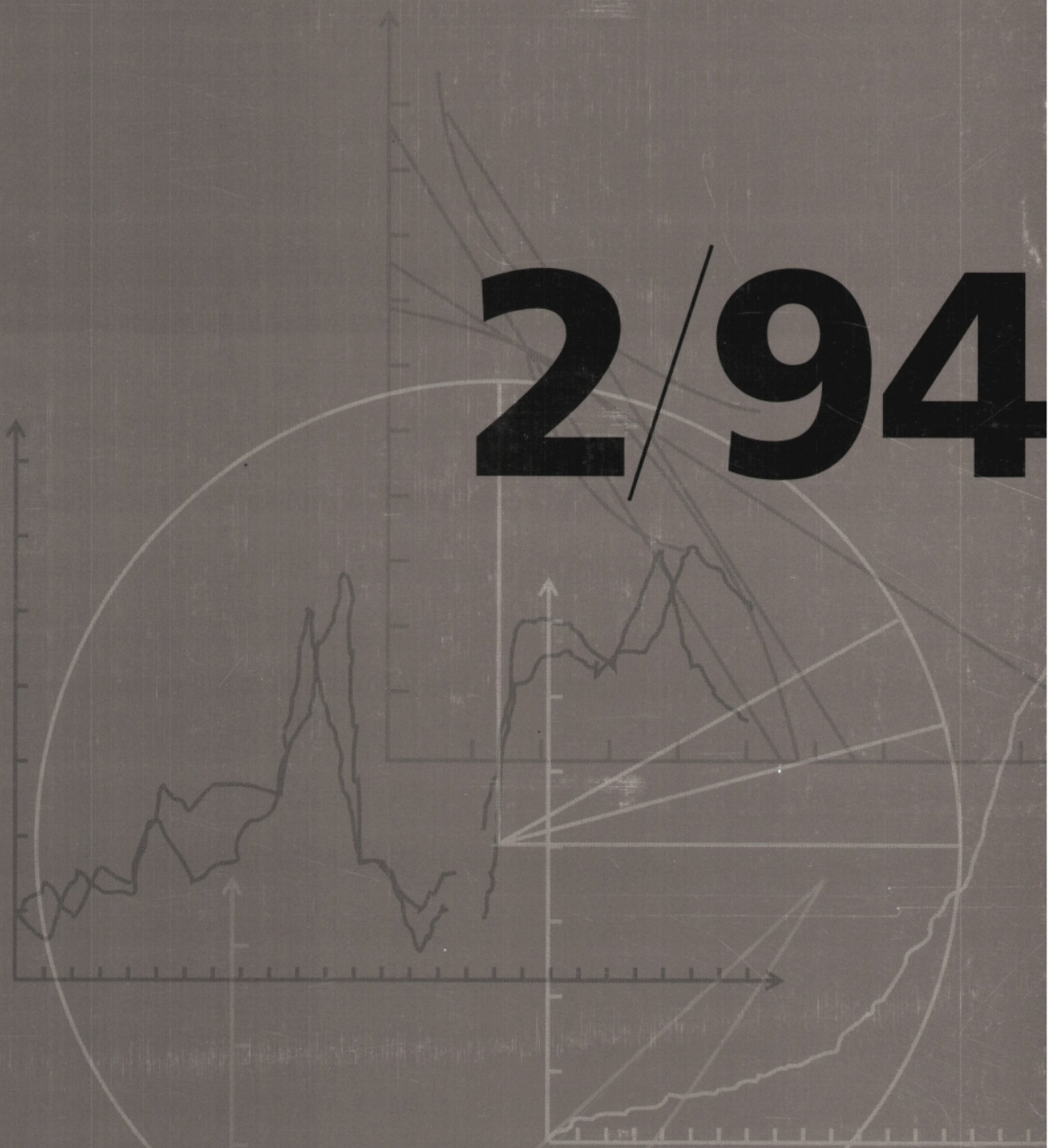
Economic Survey

Statistics Norway

Statistisk sentralbyrå

2/94



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Article

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Economic Survey

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Economic Survey

is published four times a year by the Research Department of Statistics Norway. The Research Department was established in 1950. The Department has about 90-100 employees (Feb. 1994). The Research Department is today organized in four divisions. Head of Department is *Olav Bjerkholt.*

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Symbols in Tables	**Symbol**
Data not available	..
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Nil	0
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Economic trends

Following several years of slow growth and some stagnation in the mainland economy, a pronounced turnaround in demand took place in the second half of 1993. It was particularly private consumption which gathered momentum, fuelled by the decline in interest rates, a pent-up need to replace some consumer durables and improved household wealth. There has been increasing evidence of a sharp growth in consumption so far in 1994, supported by the preliminary national accounts figures for the first quarter of this year which are also published in this report. Against this background, the growth projection for private consumption between 1993 and 1994 has been revised upwards set from the estimate presented in Economic Survey 1/94, to 4.3 per cent. This will then be the highest registered growth in consumption since 1986.

Other factors also indicate that there are prospects for stronger growth in the Norwegian economy than just a few months ago. Internationally, GDP growth forecasts for 1994 and 1995 have been revised upwards for a number of OECD countries, and some of our main trading partners are showing signs of recovery following the deepest recession experienced in the postwar period. Demand for Norway's traditional export goods may therefore rise considerably faster in the next few years than in 1993. Furthermore, there are already signs that improved cyclical conditions have resulted in a pronounced rise in prices of important raw materials which account for a high share of Norwegian exports.

A marked improvement in cost competitiveness during the past five years has created a basis for allowing Norwegian industry and commerce to benefit from a resumption of growth internationally. According to the forecasts presented in this report, price and wage inflation in Norway during the next few years will also be lower than the average for our trading partners; consumer price inflation in 1994 may be as low as 1 per cent on an annual basis.

Whereas higher international growth may generate an impetus to export-oriented industries, other sectors will experience adjustment problems as a result of a projected decline in petroleum investment in both 1994 and 1995. All in all, manufacturing output will probably exhibit sluggish growth in this period. The sharp growth in other domestic demand components nonetheless entails that mainland GDP growth may be more than 3 per cent in 1994, thereby making Norway one of the fastest growing economies in the OECD area even when oil and gas are excluded.

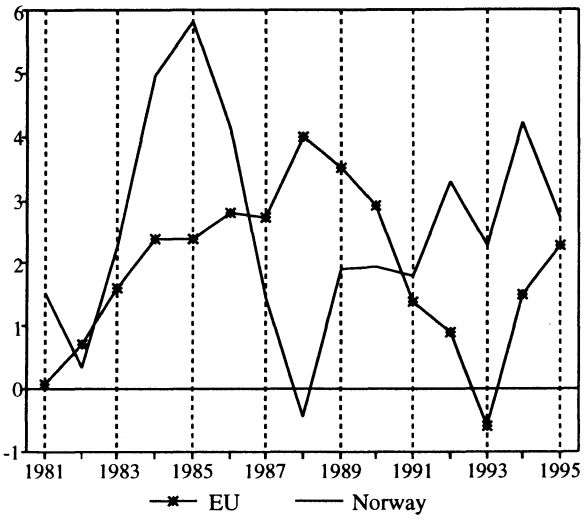
Higher output growth in mainland Norway has in turn contributed to a rise in employment and a slight decline in unemployment. The current macroeconomic calculations indicate a decline in the unemployment rate, from about 6 per cent in 1993 to about 5 per cent next year. However, there is reason to emphasize that there is considerable uncertainty attached to such projections, both with regard to employment growth and not least with regard to how an improvement in the labour market will affect the supply of labour.

Main indicators for the Norwegian economy
Growth from previous year. Per cent

	1993	1994	1995
GDP	2.3	4.2	2.7
Private consumption	1.7	4.3	3.0
Unemployment rate[1)]	6.0	5.6	5.1
Consumer price index	2.3	1.1	1.9

1) Level in per cent.

GDP growth, Norway and EU
Annual rates



Source: Statistics Norway and Consensus Forecasts.

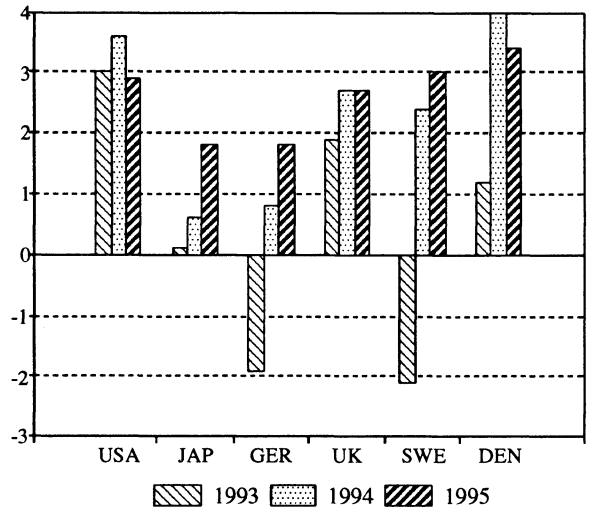
International economy

The outlook for economic developments in the OECD area appear brighter than just a few months ago. In Anglo-Saxon industrial countries, with the US leading the way, the economic recovery is firmly established, while Japan and continental Europe seem to have passed a cyclical trough. It is likely that GDP/GNP growth for the OECD area as a whole will be around 2 1/2 per cent this year compared with a growth of 1.2 per cent between 1992 and 1993. As a result of the sluggish production trend, unemployment increased sharply in Europe last year. Unemployment is not expected to decline this year even though economic activity is projected to rise.

Preliminary first-quarter national accounts figures for the *US* show a 3 per cent annualised growth in gross domestic product (GDP) from the previous quarter. This was slightly stronger than expected, even though it is considerably lower than the rate recorded in the fourth quarter of 1993 (7 per cent). The upturn is primarily being fuelled by growth in private consumption and investment, while export demand is generating a weak impetus. The Federal Reserve has progressively tightened monetary policy to curb growth. The Federal funds rate has been raised in four steps since February this year, from 3 to 4.25 per cent. The increases in interest rates have been motivated by the growing risk of inflation as a result of the strong economic upswing. Thus far, however, this has not been reflected in the consumer price index, which rose by only 2.3 per cent in the twelve months to April 1994. The fear of accelerating price inflation, however, has resulted in unrest in the bond market. Long rates were pushed up to nearly 7.7 per cent in May, but have subsequently drifted downwards. The forecasts point to continued high GDP growth this year, although the rise in interest rates is expected to curb growth in 1995.

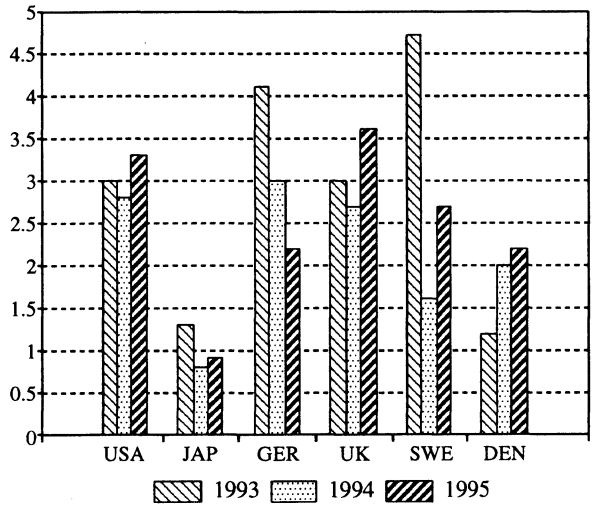
In *Japan*, national accounts figures show that GNP expanded by only 0.1 per cent between 1992 and 1993, the lowest growth rate recorded since 1974. There are now some signs that the trough has been passed, but growth in 1995 is expected to remain subdued. The downturn is largely related to a sharp fall in private investment, following several years of over-investment and inflated property and asset prices. The decline in household income as a result of reduced bonus schemes and mounting unemployment has amplified the downturn. The public sector's strong financial position has enabled the authorities to conduct an expansionary policy the past year. The fourth stimulatory package in one and a half years - equivalent to a good 3 per cent of GNP - was presented in February. The latest package contains proposals for extensive personal tax relief, representing a new element compared with earlier packages. Major political problems, however, have delayed the introduction of these measures. The Prime Minister had to resign in April as a result of accusations concerning financial irregularities, and the Socialist Party left the coalition shortly afterwards. The new minority Government is having considerable difficulties in gaining acceptance for its policies. The surplus on the balance of trade remains high, more than USD 13 billion in April, and difficult talks with the US concerning the removal of trade barriers are on the agenda. The forecasts point to continued sluggish GNP growth this year, while output is expected to expand by a little less than 2 per cent next year.

GNP/GDP growth for selected countries
Per cent



Source: Consensus Forecasts and Statistics Norway.

Growth in consumer prices
Per cent



Source: Consensus Forecasts and Statistics Norway.

In 1993 *Germany* (west) experienced its deepest recession since the Second World War, with GNP contracting by 1.9 per cent from the previous year. The decline is ascribable to a weak trend in domestic demand and reduced exports. Preliminary first-quarter national accounts figures show that GNP expanded by 2.1 per cent from the same quarter one year earlier. Even though this figure is influenced by the mild winter last year and the one additional working day compared with the first quarter of 1993, other indicators also bear evidence of an improvement in the German economy. New manufacturing orders have risen substantially, particularly from abroad, and figures from the Ifo Economics Institute show that capacity utilization has also increased slightly the last six months, after declining since the end of 1990. The somewhat brighter outlook must partly be viewed in connection with the Bundesbank's reductions in its key rates over the past two years. Following the latest interest rate cut (11 May this year), the discount rate is down to 4.5 per cent, while the Lombard rate is 6 per cent. Consumer price inflation, which slowed through last year, was down to 2.9 per cent in May. Price inflation is expected to be reduced further this year, partly because this year's wage settlements resulted in agreements providing very moderate pay increases. Unemployment rose sharply last year and the number of persons unemployed continued to rise in the first four months of 1994, albeit at a slightly lower pace. Unemployment reached 8.4 per cent in April, but then fell (unadjusted) to 8.1 per cent in May.

In the eastern länder of Germany, GNP expanded by 7.1 per cent last year, particularly as a result of strong investment growth financed through transfers from the western länder. Fixed investment in buildings and construction increased by 21 per cent between 1992 and 1993, and in the same period private consumption expanded by 1.5 per cent. In spite of extensive early retirement programmes and labour market measures, unemployment in the eastern länder continued to rise in 1994, reaching 16.2 per cent in April.

In the *UK*, it appears that economic growth will continue to be moderate this year. Preliminary first-quarter national accounts figures show a GDP growth of 2.6 per cent compared with the same quarter one year earlier. Thus far the upturn has largely been consumption-led. Private consumption grew by 2.5 per cent last year, and both retail sales and new car sales so far in 1994 point to a considerable growth in consumption again in 1994. As a result of tax increases, household real disposable income will probably not increase this year, entailing that the saving ratio may fall between 1993 and 1994. This must be viewed in conjunction with the improvement in the financial position of households the last few years and the historically high saving ratio that has existed. There are signs of recovery in private fixed investment, stimulated by low interest rates and high earnings in the business sector. National accounts figures show an investment growth of 2.2 per cent between the fourth quarter of 1993 and first quarter of 1994, and NIESR expects manufacturing investment to expand by 6 per cent this year. Unemployment has fallen since the beginning of 1993 and is now down to 9.5 per cent. Consumer price inflation, excluding mortgage interest, was 3 per cent last year, and has averaged 2.6 per cent so far this year. The devaluation of pound sterling in the autumn of 1992 contributed to boosting the rise in import prices to 7.5 per cent last year, but so far the impact on consumer prices has been limited. Price inflation is expected to remain within the Government's target range of 1-4 per cent both in 1994 and 1995.

Main international economic forecasts

	1993	1994	1995
USA			
GDP[1]	3.0	3.6	2.9
Growth in consumer prices	3.0	2.8	3.3
Current balance (level, per cent of GDP)	-1.7	-1.9	-1.8
Unemployment (level)	7.4	6.4	6.0
Short term interest rate (per cent)	3.0	4.2	4.8
Long term interest rate (per cent)	5.9	7.0	7.1
Japan			
GDP[1]	0.1	0.6	1.8
Growth in consumer prices	1.3	0.8	0.9
Current balance (level, per cent of GDP)	3.1	2.9	2.4
Unemployment (level)	2.5	3.1	3.2
Short term interest rate (per cent)	2.4	2.2	2.4
Long term interest rate (per cent)	3.7	3.7	4.1
Germany (west)			
GDP[1]	-1.9	0.8	1.8
Growth in consumer prices	4.1	3.0	2.2
Current balance (level, per cent of GDP)	-1.3	-0.8	-0.4
Unemployment (level)	9.0	10.1	10.2
Short term interest rate (per cent)	7.5	4.9	4.2
Long term interest rate (per cent)	6.5	6.2	6.2
UK			
GDP[1]	1.9	2.7	2.7
Growth in consumer prices[2]	3.0	2.7	3.6
Current balance (level, per cent of GDP)	-1.7	-1.8	-1.8
Unemployment (level)	10.3	9.5	8.9
Short term interest rate (per cent)	6.0	5.1	5.5
Long term interest rate (per cent)	7.6	7.7	7.6
Sweden			
GDP[1]	-2.1	2.4	3.0
Growth in consumer prices	4.7	1.6	2.7
Current balance (level, per cent of GDP)	-0.1	2.2	3.5
Unemployment (level)	8.2	8.0	7.2
Short term interest rate (per cent)[3]	8.0	6.3	5.4
Long term interest rate (per cent)	..	..	..
Denmark			
GDP[1]	1.2	4.0	3.4
Growth in consumer prices	1.2	2.0	2.2
Current balance (level, per cent of GDP)	4.0	3.0	2.7
Unemployment (level)	12.2	11.5	10.6
Short term interest rate (per cent)[3]	6.9	5.3	4.4
Long term interest rate (per cent)	..	..	..

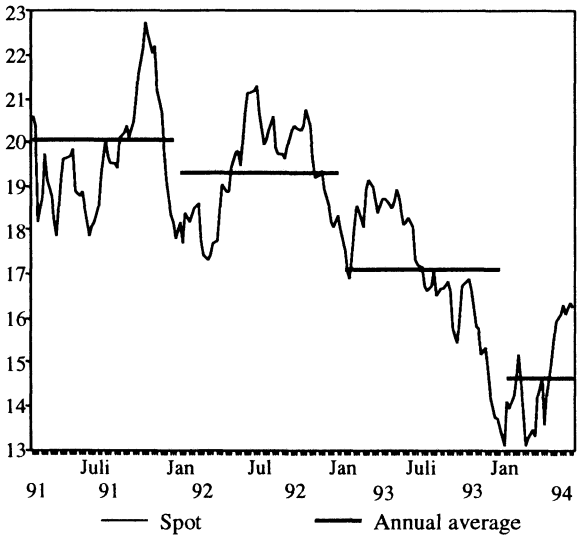
1) Percentage change from previous year, volume.
2) Retail price index, except mortgage interest payments.
3) Source: Consensus Forecasts.
Source: Actual figures for 1993: DRI. Forecasts for 1994 and 1995: Consensus Forecasts. National sources for Sweden and Denmark.

