



Research Department

Statistics Norway

Annual Report 1995

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1995



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The Annual Report 1995 for the Research Department of Statistics Norway presents in outline major programmes and projects in 1995-96 with complete lists of publications and staff. The Annual Report also gives a brief history of the Department and its role as a social and economic research institution, related to the statistical responsibilities of Statistics Norway.

The ultimate aim of the research activity of Statistics Norway is to contribute towards a better foundation for social and economic policies. To an increasing degree theories and methods pertinent for this aim are drawn from international research pools

The Research Department welcomes interests in our publications, and we are happy to forward these on request or as institutional exchange subscriptions.

Oslo, 15 March 1996

Olav Bjerkholt
Assistant Director General
Head of Research Department

Brief history of the Research Department

The research activities of Statistics Norway have roots far back in the history of the institution. The statistical bureau of Norway was founded in 1876 by separating a small statistical office from the Ministry of the Interior. In the historical chronicles of Statistics Norway the background for the separation of the statistical service from the ministerial environment was stated as follows: "The work of the Office would be facilitated by more distance from the government offices; the scientific character of the Office would thus be better understood by the public." Since then Statistics Norway, or as it was known until 1993 - the Central Bureau of Statistics - has been the national statistical institution of Norway, part of the government administration but with an autonomy in statistical matters, like similar institutions in other countries.

The first Director General of Statistics Norway, Anders N. Kiær (1876-1913), took an active part in the international statistical cooperation and was a pioneer in the use of representative samples as a basis for statistics, especially with regard to income statistics. Kiær pioneered also in technical advances: a Hollerith electrical machine was employed in Norway for the first time in the compilation of statistics of incomes and wealth for 1891, shortly after its invention. The research activity of Statistics Norway in the early years was modest and mostly related to analysis of data from the population census and income statistics. Later on after the turn of the century statistical investigations of social issues and poverty conditions became an important area. After World War I Statistics Norway started to publish regular economic surveys.

A separate Research Department was not established, however, until 1950 on the initiative of the new Director General Petter Jakob Bjerve (1949-1980) who had strong academic interests and to whom applied economic and econometric research was a natural extension of the statistical work. In the years just preceding 1950 intensive efforts had taken place in establishing National Accounts, based on production statistics as the primary data source. The pioneering national accounts work of this period was an empirical research frontier which later would provide a basis for macroeconomic modelling and other planning and policy oriented tools. The national accounts system was completed in the early 1950s as one of very few, which at that time integrated detailed annual input-output tables within the national accounting framework.

In the first decade the work of the Research Department comprised in addition to national accounts, tax research, monthly and annual economic surveys, and other research activities often directed towards improving methods of economic

planning in the postwar period. Towards the end of the 1950s the first macroeconomic model of Statistics Norway - the MODIS I model - was developed as a simple input-output model, large in relation to the computer capabilities of the time. The model drew on inspiration from W. Leontief's pioneering work as well as the modelling experiments of Ragnar Frisch at the Institute of Economics (University of Oslo). The computer used to solve the MODIS I model from 1960 until its replacement in 1965 was a British built first-generation vacuum-tube computer called DEUCE, the only one of its kind in Scandinavia.

Throughout the 1960s and 1970s models of the MODIS family, ever increasing in size continued to be developed and used intensively by policy makers. Around 1980 a new breed of macroeconomic models were finally taking over, and constituted the family of models used today. The 1960s also initiated an era of computer based tax models run by the Research Department as a service directed primarily towards the Ministry of Finance and the Storting (Parliament).

In the 1970s natural resource accounts and energy economics became new adopted research fields, later on after 1980 petroleum economics followed. During the 1980s and even today, a major emphasis is placed on developing microsimulation models, combining advances in computer technology, econometric methods, and data availability. These models, although far from having reached perfection, have been extremely versatile and useful vehicles for the analysis of societal change as a result of demographic development, economic growth, and government policy.

General research objectives

The general objectives of the Research Department's function within Statistics Norway are four-fold:

Enhanced empirical knowledge

Statistics alone is an insufficient source of information for understanding social and economic development. Analysis of statistical data by means of relevant theory and analytical methods and the use of models when appropriate may give enhanced empirical insight and deeper understanding of the phenomena under consideration. Such analytic knowledge beyond what can be derived from data alone, is inherent in many of the published results of the Department on the state of the economy, the environmental situation etc. Key parameters, such as the interest sensitivity of household saving or of the relation between economic growth and environmental deterioration, are examples of embodiments of empirical knowledge beyond the realm of statistics.

Analytical tools for monitoring economic and environmental development or government planning

An important use of empirical insight gained is embodied in the design of tools for government planning, usually in the form of simulation models. Modelling activities are carried out in close contact with user interests and with emphasis on government planning needs. Signals concerning needs will generally be channelled through Research council programmes and direct contact with ministries. Analytical tools will often involve substantial operational commitments. In order to avoid an accumulation of operational tasks in the Research Department, continual attempts is made to make operation of existing models more efficient, and assessing the society's need and willingness to pay for continued operation.

Feed-back to the statistics

Researchers in the Statistics Norway have a unique position close to the sources of data. The Statistics Act clearly states that this position should not be utilized to monopolize access to data. The proximity with the statistical work provides special opportunities for exploitation of the data expertise in the Statistics Norway, for special organization of data material and links to other sources, and for influencing the methods of collection of primary data. The analytic use gives feed-back effects to statistical work and may serve to improve the quality of the official statistics.

Cumulating competence

Adequate expertise and scientific competence are obvious prerequisites for successful performance of research tasks. The research activity shall give results that can be utilized in the Norwegian society and provide documentation that high scientific standards in the analyses have been maintained. Good contact with research institutes and universities abroad and at home is a necessity. Competence building and the maintenance of a high scientific level demands considerable resources.

<i>Department</i>	<i>Division</i>	<i>Office</i>	
Economic Statistics	National Accounts	Administration	
	Environmental Statistics	Systems Development	
	External Trade, Energy and Industrial Production Statistics		
	Economic indicators		
	Public Finance and Credit Market Statistics		
	Labour Market Statistics		
Social Statistics	Social and Demographic Research	Administration	
	Population and Education Statistics	Systems Development	
	Health Statistics		
	Sample Surveys		
	Social Welfare Statistics		
Industry Statistics	Business Register	Administration	
	Income and Wage Statistics	Systems Development	
	Primary Industry Statistics		
	Transport and Tourism Statistics		
	Data Registration		
	Construction and Service Statistics		
	Research Olav Bjerkholt	Public Economics Nils Martin Stølen	Administration and Computer Services Otto Gerhard Vaagen
		Resource and Environmental Economics Knut H. Alfsen	
	Macroeconomics Ådne Cappelen		
	Microeconometrics Jørgen Aasness		
Administrative Affairs	Budget and Accounting	Joint Services, Oslo	
Coordination and Development	Computer Systems and Development	Joint Services, Kvgr.	
	Statistical Methods and Standards		
	Information and Publishing		
Units without department connection	Computer Services	International Consulting	

Chairman of the Board
Åge Danielsen

Director General
Svein Longva

Each division has its own responsibilities and research tasks. On an ad hoc basis the divisions join forces to cooperate on major studies or special investigations. A staff unit deals with personnel, finances, publication, and computer resources.

