period earlier than in the scenario with no tax. The price is then \$6.50 lower than it would have been without a tax. It is not until 2040 that the producer price is reduced by the entire tax of \$27. This means that in the first 40 years the consumer price shows the greatest change as a result of the tax, whereas it is the producers who bear the entire tax burden after this time. The reason for this is found on the supply side in the model, which we will now examine more closely.

Figure 2 in the previous section shows how the production profiles in OPEC and the fringe change as a result of the CO₂ tax. OPEC reduces production by 11 per cent in 2010 and by 18 per cent in 2020. The cartel reduces production to maintain oil prices at about the same level which prevailed before the tax was introduced. The fringe consider the oil price as given. The fringe finds it optimal to increase production in 2000, 2010 and 2020 when the reduction in the producer price is minimal. When the price is reduced by the entire tax in 2040, it is no longer profitable for the fringe to produce oil. Since the oil price is lower than the original path over all time periods, the fringe's accumulated production is reduced by 20 per cent. Oil wealth outside OPEC is reduced by about 15 per cent (as measured by the present value of future petroleum rent). Beginning in 2040 OPEC satisfies all demand at the maximum producer price as long as the cartel's unit costs do not exceed this. In 2070 the renewable, alternative energy source has become cheaper than oil, and it is not profitable for OPEC to produce oil.

Even after the introduction of the tax, oil consumption rises slightly in Annex B over time up to 2040, as is the case with global oil production. We see in figure 6 that it is particularly the consumption of coal which is reduced throughout this period after the tax has been introduced. In 2020, coal consumption has already been reduced by half

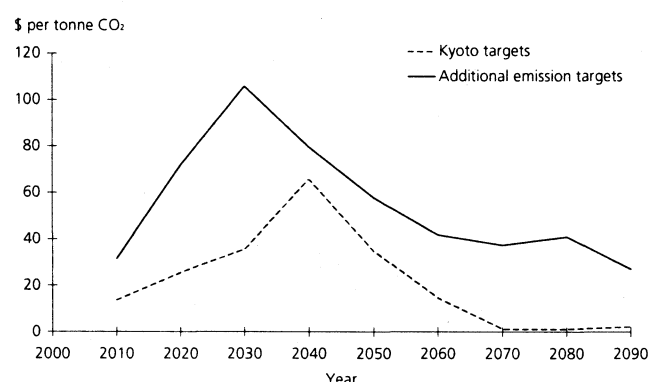
in relation to the reference scenario. Coal contains more carbon so that the tax in relative terms is higher than for gas and oil. The tax also results in a slight reduction in the consumption of gas the first decades. The reason is that the tax results in relatively higher prices for gas and especially coal in relation to oil because the oil price is higher per barrel of oil equivalents. This occurs for natural gas even though it is a cleaner fuel, and is ascribable to the fact that it is movements in relative and not absolute prices which influence the choice of energy source. The demand for oil will therefore be relatively higher in the first periods. When the tax reaches a peak in 2040, figure 2 showed that the fringe stops producing oil, and the cartel's oil production starts to decline. Inasmuch as production falls until it comes to a complete halt in 2070, the tax is also reduced in this period. Figure 6 shows that from 2050 coal consumption begins to increase in line with the decline in the CO₂ tax. Gas consumption in Annex B moves along approximately the same path as in the reference scenario (with no tax) beginning in 2050. Gas consumption falls gradually in this period because gas production becomes unprofitable and is phased out in the three production regions.

A key point is that if only the OECD had been subject to emission reduction targets in Kyoto, the taxes (and the permit price) would initially have to be higher. If an efficient tradeable permit market is assumed, the model shows that the OECD can actually increase emissions by 2.4 per cent from 1990 to 2010 due to substantial emission reductions in Russian Federation, the Ukraine and the former Eastern European countries. As a result of the collapse and dissolution of the Soviet Union at the beginning of the 1990s, emissions from this category of Annex B were about 26 per cent lower in 1994 than in 1990. These countries have thus been allocated commitments they will be able to fulfill by a wide margin without having to implement measures (with this phenomenon referred to as "hot air").

Effects in natural gas markets

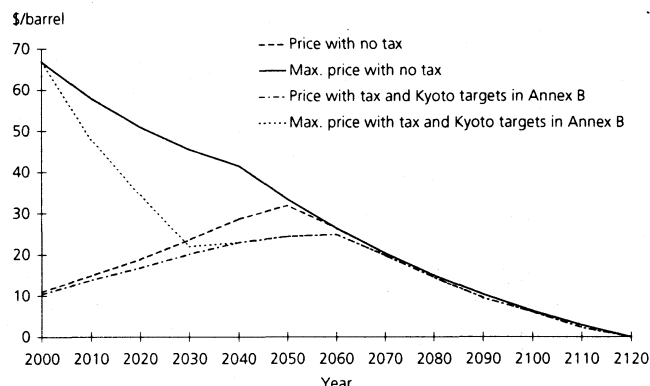
When taxes are introduced, the producer price is reduced slightly over the entire horizon in the three regions which produce gas. As in the oil market, however, most of the burden falls on consumers in the first periods. Total production is reduced by 11 per cent in OECD-Europe, 6 per cent in Rest of OECD and 5 per cent in Non-OECD. As noted earlier, the reason for lower production following the introduction of the CO₂ tax is that the tax results in relatively higher prices for gas than for oil because the oil price (including other taxes) is higher per barrel of oil equivalents. This occurs even though gas is a cleaner fuel than oil. The level of extraction in OECD-Europe is reduced in the first five periods, but production is higher in 2060-2070 compared with the reference scenario with no CO₂ tax because the CO₂ tax then is low. Gas wealth in OECD-Europe is reduced by about 18 per cent following the introduction of the CO₂ tax. The reduction in Norway's oil and gas wealth is summarized in figure 11. It is assumed that the relative reduction in Norway's oil and gas wealth is

Figure 7. Time-path of a CO₂ permit price with OPEC as a cartel



Source: Statistics Norway.

Figure 8. Oil producer price with and without Kyoto targets, and competitive oil market



Source: Statistics Norway.

equal to the percentage decline in the fringe's oil wealth and OECD-Europe's gas wealth, respectively.

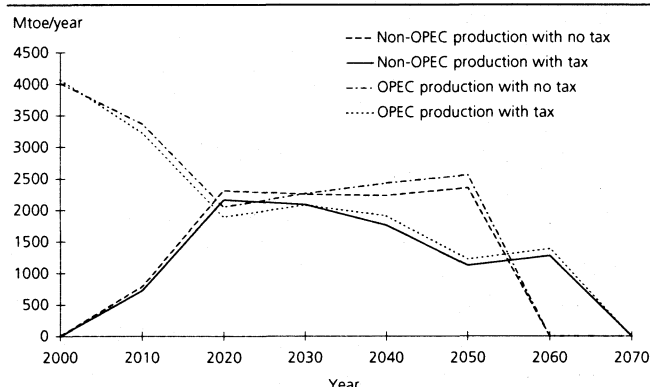
Consequences of additional emission reduction targets

Global emissions rise from 5.9 billion tonnes of carbon in 1990 and reach a peak level in the reference scenario (with no CO₂ tax) of 12.1 billion in 2060. Emissions also rise more rapidly outside Annex B due to stronger economic growth and because a given income growth in this region results in higher demand for fossil fuels. In particular, the consumption of coal rises faster outside Annex B.

Additional emission reduction targets refer to a situation where the entire world first reduces emissions by 5.2 per cent in 2010 compared with the level in 1990, and then reduces them further by 20 per cent in 2020 compared with 1990. The global tax is imposed on consumption from 2010. Figure 7 shows the tax converted to a CO₂ permit price. With an efficient international tradeable permit market, the permit price will correspond to the tax necessary to achieve the same reduction in emissions. A CO₂ tax of \$1 per barrel of oil with an efficient international tradeable permit market will be equivalent to about \$2.5 per tonne CO₂.

As a result of additional emission reduction targets, the tax, and thus the CO₂ permit price must in all periods be higher than the tax level in the case with commitments only for Annex B. This is particularly due to the much higher consumption of coal inasmuch as we are considering global consumption. The tax now rises sharply from \$10 per barrel of oil equivalents in 2010 and up to \$40.70 in 2030. For OPEC, it is now profitable to reduce production only in the first period in order to maintain oil prices, compared with the situation with Kyoto targets in figure 2. The high tax gradually results in a dramatic decline in the producer price, entailing that it is not profitable for the fringe to produce more than in the first two periods. With additional emission reduction targets, the fringe's oil wealth is reduced as much as 42 per cent. With regard to the gas market

Figure 9. Oil production with and without Kyoto targets, and competitive oil market



Kilde: Statistisk sentralbyrå.

in OECD-Europe, the producer price is reduced further compared with the case with Kyoto targets, and production is slightly lower. Gas wealth in OECD-Europe is now reduced by 34 per cent, compared with 18 per cent with emission reduction commitments applying only to Annex B. The wealth effects for Norway are summarized in figure 11.

Perfect competition in the oil market

This section will particularly focus on the oil market because the results in natural gas markets are approximately the same as in the cartel model.

If OPEC is dissolved and the oil market becomes a competitive market, the model-based calculations show that this will have major consequences for prices and production, as shown in figures 8 and 9. OPEC no longer restrains production in order to maintain oil prices. They now quadruple their production in the first period, bringing the initial oil price down to about \$11 in the year 2000, i.e. at about the same level as the current oil price. This does not necessarily mean that the current oil market more closely resembles a competitive market than a market where

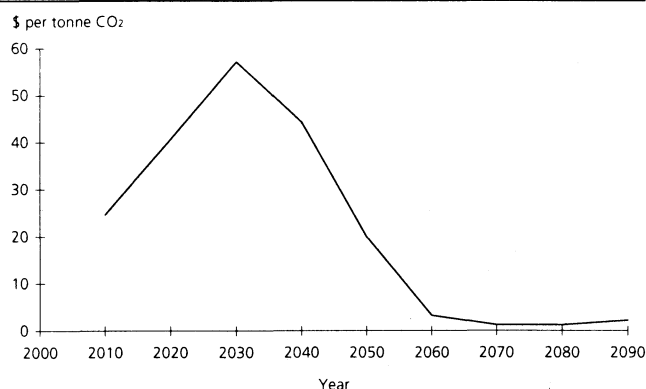
OPEC functions as an effective cartel. Short-term phenomena with reduced demand for a small period may have resulted in the current low oil prices. Such phenomena will not be captured in the model's long-term price paths. Moreover, it is a sign of cartel behavior that OPEC has carried out two relatively large production cuts in 1998 with the aim of increasing oil prices. The scenario with perfect competition is therefore intended to be a hypothetical case. The discussion of who shall reduce production may, for example, result in such considerable strains that the various member countries completely disregard the production quotas.

The low oil price entails that high-cost countries find it optimal to postpone production until a later period, and it is not until the third period that these countries achieve the same production level that they have when OPEC operates as a cartel. Due to high production initially, OPEC halts production one period earlier, while the fringe produces one period longer compared with the cartel case. The dissolution of OPEC has major negative consequences for the other producer countries. The fringe's oil wealth is reduced as much as 71 per cent.

The Kyoto targets for Annex B and the introduction of a tax in a situation with perfect competition result in a further reduction in the producer price. We see from figure 8 that the impact is greater up to 2040 than in a situation with OPEC acting as a cartel. This is because OPEC countries do not find it optimal to limit their production to the same extent. A larger burden therefore falls on producers in high-cost countries, and the reduction in the fringe's oil wealth as a result of the tax is greater, about 30 per cent. The wealth effects for Norway are summarized in figure 11. All in all, the combination of perfect competition and a CO₂ tax results in a reduction of as much as 80 per cent in the fringe's oil wealth compared with the cartel situation without a tax. Figure 9 also shows that it is profitable for both OPEC and the fringe to postpone oil production so that they produce one period longer than in the case without a tax. The reason is that the CO₂ tax is low in 2060 and 2070 and the producer price only shows a slight reduction.

Global oil production is thus higher in the case with perfect competition in the first periods. It also appears that oil consumption in Annex B is higher than when OPEC acts as a cartel. With perfect competition, the initial oil consumption is now almost 30 per cent higher. As a result, the tax in Annex B must be higher in the period up to 2030 in the case with perfect competition. Figure 10 shows movements in the permit price which correspond to this tax, and thus assumes an efficient international tradeable permit market. The permit price rises up to 2030, and in this period it is particularly coal consumption which declines. After 2030 oil consumption in Annex B falls, and the permit price declines. Emissions, and thereby the permit price, are the same in the case with perfect competition as with OPEC operating as a cartel when oil production ceases in 2070.

Figure 10. Time-path of a CO₂ permit price with Kyoto targets and competitive oil market



Kilde: Statistisk sentralbyrå.

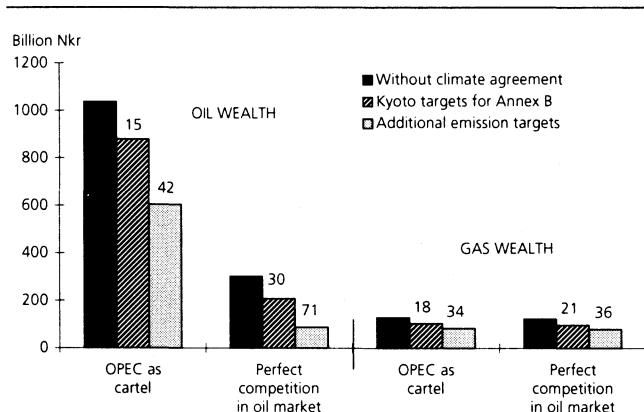
Figure 7 shows changes in the CO₂ permit price in the case with Kyoto targets and OPEC as a cartel. When this is compared with the case with the competitive market situation above, it may generally be said that irrespective of the assumption concerning OPEC's behavior, the permit price will rise from about \$14-24 per tonne CO₂ in 2010 to about \$36-57 in 2030. The Ministry of the Environment (1998) of Norway refers to calculations of permit prices from a number of institutions both in Norway and other countries, including CICERO and the OECD. Using different assumptions, the price estimates vary from \$7-27 per tonne CO₂ in 2010, and an average estimate of \$17 per tonne is selected for the period 2008-2012. This estimate is thus within the price interval provided by the model here, but in addition this study points to possible development paths after 2010.

As in the case with a cartel situation, *additional emission reduction targets* entail that the tax, and thus the permit price, must now be higher in all periods than the tax level in the case with the Kyoto targets. The producer price of oil is now considerably lower during the period in which the fringe produces compared with the situation with perfect competition and emission targets for Annex B in figure 8. The fringe's production is therefore also reduced through the entire period and is 36 per cent lower than in the case without emission reduction commitments. As a result, the fringe's oil wealth is now reduced as much as 71 per cent, against 30 per cent with the current Kyoto targets. The effects in the gas market show little change compared with the cartel case and additional emission reduction targets.

Summary of wealth effects for Norway

The results in the model have thus far referred to the fringe and OECD-Europe as a whole. The relative loss of oil wealth is now assumed to be the same for Norway as for the fringe as a whole. The figure for oil wealth in figure 11 is obtained by using the proportion of the fringe's oil wealth in the model which corresponds to Norway's share of oil reserves in the fringe in 1994. Similarly, the relative loss of gas wealth is assumed to be the same for Norway as

Figure 11. Norway's oil and gas wealth based on different emission targets. The figures above the columns are the percentage decline from the reference scenario without climate treaty



Kilde: Statistisk sentralbyrå.

for OECD-Europe as a whole. Gas wealth is estimated as a percentage of the gas wealth in OECD-Europe which corresponds to Norway's share of the respective gas reserves in the region in 1994.

The Ministry of Finance (1997) estimates that Norway's total petroleum wealth in 1997 amounted to Nkr 750 billion (after deducting the value of the sector's real capital), i.e. \$100 billion. The Ministry of Finance applies a constant oil price of Nkr 115, or about \$15. The estimate for total petroleum wealth in the case with OPEC as a cartel and without a climate treaty is higher in this study, partly because the oil price rises somewhat. The estimate for gas wealth is more uncertain, because the gas market is modelled more simply.

It is important to point out that both the case with a unified cartel and perfect competition are constructed market situations. It may be said that the current oil market shares some features with both these cases.

Uncertainty and sensitivity analyses

A characteristic feature of markets for fossil fuels is that there is imperfect competition. Since natural gas markets are modelled as competitive markets, there is greater uncertainty associated with the results here. Greater criticism may perhaps be made of the description of the coal market, which is also modelled as a competitive market with a very simple cost function. It is uncertain how this affects the results.

There is considerable uncertainty associated with the value of several parameters. Some sensitivity analyses have been carried out to examine the degree to which the results depend on special numerical assumptions. The results apply to the oil market in the cartel case.

More rapid *technological progress* in the fringe will result in higher production. However, inasmuch as total production and thereby emission also increase, the CO₂ tax must be higher if the emission targets are to be achieved. The result will be approximately the same relative reduction in oil wealth even though it has risen in nominal terms compared with situations with less rapid technological progress. Similar effects are seen the higher the price of the *alternative energy source* and the less rapid the technological progress is for this energy source. The conclusion is that if various factors result in higher production both in the fringe and as a whole, taxes will then have to be set at a higher level and the relative impact on oil wealth shows little change. On the other hand, the tax and permit price of CO₂ will rise so that the size of these is more sensitive to changes in such conditions.

Conclusion

This study shows that in order to achieve the emission reduction targets for Annex B parties in the Kyoto Protocol, international CO₂ taxes must rise in the 30-40 years after the turn of the millennium. This is necessary in order to reduce in particular a steadily rising consumption of coal in Annex B. If the rest of the world were to be subject to additional emission reduction commitments, the result is higher taxes. Irrespective of the emission reduction targets, taxes will have to be reduced substantially when global oil production begins to fall because an alternative carbon-free energy source replaces oil.

The results for the oil market show that in the first periods it is consumers who bear the greatest burden of the introduction of the CO₂ tax if OPEC functions as a cartel. The reason is that OPEC reduces production to maintain oil prices, entailing that the reduction in the producer price is not as great as in the first periods. With an efficient international tradeable permit market, the results indicate a CO₂ permit price which rises from \$14 per tonne in 2010 to \$36 in 2030. If the oil market becomes competitive, oil production will be higher in the first periods, resulting in a higher permit price in order to achieve a given emission target. In addition, the fall in the producer price is greater under perfect competition because the producers consider the oil price as given. The results indicate that the permit price in this case will rise from \$24 per tonne CO₂ in 2010 to \$57 in 2030.

The current oil market cannot be fully described as a situation with a cartel having coinciding interests or as a competitive market where all producers consider the price as given. The current situation can be said to share features from both market descriptions. If OPEC acts as a cartel, the simulations show that the Kyoto commitments result in a reduction in Norway's oil wealth of about 15 per cent. As an oil producer, Norway will lose considerably more if OPEC is dissolved than if the Kyoto Protocol is fulfilled. If OPEC were to be dissolved, or the various member countries begin to disregard their production quotas, Norway might lose about 70 per cent of its oil wealth in the case

with no emission targets. If the oil market becomes a competitive market, the achievement of the Kyoto targets might reduce the oil wealth by 30 per cent after taxes are introduced. The reason is that in this market the producer price of oil will fall by a greater margin, thereby resulting in a greater reduction in oil wealth. Even though the relative loss as a result of the Kyoto targets is greater than in the case with a cartel, the loss in nominal terms is less because the fringe's initial wealth is already considerably lower in the competitive market case. The combination of perfect competition and the Kyoto commitments may reduce the wealth by almost 80 per cent. The results suggest that Norway loses about 20 per cent of its gas wealth with the achievement of the Kyoto Protocol, irrespective of OPEC's behavior.

The results are amplified if the emission reduction targets set out in the Kyoto Protocol were to be applied globally and with additional emission reduction commitments. This would result in higher CO₂ permit prices and a greater reduction in Norway's oil and gas wealth.