Most economic indicators now show that *Sweden's* economy is picking up following the severest recession in the postwar period. Through the last half of 1994 exports expanded sharply and the fall in domestic demand levelled off. Continued strong growth in exports is expected in 1994 and, combined with higher business fixed investment, this may result in a GDP growth of 2.5 per cent between 1993 and 1994. Domestic demand is projected to pick up in 1995. Along with continued high growth in exports this will contribute to a GDP growth of 3 per cent. Based on moderate demand growth and favourable productivity trends the next few years, inflation is expected to remain low. However, the labour market is not expected to show much improvement in this period. Overt unemployment is estimated to fall from 8 per cent of the labour force in 1994 to 7.2 per cent in 1995. The number of unemployed persons participating in labour market programmes is expected to remain at a good 6 per cent of the labour force. Despite the growth in the economy, government budget deficits will continue to be substantial the next few years. This entails that the public sector's net debt as a share of GDP will be close to 40 per cent at the end of 1995.

Preliminary national account figures show that there was a marked economic upturn in *Denmark* through the third and fourth quarters of 1993. Most domestic demand components showed a sharp growth, and the fall in exports through the first half of 1993 came to a halt. GDP thus expanded by 1.2 per cent between 1992 and 1993, compared with the earlier estimate of 0.2 per cent. As a result of continued growth in domestic demand this year and rising export growth, GDP is projected to expand by about 4 per cent this year and 3.4 per cent next year. Consumer prices are projected to rise by 2 per cent in 1994. The year-on-year rise in consumer prices was 2.1 per cent in April. Despite the economic upturn, unemployment has declined only marginally. The Government's labour market reform (including leave of absence arrangements which came into force in January 1994) has so far had little impact on joblessness figures. Unemployment was 12.6 per cent of the labour force in April this year, compared with an average 12.2 per cent in 1993. The Government's forecast for unemployment of 11.5 per cent in 1994 may thus seem slightly optimistic.

Oil prices have picked up slightly after falling below USD 14 p/b around the end of last year. Thus far in June the price of Brent Blend has been slightly higher than USD 16 p/b. The latest rise in prices is particularly ascribable to higher demand, inter alia in the US, in the wake of the cyclical upturn. The market situation is also characterized by signals and expectations of continued growth in demand. At its last meeting in March, OPEC decided to maintain the production ceiling of 24.5 million b/d for the rest of the year. On the assumption that there are no dramatic changes on the supply side, e.g. that Iraq resumes its position as an oil exporter, prices are likely to remain at the current level or be slightly higher later in the autumn.

Spot price, Brent Blend
Dollar per barrel



Source: Petroleum Intelligence Weekly

Norwegian economy

Developments thus far this year

Preliminary first-quarter national accounts figures show that the Norwegian economy has continued to expand after the turnaround which took place in the second quarter of 1993. A pronounced growth in private consumption has fuelled a continued rise in mainland demand in spite of the decline in mainland fixed investment.

It is natural to view the upswing in household consumer spending as a consequence of the rapid decline in interest rates over the last five quarters. At the end of the first quarter of 1994 the banks' average lending and deposit rates were a good 5 percentage points below the level prevailing at end-1992. The real costs of owning fixed assets have thus been reduced by 30-40 per cent in a little over a year. This has contributed to a sharp rise in purchases of cars and other consumer durables as well as an increase in prices of resale homes. New dwellings have thereby become more attractive relative to existing dwellings, and housing investment is moving on an upward trend. On a seasonally adjusted basis, however, housing starts have not shown any definite signs of growth in the first four months of 1994 after rising sharply through the second half of last year.

The steep growth in private consumption in the first quarter of 1994 is also influenced by a few special conditions. The rise in electricity consumption (seasonally adjusted) from the fourth quarter of 1993 to the first quarter of 1994

Macroeconomic indicators
Growth from previous period unless otherwise noted. Per cent[1)]

		Seasonally adjusted[2)]				
	1993	93.1	93.2	93.3	93.4	94.1
Demand and output						
Private consumption	1.7	-1.5	1.3	2.8	0.0	2.0
Public consumption	1.8	0.1	-0.9	3.4	0.7	1.9
Gross fixed investment	8.0	6.3	-6.7	26.3	-13.2	-2.6
- mainland Norway	-4.7	-17.0	5.9	2.7	2.4	-9.4
- accrued petroleum investments[3)]	15.6	12.3	-5.1	47.3	17.0	-1. 8
Final domestic demand from mainland Norway[4)]	0.7	-3.6	1.4	2.9	0.5	0.3
Exports	1.8	-4.1	7.7	-3.2	5.5	1.6
- crude oil and natural gas	5.8	-2.6	7.7	-4.5	14.0	0.4
- traditional goods	3.0	-2.3	8.7	-3.1	6.8	3.3
Imports	3.3	-1.5	4.8	7.2	-3.6	1.6
- traditional goods	1.7	-4.5	3.2	6.4	2.8	6.9
Gross domestic products	2.3	-1.0	0.9	2.6	1.2	1.1
- mainland Norway	2.0	-1.4	1.1	1.8	0.9	2.5
Labour market[5)]						
Man-hours worked	0.0	0.7	0.3	-0.1	0.0	1.1
Employed persons	-0.0	-0.3	0.1	0.5	0.5	0.0
Unemployment rate, level	6.0	6.2	6.4	6.3	5.7	5.6
Prices						
Consumer Price Index[6)]	2.3	2.5	2.5	2.2	1.9	1.2
Export prices, traditional goods	0.2	0.4	-0.7	0.1	-1.1	2.2
Import prices, traditional goods	0.4	1.4	-0.5	0.9	-0.1	0.4
Balance of payment (unadjusted, level)						
Current balance, bill. NOK	17.1	5.3	7.6	4.1	0.1	9.2
Memorandum items (unadjusted, level):						
Eurokrone rate (3 month)	7.2	9.4	7.4	6.1	5.6	5.1
Average lending rate[7)]	11.4	13.5	12.1	10.7	9.4	8.7[8)]
Crude oil price, NOK (Spotprice Brent Blend)[9)]	121.9	127.5	126.2	121.8	112.2	103.99
Effective exchange rate on NOK (1992=100)	103.8	102.0	102.8	105.1	105.1	106.6

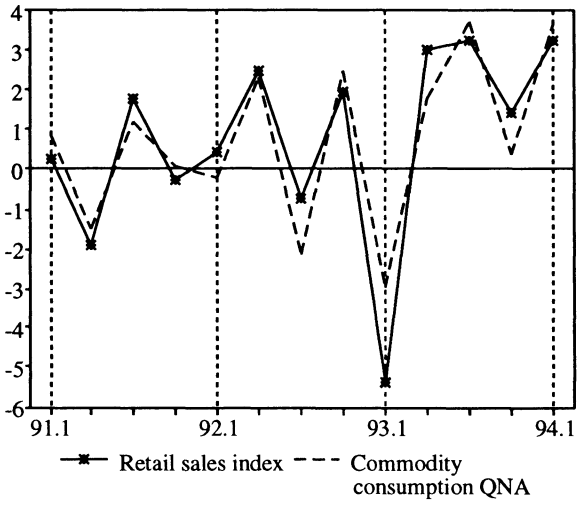
1) Figures for 1993 may deviate somewhat compared to those published in Økonomiske analyser 4/94 due to new information.
2) The method for seasonal adjustment has been changed.
3) Growth from previous year.
4) Private consumption + Public consumption + Gross fixed capital formation in mainland Norway.
5) Based on monthly figures, seasonally adjusted.
6) Percentage change from previous year.
7) Private financial institutions.
8) Forecast.
9) Average Norwegian oil production.
Source: Statistics Norway.

Relationship between the retail sales index and goods consumption in the quarterly national accounts

Calculations of the course of private consumption in the quarterly national accounts (QNA) are based on a number of indicators, including retail sales. The retail sales index is the most important indicator for calculating spending on goods, which accounts for about 60 per cent of total private consumption. Housing consumption and other service categories each account for about half of the remaining 40 per cent.

The chart below shows the growth in the volume of retail sales and in goods consumption in the QNA in the period from the first quarter of 1992 to the first quarter of 1994. The chart illustrates that the retail sales index and goods consumption in the QNA may show divergent growth rates from one quarter to the next even though trends in the two indicators are not very different. While the volume of retails sales expanded by 2.3 per cent in 1992 and fell by 3.3 per cent in 1993, goods consumption in the QNA showed a growth of 1.4 and 1.6 per cent, respectively, in these two years. The disparities can primarily be ascribed to two factors:

Retail sales index and cons. of commodities in QNA
Percentage change from previous quarter
Seasonally adjusted



Source: Statistics Norway.

First, the retail sales index is not the only source for estimates of goods consumption in the QNA. Energy consumption accounts for about 10 per cent of goods consumption, and here the QNA is based on information from the energy accounts. Purchases of personal transport equipment currently amount to about 5 per cent of total goods consumption, and here the QNA makes use of the Directorate of Public Roads' figures on new registrations. The business sector's purchases of private cars must, however, be extracted because these are considered as investment and not private consumption. In general the national accounts applies the convention that these vehicles are sold to households after three years.

Secondly, the retail sales index provides information about the value of retail sales by industry. In the national accounts, consumption is split up into goods and services groups. Many types of goods can be sold by a number of industries, and the retail trade industry does not sell exclusively to private households. It is therefore necessary to convert the estimates of retail sales by industry to the QNA's estimates for the value of household purchases of the various goods. Both this transition and conversion from nominal values to constant prices are carried out on a more disaggregated level in the QNA than the conversion of the retail sales index from value to volume. Since the prices of the various goods do not show an entirely parallel development, this also entails a source of deviations between movements in the volume of retail sales and goods consumption in the quarterly national accounts.

was about the same as the increase in purchases of personal transport equipment, and the growth in energy consumption accounted for almost half of the seasonally-adjusted growth in consumption in the same period. The Norwegian Water Resources and Energy Administration (NVE) estimates that about 3/4 of the sharp growth in electricity consumption in the twelve months to the first quarter of this year can be ascribed to low average temperatures during the winter months. The trend in consumption in the first quarter of this year must also be viewed in connection with Easter purchases which were made in March this year, while the actual public holidays primarily occurred in April. This is probably an important explanation for the pronounced seasonally adjusted decline in retail sales from March to April this year.

After rising noticeably through last year, mainland investment fell by a seasonally adjusted 9 per cent from the fourth quarter of 1993 to the first quarter of this year. The decline in manufacturing investment is estimated at 12 per cent, but the second-quarter survey indicates approximately zero growth on an annual basis. Accrued oil investment grew by a seasonally adjusted 9 per cent in the first quarter of this year, thereby limiting the decline in total gross investment to about 2 per cent. According to Statistics Norway's investment intentions survey for the second quarter, accrued oil investment is likely to decline on an annual basis.

Traditional merchandise exports grew by a good 3 per cent on a seasonally adjusted basis from the fourth quarter of 1993 to the first quarter of this year, on a par with the underlying growth through last year. Excluding energy goods and second-hand aircraft, however, traditional merchandise exports showed no growth in the first quarter of 1994. As a result of moderate growth in exports of oil and servi-

ces and a continued decline in exports of ships and platforms, the rise in total exports was only about 1.5 per cent on a seasonally adjusted basis.

The high growth in traditional merchandise imports in 1993 continued into the first quarter of this year. While developments in oil investment were an important factor underlying the growth recorded last year, consumption and exports of traditional goods played a more important role in the growth in imports in the first quarter of 1994. As a result of the fall in imports of ships and platforms and in service imports, total imports rose by only about 1.5 per cent on a seasonally adjusted basis, i.e. approximately the same as the growth in total exports.

Mainland GDP expanded by more than 2.5 per cent (seasonally adjusted) from the fourth quarter of 1993 to the first quarter of this year. The expansion was particularly strong in private services, while the rise in manufacturing output was on a par with the average. The decline in the gross product of both oil production and shipping explains why total GDP growth was less than half the growth in mainland GDP.

Developments in the labour market through 1993 and thus far in 1994 provide further evidence of the turnaround in the mainland economy. Even though the number of people employed (seasonally adjusted) was approximately unchanged between the fourth quarter of 1993 and the first quarter of this year, employment rose during 1993. This was also the case for the number of man-hours worked, and the increase continued in the first quarter of 1994 (seasonally adjusted). Unemployed declined, and the positive trend seems to have continued in 1994. On a seasonally adjusted basis, about 5.6 per cent of the labour force was unemployed in the first quarter of this year, the lowest unemployment rate recorded since the third quarter of 1991.

The consumer price index rose by 1.1 per cent from January-May 1993 to the same period in 1994. On a year-on-year basis the rise in the consumer price index slowed through the period and in May the index was only 0.9 per cent higher than the level one year earlier. As a result of the decline in interest rates last year, the house rent component has slowed the rise in consumer prices since March of this year. Partly as a result of the depreciation of the effective exchange rate, prices of imported consumer goods contributed to boosting the rise in prices. The same was true for prices of Norwegian-made consumer goods which are sold in competition with imported goods and prices of services where labour costs constitute the dominating price factor. Wage growth, however, remains moderate. The Technical Reporting Committee for Income Settlements has previously estimated the wage carry-over into 1994 at a good 1 per cent for groups covered by the two main employer and employee organizations and in the public sector. So far it appears that the centralised wage settlements in both sectors will contribute an additional 1 per cent to wage growth this year.

The rapid decline in Norwegian money market rates last year levelled off in the first five months of 1994. Through the first half of June the three-month Euro-krone rate was at about the same level as in January. However, both capital and money market rates in Norway are now noticeably higher than corresponding German rates. The differential is wider for long maturities than short maturities, which may indicate market uncertainty about future interest rate developments. Nonetheless a further decline in short German rates will probably reduce Norwegian money market rates slightly over the remainder of the year.

The current account of the balance of payments showed a surplus of NOK 9.2 billion in the first quarter of the year, against NOK 5.3 billion in the same period one year earlier. The entire improvement in the current balance is ascribable to the interest and transfers balance inasmuch as the surplus on the balance of goods and services was reduced by about NOK 0.9 billion.

Outlook for 1994 and 1995

The projections for macroeconomic developments in Norway in 1994 and 1995 are derived from Statistics Norway's macroeconomic quarterly model, KVARTS, based on preliminary national accounts figures up to and including the first quarter of 1994. The forecasts for 1994 and 1995 are close to the projections presented in Economic Survey 1/94. However, the growth estimates for 1994 have been revised upwards in some areas, based on new data concerning economic developments during the first few months of this year.

According to the calculations, growth in mainland demand, which was moderate in 1993 as a whole, will pick up markedly in both 1994 and 1995. While the impetus to growth this year primarily stems from household demand, business sector fixed investment will also make a positive contribution next year. External demand is also expected to be stronger in 1994 and 1995 than in 1993, while accrued investment in the petroleum sector will decline. Mainland GDP growth is projected to pick up slightly and contribute to a decline in unemployment through the projection period. Moderate wage growth and the steep decline in interest rates through 1993 will contribute to a continued low rise in consumer prices in 1994 in spite of a slightly higher rise in import prices. In addition to inflationary impulses from abroad, the domestic cyclical upturn will result in slightly higher price and wage inflation in 1995.

The interest rate environment, the inflation outlook for 1995, public budget balances and developments in other key macroeconomic variables may depend on whether Norway becomes a member of the European Union (EU). The model-based calculations that have been made do not take account of this directly. As the projections are based on quantitative relationships estimated on historical data, the estimates are probably closest in line with the situation arising if Norway and its Nordic neighbours do not become members of the EU, provided this do not severely affect

Main economic indicators
Percentage change from previous year unless otherwise noted

	1993	1994		1995
	Accounts	SN	MoF[1]	SN
Real economy				
Private consumption	1.7	4.3	3.0	3.0
Public consumption	1.8	3.1	3.2	1.5
Gross fixed capital formation	8.0	2.1	..	5.2
- mainland Norway	-4.7	5.8	4.4	9.7
- accrued oil investment	15.9	-2.0	-8.0	-5.3
Demand from mainland Norway[2]	0.7	4.2	3.3	3.1
Exports	1.8	5.8	5.9	4.3
- crude oil and natural gas	5.8	10.3	12.8	3.3
- traditional goods	3.0	6.8	5.0	4.6
Imports	3.3	4.7	2.8	5.6
- traditional goods	1.7	7.9	5.0	4.9
Gross Domestic Product (GDP)	2.3	4.2	4.0	2.7
- mainland Norway	2.0	3.3	2.6	2.6
Labour market				
Persons employed	-0.0	1.4	1.0	1.7
Unemployment rate (level)	6.0	5.6	5 1/2	5.1
Prices and wages				
Wages per man-hour	2.7	2.7	2	3.6
Consumer price index	2.3	1.1	1 1/4	1.9
Export prices, trad. goods	0.2	3.9	3	7.6
Import prices, trad. goods	0.4	2.2	2.5	3.7
Balance of payments				
Current balance (bill. NOK)	17.1	27.6	19.9	31.1
Memorandum items:				
Money market rate (level)	7.2	5.2	..	4.5
Average borrowing rate (level)[3]	11.4	8.8	..	7.8
Crude oil price NOK (level)[4]	122.4	115.3	110	122.4
International market growth	2.3	4.5	..	6.0
Manufacturing ind. eff. krone exchange rate[5]	3.8	2.7	..	0

1) MoF: Ministry of Finance's forecasts. Final budget bill 1993.
2) Private consumption + Public consumption + Gross fixed capital formation in mainland Norway.
3) Houseolds' borrowing rate in private financial institutions.
4) Averge Norwegian oil production.
5) Positive entails depreciation.

capital and foreign exchange markets or the investment outlook.

Exchange rates and interest rates

Short-term rates in Germany are expected to decline further this year, but in the light of improved growth prospects for the German economy, no further decline is anticipated through 1995. With price inflation in Norway at a lower level than in the ECU area and the prospect of a further improvement in the current balance, conditions are favourable for a continued decline in Norwegian money market rates this year, to about 4.5 per cent at the end of the year. This will contribute to a further decline in financial institutions' lending and deposit rates in 1994. Renewals of fixed-rate contracts will result in a further slight decline in average interest rates next year.

In the projections we have assumed a dollar exchange rate of NOK 7.20 and unchanged exchange rates from mid-May until the end of 1995. This entails a depreciation of manufacturing industry's effective krone exchange rate of about 2 per cent this year compared with a good 3 per cent last year.

Economic policy

The estimates concerning the use of resources in the general government sector are based on the Revised National Budget for 1994 and more recent signals of changes as a result of the budget deliberations in the Storting. Growth in public consumption in 1994 is put at a good 3 per cent. The high growth rate is partly a consequence of a downwaid reversion of the public consumption figures for 1993 after the acceptance of the original budget.

For the central government the estimates entail zero growth in consumption and a 10 per cent decline in investment. Local government consumption is projected to rise by about 4 per cent and investment by a good 5 per cent in 1994.

For the central government, the projections for 1995 embody assumptions of spending growth at about the same level as in 1994, unchanged real tax rates and slightly lower excise duty increases in real terms than in preceding years. The growth in local government consumption is estimated at 2 per cent based on an assumption of slightly lower growth in central government transfers. Local government investment, however, is projected to rise slightly in 1995, while the level of central government investment is expected to remain unchanged.

The petroleum sector

Following substantial growth in accrued petroleum investment the last three years, it now appears that investment will edge down both in 1994 and 1995. The fall in investment will primarily affect platform construction. A number of major investment projects will be completed in 1995. Many of these investments in platforms are modules to be built in other countries, entailing that the fall in the demand for goods and services from the offshore industry next year will be greater than indicated by the development in accrued investment. Investment in oil and gas pipelines is expected to increase further both in 1994 and 1995. Construction investment is expected to pick up sharply in 1994, but decline by the same margin next year. Investment in oil drilling is projected to remain approximately unchanged both years.