Business cycle analysis

Business cycle reporting

As in earlier years the Research Department in 1995 published the annual economic survey of the preceding year and three quarterly surveys in parallel editions in Økonomiske analyser and Economic Survey. Besides presenting the quarterly national accounts, these surveys also offer a brief presentation of the main international economic trends and forecasts of the macroeconomic development of the Norwegian economy. The forecasts are constructed by means of the quarterly macroeconometric model KVARTS (see below). The KVARTS model is also used to provide alternative scenarios for the Government appointed Expert Committee for income settlements in connection with the annual wage and income negotiations.

To appraise international economic developments, the Research Department also employs the NIGEM model of The National Institute of Social and Economic Research, UK. The last quarterly survey of 1995 contained an assessment of international economic trends based on a NIGEM simulation.

In 1995 Statistics Norway completed the first stage of a major revision of the national accounts. Results were published in the third quarterly survey, accompanied by a comparison of previously published and revised figures. According to this comparison, the main revision did not significantly change the previously offered description of economic developments in Norway.

Project leaders: *Knut Moum and Mette Rolland.*

Business cycle history

The aim of the project is to analyse business cycles and growth in the Norwegian economy. Especially, we will specify econometric models like cointegrating vector autoregression (VAR) models, to identify different types of domestic and foreign shocks that give cyclical variability in the economy. A variety of univariate models of trends and cycles have first been specified and applied to a set of macroeconomic variables. We find that some variables (e.g. unemployment and investment) have experienced a structural break in the trend in the late 1980s, possibly as a consequence of the deregulation of credit markets in the mid-1980s.

Project worker: *Hilde Christiane Bjørnland.*

Financial support: The Research Council of Norway.

Documentation: SES 92.

H.C. Bjørnland: The Dynamic Effects of Aggregate Demand, Supply and Oil Price Shocks. To appear in the series Discussion Papers.

The objective of macroeconomic analysis within Statistics Norway is to analyse the state, functioning and development of the Norwegian economy by exploiting internal and external data sources and by developing and utilizing macroeconomic models. Key users of the models are the Ministry of Finance and the Storting (Parliament), although general availability to the public of models and results is also emphasized. Business cycle analysis reports are published quarterly. Current work is organized under four headings: Business cycle analysis, Macroeconometric models, General equilibrium models and International projects.

H.C. Bjørnland: Sources of Business Cycles in an Energy Producing Economy. To appear in the series Discussion Papers.

Univariate structural time series models

Models of the Unobserved Component ARIMA-class are estimated for some key macroeconomic time series. Besides a trend, a seasonal and an irregular component it is at the outset allowed for a stochastic business cycle component. Little evidence is found for a business cycle component within this framework. A possible explanation for this result is that the business cycle is a lot more irregular, e.g. with regard to the periodicity of the business cycle over the sample, than what is assumed by this type of model. But even if the business cycle is regular, the sample size may be too short for the purpose of business cycle extraction.

Project worker: *Terje Skjerpen.*

Documentation: DP 140.

Macroeconometric models

Model applications and development

The Research Department possesses two macroeconomic models - KVARTS and MODAG. The annual model MODAG is mainly used by the Ministry of Finance for forecasting and policy analysis. In 1995 a slightly modified version of the model was used extensively by the "Green Tax Commission", a public committee appointed to analyse effects of environmental taxes. Another modification of MODAG has made it possible to analyse effects of subsidizing some labour intensive services. KVARTS is used for forecasting and analysis in our own business cycle reports, as well as in the "Business cycle history" project.

References given under Documentation are to issues in Statistics Norway Publications, see pp. 21-25, or for numbers in brackets to External Publications, see pp. 26-28.

In 1995, there was a main revision of the national accounts system on which the models are based. The models were updated in line with this, as well as transferred from TROLL on an IBM mainframe computer to the new PCTROLL/FAME on a UNIX workstation. No major changes in the model structures were undertaken. In 1995 a doctoral dissertation on modelling of exports and factor demand was completed. Also work on modelling of import prices has been completed in 1995, although the results have not yet been implemented directly into the models.

Project workers: *Einar Bowitz, Torbjørn Eika, Inger Holm, Stein Inge Hove, Laila Haakonsen, Kjersti-Gro Lindquist, Bjørn Naug and Jørgen Ouren.*

Financial support: Ministry of Finance, Ministry of Administration.

Documentation: ØA 3/95, ØA 5/95, NOT 95/17, NOT 95/29, NOT 95/31, REP 95/2, DP 157, [19], [43].

K. Eika and T. Eika: To makroøkonometriske modellar for norsk økonomi. Eigenskapar ved KVARTS og RIMINI illustrert ved to verknadsutrekningar. *Sosialøkonomen*, No. 1, 1996.

B.E. Naug and R. Nymoen: Import Price Formation and Pricing to Market: A Test on Norwegian Data. *Scandinavian Journal of Economics* (forthcoming, 1996).

Expectation formation

Whether the behaviour of economic agents is based on expectations about the future and, if so, how these expectations are formed, is of importance to how the economy will react to economic changes such as policy or world market activity. Empirical studies have been carried out on the price setting behaviour of Norwegian producers at domestic and foreign markets and on decisions concerning labour demand. Little evidence is found that support the hypothesis of rational expectations, and the results indicate that if expectations matter, it is more likely that they are formed according to extrapolative models. One aim with the project is to establish an aggregate macroeconomic model for the Norwegian economy, which introduce

forward-looking behaviour as far as empirical support is established.

Project workers: *Ingvild Svendsen.*

Financial support: The Research Council of Norway.

Documentation: DP 151, DP 152.

General equilibrium models

Model development

The Research Department has for 20 years developed and used successive versions of the Multi-Sectoral Growth (MSG) model which originated in the late Professor Leif Johansen's doctoral thesis of 1959.

In 1995 a new version, labelled MSG-6, became operational. This version deviates substantially from the previous versions (MSG-5) of the model. First, it has been designed in order to analyse various kinds of industry policies, including tariff and non-tariff import protection, government transfers, taxation and various domestic market regulations. This focus has commanded a more disaggregated classification of the manufacturing industries, and the specification and working of such policy instruments has been modelled in greater detail than earlier model versions. Second, the model provides a relatively detailed description of the energy markets and polluting activities in order to address issues within the field of environmental economics. Third, the producer behaviour specified is typically based on the theory of monopolistic competition with free entry and exit of firms. In a large number of industries the industry production function has been explicitly derived from perfect aggregation of a simplified representation of heterogeneous firms. Typically, firms produce at decreasing returns to scale due to the existence of fixed factors which also represent a fixed cost element. Fourth, exports are determined as parts of optimizing producer behaviour. Contrary to the Armington assumption, adopted in MSG-5, Norwegian exporters face perfectly elastic demand functions in the world markets. Alternative closure rules are optional to the model user. In particular, an intertemporal version with perfect foresight will soon be available. The model is now used by the Ministry of Finance and will be used internally as the main tool in analyses of industry, trade and environmental policies.

