Economic Survey 3/93

Economic Trends

Article:

Effects of an EC carbon/energy tax

Economic Survey 3/93

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Contents

Main economic developments

> * *New currency unrest, but the Norwegian krone little affected*
>
> * *Weak first half-year, but decline in employment has halted*
>
> * *Interest rate decline will boost mainland demand*

Developments over the past year have once again underscored the strong international dependence of the Norwegian economy. A number of our main trading partners are in the throes of the deepest recession since World War II. This has substantially limited the growth potential of traditional Norwegian exports. In addition, increased market penetration of suppliers from formerly centrally-regulated states in eastern Europe has led to low prices for several important Norwegian export products. Preliminary national accounts figures for the first two quarters of 1993, which show a weak underlying trend in traditional Norwegian exports, must be view in the light of these factors.

However, as a whole Norway's economic situation is clearly better than that of most other OECD countries. Unemployment remains low by European standards, and whereas unemployment in Europe has recently shown clear signs of increase, in Norway it appears to have stabilised at around 6 per cent. A major reason why Norway stands out is her large petroleum revenues which in recent years have given the authorities the oportunity to pursue an expansionary fiscal policy. In 1992 the growth in the number of employees in the general government sector was about as strong as the drop in the private sector. This trend appears to continue in 1993.

The large and growing revenues from the export of crude oil and natural gas explain why Norway in 1993 for the third year running will experience a substantial surplus on the current account. Together with several years of low price and wage growth, which have improved the competitiveness of mainland industries, this gives a picture of a relatively speaking strong economy.

Confirmation that this is view is presently shared by agents in financial markets emerged in connection with the latest turmoil in the European currency market. Strong pressure on currencies, such as the Danish krone and French franc led EC countries at the beginning of August to decide to float their currencies within new expanded margins. In this period the Norwegian krone was subject to little downward pressure.

In the short term the latest changes in the ERM will probably benefit economic development in

MACROECONOMIC INDICATORS
Growth from previous period. Per cent

		Seasonally adjusted [1]		
	1992	92.4	93.1	93.2
Demand and output volume indicators				
Private consumption	1.8	1.1	-1.2	0.9
Public consumption	4.6	0.2	1.2	-2.7
Gross fixed investment - Mainland Norway	0.8	9.5	-14.3	7.5
Final domestic use of goods and services	1.5	-0.1	-0.0	-2.4
Final domestic demand from mainland Norway	2.3	2.1	-2.7	0.8
Exports	6.1	2.5	-4.2	4.3
- traditional goods	4.1	-0.7	-2.4	4.8
Imports	2.2	-1.2	-1.4	-0.5
- traditional goods	4.2	-4.6	-3.2	0.8
Gross Domestic Product	3.3	1.5	-1.4	-0.1
- Mainland Norway	2.0	2.6	-1.0	-0.6
Labour-market				
Man-hours worked	-0.4	-1.0	1.4	1.3
Employed persons	-0.3	-0.4	-0.1	0.1
Unemployment rate, level [2]	5.9	6.0	5.9	6.1
Prices				
Consumer Price Index [3]	2.3	2.2	2.6	2.5
Export prices, traditional goods	-6.7	-0.8	1.7	0.0
Import prices, traditional goods	-1.9	0.5	1.5	-0.8
Balance of payments				
Current balance, bill. NOK [4]	17.8	4.8	5.1	9.5

1) See "Technical comment".
2) Seasonally adjusted levels in per cent.
3) Growth from same peirod previous year.
4) Unadjusted levels in NOK bn.

Europe, since the scene is now set for a sharper interest rate decline. Given the confidence that has been generated, the interest rate level in Norway will probably remain at or below the European level. Hence, the stage is set for a marked fall in both market rates and borrowing rates in Norwegian financial institutions in 1993 and 1994. In the light of the financial consolidation which has taken place among households and enterprises, this will provide an impetus to domestic demand growth. Some signs of a turnaround in demand in mainland Norway can already be observed, for instance in the housing market where increased trade and evidence of rising prices has been registered. Our forecast of stronger growth in private consumption next year is based on expectations that the interest rate decline will consolidate and strengthen in the period ahead.

International economy: Continued currency unrest in Europe

The turbulence in the *European currency market* flared up again this summer. Recession and growing unemployment had increased the need for a rapid and marked drop in interest rates in Europe. However, for the countries still in the ERM, the interest rate trend was checked by the Bundesbank's strategy of gradually reducing German rates. The German central bank's omission to lower the discount rate at its meeting at the end of July triggered speculation against vulnerable currencies, in the first instance the French and Belgian franc and Danish krone. At a meeting on 2 August the EC monetary committee decided to extend the swing margins in the ERM from 2.25 to 15 per cent, except in the case of the German mark and Dutch guilder where the old margins still apply. In practice this means a suspension of the ERM since exchange rates can now float freely within the new broad intervals.

The demise of the system of fixed exchange rates allows European countries to pursue a more independent monetary policy. In the present situation this will serve to hasten the interest rate decline in Europe and thereby stimulate output and demand. However, it is difficult to say anything about the strength of the contribution from lower interest rates; probably no clear-cut effects will be evident until the end of the current year. An uncertain factor is how exchange rate fluctuations, which to a greater or lesser extent will have to be expected in the coming period, will affect investment decisions. Further, higher import prices as a result of currency depreciations could arouse concern in a number of countries.

However, in the *United Kingdom* the release from the ECU and the ensuing fall in interest rates appear so far to have had exclusively positive ef-

fects. The export industry has been substantially strengthened by the depreciation of the pound sterling against other European currencies since last year. The associated drop in interest rates has probably stimulated domestic demand; new car sales have gathered pace, and there are signs of a turnaround in the housing market. National accounts figures for the first half of this year support the picture of rising output and demand, and GDP is now set to expand by about 2 per cent from 1992 to 1993.

In *Germany* the recession has intensified in recent months. The export industry in particular has problems, partly because of the appreciation of the German mark. The domestic market, on the other

GNP/GDP GROWTH FOR SELECTED COUNTRIES
Per cent

USA JAP GER UK SWE DEN

1992   1993   1994
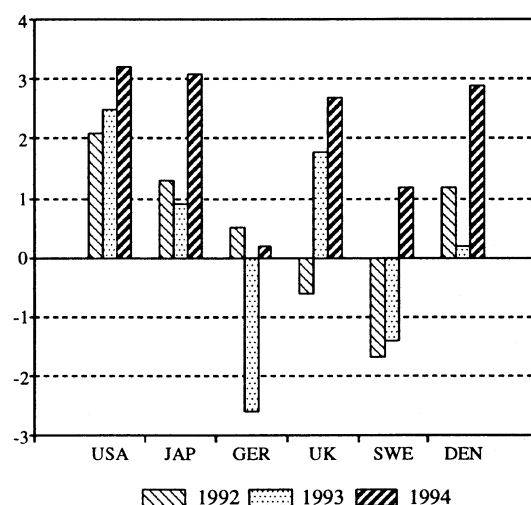
GROWTH IN CONSUMER PRICES
Per cent

USA JAP GER UK SWE DEN

1992   1993   1994
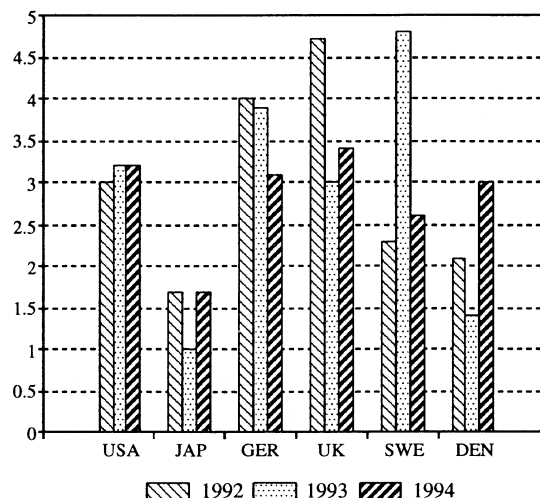
hand, has long been tight owing to an expansionary economic policy and the unification of the two former German states. The result has been a high inflation rate by German standards, which is a major explanation for the Bundesbank's tight monetary policy. However, during the past few months there have been clear signs of weakening domestic demand, and even in the construction sector there are now signs of reduced activity. Unemployment showed a new strong increase in the summer months of this year and, reckoned as a share of the workforce, unemployment is expected to rise from just below 6 per cent in 1992 to about 8 per cent in 1993. The interest rate level is expected to continue to fall in Germany in 1993, but will hardly prevent a continuation of the weak output trend and a further increase in unemployment in 1994.

Sweden is in the throes of a deep economic crisis. An overheated economy with several years of high inflation has weakened the country's competitive position, and strong expansion in public spending has led to a sharp increase in the budget deficit. When the international recession took hold, unemployment rose very rapidly. Accelerating unemployment benefit outlays have further weakened public budgets and led to an acute need for retrenchment. Decisions to implement substantial austerity measures could not prevent Sweden (after Finland) being a "first choice" for currency market speculators last autumn. The sharp depreciation which followed has restored competitiveness of Swedish manufacturing, and exports showed signs of recovery through the first half of this year. However, this has not sufficed to prevent a sharp rise in unemployment, and in June registered unemployment reached 435,000 persons. Unemployment will probably increase from 5.3 per cent in 1992 to an average of almost 8 per cent in 1993. In the course of the last few weeks the Swedish krona has weakened further against other currencies. Since the Swedish krona was floated in November 1992, it has weakened by almost 20 per cent against the Norwegian krone.

The economy in *Denmark* has deteriorated so far in 1993. After several years of low inflation the Danish economy had long been perceived as well prepared to meet an international recovery. However, the recovery has been long in coming. Instead, Danish industry have been hit hard by recession among important trading partners such as Sweden and Germany. An already high unemployment rate has thus risen further. On top of this came the currency unrest last autumn resulting in an appreciation of the Danish krone. After the expanded swing margins were introduced in the ERM at the beginning of August the Danish krone has weakened by about 6 per cent. Concurrently short rates

have fallen from close to 14 per cent at the turn of the month July/August to just over 10 per cent a month later. The Danish authorities have stated that a stable exchange rates vis-à-vis other European countries is still a main objective. If this strategy is pursued the interest rate level in Denmark will probably shadow German rates downward. After close to zero growth in the current year, the forecasts point towards a GDP growth of 2-3 per cent next year.

In the *United States* GNP growth estimates for 1993 have been revised downwards to 2.5 per cent following a weaker-than-expected first half-year. The revision is due primarily to reduced public sector demand. In addition, severe weather conditions in March contributed to a fall in housing investment. On the other hand, private consumption rose markedly in the second quarter. This may to some extent be related to a number of positive reports concerning the trend in the labour market. In the course of the past few months employment has risen both in several service industries and in the construction sector, and unemployment was reduced both in July and August reckoned from the preceding month. After a tug of war, President Clinton got the austerity part of his package of economic measures through Congress. The package aims at reducing the federal budget deficit by almost USD 500 billion in the course of a five-year period and contains both increased taxation for businesses, higher increased personal taxation on annual incomes in excess of USD 200,000 as well as a small increase in petrol tax. On the expenditure side a cut is planned in the defence budget and for the Medicare health programme. The austerity package is designed to avoid weakening the economic upswing now under way. For 1994 the forecasts continue to point to a GNP growth of about 3 per cent.

In *Japan* domestic demand continues its very weak trend, despite the comprehensive stimulatory measures that have been implemented. According to the forecasts, GNP growth this year will be as low as 1 per cent. The growth is expected to strengthen to more than 3 per cent in 1994, partly as a result of a recovery of both private and public investment. As a result of the low domestic activity, import growth is also low, and the stage could therefore be set for a new record trade surplus in 1993. The yen has strengthened markedly so far this year, also against the dollar. This has contributed to weakening manufacturing industry's competitiveness in traditional export markets. Japan's total exports have nonetheless held up fairly well thanks to strong growth in deliveries to new markets in South-east Asia.

Norway: Moderate growth in the mainland economy in 1993

Despite some growth in the second quarter, mainland demand fell by 1 per cent (seasonally adjusted) from the second-half of last year to the first half of this year, according to preliminary quarterly national accounts (QNA) figures. Total consumption remained approximately unchanged, whereas gross mainland investment fell by 7 per cent. The underlying rate of growth in mainland demand has been very weak since the trough in 1989. Wide fluctuations call for great caution in interpreting the growth rates.

Fixed capital formation outside the oil sector and maritime trade has shown wide fluctuations in the past three quarters. Manufacturing investment increased by almost 13 per cent in the second quarter of this year, after an equally large fall in the preceding period. An unchanged seasonally adjusted level to year-end will result in these investments growing of a little below 5 per cent from 1992 to 1993, while the CBS' investment survey for the second quarter of this year indicates a fall of about 10 per cent this year. Investment in private services, which makes up about 30 per cent of fixed capital formation in mainland Norway, has been even more unstable than manufacturing investment in recent quarters. This may to some extent be traced back to problems in drawing a clear distinction between accrued and book variables in the accounting data which are one of the sources for this item in the quarterly national accounts.

Despite the wide fluctuations in the past three quarters, the clear-cut downward trend in investment in mainland Norway in the period 1988 - 1991 appears to have levelled off. The falling interest rate

level will contribute to a decline of about 1.5 percentage points in the real cost of borrowing from 1992 to 1993, and to improved earnings in the corporate sector, which is in a net debtor position. Continued moderate growth through the year will result in a weak rise in these investments from 1992 to 1993.

Residential investment fell by 3 per cent (seasonally adjusted) from the first to the second quarter of this year, i.e. more or less in line with the average through the past six quarters.

After a steep downturn lasting several years, second-hand prices in the housing market are now appreciably lower than the costs of new construction. However, information from OBOS and the Norwegian Building Research Institute indicates that housing prices are now rising in Oslo. On the assumption of a continued decline in lending rates next year, this trend will persist and work through to the rest of the country. This will stimulate housing starts, which in volume terms now appear set to bottom out after declining for more than five years. The drop in housing investment may in that case come to a halt around the turn of the year 1993/94, but there will nonetheless be a decline of about 10 per cent from 1992 to 1993.

