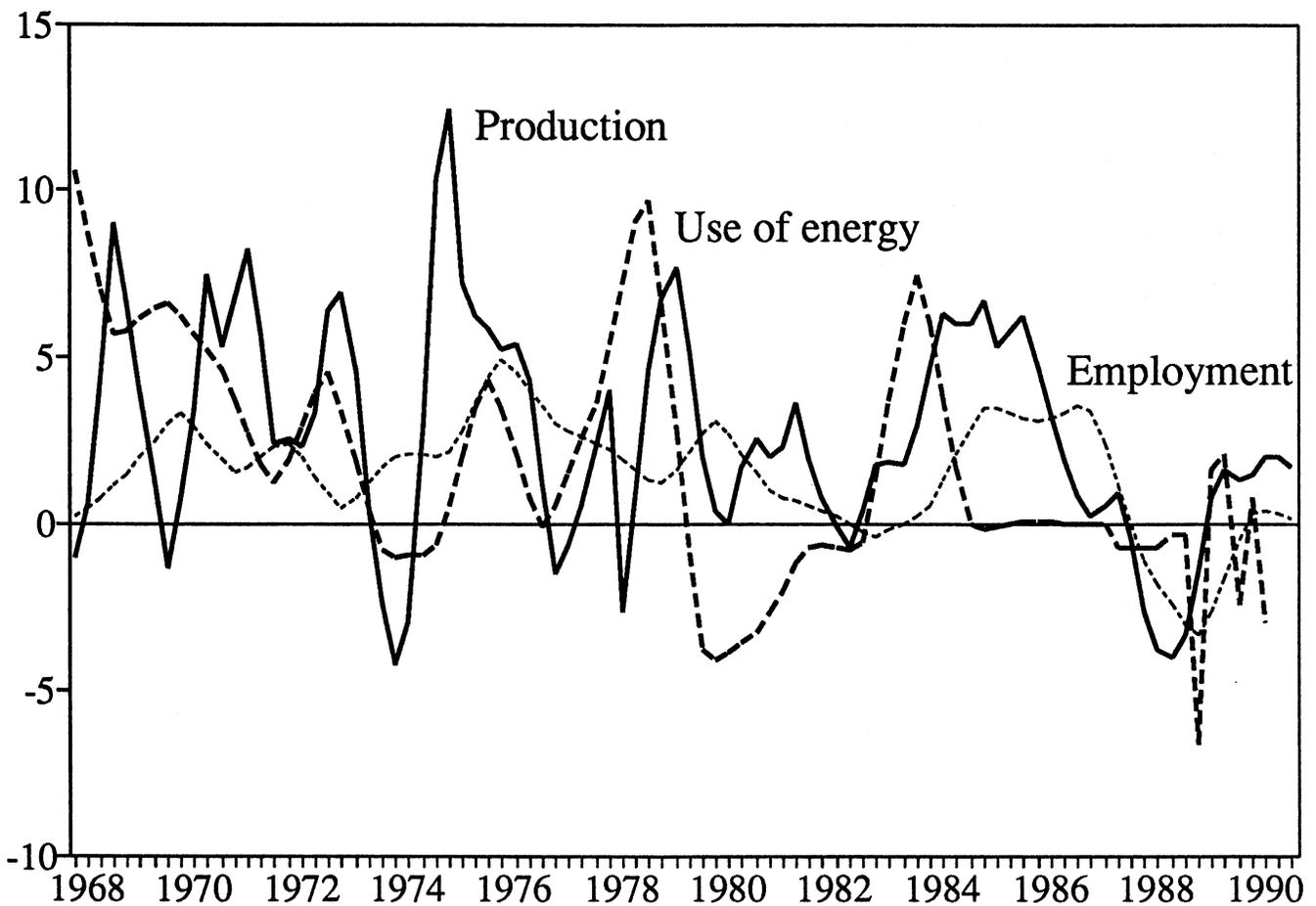


ANNUAL REPORT 1990



Annual Report 1990

The Research Department The Central Bureau of Statistics, Norway

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Figure, page no. 59 : PRODUCTION, EMPLOYMENT AND USE OF ENERGY IN NORWAY 1968-1990

Estimated growth from preceding quarter, seasonally adjusted.
Per cent annual rates.

PRODUCTION: Gross domestic product excluding
oil and shipping.

EMPLOYMENT: Number of employees.

USE OF ENERGY: Excluding transport oil and solid fuel.