Turnaround in international markets in 1994

Due to the breakdown of foreign trade statistics in EU countries, developments in demand in Norway's export markets have probably been more favourable than indicated by official foreign trade data. Based on other available information, market growth in 1994 has therefore

been revised upwards to 2.3 per cent. Despite this upward revision, 1993 represents a cyclical trough in demand among our trading partners. It appears that market growth began to pick up towards the end of last year, and in the calculations it is assumed that a strong recovery in 1994 will continue into 1995. As a result of the turnaround, market growth for Norway's main export goods is projected to reach 4.5 per cent this year, rising to 6 per cent next year. This contributes to boosting traditional merchandise exports in the projection period. Freight earnings in the shipping sector are expected to rise in volume in the period ahead as a result of expanded world trade. Oil and gas exports are projected to increase substantially in volume in 1994, while growth in 1995 is expected to be more moderate.

The improved economic situation internationally is also expected to push up commodity prices through 1994 and 1995. In line with this, the rise in prices of traditional imports is expected to pick up during 1994, and is projected at 2.2 per cent from 1993 to 1994. Prices of traditional merchandise imports are estimated to rise by 3.6 per cent in 1995. Prices on raw materials are generally expected to rise more than the prices of finished goods, which helps to explain the sharp rise in prices of Norway's traditional export products later in 1994 and in 1995.

Lower price and wage inflation in 1994, slightly higher in 1995

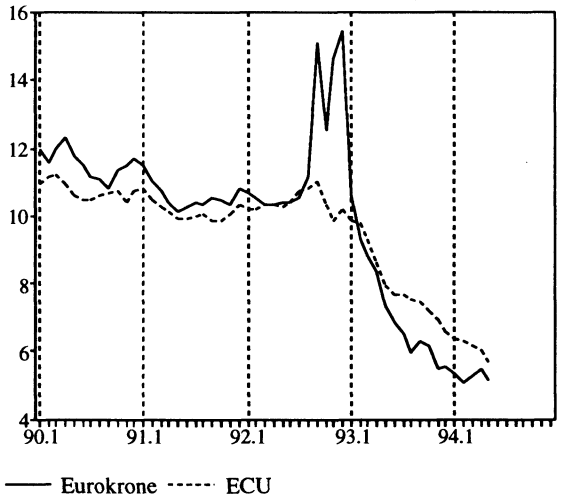
The average rise in the consumer price index is estimated at 1.1 per cent in 1994, increasing to 1.9 per cent next year. Moderate increases in excise duties and the fall in interest rates through 1993, which contribute to reducing housing rents, are the main factors behind the modest price inflation in 1994. A stabilization of interest rates through 1995 and a faster rise in import prices will boost the rise in the consumer price index next year. Improved profitability in the business sector as a result of the cyclical upturn will contribute to slightly higher wage growth next year. The growth in wages per man-hour worked in 1995 is also influenced by the fact that there are two fewer working days compared with 1994.

Higher growth in mainland demand

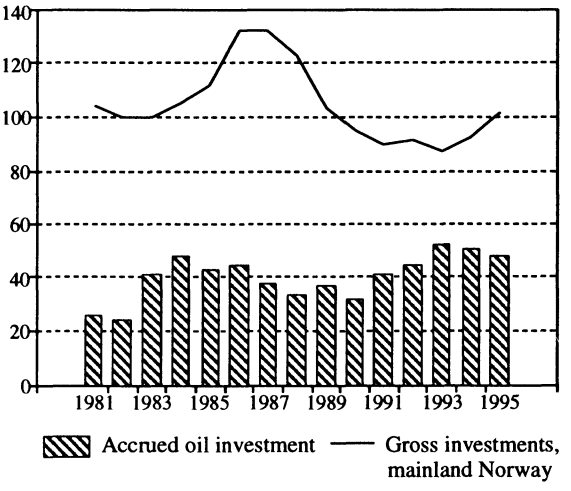
Output growth and the decline in interest rates will, according to the calculations, result in an upswing in mainland fixed investment in 1994, with the rise continuing in 1995. The development of Gardermoen airport and the expansion in housing investment are important factors behind the projected growth, but the calculations also point to a clear investment upturn in some service sectors. Manufacturing investment will probably rise only marginally from 1993 to 1994, but noticeably faster in 1995.

Following several years of growth in household income, the pronounced decline in real interest rates last year spurred the demand for dwellings. The turnaround in the housing market started early in 1993 when housing prices be-

Short term interest rates
Per cent

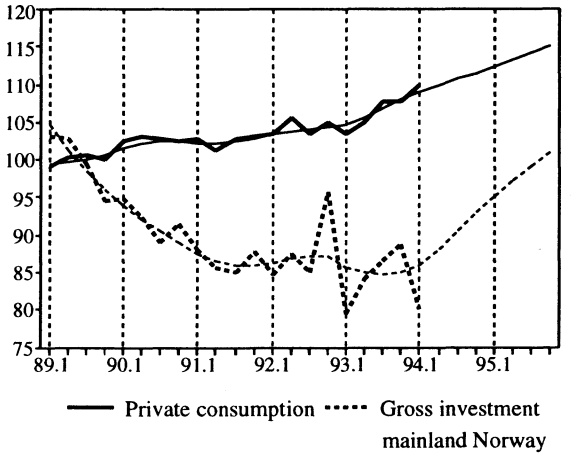


Accrued oil investments and investments in mainland Norway
NOK billion 1991



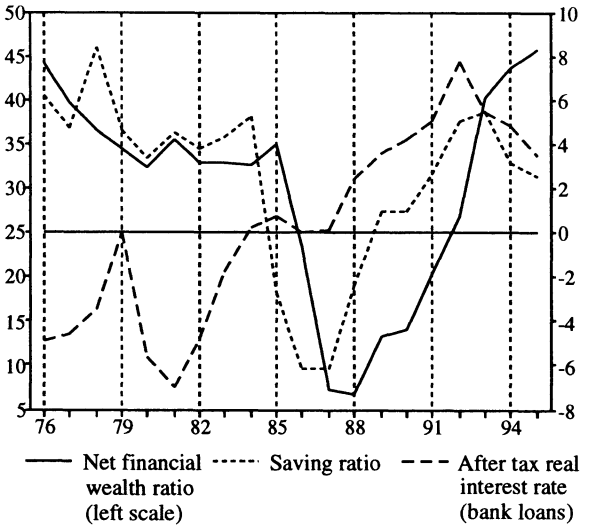
Source: Statistics Norway.

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



Source: Statistics Norway

Net wealth ratio, saving ratio and after tax real interest rate 1976 - 1995

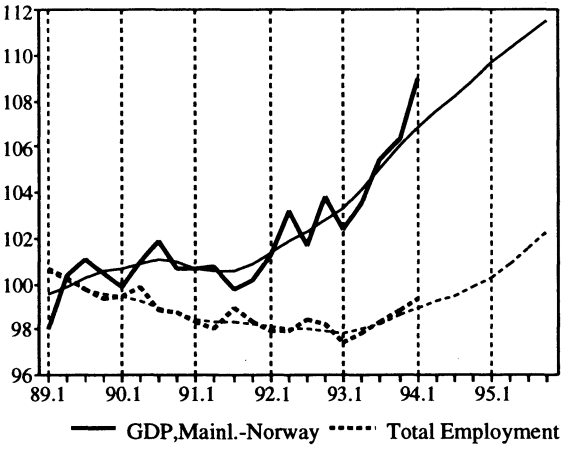


Source: Bank of Norway and Statistics Norway.

Gross domestic product and employment

1989=100. Seasonally adjusted (QNA)

Seasonally adjusted and smoothed (KVARTS)

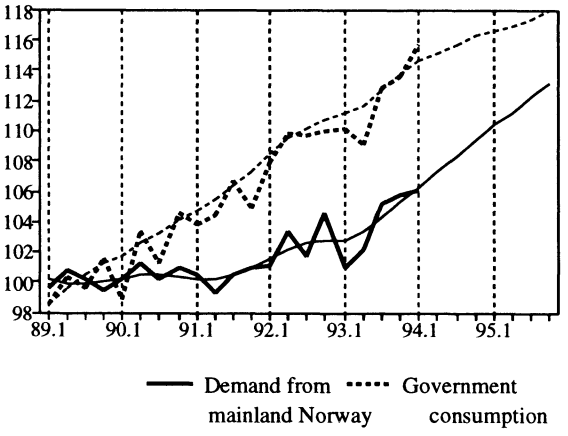


Source: Statistics Norway

Demand from mainl.-Norway and governm. consumption

1989=100. Seasonally adjusted (QNA)

Seasonally adjusted and smoothed (KVARTS)

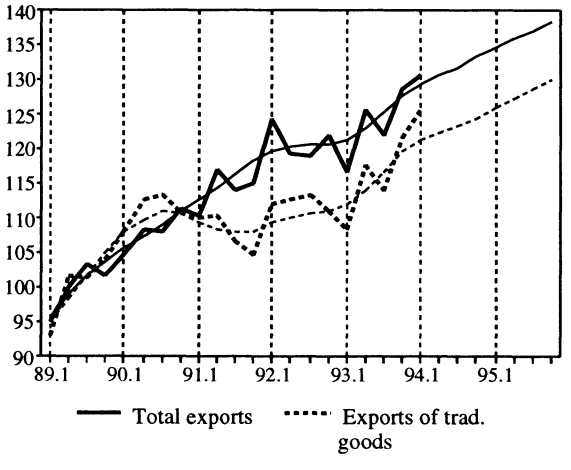


Source: Statistics Norway

Exports

1989=100. Seasonally adjusted (QNA)

Seasonally adjusted and smoothed (KVARTS)



Source: Statistics Norway

gan to pick up. If interest rates decline further, prices will continue to rise in both 1994 and 1995. The increase in prices in 1993 stimulated housing starts and after having touched bottom in 1993 housing investment is estimated to increase by 27 per cent in 1994 and 8 per cent in 1995.

Household real disposable income is projected to rise by about 2 per cent in both 1994 and 1995. The income growth can largely be ascribed to higher wage income as a result of a growth in real wages and rise in the number of man-hours worked. Developments in net interest income also make a positive contribution to the growth in household real disposable income this year, but the effect will be neutral next year. The contribution from higher transfers from the public sector is declining, but is still substantial.

In the last few years net lending has been positive for the household sector. With housing prices starting to pick up, total household wealth is moving on an upward trend following several years of decline. As a result of the increase in wealth, the fall in interest rates and growth in real wages, private consumption is estimated to expand by 4.3 per cent in 1994 and 3.0 per cent next year. An important element in consumption growth in the projection period is a sharp rise in the purchases of new car, partly the result of the low level of car registrations over several years and the fall in interest rates.

According to the calculations, the household saving ratio will be reduced from 5.3 per cent in 1993 to 3.1 per cent in 1994 and further to 2.4 per cent in 1995. Much of the growth in consumption, however, is related to purchases of consumer durables. When consumption is adjusted for such purchases, the decline in the saving ratio from 1993 is negligible. In spite of the sharp growth in household consumption and fixed investment in both 1994 and 1995, the household sector will continue to improve its net financial asset position.

Strong growth in GDP in 1994

In spite of the cyclical turnaround in Norway's main trading partner countries, the calculations show only moderate production growth in manufacturing industries. The growth in private consumption will not benefit to any large extent Norwegian manufacturing industry, but rather stimulate imports and service industries. Lower demand from the petroleum sector will also entail that value added in manufacturing industry only increases by about 1 per cent this year. In line with the outlook for a further rise in market growth, output in export-competing industries will increase somewhat next year. The upswing in machinery investment will also contribute to bringing output growth in manufacturing industry more in line with developments in other mainland sectors.

A sluggish trend in the construction industry for a number of years came to an end and a recovery began at the end of 1993. The sharp rise in housing investment and construction investment in various sectors will result in higher growth in 1994 and 1995.

Production in service industries is generally expected to be slightly higher the next two years than in 1993. As a result, production growth in the total mainland economy will pick up in both 1994 and 1995. According to the calculations, mainland GDP growth will be 3.3 per cent in 1994 and 2.6 per cent next year.

Oil and gas production is projected to rise sharply in 1994, with total GDP growth reaching more than 4 per cent. Next year output growth in the offshore sector will be

Effects of the fall in interest rates

The decline in interest rates is mentioned as an important factor underlying the upswing in mainland Norway's economy in 1993 and the projected upturn this year. It is thus likely that the average lending rates of private financial institutions will show a decline of about 5 percentage points from the end of 1992 to the end of 1994. In order to give an indication of the significance of interest rate movements to economic developments through 1993 and 1994, model calculations have been carried out where Norwegian interest rates are held constant at the level prevailing at end-1992. This counterfactual course for the Norwegian economy is compared with the preliminary accounts figures for 1993 and the projection for 1994 presented above. It should be emphasised that the calculations do not take into account that the fall in interest rates in Norway is largely the result of a general decline in interest rates in Europe and that price inflation abroad and market growth for Norwegian exports would also have been different if interest rates in Europe had not fallen.

The table below illustrates the estimated effect of the decline in interest rates on major macroeconomic variables by showing growth rates for 1993 and 1994 in the two scenarios. The results indicate that the growth in private consumption would have been 0.4 percentage point higher in 1993 if interest rates had not declined. This is ascribable to a fall in household disposable income when interest rates are reduced because the household sector (in the projection period) is in a net financial asset position. The effect is amplified by the faster drop in financial asset rates than in debt rates at the beginning of 1993 in the projection scenario.

Developments in selected macroeconomic variables in two scenarios for the Norwegian economy
Percentage growth from previous year

	Projection scenario		Unchanged interest rates	
	1993	1994	1993	1994
GDP	2.3	4.2	2.4	3.4
Private consumption	1.7	4.3	2.1	1.7
Housing investment	-5.2	27.0	-6.4	-1.4
House prices	0.8	14.2	-1.0	3.3
Consumer price index	2.3	1.1	2.4	1.7

In 1994, on the other hand, consumption growth would have been about 2.5 percentage points lower than estimated if interest rates had not fallen. This is ascribable to other links between interest rate movements and household demand which are incorporated in the KVARTS model. First, a decline in interest rates will increase the demand for dwellings which translates into an increase in the real price of existing dwellings, and thereby a rise in household wealth. The calculations indicate that housing prices would have declined between 1992 and 1993 if interest rates had remained high. The projected upturn in 1994 would also have failed to materialize. A third effect on consumption is that lower interest rates reduce service prices from consumer durables, resulting in higher purchases.

Furthermore, the calculations indicate that the rise in housing investment this year may be looked upon as a result of the fall in interest rates. Changes in the consumer price index are also directly dependent on movements in interest rates inasmuch as a decline in rates results in lower housing rents and thus a lower rise in consumer prices in a transitional period. The table shows that inflation in the present year might have been half a percentage point higher than estimated if interest rates had not declined.

The effect of the fall in interest rates on GDP is estimated at slightly less than 1 per cent this year. The noticeably weaker impact of falling interest rates on GDP compared with the effect on private consumption is partly ascribable to the import component of consumer demand and partly the very limited effect of an interest rate decline on imports and investment.

more in line with the increase in mainland activity, with GDP growth estimated at 2.7 per cent.

Lower unemployment in 1994 and 1995

Pronounced growth in the mainland economy will result in a noticeable improvement in the labour market in the projection period. According to the calculations, unemployment will edge down to 5.5 per cent in 1994 and further to 5 per cent in 1995. After falling since the recession began in 1988, the labour force was unchanged from 1992 to 1993. The calculations indicate a rise in the supply of labour in 1994 and 1995 which is higher than the growth implied by underlying demographic trends.

Rising current account surplus

Crude oil prices are assumed to remain at USD 16.50 p/b on average from the second quarter of 1994 to the end of the year. A crude oil price of USD 17 p/b has been assumed for 1995. With a projected USD exchange rate of NOK 7.20 from the second quarter of this year, this is equivalent close to NOK 116 per barrel in 1994 and about NOK 122 per barrel in 1995.

In the calculations, the trade balance remains approximately unchanged in 1994, rising moderately in 1995. Lower interest payments abroad will result in a reduction in the deficit on the interest and transfers balance in both 1994 and 1995. The current-account surplus is estimated at NOK 27.6 billion in 1994 and slightly higher in 1995.

Norway: Trends in selected macroeconomic variables
Precentage volume changes in 1991 prices*) 1)

	Billion 1991-NOK	Growth from the same period previous year							
	1993	1993	92.2	92.3	92.4	93.1	93.2	93.3	93.4	94.1
Private consumption	361.9	1.7	3.7	0.9	2.0	0.2	-0.6	4.2	2.7	7.0
Goods	222.4	1.6	2.8	0.2	2.5	-0.3	-1.1	5.0	2.8	10.5
Services	127.9	1.7	2.7	2.1	1.2	0.7	0.8	3.0	2.1	3.2
Norwegian consumption abroad	24.7	3.5	14.0	9.0	0.9	1.0	1.0	5.0	6.3	5.4
- non-residents' consumption	-13.1	5.1	-3.9	13.7	-0.1	-3.2	7.8	6.1	7.9	31.3
Government consumption	156.7	1.8	4.4	2.8	5.0	3.0	-1.2	2.9	2.7	5.1
Central government	561.5	2.1	1.3	3.2	4.9	-0.1	0.4	4.2	3.8	6.8
Civilian	21.5	8.0	12.5	-11.7	10.8	-1.5	-4.9	20.0	1.9	-0.6
Military	118.8	6.0	8.6	18.9	10.5	-0.2	4.9	6.2	12.6	17.1
Local government	119.1	2.8	4.5	3.1	3.2	2.7	1.9	2.6	3.8	3.0
Gross fixed capital formation	152.8	15.2	40.7	-5.2	-1.6	7.8	-20.6	95.0	3.1	8.7
Oil and shipping	65.5	59.4	107.6	-19.9	-31.9	98.1	-35.1	405.6	56.3	26.7
Mainland Norway	87.4	-4.7	2.6	0.4	9.2	-6.3	-4.0	1.4	-8.7	2.7
Manufacturing and mining	13.3	-1.2	-12.9	5.3	16.9	-1.9	7.1	4.4	-10.6	-0.2
Production of other goods	11.9	-2.0	0.7	6.2	-5.4	-1.9	5.0	6.1	-16.3	-1.7
General government	22.6	-11.6	23.4	-7.4	6.5	-9.7	-20.3	1.1	-14.3	-1.0
Dwellings	11.7	-5.2	-14.5	-6.7	-7.8	-12.5	-12.9	-6.7	11.3	23.6
Other services	27.9	-0.9	4.9	6.0	23.4	-4.0	6.6	1.7	-6.2	-0.7
Stocks (contribution to GDP growth)[4]	-15.3	-1.4	-7.3	2.5	-0.8	1.7	2.6	-11.0	1.2	-1.6
Ships and oil platforms in progress (contribution to GDP growth)[4]	-7.9	-1.6	-6.1	2.0	0.1	1.5	3.7	-12.0	0.5	-0.2
Other commodities (contribution to GDP growth)[3][4]	-7.4	0.2	-1.2	0.5	-0.9	0.3	-1.1	1.0	0.7	-1.4
Gross investmets (incl. stock changes)	137.3	8.0	3.7	9.0	-6.3	16.0	-15.4	22.9	10.0	-2.2
Final domestic use of goods and services	656.0	3.0	3.8	2.9	1.1	4.1	-3.8	7.7	4.0	4.4
- accrued petroleum investments[2]	52.0	15.9	10.3	2.6	6.5	12.6	-4.9	47.7	17.2	18.6
- accrued investments in ocean transport[2]	5.5	-1430.8	-1018.5	-166.7	-95.6	-191.6	-152.9	87.2	1661.9	-25.0
- demand from mainland Norway	606.1	0.7	3.7	1.3	3.9	-0.0	-1.2	3.5	0.7	5.9
Exports	332.6	1.8	1.5	4.5	5.7	-6.2	5.2	2.7	5.7	11.5
Traditional goods	120.6	3.0	-0.2	6.4	5.9	-3.3	4.4	0.7	10.1	15.5
Crude oil and natural gas	113.4	5.8	7.0	15.9	7.6	-0.6	7.6	1.7	14.2	17.6
Ships and oil platforms	13.0	-12.5	-24.4	-50.8	0.4	-52.4	45.8	54.7	-35.4	-20.8
Services	85.6	-2.2	2.2	1.9	4.3	-4.6	-2.2	1.4	-3.8	2.3
Total use of goods and services	988.6	2.6	3.0	3.5	2.6	0.4	-0.8	6.0	4.6	6.8
Imports	262.3	3.3	4.7	4.1	-2.9	0.0	-4.4	11.3	6.7	7.2
Traditional goods	159.6	1.7	-1.3	11.0	0.6	-3.0	-1.4	3.0	7.8	14.2
Crude oil	1.2	18.9	-47.5	71.3	-47.3	64.7	-25.4	16.5	59.2	-21.5
Ships and oil platforms	15.9	44.4	-7.2	-45.7	-51.4	78.8	-14.8	166.8	40.9	-20.9
Services	85.7	0.8	22.3	0.6	4.4	-1.1	-7.0	12.0	-0.4	-1.6
Gross domestic product (GDP)	726.2	2.3	2.4	3.2	4.6	0.6	0.6	4.2	3.8	6.6
Mainland Norway	586.6	2.0	1.5	0.9	3.9	1.0	0.1	4.3	2.4	4.9
Oil activities and shipping	139.6	3.8	6.2	14.5	8.0	-1.1	2.4	3.7	10.0	14.0
Mainland industry	541.0	1.8	0.9	0.7	3.7	0.8	0.3	3.9	2.2	4.1
Manufacturing and mining	97.6	1.6	-0.6	2.6	1.2	0.1	0.6	2.8	3.1	1.9
Production of other goods	73.9	1.9	5.3	-2.3	10.0	0.2	-4.0	8.4	1.4	1.6
General government	119.1	2.8	4.5	3.1	3.2	2.7	1.9	2.6	3.8	3.0
Private services	250.4	1.4	-1.2	-0.1	3.2	0.5	0.4	3.5	1.4	6.4
Correction items (contribution to GDP growth)[4][5]	45.6	3.5	10.1	4.4	5.2	2.8	-1.5	8.8	4.0	14.8

*) Notes, see "Technical comments".