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Methane emissions and permit prices for greenhouse gases

Annegrete Bruvoll and Torstein Bye

The Kyoto Protocol restricts emissions of five greenhouse gases in addition to CO₂. An international permit price for tradable quotas of greenhouse gases will depend on the costs of reducing emissions of all these gases. A cost-effective reduction both nationally and internationally entails that the marginal cost of further reductions must be the same for all measures and all gases in all countries. Methane from landfills is one of the largest sources of emissions besides CO₂. In order to ensure a cost-effective implementation of climate policy, it is necessary to evaluate the costs of the various measures aimed at landfill gases against reductions in other greenhouse gases, and implement the least expensive measures first. Moreover, the total costs of abatement for Norway will depend on those sectors of the economy that might be exempt from cost-effective taxes.

Introduction

Studies that have attempted to provide estimates of the permit price for tradable quotas of greenhouse gases indicate that the inclusion of additional gases in the climate protocol will result in substantially lower permit prices. Methane is the most important greenhouse gas besides CO₂. This means that the cost of reducing emissions of methane may have an important influence on the permit price for greenhouse gases as a whole. In this article, we look more closely at the marginal costs of reducing methane emissions. Methane accounts for about the same proportion of total greenhouse gas emissions in Norway as in the rest of the world, and the importance of methane gas emissions for the permit price in Norway may therefore provide some indication of the importance in other countries.

Many studies show that there are increasing marginal costs associated with reducing greenhouse gas emissions. This means that the stricter the requirements are, the more expensive it is per unit to reduce emissions. This in turn implies that the necessary permit price will depend on perceptions of emission changes without permit prices. With a sharp rise in emissions, the necessary permit price will be relatively higher than in the case with lower growth. Some studies show that analyses made prior to the Kyoto negotiations may have been optimistic with regard to how low emissions would be without restrictions.

In this article we will first look at emissions in Annex B Parties and then cite some studies of international permit prices in connection with emission reductions. We present projections of methane gas emissions in Norway, and ana-

lyze the costs of various measures aimed at reducing these emissions. The importance of including methane in the Kyoto Protocol for permit prices will depend on the change in the marginal costs of reducing emissions of other gases. Three calculations have been made for Norway under different assumptions concerning the possibilities of replacing or reducing the use of fossil fuels both on the supply side and the demand side in the energy market. Using these calculations as a basis, we discuss the degree to which these can serve as an illustration of the permit price which is necessary internationally in order to achieve the targets in the Kyoto Protocol.

Emissions of greenhouse gases

Total emissions of the six greenhouse gases in Annex B Parties came to 16.5 billion tonnes CO₂ equivalents in 1990, see table 1. We see that CO₂ is the dominant greenhouse gas in all countries, with a total share of 83 per cent in 1990, while methane accounted for 13 per cent and nitrous oxide 4 per cent. This indicates that the inclusion of other gases in the determination of permit prices may be of some significance in an initial Kyoto Protocol. The importance, however, may be more limited if the Protocol later includes more restrictive requirements.

The largest countries with regard to greenhouse gas emissions are the US, Russia, Japan and Germany. About 35 per cent of greenhouse gas emissions is generated in the US and just under 20 per cent in Russia. These two countries can thus block an agreement, which requires that the Kyoto Protocol must be ratified by Parties with combined emissions equal to 55 per cent of emissions by Annex I Parties.

Total emissions in most countries increased from 1990 to 1995. Total emissions for the 10 countries explicitly mentioned in table 1 nevertheless declined by 2.3 per cent, pri-

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Table 1. Emissions of greenhouse gases in selected countries of participants in the Kyoto Protocol and total for Annex B. Million tonnes CO₂ equivalents. 1990

	CO ₂	N ₂ O	CH ₄	HFC/PFC/SF ₆	Total	Total 1995 ¹
USA	4 957.0	127.5	567.0	92.2	5 680.2	6 149
Russia	2 388.7	27.8	567.0	..	2 983.5	2 165
Germany	1 014.2	65.4	119.3	20.6	1 205.3	1 065
Japan	1 155.0	17.1	29.0	..	1 201.1	1 347
United Kingdom	577.0	33.6	95.2	2.1	706.3	654
Canada	462.6	29.6	64.8	9.1	559.9	618
France	366.5	54.8	60.8	..	482.1	498
Sweden	61.3	4.7	6.9	1.4	73.4	69
Denmark	52.0	3.2	8.5	0.2	63.9	75
Norway	35.5	4.7	6.1	4.8	47.4	55
Other country	2 605.2	246.2	623.3	9.1	3 483.8	
Total	13 675.1	614.5	2 148.0	139.5	16 486.9	
Share	0.83	0.04	0.13	0.01	1.00	

¹ 1994 for Russia, Japan og Denmark.

Source: Climate Secretariat. There are some differences in these figures and final statistics for the various countries, including Norway, see later overview of Norway's figures. However, this does not alter the overall picture described here. The total figures are the combined figures for those countries that have reported figures to the Secretariat.

marily due to lower emissions in Russia and the other former Eastern bloc countries.

The table indicates that Norway's emissions of greenhouse gases accounted for about 0,3 per cent of total greenhouse gas emissions among participating countries in the Kyoto Protocol as these were reported prior to the negotiations. Norway accounted for a good 3 per cent of emissions of HFCs/PFCs/SF₆ and about 0.8 per cent of nitrous oxide emissions. Norway's emissions of methane accounted for about 0.3 per cent of emissions of this gas in Annex B Parties. A reasonable reduction potential for additional gases will thus have a slightly greater impact for Norway than for Annex I Parties combined. Important sources of methane emissions are livestock and the decomposition of waste. Emissions of nitrous oxide primarily come from the production of fertilizer, where Norway is an important world market participant. Livestock production is also an important source, but in this case Norway is more on a par with other countries throughout the world. Even though Norway has a relatively high share of emissions of HFCs/PFCs/SF₆, the importance of this has declined sharply in recent years with emissions reduced to half in Norway.

We also see that the US accounts for nearly 70 per cent of total emissions of CFCs, HFCs and SF₆. If the US can substantially reduce its emissions of these gases at low costs, this may influence the permit price for the other gases. These emissions, however, do not account for a particularly higher proportion of total emissions in the US than in other countries. The reason, of course, is that the US dominates in the overall picture of emissions by Annex B Parties.

The US, Germany and Japan have a lower proportion of methane emissions than their share for total greenhouse gases. Russia has a substantially higher methane share than

its share for greenhouse gases due to considerable reductions in CO₂ emissions as a result of the economic downturn following the breakup of the former Soviet Union. This may imply that Russia has a potential for reducing its emissions at low costs in addition to those emissions which have already been reduced, provided that it is less expensive to reduce methane than the other gases. France, Germany, Norway and Sweden have relatively high nitrous gas emissions.

Permit prices for CO₂

Many studies carried out in the early 1990s, prior to the Kyoto negotiations, analyzed the level of taxes or permit prices for CO₂ which would be necessary to stabilize emissions of CO₂ at the 1990 level, globally or within the OECD area. The estimates in these studies, and the underlying assumptions concerning the rise in total emissions, have varied considerably¹, see table 2. There have been two new elements in the development of these studies. The estimates for necessary taxes/permit prices have become increasingly lower, and the increase in base scenario emissions has been steadily reduced. Early international studies in this area were reviewed in the KLØKT project (see Moum 1992). These studies then estimated that the taxes necessary to stabilize emissions ranged between Nkr 700-10 000 per tonne CO₂. The accompanying emission reductions ranged between 20-60 per cent. The KLØKT study assumed that the most realistic estimate was Nkr 1400 per tonne CO₂ with an accompanying reduction in emissions of 35 per cent.

The Green Tax Commission (NOU 1996:9) made use of the OECD's global model GREEN to analyze the consequences of introducing a tax which on a global basis was sufficient to stabilize emissions at the 1990 level in 2010

¹ See, for example, Bye (1997) and Hourcade et al. (1996) for a review of these studies.

Table 2. Estimated tax to achieve stable emissions at 1990 level in 2010, Nkr per tonne CO₂, and projected growth in total greenhouse gas emissions 1990-2010, per cent

	Year of study	Tax	Year	Rise in emissions
SIMEN ¹	1989	1 000	2000	16
Nordhaus	1990	3 325	2020	50
IEA	1990	350	2025	12
ECON	1990	1 400	2000	18
KLØKT	1992	1 400	2025	35
Jorgenson and Wilcoxon (1990)	1990	420	2020	32
Grønn skattekommisjon (NOU 1996:9)	1996	360	2020	45
Energiutvalget (NOU 1998:1)	1998	200	2020	45
St meld nr 29 (1997-98)	1998	50-200	2010	23
Alfsen, Holtsmark og Torvanger (1998)	1998	50-100	2010	6.5
Grubb and Vrolijk (1997)	1998	35-70	2010	6.5

¹ Bye, Bye and Lorentsen (1989).

and maintain emissions at this level until 2030. A tax of Nkr 360 per tonne CO₂ was sufficient to achieve this stabilization, or a reduction in carbon emissions of about 45 per cent compared with the baseline scenario in 2020. With linearity in the effect, this means that each 5 per cent reduction in emissions requires an additional tax of about Nkr 40. Against this background, it is estimated that a 5 per cent reduction in emissions would require a tax of about Nkr 400 per tonne CO₂.

A number of national studies show that relatively strong instruments would be necessary in order to stabilize greenhouse gas emissions in Norway from 1990 to 2010-2020.

Calculations carried out by the Energy Commission² indicate that even a tax of Nkr 400, where considerable emission reductions are achieved by subjecting energy-intensive industries to sharply rising electricity prices, will not be sufficient to achieve Norway's Kyoto commitment without buying permits (see later section on tax calculations for the Norwegian economy). Although the costs of reducing emissions in Norway may be high compared with other countries, when disregarding a dramatic adaptation of the structure of industry, these calculations - which include an adaptation of manufacturing - indicate that also in the rest of the world the shadow price of greenhouse gases may be high under the Kyoto Protocol's targets for total emissions. In the Energy Commissions Report, Nkr 200 is used as an illustration of a necessary permit price internationally in order to achieve the Kyoto targets.

Studies referred to in Report no. 29 to the Storting (1997-98) indicate a low international permit price. The report states: *A number of institutions both in Norway and other countries, including CICERO and the OECD, have evalua-*

ted potential permit prices. Under different assumptions the price estimates vary from Nkr 50 to about Nkr 200 per tonne CO₂. References to studies in the report are not precise, but the estimates are primarily based on a study by Grubb and Vrolijk (1997), see Alfsen, Holtsmark and Torvanger (1998). Compared with the Green Tax Commission's analyses and national studies, a price of Nkr 50 seems very low.

The low estimates may be ascribable to several factors: in part the inclusion in the Kyoto Protocol of a number of gases in addition to CO₂, which may be cheaper to reduce, and in part the very slow rise in emissions in the baseline projection. Grubb and Vrolijk (1997), however, *assumes* that a 10-15 per cent reduction of CO₂ emissions and a 30 per cent reduction in other greenhouse gases may occur at no cost. The basis for this assumption is not documented.

Based on the data used in connection with the negotiations, Alfsen, Holtsmark and Torvanger (1998) indicate that total emissions of greenhouse gases by Annex B Parties will rise by 6.5 per cent from 1990-2010. This is very low compared with the OECD study used by the Green Tax Commission where emissions grow by 45 per cent up to 2020. By way of comparison, Norway's second communication to the climate convention indicated an increase in Norway's emissions of 19 per cent from 1990 to 2010, see Alfsen (1998). The Energy Commission indicates a 15 per cent increase in emissions up to 2010 in its baseline scenario, while Report no. 29 to the Storting indicates a 23 per cent increase³. A recent study by Schmalense, Stoker and Judson (1998) shows that projections of global CO₂ emissions, which were used as a basis for the Kyoto negotiations, may be highly underestimated. The emission projections from Schmalense et al. are nearly 25 per cent higher than the IPCC's estimates of emissions for 2020, see also Hourcade et al. (1996).

The marginal cost of reducing greenhouse gas emissions to a stabilization level is very dependent on the level of emissions in the baseline projection, i.e. on how much emissions must be reduced, see e.g. Johnsen, Larsen and Mysen (1997) and Dean and Holler (1992). Underestimated emissions in the baseline projection may thus indicate that the shadow price of greenhouse gases, given the Kyoto Protocol's targets, may be substantially higher than the level suggested by the studies used so far.

Greenhouse gases excluding CO₂ account for 17 per cent of total greenhouse gases in countries participating in the Kyoto Protocol. There is thus reason to assume that the introduction of additional gases, combined with the continued objective of stabilization, may have some bearing on the permit price which will be generated in an international permit market. This particularly applies in an initial phase where a reduction of these gases may constitute a high

² See, for example, Energy and Power Balance in the period to 2020 (NOU 1998:1) as a most recent example of this.

³ It is particularly with regard to CO₂ emissions that the Report to the Storting is considerably higher than those of the Energy Commission.

share of total emission reductions. It is not certain, however, that the importance is considerable. The most important gas next to CO₂ is methane. Due both to its size and the lower potential for reducing other gases, we will in addition to CO₂ focus in particular on methane in the following.

Calculations of methane gas emissions

Methane is the main greenhouse gas besides CO₂, also in Norway. Emissions from agriculture account for 22 per cent of total methane gas emissions, and most of these emissions stem from animal digestion. According to Report no. 29 to the Storting, measures aimed at reducing these emissions are not considered relevant. The methane emissions which are relevant in a climate policy context are thus emissions of gases from landfills, which are estimated at 67 per cent of total methane gas emissions and about 12 per cent of total greenhouse gas emissions in Norway.

There is considerable uncertainty surrounding the quantities of methane that are actually generated at landfills, the quantities that are released, and the effect of burning methane gas. First, there is uncertainty concerning the actual level of emissions. More recent studies indicate that the level may be lower than assumed earlier, partly because methane naturally decomposes into CO₂ on its way out of the landfill. Tests of methane emissions from landfills with a soil cover indicate that methane emissions from Norwegian landfills may be far lower than the level on which earlier calculations have been based (Slyngstad 1998a). With optimal conditions in the top layer of the landfill, the landfill may have negative emissions, since in addition to the methane from the landfill itself it decomposes other methane from the surrounding air.

On the other hand, updated estimates of future economic developments indicate that the *growth* in waste generation is underestimated, with the decline in methane gas emissions thereby overestimated, see below. Another question is the cost of reducing methane gas emissions. New research seems to conclude that methane gas emissions can be reduced using relatively simple means and at low costs. A major Swedish project (Lagerkvist 1998) concerning landfill gas concluded that the problem of landfill gas is highly overestimated and that emissions can be kept at a low level through relatively simple means.

Projections of waste and methane gas emissions in Norway

Earlier projections of municipal waste for Norway in the period to 2010 are based on waste statistics from 1992 (Bruvoll and Ibenholt 1995). The projections are based on an assumption that waste quantities increase with rising production and use of materials. Economic developments

Table 3. Projections of municipal waste, 1 000 tonnes (growth from 1992 in per cent)

	1992 ¹	1995	2010 (new projec- tions)	2010 (previous projec- tions)
Industrial waste	1 135.4	1 460.2	1 773.8 (56)	1 778.9 (57)
Household waste	1 087.4	1 262.0	1 815.1 (67)	1 429.1 (31)
Total	2 222.8	2 722.2	3 588.8 (61)	3 208.0 (44)

¹ Figures for 1992 include 93.6 tonnes of unknown/mixed waste distributed proportionally on industrial and household waste.

Table 4. Projections of total disposed of waste quantities, 1 000 tonnes (growth from 1992 in per cent)

	1992	1995	2010
Municipal industrial waste	862.9	919.9	1 117.5 (29)
Household waste	826.4	795.0	1 143.5 (38)
Other industrial waste	938.0	1 000.0	1 214.8 (29)
Total	2 627.4	2 715.0	3 475.7 (32)

in the macroeconomic model MSG, which is also used for energy and emission calculations, are used as the basis for waste projections⁴. The projections have now been updated using updated waste figures from 1995 and new forecasts for economic developments in MSG⁵, see table 3.

The new projections in table 3 show a far higher growth in waste generation than assumed earlier. Whereas the previous projection showed a rise of 44 per cent in the period to 2010, the current statistics imply that the growth may be a good 60 per cent. This is primarily ascribable to higher growth in registered quantities of household waste in recent years, and thus higher waste generation per consumption unit than assumed earlier. As much as 23 per cent of the previously estimated growth of 44 per cent was reached in the period 1992-1995. Moreover, new projections of macroeconomic developments contribute to changes in waste generation in the various sectors. Industrial waste is expected to show a lower growth from 1995 compared with earlier projections.

In the Norwegian Pollution Control Authority's forecasts, industrial waste, excluding municipal waste assumed to be about 1 million tonnes (Norwegian Pollution Control Authority 1988). We use this estimate for 1995, and assume that the quantities change in pace with municipal industrial waste.

Table 4 shows estimates of future *quantities of landfilled waste* which follow from projected waste quantities. In 1992, 76 per cent of municipal waste was disposed of in

⁴ See Bruvoll and Ibenholt (1997) for a description of the model.

⁵ The economic projections largely correspond to the calculations used as a basis by the Energy Commission.

Table 5. Potential methane emissions in millions of tonnes (CO₂ equivalents)

Methane potential kg methane/tonne waste	1992	1995	2000	2010
83 (Holdhus 1998)	0.218 (4.6)	0.205 (4.3)	0.213 (4.5)	0.218 (4.6)
130 (St meld nr 29)	0.342 (7.2)	0.321 (6.7)	0.333 (7.0)	0.341 (7.2)
<i>Memo: St meld nr 29</i>	<i>1990</i> 0.302 (6.3)	<i>1996</i> 0.327 (6.9)		<i>2010</i> 0.248 (5.2)

landfills, whereas the share was 63 per cent in 1995 (Statistics Norway 1994, 1988). We assume an unchanged landfill rate from 1995-2010 for both municipal waste and other industrial waste. This means that additional measures aimed at a higher percentage of materials and energy recovery will result in corresponding reductions in landfill.

Given these assumptions, landfilled quantities show a rise of 32 per cent from 1992 to 2010. These figures provide a basis for new projections of methane emissions. Methane is emitted over a period of many years following disposal, and emissions and the timing of these will depend on dampness, disposal method, cleaning technology, etc. The methane potential, the total future potential quantity of methane from disposed of waste in one year, will differ from actual annual emissions, which arise from the waste quantities of the previous year and earlier years. There is also considerable uncertainty associated with this methane potential. Report no. 29 to the Storting points out that a project has been initiated to evaluate the level of methane gas from landfills in Norway, and various studies will be compared.

The estimates for methane emissions in Report no. 29 to the Storting are based on an assumption of 130 kg methane per tonne waste. This report refers to calculations from the Norwegian Pollution Control Authority which show 100 kg methane per tonne waste. Studies carried out by the Centre for Soil and Environmental Research indicate an even lower methane potential. According to Holdhus (1998), maximum emissions might be 83 kg methane per tonne waste. In order to illustrate the uncertainty in the figures, we present calculations based on the assumptions applied in both the Report to the Storting and by the Centre for Soil and Environmental Research (Holdhus).

It is assumed that the proportion of landfilled waste in facilities with methane recovery systems rises from 45 to 70 per cent. Moreover, it is assumed that the burning effect of the facilities rises from 20 to 35 per cent in the period 1995 to 2010 (cf. Report no. 29 to the Storting). This means that we assume that 25 per cent of the methane gas from waste which goes to landfills in 2010 will be burned. Table 5 shows the potential methane emissions in excess of what is burned under different assumptions on the methane potential. Under Holdhus' assumptions on maximum methane emissions, the emissions are far lower than assumed earlier.