Project workers: *Erling Holmøy, Torbjørn Hægeland and Birger Strøm.*

Financial support: Ministry of Finance, The Research Council of Norway.

Documentation: To appear.

Macroeconomic models:

All of Statistics Norway's macroeconomic models are based on the national accounts. The core of the models consists of input-output relations for supply and utilization of specified goods and services. Linked to this core are behavioural relations etc. for different sectors of the economy.

The MODAG model has an input-output core with 41 goods and 33 production sectors. This model is particularly designed for medium term analysis. The behavioural relations cover production, consumption, investment, imports, exports, prices, interest rates, wages and the labour market. The Ministry of Finance is an important user of the MODAG model for forecasting and economic policy analyses.

The KVARTS model is a quarterly model which contains largely the same type of behavioural relations as MODAG, but is more aggregated. The input-output core has 24 goods and 18 production sectors. In the model great emphasis is placed on short-run dynamics. The model is used in business cycle analyses and for work in the Expert committee for Income Settlements.

The MSG model is an applied general equilibrium model based on optimising individual behaviour and market clearing flexible prices. In 1995 a new version, MSG-6, became operational, which specifies 45 commodity groups and 38 production sectors. Producer behaviour is typically based on the theory of monopolistic competition with free entry and exit of heterogeneous firms. MSG-6 is intended to be particularly suitable for long-run growth projections and to assess welfare and allocation effects of various policy changes, including taxation, energy policy and various kinds of industry assistance. The Ministry of Finance is an important user of the model.

Model applications

During the 1990s the foreign trade conditions for Norway was liberalized through the EEA treaty, the WTO agreement, the OECD agreement on subsidies to ship building, and the EFTA agreement on subsidies to fishery. The consequences on resource allocation and welfare of these leaps towards trade liberalization are analysed by employing a special version of the general equilibrium model MSG-5. The results indicate large changes in industry structure and trade patterns but moderate welfare gains.

Project workers: *Taran Fæhn and Leo Andreas Grünfeld.*

Financial support: The Research Council of Norway.

Documentation: T. Fæhn and L.A. Grünfeld: Recent Leaps Towards Free Trade. The Impact on Norwegian Industry and Trade Patterns. To appear in the series Discussion Paper.

Welfare analysis of environmental taxes

The introduction of environmental taxation will in addition to short term effects on prices and costs, have long term welfare effects through changing the rate of capital accumulation and economic growth. Using an intertemporal general equilibrium model for a small open economy with differentiated products, the long run welfare effects of both a unilateral and an international carbon tax are discussed. It is shown that for a petroleum producing economy an international carbon tax may give a larger welfare loss than a unilateral tax due to lower terms of trade gain.

The existence of a "double dividend" with environmental tax reforms are also analysed. If the labour market is characterized by nominal wage rigidity implying involuntary unemployment, a "green" tax reform where an increase in the tax on fossil fuels is combined with a revenue neutral reduction in the labour income tax, may have a positive effect on both employment and total welfare, in addition to reducing pollution.

Project worker: *Brita Bye.*

Financial support: The Research Council of Norway.

Documentation: DP 145.

B. Bye: Taxation, unemployment and growth: dynamic welfare effects of "green" policies. To appear in the series Discussion Papers.

Structural indicators

Effective Rates of Assistance (ERA) are a summary measure of the effective assistance to labour and capital implied by the direct government transfers, indirect taxes and subsidies, import protection through tariffs and non-tariff barriers and price regulations. The relative dispersion of ERAs

between industries in the business sector can under certain conditions be interpreted as an indicator of the total allocative effect of these policy measures. The calculations have been carried out for 1989 and 1991 and will be updated to cover 1994 during the first quarter of 1996. The ERAs were presented in the National Budget for 1996 and have been used as input in an ongoing OECD project on quantification of indicators of government assistance.

During 1995 the first steps were taken to develop a broader set of structural indicators. So far most of the work has been devoted to give such indicators a precise meaning. So far the result from this work has been a theoretical framework which provides a decomposition of economic welfare into measurable contributions from productivity change, reallocation and revaluation of resources and changes in the relative price structure due to distortive tax wedges, monopoly rents and price regulations. The framework represents an extension of the growth accounting framework much used to identify technical change. A quantification of the components in this account of welfare changes will be undertaken this year.

Project workers: *Taran Fæhn, Leo Andreas Grünfeld, Erling Holmøy, Torbjørn Hægeland and Birger Strøm.*

Financial support: Ministry of Finance.

Documentation: REP 95/9, DP 147, DP 161.

International projects

An economic-environmental model for Indonesia

In 1995 a disaggregated multi-purpose economy wide model designed to analyse the interplay between economic and environmental variables in Indonesia was completed. The model has been used in an analysis of effects of fuel taxes on CO₂-emissions. The main (though preliminary) results are: Emissions of CO₂ in Indonesia are likely to grow strongly in the coming decades. Substantial reductions in the CO₂ emissions per unit of GDP can be accomplished by increasing domestic fuel prices. However, unless the trading partners pursue similar policies as well, this will depress domestic production and income. The project has been a cooperation with the State Ministry of Environment in Indonesia.

Project worker: *Einar Bowitz.*

Financial support: Ministry of Environment.

Documentation: DOC 95/7, DOC 96/2, REP 96/1.

Planning models for Saudi Arabia

The Research Department has contracted with UN to develop a system of models for the Ministry of Planning in Saudi Arabia. The Implementation Model is a short-to-medium term, demand oriented macroeconomic model whose main purpose will be to monitor the five year Development Plan implementation and to analyse effects of fiscal and monetary policy actions, as well as shocks from the oil sector and abroad. The Selection Model, a supply oriented CGE-model, is on the other hand directed towards preparing the Ministry's five year plans, and will focus on investment programs and allocation of available resources. Both models are based on an input-output core and focus on the private non-oil sector of the economy. In addition to the model development, an extensive training programme of Saudi officials has been carried out. Support and maintenance of the two models, as well as further training schedules, are planned for the coming two years.

Project workers: *Olav Bjerkholt (project leader), Kjell Arne Brekke, Ådne Cappelen, Robin Choudhury, Per Richard Johansen and Knut A. Magnussen.*

Financial support: UN/DDSMS.

Documentation:

The Implementation Model. A Short-Term Macroeconomic Model for the Ministry of Planning of the Kingdom of Saudi Arabia (authored by P.R. Johansen and K.A. Magnussen). Report to United Nations, 1995.

The Implementation Model. A Short-Term Macroeconomic Model for the Ministry of Planning of the Kingdom of Saudi Arabia. Technical Documentation of Programs and Procedures (authored by R. Choudhury and K. A. Magnussen). Report to United Nations, 1996.

The Selection Model. A Computable General Equilibrium Model, developed for the Ministry of Planning of the Kingdom of Saudi Arabia (authored by Å. Cappelen and K. Magnussen). Report to United Nations, 1996.