Norway: Trends in selected macroeconomic variables
Percentage volume changes in 1991 prices*) 1)

	Billion 1991-NOK	Growth from previous quarter seasonally adjusted[6]							
	1993	1993	92.2	92.3	92.4	93.1	93.2	93.3	93.4	94.1
Private consumption	361.6	1.6	2.0	-1.8	1.5	-1.5	1.3	2.8	0.0	2.0
Goods	222.1	1.6	2.3	-2.1	2.5	-3.0	1.8	3.7	0.4	3.7
Services	127.8	1.6	1.7	-0.4	-0.4	-0.0	1.6	1.3	-0.7	1.3
Norwegian consumption abroad	24.7	3.4	-0.9	0.5	-1.0	2.6	-0.6	3.7	0.1	-2.8
- non-residents' consumption	-13.0	5.0	-2.2	10.8	-5.6	-5.1	10.0	6.1	-1.5	14.4
Government consumption	156.7	1.9	1.8	-0.1	0.2	0.1	-0.9	3.4	0.7	1.9
Central government	139.4	3.7	-3.3	5.3	-3.3	0.8	0.1	5.8	2.5	-4.7
Civilian	118.5	5.9	-3.7	6.1	-3.3	1.6	1.2	6.3	2.7	-5.3
Military	20.9	-6.9	-1.3	1.3	-3.1	-2.8	-5.3	2.7	1.8	-1.4
Local government	97.6	1.6	1.2	-0.3	0.1	-1.1	2.0	1.7	0.7	2.7
Gross fixed capital formation	153.1	15.5	87.9	-40.3	7.4	-11.9	41.3	45.7	-41.7	-8.5
Oil and shipping	65.4	59.2	617.0	-74.0	-10.5	9.4	155.0	102.9	-71.5	-6.2
Mainland Norway	87.6	-4.1	3.2	-3.0	12.7	-17.0	5.9	2.7	2.4	-9.4
Manufacturing and mining	13.4	0.1	-2.4	6.7	13.3	-18.6	8.9	6.0	-2.0	-12.7
Production of other goods	12.0	-1.7	0.3	3.9	-3.7	-2.6	8.5	3.9	-23.5	14.8
General government	22.8	-10.2	13.1	-17.0	11.8	-12.8	0.3	3.6	-3.7	-6.2
Dwellings	11.6	-5.6	-1.0	-0.7	-7.1	-4.6	-0.8	6.3	10.5	5.4
Other services	27.9	-1.0	0.1	3.2	30.2	-28.5	11.2	-1.5	19.1	-23.8
Stocks (contribution to GDP growth)[4]	-15.8	-1.5	-1.8	3.6	-1.3	0.6	-7.6	-5.2	9.8	1.0
Ships and oil platforms in progress (contribution to GDP growth)[3)4)]	-8.0	-1.6	-3.4	4.2	-0.2	1.3	-4.7	-8.0	11.9	0.2
Other commodities (contribution to GDP growth)[4]	-7.8	0.5	-0.7	-0.7	-0.2	1.9	-1.6	2.1	-0.6	0.6
Gross investments (incl. stock changes)	137.3	7.6	29.3	-9.1	-4.3	6.3	-6.7	26.3	-13.2	-2.6
Final domestic use of goods and services	655.6	2.9	6.9	-3.0	0.0	0.4	-0.9	7.5	-2.9	1.1
Demand from mainland Norway	606.0	0.8	2.1	-1.5	2.8	-3.6	1.4	2.9	0.5	0.3
Exports	332.3	1.7	-4.0	-0.3	2.4	-4.1	7.7	-3.2	5.5	1.6
Traditional goods	120.5	2.9	0.4	0.7	-2.2	-2.3	8.7	-3.1	6.8	3.3
Crude oil and natural gas	113.3	5.6	-0.2	1.4	1.1	-2.6	7.7	-4.5	14.0	0.4
Ships and oil platforms	13.0	-12.5	-48.7	-25.5	78.5	-30.2	57.1	-20.8	-25.7	-14.4
Services	85.4	-2.3	-2.7	-0.4	2.3	-3.7	0.1	2.2	-1.8	2.7
Total use of goods and services	987.9	2.5	3.0	-2.1	0.8	-1.1	1.9	3.8	-0.1	1.2
Imports	262.3	3.3	9.3	-7.2	0.2	-1.5	4.8	7.2	-3.6	1.6
Traditional goods	159.6	1.6	0.9	2.9	-2.3	-4.5	3.2	6.4	2.8	6.9
Crude oil	1.2	18.9	91.9	-18.2	-32.1	54.7	-13.0	27.7	-7.3	-23.7
Ships and oil platforms	15.9	44.4	186.8	-59.8	39.4	11.2	36.7	25.9	-26.4	-37.5
Services	85.6	0.8	9.9	-13.3	1.9	2.0	3.4	4.9	-10.2	-1.8
Gross domestic product (GDP)	725.6	2.2	0.9	-0.2	1.0	-1.0	0.9	2.6	1.2	1.1
Mainland Norway	586.2	1.8	1.9	-1.4	2.0	-1.4	1.1	1.8	0.9	2.5
Oil activities and shipping	139.4	3.7	-3.3	5.3	-3.3	0.8	0.1	5.8	2.5	-4.7
Mainland industry	540.7	1.7	1.4	-1.3	2.3	-1.4	0.9	1.5	1.3	2.0
Manufacturing and mining	97.6	1.6	1.2	-0.3	0.1	-1.1	2.0	1.7	0.7	2.7
Production of other goods	73.6	0.7	4.0	-2.6	3.9	-4.8	1.1	3.4	2.2	-1.5
General government	119.3	2.9	1.2	0.1	0.3	1.4	0.3	0.9	1.1	0.3
Private services	250.3	1.4	0.8	-2.0	3.6	-1.8	0.7	1.0	1.4	3.6
Correction items (contribution to GDP growth)[4)5)]	45.5	0.2	0.1	0.0	0.2	-0.5	0.2	0.4	-0.3	0.5

*) 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[6]				
	1993	93.2	93.3	93.4	93.1	93.2	93.3	93.4	94.1
Private consumption	1.9	2.1	1.6	1.5	1.0	0.1	0.5	0.5	0.0
Government consumption	1.0	1.0	1.1	1.4	2.6	0.4	0.5	0.7	1.4
Gross fixed capital formation	3.4	3.1	4.1	2.9	0.2	0.0	1.0	-0.2	-3.2
- mainland Norway	1.1	0.6	1.8	1.8	1.7	0.9	0.7	0.4	-0.2
Final domestic use of goods and services	1.9	2.2	1.6	1.7	0.9	1.4	-0.3	0.1	2.6
- demand from mainland Norway	1.6	1.6	1.5	1.6	1.5	0.3	0.5	0.6	0.4
Exports	2.9	3.7	5.6	-2.3	-5.4	-0.6	0.1	-4.0	-0.8
- traditional merchandise exports	0.2	0.8	1.2	-1.6	0.4	-0.7	0.1	-1.1	2.2
Total use of goods and services	2.2	2.5	2.9	0.4	-1.3	0.6	0.0	-1.4	1.5
Imports	2.8	1.9	4.5	2.9	0.9	-0.1	1.8	-0.6	0.5
- traditional merchandise imports	0.4	-0.9	2.0	1.7	0.4	-0.5	0.9	-0.1	0.4
Gross domestic product (GDP)	2.0	2.7	2.4	-0.5	-2.1	0.9	-0.6	-1.6	1.9
- mainland Norway	1.6	2.3	1.0	1.1	1.6	0.5	0.2	0.1	0.9

Technical comments on the quarterly accounts figures

Footnotes:
1) Figures for 1993 may deviate somewhat compared to those published in Økonomiske analyser 4/94 due to new information.
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 precentage of GDP.
5) Corrected for free bank services and certain indirect taxes.
6) The method for seasonal adjustment has been changed.

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 signigicant 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 occurences 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.		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	93.3	93.4
								GDP mainland Norway									
Feb.	-91	2	2	2													
June	-91	1	1	0	-1												
Sept.	-91	1	1	0	0	-1											
Dec.	-91	1	1	0	0	-1	-1										
Feb.	-92	1	1	0	0	0	0	1									
June	-92	2	1	1	0	-1	-1	0	1								
Sept.	-92	2	1	0	0	-1	-1	0	2	3							
Dec.	-92	2	1	0	0	-1	0	0	1	1	0						
Feb.	-93	2	1	0	0	-1	0	1	2	2	1	-1					
June	-93	1	1	0	-1	-1	-1	1	2	2	2	2	0				
Sept.	-93	1	1	0	-1	-1	-1	1	2	2	2	2	0	-1			
Dec.	-93	1	1	0	-1	-1	-1	1	2	2	2	2	1	1	2		
Feb.	-94	1	1	0	-1	-1	-1	1	2	2	2	2	2	2	4	4	
June	-94	2	2	0	-2	-2	-1	2	4	3	1	1	1	3	6	7	4
								Final demand from mainland Norway									
Feb.	-91	2	2	2													
June	-91	1	0	0	-2												
Sept.	-91	1	0	-1	-2	-3											
Dec.	-91	1	0	-1	-2	-2	0										
Feb.	-92	1	0	-1	-1	0	3	4									
June	-92	1	1	0	0	0	2	2	2								
Sept.	-92	1	1	0	0	0	1	2	2	3							
Dec.	-92	1	1	0	0	0	1	2	2	2	1						
Feb.	-93	1	1	0	0	0	1	2	2	2	1	0					
June	-93	1	1	0	-1	-1	1	2	2	3	2	1	-1				
Sept.	-93	1	1	0	-1	-1	1	2	2	2	2	1	-1	-1			
Dec.	-93	1	1	0	-1	-1	1	2	2	2	1	1	1	2	4		
Feb.	-94	1	1	0	-1	-1	1	2	2	2	2	1	1	3	4	4	
June	-94	2	-1	0	-1	-1	1	3	4	2	2	-1	-1	3	6	4	2

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 year, 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	
Sept.	-93	"		
Dec.	-93	"		
Feb.	-94	"		
June	-94	"		

Economic policy calendar 1994

January

1. The EEA Agreement comes into force.

3. Torstein Moland takes over as head of Norges Bank after Hermod Skånland.

8. Kaci Kullman Five announces that she will not seek re-election as Conservative Party chairman at the annual conference this spring.

10. The EU Commission presents a draft reply to Norway's fishery demands at the EU membership talks. The EU accepts Norway's position that catch quotas in Norwegian territorial waters should remain unchanged, and that Norway should be given full market access from its first day as an EU member. On the other hand, the Commission does not accept Norway's demand for complete control over fishery resources north of the 62nd parallel.

10. Statoil and the Finnish group Neste formalise an agreement to merge their petrochemical operations. The new company, Borealis, with headquarters in Copenhagen, will be owned 50-50 by Statoil and Neste. The agreement is subject to the approval of the boards of the two companies, and by the Norwegian and Finnish authorities.

11. The European Monetary Institute starts operations. The Maastricht Treaty designates the institute as the forerunner of the European central bank. The EMI's head office is in Frankfurt.

13. Foreign Minister Johan Jørgen Holst dies at Sunnaas Hospital.

19. The Ministry of Transport and Communications decides that the road link across the Oslo Fjord to Drøbak shall be laid in a tunnel under the seabed. The Ministry thereby sets aside the recommendation of the Directorate of Public Roads for a road bridge across the fjord. The tunnel will be finished in 1998 at the earliest.

21. Statoil finds oil in the Barents Sea, about 40 km off the North Cape. This is the first time oil has been discovered in this area. Preliminary studies indicate modest reserves, in the order of 4-5 million barrels.

24. Bjørn Tore Godal is appointed foreign minister after Johan Jørgen Holst. Grete Knudsen succeeds Mr. Godal as trade minister, while Hill-Marta Solberg becomes the new health and social affairs minister.

26. Representatives of the EU and EFTA agree on a supplementary package of more than 400 directives and other regulations to be included in the EEA Agreement. The new section of the agreement, called EEA 2, includes a number of laws and rules for the single market that have been adopted since August 1991. The new package must be approved by the EFTA countries' national assemblies.

28. The boards of Norges Postbank and the Postal Giro endorse the proposal to merge the two institutions with effect from 1 January 1995. The Storting will probably vote on the merger during the spring session of 1994.

30. The world's six leading aluminium producers agree to reduce excess production on the world market. However, a statement issued after a meeting of representatives from the EU, USA, Russia, Canada, Australia and Norway gives no indication of how much each country is willing to reduce its production.

February

3. The British firm Tarmae and the Norwegian company Noran A/S present plans for the construction of a stone crushing plant in Jøssingfjord in Sokndal. The plant is estimated to cost NOK 750 million.

4. The EU Commission approves minimum prices for a number of fish types, including cod, haddock and salmon, following widespread unrest and demonstrations by French fishermen. The minimum price arrangement enters into force immediately and will be in effect until 15 March 1994.

7. The British Energy Minister Tim Eggar rejects a renegotiation of the Frigg agreement on the transport of natural gas to the UK. This agreement expires in 1997 when the Frigg field is depleted according to plans. This will be an obstacle to annual gas deliveries of a good 2 billion cubic metres from Norway to the British electricity company National Power.

8. Norges Bank lowers its overnight lending rate from 7 to 6.75 per cent. The interest rate on banks' sight deposits is also reduced to 4.75 per cent.

12. The XVII Winter Olympic Games at Lillehammer begin. The Games are completed after 15 days of beautiful weather, and 10 gold medals won by Norway.

15. Bergenhalvøens Municipal Power Company (BKK) is awarded a contract for supplying electric power to the Troll terminal at Kollsnes. The contract will give BKK revenues of more than NOK 1 billion a year.

17. The German Bundesbank lowers its discount rate by half a percentage point, to 5.25 per cent.

18. A government-appointed committee, headed by Professor Aanund Hylland, presents its report on the future role of private pension insurance. The committee proposes that

the tax relief for retirement saving be maintained, but that such saving should no longer have to contain an insurance element. The criterion for tax deductions is that the savings are tied up until the age of retirement and that payments are made over a certain period of time.

24. The Government presents a new White Paper on petroleum activities (Report no. 26 to the Storting, 1993-94) which paves the way for exploratory drilling in new areas off the coast of central Norway and the county of Nordland as well as in a limited part of Skagerak. Controversial areas around Lofoten will be protected from exploratory activities.

March

1. Sweden and Finland complete their membership negotiations with the EU. For Norway, some issues still have to be clarified, particularly concerning the agricultural and fishery sectors. Negotiations are resumed after a five-day break.

7. Norway and the EU temporarily suspend negotiations on membership after failing to reach agreement about catch quotas in Norwegian territorial waters. Negotiations on the agricultural chapter have already been completed. As a member of the EU, the main principle is that EU prices will apply from the first day. However, Norway will be permitted, in a transitional period, to maintain a system that limits imports of some products, including meat, concentrated feedstuffs, tinned vegetables and a few dairy products.

7. Aker Stord is awarded a contract for joining the deck and concrete base for Troll phase 1. Altogether, the Aker Group has received contracts worth about NOK 10 billion for the Troll field development.

11. In a report on future student financing, the Storting's Church and Education Committee advocates an increase in the scholarship component of student loans to 30 per cent by 1997.

11. The central government approves the proposal presented by Norsk Hydro's board to increase capital by up to NOK 5 billion. The Government indicates that it will participate in the share capital increase, with the government retaining its majority shareholding in Hydro.

15. Norway and the EU reach agreement on a fishery agreement. The fishery chapter entails that Spain will have a quota of about 4,000 tons of cod in Norwegian territorial waters beginning in 1995. Norway will continue to have control over fishery resources north of the 62nd parallel up to July 1998. After this time the EU will formally take over the management, but the agreement contains declarations that the EU will apply Norway's management regime for fishery resources. For processed fish, Norway will have full market access from the first day of membership. However, a monitoring system will be established which, in a transitional period, can result in import limitations for certain types of fish.

18. The Swedish Government decides that the referendum on EU membership will be held on 13 November.

19. The international agreement on climate change comes into force. The Climate Convention, signed by 159 countries at the UN Climate Conference in Rio de Janeiro in 1992, requires that the countries draw up an action plan for climate measures. The aim is to stabilise national emissions at the 1990 level in the year 2000.

21. Aker Contracting is awarded a contract for the installation of a new process module on the Frigg field. The contract, worth NOK 200 million, was awarded by Elf Petroleum Norge.

26. At a meeting in Geneva OPEC decides to maintain current quotas, with total daily production at 24.5 million barrels of crude oil.

30. Kværner Energy A/S is to supply turbines and mechanical equipment to the hydropower project Natpha Jhakri in India. The contract is worth NOK 350 million.