According to the Revised National Budget for 1993 the stage is set for a reduction of 4.9 per cent on an annual basis in gross investment in public administration. The estimated decline is in large institution ascribable to the conversion of Statsbygg (Directorate of Public Construction and Property) from a government to a public corporation. Statsbygg's investments will henceforth be included in the investments in the sector "other private services" in the national accounts. Aggregate investment in mainland Norway is now estimated to show negligible change from 1992 to 1993.

Private consumption remained approximately unchanged from the second half of last year to the first half of this year, adjusted for normal seasonal variations. However, the quarterly trend through this period was strongly affected by the household sector's adjustment to an expected price rise as from 1 January this year, partly resulting from the increase in value-added tax effective from the same date. There are no clear signs that the fall in the interest rate level was reflected in purchases of consumer durables in the second quarter of this year. However, figures for July and August show clear growth in new car sales, and may be an indication that enterprises and households are responding to the new level of borrowing costs.

Private consumption rose appreciably less than household real disposable income in 1992, and the saving ratio rose by almost 2.5 percentage points to 5 per cent. Given a slight fall in household net real investment from 1991 to 1992, this resulted in an

CYCLICAL DEVELOPMENT
(Per cent growth from previous quarter.
Seasonally adjusted and smoothed. Annual rates.)

—— GDP mainland Norway 1)
----- Exports of traditional goods
– – – Final demand from mainland Norway 1)
1) Excl. oil and ocean transport.
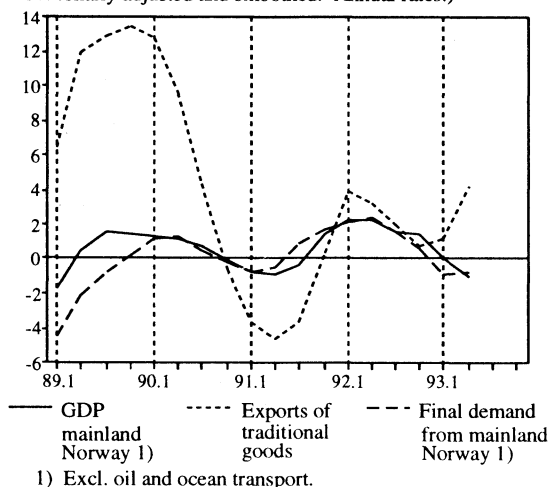
Source: CBS.

increase in household net assets of more than NOK 20 billion. Based on figures from Norges Bank, net assets at the end of the first quarter of this year is estimated at slightly less than 31 per cent of disposable income (seasonally adjusted), i.e. an increase of 3 percentage points from the end of the fourth quarter of last year. A good quarter of the change is ascribable to revaluations. Although the net asset ratio has risen markedly from the low point of about 12 per cent in 1988, it still remains below the 35 to 40 per cent level of the early 1980s.

The strong growth in household incomes last year can partly be ascribed to tax reliefs and a marked increase in benefits. However, the public sector contribution to household income growth will be appreciably lower in the current year. Assuming continued moderate growth in real wage earnings, the stage is still set for an increase of more than 2 per cent in household real disposable income from 1992 to 1993. As a result of the accumulation of net assets in recent years and the decline in the interest rate level, we expect some growth in consumption over the rest of the year. Even so, given the relatively weak growth in consumption in the first half-year consumption on an annual basis will increase by just over 1 per cent at the most. This will bring the saving ratio to a level close to 6 per cent.

Continued strong growth in oil investment

According to preliminary national accounts figures, accrued investment costs in the oil sector including pipeline transport showed almost 9 per cent volume growth in 1992, after expanding by more than 30 per cent in the previous year. This growth has brought accrued oil investment up to a level corresponding to half the investment in mainland Norway, and 6.3 per cent of total GDP. According to the CBS' investment survey for the first quarter, accrued investment in the oil sector will show a further strong increase in 1993, to a level of about 7.5 per cent of GDP. According to the survey a decline corresponding to just over half a per cent of GDP is likely in 1994.

Weak market growth puts a brake on traditional exports

Exports of traditional goods fell by 0.4 per cent, seasonally adjusted, in the first quarter of this year, after a decline of the same order of magnitude in the second half of last year. Over the past three to four years the quarter-on-quarter trend has been heavily affected by fluctuations in deliveries of refined oil products from the Mongstad refinery and in sales of surplus power to foreign countries. The weak trend in traditional export is closely related to

DEMAND FROM MAINLAND NORWAY
AND GOVERNMENT CONSUMPTION
1989=100. Seasonally adjusted (QNA)
Seasonally adjusted and smoothed (KVARTS)
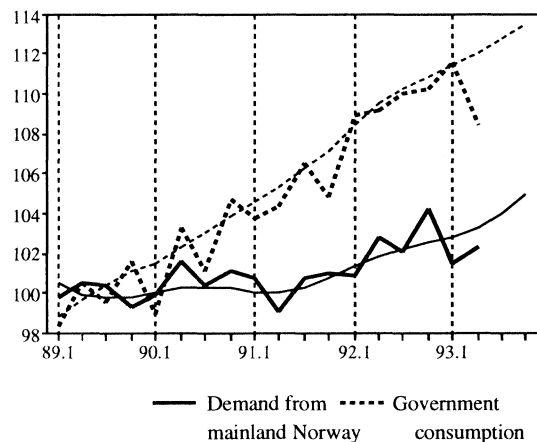
—— Demand from ----- Government
mainland Norway consumption

CONSUMPTION AND INVESTMENT
1989=100. Seasonally adjusted (QNA)
Seasonally adjusted and smoothed (KVARTS)

—— Private consumption ----- Gross investment
mainland Norway
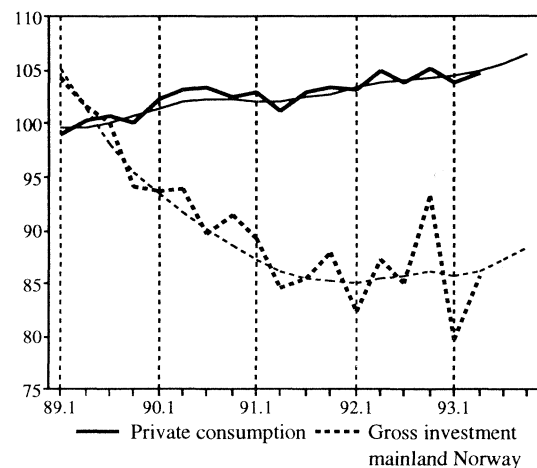
NET WEALTH RATIO, SAVING RATIO AND POST
TAX REAL INTEREST RATE 1976 - 1994

—— Net financial ----- Saving ratio − − − Post tax real
wealth ratio interest rate
(left scale) (bank loans)
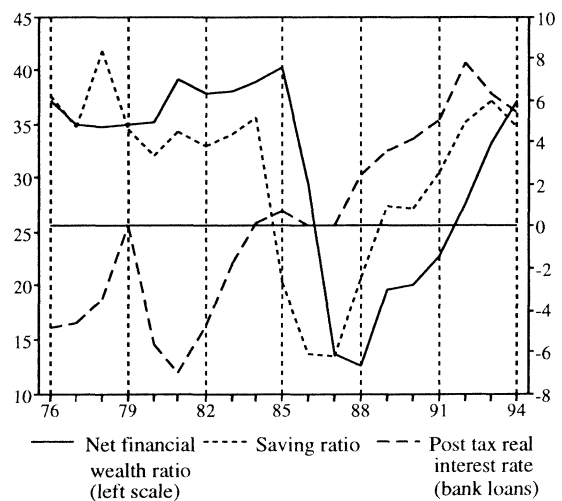
Source: Bank of Norway and Statistics Norway.

EXPORTS
1989=100. Seasonally adjusted (QNA)
Seasonally adjusted and smoothed (KVARTS)
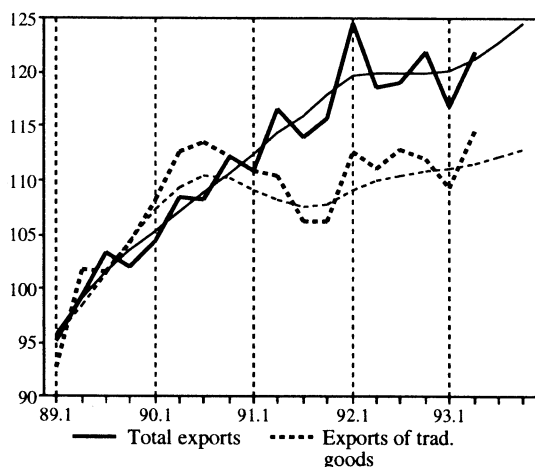
——— Total exports   ▪▪▪▪ Exports of trad.
                          goods

IMPORTS
1989=100. Seasonally adjusted (QNA)
Seasonally adjusted and smoothed (KVARTS)

——— Total imports ▪▪▪▪ Trad. imports

GROSS DOMESTIC PRODUCT
1989=100. Seasonally adjusted (QNA)
Seasonally adjusted and smoothed (KVARTS)

——— Total   ▪▪▪▪ Mainland Norway
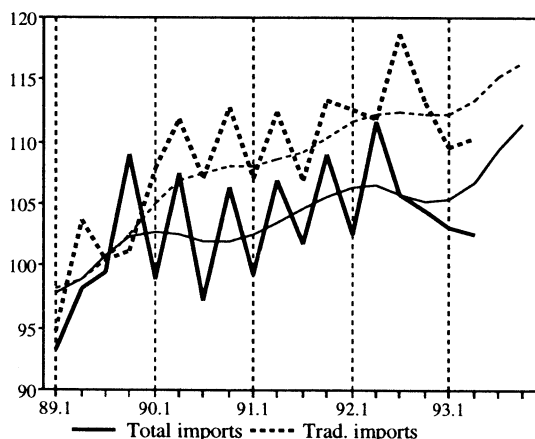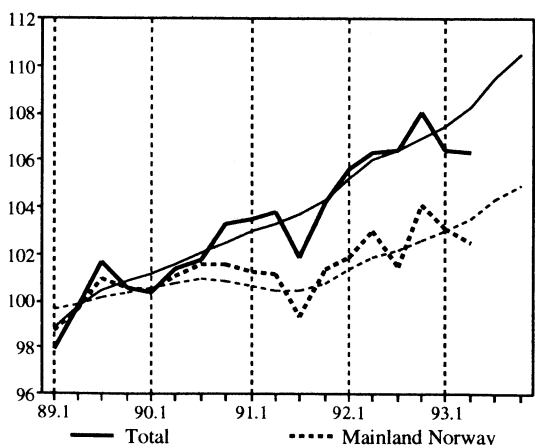
the economic situation among our main trading partners.

According to preliminary estimates, Norway's export markets expanded by about 2 per cent in 1992, i.e. about 0.5 percentage points more than in 1991, but clearly weaker than in 1990. Whereas the German unification contributed to maintaining growth in 1990, the weak trend in Sweden is an important part of the explanation of why market growth proved particularly low in 1991. For 1993 growth in the Norwegian export markets appears set to fall towards the level of 1991. Hence, given continued low prices on metals and certain other commodities, growth in traditional exports will be very slow in 1993. Next year growth among Norway's main trading partners is expected to pick up somewhat, and exports of traditional goods may increase by about 2 per cent.

Exports of crude oil and gas rose by just over 1.5 per cent, seasonally adjusted, in the first half of this year, i.e. about the same as in the second half of last year, but markedly weaker than in 1991 and 1992. The moderate growth in the first half of 1993 is mainly ascribable to difficult weather conditions in January/February, and the halt to buoy-loading of oil at the Statfjord and Gullfaks fields. With a further escalation of production at the Snorre field in the current year, and the start-up of Brage and Draugen, both production and export of petroleum will expand by some 6 - 7 per cent both this year and next.

Service exports fell by almost 4 per cent in fixed prices in the first half of this year, after stagnating from the first to the second half of last year. Half of the reduction in 1993 is ascribable to a decline in exports of shipping services, which are constrained by weak international trading conditions.

Weak underlying import growth

As a result of periodic deliveries of submarines and purchases of new civilian aircraft, imports of traditional goods have fluctuated widely in recent years. If these cyclically insensitive goods are disregarded, the underlying growth in traditional imports over the past thirteen quarters has not been visibly stronger than the underlying growth in mainland demand, despite the steep rise in North Sea investment activity. After a decline of 3 per cent from the second half of last year to the first half of this year, imports of traditional goods will probably show slightly weaker growth than demand in the mainland economy in 1993.

Weak trend in output

Preliminary quarterly national accounts figures indicate an unchanged seasonally adjusted level of

GDP in mainland Norway from the second half of last year to the first half of this year, despite some decline in the past two quarters. This decline is partly ascribable to private services, partly to the trend in commodity-producing sectors other than manufacturing and mining.

Some rise in mainland demand during the rest of the year and a continued high level of accrued oil investment will contribute to growth in mainland Norway's GDP for the year as a whole. However, it now appears that this growth will be somewhat weaker than last year's output growth of about 2 per cent. Next year the decline in oil investment will provide a negative contribution to expansion in mainland GDP.

Decline in employment levels off

According to the Statistics Norway's labour market survey (AKU), both the workforce and the number of employed persons in the first half of this year were at virtually the same level as previous year. The number of man-hours worked showed a slight increase, but the figures for this item are encumbered with somewhat greater uncertainty than the employment figures. The development over the past year suggests regardless that the decline in employment has come to a halt. The unemployment rate (seasonally adjusted) has remained at about 6 per cent over the past 5 - 6 quarters. The tendency of unemployment to level off after the marked growth from 1991 to 1992 may to some extent be due to escalation of government employment programmes.

The demographic trend of increasing shares of the population with high participation rates suggests an increase in the workforce in the period ahead. Given normal productivity growth in the mainland economy in the current year, the growth in employment will be very moderate, and average unemployment may edge up slightly from 1992 to 1993.

The inflation rate down towards the 1992 level

The spring wage round for the private and public sector resulted in moderate central wage increments, and the same appears generally to be the case for the local negotiations. Accordingly, for the economy as a whole, an average hourly wage growth of almost 3 per cent appears likely in the current year, which is about the same growth rate as last year. The 2.4 percentage point reduction in pay-roll taxes as from 1 January means that wage costs per man-hour will rise appreciably less than this figure.