The Century Model – on the Long Term Sustainability of the Saudi Arabian Economy (authored by K.A. Brekke). Report to United Nations, 1996.

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Labour supply

The labour supply studies are focused on estimating empirical models that account for nonstandard budget constraint (such as kinked and nonconvex tax systems), and non pecuniary job-attributes (such as type of work). To this end an econometric framework has been developed that allows for convenient treatment of rather general budget constraints and rationing of jobs. Empirical and theoretical work with the purpose of accounting for measurement error and justifying functional form assumptions is in progress. In 1995 a model version has been applied to study labour supply responses and welfare effects of tax reform. The analysis shows that gradual tax reforms in Norway may have removed some of the distortions on worker behavior. Moreover, the results indicate that proportional taxes may reduce the inequality in the distribution of disposable household income. Yet, when the distributional consequences are related to changes in individual welfare, it is found that rich households may benefit far more than households at the other tail of the income distribution, because they earn more without any significant increase in effort.

Project leader: *John K. Dagsvik*.

Financial support: The Research Council of Norway.

Documentation: SES 91, REP 95/36, [2], [28], [59].

Welfare and inequality

The activity in this field covers empirical as well as theoretical topics. Recent theoretical results deal with characterizations of Lorenz curves and distributions of income. By exploiting the fact that the Lorenz curve is a cumulative distribution function a new family of inequality measures is developed. This family of inequality measures may form the basis of describing and summarizing the Lorenz curve and the corresponding income distribution. Moreover, it is demonstrated that these measures of inequality combine descriptive features of the inequality concept with normative ones.

A major problem in interpreting evidence on annual income inequality is the need to distinguish two basically different kinds of inequality; temporary, short-run differences in income, and differences in long-run, permanent income. Thus, it is important to know what happens to inequality when the accounting period of income is extended. A joint project with the Nordic countries compares income inequality and income mobility in the Scandinavian countries and in the United States during the 1980s. The results demonstrate that inequality is greater in the United States than in the Scandinavian countries and that the ranking of countries with respect to inequality remains

A long tradition within the Research Department is econometric analyses of micro-data collected by Statistics Norway and application of estimated behavioural relations and welfare measures in policy simulation experiments.

The overall aim has been to establish a micro-based system of structural behavioural relations for households and firms. Adequate theory and methods for econometric analysis is developed and adapted for this purpose.

The microeconomic research activity within Statistics Norway emphasize empirical studies and the application of findings from these in the Department's inventory of macroeconomic models and microsimulation tools.

unchanged when the accounting period of income is extended from one to eleven years. The pattern of mobility turns out to be remarkable similar despite major differences in labour market and social policies between the Scandinavian countries and the United States.

Project leader: *Rolf Aaberge*.

Financial support: Nordic Council for Economic Research.

Documentation: DP 158, DP 168.

Consumer behaviour

Models of systems of household expenditure are developed, estimated, tested, and implemented into a network of macro- and microeconomic simulation models. A study based on panel data from the household expenditure survey, using 28 commodity groups, was presented at the 1995 Econometric Society World Congress in Tokyo. A specific feature is simultaneous estimation of the distribution of preferences, measurement errors and latent total expenditure across the population of Norwegian households. A similar Engel curve model, but using a single equation instrumental variable approach on cross section data, was estimated on 673 different commodity groups. These estimates was applied in different policy analysis, and will be further investigated, in particular with respect to distributional effects of green taxation. A systematic work on building data bases for econometric analysis based on the continuous Norwegian household budget surveys (starting in 1973), in combination with the consumer price index and other sources, was started up and applied in the 673 commodity study.

A household consumer demand model, based on a four level nonhomothetic utility tree with demographic effects, was calibrated based on both

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micro- and macroeconometrics. The 18 commodity groups in the model can be aggregated both from the 673 commodities in the micro data and from the commodities in the National Accounts. The model aggregated over all Norwegian households was implemented in the general equilibrium model MSG-6, and a policy analysis using a former version of this model (MSG-EE) was finished. We have also worked with implementing this consumer demand model in a microsimulation model with 8000 utility maximizing households (LOTTE-konsum). Tax policy analysis based on this microsimulation model was accomplished.

Project leader: *Jørgen Aasness*.

Financial support: The Research Council of Norway.

Documentation: DP 148, DP149, NOT 95/17, ØA 8/95, [33], [46], [47], [56].

Producer behaviour and productivity

Studies are conducted on R&D, scale economies, investment, job creation and productivity. The role of internal and external finance for investment at the micro level has been investigated. We have also completed studies on job creation and the relationship between job creation and innovation. Currently we are working on a new framework for studies of the relationship between R&D, profits and productivity.

Project leader: *Tor Jakob Klette*.

Financial support: The Research Council of Norway.

Documentation: DP 136, DP 159, NOT 95/35, [14], [16], [17], [27], [42].

Discrete and continuous choice

Many important choice settings can be formulated as discrete and continuous choice processes where heterogeneous decision makers face different and partly unobservable choice constraints. This is a typical challenge with which the theory of discrete choice is concerned.

The activity in this field includes the development of theory and methodology for structural analysis of data generated by individual choice from a continuous or finite set of alternatives. In particular, it is focused on topics such as;

- (i) characterization of transition probabilities for individual choices that take place over time,
- (ii) modelling two-sided search/matching behaviour in markets with flexible contracts and limited information,

- (iii) models for discrete and continuous choice,
- (iv) development of models of consumer demand for commodities with unobservable quality attributes,
- (v) stochastic models for choice among strategies when the outcomes are uncertain.

An empirical analysis of the potential demand for alternative-fuel cars has been accomplished.

Estimation of discrete choice models is, apart from logit and nested logit specifications, a complicated task. In 1995 a new and promising simulation technique for computation of structural choice probabilities was developed and documented in a doctoral thesis. In 1996 we will apply this technique in an empirical analysis.

Project leader: *John K. Dagsvik*.

Documentation: DP 141, DP 165, DP 166, DP 167, NOT 96/3.

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*on leave

Norwegian and Nordic energy markets

Supply and demand for electric power

This project provides national and regional projections of important variables for the electricity market in Norway. Investments in production and transmission equipment for electric power have a very long lifetime, and there are considerable lags from investment decisions are taken to the realization of the projects. This naturally leads to a need for information on future electricity prices and the general development of the power market. Also the regional distribution of future electricity supply and demand are of importance, in particular for the transmission companies and local power producers. The projections are based on the macroeconomic model MSG-5, supplemented with models capable of regionalizing the energy demand.

Project workers: *Torstein Bye (project leader), Tor Arnt Johnsen and Mona Irene Hansen.*

Financial support: Norwegian Power Grid Company.

Documentation: REP 95/18.

Demand for power in the short run

One of the objectives of the Energy Law adopted in Norway in 1991 has been to provide incentives for a more efficient use of the Norwegian power system. As a consequence, customers can now choose between several types of contracts different from the traditional flat-rate contracts. The terms of the new contracts are in various ways linked to the price of electricity in the spot market. The aim of this project has been to study the evidence for changing consumer behaviour under the new contracts and to provide some rationale for the choice of contract.