THE RESEARCH DEPARTMENT IN THE CENTRAL BUREAU OF STATISTICS

The CBS enjoys a long tradition as a research institution, although the Research Department (as a separate part of the organization) has only existed for one-third of the 110 years that the Bureau has existed. Proximity to primary data sources is of undisputed benefit for a research institution within a statistical bureau. The autonomy traditionally maintained by statistical bureaus and the central position they hold in the production and distribution of information in our societies is also invaluable in research work. The Research Department of the CBS has enjoyed these advantages since its inception.

From the beginning...

From an early stage there has been a research tradition within the CBS. From the beginning, statistical information was used to enlighten the general public about social conditions. Anders Nicolai Kiær, the Director General for the first 37 years after the foundation of the Bureau in 1876, ensured that this became a tradition.

National Accounts, Tax Research, MODIS

The Research Department was established in 1950. The early activities of the Research Department comprised national accounting, input-output analysis, consumer demand analysis, tax research and economic surveys. The first large-scale model (MODIS) was developed in 1960. The postwar austerity of the 1940s and

early 1950s brought economic issues to the forefront of politics. Input-output analysis based on the new national accounts came to be adopted as a multitask tool for policy analysis and has been a cornerstone in the Department's work since then.

Population

In the 1960s the population wave created by the baby boom of the 1940s swelled the inflow to the labour market. As a result there was an increasing interest in population issues, changes in the labour market, and migration, which led to the establishment of a demographic research unit within the CBS to cover these fields.

Environment

From the early 1970s a growing interest in environment and natural resource issues emerged, which in 1978 led to the establishment of another research unit in the CBS. The latter two units were formally incorporated into the Research Department from 1983.

Some reflections

During the last 10 to 15 years there has been a great expansion of the Department's activities. The issues of thirty years ago are no less important today. The concepts of the national accounts - at that time known and understood only by a small community of postwar economists - are now a general frame of reference in public debate, taught

in school at the intermediary level etc. The development of macroeconomic models and other model tools in this period has been prolific. The challenging task of managing a modern economy has not, however, become any easier. We have to recognize that even the best models we are able to build at present fall far short of ideal requirements.

The tax research activity, which also started in the 1950s, has provided both government and political opposition parties with confidential analyses of the effect of changes in tax rules for more than thirty years. The volume of this service increased immensely after computerbased tax models were developed in the late 1960s. The 1980s have provided more volatility in economic development than any other part of the postwar period. This has accentuated the need to better understand the international environment and the changes that take place in our own society. There is less unanimity about the future, and perhaps also less belief in traditional forecasting. The practice of extending observed trends without asking what supports such trends, and to take a narrow view with regard to the set of interdependent factors, is still widespread. Furthermore, there is an overwhelming tendency to underestimate the uncertainty of projections.

The future

Norwegian society in the 1990s, the 2000s and the 2010s is being formed by decisions made today. The major challenge for the Research Department is to contribute information to this process and to provide the requisite expertise for providing the best tools and analyses for such decisions

in the future.

Main activities

The activities of the Research Department comprise:

National accounts, input-output data, balance of payments.

Economic analysis, macroeconomic models, economic surveys, tax research, input-output analysis, econometric studies.

Population models, family and fertility studies, labour market analysis.

Natural resource analysis, energy analysis, environmental studies.

Petroleum economics.

Regional demographic and geographical analysis.

The research department - civil service and academic activity

The scope of research activity is not matched by many other research institutions in Norway. One important dimension in this range of activities is the emphasis on the use of detailed information to create a picture of the aggregate development in various areas. A second dimension is the emphasis on providing tools and analyses that can be used in general social planning. Models are made available for ministries and others, and forecasts and analyses, e.g. economic growth, population development and indicators of environmental standards are made regularly or on request. A third dimension is the emphasis on academic

standards, contact with international research activities etc. to support and complement the applied orientation.