The new projections result in higher emissions than in the Report to the Storting for different assumptions on the met-

hane potential. The deviation is primarily ascribable to the fact that the Report to the Storting assumes that additional recycling/recovery measures will reduce disposed of waste quantities in 2010, an assumption which is not made in our projections. We will now instead evaluate the costs of several measures, including recycling (composting of wet organic waste).

Costs of reducing methane

Reduced quantities of organic waste for disposal will contribute to lower methane emissions. The actual methane gas which arises can also be burned so that the gas is converted into CO₂ (which has a far lower climate effect). Moreover, during methane oxidation microorganisms can convert methane into CO₂ when the gas on its way to free air passes through a layer of soil/bark with a certain organic composition.

The potential for reducing methane through other methods than burning is 4.6-7.2 million tonnes CO₂ equivalents in 2010, depending on the methane potential (see table 5). Our figures on costs indicate that methane can be reduced at relatively low marginal costs (see table 6). It is likely that the marginal cost rises with the share of methane that is reduced, and it is uncertain when the marginal cost exceeds the marginal cost of CO₂ reductions. Even though it appears that methane can initially be reduced relatively cheaply, it is thus not certain that it is profitable to make use of the entire potential.

Materials recovery

A main strategy for the Government for reducing methane emissions is to initiate an increase in the proportion of waste that is recycled. Report no. 29 to the Storting refers to agreements on recycling packaging waste that have been entered into with the business sector and consumer waste in municipalities.

Composting wet organic waste is one possible policy for increasing the rate of recycling. Several counties have introduced a ban on the disposal of wet organic waste. A recent study by InterConsult ASA (1998), based on the composting of wet organic waste in the county of Sogn og Fjordane, indicates that composting provides few climate gains compared with the social costs, see table 6. Their figures show that the costs per tonne CO₂ will range between Nkr 1150-1300 per tonne CO₂. As pointed out by Bruvold

(1998a), the recycling of materials in many cases may be a costly alternative to waste treatment, which indicates that more cost-effective measures for reducing methane gas emissions should be evaluated.

Waste incineration

Increased waste incineration will also reduce emissions of landfill gases. The power market is decisive when evaluating incineration for energy purposes versus disposal. In the baseline scenario in the Energy Report, gas-generated power is the marginal energy source in the long term. An increased supply of energy from waste incineration will not alter the marginal cost of electricity within the current interval of 25 TWh for gas-generated power in the Energy Report's baseline scenario. Energy from waste will therefore replace gas-generated power instead of increasing total electricity consumption. For fossil waste materials, such as plastic, this means that the climate effect of CO₂ from plastic waste is reduced substantially, and that burning paper through reduced gas consumption contributes to lower greenhouse gas emissions.

The costs of incinerating paper and plastic waste can illustrate the costs of waste incineration as a climate policy instrument. Because some of the statistics are based on foreign data, they should only be used as an indication of Norwegian conditions.

The costs for paper and plastic (including environmental costs but excluding climate costs) are estimated on the basis of Bruvoll (1998a). If the greenhouse gas saving is taken into account, the incineration of *paper* (instead of disposal without methane burning) may result in greenhouse gas reductions to about NKr 50 per tonne CO₂ (about NKr 60 if it is not assumed that the energy replaces gas-generated power).

Plastic at landfills decomposes very slowly, while CO₂ is released immediately with incineration. In a market where the marginal energy source is based on non-fossil fuels, the incineration of plastic does not appear to be a relevant climate policy instrument. However, under the Energy Commission's assumptions concerning the power market, the cost per tonne CO₂ will be negative for plastic incineration compared with disposal as incineration entails lower econo-

Table 6. Costs of reducing methane gas emissions in NKr per tonne and reduction potential in millions of tonnes CO₂ equivalents

Measure	Cost
Composting wet organic waste	1 150 - 1 300 NKr
Waste incineration	Paper: 50 NKr Plastics: negative
Burning methane	Paper: about 60 NKr Plastics: about 400 NKr
Methane oxidation	20 - 50 NKr

mic costs. In addition, there is a positive climate effect in that the organic material replaces other emissions, something which only partially takes place for the methane gas that is burned at landfills. Plastic, however, accounts for only a small share of total waste quantities, and plastic incineration therefore represents a limited potential for greenhouse gas reductions.

Reduced waste generation

Another way to reduce the landfilled waste is to promote waste minimization. Possible instruments in this connection are taxes which in various ways provide an incentive to reduce the use of materials which sooner or later end up as waste. For example, municipalities have been urged to use differentiated waste fees in order to encourage a reduction in the quantity of waste for final treatment. These appeals have not been sufficient to influence waste quantities, since the waste fees provide no reward for lower waste production by households (Hass 1997). The final treatment fee for waste can also promote reduced waste generation.

Taxes to reduce waste generation may result in a lower level of waste disposal, but will also result in costs for other sectors of the economy. Bruvoll (1998b) shows that a general tax on raw materials (paper and plastic) not only reduces waste quantities but also other environmental discharges. The total environmental gain, which primarily stems from emissions other than those from the waste sector, is higher than the costs in the form of reduced production and consumption. The greenhouse gas effect, however, is unclear. A tax on the use of materials is an indirect instrument in relation to landfill gases, and relatively high taxes are probably necessary to produce a relevant effect on greenhouse gases alone.

Methane burning

Today 40-50 per cent of the waste is disposed of at landfill sites with methane burning. In Report no. 29 to the Storting it is assumed that most larger landfills will have installed gas recovery systems in the course of 1999 and that about 70 per cent of the waste disposed of annually will then be placed in landfills with gas recovery facilities. Existing technology captures about 20 per cent of methane emissions from facilities with methane burning, and it is assumed that the effect in 2010 can increase to 30-40 per cent. According to Bruvoll (1998b), it will be possible to achieve greenhouse gas reductions to about NKr 60 per tonne CO₂ for paper waste, assuming that methane burning replaces fossil fuels (NKr 70 per tonne if the energy does not replace fossil fuels). For plastic waste, the methane gas emissions are small due to low degradability, and the cost is thereby relatively high, about NKr 400 per tonne CO₂.

Methane oxidation

The covering layer of landfills which initially has been placed there for aesthetic reasons has proven to function as an oxidation layer for some of the methane that is formed

at landfills. An optimal covering layer consists first of a porous material which distributes the methane gas equally before it passes through the oxidation layer. The oxidation layer shall provide favourable conditions for methane-oxidizing microorganisms. Experiments are under way where a compost of bark and sewage sludge appears to be promising (Slyngstad 1998b)⁶. When conditions permit safe gas handling, the emissions of methane during landfilling do not have to be very high. The method is relatively new and is being tested, and the effect of the method is therefore uncertain.

Methane oxidation may be less expensive than methane burning. Slyngstad (1998a) maintains that a medium-sized municipality can save a total of NKr 4-7 million (investment and operating expenses) using methane oxidation instead of methane burning. Holdhus (1998) estimates the cost of the covering layer, including purchases and the spreading of materials to which nutrients have been added, at a maximum NKr 1200 per cubic metre. However, for suitable waste, such as garden waste/demolition refuse with nutrient-rich sewage sludge added, the cost in practice will be eliminated for the material itself, and the cost will be linked to the actual costs of mixing and spreading, estimated at NKr 200-300 per cubic metre. With a landfill of 10 metres and with a covering layer of 0.5 metre at a cost of NKr 1200 per cubic metre, the cost of reducing methane will vary between NKr 25 and 45, measured per tonne CO₂ equivalents. These relatively low figures for costs are supported by other studies. In an extensive review of the literature concerning landfill gases, Haarstad (1998) concludes that methane gas emissions from landfills can be reduced or even eliminated using relatively simple techniques for methane oxidation.

The figures on costs (NKr 25 and 45 per tonne CO₂ equivalents) presuppose a methane potential of 130 and 83 kg, respectively, per tonne waste, see table 5. This means that the higher the methane potential is, the higher will be the share of greenhouse gas reductions that can be achieved on the waste side and at even lower costs per tonne. However, if

the methane potential and the problems associated with methane are overestimated, as is argued by a number of observers, the greenhouse gas reductions that can be achieved through landfills will be lower and the cost per unit higher.

Calculations of taxes for the Norwegian economy

We showed in table 1 that methane accounted for about the same share of total greenhouse gas emissions in Norway as in other Annex I Parties. The importance of including methane in the Kyoto Protocol will depend on the change in the marginal costs of reducing emissions of other gases. In connection with the Energy Commission's report, Statistics Norway made some calculations of the consequences for the Norwegian economy and greenhouse gas emissions as a result of the introduction of different tax levels for CO₂ in Norway (Bye, Johnsen, Aune and Hansen 1998). In the following we discuss three calculations from this study, where we analyze the effect of an international permit price of NKr 200 under different assumptions concerning exemptions and targets for emission reductions, see table 7. We also make some evaluations of which of these are likely to be the most comparable with other countries on average.

Emissions of greenhouse gases in the *baseline scenario* in the Energy Commission based on new projections of methane emissions are lower than indicated by Report no. 29 to the Storting. Emissions of greenhouse gases rise by a good 22 per cent from 1990 to 2020. Emissions of CO₂ show a particularly sharp rise (40 per cent). According to the revised estimates, emissions of methane decline slightly, particularly in relation to the current level. CO₂ thus accounts for a steadily rising share of total greenhouse gas emissions. If the same applies to other countries, this may imply that a reasonable reduction in emissions of other gases are offset by a sharp rise in CO₂ emissions. This also indicates that with any stricter requirements in the Kyoto Protocol at a later time, the marginal cost of CO₂ reduc-

Table 7. Norway's greenhouse gas emissions in different scenarios, millions of tonnes CO₂ equivalents

	1990	1996	2000			
			Reference	Cost Effective	Industry exempt	Stricter requirements
CO ₂	35.5	41.1	49.8	39.5	42.1	38.4
Methane ¹	9.3	7.7	7.8	7.7	7.7	7.7
N ₂ O	5.7	5.6	5.3	5.3	5.4	5.3
Other gases	4.7	2.1	4.5	4.5	4.5	4.5
Total	55.1	56.5	67.4	57.0	61.1	55.9

¹ Total quantities of methane from landfills and other sources. 1990 figures from Statistics Norway (1998). Based on the new projections of waste quantities, the methane forecasts differ from those presented in the Energy Report. A methane potential of 83 kg/tonne waste is assumed, see table 5. The methane potential is very uncertain.

⁶ Experiments with other masses are being planned in a joint project between the Institute of Soil and Water Studies at the Norwegian College of Agriculture and Hjeltnes COWI.

tions will be of greater importance to the permit price for greenhouse gases.

In the *cost-effective* scenario, it is assumed that all CO₂ emissions in Norway are subject to a tax of Nkr 200 per tonne. This means that those sectors which today have a tax higher than Nkr 200 will see a reduction in their tax, while those sectors which have a lower tax or are exempt from the tax will experience a rise in the tax. The macro-economic calculations then showed virtually unchanged economic growth. Emissions of greenhouse gases are reduced by nearly 10 million tonnes, or 21 per cent, which results in an increase in greenhouse gas emissions from 1990 of about 3.5 per cent. The main reason for the sharp reduction is that in the baseline scenario there is a relatively large element of gas-generated power with sizeable CO₂ emissions, whereas gas-generated power will not be profitable in the cost-effective scenario. The demand for energy will be covered through slightly greater hydropower development. The greatest effect, however, comes through the reduction in electricity consumption, particularly in power-intensive manufacturing sectors, which will face higher electricity prices.

A reduction in methane emissions by an estimated 50 per cent in relation to table 7 will mean a further reduction of about 3.8 million tonnes. Total emissions in 2020 will then be about 3.5 per cent lower than the 1990 level. This may indicate that a permit price of Nkr 200 will be too high to achieve an international reduction of 5.2 per cent, as it is common to assume that it is more expensive to reduce emissions in Norway than the average internationally. On the other hand, the cost-effective scenario reflects a situation with relatively large substitution possibilities in the Norwegian economy, both on the supply side for electricity (hydro and other renewable sources versus gas) and on the demand side for electricity (power-intensive manufacturing industry is reduced sharply). Substantial substitution possibilities entail low marginal costs for reducing greenhouse gas emissions.

If *power-intensive manufacturing sectors are exempt* from taxes on greenhouse gases, the reduction in emissions will be smaller (see manufacturing exempt in table 7). Emissions, however, may still be reduced by a considerable margin with the elimination of gas-generated power. Electricity is instead imported from other countries. Changes in emissions in these countries will depend on their climate policy. Here it has been assumed that all countries introduce a tax of Nkr 200 per tonne CO₂. With a 50 per cent reduction in methane emissions, Norway's emissions will rise by 4 per cent from 1990. This is a situation where substitution possibilities on the demand side are considerably less than in the cost-effective scenario, but where there are still substantial substitution possibilities on the supply side for electricity.

If it is more expensive to reduce emissions in Norway than in other countries, one can conclude that an international permit price may be lower than Nkr 200 per tonne CO₂,

assuming that the targets in the Kyoto Protocol are to be achieved. However, it is far from certain that the assumption of cheaper adaptation in other countries is correct with the high level of gas-generated electricity included in the baseline scenario and with the considerable substitution possibilities on the demand side which are assumed in one of the scenarios. It is therefore interesting to see what can be achieved at the margin in Norway without including gas-generated electricity. In the scenario involving *stricter requirements in the Kyoto Protocol* a cost-effective tax of Nkr 400 has been introduced. This can illustrate a situation where gas-generated electricity is excluded - it is eliminated with a tax of Nkr 200 - but where there is still considerable flexibility on the demand side in that a large proportion of power-intensive manufacturing sectors are still included. We see that in this case total greenhouse gas emissions are only reduced by about 1 million tonnes in relation to the cost-effective scenario with a tax of Nkr 200.

It is not obvious that it is considerably more expensive to reduce emissions of greenhouse gases in Norway than in other countries in the long term. First, gas-generated power will be replaced relatively easily by alternative technology with taxes on greenhouse gas emissions. Second, we make it unnecessarily expensive to eliminate greenhouse gas emissions in Norway by sheltering large parts of the economy from the costs of emissions. With considerable substitution possibilities, a permit price of about Nkr 200 per tonne CO₂ equivalents will be close to the permit price necessary for achieving stabilization or a 5 per cent reduction in greenhouse gas emissions. This particularly applies if methane can be reduced by a considerable extent at a cost which is lower than this. Fewer substitution possibilities, however, result in substantially higher costs or a substantially smaller effect on emissions with the same permit price.

Summary

There is considerable uncertainty concerning the international permit price which is necessary to achieve the Kyoto Protocol's emission targets. The marginal costs of various pollutants in Norway in the period ahead are therefore also uncertain. Many early studies have calculated relatively high costs for stabilizing CO₂ emissions internationally. The Kyoto Protocol, however, has introduced additional gases, and more recent studies indicate very low costs for stabilizing *total* greenhouse gases. This is also indicated in Report no. 29 to the Storting.

There are two new elements in more recent studies. First, the projection in the baseline scenario shows lower emissions than earlier. Moreover, it is assumed that gases other than CO₂ can be reduced considerably and at low costs. This particularly applies to methane, which is the largest of these.

More recent projections for Norway show that municipal waste quantities are rising at a faster pace than assumed earlier. At the same time, methane emissions from landfills may be overestimated, and the importance of methane in a

greenhouse gas context may be somewhat less than previously estimated for Norway.

Based on Norwegian analyses, there is also reason to assume that methane emissions can be reduced substantially at relatively low costs. This may result in low permit prices in the short term. In the longer term, it is conceivable that stricter emission requirements will be introduced, thereby resulting in higher permit prices. CO₂ will then be of greater relative importance to the permit price in relation to other gases.

Recent projections of global emissions show a substantially stronger increase in emissions than assumed prior to the Kyoto negotiations. The baseline calculations for emissions in the years ahead will be decisive for how high permit prices in the tradeable permit market will be given the restrictions on emissions stipulated in the Kyoto Protocol.

Calculations for two "worlds" - one with considerable and one with limited substitution possibilities - indicate very different necessary permit prices for achieving stable emissions of greenhouse gases. It is not certain that Norway in every respect is an expensive country in which to reduce greenhouse gas emissions. On the contrary, there are elements on the supply and demand side which may indicate that it is inexpensive to reduce emissions in Norway. It is argued that an international permit price of NKr 200, which is used in the Energy Report, may be a good illustration of what will be necessary to achieve the Kyoto Protocol's emission targets internationally.

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Research publications in English

New titles

Social and Economic Studies

Dennis Fredriksen:

Projections of Population, Education, Labour Supply and Public Pension Benefits. Analyses with the Dynamic Microsimulation Model MOSART
SES 101, 1998. pp 123.
ISBN 82-537-4572-9

Norway, like most developed countries, is facing an ageing population from the beginning of the 21st century, and this may have large impacts on public pension expenditures. These relations are analysed with a dynamic cross-sectional microsimulation model called MOSART. The model simulates the life course of a representative sample of the Norwegian population with respect to demographic events, education, labour supply and public pension benefits. Changes in these subjects since 1960 are also reported, and the MOSART model is tested by its ability to reproduce the actual development in this period.

The base line alternative of the analyses is a situation where "everything continues as in 1993". Consequences for the tax level are analysed by calculating a contribution rate given by dividing public pension expenditures by the sum of wages and half the public pension expenditures (pensioners pay less taxes than wage earners). This contribution rate was 15.6 per cent in 1993, and increases to 25 per cent by year 2040 with the base line alternative. The size of the population has stabilized by this time, and the projected contribution rate is the result of structural aspects of the individual life courses. These aspects include the average number of years each respectively participates in the labour force or is a pensioner, and the ratio between average pension benefits and wages. Improved benefits and longer life expectancy explain most of the growth in the contribution rate.

Systematic, but still moderate changes in the underlying assumptions on life expectancy, disability pension and labour force participation rates may change the conclusion of a growing contribution rate. Political decisions which may reduce and finally eliminate public supplementary

pension schemes can also change the conclusion.

If the underlying assumptions turn out to be correct, simulation of historical data shows that the MOSART model is able to predict the actual development from 1960 and onwards reasonably well. A projection where all underlying assumptions are assigned the level in 1967 gives a surprisingly good prediction of the contribution rate in 1993. However, large changes in several components working in opposite direction are hidden behind this picture. The projections with the perspectives from respectively 1967 and 1993 are very different by the middle of the 21st century. Important changes in the underlying assumptions from 1967 to 1993 are lower fertility, larger propensities to enter disability pension, lower retirement age and a higher expected increase in life expectancy.

Discussion Papers

Hege Medin, Karine Nyborg and Ian Bateman:

The Assumption of Equal Marginal Utility of Income: How Much Does it Matter?

DP no. 241, 1998. pp 31.

In most applied cost-benefit analyses, individual willingness to pay is aggregated without using explicit welfare weights. This can be justified by postulating a utilitarian social welfare function, along with the assumption of equal marginal utility of income for all individuals. However, since marginal utility is a cardinal concept, there is no generally accepted way to verify the plausibility of this latter assumption, nor its empirical importance. In this paper we use data from seven contingent valuation studies to illustrate that if one instead assumes equal marginal utility of the public good for all individuals, aggregate monetary benefit estimates change dramatically.

Richard B. Howarth and Kjell Arne Brekke:

Status Preferences and Economic Growth

DP no. 240, 1998. pp 26.

This paper examines the implications of status-seeking behavior for long-term

growth in a competitive economy. We explore the intuitive hypothesis that the quest for enhanced economic status leads to excessive levels of production and consumption.

In a Ramsey growth model in which preferences are altered to include a concern for relative consumption, status seeking has no impacts on the economy's long-run equilibrium in the absence of a labor-leisure tradeoff. Relative consumption effects do, however, induce short-term departures from efficient resource allocation, either augmenting or depressing consumption growth rates in accordance with the elasticity of substitution between consumption and status.