Project workers: *Torstein Bye (project leader), Tor Arnt Johnsen and Jan Øyvind Oftedal.*

Financial support: Norwegian Electricity Federation/The Research Council of Norway.

Documentation: T. Bye, T.A. Johnsen and J.Ø. Oftedal: *Etterspørsel i et markedsbasert omsetningssystem (Demand in a market based trading system)*. To appear in the series Reports.

The cost of decommissioning Swedish nuclear power

Nuclear reactors produce almost half of the demand for electricity in Sweden (approximately 70 TWh per year). The Swedish parliament (Riksdagen) decided in 1980 that nuclear power should be phased out before the year 2010. The question has come up for renewed consideration in the winter of 1995/1996. In this project we have used a model of the Nordic energy markets to estimate

A prime objective of the Research Department in recent years has been to analyse the interactions between the environment, natural resource use, and economic development. The main user groups are governmental bodies, in particular the Ministry of Environment and the Ministry of Finance, although informing the general public is also emphasized. The work is currently organized under five headings: Norwegian and Nordic energy markets, International energy markets and the environment, The macro-economy and the environment, Methodological issues and Developing economies and the environment.

the effects on both the Swedish and the Norwegian electricity market (supply and demand side) of the decommissioning of the Swedish power plants. The present value of the total cost for Sweden is calculated to be of the order of 77 billion Nkr.

Project workers: *Finn Roar Aune, Torstein Bye (project leader) and Tor Arnt Johnsen.*

Documentation: REP 95/34, ØA 7/95, ES 4/95.

Potential demand for transport in the households

Emissions from automobiles represent a considerable fraction of Norwegian CO₂ emissions. A carbon tax is a common control policy to combat further growth in these emissions. This will reduce the growth in road traffic, and in the longer run give incentives for the development of more energy efficient cars. A number of alternative transport technologies are on the drawing board, for instance hybrid, gas powered and electric cars. In this project the attitudes of Norwegian households towards these new technologies are investigated, and important characteristics of the technologies are determined.

Project workers: *John K. Dagsvik (project leader), Rolf Aaberge and Dag G. Wetterwald.*

Financial support: The Research Council of Norway.

Documentation: DP 165.

International energy markets and the environment

Energy demand and CO₂ emissions in a changing Western Europe

The Maastricht treaty draws up guidelines and goals for the further economic integration of Western Europe after the turn of the century. The current national interests and trends makes it,

References given under Documentation are to issues in Statistics Norway Publications, see pp. 21-25, or for numbers in brackets to External Publications, see pp. 26-28.

however, uncertain whether or not all parts of the treaty can be expected to be fulfilled. Based on a Sectoral European Energy Model (SEEM), the project analyses the future energy demand and related emissions of CO₂ in Western Europe under the assumption of successful further economic integration and compares this to a situation where fragmentation and national interests dominate.

Project workers: Pål Boug, Leif Brubakk, Dag Kolsrud and Morten Aaserud (project leader).

Outside partners: Frits van Oostvoorn, Wilma Pellekaan, Netherlands Energy Research Foundation (ECN).

Financial support: Statoil, Ministry of Environment and the Dutch Ministry for Planning.

Documentation: REP 95/24, DOC 95/6, DOC 96/1.

P. Boug and L. Brubakk: Impacts of Economic Integration on Energy Demand and CO₂ emission in Western Europe. To appear in the series Discussion Papers.

K.H. Alfsen, P. Boug and D. Kolsrud: Fragmentation or Integration in Western Europe? Consequences for Energy Demand, Carbon Emissions and Acid Rain. To appear in the series Reports.

International models

Nordic energy demand model

This model is a regionalized partial equilibrium energy model for the Nordic countries (Norway, Denmark, Sweden and Finland) covering the most important energy carriers in this region. Supply functions and an energy transport network is linked to a demand model comprising three manufacturing sectors, a service sector, four transport sectors and the households. The demand for energy in Iceland is covered in a separate model.

Sectoral European Energy Model (SEEM)

The Sectoral European Energy Model (SEEM) is a model for the calculation of future demand for fossil based energy in thirteen Western European countries given an economic development path, and price paths for oil, gas and coal at the import level (cif). The model calculates end user prices including taxes and demand for solid, liquid and gaseous fossil fuels from manufacturing industry, services, transportation, power production and households. For given supply paths of non fossil electricity, the model computes equilibrium prices and quantities of electricity based on the average incremental cost of conventional power and relative energy prices. The model also comprises a routine for calculating emissions of CO₂ from fossil fuel use.

DYNOPOLY - a DYNamic OligoPOLY model for the European gas market

The game depicted by the model is essentially an investment game between dominant natural gas suppliers (Algeria, former USSR and Norway) facing a deregulated gas market with no intermediate barrier between suppliers and end users. The demand region is continental Western Europe. Each player possesses a bundle of strategic investment options. In the beginning of each five-year period they can make use of one or more of the remaining options, or none. The moves are made simultaneously, only previous investments are known. The investments are operative from the next period. The players maximize discounted cash flows over the remaining horizon. They have full information of demand, options and costs and can predict the other players' best moves. The model is solved by dynamic programming, and the solutions are perfect Nash equilibria. In equilibrium, the players balance the profits from discouraging the opponents' supplies by making an investment, against the profits from restricting supply by postponing the investment.

CO₂ taxes and the petroleum wealth

An international treaty on taxation of carbon emissions is likely to have great impact on the markets for fossil fuels. In this project we analyse, by employing a regionalized dynamic general equilibrium model of the markets for fossil fuels, how such a treaty may affect the petroleum wealth of various groups of producers. The results indicate that market power in the oil market is important for impacts on petroleum wealth. If OPEC continues to operate as a cartel, a likely outcome is that the petroleum wealth of OPEC is reduced considerably, while the losses for other producers are much smaller.

Project workers: Snorre Kverndokk (project leader), Elin Berg, Knut Einar Rosendahl and Tom W. Karlsen.

Financial support: The Research Council of Norway.

Documentation: NOT 95/15, NOT 95/58, ØA 1/95.

E. Berg: Some Results from the Literature on Impacts of Carbon Taxes on Petroleum Wealth. To appear in the series Documents.

E. Berg, S. Kverndokk and K.E. Rosendahl: Market Power, International CO₂ Taxation and Petroleum Wealth. To appear in the series Discussion Papers.

Supply of Norwegian natural gas to Western Europe and the environment

With current production levels, known Norwegian oil reserves will last for 20 years, while the gas reserves will last for 115 years. Thus, Norway will early in the next century turn from being an "oil nation" to become predominantly a "gas nation". Questions have been asked about the likely environmental impact of steadily larger Norwegian gas deliveries to the Western European market. This issue has been addressed by the use of an oligopoly model of the European gas market called DYNOPOLY. The results indicate that a reduction in Norwegian gas deliveries from current plans, will not initiate investments in new capacity in Algeria or Russia. Thus, a reduction in Norwegian gas deliveries will translate into a reduction in total supply of natural gas.