Financing

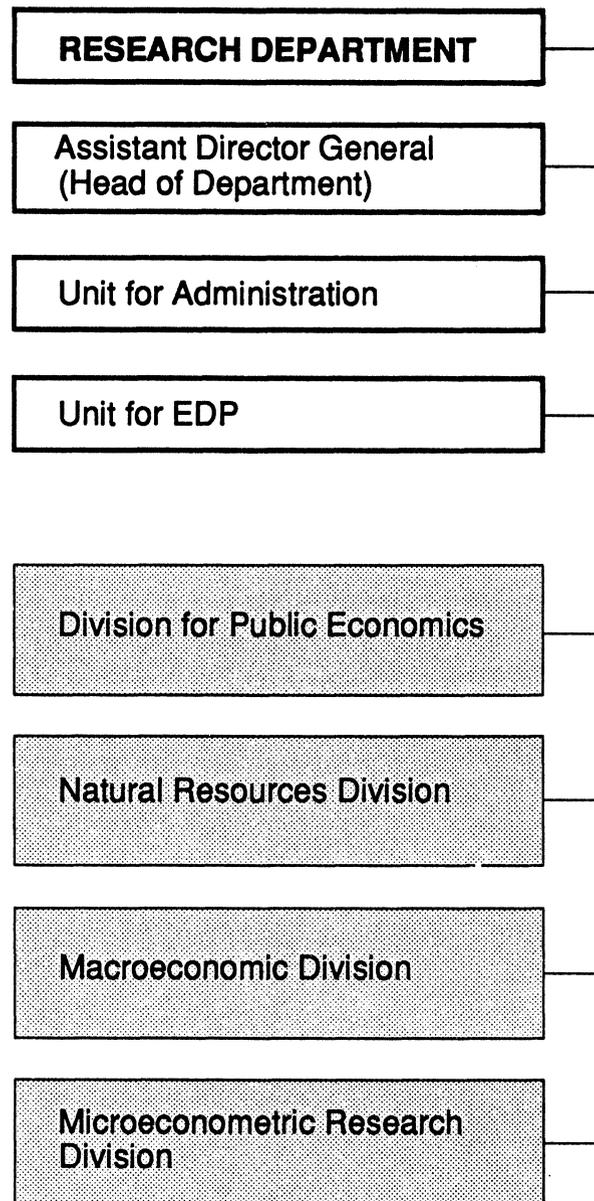
Most of the Research Department's activities are funded via the regular annual budget of CBS, but an increasing share has in recent years come from Norwegian Research Councils and other research contracts. The research contracts are mostly with ministries and other central government institutions.

External contacts - at home and abroad

The general orientation of the Department's work makes Norwegian ministries a particularly important user group. Of particular importance are the ties with the Ministry of Finance and the Ministry of Environment. Also in close contact with the Research Department are the Ministry of Oil and Energy, the Ministry of Children and Family Affairs, the Ministry of Labour and Government Administration and the Ministry of Local Government. With 5-6 other ministries the contacts are more sporadic. It is of importance for these links that the Research Department is - as part of the CBS - embodied in the central government administration.

The Research Department maintain strong international links and take part in several international cooperation projects. Every year the Department receive visitors from throughout the world, from universities, research institutes, and statistical bureaus.

Organization Chart of the Research Department:



Publishing

Research results are reported and published in the following series from the CBS:

Norwegian Official Statistics (NOS)

Social and Economic Studies (SES)

Reports (REP)

Discussion Papers (DP)

Reprint Series

Internal documentation (IN)

The Discussion Papers are all in English. Some of the other publications are in Norwegian with English summario.

In addition, the Research Department publishes the "Økonomiske analyser" ("Economic Survey") with 9 issues a year. The first volume of each year presents an economic review of the past year and is also made available in English. Other issues contain economic surveys both of the Norwegian and the international economic development, quarterly and annual Norwegian national accounts figures with comments and short articles presenting results from ongoing research projects.

Starting from 1991 the Economic Survey will be published also in English with 4-5 issues a year.

Organization

From 1st of February 1991 the administrative structure of the Research Department as well as the CBS as such is

changed.

The main line for the changes has been the creation of larger and more independent divisions within each department. The main part of the administrative tasks has now been desentralized to the departments.

The Research Department is by 1st of February 1991 divided into the following 4 divisions:

Division for Public Economics

Natural Resources Division

Macroeconomic Division

Microeconomic Research Division

The Division for National Accounts was a part of the Research Department in 1990, but will due to the new organization in CBS, belong to the Department of Statistics from February 1991.

The Head of the Research Department, is also Assistant Director General of the CBS. Units for administration and for EDP are organized across divisions.

Management and personnel

The Research Department employs approximately 100 persons, most of them with an academic background. Altogether there are about 50 economists in the Department. Other academic staff represent many disciplines. An incomplete list includes sociology, geography, statistics, computer science, agricultural science, physics, biology and engineering. Most of the non-academic staff are highly trained specialists.

Research and analysis

The research activities of the Central Bureau of Statistics have a general orientation towards developing analytic tools for social planning and political decisions. Emphasis is placed on the development and use of models for analyzing current trends of development

and the effects of alternative policy measures in different areas. Most of the activities related to research and analysis are handled by the Research Department. The Research Department has until 1991 also been responsible for the official statistics of natural resources and related areas. Extensive use is made of the data bases and national accounts of the CBS.