In the case where social status is defined in terms of the relative accumulation of manufactured capital, status seeking leads to excessive rates of short-run growth and inefficiently high levels of capital and consumption in the long-run equilibrium. Similar results hold when preferences embody a concern for career status as captured by the relative accumulation of human capital, and when relative consumption effects are accompanied by a labor-leisure tradeoff.

Kjell Arne Brekke, Richard B. Howarth and Karine Nyborg:

Are there Social Limits to Growth?

DP no. 239, 1998. pp 13.

Hirsch (1976) suggested that as consumption grows, an increasing proportion of the benefits people derive from consumption is due to a status effect. Status is a relative concept that cannot be increased on average; thus it may seem reasonable to expect that as consumption grows, the marginal benefits of consumption decrease more than the marginal benefits of status. In equilibrium, however, there will be price effects that may more than outweigh this effect. Thus, there is no a priori reason to expect more status-seeking behavior in richer societies.

John K. Dagsvik, Ane S. Flaatten and Helge Brunborg:

A Behavioral Two-Sex Marriage Model

DP no. 238, 1998. pp 41.

In this paper we discuss a particular marriage model, i.e., a model for the number of

marriages for each age combination as a function of the vectors of the number of single men and women in each age group. The model is based on Dagsvik (1998) where it is demonstrated that a specific matching game played at the individual level imply, under specific assumptions about the distribution of the preferences, a convenient expression for the corresponding structural marriage model.

Data from the Norwegian Population Register for nine years are applied to estimate the model. We subsequently test the hypothesis that, apart from a random "noise" component, the age-specific parameters change over time according to a common trend. We find that the hypothesis is not rejected by our data.

Kjersti-Gro Lindquist:

The Response by the Norwegian Aluminium Industry to Changing Market Structure

DP no. 237, 1998. pp 27.

This paper analyses how changes in market structure have affected the margins (measured by the Lerner index) of Norwegian aluminium plants. Instead of showing the expected negative trend, due to increased competition internationally, the margins are found to move procyclically around a constant that significantly exceeds zero. Three explanations for this stability in the levels of the margins are identified; a better exploitation of scale economies, increased productivity and product specialisation which allows Norwegian producer prices to increase more rapidly than the international reference price.

Karin Ibenholt:

Material Accounting in a Macroeconomic Framework Forecast of waste generated in manufacturing industries in Norway

DP no. 236, 1998. pp 29.

This paper analyses the generation of waste in production processes, based on the physical law of conservation of mass. By this law, mass going into a production process must equal the mass coming out of the same process. The paper uses this mass balance perspective to refine a previously developed technique for forecasting waste amounts. A macro economic model predicts the use of intermediate inputs and production in monetary units, and by multiplying these variables with weight conversion factors we estimate physical amounts going in and out of production. The difference between input and output, the residual, consists of discharges to land, water and air. We predict a growth in the residuals for manufacturing industries of 83 per

cent from 1993 to 2010. The growth is partly explained by an anticipated growth in material intensity.

Erik Biørn, Kjersti-Gro Lindquist and Terje Skjerpen:

Random Coefficients and Unbalanced Panels: An Application on Data from Norwegian Chemical Plants

DP no. 235, 1998. pp 28.

A framework for analyzing substitution and scale properties, and technical change from plant-level panel data is presented. Focus is on comparing the constant and random coefficient specification of the substitution and scale parameters and investigating the potential variation of the parameters across firms. Characteristics of the model framework are (i) an equation system consisting of a three-factor translog cost function and the corresponding cost-share equations, (ii) random firm specific heterogeneity in coefficients, and (iii) a Maximum Likelihood procedure allowing for unbalanced panel data. The empirical results, based on data from Norwegian chemical plants, indicate substantial firm specific heterogeneity in substitution and scale properties.

John K. Dagsvik and Leif Brubakk:

Price Indexes for Elementary Aggregates Derived from Behavioral Assumptions

DP no. 234, 1998. pp 36.

This paper discusses the properties of price- and Cost-of-Living indexes that follow from specific assumptions about the structure of consumer preferences. Of particular interest are indexes for elementary aggregates. In the first part of the paper we show how particular indexes for elementary aggregates emerge from a micro model with heterogeneous consumers and unobservable choice sets of product variants. Subsequently, we demonstrate that these indexes also follow from a particular preference structure of a representative consumer. Indexes that are currently used in many countries emerge as special cases of the ones proposed in this paper.

Morten Sjøberg:

Uncertainty and International Negotiations on Tradable Quota Treaties

DP no. 233, 1998. pp 24.

Negotiating an international tradable quota treaty between industrialised and developing countries is complicated by uncertain marginal abatement costs and non-uniform quota prices. An initial quota allocation that implies zero expected net cost to developing countries will typically be insufficient to attract their participation in the treaty. Two options to compensate for uncer-

tainty are discussed here, extra emissions quotas and financial transfers. The latter is found to be more effective in facilitating treaty-making, but the scope of co-operation is restricted by the developing countries' risk-aversion.

Runa Nesbakken:

Price Sensitivity of Residential Energy Consumption in Norway

DP no. 232, 1998. pp 28.

The main aim of this paper is to test the stability of the results of a model which focus on the relationship between the choice of heating equipment and the residential energy consumption. The results for the income and energy price variables are of special interest. Stability in the time dimension is tested by applying the model on micro data for each of the years 1993, 1994 and 1995. The parameter estimates are stable within a 95 per cent confidence interval. However, the estimated impact of the energy price variable on energy consumption is considerably weaker in 1994 than in 1993 and 1995. The results for two different income groups in the pooled data set are also subject to stability testing. The energy price sensitivity in residential energy consumption is found to be higher for high-income households than for low-income households.

Runa Nesbakken:

Residential Energy Consumption for Space Heating in Norwegian Households. A Discrete-Continuous Choice Approach

DP no. 231, 1998. pp 26.

In this paper the demand for space heating energy is estimated by using a discrete-continuous choice model which focuses on the relationship between the choice of heating equipment and energy consumption. The model is estimated on Norwegian micro data, and the two stages of the model are estimated simultaneously. The capital cost and the operating cost of the heating systems are both found to have a significant impact on the choice of heating system. Furthermore, the results show that household characteristics are important variables in residential energy models. Energy price elasticities and income elasticities are estimated.

Rolf Aaberge, Ugo Colombino and Steinar Strøm:

Social Evaluation of Individual Welfare Effects from Income Taxation. Empirical Evidence Based on Italian Data for Married Couples

DP no. 230, 1998. pp 28.

This paper discusses methodological principles for social evaluation of tax systems

and tax reforms when concern is primarily turned to who gains and who loses. The discussion is followed by an empirical analysis based on Italian household data. Using a household microeconomic labor supply model we have simulated behavioral responses and welfare gains and losses for married couples resulting from replacing the Italian tax system as of 1993 by proportional taxation.

John K. Dagsvik, Yu Zhu and Rolf Aaberge:

A Framework for Empirical Modelling of Consumer Demand with Latent Quality Attributes

DP no. 229, 1998. pp 44.

This paper discusses a particular approach to empirical consumer demand modelling when products are differentiated and the product attributes are unobservable. In contrast to the traditional approach to this problem, see e.g. Epple (1987) and Deaton (1987, 1988), where the product variants are treated as infinitely divisible goods, the present approach assumes that the consumer is making his choice of variant from a set of discrete "packages" of attribute combinations. Subsequently, given the (discrete) choice of variants the corresponding quantities are treated as continuous choices. Thus in this approach the consumer's decision process is formulated as a discrete/continuous choice problem.

The empirical analysis is based on microdata from the Sichuan province in China. We show that in this case the estimation methods work well and yield reasonable results.

Reprints

Annegrete Bruvoll:

Taxing Virgin materials. An Approach to Waste Problems

Reprints no. 129, 1998. pp 17.

Reprint from Resources, Conservation and Recycling, Vol. 22, 1998.

Annegrete Bruvoll and Karin Ibenholt:

Future Waste Generation. Forecasts on the Basis of a Macroeconomic Model

Reprints no. 128, 1998. pp 14.

Reprint from Resources, Conservation and Recycling, Vol. 19, 1997.

Lasse S. Stambøl, Nils Martin Stølen and Turid Åvitsland:

Regional Analysis of Labor Markets and Demography. A Model Based Norwegian Example

Reprints no. 127, 1998. pp 28.

Reprint from The Journal of the RSAI, Vol. 77, No. 1, 1998.

Kjell Arne Brekke:

Hicksian Income from Resource Extraction in an Open Economy

Reprint no. 126, 1998. pp 12.

Reprint from Land Economics, Vol. 73, No. 4.

Bente Halvorsen and Kjartan Sælensminde:

Differences between Willingness-to-Pay Estimates from Open-Ended and Discrete-Choice Contingent Valuation Methods. The Effects of Heteroscedasticity

Reprints no. 125, 1998. pp 20.

Reprint from Land Economics, Vol. 74, No. 2.

Asbjørn Aaheim and Karine Nyborg:

On the Interpretation and Applicability of a "Green National Product"

Reprints no. 122, 1998. pp 17.

Reprint from The Review of Income and Wealth, Vol. 41, No. 1.

Documents

Kjell Arne Brekke and Jon Gjerde:

Optimal Environmental Preservation with Stochastic Environmental Benefits and Irreversible Extraction

Documents 98/21, 1998. pp 19.

In this paper we will derive the optimal solution to a wide class of stochastic optimal environmental preservation problems, taking the quasi-option value into account. The paper generalizes and extends previous results in this area. The optimal policy is to preserve until marginal environmental benefits reaches some trigger level. A striking feature of the optimal policy, is that it is independent of what is assumed about marginal environmental benefits below this trigger level.

Kjell Arne Brekke (Coauthor on appendix: Jon Gjerde):

Hicksian Income from Stochastic Resource Rents

Documents 98/20, 1998. pp 15.

The paper defines the risk adjusted Hicksian income as the highest consumption level that is consistent with utility being a martingale. We find that the appropriate risk adjustment is to compute wealth using a risk adjusted rate of return, but to compute the income as the risk free return to that wealth. The results are applied to estimation of Hicksian income from Norwegian petroleum wealth in the period 1973-1989.

Solveig Glomsrød:

Integrated Environmental-Economic Model of China. A paper for initial discussion

Documents 98/17, 1998. pp 24.

This paper is memorizing some initial thoughts about the upcoming process of developing an integrated environmental economic model in State Statistical Bureau of The People's Republic of China. The topics dealt with partly reflect a need to become familiar with statistical data and definitions, partly a wish to associate the economic and environmental scenery of China with some relevant modeling options.

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Natural Resources and the Environment
1998. SA 26, 1998.

Natural Resources and the Environment
1997. SA 17, 1997.

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SES 99, 1998.

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Taran Fæhn and Leo Andreas Grünfeld:
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Terje Skjerpen and Anders Rygh Swensen:
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John K. Dagsvik:
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1995. DP no. 203, 1997.

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Estimation of Price Elasticities from Nor-
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DP no. 202, 1997.

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bution. How Did the Nordic Countries
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Oil Price Shocks and Imported Inflation.
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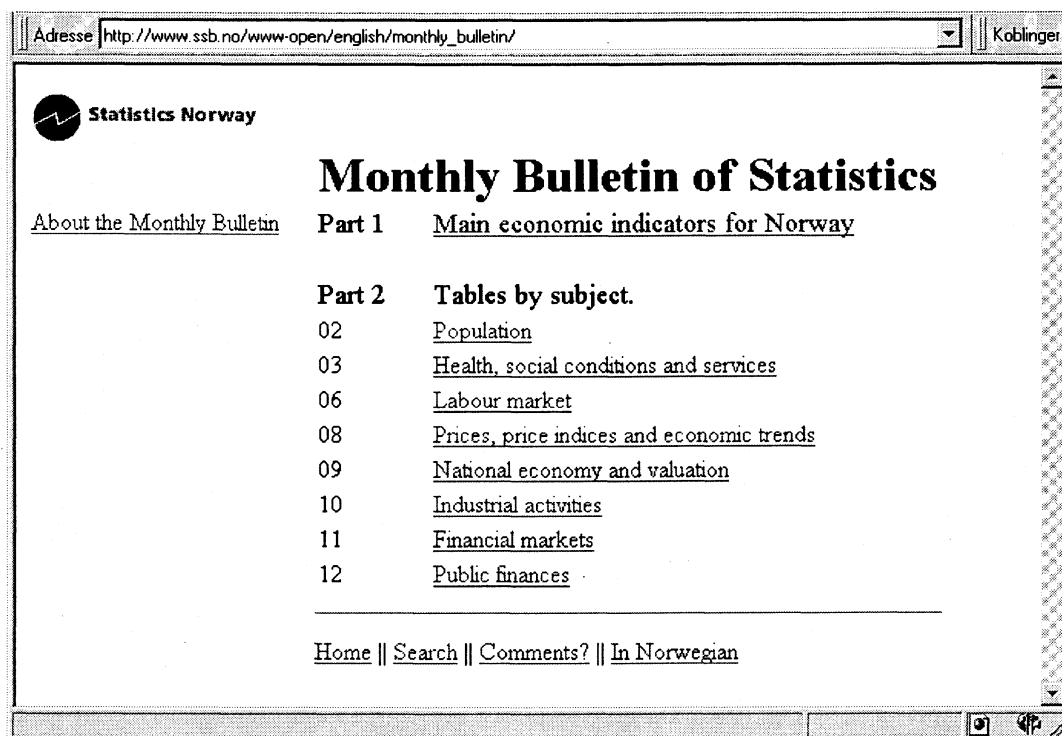
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NATIONAL ACCOUNTS FOR NORWAY

Table A1. Final expenditure and gross domestic product. At current prices. Million kroner

	1995	1996	1997	97:1	97:2	97:3	97:4	98:1	98:2	98:3
Final consumption exp. of househ. and NPISHs	458 492	486 677	515 747	118 095	125 509	131 995	140 149	126 250	132 950	141 664
Household final consumption expenditure . . .	435 247	462 620	490 949	112 011	119 372	125 730	133 836	119 998	126 611	135 169
Goods	246 431	262 815	279 573	62 460	67 225	69 282	80 607	66 592	71 714	75 103
Services	185 786	195 547	205 819	48 970	51 125	54 743	50 981	52 392	53 584	58 278
Direct purchases abroad by resident househ.	18 004	19 479	21 359	3 758	4 948	7 479	5 174	4 215	5 340	8 121
- Direct purchases by non-residents	-14 974	-15 221	-15 802	-3 177	-3 926	-5 774	-2 925	-3 201	-4 027	-6 333
Final consumption exp. of NPISHs 4)	23 245	24 058	24 798	6 083	6 137	6 265	6 313	6 252	6 338	6 494
Final consumption exp. of general government .	194 525	206 871	218 811	53 437	54 199	55 370	55 804	56 896	58 011	59 653
Final consumption exp. of central government.	77 598	82 432	86 585	21 179	21 425	21 874	22 108	22 425	22 731	23 340
Central government, civilian	56 863	60 364	63 039	15 424	15 599	15 926	16 091	16 411	16 711	17 155
Central government, defence	20 735	22 068	23 546	5 755	5 826	5 948	6 017	6 015	6 020	6 185
Final consumption exp. of local government . .	116 927	124 439	132 225	32 258	32 775	33 496	33 696	34 471	35 280	36 313
Gross fixed capital formation	192 518	216 502	249 931	54 414	62 134	62 632	70 750	63 275	67 144	68 547
Petroleum activities	47 940	50 291	61 382	12 798	16 794	15 112	16 678	16 399	20 348	21 246
Ocean transport	3 733	6 222	11 168	3 172	2 583	3 220	2 193	3 984	1 836	2 256
Mainland-Norway	140 845	159 990	177 380	38 445	42 757	44 300	51 879	42 891	44 960	45 045
Mainland-Norway excl. general government .	110 962	128 252	141 327	29 980	34 213	35 792	41 342	33 287	35 813	36 437
Manufacturing and mining	15 695	17 431	18 582	3 341	4 828	4 442	5 971	3 748	4 969	5 813
Production of other goods	13 282	12 938	13 146	2 266	3 645	3 702	3 533	2 482	3 725	3 710
Dwelling services	26 461	26 921	30 151	6 922	7 331	7 742	8 156	7 760	7 677	7 532
Other services	55 524	70 962	79 448	17 450	18 410	19 906	23 681	19 298	19 443	19 382
General government	29 883	31 738	36 053	8 465	8 544	8 508	10 537	9 605	9 147	8 608
Changes in stocks and stat. discrepancies . . .	27 438	22 221	23 741	7 696	7 189	4 219	4 637	13 434	7 254	5 381
Gross capital formation	219 956	238 724	273 672	62 111	69 324	66 850	75 387	76 709	74 398	73 928
Final domestic use of goods and services	872 973	932 272	1 008 230	233 643	249 032	254 215	271 340	259 855	265 359	275 245
Final demand from Mainland-Norway 2)	793 862	853 539	911 938	209 977	222 465	231 664	247 832	226 038	235 921	246 362
Final demand from general government 3) . . .	224 408	238 609	254 864	61 902	62 743	63 878	66 341	66 501	67 158	68 261
Total exports	353 426	414 266	447 582	108 757	109 975	114 189	114 660	109 783	102 317	100 290
Traditional goods	143 424	155 854	169 280	39 355	42 386	42 324	45 214	46 336	42 288	42 413
Crude oil and natural gas	113 231	156 688	163 674	42 598	38 947	40 220	41 909	34 287	31 048	27 268
Ships and oil platforms	10 579	9 163	10 761	3 207	2 735	2 482	2 337	3 138	2 563	1 597
Services	86 192	92 561	103 867	23 597	25 907	29 163	25 200	26 022	26 418	29 012
Total use of goods and services	1 226 399	1 346 538	1 455 812	342 400	359 007	368 404	386 000	369 638	367 676	375 536
Total imports	297 654	326 487	371 024	82 019	93 518	96 268	99 219	98 509	98 525	100 934
Traditional goods	202 858	223 411	239 895	53 371	60 482	59 328	66 714	64 958	65 937	65 116
Crude oil	1 121	1 445	1 517	436	322	413	346	457	292	320
Ships and oil platforms	12 920	17 656	26 011	7 405	7 146	6 458	5 002	8 223	4 709	4 212
Services	80 755	83 975	103 601	20 807	25 568	30 069	27 157	24 871	27 587	31 286
Gross domestic product 1)	928 745	1 020 051	1 084 788	260 381	265 489	272 136	286 781	271 129	269 151	274 602
Mainland-Norway (market prices)	790 070	834 998	890 883	210 132	218 799	224 977	236 975	229 566	232 175	241 014
Petroleum activities and ocean transport	138 675	185 053	193 904	50 249	46 690	47 159	49 806	41 564	36 976	33 588
Mainland-Norway (basic prices)	692 392	726 316	776 750	186 285	190 842	194 484	205 139	202 342	201 294	209 002
Mainland-Norway excl. general government . .	545 789	569 150	609 937	145 518	149 616	152 306	162 498	159 078	157 100	163 440
Manufacturing and mining	112 928	115 414	122 689	29 238	31 812	28 575	33 064	33 250	33 011	31 216
Production of other goods	77 813	78 993	85 938	21 170	17 527	22 682	24 560	23 779	19 076	23 732
Service industries	355 048	374 743	401 309	95 110	100 277	101 049	104 874	102 050	105 013	108 492
General government	146 603	157 165	166 813	40 767	41 226	42 178	42 641	43 263	44 194	45 561
Correction items	97 678	108 683	114 134	23 847	27 957	30 493	31 836	27 224	30 881	32 012

1) Gross domestic product is measured at market prices, while value added by industry is measured at basic prices

2) Defined as total final consumption expenditure plus gross fixed capital formation in Mainland-Norway

3) Defined as final consumption expenditure plus gross fixed capital formation from general government