In the first seven months of the year the consumer price index stood 2.5 per cent higher than in the same period of 1992. However, the consumer price

GROSS DOMESTIC PRODUCT AND EMPLOYMENT
1989=100. Seasonally adjusted (QNA)
Seasonally adjusted and smoothed (KVARTS)

—— GDP,Mainland-Norway ····· Total Employment
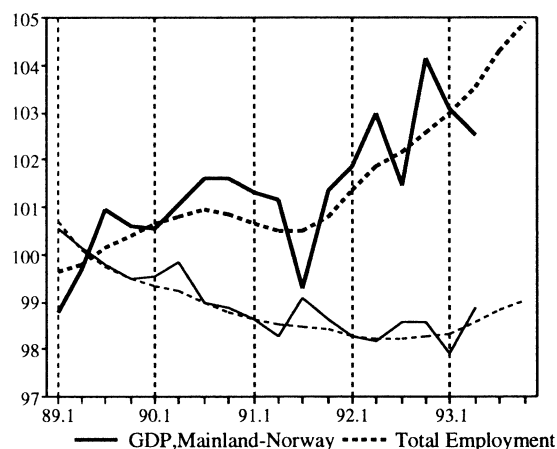
3 MONTH EURO RATES AND AVERAGE LENDING RATES IN PRIVATE FINANCIAL INSTITUTIONS

—— Germany, ····· Norway, — — Lending rate
3 month   3 month
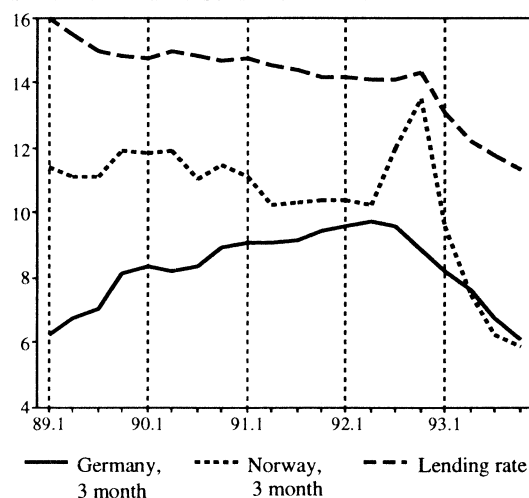
Source: Bank of Norway and Statistics Norway.

CURRENT BALANCE AND FOREIGN DEBT
Per cent of GDP

▨ Net foreign debt —— Current balance
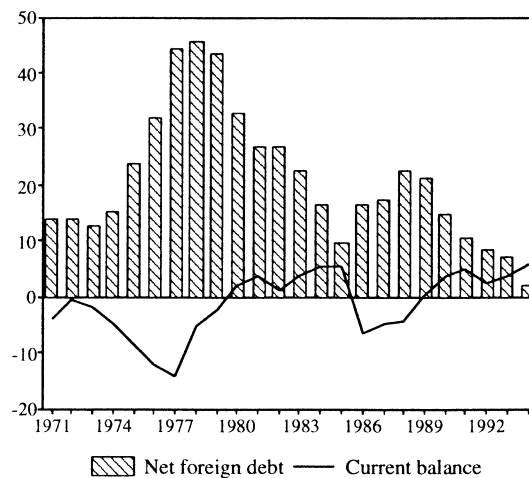
Source: Statistics Norway.

index apart from food articles rose 3.2 per cent in this period after rising by an average of 2.5 per cent in 1992. This rise in the inflation rate is probably ascribable to the increase in value-added tax and stronger growth in import prices as a result of the depreciation of the krone. However, the decline in the interest rate level means that housing rentals are now increasing more slowly than the consumer price index apart from food articles.

Against the background of an expected growth of about 1 per cent in labour costs in 1993 and a further fall in interest rates, there is no reason to expect any clear-cut tendency of increasing price growth over the rest of the year. Hence the average growth in the consumer price index in 1993 appears set to fall towards the 1992 level of 2.3 per cent.

Stable currency and marked interest rate fall

As a result of its release from the ECU in december 1992, the Norwegian krone immediately deprecia-ted by 6 per cent. Up to the end of January, however, the krone recovered by almost 2.5 percentage points, and thereafter the exchange rate remained relatively stable at a level corresponding to just under NOK 8.25 per ECU up to the turn of the month July/August. In the aftermath of the latest crisis in the ERM, the krone weakened by about 0.5 per cent against the ECU.

Fluctuations in the values of other currencies, principally the dollar and the mark, resulted in an effective appreciation of 1.3 per cent in the value of the krone in 1992. Given an unchanged effective exchange rate against the ECU for the rest of the year, an effective depreciation of about 3 per cent is likely from 1992 to 1993.

In the period January - August of this year Norges Bank purchased foreign currency for a good NOK 51 billion in the market. Even so, money market rates have been lowered more rapidly than rates in the ECU area, and are now on a level with German rates. Since the new year the three-month

interbank rate (NIDR) has fallen almost 5 percent-age points to a level of 6.6 per cent at the beginning of September. At the same time the effective yield on government bonds with 5 years' residual matu-rity had fallen to 5.8 per cent, only 0.1 percentage point over the corresponding German rate. Banks' deposit and lending rates fell by 1 percentage point between the end of the fourth quarter of last year and the end of the first quarter of this year, and the decline continued in the second quarter. A continu-ed decline in the interest rate level in Europe may bring the Norwegian interbank rate down to a level below 6 per cent towards the end of 1993. This will contribute to a further decline in interest rates in private financial institutions, and the average len-ding rate could fall by about 1 1/2 percentage points from 1992 to 1993.

Large current account surplus again in 1993

Preliminary estimates show a surplus of more than NOK 14.7 billion on the current account of the balance of payments in the first quarter of this year, i.e. an increase of NOK 10.5 billion from the same period of last year. The surplus on the trade balance increased by NOK 7 billion in this period to a level of NOK 32.5 billion.

The deficit on the interest and transfers balance is for the time being estimated at NOK 17.8 billion for the first half of this year. The improvement of just over NOK 3.5 billion from the same period of last year is mainly due to a fall in dividend payments by oil companies to foreign shareholders, although a reduction in net interest payments also contribu-ted.

Weak imports, continued clear growth in the value of oil exports and further improvement in the account of net interest and transfers will set the stage for an increase in the current account surplus to about NOK 27 billion in 1993, i.e. an increase of NOK 9 billion over 1992.

NORWAY: TRENDS IN SELECTED MACROECONOMIC VARIABLES
Percentage volume changes in 1991 prices[1]

	Billion 1991-NOK	Growth from the same period previous year					Growth from previous quarter, seasonally adjusted			
	1992	1992	92.3	92.4	93.1	93.2	92.3	92.4	93.1	93.2
Private consumption	355.9	1.8	0.9	1.9	0.5	-0.3	-1.0	1.1	-1.2	0.9
Goods	218.8	1.4	0.1	2.4	-0.3	-0.8	-0.7	1.8	-2.5	0.9
Services	125.7	1.6	2.0	1.0	1.3	0.8	0.6	-1.2	0.4	1.0
Norwegian consumption abroad	23.9	9.2	9.0	0.8	3.1	2.0	0.3	-0.4	2.6	-0.3
-Non-residents' consumption	12.5	6.9	13.7	-0.2	-3.2	7.9	23.8	-13.4	-0.5	0.8
Government consumption	154.2	4.6	3.1	5.3	2.6	-0.8	0.7	0.2	1.2	-2.7
Central government	61.5	5.3	3.5	8.0	3.1	-5.5	1.9	-1.8	1.5	-6.8
Civilian	38.9	7.6	1.5	9,7	5.5	0.6	-2.6	0.1	7.8	-4.2
Military	22.6	1.6	7.4	6.1	-2.9	-16.8	10.1	-4.8	-9.1	-12.0
Local government	92.7	4.1	2.8	3.2	2.3	2.4	-0.0	1.5	1.1	-0.1
Gross fixed capital formation	131.5	3.5	-6.0	-3.2	8.0	-11.2	-20.3	0.4	27.2	-7.0
Oil and shipping	41.1	10.1	-19.8	-31.7	80.2	-18.8	-45.6	-22.8	176.7	-23.1
Mainland Norway	90.4	0.8	-0.8	7.0	-3.4	-2.3	-2.4	9.5	-14.3	7.5
Manufacturing and mining	13.5	-0.4	5.3	16.6	-1.7	13.5	10.2	7.8	-13.4	12.8
Production of other goods	12.0	0.9	5.6	-6.4	-8.2	-5.7	7.2	-10.3	-4.9	3.1
Other services	64.9	1.0	-3.4	7.6	-2.9	-4.6	-6.6	14.0	-16.1	7.2
Stocks (contribution to GDP growth)[4]	-6.3	-1.2	2.5	-1.1	1.8	-1.0	2.7	-0.8	-4.4	-0.4
Ships and oil platforms in progress (contribution to GDP growth)[4]	3.2	-1.0	2.0	0.0	1.7	1.2	3.0	-0.5	0.5	-3.3
Other stocks (contribution to GDP growth)[3][4]	-9.4	-0.2	0.5	-1.1	0.1	-2.2	-0.5	-0.9	2.1	-3.0
Final domestic use of goods and services	635.4	1.5	2.8	0.5	4.1	-4.7	-2.2	-0.1	-0.0	-2.4
-gross capital formation in oil and shipping (incl. stocks)[2]	44.3	-6.4	19.2	-21.4	83.9	-15.8	-12.8	-21.5	122.1	-43.2
-demand from mainland Norway	600.5	2.3	1.2	3.6	0.5	-0.7	-0.7	2.1	-2.7	0.8
Exports	326.4	6.1	4.5	5.5	-6.5	2.8	0.3	2.5	-4.2	4.3
Traditional goods	117.1	4.1	-6.4	5.9	-3.8	3.1	1.7	-0.7	-2.4	4.8
Crude oil and natural gas	107.2	10.8	15.9	7.6	-1.0	7.6	0.5	1.8	-3.4	8.6
Ships and oil platforms	14.9	4.8	-50.8	0.4	-52.1	-0.0	-25.6	78.4	-29.6	7.0
Services	87.3	3.8	1.7	3.3	-5.1	-3.4	1.7	0.1	-2.9	-2.1
Total use of goods and services	961.8	3.0	3.4	2.1	0.3	-2.2	-1.4	0.8	-1.4	-0.2
Imports	252.5	2.2	3.8	-3.4	-0.2	-8.3	-5.2	-1.2	-1.4	-0.5
Traditional goods	156.9	4.2	11.0	0.6	-3.4	-1.4	6.2	-4.6	-3.2	0.8
Crude oil	1.0	-32.7	71.3	-47.3	64.7	-44.3	-18.2	-32.1	54.7	-35.1
Ships and oil platforms	10.8	-40.6	-45.9	-52.2	72.6	-57.0	-59.8	38.0	3.5	-25.2
Services	83.7	9.0	-0.1	3.0	-0.4	-9.4	-13.0	2.5	0.9	1.0
Gross domestic product (GDP)	709.3	3.3	3.2	4.1	0.5	0.1	0.1	1.5	-1.4	-0.1
-Mainland Norway	574.8	2.0	0.9	3.2	1.0	-0.4	-1.5	2.6	-1.0	-0.6
Oil activities and shipping	134.5	9.4	14.5	8.0	-1.2	2.2	6.9	-3.3	-3.3	2.1
Mainland industry	531.0	1.7	0.7	3.0	0.8	-0.4	-1.7	2.6	-0.4	-0.7
Manufacturing and mining	96.0	1.8	2.6	1.2	0.1	0.6	-0.3	-0.9	1.6	0.4
Production of other goods	72.1	1.4	-4.0	10.1	0.6	-3.6	-3.0	6.8	-6.1	-0.2
Other services	362.8	1.7	1.4	2.0	1.0	-0.1	-1.9	2.7	0.2	-1.1
Correction items (contribution to GDP growth)[4][5]	43.9	0.3	0.2	0.4	0.2	-0.0	0.1	0.2	-0.5	0.1

1) Notes, see "Technical comments".

NORWAY: PRICE INDICES FOR SELECTED MACROECONOMIC VARIABLES

	Percentage change from the same period the previous year					Growth from previous quarter, seasonally adjusted. Per cent			
	1992	92.3	92.4	93.1	93.2	92.3	92.4	93.1	93.2
Private consumption	2.6	2.6	2.4	2.6	2.4	0.7	0.6	0.6	0.5
Government consumption	2.0	1.8	1.3	0.3	1.2	0.1	0.2	-0.1	1.0
Gross fixed capital formation	2.1	1.1	2.5	1.9	1.3	-0.5	1.8	-0.1	0.2
-Mainland Norway	0.6	0.2	0.5	-0.9	0.9	-0.2	0.5	-1.2	1.9
Final domestic use of goods and services	2.4	2.0	2.2	1.8	2.0	-0.8	-0.2	2.5	0.6
-Demand from mainland Norway	2.1	2.1	1.8	1.5	1.9	0.4	0.5	0.2	0.8
Exports	-7.2	-8.8	-4.1	5.1	3.4	-1.5	2.8	2.7	-0.7
-Traditional merchandise exports	-6.7	-7.2	-4.2	0.8	0.3	-0.6	-0.8	1.7	0.0
Total use of goods and services	-0.9	-1.6	0.1	3.1	2.3	-1.0	0.7	2.6	0.0
Imports	-0.3	-2.3	-0.7	2.0	1.2	-1.3	1.4	2.2	-1.2
-Traditional merchandise imports	-1.9	-4.6	-3.0	-1.1	-0.8	-2.2	0.5	1.5	-0.8
Gross domestic product (GDP)	-1.1	-1.4	0.4	3.5	2.7	-0.9	0.4	2.8	0.4
-Mainland Norway	1.6	2.3	2.1	1.7	2.2	0.7	-0.1	0.7	0.9

TECHNICAL COMMENTS ON THE QUARTERLY ACCOUNTS FIGURES

Footnotes: 2) Including ships, oil platforms and platform modules in progress. 3) Excluding ships, oil platforms and platform modules in progress. 4) Contributions to GDP growth are calculated as the difference between corresponding figures calculated as a percentage of GDP. 5) Corrected for free bank services and certain excises.

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 quarterly national accounts figures for the years up to and including 1991 have been reconciled against the most recently published annual accounts figures.

Gross fixed capital formation: Total gross fixed capital formation is heavily influenced by significant fluctuations in investment in oil activities. These fluctuations are inter alia due to the fact that platforms that have been under construction for several years are counted as investment in the quarter and with the capital value they have at the time they are towed out to the field.