NATURAL RESOURCES AND NATURAL ENVIRONMENT

This area of statistics describes the resource base, extraction, conversion and use of natural resources and the effects the use of natural resources have on environmental conditions as water and air quality. Resource and environmental statistics are partly deduced from different industry statistics, but special statistics are also collected, including some atmospheric emissions, discharges into water and other pollution.

Resource accounts and environmental statistics

The resource accounts link information about natural resources in a system with standard definitions and classifications. In principle, the accounts have the same function for this area of statistics as the national accounts have for economic statistics. The resource accounts are a key source of data for resource and environmental monitoring and provide basic data for resource and environmental analyses. An annual publication provides key figures from the resource accounts and

analyses based on these accounts. A periodic survey publication for environmental statistics provides an overview of data on natural resources, pollution and environmental conditions in Norway along with international comparison of data and analyses of selected subjects concerning natural resources and pollution. The latest compendium on environmental statistics was published at the beginning of 1989.

In 1990, resource accounts for energy, air pollution, and parts of the accounts for fish and forests were updated. The work on resource accounts and environmental statistics will be continued in 1991.

Energy statistics

Energy statistics provide data on prices, production and consumption of energy by different types of energy and different consumer groups. Energy balances are

published annually. In 1991 the publication will be reviewed by the Advisory Committee for Energy Statistics with a

view to improvements. The energy balances will hereafter be prepared quarterly.

Resource and environmental analysis

The aim of this analysis is to improve the basis for resource and environmental policies and to help integrating resource and environmental concerns in economic and other social planning. Work is carried out in the following fields:

Environmental economics

The work in environmental economics has been concentrated on analyses of relationships between economic development, the use of energy and emissions to air. Annual data are published for atmospheric emissions of sulfur dioxide, nitrogen oxides, carbon monoxide, carbon dioxide, volatile organic compounds, lead and particles from more than a hundred economic sectors. The emissions are also specified by municipality.

The historical data form the basis for projections of atmospheric emissions. The projections are based on simulations of the Norwegian economy and assumptions on technological developments, introduction of new cleaning requirements etc. Economic as well as environmental consequences of alternative environmental policies are analyzed, and attempts are made to quantify the costs and benefits of the measures.

In 1990, the work on the SIMEN project (Studies of Industry, Environment and Energy up to the year 2000) was followed up with calculations for the

"interministerial committee on climate change". In these analyses attempts are made to shed light on the possibilities of combining economic growth with some key environmental constraints on air pollution.

Work was continued on quantifying some important benefits related to reduced atmospheric emissions, e.g. reductions in damages to health and damages to nature as a result of reduced air pollution. Effects on traffic-related costs such as traffic accidents, wear and tear on roads, congestion, noise, etc. from measures to reduce the consumption of fossil fuels were also studied. An attempt will be made to include some of these feedback mechanisms, between the economy and changes in the state of the environment in a revised longterm planning model (MSG). These revisions will improve and complete the basis for making decisions on environmental measures. Thus far economists have only modelled the costs of environmental measures.

In 1990, the Central Bureau of Statistics was involved in a number of international environmental projects. The CBS participates actively in a project organized by the United Nations aiming at modelling global economic development and the accompanying use of resources and environmental strains. Moreover, the CBS has contributed to several environmental studies and reports carried out by the Economic Commission for Europe (ECE). This work will be continued in 1991.

Sustainable agriculture

This project is financed by the Ministry of Environment and the State Pollution

Control Authority. The project is carried out in operating with the Agricultural University's research project "Agricultural Policy and Environmental Management". Pilot models have been constructed for calculating nitrogen and phosphorus runoff from agriculture in two limited areas (SIMJAR 1) and for nitrogen runoff for southern Norway (SIMJAR 2).

The models are used to simulate environmental measures such as a reduction/change in the use of fertilizer and changes in the structure of production. Model calculations comprise the effects of the measures on runoff, economic result, production, and employment. In cooperation with Jordforsk, the CBS has in 1990 initiated a project to develop the models further to make it possible to calculate nitrogen-, phosphorus- and soil-losses from agricultural land for larger areas.

Oil and energy

The aim of the work in this field is to provide a theoretical basis for management decisions of Norway's energy resources. The work consists of organizing data and developing models for analyzing the relationships between economic development, energy production, energy consumption and environmental consequences, as well as shedding light on principles for the management of revenues generated by the exploitation of energy resources.