4) NPISH: Non-profit institutions serving households

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NATIONAL ACCOUNTS FOR NORWAY

Table A2. Final expenditure and gross domestic product. At constant 1995-prices. Million kroner

	1995	1996	1997	97:1	97:2	97:3	97:4	98:1	98:2	98:3
Final consumption exp. of househ. and NPISHs	458 492	479 888	496 319	114 458	120 756	127 024	134 080	119 518	124 690	132 966
Household final consumption expenditure . . .	435 247	456 574	472 933	108 618	114 938	121 172	128 204	113 704	118 932	127 193
Goods	246 431	261 607	270 914	60 310	65 220	67 310	78 074	63 599	68 270	71 603
Services	185 786	191 119	196 411	47 576	48 631	52 318	47 887	49 035	49 420	54 111
Direct purchases abroad by resident househ.	18 004	18 844	20 731	3 806	4 810	7 131	4 984	4 050	4 944	7 400
- Direct purchases by non-residents	-14 974	-14 996	-15 124	-3 073	-3 723	-5 587	-2 741	-2 981	-3 703	-5 921
Final consumption exp. of NPISHs 4)	23 245	23 315	23 386	5 840	5 818	5 851	5 876	5 814	5 759	5 773
Final consumption exp. of general government .	194 525	200 797	206 781	51 440	51 475	51 700	52 166	53 012	52 834	52 952
Final consumption exp. of central government.	77 598	80 085	82 027	20 429	20 377	20 501	20 720	20 900	20 738	20 880
Central government, civilian	56 863	58 726	59 735	14 871	14 841	14 947	15 077	15 285	15 244	15 342
Central government, defence	20 735	21 358	22 292	5 558	5 536	5 554	5 643	5 615	5 494	5 538
Final consumption exp. of local government . .	116 927	120 713	124 754	31 011	31 097	31 199	31 447	32 112	32 096	32 072
Gross fixed capital formation	192 518	211 084	237 777	52 858	59 244	59 060	66 614	58 671	61 441	62 685
Petroleum activities	47 940	48 667	56 206	12 078	15 442	13 593	15 093	14 544	17 899	18 594
Ocean transport	3 733	6 113	10 124	2 946	2 405	2 768	2 005	3 444	1 709	2 125
Mainland-Norway	140 845	156 303	171 447	37 834	41 396	42 699	49 517	40 683	41 833	41 966
Mainland-Norway excl. general government .	110 962	125 301	136 709	29 555	33 117	34 533	39 504	31 589	33 359	34 052
Manufacturing and mining	15 695	17 175	18 270	3 334	4 776	4 369	5 791	3 655	4 750	5 601
Production of other goods	13 282	12 762	12 995	2 265	3 609	3 641	3 481	2 422	3 541	3 521
Dwelling services	26 461	26 149	28 497	6 663	6 952	7 278	7 603	7 197	6 965	6 750
Other services	55 524	69 215	76 946	17 293	17 780	19 245	22 629	18 315	18 103	18 179
General government	29 883	31 002	34 738	8 280	8 280	8 166	10 013	9 094	8 474	7 914
Changes in stocks and stat. discrepancies . . .	27 438	22 049	23 917	7 759	6 895	4 494	4 769	12 857	6 909	5 129
Gross capital formation	219 956	233 133	261 693	60 617	66 139	63 554	71 383	71 528	68 350	67 814
Final domestic use of goods and services	872 973	913 818	964 793	226 516	238 370	242 277	257 630	244 057	245 875	253 731
Final demand from Mainland-Norway 2)	793 862	836 989	874 546	203 733	213 627	221 423	235 763	213 212	219 358	227 884
Final demand from general government 3)	224 408	231 799	241 519	59 720	59 754	59 866	62 179	62 106	61 308	60 866
Total exports	353 426	388 209	410 702	100 313	103 108	102 850	104 431	107 302	101 520	100 109
Traditional goods	143 424	157 809	170 493	40 468	43 582	41 824	44 618	46 151	42 222	42 465
Crude oil and natural gas	113 231	130 894	133 959	33 861	33 300	32 113	34 686	34 298	32 743	29 826
Ships and oil platforms	10 579	8 862	9 896	3 015	2 575	2 240	2 066	2 998	2 374	1 512
Services	86 192	90 644	96 354	22 969	23 651	26 673	23 061	23 854	24 182	26 306
Total use of goods and services	1 226 399	1 302 028	1 375 495	326 829	341 478	345 127	362 061	351 360	347 396	353 841
Total imports	297 654	322 470	362 209	82 235	92 259	91 594	96 121	95 350	94 784	96 367
Traditional goods	202 858	223 147	242 355	54 958	61 896	58 549	66 952	65 239	66 136	64 379
Crude oil	1 121	1 059	1 235	354	285	331	265	474	313	361
Ships and oil platforms	12 920	17 010	23 179	6 846	6 397	5 549	4 388	7 246	4 273	3 896
Services	80 755	81 255	95 440	20 077	23 682	27 165	24 517	22 392	24 063	27 731
Gross domestic product 1)	928 745	979 557	1 013 286	244 594	249 218	253 533	265 940	256 009	252 612	257 474
Mainland-Norway (market prices)	790 070	822 300	853 090	204 011	209 373	215 502	224 204	215 057	213 515	221 642
Petroleum activities and ocean transport	138 675	157 257	160 196	40 584	39 845	38 031	41 736	40 952	39 096	35 832
Mainland-Norway (basic prices)	692 392	713 616	740 206	178 612	181 689	186 821	193 085	189 026	185 394	191 878
Mainland-Norway excl. general government . .	545 789	561 604	584 407	139 923	142 932	147 756	153 796	149 216	145 802	152 063
Manufacturing and mining	112 928	115 478	119 000	28 974	30 574	28 092	31 360	30 977	30 251	28 644
Production of other goods	77 813	76 648	80 611	19 375	16 570	22 445	22 221	21 205	16 659	22 536
Service industries	355 048	369 478	384 796	91 573	95 789	97 219	100 215	97 034	98 892	100 883
General government	146 603	152 013	155 799	38 689	38 757	39 064	39 289	39 810	39 593	39 815
Correction items	97 678	108 684	112 883	25 399	27 684	28 681	31 119	26 031	28 121	29 764

- 1) Gross domestic product is measured at market prices, while value added by industry is measured at basic prices
- 2) Defined as total final consumption expenditure plus gross fixed capital formation in Mainland-Norway
- 3) Defined as final consumption expenditure plus gross fixed capital formation from general government
- 4) NPISH: Non-profit institutions serving households

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NATIONAL ACCOUNTS FOR NORWAY

Table A3. Final expenditure and gross domestic product.
Percentage change in volume from the same period in the previous year

	1995	1996	1997	97:1	97:2	97:3	97:4	98:1	98:2	98:3
Final consumption exp. of househ. and NPISHs	3,4	4,7	3,4	0,8	5,3	3,8	3,7	4,4	3,3	4,7
Household final consumption expenditure . . .	3,6	4,9	3,6	0,9	5,5	4,0	3,8	4,7	3,5	5,0
Goods	3,3	6,2	3,6	-1,0	6,3	4,5	4,1	5,5	4,7	6,4
Services	3,4	2,9	2,8	2,5	3,5	2,5	2,6	3,1	1,6	3,4
Direct purchases abroad by resident househ.	0,7	4,7	10,0	8,4	12,5	8,3	11,4	6,4	2,8	3,8
- Direct purchases by non-residents	-6,9	0,1	0,9	-3,0	1,0	1,2	4,6	-3,0	-0,6	6,0
Final consumption exp. of NPISHs 4)	0,0	0,3	0,3	-0,5	0,4	0,6	0,7	-0,4	-1,0	-1,3
Final consumption exp. of general government .	0,3	3,2	3,0	2,5	3,0	2,9	3,5	3,1	2,6	2,4
Final consumption exp. of central government.	-1,7	3,2	2,4	2,4	2,4	2,1	2,9	2,3	1,8	1,8
Central government, civilian	0,2	3,3	1,7	1,6	1,6	1,6	2,0	2,8	2,7	2,6
Central government, defence	-6,4	3,0	4,4	4,6	4,4	3,3	5,2	1,0	-0,8	-0,3
Final consumption exp. of local government . .	1,7	3,2	3,3	2,6	3,4	3,5	3,9	3,6	3,2	2,8
Gross fixed capital formation	3,4	9,6	12,6	13,6	18,5	12,8	7,0	11,0	3,7	6,1
Petroleum activities	-13,7	1,5	15,5	23,9	30,3	14,6	-0,7	20,4	15,9	36,8
Ocean transport	-26,2	63,8	65,6	135,0	120,6	77,5	-9,3	16,9	-28,9	-23,2
Mainland-Norway	12,3	11,0	9,7	6,5	11,8	9,7	10,4	7,5	1,1	-1,7
Mainland-Norway excl. general government .	14,9	12,9	9,1	2,5	9,5	10,7	12,8	6,9	0,7	-1,4
Manufacturing and mining	34,8	9,4	6,4	-2,2	17,7	-1,8	10,2	9,6	-0,5	28,2
Production of other goods	13,9	-3,9	1,8	-3,8	5,3	6,2	-2,1	6,9	-1,9	-3,3
Dwelling services	9,1	-1,2	9,0	6,0	12,5	9,1	8,5	8,0	0,2	-7,3
Other services	13,2	24,7	11,2	3,0	7,3	15,7	17,8	5,9	1,8	-5,5
General government	3,5	3,7	12,1	24,1	21,9	5,6	2,1	9,8	2,3	-3,1
Changes in stocks and stat. discrepancies . . .	84,1	-19,6	8,5	-28,5	83,4	-35,7	965,5	65,7	0,2	14,1
Gross capital formation	10,0	6,0	12,3	5,6	23,1	7,1	13,9	18,0	3,3	6,7
Final domestic use of goods and services	4,3	4,7	5,6	2,5	9,1	4,5	6,3	7,7	3,1	4,7
Final demand from Mainland-Norway 2)	4,1	5,4	4,5	2,3	5,9	4,7	5,0	4,7	2,7	2,9
Final demand from general government 3)	0,7	3,3	4,2	5,0	5,2	3,3	3,3	4,0	2,6	1,7
Total exports	4,3	9,8	5,8	3,3	9,9	6,8	3,4	7,0	-1,5	-2,7
Traditional goods	4,5	10,0	8,0	-1,4	15,5	11,2	7,7	14,0	-3,1	1,5
Crude oil and natural gas	9,2	15,6	2,3	5,8	3,9	-2,0	1,9	1,3	-1,7	-7,1
Ships and oil platforms	-0,1	-16,2	11,7	19,0	21,9	73,1	-29,3	-0,6	-7,8	-32,5
Services	-1,3	5,2	6,3	6,7	7,9	8,4	2,1	3,9	2,2	-1,4
Total use of goods and services	4,3	6,2	5,6	2,7	9,4	5,2	5,4	7,5	1,7	2,5
Total imports	5,6	8,3	12,3	8,4	22,4	12,5	7,0	15,9	2,7	5,2
Traditional goods	8,8	10,0	8,6	2,2	14,9	7,3	9,9	18,7	6,9	10,0
Crude oil	31,7	-5,5	16,6	83,3	44,6	62,2	-43,0	33,9	9,7	9,2
Ships and oil platforms	7,1	31,7	36,3	85,7	182,1	57,0	-41,7	5,8	-33,2	-29,8
Services	-2,0	0,6	17,5	10,6	24,3	17,5	17,1	11,5	1,6	2,1
Gross domestic product 1)	3,8	5,5	3,4	0,9	5,2	2,8	4,9	4,7	1,4	1,6
Mainland-Norway (market prices)	2,9	4,1	3,7	0,0	5,4	4,1	5,4	5,4	2,0	2,8
Petroleum activities and ocean transport	9,3	13,4	1,9	5,6	4,0	-4,1	2,1	0,9	-1,9	-5,8
Mainland-Norway (basic prices)	2,5	3,1	3,7	0,2	5,2	3,9	5,6	5,8	2,0	2,7
Mainland-Norway excl. general government . .	3,0	2,9	4,1	-0,2	6,0	4,2	6,3	6,6	2,0	2,9
Manufacturing and mining	2,1	2,3	3,1	-3,4	7,8	2,9	5,1	6,9	-1,1	2,0
Production of other goods	6,9	-1,5	5,2	-6,7	9,1	8,7	10,9	9,4	0,5	0,4
Service industries	2,4	4,1	4,1	2,3	4,9	3,6	5,6	6,0	3,2	3,8
General government	0,7	3,7	2,5	1,6	2,4	2,9	3,0	2,9	2,2	1,9
Correction items	5,8	11,3	3,9	-0,8	6,9	4,9	4,3	2,5	1,6	3,8

1) Gross domestic product is measured at market prices, while value added by industry is measured at basic prices
2) Defined as total final consumption expenditure plus gross fixed capital formation in Mainland-Norway
3) Defined as final consumption expenditure plus gross fixed capital formation from general government
4) NPISH: Non-profit institutions serving households

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Table A4. Final expenditure and gross domestic product.
Percentage change in prices from the same period in the previous year

	1995	1996	1997	97:1	97:2	97:3	97:4	98:1	98:2	98:3
Final consumption exp. of househ. and NPISHs	2,4	1,4	2,5	3,2	2,8	2,2	1,8	2,4	2,6	2,5
Household final consumption expenditure . . .	2,3	1,3	2,5	3,2	2,8	2,2	1,8	2,3	2,5	2,4
Goods	2,2	0,5	2,7	4,4	3,0	2,2	1,6	1,1	1,9	1,9
Services	2,6	2,3	2,4	2,1	2,8	2,5	2,3	3,8	3,1	2,9
Direct purchases abroad by resident househ.	0,9	3,4	-0,3	-4,1	-0,0	0,7	0,9	5,4	5,0	4,6
- Direct purchases by non-residents	2,2	1,5	2,9	2,5	3,0	2,9	3,3	3,9	3,1	3,5
Final consumption exp. of NPISHs 4)	3,0	3,2	2,8	3,1	3,0	2,7	2,3	3,2	4,3	5,1
Final consumption exp. of general government .	3,9	3,0	2,7	2,9	2,8	3,0	2,2	3,3	4,3	5,2
Final consumption exp. of central government.	3,9	2,9	2,6	2,5	2,6	3,0	2,1	3,5	4,3	4,8
Central government, civilian	4,4	2,8	2,7	2,7	2,7	2,8	2,4	3,5	4,3	5,0
Central government, defence	2,5	3,3	2,2	1,9	2,3	3,5	1,3	3,5	4,1	4,3
Final consumption exp. of local government . .	4,0	3,1	2,8	3,2	3,0	3,0	2,2	3,2	4,3	5,5
Gross fixed capital formation	3,8	2,6	2,5	1,3	2,4	3,8	2,4	4,8	4,2	3,1
Petroleum activities	3,5	3,3	5,7	3,9	5,5	7,3	6,1	6,4	4,5	2,8
Ocean transport	-3,2	1,8	8,4	8,5	6,7	14,2	5,5	7,4	0,0	-8,7
Mainland-Norway	4,1	2,4	1,1	0,0	1,1	2,0	1,1	3,8	4,1	3,5
Mainland-Norway excl. general government .	4,2	2,4	1,0	-0,1	1,0	2,0	0,9	3,9	3,9	3,2
Manufacturing and mining	3,6	1,5	0,2	-1,3	0,7	0,2	0,7	2,3	3,5	2,1
Production of other goods	4,0	1,4	-0,2	-1,2	0,4	0,2	-0,6	2,4	4,1	3,6
Dwelling services	7,0	3,0	2,8	1,8	2,3	3,1	3,7	3,8	4,5	4,9
Other services	3,2	2,5	0,7	-0,5	0,7	2,3	0,1	4,4	3,7	3,1
General government	3,8	2,4	1,4	0,4	1,2	1,8	2,1	3,3	4,6	4,4
Changes in stocks and stat. discrepancies . . .	2,8	0,8	-1,5	-2,5	0,1	-5,8	43,9	5,3	0,7	11,8
Gross capital formation	3,1	2,4	2,1	0,8	2,3	3,2	2,1	4,7	3,8	3,6
Final domestic use of goods and services	2,9	2,0	2,4	2,5	2,7	2,6	2,0	3,2	3,3	3,4
Final demand from Mainland-Norway 2)	3,1	2,0	2,3	2,5	2,5	2,3	1,7	2,9	3,3	3,3
Final demand from general government 3)	3,9	2,9	2,5	2,6	2,6	2,8	2,1	3,3	4,3	5,1
Total exports	1,7	6,7	2,1	6,0	1,2	3,6	-1,7	-5,6	-5,5	-9,8
Traditional goods	6,8	-1,2	0,5	-1,2	-1,8	3,4	1,6	3,2	3,0	-1,3
Crude oil and natural gas	-2,6	19,7	2,1	16,4	2,1	2,6	-9,3	-20,5	-18,9	-27,0
Ships and oil platforms	-0,0	3,4	5,2	3,5	3,2	5,9	9,1	-1,6	1,6	-4,7
Services	-0,3	2,1	5,6	1,8	6,0	7,3	6,9	6,2	-0,3	0,9
Total use of goods and services	2,6	3,4	2,3	3,6	2,2	2,9	0,8	0,4	0,7	-0,6
Total imports	0,9	1,2	1,2	-1,0	0,7	4,3	0,6	3,6	2,5	-0,3
Traditional goods	1,1	0,1	-1,1	-3,4	-1,8	2,0	-1,3	2,5	2,0	-0,2
Crude oil	-1,8	36,4	-9,9	9,1	-12,7	-2,4	-14,6	-21,7	-17,4	-29,0
Ships and oil platforms	-3,3	3,8	8,1	5,6	8,2	10,7	9,6	4,9	-1,3	-7,1
Services	1,1	3,3	5,0	2,7	4,4	7,2	5,0	7,2	6,2	1,9
Gross domestic product 1)	3,1	4,1	2,8	5,1	2,9	2,6	0,9	-0,5	0,0	-0,6
Mainland-Norway (market prices)	4,3	1,5	2,8	3,0	2,8	2,6	2,8	3,6	4,1	4,2
Petroleum activities and ocean transport	-3,3	17,7	2,9	14,6	3,2	3,4	-7,1	-18,0	-19,3	-24,4
Mainland-Norway (basic prices)	3,6	1,8	3,1	3,9	3,3	2,2	3,1	2,6	3,4	4,6
Mainland-Norway excl. general government . .	3,3	1,3	3,0	3,8	3,2	1,9	3,1	2,5	2,9	4,3
Manufacturing and mining	8,3	-0,1	3,2	1,3	2,8	0,6	7,6	6,4	4,9	7,1
Production of other goods	2,9	3,1	3,4	6,9	3,7	1,1	2,4	2,6	8,3	4,2
Service industries	1,9	1,4	2,8	3,9	3,3	2,4	1,8	1,3	1,4	3,5
General government	4,5	3,4	3,6	4,2	3,5	3,3	3,2	3,1	4,9	6,0
Correction items	9,6	-0,0	1,1	-3,3	-0,1	5,6	1,3	11,4	8,7	1,2

1) Gross domestic product is measured at market prices, while value added by industry is measured at basic prices
2) Defined as total final consumption expenditure plus gross fixed capital formation in Mainland-Norway
3) Defined as final consumption expenditure plus gross fixed capital formation from general government
4) NPISH: Non-profit institutions serving households

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Table A5. Gross domestic product and value added by industry.
At current prices. Million kroner