Seasonally-adjusted figures: The original quarterly national accounts are not seasonally adjusted, as these accounts are attempts to register the actual transactions that have taken place in each quarter. Many of the statistical series thus show clear seasonal variations. These are therefore seasonally adjusted on the detailed accounts level and then added together with the other statistical series to obtain the figures presented in the tables and charts of this volume.

Underlying trend: The Norwegian economy is so small that random or single important occurrences can give wide variations in the figures. The seasonally adjusted figures are therefore smoothed so that it is possible to calculate the underlying trend for each series. Smoothing is an attempt to distinguish between random and systematic variations in the series.

NORWAY: REVISIONS OF UNDERLYING TREND
Percentage growth from previous quarter. Seasonally adjusted and smoothed. Annual rates

Publ.		89.3	89.4	90.1	90.2	90.3	90.4	91.1	91.2	91.3	91.4	92.1	92.2	92.3	92.4	93.1	93.2
							GDP mainland Norway										
June	-90	1	0	-2													
Sept.	-90	1	1	1	3												
Dec.	-90	1	1	2	3	3											
Feb.	-91	2	1	1	2	2	2										
June	-91	1	1	1	1	1	0	-1									
Sept.	-91	1	1	1	1	1	0	0	-1								
Dec.	-91	1	1	1	1	1	0	0	-1	-1							
Feb.	-92	1	1	1	1	1	0	0	0	0	1						
June	-92	2	2	2	2	1	1	0	-1	-1	0	1					
Sept.	-92	2	2	2	2	1	0	0	-1	-1	0	2	3				
Dec.	-92	2	2	2	2	1	0	0	-1	0	0	1	1	0			
Feb.	-93	2	2	2	2	1	0	0	-1	0	1	2	2	1	-1		
June	-93	2	2	2	1	1	0	-1	-1	-1	1	2	2	2	2	0	
Sept.	-93	2	2	2	1	1	0	-1	-1	-1	1	2	2	2	2	0	-1
							Final demand from mainland Norway										
June	-90	-1	-1	-1													
Sept.	-90	0	1	2	3												
Dec.	-90	-1	0	1	2	2											
Feb.	-91	0	1	1	2	2	2										
June	-91	-1	0	1	1	0	0	-2									
Sept.	-91	-1	0	1	1	0	-1	-2	-3								
Dec.	-91	-1	0	1	1	0	-1	-2	-2	0							
Feb.	-92	-1	0	1	1	0	-1	-1	0	3	4						
June	-92	-1	0	1	1	1	0	0	0	2	2	2					
Sept.	-92	-1	0	1	1	1	0	0	0	1	2	2	3				
Dec.	-92	-1	0	1	1	1	0	0	0	1	2	2	2	1			
Feb.	-93	-1	0	1	1	1	0	0	0	1	2	2	2	1	0		
June	-93	-1	0	1	1	1	0	-1	-1	1	2	2	3	2	1	-1	
Sept.	-93	-1	0	1	1	1	0	-1	-1	1	2	2	2	2	1	-1	-1

COMMENTS ON THE REVISIONS

Revisions can either be due to new/revised quarterly figures for the current year, new/revised annual national accounts figures for previous years, or a change to a new base year. Because the growth rates calculated as annual rates are rounded off to the nearest whole per cent, a 1 percentage point change in the growth rate can be due to different rounding.

Published:	Price basis:	New annual accounts:	Other comments:
Dec. -89	1987		Revised seasonal adjustment programme
Feb. -90	"		
June -90	1988	1987-88	
Sept. -90	"		
Dec. -90	"		
Feb. -91	"		
June -91	1989	1988-89	
Sept. -91	"		
Dec. -91	"		
Feb. -92	"		
June -92	1990	1989-90	
Sept. -92	"		
Dec. -92	"		
Feb. -93	"		
June -93	1991	1990-91	
Sep. .93	"		

Outlook for 1993 and 1994

Estimates of the macroeconomic development in Norway for 1993 and 1994 have been made using Statistics Norway's quarterly model, KVARTS. The estimates for this year and next year are well in line with the projections presented in the June issue of Economic Trends. It now appears that rapid growth in oil sector investments in 1993 will be replaced by a decline in 1994. Demand in the mainland economy will expand at a moderate pace in 1993, but growth will pick up in 1994. Impetus to growth from the foreign sector will also be stronger next year. Even so, unemployment in the period will remain at about the same level as in 1992. Moderate wage growth, the reduction of employers' contributions as from 1 January 1993 and a marked fall in interest rates mean that the rise in consumer prices in 1993 will not be much higher than in 1992, despite increased value-added tax and somewhat stronger growth in import prices. For 1994 our calculations indicate that price inflation will be reduced to about 2 per cent.

Exchange and interest rates

The forecasts are based on a stable exchange rate against the ECU from September this year to end-1994. A continued decline in German interest rates in Europe in the second half of 1993 and the first half of next year is expected to lead to a moderate strengthening of the dollar against the ECU. This will cause a fall in the effective exchange rate of the krone of around 3-3.5 per cent from 1992 to 1993.

We assume that the change in the European exchange rate system will open the way for a somewhat stronger interest rate decline in Europe in 1994 than previously expected. Money market rates may fall below 6 per cent towards the end of this year and below 5 per cent next year. In keeping with this trend, financial institutions' lending and deposit rates will continue to fall. The decline could be about 2 percentage points both in 1993 and 1994.

## Upswing in international market growth in 1994

Estimates of economic activity in several of Norway's main trading partners have been revised downwards lately. In line with this we base our calculations on the assumption that market expansion for Norwegian exports will be very weak in 1993, about 1 per cent, but that it will pick up in 1994.

The price of crude oil is assumed to fall from an average of USD 19 1/2 p.b. in 1992 to USD 17 3/4 in 1993. A slight increase in oil prices is expected in 1994 bringing the average for next year to USD 18 1/4 p.b. Given our exchange rate assumptions this entails an estimated oil price of NOK 126 p.b. in 1993, rising to NOK 137 p.b. in 1994. International prices are expected to rise fairly slowly in 1993, but to quicken somewhat later in 1994 as business cycles improve. Prices of aluminium and other metals are assumed to remain low in 1993 and to accelerate markedly in 1994.

CONSUMPTION AND INVESTMENT
1989=100. Seasonally adjusted and smoothed

Private consumption ----- Gross investment mainland Norway
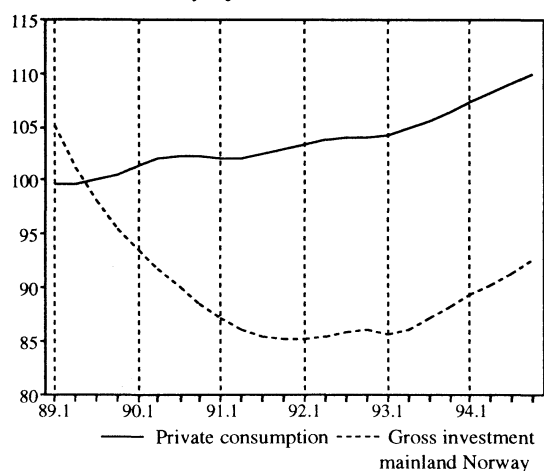
EXPORTS AND IMPORTS OF TRADITIONAL
MERCHANDISE. 1989=100. Seasonally adjusted and smoothed

Exports ----- Imports
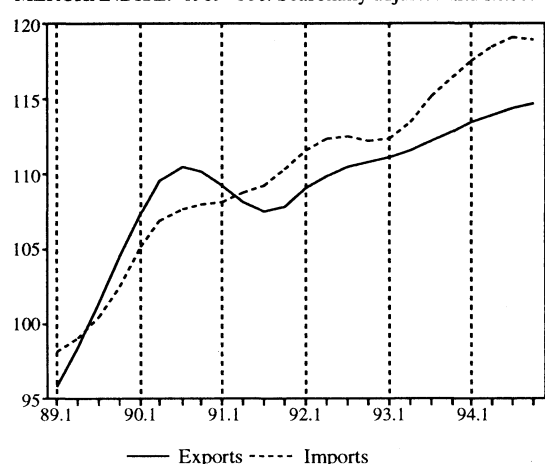
According to our assumptions growth in prices of traditional imports will pick up from -1.9 per cent in 1992 to 0.9 per cent in 1993 and to 3.2 per cent in 1994. The turnaround in import prices is largely related to the exchange rate trend. A marked rise in metal prices will also contribute to rising import prices in 1994.

Oil sector

Accrued oil investment is expected to increase by about 20 per cent from 1992 to 1993. Several major investment projects will be completed in 1994. We therefore assume a fall of about 7 per cent in oil investment next year. Production of oil and gas is expected to increase by 6 per cent in 1993 and 7 per cent in 1994.

Economic policy

Our calculations for government expences are based on the Revised National Budget for 1993. In 1994 we have assumed 2 per cent growth in public consumption, approximately unchanged real tax rates and a somewhat lower increase in real indirect taxes than in preceding years. Gross central govern-

MAIN ECONOMIC INDICATORS
Percentage change in volume from previous year unless otherwise noted

	1992 Accounts	1993 SN[1]	1993 NB[2]	1993 MoF[3]	1994 SN[1]	1994 NB[2]
Private consumption	1.8	1.2	1.5	1.3	3.2	1.7
Public consumption	4.6	2.0	2.3	2.3	2.1	1.4
Gross fixed captial formation[4]	3.5	20.0	-	-	-12.7	-
- mainland Norway	0.8	-0.7	1.5	-1.6	5.3	2.3
Exports	6.1	0.5	0.2	-1.4	5.1	4.3
- crude oil and natural gas	10.8	6.4	2.0	2.0	7.4	4.3
- traditional goods	4.1	0.5	1.0	1.0	2.1	4.0
Imports	2.2	1.8	3.3	1.7	5.7	2.9
- traditional goods	4.2	0.8	3.1	1.0	4.0	3.5
Gross Domestic Product (GDP)	3.3	2.0	1.2	0.8	3.2	2.3
- mainland Norway	2.0	1.6	1.7	1.3	2.2	2.2
Man-hours worked, employees	0.5	0.0	0.4	0.1	1.0	0.7
Unemployment rate (level)	5.9	6.1	51/2-61/2	-	6.0	51/2-61/2
Rise in wages per man-hour	2.9	2.8	-	21/4	2.9	-
Consumer Price Index	2.3	2.3	2.8	2.5	2.0	2.5
Short term interest rate (level)	11.8	7.1	-	-	4.8	-
Average borrowing rate (level)[5]	13.5	12.0	-	-	10.0	-
Import prices, traditional goods	-1.9	0.9	-	2.5	3.2	2.0
Export prices, traditional goods	-6.7	1.5	1.0	1.0	7.6	2.0
Current balance (level, bill.NOK)	17.8	26.8	20.0	15.9	46.4	30.2
Memorandum items:						
Demand from mainland Norway[6]	2.3	1.1	1.7	1.2	3.2	1.7
Accrued investments in the oil sector	8.6	20.5	14.0	16	-7.0	0.0
Crude oil price, NOK (level)	121	126	133	128	137	136

1) Statistics Norway.
2) NB: Forecast according to Bank of Norway, June 1993.
3) MoF: Forecast according to Ministry of Finance, National Budget Proposal 1993.
4) Includes oil platforms. In the National Account these are measured as "investments" at the time they are installed offshore. As a consequence, the growth rates may show significant fluctuations.
5) Average rate on household debt in private financial institutions.
6) Private consumption + Public consumption + Gross fixed capital formation in mainland Norway.

ment investment is estimated to fall by 11 per cent in 1993, so that total public investment will decrease compared with 1992. For 1994 an increase of about 2 per cent is assumed in public investment.

Small changes in wage and price growth

Our calculations show a 2.3 per cent rise in consumer prices from 1992 to 1993. The reduction of employers' contributions and the re-introduction of consumer subsidies on some agricultural products serve to pull down price growth. Strong competition in consumer goods markets has probably prevented the increase in value-added tax and the depreciation of the Norwegian krone from being fully passed on to the domestic consumer.

The rate of increase of consumer prices next year is put at 2 per cent. A continued fall in the interest rate level, which is expected to affect housing rentals, as well as moderate increases in indirect taxes, are factors behind the low estimate for price inflation next year.

According to our calculations the reduction of employers' contributions will contribute to increased hourly wage rates. Even so, with slowing domestic price growth, weak productivity growth and continued high unemployment, growth in hourly wage rates will remain approximately unchanged from 1992 to 1994.

Moderate rise in mainland demand

Output growth and falling interest rates lead to an upswing in investment in mainland Norway in 1993, and according to our calculations the positive trend will continue in 1994. Manufacturing investment is expected to rise by about 6 per cent in 1993,

increasing to 11 per cent in 1994. Investment in private services appears set to increase both this year and next. According to our calculations housing investment will bottom out early next year, showing weak growth from 1993 to 1994. The turnaround in housing investment is related to the fall in real interest rates and several years of household income growth.

Influenced by the fall in real interest rates, house prices will pick up this year and rise further in 1994. This will contribute to growth in households' real assets. The growth in household real disposable income and the increase in assets will edge down in the forecasting period. As a result of the fall in the interest rate level and the increase in assets, the rate of growth of private consumption will pick up from 1.2 per cent this year to 3.2 per cent in 1994. The household saving ratio will rise from 5 per cent in 1992 to 6 per cent in 1993 before falling to somewhat below 5 per cent in 1994.

Export growth in 1994

Because of weak expansion in Norway's export markets, the volume of traditional exports showed negligible change from 1992 to 1993. In 1994 we assume that general trading conditions will improve among our trading partners, and growth in the markets for Norwegian exports is estimated to pick up to about 4 per cent. According to our calculations, important sectors of traditional export industries will utilize the international upturn to raise export prices, while volume growth of traditional exports will be moderate. The growth of total exports of goods and services in volume terms will rise from 0.5 per cent in 1993 to 5.1 per cent in 1994. Much of the marked improvement in 1994 is ascribable to strong growth in exports of crude oil and natural gas and higher freight earnings.