Activities in 1990 have been concentrated on projects sponsored by the research council NORAS (the research programme "Energy and the Society"). The CBS' main project within this programme consists of

further developing the MSG model to improve the analytical capabilities of energy and the environment issues. The new model treats transportation as a separate input factor, and specifies several transport sectors. Power production is partly endogenized, which facilitates analyses of the choice between gas power and hydroelectric power. In addition, alternative specifications of production functions in all sectors of the model have been tested.

Partial analyses have also been made of the demand for energy in households. Special attention has been paid to the relationship between the choice of heating equipment and the consumption of different types of energy. The analysis shows that changes in the relative price of oil and electricity does not necessarily result in a change in the pattern of consumption. This is due to the fact that the choice between different types of energy depends on the type of heating system installed in the household. A new energy survey of households carried out in 1990 will provide a better basis for analyzing such relationships.

As a result of the new Energy Act and the possible introduction of gas power, the Norwegian energy market will become increasingly integrated in an international energy market. At the same time, the focus is increasingly shifting towards the environmental effects of energy production and consumption. This makes it necessary to examine developments in a number of countries simultaneously in order to be able to analyze possible environmental benefits, e.g. from increasing the efficiency of energy markets. Against this background, work was initiated in 1990 to

establish a demand model for 9 European countries. The aim is to develop the model further into an energy market model, where special emphasis will be placed on the description of the Nordic energy market.

Activities within petroleum economics have been reduced substantially after the NORAS programme "Oil and the Society" was scaled down. In 1990, some further work was done on the question on how to

manage the petroleum wealth under uncertainty. This project included model simulations on a simple macroeconomic model (AMEN), in which the price of oil was assumed to be stochastic. Previous analyses of the effects of a deregulation of the European gas market, as a result of "open access" to the gas grid, were followed up. In this project special emphasis has been placed on identifying the cost structure for pipeline transport and energy production in various countries.

NATIONAL ACCOUNTS AND OTHER GENERAL ECONOMIC SUBJECT MATTERS

National accounts in Norway keep to the very principles of the SNA, which consists of a logically consistent and integrated set of macroeconomic data conforming to a set of internationally agreed concepts, definitions, conventions, classifications and accounting rules. More than for most countries, the Norwegian national accounts play a particularly strong role as a key source of information for economic policy, as well as being the most important data base for macroeconomic analysis.

As for the current obligations, national accounts estimates are compiled both on quarterly and annual basis. Throughout the year, quarterly national accounts estimates are compiled with a time lag of two months, except that accumulated four quarters are published twice, first already with one month lag when also applying forecasting technique, second with four months lag including final short-term economic indicators utilized in the

compilation. In addition to these two provisional annual versions based on accumulating quarterly data, two more comprehensive versions of annual national accounts estimates are compiled, one of which is the final version including integrated input-output tables in a rather unusually detailed way internationally speaking.

References:

(i) National Accounts Statistics, a CBS annual publication providing 130 tables containing time-series for a ten-year period, in some cases back to 1930 in 5 year intervals. A selection of international national accounts data is also included. Considerable coverage of technical information (only in Norwegian) provides the reader with useful guidance.

(ii) Economic Analyses, Monthly Bulletin of Statistics and Weekly Bulletin of Statistics are all important series of

publications in which national accounts are regularly published, in particular current quarterly and provisional annual estimates. These also include monthly balance of payments data published by the CBS.

(iii) Also available: unpublished national accounts data for more detailed specifications, including detailed commodity balances (supply and uses). In 1990, a new system was constructed for improved readiness and handling of such detailed requests (input-output data).

An extensive main revision of the national accounts (both system and estimates) was initiated in 1990 and planned for

completion by 1995. A schedule has been drawn up and approved in which one important principle implies the publication of revised estimates as they gradually become available in blocks. In the late phase of the revision, the revised UN recommendations (1993 revised SNA) should be implemented in the Norwegian national accounts. Furthermore, adaptations are being made to conform with the European Integrated System of Economic Accounts (ESA). Moreover, revised activity and product (goods and services) classifications are being integrated with the revised national accounts estimates, based on the ISIC (NACE) and CPC classifications.

ECONOMETRIC METHODS AND ANALYSIS

Econometric analysis of microdata is a main concern for the department and represent a particularly important link between statistics and research. In order to enhance and develop further econometric know-how in the CBS, emphasis is placed on applying and developing theories and methods for estimating behavioural models based on microdata.