30. EU countries reach an understanding on new voting rules in an enlarged union. The last chapter in negotiations between the EU and the four applicants - concerning institutional conditions - can thus be completed.

April

10. The trade union and employer's organisation in the engineering industry reach agreement in this year's wage rounds. The agreement provides a general pay increase of NOK 1 from 1 April this year. Local negotiations will take account of each company's financial position. The parties agree to study more flexible working time arrangements in the period to 1995.

10. Jan Petersen becomes chairman of the Conservative Party after Kaci Kullman Five.

12. Negotiators from the EU and Norway sign the final agreement for Norway's accession to the EU.

14. The German Bundesbank reduces its discount rate by 25 basis points, to 5.00 per cent. The Lombard rate is also lowered to 6.50 per cent.

14. The new GATT agreement (Uruguay Round) is signed by 122 countries, and a new free trade organisation - World Trade Organization - is established to replace GATT.

24. It is revealed that the stockbroking firm Carnegie has lost more than NOK 200 million on large transactions in money and bond markets.

25. Norsk Hydro presents its profit and loss accounts for the first quarter of 1994. The accounts show an operating profit of almost NOK 1.6 billion for the period. Agricultural business accounts for much of the improvement in results from the first quarter of 1993.

25. The Government proposes a merger of Norges Postbank and the Postal Giro with effect from 1 January 1995 (cf. also 28 January). The new bank, to be fully owned by the Postal Services Administration, will have total assets of NOK 76 billion and be the fourth largest bank in the country.

29. The gas pipeline, Zeepipe, is officially opened. The pipeline will transport natural gas from the Troll field to Zeebrugge in Belgium.

29. Public sector pay negotiations are completed, entailing that all central and local government employees will receive a pay increase of NOK 2,100 from 1 May this year. In addition, limits have been set for local wage adjustments.

May

4. The EU Parliament approves the membership agreement with the four new applicants, including Norway.

6. The Government presents the Revised National Budget for 1994. The budget includes proposals to raise petrol taxes by 25 øre a litre and increase the wealth tax.

11. The German Bundesbank lowers its discount rate by half a percentage point, to 4.50 per cent. The Lombard rate is also reduced to 6 per cent.

18. Saga Petroleum A/S concludes its drilling and testing of two exploratory wells southwest of the Snorre field. Promising finds of hydrocarbons are made in both wells.

20. Den norske Bank carries out a private placement of 53 million shares. With a price per share of NOK 16.75, DnB's share capital increases by NOK 888 million.

25. The EU approves the oil directive. The directive regulates the exploration for oil and gas, including the North Sea. Norway was actively involved in the work on the directive through the EU negotiations. Irrespective of whether or not Norway becomes a member, the oil directive, subject to deliberations both nationally and in an EEA context, will apply to the Norwegian continental shelf as part of the EEA Agreement.

June

3. The Government presents a White Paper (Report no. 40 to the Storting 1993-94) concerning Norway's EU membership.

6. The Storting decides to convert Norwegian Telecom from a public corporation to a state-owned limited company.

11. The Labour Party and the Christian Democratic Party reach a compromise in the Storting on the Revised National Budget for 1994. The compromise entails, among other things, that VAT compensation for certain foodstuffs is not reduced as proposed by the Government. This will be compensated by raising excise duties on cigarettes and increasing the production tax on electric power. As part of the agreement on the revised budget, the interest rate on loans from the State Educational Loan Fund will be lowered from 8.5 to 7.5 per cent for loans that have run for less than seven years.

Four Decades of Norwegian Energy Use: An Analysis of Sectoral Trends

Sarita Bartlett

This article presents a sectoral analysis of the evolution of energy use in Norway from 1950 to 1991. The approach permits an analysis of the underlying factors that have contributed to this evolution. Focus is placed on changes in the following factors: (1) the levels of sectoral activities; (2) the relative importance of sectoral activities; (3) the intensities of the energy used to perform activities; and (4) the fuels used to perform many of these activities. During the past four decades, growth in real GDP translated into increases in activities and the intensity of the energy used to perform most activities. There was also a shift towards more energy-intensive activities. While these changes neither occurred uniformly over time nor had uniform impacts across sectors, they did contribute to substantial increases in total energy use. The impacts of the large increases in real oil prices ensuing OPEC I and OPEC II on energy use were offset by growth in real GDP and by increases in the use of relatively less expensive electricity.

Introduction

Norway is endowed with abundant oil, natural gas, and hydroelectric power reserves.[1] However, despite her abundant resources, she faces challenges relating their future use. There are environmental consequences of expanding hydro capacity, using fossil fuels for electricity production, and using petroleum for transportation. And, as international electricity markets expand, the opportunity costs of using electricity inefficiently will increase.

In order to address these challenges, it is important to have a clear understanding of the changes in energy use that have occurred in the past. This article presents a sectoral analysis of the evolution of energy use in Norway from 1950 to 1991. The manufacturing, transportation, service, and residential sectors have been chosen because together they have represented more than 90 percent of energy use (excluding energy used in the energy sector), and because it is only for these sectors that sufficient time-series data are available. The long time frame makes it possible to analyze the evolution of energy use in a stable price domain before the large shifts in relative prices following OPEC I (between 1973 and 1974), analyze the short-term impacts of the three large relative price changes ensuing OPEC I, OPEC II (between 1979 and 1981), and in the mid-1980s, and then evaluate these short-term impacts in a long-term context. The long time frame also permits an analysis of many of the impacts of the turnover of energy-using equipment, vehicle, dwelling, and commercial building stocks on the evolution of energy use.

An Overview of the Evolution of Energy Use

Climate-corrected delivered energy use in the manufacturing, transportation, service, and residential sectors increased from about 190 PJ in 1950 to nearly 620 PJ in 1991.[2, 3] (See Figure 1.) In the 1950s, energy use increased at an average rate of 3 percent per year. From 1960 to 1973, energy use increased rapidly at an annual rate of 5 percent. While energy demand continued to increase during the remainder of the 1970s, it grew at a much slower rate of approximately 2.5 percent per year. After falling slightly from 1979 to 1982, in response to the large energy price increases, energy demand grew until 1990.

In the 1950s, increases in aggregate energy use were supported by growth in energy use in the manufacturing and transportation sectors. While increases in energy use were sustained by growth in energy use in every sector in the 1960s, in the 1970s, increases were supported by growth in energy use in every sector except manufacturing. Energy use in the residential and service sectors increased more rapidly between 1980 and 1990 than in the previous decade, and transportation energy use increased at a slower rate (primarily because of a decline in freight transportation energy use from 1987 to 1990). Aside from temporary cyclical upturns in manufacturing energy use, this sector's use of energy has remained relatively constant since the mid-1970s.

Variations in the growth of sectoral energy use led to changes in each sector's relative contribution to aggregate energy use from 1975 to 1991. The most striking

1 The hydro electric power reserves have been more than adequate to support Norway's electricity demand; electricity has been almost entirely generated from hydropower.

2 The data contained in this article are based on data presented in Bartlett (1993). That report contains a description of the data and the data sources.

3 In this article, energy is expressed as delivered energy (i.e., energy delivered to the point of use), except when noted. Climate-corrected energy is energy that has been adjusted to reflect long-run average weather conditions.

Figure 1. Delivered Energy Use by Sector

PJ (Climate Corrected)

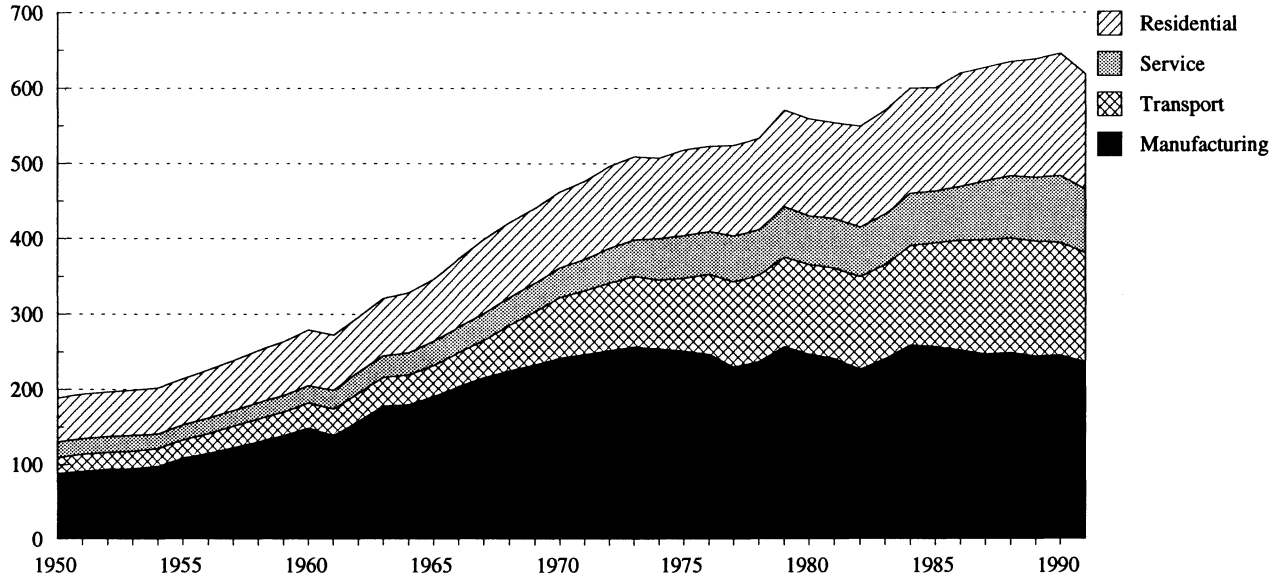
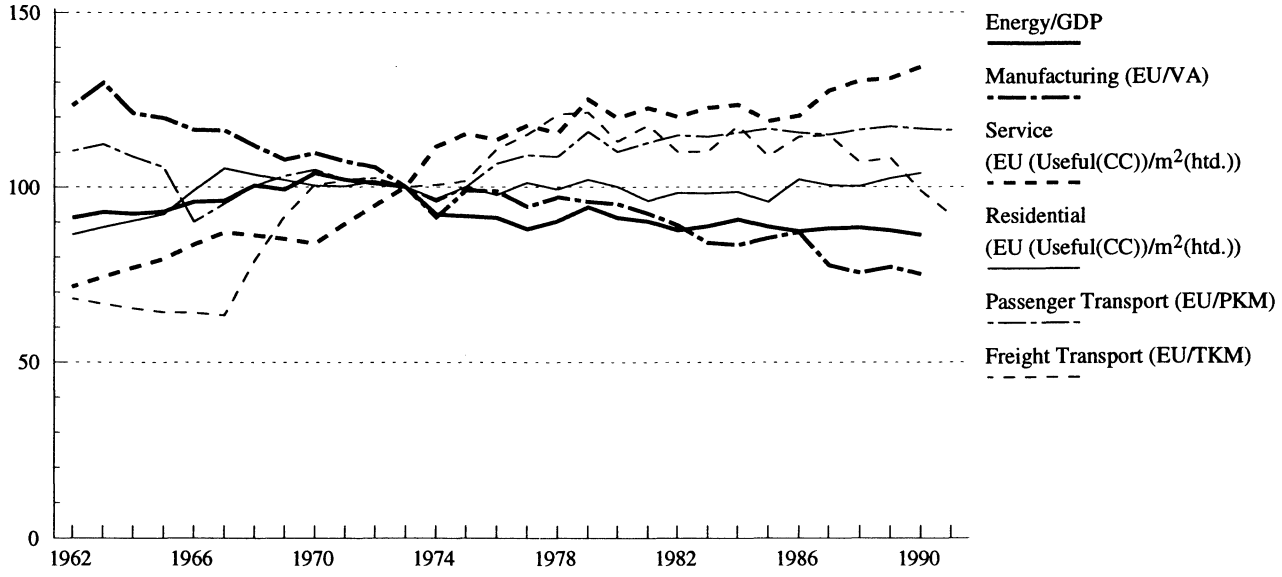


Figure 2. Intensity-Related Indicators of Energy Use

1973=100



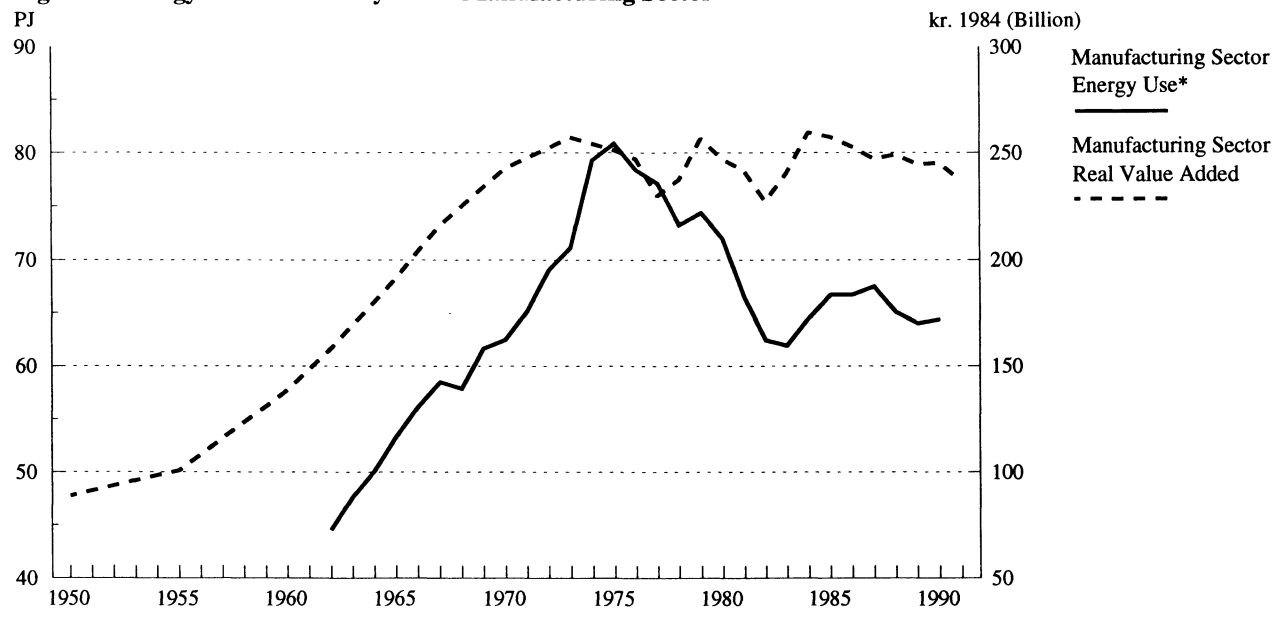
"GDP" refers to gross domestic product, "EU" to energy use, "VA" to real value added, "m^2 (htd.)" to heated floor area, "PKM" to passenger-kilometers traveled, and "TKM" to ton-kilometers transported.

transformations were that the portion of aggregate energy used for transportation increased from 11 to 23 percent, and the share of manufacturing energy use decreased from 47 to 38 percent. The residential sector's share of aggregate energy use declined from 31 to 25 percent and the service sector's share increased from 11 to 14 percent.

The Importance of a Sectoral Analysis

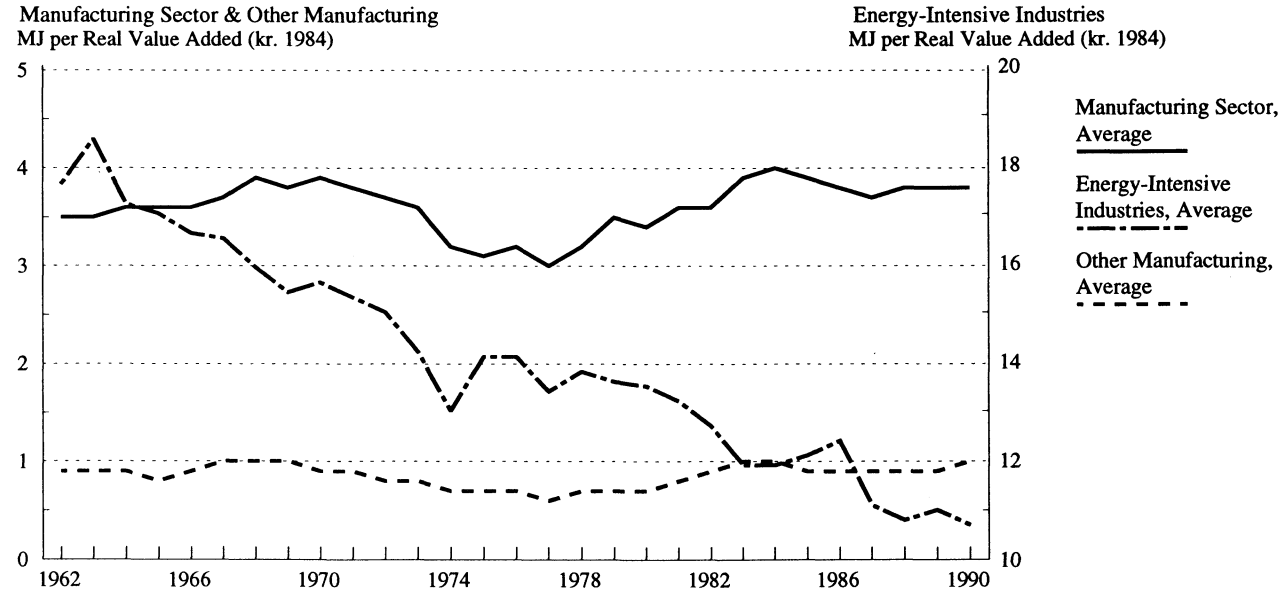
Aggregate energy use has tended to follow activity (real gross domestic product (GDP)), and in most sectors, energy use has also ensued activity. Nonetheless, activity indicators alone cannot entirely explain energy use trends. Another indicator of energy use trends is the intensity of energy use. Figure 2 illustrates the aggregate intensity indicator (the ratio of aggregate energy use to real GDP) and the sectoral average intensity indicators indexed to their 1973 values. Even though the aggregate indicator has exhibited a downward trend since the early 1970s, most sectoral indicators have tended to increase. The main reason for this divergence is that the aggregate indicator conceals changes in the following factors: (1) the levels of sectoral activities; (2) the relative importance of activities; and (3) the intensity of the energy used to perform

Figure 3. Energy Use and Activity in the Manufacturing Sector



* Excludes the use of feedstocks.

Figur 4. Energy Intensities in Manufacturing Sector



activities. In order to analyze these underlying factors, a sectoral analysis should be conducted.