GROSS DOMESTIC PRODUCT
1989=100. Seasonally adjusted and smoothed

Total   ----- Mainland-Norway

Moderate GDP expansion both in 1993 and 1994

Investment in the oil sector is a driving force behind output growth in mainland Norway in the current year. Output growth in industry catering for the off-shore sector is therefore very high in 1993, as in 1992. Export-oriented manufacturing is experiencing reduced output this year owing to slow market growth internationally, but production could also gather momentum next year in keeping with improved market prospects. The decline in oil sector investment next year will lead to zero growth in the aggregate gross product in manufacturing. Output from other industries is in general expected to expand at a slightly faster rate than in 1993, so that output growth in mainland sectors will pick up somewhat from 1993 to 1994. According to our
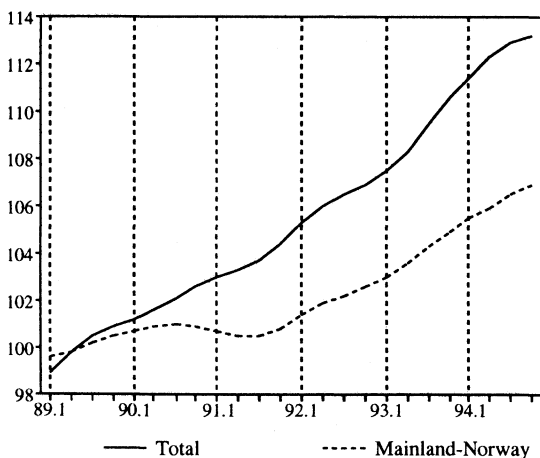
calculations GDP in the mainland economy as a whole will expand by 1.6 per cent in 1993 and 2.2 per cent next year. Oil and gas production and the activity in maritime trade are, however, assumed to expand sharply in 1994, resulting in a growth in total GDP of 3.2 per cent.

Rising balance of payments surplus

The current account surplus is estimated at NOK 27 billion in 1993, i.e. an increase of NOK 9 billion from 1992. The surplus on trade balance will increase in 1993 as a result of higher exports of crude oil and natural gas, while lower dividend payments by oil companies and reduced interest payments to foreign recipients will lead to a reduction of net interest and transfers. A new increase in oil and gas production is likely next year. Together with a drop in oil investment (part of which is imported) and an improvement in the terms of trade, this implies a substantial increase in the current account surplus. The assumption of an increase in the price of crude oil in Norwegian kroner will contribute to the improved terms of trade. In our calculations a change of USD 1 p.b. in the price of crude oil in 1994 will result in a change of NOK 6.5 billion in the current balance.

Small changes in unemployment in 1993 and 1994

Given continued moderate expansion of the Norwegian mainland economy, the situation in the labour market will not change substantially from 1992 to 1994. The unemployment rate will remain at about 6 per cent both in 1993 and 1994. It now appears that the decline in the workforce that has lasted since 1988 may have come to a halt and that the supply of labour will increase somewhat in the coming period. Our calculations indicate that the supply of labour will increase by about 10,000 persons in 1993, which however is lower than the underlying demographic factors alone suggest (15-20,000 persons). In 1994 the supply of labour will correspond more closely to the trend determined by the change in the age composition of the population.

Economic policy calendar, 1993

June

2. Norway beats England 2-0 at soccer.

8. UNI Storebrand sells its stake in Skandia, the Swedish insurance company. UNI Storebrand receives about NOK 100 per share, i.e. between NOK 1.7 and 1.8 billion for the entire holding, and has thereby lost more than NOK 2.5 billion on its original acquisition. UNI Storebrand's life insurance arm is left with a shareholding of about 3 per cent of Skandia.

9. Statoil decides to shelve the planned MTBE plant at Kårstø in Rogaland. MTBE is a petrol additive intended to replace lead, and production is based on methanol. According to the original plans Statoil was to deliver methanol to Kårstø from its new plant at Kjellbergodden outside Bergen. Investment costs were put at NOK 3 billion.

11. Norges Bank lowers the interest rate for deposits by private banks from 6.75 to 6.5 per cent.

14. The Storting adopts tax reliefs for persons domiciled in the northern counties of Finnmark and Nord-Troms. For persons earning average incomes, the relief is of the order of NOK 7-8000.

16. Hermod Skånland, head of Norges Bank, announces that he will retire at year-end.

18. Norges Bank lowers the interest rate for deposits by private banks from 6.5 to 6.25 per cent with effect from 21 June.

22. The Petroleum Commission proposes the removal of scrapped oil installations. A key element of the proposal is to leave seafloor pipelines in place.

23. The US Department of Trade retains punitive customs tariffs on steel imports from a number of countries. The tariff rates are raised from the levels set in the preliminary ruling issued in January this year (see 27 January).

23. Statoil takes over 240 BP filling stations in Sweden, thereby bringing its share of the Swedish petrol market to 26 per cent. Its share of the Norwegian market is 28 per cent.

25. Norges Bank lowers the deposit rate payable by private banks from 6.25 to 6.0 per cent.

28. Eurokraft A/S, a combine of 21 Norwegian power stations, signs a contract to deliver 5 TWh of electric power to Germany. Half of this volume is in the form of firm power, the other half linked to power exchange.

July

1. The German Bundesbank lowers its discount rate from 7.25 to 6.75 per cent. Concurrently the signal rate on loans to private banks - the so-called Lombard rate - is lowered from 8.5 to 8.25 per cent.

2. The board of ABB National Transformer resolves to transfer 170 workplaces from Sarpsborg to their plant in Drammen.

6. Fundo A/S in Høyanger sign a contract with Volvo to deliver aluminium bumpers to a value of NOK 250 million.

7. The prefab housing manufacturer Block Watne A/S takes over Hetlandshus which recently went into liquidation. The takeover guarantees continued work for 30 of Hetlandhus' 90 employees.

7. The leaders of G7, comprising the world's seven largest industrial nations, agree in Tokyo to remove customs tariffs on beer, furniture, medical equipment, steel, farm implements and construction articles. The maximum tariff on textiles, glass and chemicals is reduced by 50 per cent.

7. The fishery enterprise Skaarfish A/S i Florø has the punitive customs tariff on its salmon exports to the US market reduced from 12-13 to 5 per cent. This comes after an administrative examination of a decision adopted by the US Department of Trade in April 1991 to impose punitive custom tariffs on Norwegian salmon.

14. The Troll partners Statoil, Hydro, Saga, Shell, Elf, Conoco and Total sign a contract with the German companies Ruhrgas, BED and Thyssengas on expanded gas deliveries from the Troll field totalling 3.5 billion cubic metres of gas per year. Agreement is also reached on a 10-15 per cent

higher price for gas delivered under the original agreement.

15. Norske Shell raises its estimate of recoverable oil reserves in the Draugen field by 200 million barrels, equivalent to a value of about NOK 25 billion at current oil prices.

16. The government decides on compulsory arbitration to resolve the conflict between the OFS (Federation of Offshore Workers' Trade Unions) and the OLF (Offshore Industry's National Association).

20. Det norske Møbelsenter files a petition for debt settlement proceedings. The company approaches Den norske Bank for credit for continued operation.

24. A reform of the rouble is adopted by the Russian central bank. All rouble coins and notes issued before 1993 are rendered invalid and taken out of circulation. The original decision implied an upper exchange limit of 35,000 roubles per person, with redemption during July of this year. After vigorous protests the redemption period is extended to end-August, and the quota enlarged to 100,000 roubles.

26. Norsk Hydro presents its accounts for the first half of 1993. The accounts show a pre-tax profit of NOK 3.9 billion. This figure includes the profit on the sale of Freia shares for NOK 2.4 billion.

27. Hambro's Bank and the administrators of Hilmar Reksten's estate reach an amicable settlement whereby the bank undertakes to pay NOK 80 million to Reksten's estate. In return the administrators agree to halt further investigation in search of Reksten's fortune.

29. The German Bundesbank lowers the Lombard rate from 8.25 to 7.75 per cent. The discount rate is kept unchanged at 6.75 per cent.

August

2. After vigorous speculation against vulnerable currencies the EC monetary committee decides to extend the swing margins in the ERM from 2.25 to +/- 15 per cent. This does not apply to the German mark and Dutch guilder which will remain linked to each other within the old swing margins.

2. Norges Bank lowers the interest rate on private banks' deposits from 6.0 to 5.5 per cent.

5. The government appoints Torstein Moland to succeed Hermod Skånland as head of Norges Bank. The new incumbent will take up duties in the central bank on 1 January 1994.

11. Handelsbanken A/S, part of Svenska Handelsbanken, is to take over Oslobanken. As from 1 September 15,000 customer deposits are transferred to Handelsbanken. Under the terms of the framework agreement, Handelsbanken will gradually also take over other parts of Oslobanken's business such as foreign payments, foreign exchange activity, and the healthy segment of the loan portfolio.

18. Icelandic trawlers move into and deploy trawl nets in the so-called "hide-out" or "loophole" in the Barents Sea, a sea area between the economic zones of Norway and Russia. The matter is taken up in talks between the Icelandic and Norwegian authorities which are broken off after a few days with no agreement reached.

18. Den norske Bank presents its operating result for the first half of 1993. It shows a post-loss profit NOK 218 million, i.e. an improvement of NOK 1.4 billion on the same period of 1992. Substantial securities gains are an important reason for the improved result, but other operating items also show larger profit than one year previously. Loan losses so far this year have stood at the same level as in the first half of last year, but losses fell from the first to the second quarter of this year.

22. The government announces that it will entirely remove the electricity tax for manufacturing and mining enterprises with effect from the turn of the year 1993/1994. The measure is estimated to entail a saving of NOK 250 million for business and industry. The tax relief will be recovered by means of increased electricity prices for other consumer categories.

27. Pilots employed by Bråthen Safe A/S put down their work. The airline responds by laying off 1000 staff. Negotiations are resumed two days later following informal contacts between the parties.

Effects of an EC carbon/energy tax in a distorted energy market

Simulations with a multi-sector energy demand model

by

Hugo Birkelund, Eystein Gjelsvik and Morten Aaserud

We analyse the impacts of a carbon/energy tax as proposed by the European Community (EC) on the Western European energy markets. Simulations on a Sectoral European Energy Model (SEEM) show that inter fuel substitution is hampered by distortion of fuel prices caused by taxation already in place and by regulation of electricity production. We therefore study the effect of introducing more cost-based investment behaviour in the thermal power production sector. The impact on the CO_2 emission level by increased substitution of gas for coal is significant. Furthermore, such investment behaviour enhances the potential effect of a carbon tax and postpones the date when a carbon tax has to be increased in order to meet the stabilization target, i.e. the 1990 level, until after the turn of the century. Finally, a deregulation of the thermal power production could increase the Norwegian natural gas export, both without and with a EC carbon/energy tax.

Introduction

The European Community (EC) considers a plan to stabilize CO_2 emissions from its territory by year 2000 on the basis of the 1990 level. A significant part of the package consists of a carbon/energy tax to be implemented from 1993[1] on. We study the tax impact using a Sectoral European Energy Model (SEEM), developed by Statistics Norway. SEEM focus on the demand side of the energy markets in nine West European countries.

The national energy markets in Western Europe are distorted in several ways. Such distortions, like energy taxes already in place and regulations by national authorities, influence the fuel use pattern and thus both the need for a carbon/energy tax and the way the tax works. Especially, the need for and effect of a carbon/energy tax is likely to be very sensitive to distortions in thermal power production, which had a 30 per cent share of carbon emissions within the model region in 1988. For this reason we consider two *regimes*, representing different modelling of the thermal power production sector. In the *plan-based regime*, the electricity generating sector is supposed to invest in new capacity according to national plans as reported to

International Energy Agency (IEA) (1991). In the *cost-based regime*, the sector is assumed to behave in a cost minimizing way, thus representing a less distorted situation. For both regimes we study the impact of the EC tax. All together we will therefore consider four scenarios;

i)   A reference scenario under the plan-based regime without the EC tax (scenario 1).
ii) An alternative scenario with the EC tax, but still in the plan-based regime (scenario 1t).
iii) A scenario under the cost-based regime without the EC tax (scenario 2).
iv) A scenario under the cost-based regime with the EC tax (scenario 2t).

The base year for the calculations is 1988, and the horizon is the year 2010.

The model

This presentation of the model is restricted to a brief outline. An elaborated documentation is given in Birkelund et al (1993). The model comprises nine West European countries, including the four major energy consumers Germany (west)[2]. France, Italy

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1   Although the approval and implementation of the EC plan already is behind schedule, we have stuck to the original EC proposal by implementing the EC tax from 1993 in our simulations.

2   We wanted ro rely on knowledge of the markets, and have excluded the eastern part of Germany, as our model cannot easily describe an economy in transition.

Figure 1. Model structure
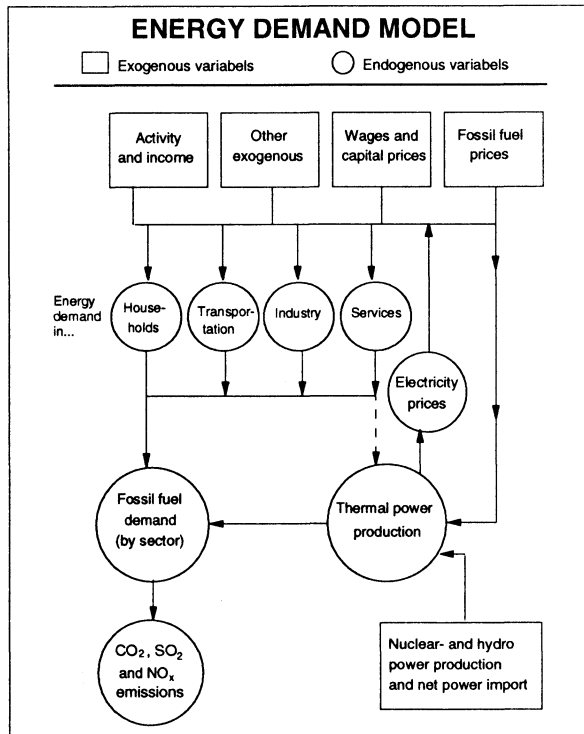
and UK, the Netherlands as a major gas country, and the four major Nordic countries Sweden, Denmark, Finland and Norway. These countries consumed about 80 per cent of total energy used in OECD Europe in 1989.

Each country is treated as a separate block, with five energy end use sectors: manufacturing industries and service industries (in the following Industry and Services), Households, Transportation and Other (agriculture, fisheries etc.) as well as the Electricity generation sector.