Project workers: Elin Berg and Kjell Arne Brekke (project leader).

Financial support: EU's Fourth Framework Programme, Joule II.

Documentation: ØA 4/95, [23].

Carbon quotas and justice

A cost effective control policy against global CO₂ emissions is to introduce tradable emission permits. Initial distribution of permits will then be a central question. Are there "just" ways of distributing the initial quotas, and will such distributions be

politically feasible? In this project questions such as these are analysed. From a number of theories of justice, it seems that a distribution of permits according to population is to be recommended. This allocation rule, however, involves transfers between countries which may be hard to implement for political reasons.

Project worker: *Snorre Kverndokk*.

Documentation: [18], [30].

The greenhouse effect and uncertainty

The greenhouse effect is recognized as a potentially serious environmental threat, although there is still large uncertainty connected to what the consequences of an increased greenhouse effect will be. This project gives an overview of the various kinds of uncertainty linked to the greenhouse effect, and how these may be treated from the point of view of economic theory, focusing primarily on the expected damage of climate change.

Project worker: *Snorre Kverndokk*.

Documentation: [29].

The macroeconomy and the environment

Material damage from air pollution

Air pollution contain compounds that deteriorates building materials through corrosion. In cooperation with the Norwegian Institute for Air Research, the extent and total cost to society of such corrosion damages has been assessed in this project. The results are based on physical damage functions describing the effect of corrosion on the economic lifetime of materials, detailed and localized estimates of material densities, and dispersion models for air pollution. The direct costs of corrosion are then introduced into a general equilibrium model of the Norwegian economy (MSG-EE) in order to assess the total effects of corrosion on the Norwegian economy.

Project workers: *Solveig Glomsrød (project leader) and Odd Godal*.

Financial support: The State Pollution Control Authority.

Documentation: S. Glomsrød, O. Godal, J.F. Henriksen, S. Haagenrud and T. Skancke: Luftforurensning og materialkostnader på bygninger og biler i Norge (Air pollution and damage to materials in Norway). To appear in the series Reports.

Air pollution, damage to health and the macroeconomy

Economic activity generates, through combustion processes and transport activities, air pollution which may affect the health of the population. The health damage will in turn lower the productivity of the economy, and thus affect the possibilities for future economic growth. A long term macroeconomic model (MSG-EE) is in this project modified by integrating a module for simulation of labour productivity in the core model. Taking this feedback into account will change the economic forecasts.

Project workers: *Solveig Glomsrød (project leader) and Knut Einar Rosendahl*.

Financial support: Ministry of Environment.

Documentation: K.E. Rosendahl: Helsevirkninger av luftforurensning og effekter på økonomisk aktivitet (Health effects of air pollution and consequences for economic growth). To appear in the series Reports.

Future generation of waste

Economic activity, through production processes and consumption activities, generates a large amount of waste. The handling of waste in turn generates environmental problems either associated with deposition sites or from emissions from incinerators. A large fraction of the waste stream can be recycled and not doing so represents a waste of scarce non-renewable and renewable resources. In this project we establish relations between sectoral economic activity levels and the amount of different types of waste generated. Together with projected paths for economic growth based on the general equilibrium model MSG-EE, we can thus simulate future generation of waste. The simulations indicate that the amount of waste will grow with between 35 and 60 per cent towards year 2010, depending on type of waste.

Project workers: *Annegrete Bruvoll (project leader) and Karin Ibenholt*.

Financial support: The Research Council of Norway.

Documentation: REP 95/8, REP 95/31, [52], ØA 8/95.

Optimal carbon taxes. Theoretical basis and economic consequences

In this project CO₂ emission taxes are discussed within the framework of general optimal tax policy under assumptions of either unilateral or international targets for CO₂ emissions. Model simulations are carried out to illustrate the effects on some main economic variables of following the theoretically prescribed CO₂ taxes

Multisectoral Growth – Energy and Environment: MSG-EE

MSG-EE is a variant of the MSG-5 model, distinguished by a more detailed modelling of transport activities. Domestic commercial transport is produced in five sectors covering road, rail, air and boat transport as well as post and telecommunication services. Transport is also produced in other producing sectors for own consumption (own transport). In MSG-EE transport is treated as a separate input factor in production, in addition to the usual capital, labour, energy and materials set of input factors. Finally, the households have a choice of consuming own or public road transport.

rather than adhering to the current Norwegian system for carbon taxation.

Project workers: *Torstein Bye (project leader) and Anne Brendemoen.*

Outside partners: Michael Hoel (University of Oslo).

Financial support: Ministry of Finance.

Documentation: [24].

Methodological issues

The costs of structural change

Many attempts have been made at calculating the economic costs of environmental taxation. Most often such attempts are based on long term models that disregard the short term restructuring costs. However, in the short term the production equipment is given by historical investments carried out under different conditions where environmental taxes were neither introduced nor expected. Thus, the short term effect of an environmental tax on for instance emissions, will be lower than the longer term effect. The cost to the firm will, however, be larger in the shorter term, since the substitution possibilities are more restricted in the short term than in the long run. This project tries to establish a pilot vintage model where the (short term) effects of an environmental tax on investments, depreciation rates and prices are taken into account.

Project worker: *Petter Frenger.*

Financial support: The Research Council of Norway.

On the forecasting of environmental indicators

For Norway, it is established a set of environmental indicators that is meant to provide an overview of the state of the environment. Linking indicators to variables in sectoral economic growth models, one should be able to make projections of the state of the environment into the future. However, not all indicators are meaningfully linked to variables in an economic model. Some indicators are related to environmental problems of little or no concern in a macroeconomic context. Others are related to global environmental problems where Norwegian contributions traditionally are insignificant and not able to treatment within a national economic modelling framework. It turns out that indicator forecasts based on economic modelling are meaningful only for four problem areas related to the urban environment, waste, forests and surplus of nutrients in fresh water lakes and rivers.

Project workers: *Hilde Lurås (project leader) and Arne Jakobsen.*

Financial support: The Research Council of Norway.

Documentation: REP 95/25.

National income and global sustainability

Estimates over a nation's resource wealth give the market values of the resources. Resource extraction gives a contribution to the national income equal to the highest permanent consumption that can be financed by the resource wealth. This contribution can be higher or lower than the current rate of return from the resource wealth, depending on how future rates of return are expected to develop. If the national consumption level is below the income level, then future generations can expect to consume at least the same amount as the current generation. Within this framework it really does not matter whether the nation save by for instance letting oil resources stay in the ground, or by extracting the oil and putting the money in a bank, given that future demand for oil can be obtained from the world market when needed. Considering the world as a whole, this creates a potential problem, since nobody can obtain resources from the world market if everybody has extracted their own resource base. This project documented in a forthcoming book consider conditions for global sustainability in a world of finite resources.

Project worker: *Kjell Arne Brekke.*

Financial support: The Research Council of Norway.

Documentation: K.A. Brekke: *Economic Growth and the Environment. On the Measurement of Income and Welfare*, London: Edward Elgar (forthcoming 1996).