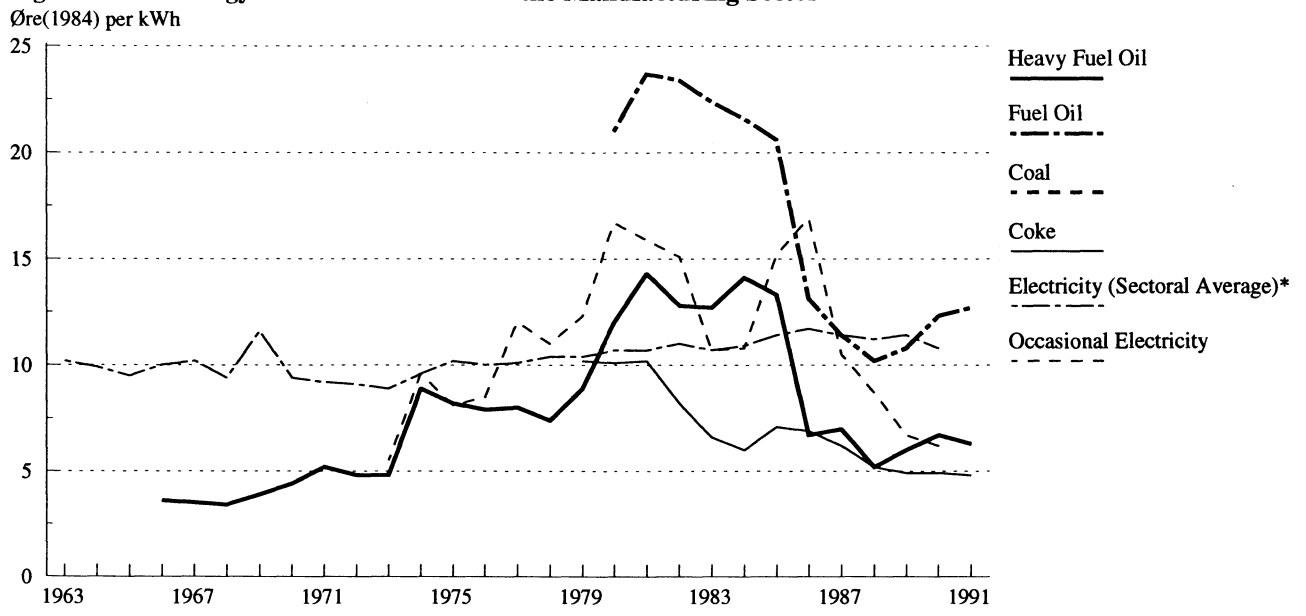
The impacts of the large increases in real oil prices following OPEC I and OPEC II on energy use were offset, in most sectors, by growth in real GDP.[4] In addition, many agents substituted less expensive electricity, and to a lesser extent solid fuels, for oil in production processes and for space heating purposes. A sectoral analysis permits a more thorough examination of this fuel-switching behavior.

Manufacturing Sector

Energy use in the manufacturing sector depends on the level of output produced, the intensity of energy used to produce this output, and energy prices. Energy prices also influence the intensity of energy use and a firm's choice of fuels. Since this sector is constituted of industries engaged in the production of diverse commodities, there can be large differences in energy intensities among industries. Over time, the level of energy use can change because of variations in the total output or the sectoral average intensity, but it can also change because of transformations in

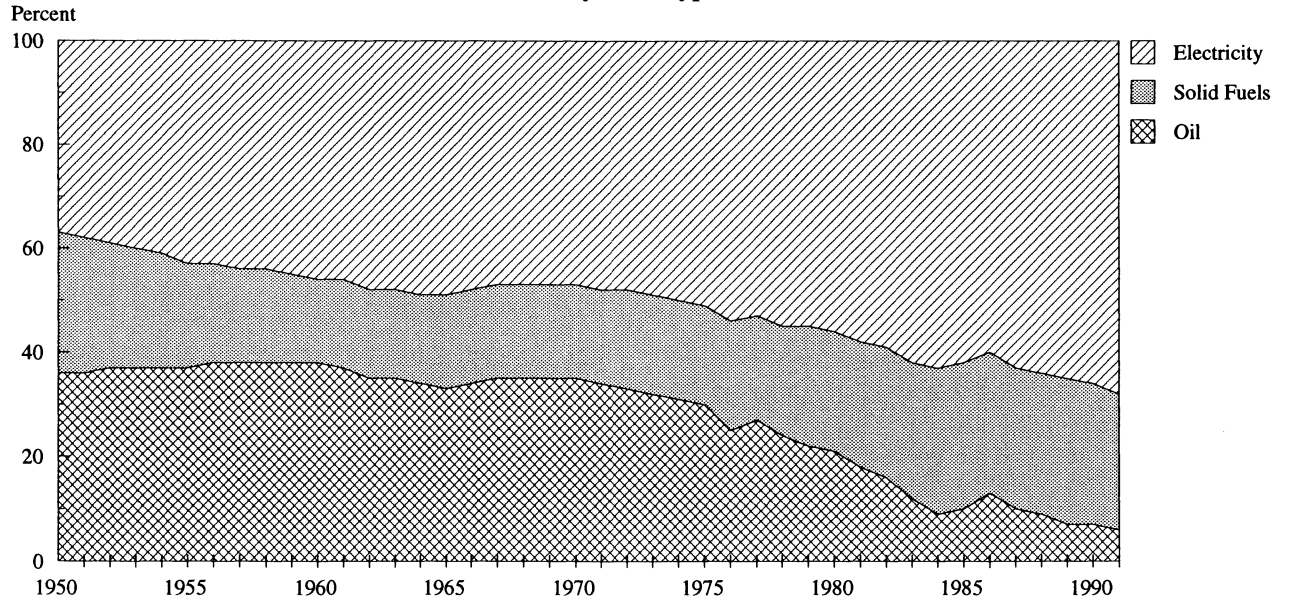
4 Figures 5, 8, 12, and 15 illustrate the changes in real energy prices for each sector.

Figure 5. Real Energy Prices for Customers in the Manufacturing Sector



* There are significant variations in the electricity prices in this sector. Customers in the other, less energy-intensive industries have paid two to three times more per kWh than their counterparts in the energy-intensive industry groups.

Figure 6. Energy Use in the Manufacturing Sector by Fuel Type



the composition of activities. In order to capture the latter changes, the sector is divided into five energy-intensive industry groups and a residual group that comprises other, less energy-intensive industries.[5]

From 1950 to 1973, energy use in the manufacturing sector grew at an annual average rate of nearly 5 percent from approximately 89 to 257 PJ. [6] The growth in energy use during this period was primarily supported by increases in activity. (See Figure 3.) From 1962 to 1973, real value added (a measure of activity in this sector) grew at an annual average rate of 4.3 percent from 44.6 to 71.1 billion 1984 kroner. A slight increase in the average intensity of energy use, from 3.5 to 3.6 MJ per real kroner value added, also led to an increase in energy use. (See Figure 4.) The increase in the average intensity was, however, due to changes in the composition of sectoral activity. That is, increases in the energy-intensive industries' share of

5 The five energy-intensive industry groups are: (1) Paper and pulp industries; (2) Industrial chemicals; (3) Mineral products (Stone, clay, and glass); (4) Iron, steel, and other ferro alloys; and (5) Non-ferrous metals. For a description of industries contained in these groups and the industries contained in the residual group, see Bartlett (1993).

6 Energy use excludes the use of feedstocks. See Bartlett (1993).

sectoral activity, from 16 to 21 percent of sectoral value added, outweighed the reductions in the average intensity of energy use in energy-intensive industries (from 17.6 to 14.2 MJ per real kroner value added) and in the other industry group (from 0.9 to 0.8 MJ per real kroner value added). As a consequence of these changes, the energy-intensive industries' share of sectoral energy use increased from 73 to 82 percent from 1950 to 1973.

From 1973 to 1990, energy use remained fairly constant even though output declined after peaking in 1975. The fluctuations in energy use, illustrated in Figure 3, are related to cyclical changes in output. Aside from two cyclical upturns, real value added declined to 64.3 billion 1984 kroner in 1990, and reached a low of 16 percent of real GDP. The decline in total manufacturing output was, in turn, due to a decline in the other, less energy-intensive industries group's output; the energy-intensive industries groups' output increased. By 1990, energy-intensive industries accounted for 29 percent of sectoral output. While there were reductions in the intensity of energy use in all groups in the first half of the 1970s, especially in industries that were more dependent on the use of oil, by the mid-1980s, the sectoral average energy intensity had rebounded to above its pre-1973 level. This rebound is not attributable to increases in the average intensity in energy-intensive industries — in 1990, the average intensity in energy-intensive industries was 25 percent less than its 1973 level — rather it is attributable to the following: the underlying changes in the composition of sectoral output (i.e., the increases in the energy-intensive industries groups' share of sectoral output) and the increases in the average intensity in the other, less energy-intensive industries group outweighed the decreases in the average intensity in energy-intensive industries.

The large shifts in relative prices following OPEC I and OPEC II contributed to substantially alter the composition of the fuels used in the manufacturing sector. (See Figures 5 and 6.) From 1950 to 1970, oil use increased from 32 to 85 PJ. However, the share of sectoral energy use met by the use of this fuel remained constant at around 35 percent. In 1970, the paper and pulp industries and the other industries group each accounted for around one-third of the oil used in this sector, and 20 percent was used in the stone, clay, and glass industries. After 1970, oil use declined rapidly (aside from a small upturn between 1984 and 1986). The reductions in oil use were due to the shifts in relative energy prices and were reinforced by declining sectoral activity. From 1973 to 1981, the real price of heavy fuel oil increased at an annual average rate of nearly 15 percent. The average real price of electricity increased only slightly. While oil continued to be the predominant fuel choice in the other, less energy-intensive industries group and in the paper and pulp industries, regulations enacted on water deposits in the mid-1970s diminished oil use in the paper and pulp industries.[7] In addition, regulations enacted on SO_2 emissions led to fuel switching from oil to electricity. By 1991, oil use declined to 14 PJ and represented 6 percent of sectoral energy use.

After a slight decline in the use of solid fuels (coal, coke, and wood) from 24 to 20 PJ from 1950 to 1955, their use increased almost continuously until 1984. After the use of these fuels peaked in 1984 at 73 PJ, their use declined to 62 PJ in 1991. Solid fuels have been mainly used in the iron, steel, and ferro-alloy industries (38 percent in 1991), the paper and pulp industries (21 percent), and in the other, less energy-intensive industries group (17 percent).

Electricity use increased almost continuously from 33 PJ (or 37 percent of sectoral energy use) in 1950 to 162 PJ in 1984, declined by 7 percent between 1984 and 1986, and then remained fairly constant. In 1991, electricity use was 159 PJ (or 67 percent of sectoral energy use). Electricity has been used primarily in the metal industries, but by 1991, its use accounted for more than half of each of the industry groups' total energy use (aside from the stone, clay, and glass industries, where it represented 30 percent of these industries' total energy use).

Transportation Sector

The transportation sector can be divided into passenger, freight, and miscellaneous transportation (e.g., transport in the agriculture and forestry sectors), telecommunications, and pipeline transport. This analysis focuses on the first two groups as they have represented around 90 percent of transportation energy use and consistent time-series data are not available for the latter groups.

Passenger Transportation

Passenger transportation energy use depends on the relationships among structural variables (i.e., the characteristics of the transport modes), activity (the utilization of the modes), the infrastructure (e.g., the relative location of homes to work places, businesses, and leisure activities, and the availability of mass transit), economic factors (e.g., disposable income and the relative costs of the transport modes), and the demographic characteristics of the households.

From 1962 to 1991, per capita energy use for passenger transportation grew at an average annual rate of 5 percent from 5 to 21 GJ. (See Figure 7.) Most growth occurred between 1960 and 1970 and, to a lesser extent, between 1970 and 1980. Since 1985, energy use per capita has remained fairly constant. Growth in energy use was primarily sustained by large increases in activity (measured as passenger-kilometers (pkm) traveled per capita). From 1950 to 1991, activity increased at an average annual rate of 4.7 percent from 1,843 to 11,889 pkm. The substitution of automobiles and airplanes for relatively more

7 Under this regulation, wood and related wastes, and water must be separated, and then the wastes are reintroduced as an energy input in the production processes. Thus, oil use is reduced.

Figure 7. Passenger Transport Energy Use and Activity

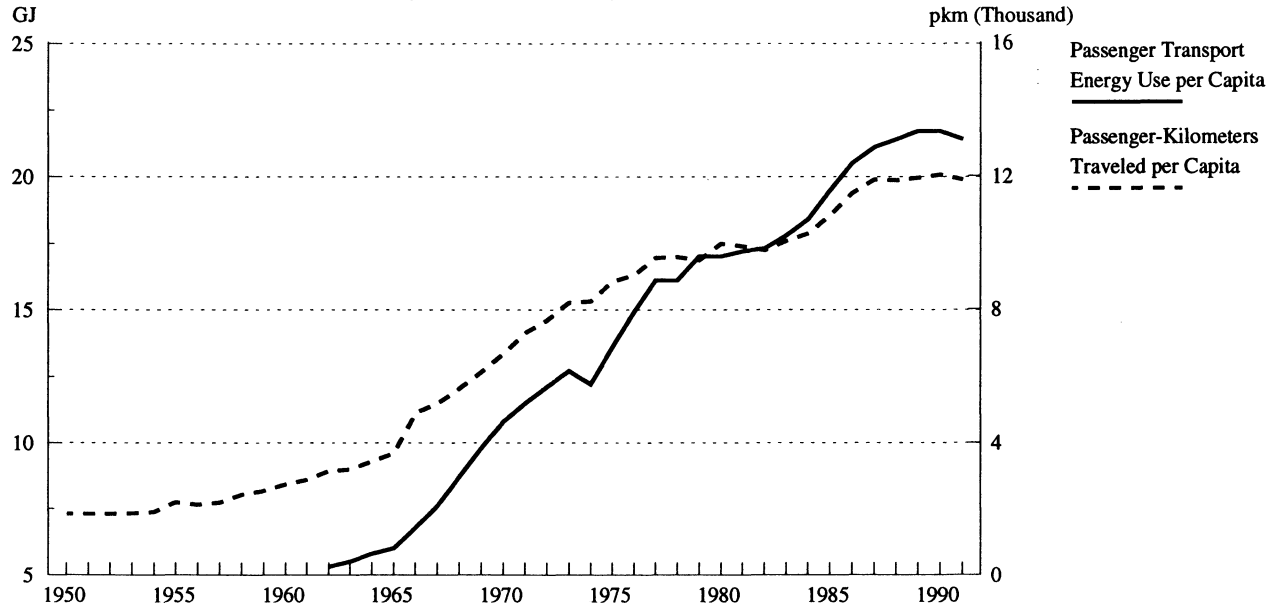
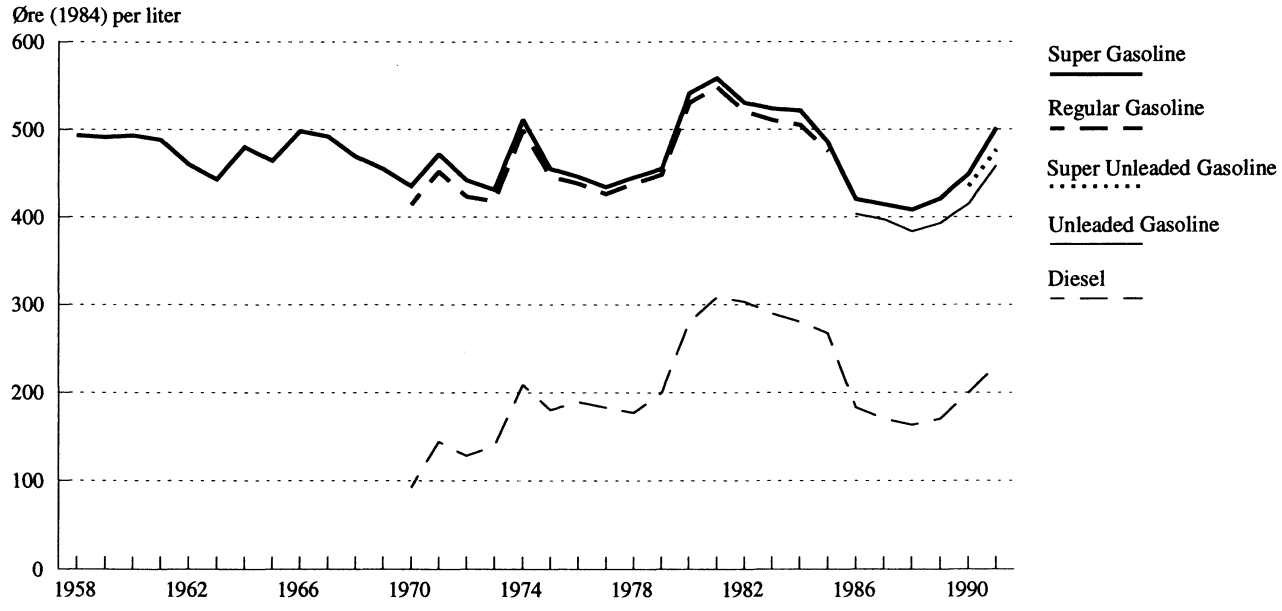


Figure 8. Real Gasoline and Diesel Prices



Gasoline and diesel prices include taxes and value added taxes (VAT).

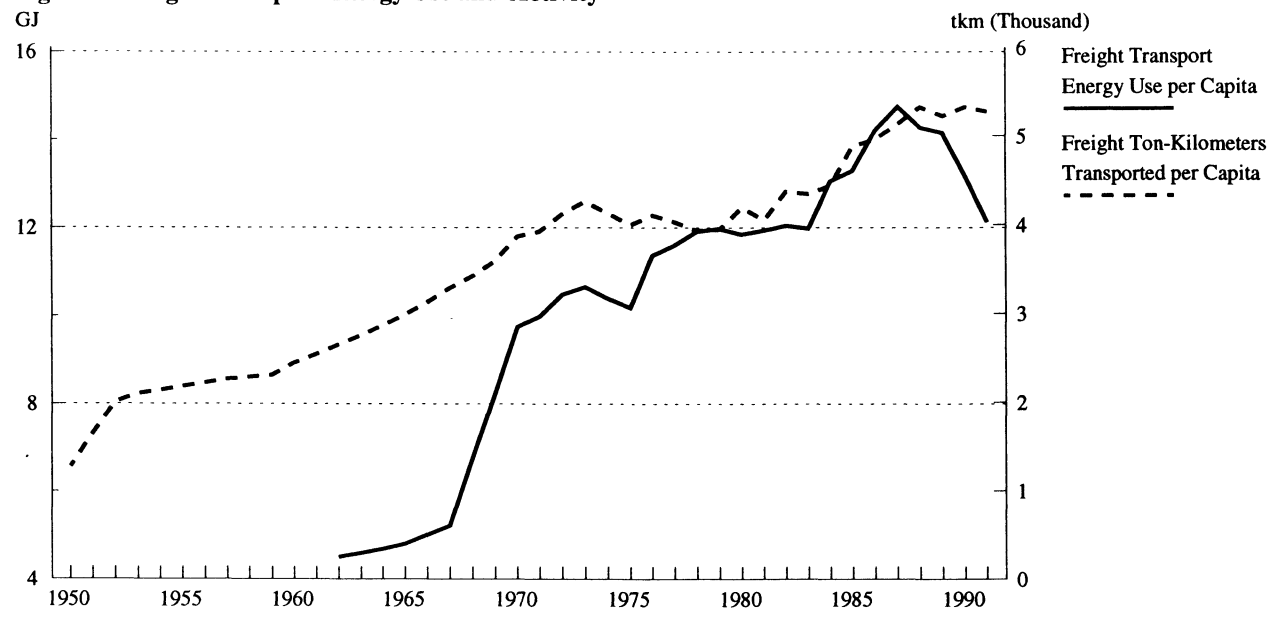
energy-efficient buses and trains also supported increases in passenger transportation energy use. From 1950 to 1991, the share of passenger travel by automobile and airplane increased from 24 to 79 percent, and less than 1 to 5 percent, respectively. The above changes contributed to increase the shares of energy used for passenger transportation by automobile and airplane from 55 to 73 percent and from 15 to 18 percent from 1962 to 1991.