Figure 1 depicts the structure of each country model block. In a first step the model determines the demand for solids, oil, natural gas and electricity in the end user sectors from exogenous information on activity levels, income and fuel[3] prices as well as capital and labour costs. The electricity generation sector then derives the need for domestic production of thermal power, given a set of plans for electricity production from renewable and nuclear sources and net power import. Based on the costs of thermal power, the model calculates electricity prices in all sectors. The model is thus simultaneous in the electricity market, where the equilibrium set of prices is defined when supply equals demand for electricity. Adding the use of fossil fuels in the end

user sectors to fossil fuel inputs in thermal power production, total demand for each fossil fuel is derived by country. In a sub model demand for solid fuels, oil and natural gas are converted into estimates of CO_2 emissions.

The industry, transport and services sectors models are mainly based on the "fuel share approach" where fuel shares of energy demand are supposed to be functions of relative fuel prices. Household fuel demand is modelled by Discrete Continuous Choice. In the discrete part of the model the choice of fuel used for space heating in dwellings depends on relative fuel prices, while the continuous part determines the level of fuel demand, given the system choice. In all sector models parameters are calibrated, based on results from the literature and previous estimates from Statistics Norway.

In the *plan-based* thermal power production model, the fuel shares in power production are specified as Cobb Douglas functions with marginal fuel costs as arguments. Parameters are calibrated such that, given the relative fuel price path and electricity demand, national plans (IEA (1991)) for fuel use in thermal power production are ensured in the reference scenario.[4]

The plan efficiency assumption reflects the regulated nature of the power production sector in the European countries. National governments, in coherence with dominating and protected utilities, make plans for investment and production. The reference path thus reflects the priorities of national energy policies as of 1991[5]. These priorities may mirror security of supply (an IEA favourite), protection of national industries (such as coal in Germany and nuclear in France), conflicting industry interests as well as cost considerations. The cost of these policies are covered by electricity consumers by a markup mechanism. This reflects the most common pricing policy by electricity producing utilities.

It may seem inconsistent to assume that the producers of thermal power may react as optimizing economic agents when carbon taxes are introduced while they in the reference case (scenario 1) fulfil government production plans. However, carbon taxes certainly increase thermal power production costs. Also under a planning regime such costs will be passed on to the consumers through higher electricity prices. Thus, less electricity will be consumed and less fossil fuel input will be used in the power production. This scale effect is reflected in

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3   The electricity prices are however, as discussed below, endogenous in the model.

4   In general, the electricity demand forecasts made by the individual governments are not equal to the reference scenario. Because of this the reference path diverges from the official plans reported in *Energy Policies And Programs of IEA Countries (1991).*

5   The plans from IEA (1991) deviate substantially from the earlier ones (IEA (1988)), mainly by a giant switch from coal to natural gas.

Figure 2. Marginal coal share in thermal power production
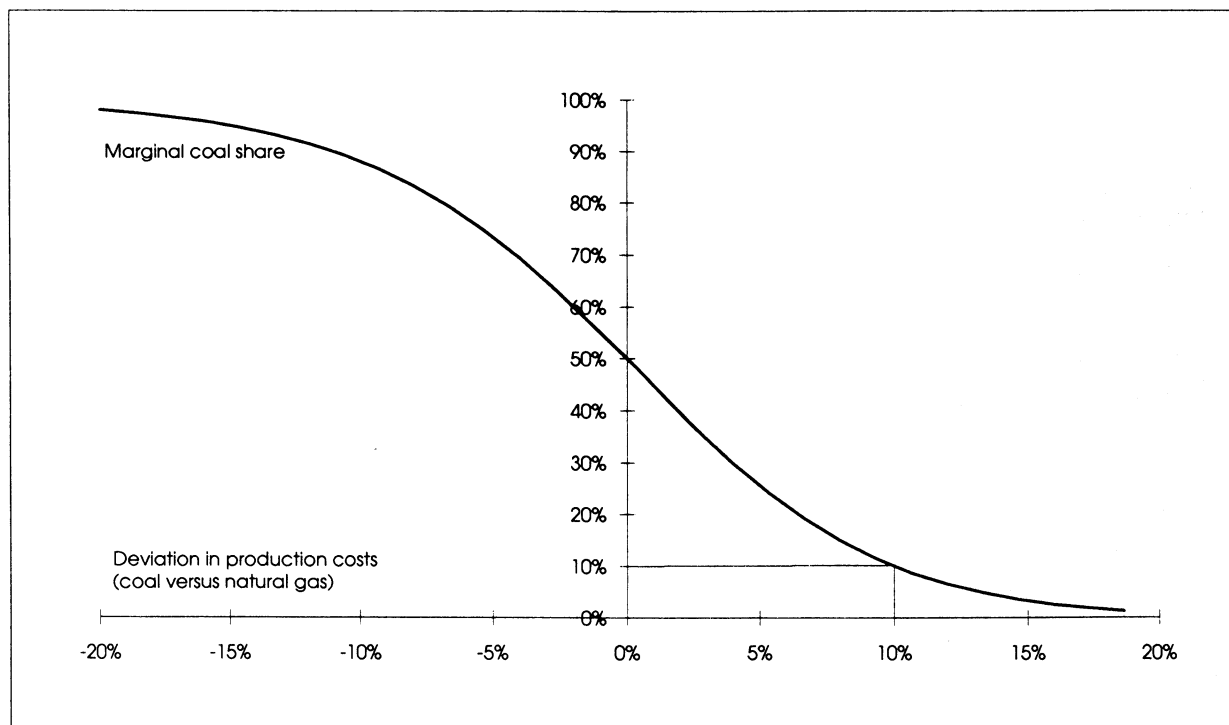
our model. Also, since cost considerations are part of a planning process, the cost of taxes will be reflected in the fuel shares.

In the *cost-based* model we focuse on the substitution of gas for coal, while the oil shares are set equal to those of the plan-based model. Also, the fuel shares for coal and gas are functions of long term marginal costs in this model. From published data in a number of papers on the generation technology (see for example IEA(1992) and ELKRAFT/ELSAM (1990)), reliable estimates on capital and operating costs for gas combined cycle and coal fired plants can be derived.

For a given price path of coal, the break-even price of gas in thermal power production is assumed to be a function of the capital and operating costs. Capital costs are functions of lifetimes, investment costs, load factors and discount rates. To avoid any bias in favour of gas, we have chosen high estimates of capital costs for gas compared to those of coal (compared to the average estimates in the surveyed papers).

The fuel shares for coal and gas are specified as logit functions. The logit functions are calibrated to distribute the marginal fuel shares equally between coal and gas when the marginal cost of coal power equals that of gas. They are further designed to distribute less than 10% to a fuel when the marginal production cost is 10% higher than that of the other. An example of this is given in figure 2 where the marginal oil share is set to zero.

We admit that the calibration of the logit function is a matter of judgement. Even if there were agreement on the break even estimate, it would depend on country specific parameters, as capital costs depend on national cost levels. Besides, there is no such thing as a given expectation of the price of coal. These matters justify the use of a logit function, with some probability of chosing coal even if the coal price expectation is above break even, and vice versa. But they do not justify the uniform choice of the (10%, 10%) intersection. The model can easily be recalibrated to alternative choices.

Basic assumptions

A summary of the most important exogenous assumptions underlying all the scenarios is presented in table 1. The real GDP growth is expected to be moderate towards the middle of the 1990s and then rise somewhat.

The proposed EC tax is a tax based partly on an energy component and partly on a carbon component, where the energy component of the tax should not exceed 50 per cent. In the tax scenario, $3 per barrel tax is introduced in 1993 with an additional $1 per barrel in successive years until 2000. Therefore, both the tax per carbon unit and the tax per energy unit equals $5 (in 1993 prices) per barrel oil by the year 2000. After year 2000 the carbon/energy tax is constant. Note that the energy/carbon taxes are superimposed on the *existing* excise tax system.

Table 1. Exogenous variables

	Average annual growth (per cent)		
	1990-2000	2000-2010	Comments
Power production:			
Hydro power	2.25	0.61	Hydro power equals the sum of hydro and other (wind, solar) power
Nuclear power	0.82	0.71	The surge in hydro power before 2000 is thus due to growth in other power. Source: IEA and Statistics Norway
Technical progress in:			
Households and Industry	0.70 - 0.75	0.70 - 0.75	Technical progress is autonomous in all sectors.
Services and Transport	1.10 - 1.20	1.10 - 1.20	Source: Statistics Norway and ITE*
Real GDP growth	0.25 - 2.06	1.3 - 2.3	Growth rates in services and manufacturing are somewhat higher respectively lower than the GDP rate while private consumption keeps up with the GDP growth. Source: Statistics Norway and DRI (1990a, 1991)**
Capital costs	Constant in real terms		Source: Statistics Norway
Labour costs	Follows the real GDP growth rate		"
Import energy prices, CIF:			
Coal	0.18	1.69	Source: ETSAP (1991)***
Oil	2.14	1.84	"
Natural gas	2.14	1.84	"

* Institute of Transport Economics, Oslo, Norway
** Data Resources Institute, USA
*** Energy Technology System Analysis Program

A key characteristic of the tax proposition is revenue neutrality, meaning that the tax will be fully compensated by tax incentives or cuts in taxes or other public charges. Assuming strict revenue neutrality, the impact on GDP is estimated to be modest.[6] This justifies constant forecasts for goods and services production and income in all scenarios. Also for other exogenous variables including fuel import prices and other energy taxes we have assumed the same values in all scenarios.

Compared to the simulations under the plan-based regime there are no changes to any exogenous variable in the cost-based regime. The only difference between the two regimes is thus the investment behavior in the thermal power sector.

Results under the plan-based regime

Table 2 reports the simulated carbon dioxide emissions and fossil fuel use for the whole model region

in the plan-based regime without and with the EC carbon/energy tax (scenarios 1 and 1t). In the reference case (scenario 1) CO_2 emissions rise moderately from 1990 to 2000, reaching 2576 million metric tons. This is 10 per cent higher than the simulated 1990 level, i.e. 10 per cent above the EC target. After the turn of the century the emissions accelerate with an average annual growth rate of 2.3 per cent between year 2000 and 2010. The emission projections can be explained by studying the energy use in the plan-based reference path. As a consequence of weak economic growth before 1995, the main polluters solids and oil, grow moderately. Solids consumption, mainly coal used in the power production sector, also suffers from low planned investment in new coal fired power plants. In the second half of the 1990's economic growth is expected to recover, and solids and oil consumption grows somewhat faster in the period 2000-2010. Demand for natural gas increases by an annual rate

6 A number of studies have considered the impact of carbon taxes on GDP. The estimates for Europe seem to be in the range of 1-3 per cent loss depending on the speed of tax implementation, see DRI (1990b), NOU (1992), Agostini et al. (1992), Manne and Richels (1991) and Berniaux et al. (1991).

Table 2. CO_2 emissions and energy use in the SEEM area under the plan-based regime without and with a carbon/energy tax (scenario 1 and 1t)

	Scenario 1					Scenario 1t			
	Level			Annual growth (%)		Tax impact Difference between scenario 1-1t (%)		Deviation from 1990 level (%)	
	1990	2000	2010	1990-2000	2000-2010	2000	2010	2000	2010
CO_2 (Mill.tons)	2346	2576	2934	0.8	2.3	-9.4	-10.7	-0.5	11.7
Coal (Mtoe)	222	239	260	0.6	1.6	-14.9	-18.5	-8.5	-4.5
Oil (Mtoe)	359	366	412	0.2	1.4	-5.1	-5.6	-3.3	8.1
Natural gas (Mtoe)	173	233	287	2.5	5.2	-8.0	-8.0	23.9	52.8

of 2.5 and 5.2 per cent in the two decades, reflecting a trend towards increased investments in natural gas based power plants in the plans reported to IEA.

The introduction of the EC tax in 1993 (scenario 1t) implies that the CO_2 stabilization target is met by year 2000. But, if a long term stabilization is sought through tax measures, the tax has to rise also beyond year 2000. This simply reflects that the shadow price of the emission constraint increases over time as energy demand increases. The tax impact on demand for the different fuels varies. Compared to the reference scenario, the solid fuel demand is reduced by 15 per cent in year 2000, while the reduction in oil and natural gas demand is 5 respectively 8 per cent only. Since the tax (per energy unit) on oil is higher than that on natural gas, this result may seem surprising. However, an important component of oil demand stems from the activity of the transportation sector, where the relative impact on fuel prices, and thus the fuel use reductions, is quite small due to the high initial tax level on gasoline and autodiesel. Moreover, there are small interfuel substitution possibilities in transportation.

Results under the cost-based regime

Table 3 lists CO_2 emissions and fossil fuel use in the cost-based regime without and with the EC tax (scenarios 2 and 2t). The table also illustrates the effect of "deregulating" the thermal power production sector measured as the percentage shift between the two reference scenarios (scenarios 1 and 2).

The table suggests that an introduction of cost-based investment decisions in the thermal power sector reduces CO_2 emissions by 3.5 per cent by year 2000 and thus lowers the CO_2 reduction re-

quired to reach the EC stabilization target. The 3.5 per cent reduction is rather moderate considering the giant shift from coal to natural gas (a relatively cleaner fuel) in the electricity generating sector. This shift in fact results in a 22 per cent rise in total natural gas use at the expense of coal by year 2000. However, the difference between CO_2 emission factors of natural gas and coal is too low to cause major shifts in total CO_2 emissions.

Obviously, the change of regime has the largest impact on fuel use in the electricity generating sector. But another impact is lower *average* production cost in the thermal power sector. The savings are passed on to electricity consumers, causing substitution of electricity for fossil fuels in the end use sectors. The difference between the demand for thermal power in the two reference scenarios (scenarios 1 and 2) can be interpreted as a scale effect resulting from the change in investment policies. However, by 2010 the effect accumulates to only 2.8 per cent. The explanation for this small effect is that cost-based investments in new thermal power capacity only pays off as the discrepancy in capital stock in the power sector increase between the two regimes.