Do the members of parliament use cost-benefit analyses?

The transport sector is the sector in Norway where cost-benefit analysis are most commonly used. It has been questioned, however, whether politicians actually take these results into account when making decisions. In this project we present results from an interview survey of Norwegian transport politicians. They show that the attitude towards cost-benefit analysis varies systematically with political affiliation along a left-right dimension. However, none of the politicians believed that cost-benefit analysis could provide the "correct" answer to questions related to transport policy.

Project workers: *Karine Nyborg.*

Outside partner: Inger Spangen (Institute for Transport Economics).

Financial support: The Research Council of Norway.

Documentation: ØA 7/95, [61].

Developing economies and the environment

Economic growth and soil mining in Ghana

A successful agricultural policy is a prerequisite for economic development in many developing countries. Increased agricultural production may, however, lead to soil mining and declining soil productivity and thus threaten the economic growth perspective. In this study we integrate a soil productivity model in a general equilibrium model of the Ghanaian economy in order to study the macroeconomic impacts of soil mining and potential corrective policy actions to improve agricultural productivity in the long run.

Project workers: *Knut H. Alfsen, Torstein Bye, Solveig Glomsrød (project leader) and Henrik Wiig.*

Financial support: Environment Department of the World Bank.

Documentation: DOC 95/8.

Structural adjustment, soil mining and economic growth in Tanzania

As a part of an economic stabilization and structural adjustment policy, many developing countries have reduced public expenditures, including subsidies for fertilizers. In particular for African countries it has been questioned whether the removal of fertilizer subsidies could be counterproductive with respect to economic growth and food safety, since it could lead to soil mining and falling soil productivity in the long run. These questions are addressed in the case of Tanzania by use of an integrated general equilibrium soil-economy model with a detailed treatment of 11 agricultural sectors.

Project workers: *Solveig Glomsrød (project leader) and Henrik Wiig.*

Financial support: The Research Council of Norway.

Documentation: S. Glomsrød and H. Wiig: Economic growth and soil mining in Tanzania. To appear in the series Discussion paper.

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The Research Department has for many years had the responsibility for tax simulation models used by the Ministry of Finance and the Storting (Parliament). The models are also used for income distribution studies. The current model strategy aims at further development of microsimulation models, both static and dynamic.

Microsimulation model tools for projection of the labour force by gender, age and education and social security rights are used for projections of the labour market. Other model tools have been developed for analyses of labour market imbalances, regional development and municipal economics.

Taxes and transfers

Tax-benefit models LOTTE and ODIN

The tax-benefit models LOTTE and ODIN are the main tools in analyses of effects of direct taxes and social security benefits. From a core model of personal taxation LOTTE has developed into a system of models that can be used separately or together. An advantage of this system is that e.g. taxes and social security benefits can be simultaneously analysed with consistency between tax rules and social security entitlements for each individual in the sample. Recent applications of the microsimulation model LOTTE range from analysis of the tax reform for corporate taxation see below to studies of taxation of old age pensioners.

The microsimulation model LOTTE

LOTTE is a static tax-benefit microsimulation model that simulates direct taxes and social security benefits. Simulations are based on a sample of income tax returns, with additional information from administrative registers. Household characteristics are recorded by interview. The sample size varies from year to year. The sample from 1993 includes approximately 18 000 individuals (6 500 households). Sophisticated calibration methods are applied to ensure consistency between model estimates and the corresponding totals from the tax register. The individual records can be aggregated to households and married couples, and are weighted in terms of consumption units. The model keeps track of the link between each individual's income, tax, pension entitlement and pension income. For any change in tax or benefit rules, the model simulates taxes, disposable income, and average and marginal tax rates, for individuals and households. Model results comprise total tax revenue, as well as effects on tax revenue and income distribution of specified policy changes. LOTTE is extensively used by the government, especially Ministry of Finance, by the Storting (Parliament), and for special projects, e.g. OECD-studies.

The basic LOTTE model includes only direct taxes but has been extended by a module for econometric simulation of consumption, LOTTE KONSUM, which allows calculation also of indirect taxes and simulation of policy mixes with both direct and indirect taxes.

The data sets in the microsimulation models LOTTE and MOSART (see below) have been made available as anonymized micro data sets - model populations - from 1994.

Project workers: *Julie Aslaksen (project leader), Marie W. Arneberg, Hanne A. Gravningsmyhr, Kirsten Hansen, Bård Lian, Ann Synnøve Moe and Thor Olav Thoresen.*

Financial support: Ministry of Finance.

Documentation: REP 95/19, DOC 95/5, ØA 3/95, ØA 8/95, [47].

Transfers to families with children

Much of our research in 1995 on the distributional consequences of transfers to families with children has been directed towards a government appointed committee for evaluation of effects on income distribution and labour supply from changes in these transfers. This project will use data and simulation modules from the tax-benefit model LOTTE with additional simulation procedures established for this project, e.g. a simulation module for child care subsidies. This latter module also includes behavioural effects of changes in child care subsidies and, hence, explicitly considers labour supply effects of changes in taxes and transfers.

The measurement of income distribution and poverty for different household types raises many problems, e.g. the choice of unit household/individual and equivalence scale. The project aims at showing how the distributional conclusions depend upon the measurement definition.

Project workers: *Thor Olav Thoresen.*

Financial support: Ministry of Children and Family Affairs.

Documentation: DP 135, DP 146.

Income distribution and household behaviour

Distributional effects of the tax reform

Based on theoretical studies of progressivity in the tax system, this project analyses the effect of the tax reform on income distribution, particularly on income distribution for various socioeconomic groups. A major feature of the 1992 tax reform was to expand the income base for taxation, and an analysis of the distributional effects of the tax reform needs to consider income bases that are consistent over time. The project has developed adjusted income concepts, particularly for self-

employed, and compared income inequality before and after the tax reform. The main result is that inequality in disposable income has not changed significantly from 1991 to 1993.

Project workers: *Thor Olav Thoresen and Karl Ove Aarbu.*

Financial Support: The Research Council of Norway.

Documentation: [32], ØA 9/95.

Analysis of changes in income distribution

A recent project involves a methodological approach to the issue of comparing measures of inequality before and after substantial changes in policies influencing income distribution, or large structural changes in e.g. labour market conditions. A forthcoming report will show how the effect on income distribution from a policy change can be analysed by decompositions of the Gini-coefficient rather than by merely comparing Gini-coefficients before and after. The new methodology is applied to a study of the effect on inequality in personal income distribution of increased labour market participation of married women over the last 20 years. This study uses data from a sample of income tax returns over selected years.

Project workers: *Rolf Aaberge and Iulie Aslaksen.*

"Time puzzle" - Time use and consumption patterns

Within the framework of household production theories, this project analyses the connection between time use - for both paid work, unpaid household work and leisure - and consumption patterns of various household types. The focus is to describe the "time puzzle" encountered by especially families with children. The aim of the project is to link partial analyses to the microsimulation models.