As in earlier years work has continued in 1990 on projects related to the analysis of consumption, labour supply, taxes, choice of education and income inequality. In analyses of firm data the efforts have been

concentrated on statistical descriptions of productivity growth and investigation of the relationship between productivity growth and R & D investment. To stimulate the development of econometric methodology, emphasis has been placed on maintaining international contacts, especially with universities in the United States. This has also resulted in joint projects. The Department also encourage members of its staff to increase their qualifications by studying for a doctoral degree in economics. Two people have received their doctoral degree in Economics in 1990.

PUBLIC FINANCE AND LABOUR MARKET RESEARCH

The work on tax estimates and assignments for the Ministry of Finance and the Storting (the Norwegian Parliament) required considerable resources in 1990. Among other things, the change in Government resulted in extensive work for the Storting.

The publications "Current Tax Data" and "Taxes and Transfers to the Private Sector" were updated. In the latter publication we have this year included an annex which deals with the tax bases for calculating personal income taxes. Some new international surveys of the tax treatment of dwellings have been incorporated in "Current Tax Data".

The development of a new software model for use on a personal computer (PC) has now resulted in an operative model. The model has been given the name ODIN. We have started to use the model and trial versions have been supplied to some external users. We have positive experience with the model even though some development work remains before it can fully compete in user friendliness with earlier models for large mainframe computers (primarily KFS). The strength of the new model ODIN is that it covers both taxes and transfers to a greater degree and that it can be operated on a standard PC. The model LOTTE which microsimulates taxes and disposable income for a representative sample of the population is now being used even though we still do not make full use of the model's potential. We are working on improving statistical methods so that the results will be more precise. We are now well under way with

a project that will link the income and capital accounts of the national accounts with the income and tax accounts for households on which LOTTE is based. This work has started by preparing a thorough documentation of concepts and definitions. Our ultimate goal is that it will be possible to impute income concepts in the LOTTE model which are in accordance with national accounts definitions. This will be useful for analyses of income trends.

In the past year the earlier software model for calculating distributional effects of indirect taxes (INSIDENS) has not been operational. We have developed a preliminary calculation programme based on data from the consumer survey in order to satisfy the needs of external users. This will be included in LOTTE as an integrated part of the model in order to be able to microsimulate consumption expenditure for various groups of goods and thereby allow for analyses of distributional effects of different types of individual taxes. The work on an econometric model for saving and financial behaviour has been continued.

The work on studies of corporate taxes has been continued further. We will follow up the empirical analyses that we have made for Norwegian companies' tax behaviour with additional analyses. For this purpose we are in the process of accumulating data which can shed light on the relationship between corporate taxation, dividend policy and the shareholders' income and taxes.

The model MAKKO for local government

finances has been developed further. The model is based on a breakdown of local government activity into sectors which direct their services towards different population groups, children, young people, etc. For each sector variables are estimated which describe how many receive the services (coverage) and the use of resources per client (standard). The model has been used to shed light on the effects of population trends and a change in the age composition, inter alia for the government committee studying care needs. The model will be used together with the macromodels MODAG and MSG.

The work on the microsimulation model for education and job opportunities (MOSART) has now resulted in an operative model. The first projections have been published and presented to users. We have begun work on plans involving a development of this model so that we make full use of the model's capabilities. The expansion on which we are now working covers disability status and income. The model can then be used for simulating both disability pensioners and oldage pensioners. The model will also form the basis for further demographical work on a household model.

The work on an econometric model for labour market bottlenecks, which arise because the distribution of education in the

population does not match the structure of production in the economy, has been continued. The last part of the project, which will continue in 1991, will focus on empirical aspects.

Regional analysis

An important part of the research efforts in the field of regional analysis is covered by the models DRØM and REGION. REGION is a multiregional input-output model, while DRØM is a model system focusing on the relationship between regional labour market balances and interregional migration. In 1990, DRØM was used to calculate coordinated projections of labour market and population trends at the county level. The model REGION was updated with the help of national accounts data by county for 1986. Based on an assignment from the Defence Commission, the data base for the Defence Sector was considerably improved.

The work on a new model project, which is based on a more aggregated analytical framework than REGION/DRØM, was started in 1990. An important aim of this project is to provide a more satisfactory description of the adjustment processes in regional labour markets. The project will provide a starting point for several types of empirical analyses in 1991.