The simulation indicates that the "deregulation" of the thermal power production sector not only reduces the emission levels in the reference scenario, but also increases the long term effect of the EC carbon/energy tax. While impact of the EC tax on CO_2 emissions are almost the same by year 2000 under the two regimes though, the impact difference is 2.5 per cent points by year 2010. The effect of the EC tax on oil consumption are almost identical under the two regimes. As power production dominates the use of coal, improved cost incentives in this sector increase the tax effect on total coal consumption; from 14.9 per cent reduction in the

Table 3. CO_2 emissions and energy use in the SEEM area under the cost-based regime without and with the carbon/energy tax (scenario 2 and 2t)

	Scenario 2				Deregulation effect		Scenario 2t			
	Level		Annual growth. (%)		Difference between scenario 1-2 (%)		Tax impact Difference between scenario 2-2t (%)		Deviation from 1990 level. (%)	
	2000	2010	1990-2000	2000-2010	2000	2010	2000	2010	2000	2010
CO_2 (Mill.tons)	2486	2819	0.5	1.9	-3.5	-3.9	-9.7	-13.2	-4.3	4.3
Coal (Mtoe)	184	192	-0.6	-1.4	-22.9	-26.2	-20.5	-43.5	-34.1	-51.1
Oil (Mtoe)	366	412	0.2	1.4	0.2	0.2	-5.1	-5.7	-3.3	8.2
Natural gas (Mtoe)	285	349	4.2	7.3	22.2	21.6	-5.1	4.1	56.2	110.3

plan-based regime to 20.5 per cent reduction in the cost-based regime by year 2000. For natural gas consumption the impact by year 2000 is reduced to 5.1 compared to 8.0 per cent in the former regime. In year 2010 natural gas consumption will even benefit from the planned EC tax in the cost-based regime; it increases by 4.1 per cent.

We can shed more light on these results by looking more closely at the *thermal power production sector*. Figure 3 shows the fuel use in this sector in all four scenarios. Coal is by far the dominant fuel in electricity production at the start of the simulation. Coal consumption increases by 41 mtoe throughout the no tax scenario under the plan-based regime (scenario 1, left part of the figure) and holds its position as market leader by the end of the simulation period. But in scenario 2, under the cost effective regime, natural gas intersects coal consumption before the turn of the century and by 2010 the market shares are just about the opposite of those of the plan-based regime.

Under the *plan-based regime*, depicted in the left part of the figure, the tax induced substitution of natural gas for coal is not sufficient to outweigh the decreasing demand for thermal power. Thus, natural gas consumption, along with oil and coal, is reduced over the simulation period as a consequence of the tax. The impact of the tax in the *cost-based regime* is different. The scale effect of reduced electricity demand dominates the substitution effect up to the turn of the century. The implementation of the EC tax thus slightly reduces the use of natural gas in the thermal power production before year 2000, but increases it thereafter. Despite a smaller scale effect, the negative effect on coal is larger under the cost-based regime than under the plan-based regime.

There are mainly two reasons for this. First, recall that by assumption fuel substitution possibilities exist only in the new thermal power plants, which represent only a small fraction of the total capacity. Substitution in new power plants can therefore be relatively large without causing any significant short term substitution in the power system as a whole. The effects of changed marginal shares accumulates as old facilities are shut down and new plants using other fuels replaces them. This time consuming process implies that the substitution effect is relatively insignificant in the short term and it is dominated by the scale effect.

The second reason is that the price of natural gas rises faster than the price of coal in the cost-based no tax scenario (scenario 2), changing the coal/gas cost ratio in favour of coal after the turn of the century. This can be observed in the right part (solid lines) of figure 3 as the growth in natural gas consumption and fall in coal consumption is curbed after year 2000. The implementation of the EC tax however change the coal/gas cost ratio in favour of natural gas. Thus investments in natural gas power plants at the expense of coal fired plants become more attractive as a consequence of the carbon/energy tax. This substitution effect dominates the scale effect under the cost-based regime in the long run.

Finally, a summary of the simulated total carbon dioxide emissions for the whole model region under both regimes, with and without the EC tax, is presented in figure 4. The figure suggests that a combined policy, which include both a cost-based investment program in the power sector and introduction of a carbon/energy tax, may have substantial effect on the emissions (scenario 2t compared with 1).

Figure 3. Simulated effect of the EC tax on the fuel consumption in the thermal power sector. Both regimes. The dotted line show the tax paths
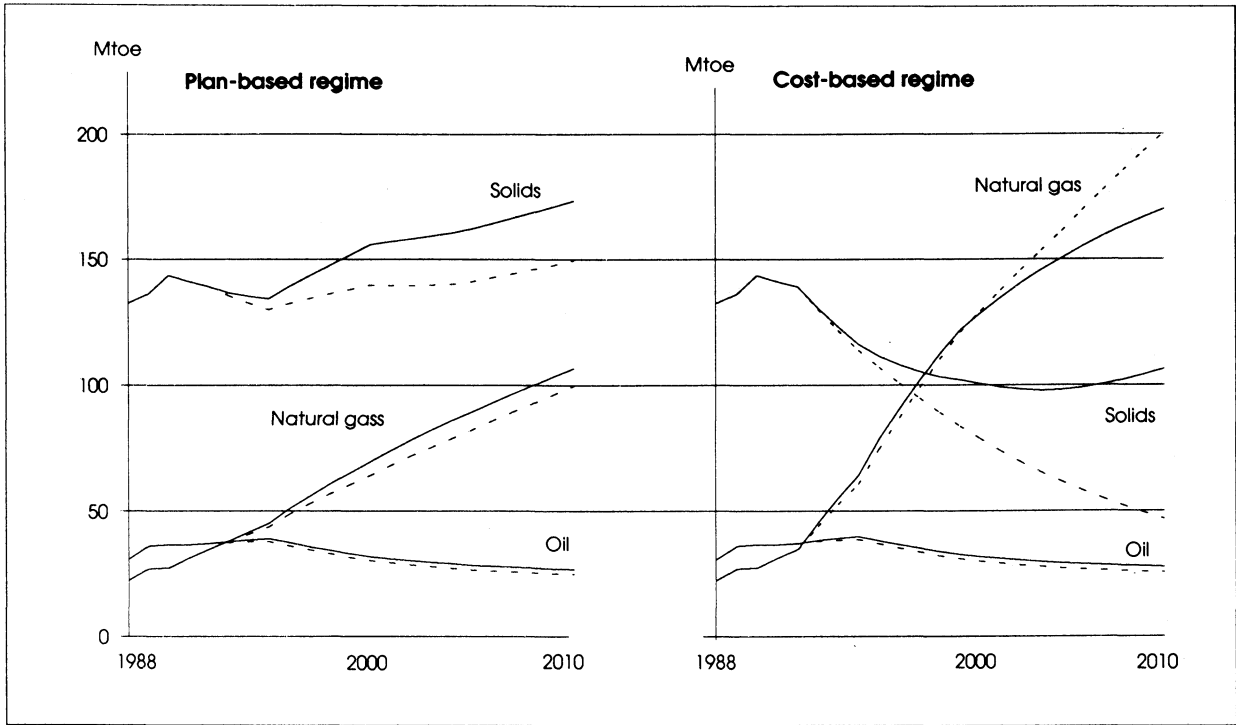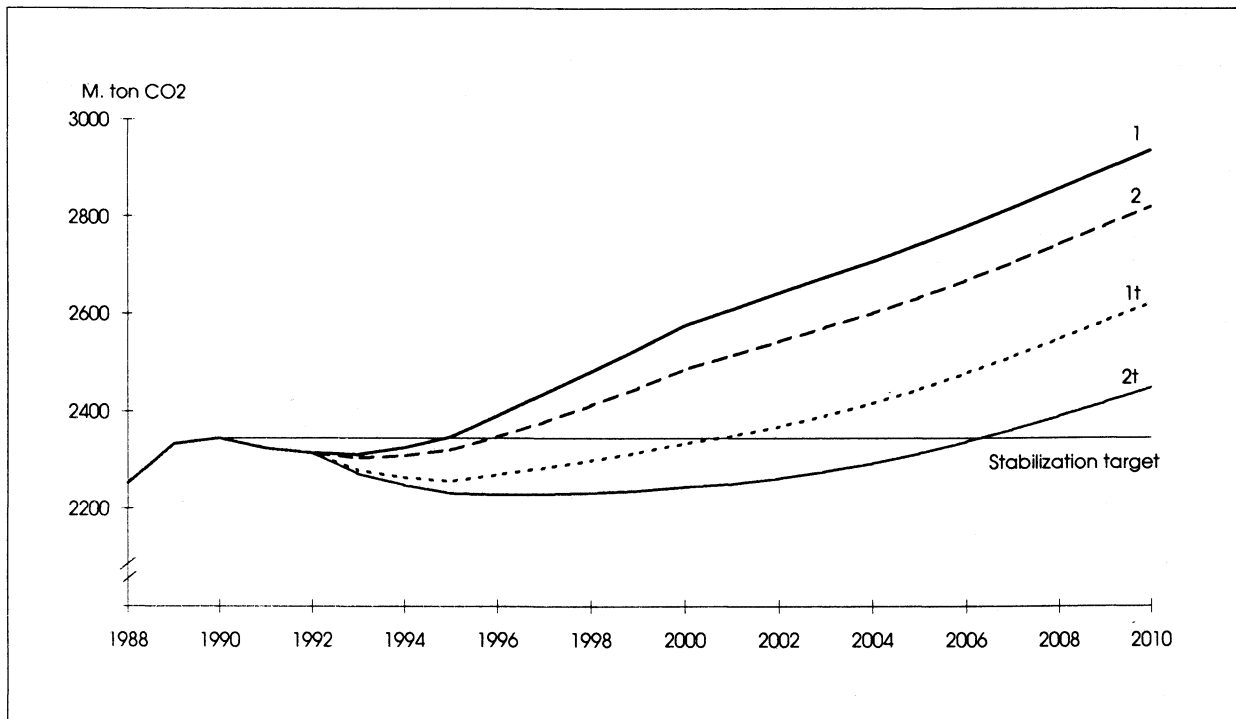

Figure 4. Simulated carbon dioxide emissions under bot regimes, with and without the EC tax

Concluding remarks

The simulations clearly indicate that carbon emission abatement in Western Europe is not only a matter of the level of taxation. On the contrary, the efficiency of a uniform tax as proposed by the EC

Commission depends crucially on the investment behaviour of the power producers. *Status quo* of the national regimes, here denoted as the plan-based regime, means that the CO_2 reduction required for reaching EC stabilization target is significantly higher than in a cost-based regime (9 per cent

versus 5 per cent by year 2000). Furthermore, the long run effect of taxation is less. This is hardly surprising, since the idea of taxation is to let the market work. Even though the recent plans imply a switch toward gas at the cost of coal, these results obtain. Thus, the EC efforts of implementing a single market in electricity and gas cannot be seen isolated from the carbon abatement strategy. Only the opening up of markets and strengthening of competition can force the protected producers to adjust to market signals. Even if this may be a difficult and painful process, and the regulation of utilities in a single market is indeed both difficult and costly, these costs have to be compared to the loss of efficiency in the present regime.

From a Norwegian point of view, a deregulation of the thermal power production would be desirable also for another reason: It could increase the possibilities for Norwegian natural gas export by stimulating natural gas demand in the West European energy market by 22 per cent in year 2000. Besides, in contrast to the plan-based regime, an introduction of the EC carbon/energy tax in the cost-based regime would increase demand for natural gas in the long run; by 4 per cent in year 2010.

Since the model does not comprise the supply side, the question of whether the incremental demand for gas can be supplied at the given price remains to be adressed. In the cost-based tax regime an additional demand of about 112 mtoe is required by year 2000, and another 64 mtoe by 2010. Simulations on a dynamic oligopolistic model (Gjelsvik and Nilstad (1993)) of the West European gas market suggest that such a development would require somewhat higher prices. At least half of the incremental supply would have to come from countries outside Western Europe, like the former USSR, Algeria or long distance LNG.

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New Research Reports

REPORTS

Kjersti-Gro Lindquist:
**EMPIRICAL MODELLING OF EXPORTS
OF MANUFACTURES: NORWAY 1962-1987**
Rapporter 93/18, 1993. Sidetall 124.
ISBN 82-537-3869-2

In former versions of the annual Norwegian large scale macro model MODAG, export volumes of different commodities were modelled by export demand equations consistent with the Armington approach assuming monopolistic competition. Dynamics were introduced by a simple partial adjustment mechanism, and the theoretical restriction of price homogeneity was imposed in both the short- and the long-run. In this report, export equations with more flexible dynamics (error correction models), which allow short-run price non-homogeneity, are estimated. Important differences across commodities with respect to both estimated elasticities and dynamics are revealed. In addition to Armington equations, also equations consistent with price taking behaviour (the small open economy case) are estimated. The "small open economy" model is assumed particularly promising for raw materials and intermediate goods, and the price taking hypothesis is not rejected for metals.

The merits of alternative ways of measuring the variables describing foreign markets in the Armington model, i.e. world demand and competitors' prices, are also investigated. The conclusion is that both careful modelling of the dynamics and the choice of explanatory variables are important for the encompassing properties and estimated long-run elasticities, and that the restrictions of short-run price homogeneity involves misspecification for important commodities. In addition, inference about competitiveness in trading industries depends critically on the choice of variables describing foreign markets.

Sarita Bartlett:
**THE EVOLUTION OF NORWEGIAN
ENERGY USE FROM 1950 TO 1991**
Rapporter 93/21, 1993. Sidetall 142.
ISBN 82-537-3890-0

In 1988, the Lawrence Berkeley Laboratory (LBL) was asked by the Royal Ministry of Industry and Energy (formerly the Royal Ministry of Petroleum and Energy) and Oslo Energi (formerly Oslo Lysverker) to analyse the long-term changes in Norwegian energy use and its underlying determinants, and to compare these changes to those that occured in other industrialized countries. The motivations for this project were to gain a better understanding of past energy-use trends in order to identify the areas in which there exist energy conservation potentials, and to examine the factors that differentiated the evolution of Norwegian energy use from that of other industrialized countries. Their period of analysis extended from 1950 to 1986.

In 1990, under contract from the Norwegian Water Resources and Energy Administration (NVE), the Central Bureau of Statistics started the project "Energibruk i Norge i et langsiktig perspektiv - utvidelse og oppdatering 1985-1990" (Energy Use in Norway in a Long-Term Perspective - Expansion and Updating from 1985 to 1990). The purpose of this project was threefold.

The first phase of this project was to extend the Schipper, et.al. (1990) analysis to include an analysis of the trends in energy use and its underlying determinants that occured from 1985 to 1990, but this report does not contain international comparisons, and it is policy benign (i.e., no policy recommendations are presented). In addition, it is important to note that because of data revisions, there are differences in some of the results presented in the two reports.