	1995	1996	1997	97:1	97:2	97:3	97:4	98:1	98:2	98:3
Gross domestic product 1).	928 745	1 020 051	1 084 788	260 381	265 489	272 136	286 781	271 129	269 151	274 602
Agriculture and hunting	11 794	11 930	11 462	2 327	25	6 122	2 987	2 188	-210	6 139
Forestry and logging	3 370	2 634	2 303	901	570	197	635	917	571	200
Fishing and fish farming	7 944	7 588	7 896	1 851	1 705	2 074	2 266	2 263	2 371	2 154
Oil and gas extraction incl. services	109 647	154 431	161 280	42 354	38 063	39 134	41 729	33 217	29 527	25 526
Oil and gas extraction	106 617	150 145	155 420	40 918	36 528	37 924	40 049	31 208	27 677	24 170
Service act. incidental to oil and gas ext.	3 030	4 286	5 860	1 436	1 534	1 210	1 680	2 008	1 851	1 356
Mining and quarrying	1 856	1 886	2 052	426	540	532	555	521	578	510
Manufacturing	111 072	113 528	120 638	28 812	31 272	28 044	32 509	32 728	32 433	30 706
Food products, beverages and tobacco	18 218	19 536	20 499	5 001	5 321	4 947	5 231	4 975	5 273	5 181
Textiles, wearing apparel, leather	2 035	2 090	1 959	503	573	407	476	473	454	378
Wood and wood products	4 242	4 408	5 578	1 255	1 378	1 360	1 585	1 485	1 394	1 279
Pulp, paper and paper products	7 223	5 263	4 184	1 008	1 007	979	1 191	1 206	1 215	1 262
Publishing, printing, reproduction	11 898	13 420	14 211	3 499	3 468	3 433	3 811	3 740	3 659	3 551
Refined petroleum products	839	200	883	184	272	210	217	537	422	554
Basic chemicals	7 267	6 445	6 743	1 554	1 729	1 721	1 739	1 827	1 805	1 575
Chemical and mineral products	9 703	10 243	10 340	2 498	2 893	2 421	2 527	2 478	2 394	2 260
Basic metals	9 858	7 907	7 482	1 559	2 122	1 607	2 193	2 345	2 456	1 993
Machinery and other equipment n.e.c.	25 430	28 568	31 916	7 817	8 175	6 981	8 942	8 945	8 739	8 199
Building of ships, oil platforms and moduls.	10 804	11 731	12 735	2 997	3 259	3 060	3 418	3 550	3 561	3 496
Furniture and other manufacturing n.e.c.	3 555	3 717	4 108	937	1 074	917	1 180	1 167	1 062	979
Electricity and gas supply	22 905	21 048	23 384	6 779	5 315	4 036	7 254	7 311	4 978	3 413
Construction	31 800	35 794	40 893	9 311	9 912	10 252	11 418	11 100	11 366	11 826
Service industries excluded general government	384 076	405 365	433 934	103 006	108 904	109 074	112 951	110 397	112 462	116 554
Wholesale and retail trade	87 947	91 553	98 556	22 836	23 984	24 036	27 700	23 964	23 968	25 483
Hotels and restaurants	11 263	11 876	12 918	2 806	3 389	3 463	3 260	3 036	3 436	3 744
Transport via pipelines	11 955	14 269	14 823	3 835	3 603	3 422	3 962	3 747	3 454	3 197
Water transport	19 072	18 379	20 119	4 553	5 649	5 245	4 672	5 179	4 632	5 601
Ocean transport	17 073	16 353	17 801	4 061	5 024	4 602	4 115	4 600	3 995	4 865
Inland water and costal transport	1 999	2 025	2 318	493	626	643	557	579	637	736
Other transport industries	38 335	41 774	45 315	10 432	12 151	11 998	10 733	10 927	12 237	13 114
Post and telecommunications	17 675	18 464	19 318	4 600	4 787	4 541	5 390	4 823	4 977	4 850
Financial intermediation	36 823	37 530	37 375	8 484	10 045	8 892	9 954	9 538	10 414	9 118
Dwelling services	63 033	64 827	67 078	16 469	16 679	16 884	17 047	17 139	17 297	17 450
Business services etc.	50 624	56 686	64 251	15 226	15 847	16 378	16 800	16 967	17 951	18 359
Personal services	47 349	50 007	54 181	13 765	12 768	14 215	13 433	15 077	14 096	15 639
General government	146 603	157 165	166 813	40 767	41 226	42 178	42 641	43 263	44 194	45 561
Central government	43 376	46 062	48 567	11 864	12 016	12 274	12 414	12 482	12 715	13 025
Civilian central government	32 331	34 454	36 447	8 907	9 017	9 211	9 311	9 350	9 549	9 780
Defence	11 045	11 608	12 121	2 957	2 998	3 063	3 103	3 133	3 167	3 245
Local government	103 227	111 103	118 245	28 903	29 211	29 904	30 227	30 781	31 479	32 536
FISIM 2)	-29 432	-30 277	-30 190	-7 419	-7 740	-7 731	-7 300	-7 791	-8 223	-8 234
Value added tax and investment levy	89 309	96 474	102 878	23 168	25 094	26 340	28 277	25 006	26 654	27 739
Other taxes on products, net	37 801	42 562	45 159	8 973	11 632	12 630	11 924	10 371	13 199	12 769
Statistical discrepancy	0	-76	-3 713	-875	-1 029	-745	-1 065	-363	-749	-263
Mainland-Norway (basic prices)	692 392	726 316	776 750	186 285	190 842	194 484	205 139	202 342	201 294	209 002
Market producers	607 985	675 306	721 985	175 765	176 084	178 660	191 477	179 727	172 932	175 303
Non-market producers	223 082	236 063	248 669	60 769	61 448	62 983	63 469	64 179	65 338	67 287
Education	39 323	41 897	44 216	10 793	10 863	11 173	11 388	11 504	11 798	12 223
Health and social work	70 182	76 197	81 591	19 954	20 182	20 628	20 827	21 500	22 069	22 705

1) Gross domestic product is measured at market prices, while value added by industry is measured at basic prices
2) Financial intermediation services indirectly measured

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Table A6. Gross domestic product and value added by industry.
Percentage change in volume from the same period in the previous year

	1995	1996	1997	97:1	97:2	97:3	97:4	98:1	98:2	98:3
Gross domestic product 1)	3,8	5,5	3,4	0,9	5,2	2,8	4,9	4,7	1,4	1,6
Agriculture and hunting	4,8	4,8	-4,3	-4,5	35,4	-3,3	-7,1	0,8	.	-2,4
Forestry and logging	10,6	-14,3	-	-	-	-	-	-2,5	-2,5	-2,5
Fishing and fish farming	14,6	4,8	4,4	-12,1	17,4	7,1	9,6	2,6	-4,1	-5,7
Oil and gas extraction incl. services	9,1	14,6	1,1	4,8	3,0	-5,3	2,2	0,8	-2,0	-6,5
Oil and gas extraction	9,0	14,2	0,9	3,8	2,2	-4,8	2,6	0,7	-2,2	-6,7
Service act. incidental to oil and gas ext.	12,6	28,4	7,7	45,1	31,3	-20,3	-9,1	2,9	2,2	0,7
Mining and quarrying	4,1	1,8	2,5	-4,5	5,8	9,8	-0,8	5,2	-3,4	-1,4
Manufacturing	2,1	2,3	3,1	-3,3	7,8	2,8	5,2	6,9	-1,0	2,0
Food products, beverages and tobacco	5,4	2,0	0,4	0,1	-0,8	1,0	1,3	-0,3	-4,4	-3,5
Textiles, wearing apparel, leather	-7,6	1,4	-1,7	-4,6	14,3	-7,2	-8,5	0,9	-13,7	-5,4
Wood and wood products	0,9	1,4	7,4	-2,5	3,7	14,7	14,0	15,8	6,2	-3,1
Pulp, paper and paper products	3,5	-6,9	4,2	-4,7	9,1	4,7	8,5	5,6	-2,1	2,4
Publishing, printing, reproduction	1,9	2,1	-0,1	-4,8	-0,6	2,5	2,5	4,6	0,7	-2,5
Refined petroleum products	-48,1	10,5	2,8	8,7	6,6	-1,4	-1,7	-8,4	-15,5	-7,3
Basic chemicals	-3,5	-0,3	2,7	-2,8	15,6	-3,5	3,1	6,9	6,3	4,8
Chemical and mineral products	7,4	3,1	3,0	-3,2	13,8	2,5	-0,6	0,6	-11,0	5,4
Basic metals	-11,8	3,5	3,3	1,4	6,7	0,2	4,7	2,7	0,9	8,3
Machinery and other equipment n.e.c.	6,3	4,8	5,4	-2,7	12,8	4,6	7,3	11,9	1,5	3,9
Building of ships, oil platforms and moduls.	5,9	2,6	1,2	-13,0	6,0	2,0	12,3	13,8	2,0	4,6
Furniture and other manufacturing n.e.c.	2,6	2,5	11,5	-3,7	26,1	14,7	11,7	23,1	-3,0	3,7
Electricity and gas supply	9,4	-14,9	6,6	-24,9	9,4	37,8	27,4	17,6	-0,7	3,6
Construction	3,7	5,6	8,5	9,3	7,7	7,1	9,8	10,1	4,0	2,3
Service industries excluded general government	3,0	4,4	4,2	2,8	5,2	3,4	5,3	5,6	2,9	3,3
Wholesale and retail trade	2,0	6,8	4,8	-0,8	8,0	6,5	5,5	9,1	3,4	6,2
Hotels and restaurants	-0,2	4,3	5,6	3,5	6,1	7,2	5,3	3,7	1,5	3,2
Transport via pipelines	16,2	19,4	5,3	12,2	6,7	-2,5	5,3	0,7	0,2	-5,3
Water transport	4,9	1,9	4,5	5,9	8,8	3,6	0,1	2,7	-2,2	-0,6
Ocean transport	5,1	1,7	4,2	5,8	8,9	3,2	-0,7	1,9	-2,5	-1,3
Inland water and costal transport	2,5	3,8	7,1	6,6	7,9	6,7	7,0	9,5	0,5	4,6
Other transport industries	9,0	8,0	6,5	5,6	12,0	3,6	4,8	3,7	-1,5	3,0
Post and telecommunications	-1,2	2,3	5,6	2,9	6,6	5,9	6,9	5,9	7,8	9,6
Financial intermediation	-2,3	-3,0	-2,3	-1,4	-6,6	-9,2	9,2	10,4	5,3	-1,0
Dwelling services	1,5	1,0	1,0	0,9	1,0	1,0	1,1	1,0	1,0	1,1
Business services etc.	5,3	7,7	9,0	8,9	7,4	8,8	10,7	7,7	7,8	5,7
Personal services	2,8	2,2	3,3	2,4	3,5	3,5	3,9	3,8	2,4	2,1
General government	0,7	3,7	2,5	1,6	2,4	2,9	3,0	2,9	2,2	1,9
Central government	-0,1	2,8	1,9	1,3	1,9	2,1	2,3	1,9	1,0	0,4
Civilian central government.	0,5	3,3	2,4	1,8	2,4	2,6	2,8	1,8	1,1	0,3
Defence.	-2,0	1,2	0,4	-0,2	0,4	0,5	0,7	2,3	0,8	0,6
Local government	1,0	4,1	2,7	1,8	2,6	3,3	3,3	3,3	2,6	2,5
FISIM 2)	0,5	-0,6	-2,1	-0,9	-2,1	-2,8	-2,5	10,8	6,1	-2,2
Value added tax and investment levy	4,5	5,8	4,9	2,4	7,1	5,3	4,8	4,8	2,9	3,1
Other taxes on products, net	11,8	9,5	2,3	-3,2	5,3	3,6	3,5	3,2	1,6	1,5
Statistical discrepancy	-100,0	.	-97,1	-97,2	-96,9	-97,1	-97,0	38,6	25,3	24,5
Mainland-Norway (basic prices)	2,5	3,1	3,7	0,2	5,2	3,9	5,6	5,8	2,0	2,7
Market producers	4,7	5,5	3,8	1,0	6,1	2,5	5,8	5,8	1,2	1,1
Non-market producers	0,9	2,9	2,1	1,5	2,1	2,4	2,5	2,4	1,8	1,6
Education	0,8	3,2	2,1	1,1	1,7	2,6	2,8	3,3	3,5	2,8
Health and social work	2,0	5,0	3,4	2,6	3,5	3,7	3,7	3,6	3,0	3,2

1) Gross domestic product is measured at market prices, while value added by industry is measured at basic prices
2) Financial intermediation services indirectly measured

NATIONAL ACCOUNTS FOR NORWAY

Table A7. Household final consumption expenditure. At current prices. Million kroner

	1995	1996	1997	97:1	97:2	97:3	97:4	98:1	98:2	98:3
Household final consumption expenditure	435 247	462 620	490 949	112 011	119 372	125 730	133 836	119 998	126 611	135 169
Food, beverages and tobacco	91 327	94 770	99 652	21 884	24 288	26 071	27 410	23 045	26 557	27 465
Clothing and footwear	26 995	27 757	28 987	5 744	7 223	6 735	9 285	6 061	7 446	7 651
Housing, water, electr., gas and other fuels	100 183	104 232	108 396	28 493	26 057	25 095	28 752	29 288	26 622	25 999
Furnishings, household equipment etc.	28 143	29 383	31 696	6 795	6 908	7 777	10 216	7 732	7 547	8 870
Health	11 155	12 075	13 101	3 067	3 266	3 301	3 465	3 543	3 718	3 759
Transport	69 068	79 053	84 230	18 622	22 534	22 719	20 355	19 878	22 868	23 982
Leisure, entertainment and culture	41 565	43 689	47 107	10 892	10 083	12 838	13 294	12 183	11 125	14 545
Education	2 018	2 107	2 290	528	492	620	650	565	520	687
Hotels, cafes and restaurants	25 134	26 765	28 973	6 047	7 309	8 647	6 969	6 508	7 963	9 391
Miscellaneous goods and services	36 629	38 531	40 960	9 358	10 189	10 222	11 191	10 182	10 932	11 031
Direct purchases abroad by resident househ. . . .	18 004	19 479	21 359	3 758	4 948	7 479	5 174	4 215	5 340	8 121
- Direct purchases by non-residents	-14 974	-15 221	-15 802	-3 177	-3 926	-5 774	-2 925	-3 201	-4 027	-6 333
Goods	246 431	262 815	279 573	62 460	67 225	69 282	80 607	66 592	71 714	75 103
Services	185 786	195 547	205 819	48 970	51 125	54 743	50 981	52 392	53 584	58 278
Services, dwellings	81 528	83 896	86 966	21 244	21 685	21 851	22 187	22 142	22 432	22 646
Other services	104 258	111 650	118 853	27 727	29 441	32 892	28 794	30 250	31 153	35 632

Table A8. Household final consumption expenditure.

Percentage change in volume from the same period in the previous year

	1995	1996	1997	97:1	97:2	97:3	97:4	98:1	98:2	98:3
Household final consumption expenditure	3,6	4,9	3,6	0,9	5,5	4,0	3,8	4,7	3,5	5,0
Food, beverages and tobacco	1,5	1,9	0,9	-1,0	-0,6	3,1	1,6	-0,3	3,4	-0,9
Clothing and footwear	0,8	6,4	4,7	-1,0	9,3	4,3	5,5	9,6	4,7	15,6
Housing, water, electr., gas and other fuels	1,2	1,4	0,9	-0,8	1,3	0,5	2,6	2,7	1,2	2,4
Furnishings, household equipment etc.	5,0	3,3	7,2	0,5	13,5	7,7	7,6	13,5	8,7	13,4
Health	2,5	4,2	6,3	3,9	8,0	6,4	6,7	7,7	5,4	6,5
Transport	3,7	14,5	3,1	1,3	9,6	1,5	-0,2	3,2	-0,4	3,9
Leisure, entertainment and culture	7,2	5,0	6,1	-0,2	10,4	6,9	7,9	10,5	8,3	11,7
Education	2,2	-0,2	5,2	1,9	5,8	5,7	6,9	3,4	1,4	7,5
Hotels, cafes and restaurants	7,8	4,3	5,6	5,7	4,0	6,9	5,2	2,7	5,1	3,6
Miscellaneous goods and services	6,9	3,1	5,4	4,0	6,1	5,9	5,5	5,3	6,0	7,0
Direct purchases abroad by resident househ. . . .	0,7	4,7	10,0	8,4	12,5	8,3	11,4	6,4	2,8	3,8
- Direct purchases by non-residents	-6,9	0,1	0,9	-3,0	1,0	1,2	4,6	-3,0	-0,6	6,0
Goods	3,3	6,2	3,6	-1,0	6,3	4,5	4,1	5,5	4,7	6,4
Services	3,4	2,9	2,8	2,5	3,5	2,5	2,6	3,1	1,6	3,4
Services, dwellings	1,6	0,8	0,9	0,9	0,9	0,6	1,1	1,0	0,7	1,3
Other services	4,8	4,5	4,2	3,7	5,5	3,7	3,9	4,6	2,3	4,8

NATIONAL ACCOUNTS FOR NORWAY

Table A9. Gross fixed capital formation by type of capital goods and by industry.
At current prices. Million kroner

	1995	1996	1997	97:1	97:2	97:3	97:4	98:1	98:2	98:3
Gross fixed capital formation	192 518	216 502	249 931	54 414	62 134	62 632	70 750	63 275	67 144	68 547
Buildings and structures	78 385	87 705	98 595	21 715	23 318	24 661	28 902	24 684	24 677	24 432
Oil exploration, drilling, pipelines	17 816	20 354	28 045	5 372	7 079	7 593	8 001	7 580	8 699	8 686
Oil platforms etc.	26 029	27 456	31 783	7 218	9 438	7 194	7 933	8 038	10 315	10 796
Ships and boats.	5 342	7 518	12 808	3 640	2 938	3 639	2 591	4 488	2 155	2 583
Other transport equipment.	17 283	22 738	23 691	5 066	6 013	5 885	6 727	5 163	6 095	5 706
Machinery and equipment	47 663	50 732	55 009	11 404	13 349	13 659	16 597	13 322	15 202	16 344
Agriculture and hunting	5 590	5 852	5 917	982	1 805	1 714	1 416	999	1 810	1 719
Forestry and logging	550	559	564	140	140	140	143	144	146	145
Fishing and fish farming	1 099	715	853	258	195	231	169	213	177	153
Oil and gas extraction, incl. services	41 853	44 299	53 214	11 700	14 666	12 524	14 324	14 391	18 235	18 698
Oil and gas extraction	41 804	41 431	53 777	11 527	15 139	12 842	14 269	14 391	18 136	18 684
Service act. incidental to oil and gas ext.	49	2 868	-563	173	-473	-318	55	-	99	14
Mining and quarrying	379	353	261	31	69	68	92	37	82	67
Manufacturing	15 316	17 078	18 321	3 310	4 759	4 374	5 879	3 710	4 887	5 746
Food products, beverages and tobacco	2 713	2 663	3 162	600	788	805	970	647	777	1 053
Textiles, wearing apparel, leather	222	237	276	66	61	63	85	35	71	46
Wood and wood products	756	1 161	833	247	196	207	184	85	143	159
Pulp, paper and paper products	1 482	1 152	1 473	179	381	366	547	307	557	496
Publishing, printing, reproduction	1 267	1 409	2 009	309	630	395	674	575	564	839
Refined petroleum products	477	351	455	30	69	220	136	101	135	81
Basic chemicals	2 538	2 090	1 273	342	319	257	354	173	265	543
Chemical and mineral products	1 431	1 964	2 185	366	537	548	733	517	521	496
Basic metals	1 125	2 493	2 866	559	910	576	821	406	575	457
Machinery and other equipment n.e.c.	2 257	2 362	2 513	421	545	622	926	562	862	1 076
Building of ships, oil platforms and moduls.	687	742	839	131	209	187	313	208	263	345
Furniture and other manufacturing n.e.c.	361	454	437	60	114	127	136	94	151	155
Electricity and gas supply	5 106	4 817	4 682	630	1 216	1 336	1 501	830	1 284	1 397
Construction	937	995	1 129	256	288	281	305	296	308	296
Service industries excl. general government	91 805	110 096	128 936	28 643	30 452	33 456	36 385	33 049	31 069	31 718
Wholesale and retail trade	18 388	21 344	22 887	5 135	5 613	5 580	6 559	5 998	6 202	5 891
Hotels and restaurants	1 792	1 895	2 344	465	493	687	699	617	625	614
Transport via pipelines	6 087	5 992	8 168	1 098	2 128	2 588	2 354	2 008	2 113	2 548
Water transtort.	4 406	6 929	12 257	3 515	2 829	3 504	2 409	4 396	2 031	2 439
Ocean transport	3 733	6 222	11 168	3 172	2 583	3 220	2 193	3 984	1 836	2 256
Inland water and costal transport	673	707	1 088	343	246	284	216	412	195	183
Other transport industries	10 223	18 568	21 794	4 562	4 858	5 452	6 923	4 364	4 693	4 589
Post and telecommunications	6 626	7 202	7 955	1 326	1 463	2 086	3 081	1 427	1 590	2 246
Financial intermediation	4 510	5 609	6 312	1 476	1 518	1 582	1 736	1 775	1 529	1 470
Dwelling services	26 461	26 921	30 151	6 922	7 331	7 742	8 156	7 760	7 677	7 532
Business services etc.	7 159	8 927	9 819	2 302	2 480	2 442	2 595	2 596	2 706	2 498
Personal services	6 153	6 710	7 249	1 841	1 740	1 794	1 874	2 109	1 905	1 890
General government	29 883	31 738	36 053	8 465	8 544	8 508	10 537	9 605	9 147	8 608
Central government	13 982	14 934	15 104	3 350	3 274	3 661	4 820	4 500	4 206	3 354
Civilian central government.	10 228	10 710	10 983	2 429	2 391	2 750	3 414	3 572	3 344	2 653
Defence.	3 754	4 224	4 121	921	883	911	1 406	928	862	701
Local government	15 901	16 804	20 949	5 115	5 270	4 847	5 717	5 105	4 941	5 254
Mainland-Norway	140 845	159 990	177 380	38 445	42 757	44 300	51 879	42 891	44 960	45 045
Education	5 269	5 884	8 562	2 670	2 705	1 557	1 630	2 276	1 816	1 147
Health and social work	6 626	7 471	8 587	1 923	1 923	2 125	2 615	1 999	2 113	2 370