The increases in the real price of gasoline between 1963 and 1966, between 1973 and 1974, and between 1979 to 1981 did not lead to significant reductions in per capita energy use or passenger-kilometers traveled because the effects of the price increases were outweighed by growth in real per capita disposable income, and because households decided to devote a larger share of their total expenditures to gasoline purchases during these periods. (See Figure 8.)

Freight Transportation

The energy used for freight transportation depends on the relationships among structural variables, activity, infrastructure (e.g., the relative locations of industries to

Figure 9. Freight Transport Energy Use and Activity



markets), economic factors (e.g, the output of firms and the relative costs of the transport modes), and the composition of the freight (in terms of perishability, weight, and value).

From 1962 to 1967, freight transportation energy use per capita increased slowly from 4.5 to 5.2 GJ, and then more than doubled between 1967 and 1973. This growth was supported by increases in activity (measured as freight ton-kilometers (tkm) transported per capita). Freight activity increased from 1,270 to nearly 5,270 tkm per capita from 1950 to 1973. (See Figure 9.) As many industrial facilities have been located in rural coastal areas, freight transportation has been dominated by the use of ships and boats. The share of freight transported by ship and boat increased from 49 to 67 percent from 1950 to 1973. During this period there was also a marked increase in the use of trucks; the share of freight ton-kilometers transported by truck increased from 17 to 25 percent.

Per capita energy use for freight transportation declined only slightly in response to a 50 percent increase in the real diesel fuel price between 1973 and 1974. The effects of this price increase were offset by growth in real GDP. After this short-term decline, energy use increased slowly until the early 1980s. While activity stabilized, increases in energy use were supported by a shift towards a more energy-intensive composition of activity; the share of tkm transported by truck increased to 32 percent in 1983, and the share of tkm transported by ship decreased to 60 percent.

The effect of a 74 percent increase in the real price of diesel fuel on freight transport energy use between 1978 and 1981 was again offset by growth in real GDP. From 1980 to 1987, increases in activity, and further increases in the share of tkm transported by truck, led to large increases in energy use. Nonetheless, this growth was somewhat dampened by decreases in the average intensity of freight transportation energy use. While activity, and the composition of activity stabilized from 1987 to 1991, continued reductions in the average intensity of freight transportation energy use contributed to diminish energy use.

Service sector

Energy use in the service sector is dependent on the level of activity (measured as heated floor area (m^2)), the intensity of energy use (measured as energy use per heated m^2), sectoral value added, energy prices, and the climate. This sector is constituted of private and public entities that produce heterogenous goods and services, so over time the level of energy demand can change because of variations in activity or in the intensity of energy use, but also because of shifts in the composition of the buildings.

Climate-corrected delivered energy use in the service sector increased slightly from 20 PJ in 1950 to 23 PJ in 1960, and then increased rapidly, reaching 67 PJ in 1979. (See Figure 10.) This strong growth was due to the expansion of the floor area and increases in the intensity of energy use. From 1960 to 1979, the heated floor area increased from approximately 25 to 48 million heated m^2 and intensity of energy use increased from nearly 550 to 1,207 useful MJ per heated m^2.[8] (See Figure 11.) The

8 Useful energy is defined as delivered energy net estimated combustion losses. In this analysis, it is measured as 66 percent of heating oil, 55 percent of solid fuels, and 100 percent of electricity and district heat.

Figure 10. Energy Use and Activity in the Service Sector

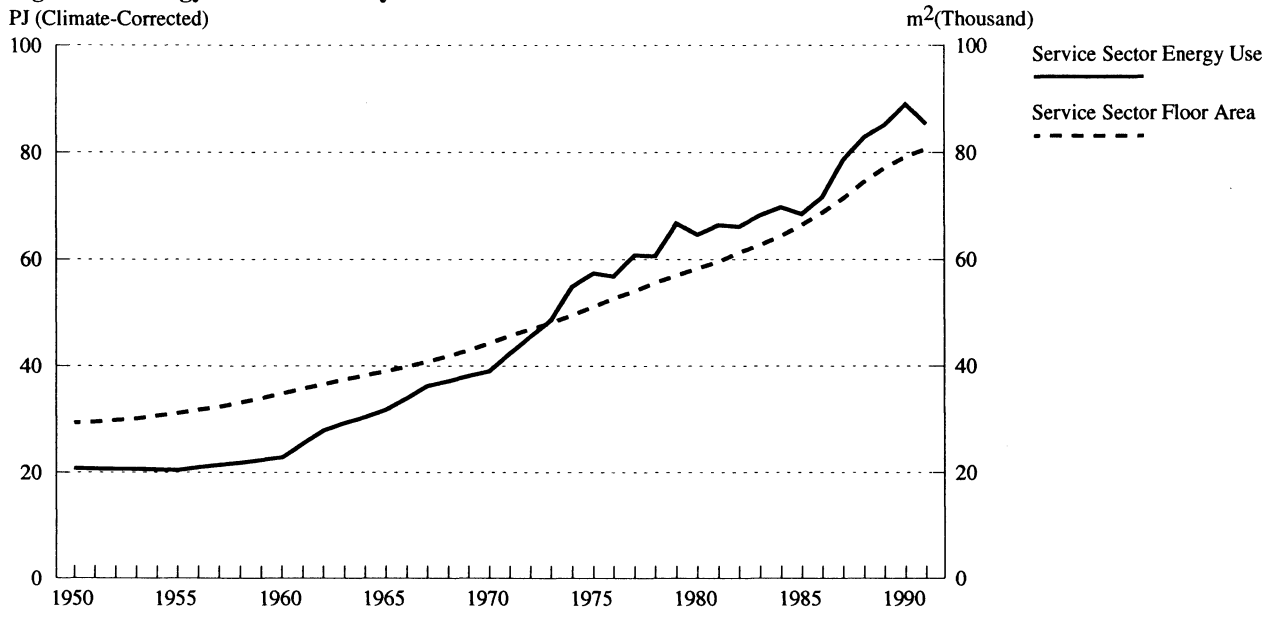
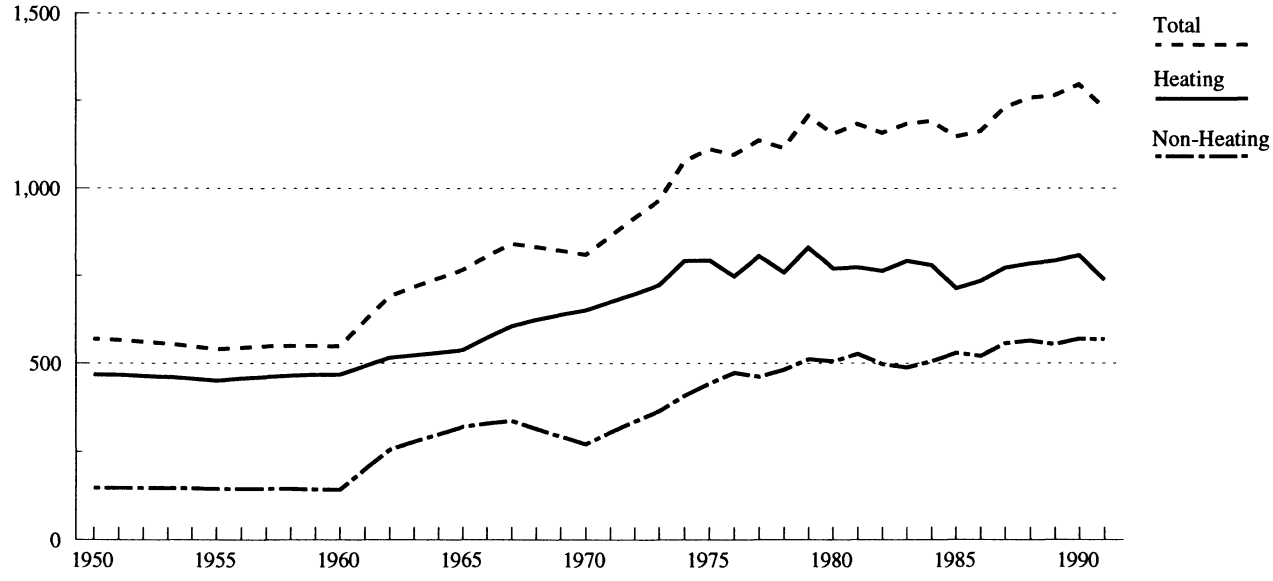


Figure 11. Service Sector Energy Intensities

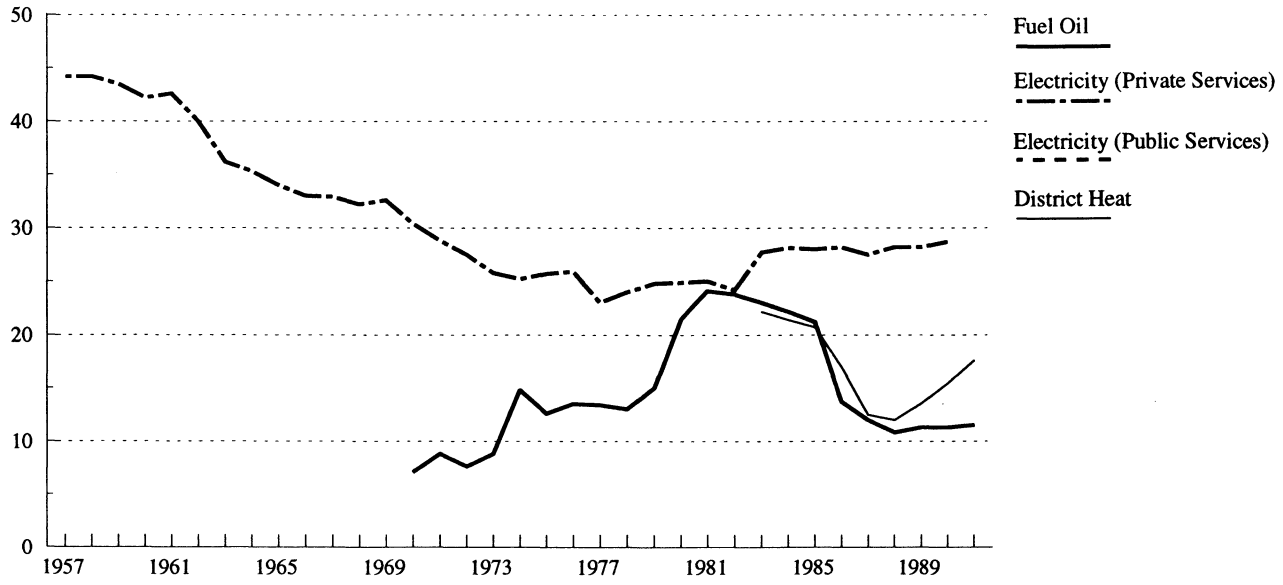


Heating includes water heating.

expansion of the floor area and the increases in the intensity of energy use were, in turn, supported by growth in real sectoral value added. Real value added increased from nearly 94 to 182 billion 1984 kroner from 1962 to 1979.

After increasing slightly in the first half of the 1980s, energy use increased from 69 to 89 PJ from 1985 to 1990; increases in the floor area supported the growth in energy use in the first half of the 1980s and increases in both the floor area and the average intensity of energy use supported the latter growth. The increases in the intensity of energy use were primarily due to increases in the intensity of the energy used for non-heating purposes. While the increases in the acquisition and utilization of energy-using equipment led to increases in the average intensity of energy used for non-heating purposes, increases in the utilization of equipment also led to waste heat. Increases in waste heat coupled with higher thermal performance standards in buildings led to a levelling of the average intensity of energy used for heating purposes. One result of these changes was that in 1990, the difference

Figure 12. Real Energy Prices for Service Sector Customers



Energy prices include energy taxes, but exclude value added taxes (VAT).

between the intensity of energy used for space heating and non-heating purposes was 25 percent less than it was in 1950.

In spite of the 68 percent increase in the real fuel oil price between 1973 and 1974, oil use continued to increase until the mid-1970s, as the impacts of the price increases were offset by the growth in real value added. (See Figure 12.) The 60 percent increase in the real oil price between 1979 and 1981 contributed to a 19 percent reduction in oil use. Total energy use remained constant because of the following: the continued growth of sectoral value added; the lack of corresponding increases in real electricity prices; and many firms substituted electricity for oil for heating purposes. Even though real fuel oil prices declined by 55 percent from 1981 to 1988, with the exception of a small upturn between 1986 and 1987, its use declined. While the share of total energy demand met by the use of oil declined continuously from 52 to 13 percent from 1973 to 1991, the portion of demand met by the use of electricity increased from 45 to 86 percent.

Residential Sector

Households use energy for the provision of many services within their homes. Energy use in this sector is commonly disaggregated by the type of service or by groups of services (e.g., the energy used for space heating, water heating, cooking, appliances (refrigerators, freezers, refrigerator/freezers, clotheswashers, dishwashers, clothesdryers, and other miscellaneous appliances), and lighting). Energy use depends on physical determinants (i.e., the size and characteristics of the dwelling stock, the characteristics of the energy-using equipment found in the dwellings), the households' use of their home environments, and the climate. The households' choice and use of their home environments is, in turn, shaped by demographics, household income, and prices.

Climate-corrected energy use in the residential sector increased almost continuously from 58 PJ in 1950 to 162 PJ in 1990, before decreasing to 153 PJ in 1991. (See Figure 13.) Increases in the number and size of dwellings, changes in dwelling types, and reductions in family size each contributed to increase energy use. From 1950 to 1991, the number of private dwellings increased steadily from an estimated 0.92 to 1.76 million. Increases in real household disposable income allowed households to purchase larger, single-family homes. This occurred in spite of decreases in the average family size. The average area per dwelling increased from 75 to 110 m^2 from 1950 to 1990, while the average family size decreased from 3.5 to 2.4 persons. Growth in household disposable income supported large increases in appliance ownership. There were notable changes in the households' ownership of refrigeration equipment (the largest component of appliance energy use). While the share of households who owned a separate refrigerator and freezer remained almost constant during from 1975 to 1991, the share of households who owned a refrigerator/freezer ("*kombiskap*") and an additional refrigerator and/or freezer increased from 6 to 25 percent. In addition, from 1967 to 1991, the share of households who owned dishwashers and clotheswashers increased from 2 to 37 percent and from 70 to 90 percent, respectively, and the share of households who owned a clothesdryer and/or drying closet increased from 22 to 34 percent from 1986 to 1991.

Increases in the intensity of energy use also elevated energy use. The intensity of space heating energy use (meas-

Figure 13. Residential Energy Use and Activity

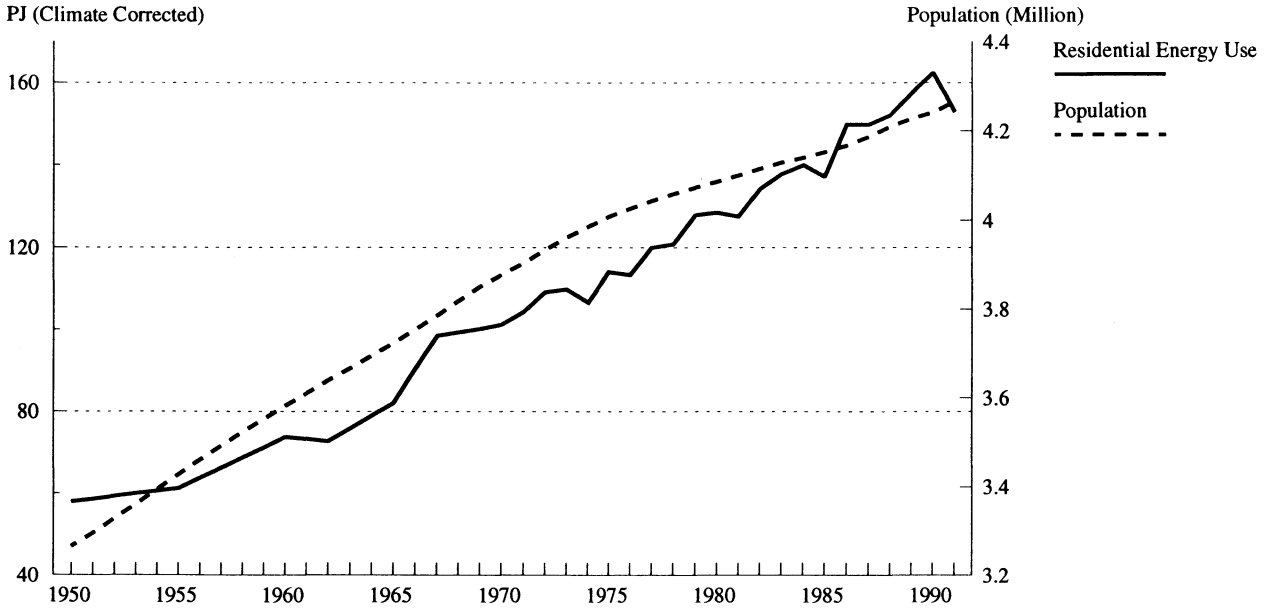
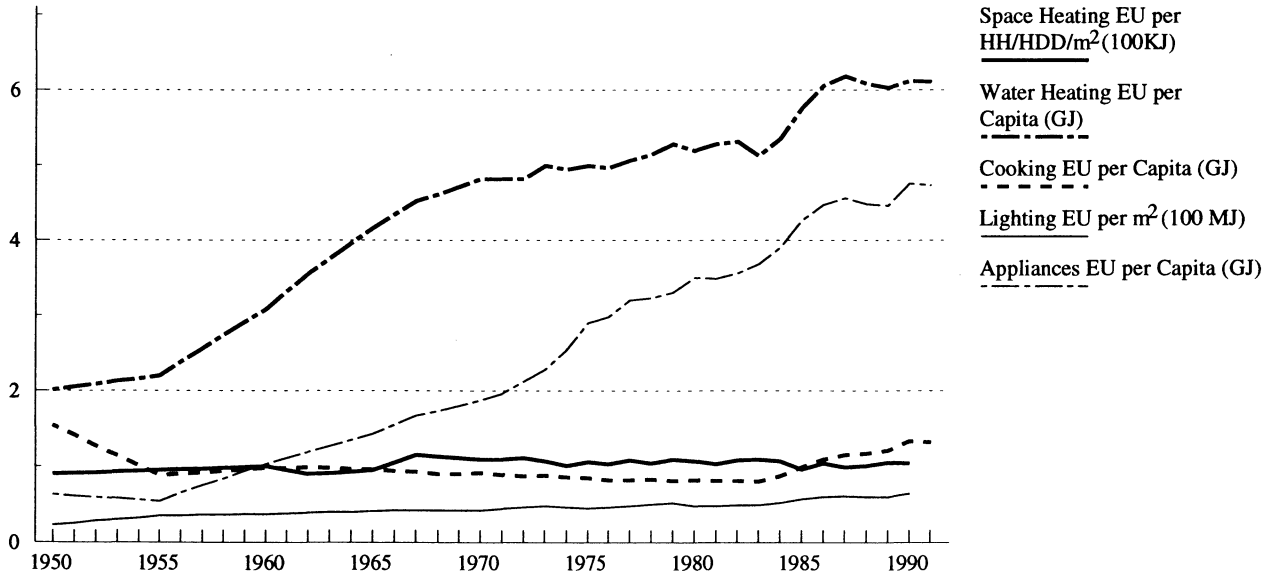


Figure 14. Residential Sector Energy Intensity Indicators



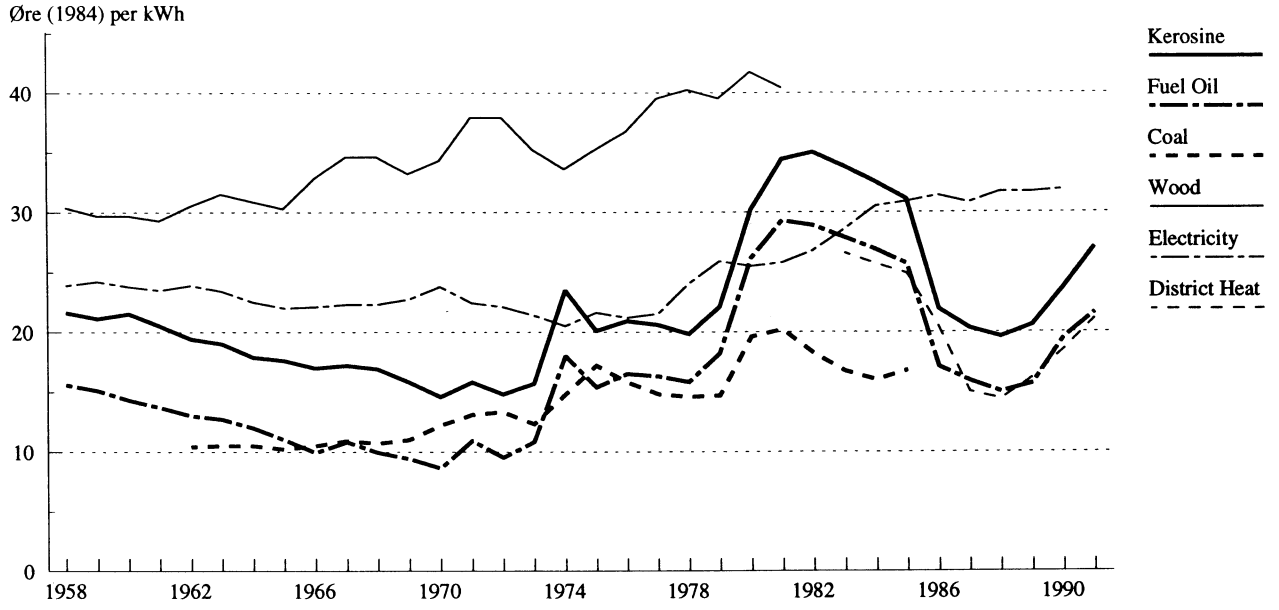
"EU" refers to energy use, "HH" to household, and "HDD" to heating-degree day.

ured as climate-corrected useful energy per household per m^2) increased by nearly 16 percent from 1950 to 1990. (See Figure 14.) These increases occurred in spite of improvements in the thermal characteristics of buildings, as many households decided to forego potential energy savings for increased comfort levels.[9] These increases, and even larger increases in most other intensities, were supported by growth in real disposable income.