MACROECONOMIC MODELS AND ANALYSIS

The development and use of the macroeconomic models MODAG and KVARTS continued in 1990. The national

budget model MODIS V will no longer be updated and hereafter MODAG will also cover the Ministry of Finance's

requirements previously handled by MODIS. This will provide rationalization benefits for both the CBS and for the Ministry of Finance. KVARTS and MODAG were updated with a new base year as usual, and all econometric parameters were reestimated so that account has been taken of the latest revisions of national accounts data in addition to new observation. All econometric residuals are explicitly represented in the models, and historical figures for these are found in the data banks.

The structure of KVARTS has not changed very much the last few years. For MODAG, on the other hand, a number of new relations have been incorporated in 1990, at the same time the model has been respecified on several points. First, government transfers to households are now generally determined in the model, while they previously had to be estimated by the model user. Secondly, most nominal interest rates have been endogenized so that changes in domestic inflation and the current account result in changes in the Norwegian interest rate level for given foreign interest rates. Thirdly, greater parts of the companies' material inputs are now determined by relations where relative factor prices, capital stock, etc. are included. In this way the treatment of factor demand in the model has become more satisfactory. Fourthly, the treatment of households' consumer demand and housing investment has been entirely changed. Particularly important is the fact that we now have a far more satisfactory model for distinguishing between durable and nondurable consumer goods than was the case with earlier versions of the model. This change is also incorporated in

KVARTS. Minor respecifications in MODAG have primarily been made by reestimating employment relations and investment relations.

In 1990, MODAG has been used internally to evaluate and test the model's properties based on all the changes that have been made in the model the past year. The model has also been used intensively in connection with the so-called KLØKT project. This project, which in some respects is a followup of the SIMEN project in 1989, analyzes measures on a national and international basis to improve climatic conditions nationally and globally. In addition, the model has been used relatively often for smaller consultancy projects for external users where the focus has generally been either mediumterm projections or analyses of changes in economic policy or international conditions.

The KVARTS model is used only by the CBS. In 1990, we have made considerable progress in using the model in connection with the presentation of economic surveys that are published every quarter. The use of the model in connection with the work of the Technical Calculation Committee on the Income Settlements has become a more permanent element than previously and entails that we can now have a continuously updated reference scenario for quarterly developments in the Norwegian economy the next few years. Based on this reference scenario, an impact study of the high oil prices on future price developments was made in September. Through this analysis we determined that the rise in prices would exceed the 4.2 per cent threshold in November which, based on the collective wage agreements for

1990/91, would trigger new wage negotiations. This conclusion proved to be correct and a new round of negotiations were finished in January.

Short-term economic analysis

The programme for and implementation of short-term economic analyses generally followed the same pattern as in 1989 when the programme was revised. In 1990, we succeeded in integrating projections of cyclical movements with the aid of the KVARTS model to a far greater extent than previously. This has long been an ambition in our studies of the economic situation in Norway. In addition, we have obtained a model tool for analyses of cyclical developments in the international economy which we will start using in the period ahead in order to improve the possibilities for linking the Norwegian and international economy. In 1990, we started work on an historical analysis of cyclical developments in the 1970s and 1980s. The aim of the project is, first, to describe the actual course of cyclical movements over a longer period and through this evaluate the suitability of different indicators for such a description. Secondly, we are interested in analyzing the importance of oil activities for cyclical movements in this period, with special emphasis on the direct effects on demand (intermediate consumption and investment) which the growth of this industry has entailed. Thirdly, we want to evaluate the importance of the impetus from cyclical developments internationally in a period involving very turbulent economic conditions on the world market. And, finally, we are interested in investigating to what extent economic policy has had a stabilizing effect on cyclical developments.

The KVARTS model will be used intensively in this study.

Equilibrium models

The work on applied general equilibrium models continued in 1990 with a shift from the development of models to applications. The main project for model applications related to the effects of changes in the system for company and capital taxation on welfare. The section of the project which has studied longterm dynamic effects within an aggregated intertemporal model has been completed and the results are in the process of being published as a doctoral dissertation. The other part of the project is studying to what extent the tax system favours fixed investment over financial investments, as well as whether the system has resulted in overinvestment in some industries and capital types. As part of this work, calculations have been made of how a tax reform based on the Aarbakke Committee's report will affect certain conditions. A necessary component of this work has been to combine a detailed description of the current tax system and the reform proposals with a consistent analytical framework. Two articles dealing with how the tax reform proposals influence the required marginal return on capital before tax have been written. A general equilibrium analysis of the effect of the tax reform on resource allocation and welfare will be documented early in 1991. This analysis will be based on a new version of the MSG model which during the last few years has been developed for analyses of welfare and resource allocation.