NATIONAL ACCOUNTS FOR NORWAY

Table A10. Gross fixed capital formation by type of capital goods and by industry.
Percentage change in volume from the same period in the previous year

	1995	1996	1997	97:1	97:2	97:3	97:4	98:1	98:2	98:3
Gross fixed capital formation	3,4	9,6	12,6	13,6	18,5	12,8	7,0	11,0	3,7	6,1
Buildings and structures	13,2	8,6	9,2	3,5	9,0	10,6	13,1	9,4	1,1	-5,7
Oil exploration, drilling, pipelines	-20,3	10,0	27,5	23,5	34,0	18,2	34,7	29,8	15,8	10,1
Oil platforms etc.	-4,9	2,3	11,5	40,6	40,3	9,2	-21,6	6,2	5,0	44,4
Ships and boats.	-17,7	38,2	57,3	111,3	108,7	66,1	-8,5	15,0	-26,7	-22,2
Other transport equipment.	6,9	25,5	3,4	-2,6	1,6	8,0	6,5	-9,1	-2,6	-6,8
Machinery and equipment	7,3	6,3	10,7	9,8	15,1	10,1	8,4	16,2	10,1	17,3
Agriculture and hunting	16,2	3,2	1,0	2,4	0,2	0,6	1,4	-0,7	-3,6	-3,3
Forestry and logging	5,2	-0,3	-	-	-	-	-	-0,1	-0,0	-0,0
Fishing and fish farming	45,1	-34,9	21,5	43,5	68,1	6,3	-8,7	-17,9	-13,9	-36,9
Oil and gas extraction, incl. services	-9,9	2,3	13,4	29,0	30,4	11,6	-7,4	15,1	18,9	45,7
Oil and gas extraction	-11,1	-4,2	22,6	23,7	33,2	15,0	18,7	16,9	14,2	41,5
Service act. incidental to oil and gas ext. . . . .	.	.	.	.	242,4	.	-98,3	-100,0	.	.
Mining and quarrying	38,2	-9,0	-25,9	-54,4	8,1	-42,7	-7,1	13,3	15,9	-6,4
Manufacturing	34,7	9,9	7,0	-1,1	17,8	-0,7	10,5	9,6	-0,8	28,7
Food products, beverages and tobacco	-3,3	-3,6	18,1	13,1	35,8	27,3	3,6	5,0	-5,5	27,8
Textiles, wearing apparel, leather	8,0	5,6	17,3	39,2	26,1	-4,8	17,0	-46,7	14,2	-27,4
Wood and wood products	-4,0	52,5	-27,5	56,7	-25,5	-56,6	-28,0	-66,8	-30,3	-25,2
Pulp, paper and paper products	129,4	-23,6	26,2	-38,6	40,1	66,1	44,9	65,0	44,3	35,9
Publishing, printing, reproduction	24,2	9,7	41,4	5,3	92,7	18,7	44,8	81,2	-13,8	110,9
Refined petroleum products	76,0	-28,8	31,0	-64,6	42,2	137,9	13,5	232,5	91,7	-62,1
Basic chemicals	220,2	-18,6	-38,4	-33,8	-39,8	-52,0	-26,3	-49,0	-19,7	104,4
Chemical and mineral products	14,7	34,9	10,8	-7,2	24,8	10,9	12,6	36,8	-6,4	-11,6
Basic metals	20,2	117,2	14,2	76,5	53,2	-9,7	-15,1	-28,9	-39,2	-25,0
Machinery and other equipment n.e.c.	36,4	3,9	6,9	-13,4	-3,4	0,1	37,0	31,5	51,9	68,6
Building of ships, oil platforms and moduls.	-4,1	6,4	13,3	-13,4	-10,7	16,7	62,0	55,0	20,8	80,7
Furniture and other manufacturing n.e.c.	25,2	24,4	-3,0	-19,5	-13,9	5,8	10,6	54,3	26,8	17,7
Electricity and gas supply	6,1	-6,7	-2,3	-25,7	6,3	12,9	-7,2	29,6	1,4	1,3
Construction	23,4	3,3	13,7	11,9	10,9	16,2	15,7	9,4	2,5	1,3
Service industries excl. general government	4,9	16,9	14,8	9,4	14,8	18,7	15,9	10,2	-1,5	-7,4
Wholesale and retail trade	13,4	13,2	7,2	1,9	10,7	8,0	8,2	11,9	6,2	1,6
Hotels and restaurants	11,0	3,1	22,3	-6,0	1,6	41,4	56,7	26,7	20,8	-13,7
Transport via pipelines	-33,3	-3,5	30,6	-12,5	29,6	31,3	72,5	75,4	-4,2	-4,5
Water transtort	-24,2	54,2	63,1	124,7	116,1	75,3	-9,2	16,5	-28,2	-23,6
Ocean transport	-26,2	63,8	65,6	135,0	120,6	77,5	-9,3	16,9	-28,9	-23,2
Inland water and costal transport	-10,1	1,4	41,2	59,2	77,2	53,5	-7,7	12,9	-19,8	-27,5
Other transport industries	21,0	76,1	15,7	-4,9	-1,9	33,0	39,9	-9,4	-6,2	-17,4
Post and telecommunications	6,1	7,6	11,6	12,7	10,2	11,4	12,0	6,0	4,8	4,8
Financial intermediation	30,4	21,2	10,6	8,8	12,2	10,7	10,8	15,1	-3,9	-11,5
Dwelling services	9,1	-1,2	9,0	6,0	12,5	9,1	8,5	8,0	0,2	-7,3
Business services etc.	14,4	21,3	9,4	8,1	10,9	8,2	10,4	7,9	4,8	-1,8
Personal services	1,8	6,9	7,3	6,4	8,4	6,4	8,2	11,0	4,9	1,4
General government	3,5	3,7	12,1	24,1	21,9	5,6	2,1	9,8	2,3	-3,1
Central government	0,6	4,4	-0,3	-0,3	-0,9	-0,0	-0,2	29,7	23,0	-12,1
Civilian central government.	-0,2	2,3	0,6	-0,3	0,3	0,1	1,9	41,8	33,5	-8,3
Defence.	2,8	10,2	-2,6	-0,3	-3,8	-0,4	-4,8	-1,2	-4,7	-23,3
Local government	6,2	3,2	23,1	47,8	42,1	10,3	4,1	-3,2	-10,5	3,7
Mainland-Norway	12,3	11,0	9,7	6,5	11,8	9,7	10,4	7,5	1,1	-1,7
Education	4,5	9,3	45,3	111,1	102,0	10,0	-13,8	-16,6	-35,0	-28,7
Health and social work	7,8	10,8	13,8	14,6	13,5	13,6	13,5	1,4	5,6	7,5

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NATIONAL ACCOUNTS FOR NORWAY

Table A11. Exports of goods and services. At current prices. Million kroner

	1995	1996	1997	97:1	97:2	97:3	97:4	98:1	98:2	98:3
Total exports	353 426	414 266	447 582	108 757	109 975	114 189	114 660	109 783	102 317	100 290
Goods	267 234	321 705	343 715	85 160	84 068	85 026	89 460	83 761	75 899	71 278
Crude oil and natural gas	113 231	156 688	163 674	42 598	38 947	40 220	41 909	34 287	31 048	27 268
Ships, new	4 138	4 257	5 267	1 513	1 307	1 121	1 326	2 727	1 563	1 202
Ships, second-hand	5 791	3 765	4 126	1 627	831	723	945	339	887	309
Oil platforms and modules, new	63	59	231	22	5	195	9	18	37	10
Oil platforms, second-hand	491	956	1 005	9	558	412	26	25	40	35
Direct exports related to petroleum act.	96	126	132	36	34	31	31	29	36	41
Other goods	143 424	155 854	169 280	39 355	42 386	42 324	45 214	46 336	42 288	42 413
Agriculture, forestry and fishing	6 767	7 035	7 711	1 863	1 888	1 779	2 181	2 203	2 100	2 191
Mining and quarrying	2 271	2 342	2 284	479	617	595	593	561	591	560
Manufacturing products	133 142	145 489	158 673	36 965	39 791	39 698	42 218	43 498	39 535	39 509
Food products, beverages and tobacco	17 164	19 528	21 437	4 989	4 771	5 008	6 669	6 160	5 295	5 288
Textiles, wearing apparel, leather	2 138	2 207	2 351	550	594	575	632	596	593	611
Wood products	3 003	2 864	2 923	717	795	699	712	657	689	672
Pulp, paper and paper products	12 864	11 593	10 811	2 556	2 683	2 748	2 824	3 041	2 972	3 012
Printing and publishing	378	559	493	118	121	119	135	147	131	157
Refined petroleum products	12 996	17 147	20 637	5 474	4 888	5 385	4 890	4 833	3 055	3 136
Basic chemicals	12 019	12 107	12 963	2 939	3 450	3 336	3 238	3 762	3 433	3 400
Chemical and mineral products	8 923	9 597	10 627	2 392	2 709	2 789	2 737	2 691	2 860	2 888
Basic metals	29 798	30 756	33 792	7 591	8 626	8 808	8 767	9 657	8 737	8 607
Machinery and other equipment n.e.c.	31 065	35 975	39 121	8 823	10 295	9 402	10 600	11 051	10 891	10 845
Furniture and other manufacturing products	2 794	3 156	3 518	816	859	829	1 014	903	879	893
Electricity	1 244	988	612	48	90	252	222	74	62	153
Services	86 192	92 561	103 867	23 597	25 907	29 163	25 200	26 022	26 418	29 012
Gross receipts, shipping	45 204	46 641	52 787	12 165	13 759	13 688	13 175	13 479	13 079	13 348
Petroleum activities, various services	576	714	752	186	188	185	193	192	184	168
Oil drilling etc.	1 405	1 543	1 925	429	451	534	511	518	578	248
Pipeline transport	2 245	3 424	3 987	1 076	890	848	1 173	1 076	890	848
Travel	14 974	15 221	15 802	3 177	3 926	5 774	2 925	3 201	4 027	6 333
Other services	21 788	25 018	28 614	6 564	6 693	8 134	7 223	7 556	7 660	8 067
Transport, post and telecommunication	7 714	8 675	8 781	1 895	2 063	2 940	1 883	2 179	2 448	3 066
Financial and business services	10 590	12 836	15 694	3 693	3 550	4 237	4 214	4 374	4 155	3 996
Services n.e.c.	3 484	3 507	4 139	976	1 080	957	1 126	1 003	1 057	1 005

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NATIONAL ACCOUNTS FOR NORWAY

Table A12. Exports of goods and services.
Percentage change in volume from the same period in the previous year

	1995	1996	1997	97:1	97:2	97:3	97:4	98:1	98:2	98:3
Total exports	4,3	9,8	5,8	3,3	9,9	6,8	3,4	7,0	-1,5	-2,7
Goods	6,3	11,3	5,6	2,3	10,5	6,3	3,8	7,9	-2,7	-3,1
Crude oil and natural gas	9,2	15,6	2,3	5,8	3,9	-2,0	1,9	1,3	-1,7	-7,1
Ships, new	-10,5	2,0	22,8	136,7	4,5	82,0	-26,1	75,7	14,7	5,2
Ships, second-hand	14,0	-39,5	-3,7	-5,0	3,1	-10,0	-1,8	-80,9	14,2	-44,9
Oil platforms and modules, new	448,7	-9,0	275,4	93,6	-59,8	650,1	-21,0	-21,2	603,5	-95,1
Oil platforms, second-hand	-44,0	94,7	5,1	-97,4	224,4	776,6	-93,4	177,8	-92,8	-91,5
Direct exports related to petroleum act.	52,5	25,7	-4,4	41,3	28,8	-9,5	-41,4	-27,6	0,2	28,2
Other goods	4,5	10,0	8,0	-1,4	15,5	11,2	7,7	14,0	-3,1	1,5
Agriculture, forestry and fishing	14,5	14,2	7,0	10,4	7,9	-4,9	14,6	18,2	-3,8	15,0
Mining and quarrying	-2,3	2,3	-2,1	-20,1	6,6	4,7	2,7	1,8	-13,2	-5,2
Manufacturing products	3,6	10,5	8,4	-0,8	16,2	12,1	7,0	14,0	-2,9	0,8
Food products, beverages and tobacco	2,7	11,8	6,7	-4,0	13,0	1,9	16,7	12,5	-3,2	-5,6
Textiles, wearing apparel, leather	-3,9	1,9	10,6	1,4	15,2	12,3	13,8	11,6	8,0	4,2
Wood products	-4,3	1,0	-3,2	3,5	3,4	-8,5	-10,8	-10,4	-11,2	-1,4
Pulp, paper and paper products	4,6	3,6	6,4	-1,9	10,6	5,9	11,5	11,5	0,2	-0,8
Printing and publishing	-15,9	56,6	-18,4	-24,0	-25,4	-14,5	-6,5	-0,7	-5,9	24,7
Refined petroleum products	-0,3	9,9	12,5	9,3	19,8	17,3	4,4	8,0	-25,0	-21,9
Basic chemicals	0,0	6,5	4,8	-9,0	24,5	1,9	5,5	22,8	0,8	9,4
Chemical and mineral products	8,6	8,6	14,7	9,1	25,3	10,8	14,4	5,5	5,8	9,3
Basic metals	-4,7	13,2	9,8	4,5	15,6	17,2	3,0	12,9	-2,5	1,3
Machinery and other equipment n.e.c.	15,2	13,3	8,0	-7,5	15,8	21,1	5,1	22,7	0,9	7,9
Furniture and other manufacturing products	8,1	11,0	8,1	6,2	16,8	4,2	6,1	3,5	-3,3	7,6
Electricity	80,6	-49,9	-24,8	-88,6	-49,6	90,0	272,9	12,3	-12,9	46,1
Services	-1,3	5,2	6,3	6,7	7,9	8,4	2,1	3,9	2,2	-1,4
Gross receipts, shipping	3,9	1,7	4,2	5,8	8,9	3,2	-0,7	1,9	-2,5	-1,3
Petroleum activities, various services	-12,2	20,6	1,6	1,7	2,5	-1,2	3,5	-0,5	-6,9	-13,2
Oil drilling etc.	-23,3	2,4	7,4	9,7	11,6	6,8	2,6	-0,6	14,3	-57,0
Pipeline transport	20,1	49,1	19,1	43,3	24,9	2,4	11,8	6,7	13,0	2,2
Travel	-6,9	0,1	0,9	-3,0	1,0	1,2	4,6	-3,0	-0,6	6,0
Other services	-7,8	11,1	11,9	9,1	8,1	26,1	4,5	10,6	11,4	-4,0
Transport, post and telecommunication	4,7	8,4	0,0	-0,3	-8,6	26,4	-17,8	12,9	15,7	-0,2
Financial and business services	-6,7	16,8	19,0	19,2	13,3	29,5	13,9	11,8	13,7	-8,0
Services n.e.c.	-29,0	-0,1	15,3	-5,0	34,4	12,3	24,1	1,7	-3,8	1,3

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NATIONAL ACCOUNTS FOR NORWAY

Table A13. Imports of goods and services. At current prices. Million kroner

	1995	1996	1997	97:1	97:2	97:3	97:4	98:1	98:2	98:3
Total imports	297 654	326 487	371 024	82 019	93 518	96 268	99 219	98 509	98 525	100 934
Goods	216 899	242 512	267 423	61 212	67 950	66 199	72 062	73 638	70 938	69 648
Ships	6 324	6 325	14 041	5 388	2 818	3 784	2 051	4 044	1 860	1 925
Oil platforms and modules	359	3 648	2 241	36	1 846	305	54	1 617	116	92
Direct imports related to petroleum activities.	6 237	7 683	9 729	1 981	2 482	2 369	2 897	2 562	2 733	2 195
Other goods	203 979	224 856	241 412	53 807	60 804	59 741	67 060	65 415	66 229	65 436
Agriculture, forestry and fishing	7 890	8 088	8 323	1 935	2 321	1 828	2 239	2 880	2 170	2 010
Crude oil	1 121	1 445	1 517	436	322	413	346	457	292	320
Mining and quarrying	2 802	2 906	3 397	728	881	923	865	984	905	806
Manufacturing products	191 918	209 072	226 855	49 921	57 032	56 514	63 388	60 763	62 594	62 218
Food products, beverages and tobacco	8 928	9 493	10 669	2 228	2 596	2 966	2 879	2 745	2 950	3 408
Textiles, wearing apparel, leather	15 201	15 344	16 738	4 159	3 473	5 129	3 977	4 831	3 585	5 491
Wood products	3 883	4 104	4 869	1 007	1 286	1 225	1 351	1 307	1 372	1 278
Pulp, paper and paper products	6 469	6 370	6 487	1 532	1 614	1 588	1 753	1 697	1 616	1 614
Printing and publishing	2 799	3 386	3 706	823	842	966	1 075	984	886	1 016
Refined petroleum products.	8 750	10 160	11 743	2 681	2 824	2 969	3 269	2 523	2 472	2 559
Basic chemicals	9 449	9 070	9 621	2 166	2 556	2 425	2 474	2 482	2 453	2 427
Chemical and mineral products.	20 551	21 757	23 529	5 171	6 167	5 875	6 316	6 265	6 502	6 453
Basic metals	21 043	22 701	23 925	5 439	5 641	5 656	7 189	6 628	6 603	5 915
Machinery and other equipment n.e.c.	77 813	83 343	91 570	19 591	23 435	22 095	26 449	25 257	26 784	25 402
Furniture and other manufacturing products	6 587	7 049	8 169	1 771	1 979	1 964	2 455	2 258	2 116	2 205
Non-competitive imports.	10 445	16 295	15 829	3 353	4 619	3 656	4 201	3 786	5 255	4 450
Electricity	248	3 345	1 320	787	248	63	222	331	268	82
Services	80 755	83 975	103 601	20 807	25 568	30 069	27 157	24 871	27 587	31 286
Operating costs shipping, excl. bunkers	18 905	19 957	24 085	5 441	5 987	6 388	6 269	6 310	6 456	6 005
Operating costs oil drilling, excl bunkers	643	1 228	1 602	215	394	512	481	572	683	719
Petroleum activities, various services.	3 963	4 140	5 685	799	2 235	1 613	1 038	900	820	1 239
Travel.	26 923	29 129	31 940	5 620	7 399	11 184	7 737	6 303	7 986	12 144
Other services	30 321	29 521	40 289	8 732	9 553	10 372	11 632	10 786	11 642	11 179
Transport, post and telecommunication.	3 437	2 862	3 427	862	799	841	925	963	1 026	1 007
Financial and business services	15 125	14 220	19 386	4 391	4 645	4 749	5 601	5 401	5 220	5 317
Services n.e.c.	11 759	12 439	17 476	3 479	4 109	4 782	5 106	4 422	5 396	4 855

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NATIONAL ACCOUNTS FOR NORWAY

Table A14. Imports of goods and services.