The differences in the growth of the intensities contributed to change the composition of energy use by end use from 1950 to 1991. The shares of energy used for space heating purposes and cooking declined almost continuously from

9 There is evidence that suggests that households have begun to realize their optimal comfort levels. In 1979 and 1983, households surveyed in Statistics Norway's residential energy use surveys stated, on average, that their desired indoor temperature was 21.5° C, although it was not ascertained whether this desired temperature was realized. In 1990, households reported, on average, that the temperature in the living area of their dwelling was 21.5° C.

Figure 15. Real Energy Prices for Residential Customers
Øre (1984) per kWh



Energy prices include energy and value added taxes (VAT).

74 to 58 percent and 9 to 4 percent, respectively, while the shares of energy used for water heating, appliances, and lighting increased from 11 to 17 percent, 3 to 13 percent, and 3 to 8 percent.

Between 1973 and 1974, the large shift in relative prices contributed to a 22 percent reduction in oil use and a 9 percent increase in electricity use. (See Figure 15.) Total energy use declined by only 3 percent. During this period, the real price of kerosine increased by 50 percent and the real price of fuel oil increased by 67 percent, while the real price of electricity fell by 4 percent. Increases in real disposable income dampened the effect of the large increases in real oil prices, and many households substituted electricity for oil for space heating purposes by using supplemental electric space heaters.

Increases in disposable income also dampened the effect of the increases in real oil prices following OPEC II. Households were again sheltered from the large real oil price increases because of their ability to use electricity and wood instead of oil for space heating. Conversely, this flexibility allowed many households to take advantage of lower oil prices between 1985 and 1986, as oil use increased by 25 percent. However, in subsequent years its use again declined. Aside from this short-term change in the fuel mix, households' increased reliance on electricity, which was, in part, spurred by the large shifts in relative prices, led to large increases in its share of sectoral energy demand. From 1973 to 1991, the share of electricity used to meet energy demand increased from 52 to 73 percent, while the share of oil used declined from 37 to 12 percent. The share of wood used increased from 11 to 14 percent, due to increases in its use for supplemental space heating.

Conclusions

Trends in aggregate indicators (i.e., GDP and GDP per unit of energy use) conceal the underlying factors that have shaped the evolution of energy use. During the past four decades, changes in activity levels pushed upwards on energy use in each sector. Changes in the relative importance of sectoral activities led to a more energy-intensive mix of activities. In most sectors, the intensity of the energy used to perform activities increased. However, these changes neither occurred uniformly over time nor had uniform impacts across sectors.

The impacts of the large increase in real oil prices ensuing OPEC I and OPEC II on energy use were offset by growth in real GDP and increases in the use of relatively less expensive electricity, and to a lesser extent solid fuels, for space heating and in production processes. Conversely, the ability to substitute fuels also allowed many agents to take advantage of lower real oil prices between 1985 and 1986. Aside from this short-term change in the fuel mix, the share of electricity used to meet total stationary energy use (i.e., energy use in the manufacturing, service, and residential sectors) increased almost continuously from 47 percent in 1970 to 73 percent in 1991, while the share of oil used declined from 36 to 9 percent.

The four factors examined in this article will continue to shape energy use in the future. The relative importance of the individual factors in determining sectoral and total energy use, however, may be different. Economic trends (i.e., real GDP growth and its composition, and prices) will continue to both directly and indirectly influence changes in the level and the composition of activities, and the intensity of the energy used to perform these activities. Improvements in the thermal characteristics of buildings and in the

energy efficiency of appliances, equipment, and lighting systems will most likely translate into larger reductions in the intensity of energy use than they have in the past, as households and firms in the service sector have begun to realize optimal comfort levels in buildings. Nonetheless, trends towards bigger and more powerful automobiles or towards larger appliances could continue to offset potential reductions. Finally, future changes in the fuel mix may not be as significant as they have been in the past because of the following: the increased importance of the energy used by automobiles, trucks, and airplanes (where in the near future there is no immediate substitute for petroleum products); agents' greater reliance on electricity as a sole space heating fuel source and its dedicated use in production processes; and the increased use of energy for electric-specific end uses (i.e., appliances, lighting, and miscellaneous office equipment) in the residential and services sectors.

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New Research Reports

Statistical Analyses

Natural Resources and the Environment 1993
SA 94/3, 1994. pp. 160.
ISBN 82-537-3968-0

Statistics Norway (SN) compiles statistics on the state of the environment, as well as accounts for a number of important resources. Statistics Norway also develops methods and models to analyze the interrelationships between socio-economic conditions, use of resources, and environmental conditions. The publication Natural Resources and the Environment contains an annual concentrated overview of this work.

Natural Resources and the Environment 1993 presents updated resource accounts for energy and emissions accounts for emissions to air, and some results of analyses based on these accounts. The report also includes key figures for fishing, sealing and whaling, agricultural pollution, forest resources and forest damage, municipal waste water treatment plants and waste management.

Reports

Haakon Vennemo:
A Growth Model of Norway with a Two-way Link to the Environment
Reports 94/5, 1994. pp. 57.
ISBN 82-537-3985-0

The paper presents an applied dynamic general equilibrium model of the Norwegian economy. The model distinguishes between a large exposed industry that faces exogenous world market prices, five smaller sheltered industries and the public sector. There are installation costs of investment in the exposed industry. On the household side, a representative consumer with infinite horizon allocates expenditure between different periods, and splits expenditure on leisure and consumer goods in any one period.

A particular feature of the model is a two-way link between the environment and the economy. The environment affects the economy in the areas of productivity, depreciation and household welfare.

The paper discusses the nature of environmental feedbacks to include in an applied dynamic general equilibrium model, and studies the workings of the model in a simplified version. A substantial appendix presents the equation system of the model.

Klaus Mohn:
Monetarism and Structural Adjustment - The Case of Mozambique
Reports 94/11, 1994. pp. 48.
ISBN 82-537-4005-0

This report is the result of a project undertaken by the Research Department of Statistics Norway to recapitulate the impact of economic policy on macroeconomic development in Mozambique. A brief review of the historical and economic origins of the structural adjustment paradigm is offered in the first chapter, whereas the second chapter contains a survey of the background and theoretical content of monetarism in development economics. The post-independence economic policy of Mozambique is reviewed in the third chapter.

A panel data set containing monetary macroeconomic indicators for ten countries in sub-Saharan Africa over the period 1980 to 1991 is presented and commented in the fourth chapter. Finally, a simple single-equation econometric model of economic growth is constructed and simulated to test and illustrate some hypotheses concerning monetarism and structural adjustment. The results seem to suggest a significant, but very modest spill-over from monetary to real economic variables. These results are probably due to the regulated macroeconomic environment which has been quite typical for developing countries in sub-Saharan Africa.

Discussion Papers

Snorre Kverndokk:
Depletion of Fossil Fuels and the Impact of Global Warming
DP no. 107, 1994. pp. 37.

This paper combines the theory of optimal extraction of exhaustible resources with the theory of greenhouse externalities, to analyse problems of global warming when the supply side is considered. The optimal carbon tax will initially rise but eventually fall when the externality is positively related to the stock of carbon in the atmosphere. It is shown that the tax will start falling before the stock of carbon in the atmoshere reaches its maximum. If, on the other hand, the greenhouse externality depends on the rate of change in the atmospheric stock of carbon, the evolution of the optimal carbon tax is more complex. It can even be optimal to subsidise carbon emissions to avoid future rapid changes in the stock of carbon, and therefore future damages. If the externality is related to the stock of carbon in the atmosphere and there exists a non-polluting backstop technology, it will be optimal to extract and consume fossil fuels even when the price of fossil fuels is equal to the price of the backstop. The total extraction is the same as when the externality is ignored, but in the presence of the greenhouse effect, it will be optimal to slow the extraction and spread it over a longer period.

Knut A. Magnussen:
Precautionary Saving and Old-Age Pensions
DP no. 108, 1994. pp. 38.

A precautionary saving model is extended to include old-age pensions and provides the framework for an empirical analysis of the relation between old-age pensions and private consumption. Norwegian macrodata for socioeconomic groups of households are used to estimate consumption functions for workers and pensioners. We find no effects from various approximations of expected pension-income to consumption for workers, but results indicate some influence from labour-income uncertainty. Income elasticities are found to differ considerably between the two groups of households. Implications for effects on aggregate saving from pension policies and of ageing populations are discussed.

Frode Johansen:
Investment and Financial Constraints. An empirical Analysis of Norwegian Firms
DP no. 109, 1994. pp. 34.

This paper investigates the relationship between a firm's investment decision and its financial situation. We present a model of investment, where the cost of external finance is increasing in the debt ratio. The model is estimated using a panel of Norwegian manufacturing establishments for the period 1977-1990. The empirical analysis finds a positive relationship between a firm's debt ratio and its marginal return to capital. This indicates that firms with high debt ratios have higher costs of finance than other firms. Including convex adjustment costs in the model did not change this result, as the size of the adjustment costs was found to be very small.

Kjell Arne Brekke and Pål Børing:
The Volatility of Oil Wealth under Uncertainty about Parameter Values
DP no. 110, 1994. pp. 24.

Aslaksen et al. (1990) concluded that the petroleum wealth of Norway, and hence the permanent income from petroleum extraction, was as uncertain as the yearly oil revenues. Their conclusion was based on wealth estimates using official price projections, with no independent empirical analysis of the oil price process. In this paper the wealth estimates are based on an empirical analysis of the oil prices.

We find that the best estimate of the roots of the price process indicates a more stable wealth than the conclusions in Aslaksen et al. (1990) indicated. If we introduce a possible shift in the price process at the time of OPEC I in 1974, the price shift in OPEC II, has an indirect effect on petroleum wealth through its influence on the best parameter estimate. This indirect effect is considerable, and the main conclusions from Aslaksen et al. (1990) are maintained in spite of the low roots.

Margaret J. Simpson:
Foreign Control and Norwegian Manufacturing Performance
DP no. 111, 1994. pp. 46.

The intangible asset theory of foreign direct investment holds that firms expand abroad to garner additional returns to intangible assets such as proprietary process or product technology or a strong reputation. I explore Norwegian manufacturing data for evidence that foreign owners are realizing returns to intangible assets. Foreign owners of Norwegian manufacturing establishments are clustered in industries that rely on such assets and, within narrowly-defined industries, differ from their domestic counterparts by being larger ans using physical and human capital more intensively. My finding that foreign-owned establishments are approximately 2% more productive than their domestic countreparts is suspect evidence for the intangible assets theory because it relies crucially on the accuracy of the estimate of the scale elasticity, and such estimates are subject to well-known omitted variables and errors-in-variables biases. I show how the foreign ownership advantage varies with alternative assumptions about economies of scale, and find that under reasonable assumptions about scale economies it disappears. I conclude that foreign-owned establishments are larger and more productive, but cannot yet sort out the relationships between size, foreign-ownership, and productivity. I find that those establishments acquired by foreigners tend to be of average productivity and above-average size, but find no evidence that acquisition leads to a productivity improvement. In addition, I find that aggregating rented and owned capital in a capital services measure does not significantly affect the productivity comparison.

Yngve Willassen and Tor Jakob Klette:
Correlated Measurement Errors, Bounds on Parameters, and a Model of Producer Behavior
DP no. 112, 1994. pp. 46.

We examine estimation of a model of producer behavior in the presence of correlated measurement errors in the regressors. Scale economies and price-cost margins are estimated from a set of panel data for manufacturing plants. The paper presents a somewhat new model for estimation of these parameters which is highly flexible but with a simple regression structure. Perhaps the most important contribution of the paper is some new results on deriving parameter bounds for a regression model with errors in variables. In particular, we consider the case where the measurement errors might be correlated. We derive asymptotic standard errors for the parameter bounds. These asymptotic standard errors are compared to bootstrap estimates. Our new results on parameter bounds are applied to the estimation of the model of producer behavior.

Dag G. Wetterwald:
Car Ownership and Private Car Use. A Microeconometric Analysis Based on Norwegian Data
DP no. 113, 1994. pp. 19.

In this paper we analyze household's car ownership and private car use decisions in a model proposed by de Jong (1990). The model, which incorporates variable and fixed costs of car use, can be used to predict the effects of changes in policy measures on the car stock and aggregate use. The model is estimated on Norwegian household data for 1985.

Knut Einar Rosendahl:
Does Improved Environmental Policy Enchance Economic Growth? Endogenous Growth Theory Applied to Developing Countries
DP no. 114, 1994. pp. 26.

The environmental impacts on an economy is studied over time using endogenous growth theory. Externalities from the environment on production are central in the analysis, and we examine whether an optimal path realizes more rapid economic growth. The paper is mainly focusing on developing countries, where production is largely influenced by the environmental quality. The result of the analysis indicates that the economic growth rate does not depend on the internalization of the environmental externality, but rather on the internalization of the human capital externality. The level of economic activity does, however, generally depend on the internalization of both externalities.

Leif Andreassen, Dennis Fredriksen and Olav Ljones:
The Future Burden of Public Pension Benefits. A Microsimulation Study
DP no. 115, 1994. pp. 28.

The microsimulation model MOSART is used to analyse the long run development in disability and old-age pensions covered by the Norwegian National Insurance System. The number of pensioners will increase relative to the number of workers, leading to a growing tax burden on future generations. It is found that among those born before the year 2000, early generations possess a larger pension wealth (the discounted value of payments and received benefits) as a per cent of life time labour income than later generations. The paper discusses changes in the rules for determining pension benefits and the consequences of going from a pay-as-you-go system to a funded system.

Anne Brendemoen:
Car Ownership Decisions in Norwegian Households
DP no. 116, 1994. pp. 25.

In this paper, household's decisions regarding how many private cars to own are analysed. The analysis is based on a particular multinominal logit type formulation that is consistent with a Stone-Geary utility function. The model is estimated on data from the Norwegian Expenditure Survey.

Audun Langørgen:
A Macromodel of Local Government Spending Behaviour in Norway
DP no. 117, 1994. pp. 47.

A cooperative bargaining model is adapted to the setting of local government in Norway. Aggregate consumption, the capital stock and net financial wealth in the local public sector are endogenized. The origin of intertia in the model is ascribed to incrementalism or adjustment costs in the disagreement points of the Nash solution. Using the method of ordinary least squares, the model is estimated on sample data for the period 1973-1991. Different hypotheses regarding the disagreement

point formation are tested, and the pure incrementalist model is encompassed by a more general partial adjustment model, implying that some other mechanism than just preservation to the status quo is operative. It is found that local government consumption, the capital stock and the net debt in the long run are stabilized relative to disposable income. Finally, results from model simulations are reported.

Kjell Arne Brekke:
Utilitarism, Equivalence Scales and Logarithmic Utility
DP no. 118, 1994. pp. 10.

It is shown that if social welfare is the sum of logarithmic utility function, the optimal income distribution and the welfare effect of any income redistribution is independent of the equivalence scales. In optimum all households have the same per capita income. Based on this observation it is discussed to what extent traditional welfare theory can be said to be concerned about fair income distribution.

Kjell Arne Brekke, Hilde Lurås and Karine Nyborg:
Sufficient Welfare Indicators. Allowing Disagreement in Evaluations of Social Welfare
DP no. 119, 1994. pp. 32.

There is no consensus on how to measure interpersonally comparable, cardinal utility. Despite of this, people repeatedly make welfare evaluations in their everyday lives. However, people do not always agree on such evaluations, and this is one important reason for political disagreements. Thus, to keep in control of the normative premises, decision makers may prefer information which can be used as input in an arbitrary social welfare function to information which is the output from a social welfare function specified by the analyst. In this paper we try to identify sufficient welfare indicators; information which enable decision makers to arrive at welfare evaluations of social states or projects, according to their own ethical beliefs. Our conclusion is that provided factual information about different population groups; their social state, size, and characteristics, may be better for this purpose than the more traditional approach of focusing on ordinal utility information.

Tor Jakob Klette:
R&D, Scope Economies and Company Structure: A "Not-so-Fixed Effect" Model of Plant Performance
DP no. 120, 1994. pp. 41.

Some well-known correlations between R&D and performance are given a somewhat new interpretation in this paper. I present an alternative model of knowledge accumulation, with some interesting and desirable properties. Perhaps the most attractive property is that it provides a simple and less data intensive framework for empirical studies of the relationship between firm performance and R&D. This property allows me to address some new aspects of this relationship combining two rich, new sources of firm and plant-level data. Among the substantial empirical findings are (i) R&D has a positive and significant effect on performance, (ii) the estimates suggest that the appropriable part of knowledge capital depreciate at a rate of 0.2, (iii) there are visible spillover effects of R&D across LBs within a firm (economies of scope in R&D), and (iv) there are significant spillovers in R&D across firms that belong to the same interlocking group of firms.

Reprints

Jørgen Aasness, Erik Biørn and Terje Skjerpen:
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