At the same time that we began to reap the benefits of the work on capital taxation in

the last half of 1990, the work on endogenizing labour supply was started. The work has proceeded rapidly, and a version of MSG has now been established in which households - divided into 14 groups - endogenously adjust labour supply as a function of, *inter alia*, real wages after tax. This provides opportunities to compare how the socioeconomic costs of an increase in public sector expenditure depend on the type of finance. Such a study is under way and will be completed in the first half of 1991.

Other subjects in the field of tax economics have also been studied. The most widely used general equilibrium models presuppose a negative correlation between the demand for exports and the relationship between domestic and foreign prices. Given the size of the elasticity which is customary in the CBS' models, there is apparently considerable leeway for the authorities to increase national income by imposing levies on exports, especially when export companies themselves do not coordinate their behaviour and make use of the degree of monopoly power they have on a combined basis *vis-a-vis* foreign buyers. This point is very much in evidence in equilibrium analyses of tax changes. The problem is now clarified in an article which is soon to be published.

The work on a new consumption block in the new version of the MSG model has been brought to a preliminary conclusion. The model is considerably more detailed in its description of the relationships between demographic and economic developments as households are now divided into 14 types by sociodemographic characteristics. A separate model was established which, based on the population projections,

projects the number of different types of households. Moreover, we have established a linear expenditure system for each of the 14 household types estimated by cross-sectional data as well as income accounts which distribute the model's various income and expenditure categories among the 14 households in the model. Documentation showing how the changeover from one to 14 households influences the empirical properties of the MSG model was published.

The work on developing a special version of the MSG model for analyzing environmental and energy issues continued in 1990. The project is part of the research programme "Energy and the Society". This model describes the power and transport sector in a more detailed way than the MSG model does today. The work in 1990 generally consisted of establishing the necessary data base. The first operational TROLL version of the model is expected to be ready at the beginning of 1991, but then with a very preliminary empirical content.

In addition to analytical tools for our own research activities, the new version of MSG was used in 1990 in connection with three government studies. First, it was used in the latest KLØKT project to simulate scenarios for the Norwegian economy with and without measures to limit Norwegian carbon dioxide emissions. Secondly, the model was used by the committee studying social care to examine the longterm consequences of changes in the composition of the population. Thirdly, the model was used to compute welfare and allocative effects of different measures aimed at increasing the efficiency of the public sector. All these projects will continue in 1991.

DEMOGRAPHY

The demographic work in the Research Department in 1990 was concentrated on population projection, the Family and Occupation Survey 1988, internal and external migration, and microsimulation of households.

New national and regional population projections were published in the autumn of 1990. Nine different sets were prepared for the period 1990-2050, with alternative assumptions concerning fertility, net immigration and the pattern of domestic migration. Greater emphasis has been placed on trends in cohort fertility and parity than in earlier projections. An evaluation of Norwegian population projections has almost been completed.

A project on the development of methods for analyzing mortality rates for the period 1846-1988 was completed. These methods were used in connection with the projection of mortality in the new population projections. Analysis of family and fertility continued to be given priority in 1990, and this will continue in the years ahead as long as the analysis of data from the Family and Occupational Survey of 1988 is a key task. Data checking and preparations for analysis have required considerable resources in 1990. The first results from the survey were published at

the end of the year and a tabular publication (NOS) with descriptive data was completed. The survey provides new figures on, among other things, the development over the lifetime in cohabitation, marriage, births, education and the occupational careers of women and men.

The increased efforts in recent years to develop files with data on individual histories have provided considerable benefits. So far files have been produced on birth and marriage histories, and the development of a file for migration histories has just been completed. A summary publication with results from the registered studies of fertility is published by the University Press. An extensive analysis of migration histories will begin in 1991. Cooperation on the development of a microsimulation model for households continued (MOSART).

Considerable attention has been devoted to demographic aspects of immigration and emigration, inter alia, through participation in the OECD's group for this (SOPEMI) and the European Science Foundation. The CBS also cooperates with international organizations concerning fertility surveys in Europe, fertility among cohabiting couples, consequences of population trends for social security expenditures, etc.

LIST OF PERSONS EMPLOYED IN THE RESEARCH DEPARTMENT AS OF 1 FEBRUARY 1991

Head of Department

Bjerkholt, Olav

Unit for Administration

Finstad, Hanne, Head of Administration
 Angeland, Kirsti, Office Secretary
 Holm, Elisa, Office Secretary
 Lysell, Kari Anne, Office Secretary
 Rambøl, Hanne, Executive Officer
 Skoglund, Anne, Junior Executive Officer
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