Percentage change in volume from the same period in the previous year

	1995	1996	1997	97:1	97:2	97:3	97:4	98:1	98:2	98:3
Total imports	5,6	8,3	12,3	8,4	22,4	12,5	7,0	15,9	2,7	5,2
Goods	8,8	11,2	10,6	7,8	21,7	10,5	4,0	17,4	3,1	6,5
Ships	-13,2	-5,5	101,7	184,5	290,7	122,5	-25,7	-29,7	-28,6	-39,8
Oil platforms and modules	58,9	892,2	-43,8	10,6	.	38,3	-98,5	.	-93,5	-65,7
Direct imports related to petroleum activities.	42,1	19,8	22,1	-1,3	44,7	12,3	36,1	24,6	4,7	-11,4
Other goods	8,9	9,9	8,6	2,5	15,0	7,5	9,5	18,8	6,9	10,0
Agriculture, forestry and fishing	6,7	3,3	-2,8	-14,4	15,1	-7,6	-2,6	33,2	-9,0	10,3
Crude oil	31,7	-5,5	16,6	83,3	44,6	62,2	-43,0	33,9	9,7	9,2
Mining and quarrying	2,1	0,6	8,6	-16,0	27,5	17,6	11,1	45,7	-2,0	0,4
Manufacturing products.	9,3	9,1	9,8	1,6	15,7	9,8	11,7	19,3	7,3	10,0
Food products, beverages and tobacco	4,0	4,5	9,2	6,5	12,5	9,7	7,9	8,9	2,0	6,1
Textiles, wearing apparel, leather	1,6	-1,3	5,7	2,1	14,2	6,9	0,9	9,9	-0,1	4,1
Wood products	3,2	8,2	18,3	6,6	28,5	19,4	18,2	25,2	2,8	11,7
Pulp, paper and paper products	5,9	1,5	9,5	2,2	14,0	12,1	9,9	9,9	-2,9	-0,9
Printing and publishing	7,6	12,6	17,0	5,8	26,1	17,8	19,0	19,0	8,2	2,2
Refined petroleum products.	12,8	0,9	14,3	10,7	25,9	3,7	18,3	9,2	-4,8	7,1
Basic chemicals	8,1	2,5	6,6	-9,1	9,1	8,5	18,7	17,0	-0,5	-5,3
Chemical and mineral products.	9,8	9,6	7,2	-2,5	11,9	11,2	8,1	16,5	3,4	8,8
Basic metals	0,8	13,9	3,3	1,4	1,6	-4,8	13,9	14,0	16,1	15,5
Machinery and other equipment n.e.c.	16,6	7,8	14,8	1,3	20,5	17,9	18,8	29,2	9,8	11,6
Furniture and other manufacturing products	6,8	3,4	15,5	6,5	25,8	16,0	14,6	19,8	5,3	9,7
Non-competitive imports.	-3,7	48,1	-6,1	4,4	10,7	-13,1	-20,2	1,5	14,1	25,3
Electricity	-54,5	.	-45,1	489,7	-66,0	-95,1	-69,2	-59,7	84,0	117,7
Services	-2,0	0,6	17,5	10,6	24,3	17,5	17,1	11,5	1,6	2,1
Operating costs shipping, excl. bunkers	8,1	1,7	4,2	5,8	8,9	3,2	-0,7	1,9	-2,5	-1,3
Operating costs oil drilling, excl. bunkers	-30,2	85,8	26,9	-41,6	33,1	63,0	72,6	158,0	67,5	35,3
Petroleum activities, various services.	-41,7	1,5	32,7	-2,7	97,5	41,7	-13,5	8,5	-65,1	-26,5
Travel.	1,8	4,7	10,0	8,4	12,5	8,3	11,4	6,4	2,8	3,8
Other services.	-2,0	-5,5	31,1	19,4	34,5	34,6	35,6	17,3	16,2	4,8
Transport, post and telecommunication.	-11,7	-19,3	17,3	23,9	10,1	3,6	33,9	8,8	23,4	16,0
Financial and business services	-8,1	-9,4	32,7	29,0	38,6	34,1	30,0	16,1	8,7	8,8
Services n.e.c.	11,0	3,4	32,5	7,9	35,9	43,3	42,7	20,9	23,2	-1,5

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NATIONAL ACCOUNTS FOR NORWAY

Table A15. Balance of payments. Summary. At current prices. Million kroner

	1995	1996	1997	97:1	97:2	97:3	97:4	98:1	98:2	98:3
Total exports	353 426	414 266	447 582	108 757	109 975	114 189	114 660	109 783	102 317	100 290
Goods	267 234	321 705	343 715	85 160	84 068	85 026	89 460	83 761	75 899	71 278
Services	86 192	92 561	103 867	23 597	25 907	29 163	25 200	26 022	26 418	29 012
Total imports	297 654	326 487	371 024	82 019	93 518	96 268	99 219	98 509	98 525	100 934
Goods	216 899	242 512	267 423	61 212	67 950	66 199	72 062	73 638	70 938	69 648
Services	80 755	83 975	103 601	20 807	25 568	30 069	27 157	24 871	27 587	31 286
Balance of goods and services	55 772	87 779	76 558	26 738	16 457	17 921	15 441	11 274	3 792	-644
Primary income and transfers from abroad	36 850	39 967	45 636	10 599	12 215	10 962	11 860	13 995	14 578	13 629
Compensation of employees.	1 200	1 200	1 200	300	300	300	300	300	300	300
Interest	21 860	23 113	28 775	6 254	7 977	6 797	7 747	9 488	10 170	9 192
Dividends etc.	1 700	2 052	3 377	241	1 126	1 060	950	765	1 376	618
Reinvested earnings	4 003	4 478	2 984	1 377	454	511	642	870	323	1 106
Current transfers	8 087	9 124	9 300	2 427	2 358	2 294	2 221	2 572	2 409	2 413
Primary income and transfers to abroad	61 770	59 179	65 418	15 997	17 337	14 522	17 562	17 318	18 338	17 111
Compensation of employees.	3 201	3 443	3 910	893	976	1 040	1 001	1 017	1 044	985
Interest	24 285	22 927	28 324	7 436	7 946	5 646	7 296	8 084	7 809	7 740
Dividends etc.	8 045	11 063	10 183	2 984	4 859	954	1 386	4 832	6 760	1 105
Reinvested earnings	5 101	2 931	3 606	340	-932	2 300	1 898	-1 563	-2 367	2 246
Current transfers from general government	7 932	7 200	7 474	1 318	1 569	1 635	2 952	1 710	2 122	1 402
Other current transfers	13 206	11 615	11 921	3 026	2 919	2 947	3 029	3 238	2 970	3 633
Primary income and transfers from abroad, net.	-24 920	-19 212	-19 782	-5 398	-5 122	-3 560	-5 702	-3 323	-3 760	-3 482
Current external balance.	30 852	68 567	56 776	21 340	11 335	14 361	9 739	7 951	32	-4 126
Capital transfers, net.	-1 067	-820	-1 277	-416	-279	-298	-284	-63	-289	92
Net lending	29 785	67 747	55 499	20 924	11 056	14 063	9 455	7 888	-257	-4 034
Revaluations, net.	7 966	-5 056	-15 080	-6 927	-1 533	-5 786	-834	1 318	497	2 772
Increase in Norway's net assets	37 751	62 691	40 419	13 997	9 523	8 277	8 621	9 206	240	-1 262

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NATIONAL ACCOUNTS FOR NORWAY

Table A16. Employed persons, employees by industry and total. 1000

	1995	1996	1997	97:1	97:2	97:3	97:4	98:1	98:2	98:3
Total employees	1 914,0	1 970,4	2 036,0	2 009,7	2 034,0	2 052,1	2 047,4	2 066,3	2 085,5	2 096,6
Agriculture and hunting	16,7	17,1	16,4	16,6	16,4	16,4	16,0	15,8	16,4	16,0
Forestry and logging	3,6	3,5	3,5	3,5	3,5	3,7	3,5	3,3	3,5	3,5
Fishing and fish farming	8,1	7,9	8,3	8,2	8,4	8,4	8,3	8,0	8,5	8,6
Oil and gas extraction incl. services	21,2	21,6	22,3	21,9	22,1	22,6	22,4	22,8	23,1	24,0
Oil and gas extraction	17,2	16,5	16,4	16,3	16,2	16,6	16,4	16,3	16,6	17,0
Service act. incidental to oil and gas ext.	4,0	5,1	5,9	5,6	5,9	6,0	6,1	6,6	6,6	7,0
Mining and quarrying	4,5	4,4	4,3	4,2	4,3	4,4	4,2	4,1	4,2	4,2
Manufacturing	291,3	297,4	306,0	301,6	307,0	310,3	304,9	308,4	310,7	309,4
Food products, beverages and tobacco	53,4	54,5	55,9	55,7	56,0	56,5	55,5	55,7	55,3	54,5
Textiles, wearing apparel, leather	8,4	8,3	7,8	7,8	7,9	7,9	7,7	7,8	7,8	7,6
Wood and wood products	15,3	15,4	16,2	15,6	16,2	16,5	16,3	16,0	16,2	16,2
Pulp, paper and paper products	11,3	11,1	11,5	11,3	11,6	11,7	11,4	11,4	12,0	12,0
Publishing, printing, reproduction	38,5	39,1	40,8	40,5	41,2	41,0	40,6	41,2	41,6	41,0
Refined petroleum products	1,9	1,9	2,1	1,9	2,2	2,3	2,1	1,8	2,0	2,0
Basic chemicals	9,3	9,6	9,5	9,3	9,5	9,6	9,4	9,4	9,6	9,6
Chemical and mineral products	20,3	21,1	21,5	21,3	21,4	22,0	21,3	22,0	21,8	21,8
Basic metals	16,6	17,0	17,2	16,7	17,3	17,8	16,9	16,7	17,5	17,6
Machinery and other equipment n.e.c.	70,8	72,6	75,1	73,8	75,2	76,4	75,1	76,0	76,1	76,9
Building of ships, oil platforms and moduls.	33,0	33,9	34,5	34,2	34,7	34,9	34,4	35,8	36,5	35,8
Furniture and other manufacturing n.e.c.	12,4	12,9	13,8	13,5	13,8	13,9	14,1	14,5	14,4	14,3
Electricity and gas supply	19,9	19,8	19,8	19,7	19,9	20,1	19,6	18,4	18,5	18,6
Construction	83,8	86,9	95,7	91,0	94,5	98,6	98,4	99,5	102,6	104,9
Service industries excluded general government	815,2	844,3	878,7	867,0	878,5	884,5	884,6	896,5	907,4	911,9
Wholesale and retail trade	269,4	284,8	301,6	298,4	302,3	300,1	305,5	309,2	312,8	309,2
Hotels and restaurants	54,0	56,4	58,6	56,5	58,6	60,4	58,9	58,3	60,2	61,9
Transport via pipelines	0,4	0,2	0,2	0,1	0,2	0,2	0,2	0,1	0,2	0,2
Water transport	49,0	48,6	48,7	48,3	48,2	49,7	48,4	48,3	48,7	49,3
Ocean transport	40,9	40,2	40,2	40,0	39,7	40,9	40,2	40,2	40,2	40,8
Inland water and costal transport	8,1	8,4	8,5	8,3	8,5	8,8	8,2	8,1	8,5	8,4
Other transport industries	72,5	74,3	77,1	75,0	77,3	78,5	77,4	77,4	78,4	80,4
Post and telecommunications	50,9	50,4	49,2	50,8	50,0	48,4	47,6	50,5	49,7	50,0
Financial intermediation	50,8	50,3	49,5	49,8	49,5	49,5	49,0	48,8	48,5	48,4
Dwelling services	1,2	1,2	1,2	1,3	1,3	1,3	1,0	1,2	1,3	1,3
Business services etc.	112,1	120,4	131,3	126,6	130,7	133,6	134,3	136,9	141,4	145,3
Personal services	154,8	157,8	161,4	160,2	160,4	162,8	162,3	165,7	166,2	166,1
General government	649,9	667,3	681,0	676,0	679,4	683,1	685,4	689,4	690,6	695,4
Central government	149,9	152,1	152,5	152,6	152,2	152,0	153,1	153,0	151,9	151,3
Civilian central government	104,6	106,7	108,8	108,9	108,7	108,4	109,2	109,1	108,9	108,3
Defence	45,3	45,4	43,7	43,7	43,5	43,6	43,9	43,9	43,0	43,1
Local government	500,0	515,2	528,5	523,4	527,2	531,1	532,4	536,4	538,7	544,1
Mainland-Norway	1 851,5	1 908,3	1 973,3	1 947,7	1 972,1	1 988,4	1 984,6	2 003,2	2 022,0	2 031,5
Total employees and self-employed	2 105,7	2 158,2	2 220,3	2 188,7	2 221,2	2 241,3	2 229,4	2 252,2	2 277,4	2 286,5

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NATIONAL ACCOUNTS FOR NORWAY

Table A17. Employed persons, employees by industry and total.
Percentage change from the same period in the previous year

	1995	1996	1997	97:1	97:2	97:3	97:4	98:1	98:2	98:3
Total employees	2,5	2,9	3,3	3,9	3,6	3,0	2,8	2,8	2,5	2,2
Agriculture and hunting	0,8	3,0	-4,5	-2,3	-5,7	-5,4	-4,5	-5,0	-0,1	-2,7
Forestry and logging	1,1	-0,6	0,0	1,7	-2,9	1,0	0,3	-4,6	-0,5	-4,2
Fishing and fish farming	2,7	-1,7	4,9	7,7	7,1	4,0	1,2	-2,9	1,9	2,9
Oil and gas extraction incl. services	-1,1	2,1	3,0	2,0	2,9	3,9	3,2	4,3	4,8	6,3
Oil and gas extraction	-1,2	-3,6	-1,0	-2,0	-1,5	-0,0	-0,6	-0,3	2,3	2,7
Service act. incidental to oil and gas ext.	-0,5	26,2	16,2	16,1	17,5	16,2	15,1	17,6	11,8	16,2
Mining and quarrying	-0,2	-0,5	-4,3	-5,8	-5,8	-4,3	-0,9	-2,8	-3,4	-2,8
Manufacturing	2,7	2,1	2,9	4,0	3,5	2,6	1,5	2,2	1,2	-0,3
Food products, beverages and tobacco	1,3	2,1	2,6	6,3	3,3	1,1	0,1	0,1	-1,2	-3,5
Textiles, wearing apparel, leather	-2,5	-1,1	-5,9	-5,3	-7,2	-6,2	-4,8	0,1	-0,9	-3,1
Wood and wood products	2,5	0,5	5,2	5,6	6,2	4,7	4,4	2,6	-0,1	-2,1
Pulp, paper and paper products	3,9	-2,1	3,5	0,4	2,4	1,0	10,9	0,9	3,5	3,2
Publishing, printing, reproduction	0,9	1,7	4,4	3,1	4,7	4,8	4,9	1,8	1,0	-0,1
Refined petroleum products	-4,0	-0,0	9,4	10,6	9,5	8,7	9,0	-2,5	-9,1	-10,0
Basic chemicals	2,5	3,0	-1,2	-1,1	-1,6	-0,9	-1,3	1,1	0,9	0,0
Chemical and mineral products	2,5	3,9	1,9	4,9	2,4	1,9	-1,4	3,1	1,7	-1,1
Basic metals	1,4	2,0	1,3	1,6	0,9	1,3	1,4	0,3	0,8	-1,2
Machinery and other equipment n.e.c.	4,6	2,5	3,5	4,5	4,4	4,2	1,0	2,9	1,1	0,7
Building of ships, oil platforms and moduls.	3,8	2,8	1,8	3,6	3,4	1,2	-0,7	4,7	5,1	2,9
Furniture and other manufacturing n.e.c.	6,4	4,1	6,9	8,3	8,2	6,3	4,9	6,9	4,1	3,4
Electricity and gas supply	0,6	-0,1	-0,0	1,7	0,1	-0,8	-0,9	-6,7	-7,1	-7,8
Construction	6,2	3,6	10,1	11,0	9,8	9,5	10,2	9,4	8,6	6,3
Service industries excluded general government	2,9	3,6	4,1	5,4	4,5	3,3	3,2	3,4	3,3	3,1
Wholesale and retail trade	5,3	5,7	5,9	7,3	6,3	4,1	5,9	3,6	3,5	3,0
Hotels and restaurants	1,2	4,4	3,9	5,7	4,4	2,6	3,0	3,3	2,8	2,5
Transport via pipelines	-2,0	-41,7	-16,5	-48,7	2,6	-23,1	2,6	-8,3	-8,3	-6,9
Water transport	-1,3	-1,0	0,2	2,7	-0,3	0,1	-1,6	0,1	1,0	-0,9
Ocean transport	-1,9	-1,8	-0,0	1,8	-0,7	0,3	-1,4	0,5	1,2	-0,1
Inland water and costal transport	1,7	2,9	1,4	7,3	1,8	-0,6	-2,1	-1,6	0,1	-4,6
Other transport industries	0,5	2,6	3,7	4,6	4,6	3,0	2,6	3,2	1,5	2,4
Post and telecommunications	1,7	-1,1	-2,3	1,0	-1,5	-4,5	-4,2	-0,6	-0,7	3,2
Financial intermediation	0,1	-1,0	-1,6	-0,2	-1,6	-2,3	-2,4	-2,1	-1,9	-2,2
Dwelling services	2,6	2,5	-0,0	7,0	3,0	0,4	-11,7	-5,6	-0,2	-1,0
Business services etc.	5,2	7,3	9,1	10,3	10,0	9,3	6,9	8,2	8,2	8,8
Personal services	1,7	1,9	2,3	2,5	2,3	3,0	1,4	3,4	3,6	2,0
General government	1,6	2,7	2,1	1,6	2,1	2,4	2,2	2,0	1,6	1,8
Central government	-0,7	1,5	0,2	0,2	0,2	0,0	0,5	0,3	-0,2	-0,5
Civilian central government	0,7	2,0	1,9	2,0	1,9	1,6	2,2	0,2	0,2	-0,1
Defence	-3,7	0,1	-3,8	-4,2	-3,7	-3,7	-3,4	0,6	-1,2	-1,2
Local government	2,3	3,0	2,6	2,0	2,6	3,1	2,7	2,5	2,2	2,5
Mainland-Norway	2,6	3,1	3,4	4,0	3,7	3,1	2,9	2,8	2,5	2,2
Total employees and self-employed	2,1	2,5	2,9	2,8	3,1	2,8	2,8	2,9	2,5	2,0

B-blad

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