Per NVE's request, the data have been placed in a system of linked Lotus 1-2-3 for windows (version 1.0) worksheets and worksheet files. Unfortunately, in many instances there were inconsistencies between the original and updated data. As a consequence, the author attempted to validate as much of the original data as possible. In some cases, entire original data series were replaced with revised data. The product of this work is a detailed set of sectoral energy use, as well as related economic, and structural, time-series data extending from 1950 to 1990 (or 1991, where there are available data). Following the methodology used by LBL, these data have been constructed using a "bottom up" approach. The data used in this report are presented in Appendix A, and information on the data are summarized in Appendix B. The complete data set, including additional data not contained in the report, is contained on diskettes.

DISCUSSION PAPER

Jørgen Aasness, Erik Biørn and Terje Skjerpen:
**ENGEL FUNCTIONS, PANEL DATA, AND
LATENT VARIABLES - WITH DETAILED
RESULTS**
Discussion Paper no. 89, 1993. 83 pages.

A system of consumer expenditure functions is estimated from Norwegian household budget data.

Specific features of the approach are: (i) Panel data from individual households are used, which offer far richer opportunities for identification, estimation and testing than cross section data. (ii) Measurement errors are carefully modelled. Total consumption expenditure is modelled as a latent variable, purchase expenditures on different goods and two income measures are used as indicators of this basic latent variable. The usual assumption of no measurement error in total expenditure is clearly rejected. (iii) The distribution of latent total expenditure across households, and its evolution over time, is estimated and important properties tested. (iv) The distribution of individual differences in preferences, represented by individual time invariant latent variables, are modelled, estimated, and tested. (v) We test the hypothesis that preferences are uncorrelated with total consumption expenditure, which is basic to virtually all cross section studies of consumer demand functions.

Einar Bowitz, Asbjørn Rødseth and Erik Storm:
FISCAL EXPANSION, THE BUDGET DEFICIT AND THE ECONOMY: NORWAY 1988-91
Discussion Paper no. 91, 1993. 25 pages.

From 1989 fiscal policy in Norway has been expansionary. With the aid of the econometric model MODAG we estimate the size of the change in policy from 1988 to 1991, its final effect on the central government budget, and its effect on the economy. We also assess the effects on the budget of cyclical factors and structural change. These appear to be more important for the increase in the deficit than activist policy. The budgetary costs of the extra jobs created by the activist part of the policy seem high.

Rolf Aaberge, Ugo Colombino and Steinar Strøm:
LABOR SUPPLY IN ITALY
Discussion Paper no. 92, 1993. 42 pages.

The present study tries to overcome some of the shortcomings of the standard empirical labor supply models by applying an alternative approach which allows for complex non-convex budget sets, highly non-linear labor supply curves and imperfect markets with institutional constraints.

The model is estimated on Italian microdata. The empirical results demonstrate that the model reproduces the distributions of labor supply for married males and married females quite well. Moreover, the results show that male labor supply is rather inelastic while labor supply among females, especially participation, is considerably more elastic.

Tor Jakob Klette:
IS PRICE EQUAL TO MARGINAL COSTS? AN INTEGRATED STUDY OF PRICE-COST MARGINS AND SCALE ECONOMIES AMONG NORWEGIAN MANUFACTURING ESTABLISHMENTS 1975-90
Discussion Paper no. 93, 1993. 56 pages.

This paper presents an integrated study of price-cost margins and scale economies. The model is estimated on the basis of a comprehensive data set for individual establishments covering almost the whole Norwegian manifacturing sector over the period 1975-90. For most manufacturing industries prices significantly exceed marginal costs. However, the price cost margins are fairly small (1.06-1.16) compared to other findings by Hall (1988) and others. There is a tendency for larger firms to obtain a higher markup. None of the samples reveals significant scale economies, while 7 out of 20 samples exhibit moderate decreasing returns.

John K. Dagsvik:
CHOICE PROBABILITIES AND EQUILIBRIUM CONDITIONS IN A MATCHING MARKET WITH FLEXIBLE CONTRACTS
Discussion Paper no. 94, 1993. 50 pages.

The purpose of the paper is to develop discrete and continuous probabilistic choice models for a matching market of heterogeneous suppliers and demanders.

The point of departure is similar to that of Tinbergen (1956) which considers equilibrium conditions in a matching market with a particular continuous distribution of preferences and attributes of the agents. The present paper extends Tinbergen's analysis to allow for rather general specifications of the preferences and the distribution of agent-specific attributes.

Tom Kornstad:
EMPIRICAL APPROACHES FOR ANALYSING CONSUMPTION AND LABOUR SUPPLY IN A LIFE CYCLE PERSPECTIVE
Discussion Paper no. 95, 1993. 60 pages.

During the last decade several approaches for estimation of structural life cycle models of labour supply and consumption from micro data have been proposed. Ideally, estimation requires complete, individual, life cycle data for a variety of variables such as labour supply, consumption of durables and non-durables, and their expected prices; including interest and income tax rates. No single data set includes all these variables, and the challenge has been to find specifications that can be used for estimation of the unknown parameters of interest

from the data actually available. This paper surveys these approaches.

Tom Kornstad:
AN EMPIRICAL LIFE CYCLE MODEL OF SAVINGS, LABOUR SUPPLY AND CONSUMPTION WITHOUT INTERTEMPORAL SEPARABILITY
Discussion Paper no. 96, 1993. 50 pages.

This paper formulates and estimates a structural life cycle model of married couples' labour supply and consumption of durables and non-durables. The purpose of this work has been to find a specification of this class of life cycle models that can be estimated in the absence of observations of consumption of non-durables, and the price and the physical stock of durables. We allow for a particular kind of non-separability in the demand durables, and treat durables and non-durables as a (single) Hicks composite good.

Snorre Kverndokk:
COALITIONS AND SIDE PAYMENTS IN INTERNATIONAL CO_2 TREATIES
Discussion Paper no. 97, 1993. 42 pages.

Most numerical studies analysing the costs and benefits of international CO_2 emissions abatement assume full cooperation by all countries and regions in the world. Based on the experience from the 1992 Rio conference on the one side, and the theory of self-enforcing agreements to restrict pollution among sovereign countries on the other, full cooperation will probably not be the outcome of an international treaty on reducing CO_2 emissions. In this study we focus on coalitions and side payments in international CO_2 treaties by answering questions such as: Given the commitment of cooperation by a defined group of countries, what is the optimal policy of the group? What is the global loss of partial cooperation compared to full cooperation (social optimum), and how is the optimal abatement level affected by the number of countries committed to cooperate? The framework of the analysis is as follows. A group of OECD countries have committed themselves to cooperate on the global warming problem. The coalition (or the cooperating countries) chooses emission levels and offer the non-cooperating countries transfers if they restrict their emissions. The abatement and side payments made by the coalition are chosen so that its intertemporal utility function is maximised. Compared to the social optimum, limited participation implies a significant global loss. However, compared to doing nothing, a treaty signed by a group of countries may be important. Side payments are an effective policy instrument for making a limited treaty significant.

Torbjørn Eika:
WAGE EQUATIONS IN MACRO MODELS. PHILLIPS CURVE VERSUS ERROR CORRECTION MODEL DETERMINATION OF WAGES IN LARGE-SCALE UK MACRO MODELS
Discussion Paper no. 98, 1993. 33 pages.

In this article the implications of implementing either a Phillips curve or an Error Correction type of wage equations in macro models are investigated. First the implications in a small theoretical model is studied. Secondly, stylized wage equations of the two types is implemented in two large scale UK macro models (HM Treasury and Bank of England) and the multipliers are studied. The exercise highlights some undesired properties with the rest of the macro models and the results shows large differences in responds depending on the rest of the macro model. Generally a Phillips curve wage determination seems to make the reactions more unstable than an ECM type of wage formation.

Anne Brendemoen and Haakon Vennemo:
THE MARGINAL COST OF FUNDS IN THE PRESENCE OF EXTERNAL EFFECTS
Discussion Paper no. 99, 1993. 34 pages.

The Marginal Cost of Funds (MCF) is useful in cost-benefit and tax reform analysis. This paper presents general equilibrium estimates of the MCF in an economy with environmental external effects. Environmental externalities affect the estimates in the following way: If increased taxes leads to substitution away from activities that have external effects, then the estimate of the MCF will be lower than would have been the case otherwise. Substitution into activities with external effects will increase the estimate of the MCF. Environmental externalities are uncertain. We treat them as random variables to account for the uncertainty.

Our results indicate that the "base-case" estimate of the MCF is reduced by around 0.2 when invironmental externalities are taken into account. The impact of externalities however depends greatly on which tax is being used to increase public revenue. This indicates a significant potential for tax reform.

NOTATER

Mario A. De Franco, Solveig Glomsrød, Henning Høie, Torgeir Johnsen and Eduardo Marín Castillo:
SOIL EROSION AND ECONOMIC GROWTH IN NICARAGUA
Notater 93/22, 1993. 59 pages.

Olav Bjerkholt:
**REVIEW OF MACROECONOMIC MODEL-
LING NEEDS OF THE MINISTRY OF
PLANNING OF THE KINGDOM OF SAUDI
ARABIA**
Notater 93/25, 1993. 44 pages.

This report from a two months assignment for the
United Nations in June-August 1993 to work in the
Ministry of Planning og the Kingdom of Saudi
Arabia reviews the macroeconomic modelling
needs of the Ministry in connection with the five-
year Development Plans (DP). The assignment has
been part of a long-term technical cooperation pro-
vided to economic planning in the Kingdom within
the framework of the United Nations Development
Programme. The cooperation project is called
*Development Planning Advisory Services,
SAU/92/002, phase IV*, having as one of its objec-
tives the strengthening of planning capabilities of
the Ministry of Planning.

After consultation with the Ministry of Planning
the task was defined as reviewing the existing
macroeconomic model tools in the Ministry, pro-
posing appropriate model tools to be developed
according to the Ministry's need in connection with

the 6DP and future Development Plans including
the statistical requirements needed to support the
Ministry's macroeconomic reponsibilities, and
improving the currently used macroeconomic tools.

The main report is kept short with additional
material in appendices. The report has been written
on the basis of somewhat incomplete knowledge
about the national planning process of the King-
dom, and I apologize in advance for shortcomings.
The models proposed in the report are represented
in brief outline, not as drafted model structures. The
outlines should be read as suggestions about direc-
tions in which to develop new tools rather than as
definitive proposals.

The Ministry provided a pleasant and convenient
working environment during my stay. I owe thanks
for the information and valuable assistance given to
me by many staff members and by the library of the
Ministry. Special thanks are due to the Project
Manager Assistant Deputy Minister A.I. Al-
Hakamy for taking me on as a short-term contri-
butor to the project and to Hashem A-Shami, Heinz
Muerdter and Erwin Wartenberg for very useful
discussions and advice.

The Research Department

was established in 1950. The Department has about 110 employees (may 1993). The budget for 1993 is about 36.5 mill. NOK, of which about 45 per cent is financed by research councils and other research contracts.

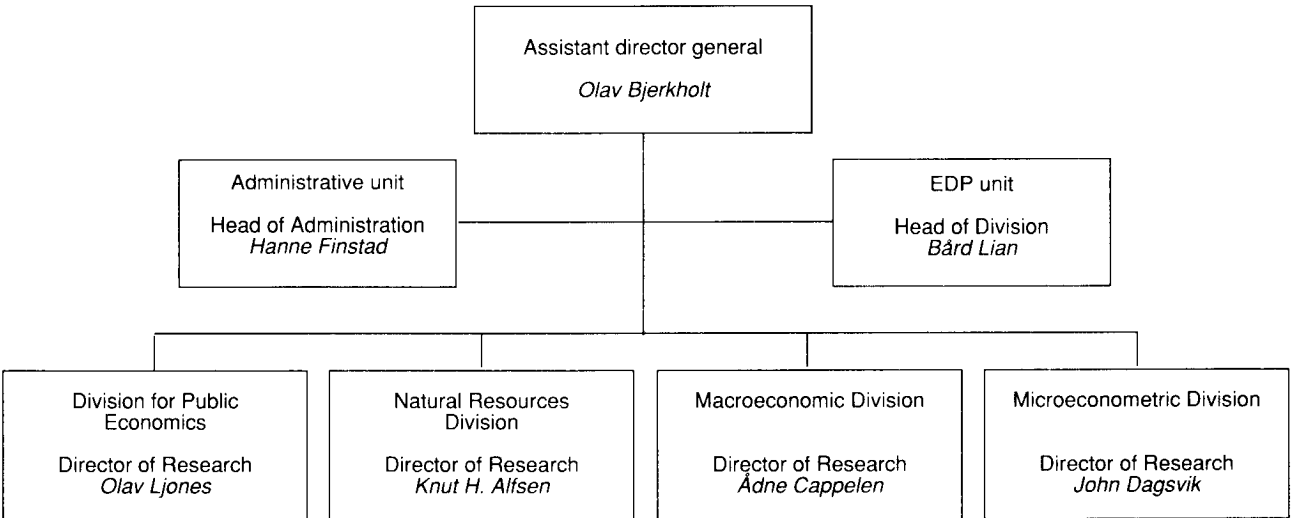The Research Department is today organized in four divisions:

o Division for Public Economics
   * Public economics, taxes
   * Labour and education
   * Regional analysis

o Natural Resources Division
   * Environmental economics
   * Petroleum economics
   * Energy markets

o Macroeconomic Division
   * Economic analysis
   * Macroeconomic models
   * Equilibrium models

o Microeconometric Division
   * Distributional analysis, labour supply
   * Consumer behaviour
   * Productivity performance in the business sector

The organization of the Research Department:

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                    ┌─────────────────────────┐
                    │ Assistant director general │
                    │     Olav Bjerkholt        │
                    └─────────────────────────┘
  ┌──────────────────────┐                    ┌──────────────────────┐
  │ Administrative unit   │                    │ EDP unit              │
  │ Head of Administration│                    │ Head of Division      │
  │   Hanne Finstad       │                    │   Bård Lian           │
  └──────────────────────┘                    └──────────────────────┘
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Division for Public Economics	Natural Resources Division	Macroeconomic Division	Microeconometric Division
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Economic Survey

Statistics Norway