The first part of the project has focused on developing household production tables, where consumption expenditure is allocated to household productive activities by various allocation rules. These tables show considerable variations in consumption patterns and time use across various household types. Household production tables have a natural interpretation as input-output tables and may thus be linked to the satellite accounts for household production within the national accounts framework.

Project workers: *Iulie Aslaksen and Hanne A. Gravning Smyhr.*

Financial support: The Research Council of Norway.

Documentation: NOT 95/26, [5].

Corporate taxation

Behaviour analyses

The purpose of this project is to shed light on corporations' utilization of accelerated depreciation and tax exempt funds. In 1995 the work has been extended, by developing a better theoretical foundation and using a richer data set. The main conclusion is that corporations do not always utilize the maximum limits for depreciation, especially in a recession year like 1991 where income before depreciation was low.

An important element in the recent Norwegian tax reform was to split by imputation the income of unincorporated businesses in labour remuneration and capital income. The tax reform has been evaluated using a specially adapted version of LOTTE for self employed persons and the corporate sector. This model connects the personal tax for the self employed persons and the owners of a corporation to the corporate tax liability. This gives us the opportunity to calculate the total tax on the corporate income, whether the corporate income is paid out as wages, dividends or retained.

Project workers: *Erik Fjærli, Bård Lian and Karl Ove Aarbu.*

Outside partners: Jeffrey K. MacKie-Mason (University of Michigan) and Diderik Lund (University of Oslo).

Financial support: The Research Council of Norway.

Documentation: DP 155, ØA 8/95.

Tax incentives and corporate financing behaviour

The project investigates the effects of non-linearities in the corporate tax code on financing behaviour, using panel data from Norwegian corporations in the period 1986-1991. The analysis concentrates on the retention policy of the firm, because this is viewed as a more important as well as a more flexible and tax-sensitive source of financing than share issues. Empirical findings indicate that different probabilities of tax-exhaustion across firms have significant effects on the firm's choice between retention and borrowing, measured by the individual dividend pay-out ratios.

Project workers: *Erik Fjærli.*

Financial support: The Research Council of Norway.

Taxation of hydropower plants: A micro-simulation model

The government proposed in 1995 new legislation on the taxation of hydro power based on the recommendations of a 1992 report from an expert committee. A model has been developed to evaluate the consequences of this tax reform for the local and national tax revenue and for the tax

The household type model ODIN

ODIN is a "law model" that calculates direct taxes and social security benefits for stylized household types. The model simulates taxes, disposable income, and average and marginal tax rates for households with given characteristics such as family composition, socio-economic group and pension status. ODIN is used in research projects and by the Ministry of Finance.

burden falling on the rent accruing to the owners of hydro power plants. The model is based on economical, historical and technical micro data from hydroelectric plants and firms and is expected to be extensively used in connection with the legislative debates in early 1996.

Project workers: *Torstein Bye, Erik Fjærli and Bård Lian.*

Financial support: Ministry of Finance, Ministry of Industry and Energy.

Labour market

Projections of labour force, education and social security in the MOSART model

In 1995, a new initial population was constructed for use in the MOSART model. The demographic module has been reestimated and expanded to include household characteristics. The modelling of transitions through the educational system has been improved by the inclusion of unemployment and the capacity of the system as explanatory variables for choice of education.

MOSART is used extensively 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. The model has been used to analyse how changes in behaviour such as changes in the number of people claiming disability benefits and in the rules for determining pension benefits will affect this future tax burden. A number of technical improvements have been implemented in the model, reducing random variation in output as well as reducing the time it takes to run the model.

Two new subprojects were started in 1995, one which analyses how labour force participation has changed over the last decade and another which studies the inclusion of private pensions, capital income and taxes in the model. These projects will continue in 1996.

Project workers: *Leif Andreassen (project leader), Helge Brunborg, Dennis Fredriksen, André Hansen and Inger Texmon.*

Financial support: The Research Council of Norway, Ministry of Finance, Ministry of Local Government and Labour.

Documentation: DP 115, REP 93/6, REP 93/7, ØA 1/95.

Labour market imbalances

In order to analyse the possibility of disequilibrium in various labour markets a simple submodel to the macroeconomic model MODAG and the microsimulation model MOSART is constructed. In this model supply and demand for different kinds of labour by education is compared by using the number of persons as the unit of measurement.

As a result of the marked increase in the educational propensities the last years, expected growth in supply of persons with education at the university level is much stronger than the expected growth in demand, indicating that a lot of persons within these groups may get trouble in finding a job in accordance with their education.

The projections are rather simple regarding the assumptions about the composition of demand for the different kinds of education. To improve the projections further, work is carried out to analyse the factors determining the composition of employment by education in different industries. In the metal industry almost constant relative wages makes it difficult to estimate the elasticities of substitution. Technical progress has caused a significant decrease in demand for unskilled workers. Growth in supply of skilled workers also seems to have contributed to lower employment among unskilled as a result of small wage differentials.

Project workers: *Nils Martin Stølen and Turid Åvitsland.*

Financial support: Directorate of Labour.

Documentation: ES 4/94.

Regional and municipal economics

Analyses of regional labour markets and migration

REGARD is a regional model for the Norwegian economy based on regional national accounts and other statistical sources. The core model for production is based on 7 regions and 28 industrial sectors. A demographic model block takes care of internal migration and labour force participation. The model provides projections of the labour market balances, illuminating the implications for regional employment and the labour force of a given macroeconomic scenario. Further, the model may be applied to analyse the effects on regional employment and population from changes in economic policy. REGARD is used as a submodel to the macroeconomic model MODAG.

In 1995 an analysis investigating the migration patterns for persons in the labour force is carried through. This project is going to be extended in 1996 by a cooperation with researchers in other

The microsimulation model MOSART

MOSART is a dynamic cross-sectional stochastic microsimulation model which projects population size and composition, labour force, educational level, and future pension benefits. The simulation sequence for each year in the projection period starts with the demographic events death, birth, marriage, divorce and education, continues with the simulation of disability and retirement and concludes by simulating labour force participation and wage income. The model keeps track of the link between spouses and of each individual's pension entitlements and pension income. The initial population and the transition probabilities in the model are based on data registers covering the whole population. MOSART is extensively used by government ministries, especially the Ministry of Finance, in analysing long-run developments in the labour force and in disability and old-age pensions. The current version of the model simulates life histories for a one per cent sample of the Norwegian population from 1990 to 2060.

Nordic countries, making a comparison of internal migration patterns.

Project workers: *Eva Ivås, Lasse S. Stambøl, Nils M. Stølen and Turid Åvitsland.*

Financial support: Nordic Council of Ministers, Sparebanken Nord-Norge.

Documentation: SES 88, REP 95/28, ØA 3/95, ØA 8/95.

Municipal economics

MAKKO is a macro model for the local government economy. For given standards of man-hours per client and coverage levels (number of clients in proportion to the population in separate age groups) the model describes how employment and service production is affected by population changes. The model is used to project employment and the number of clients in local public services in Norway.

A subproject on econometric time series modelling of local public spending behaviour is completed. The model endogenizes local public expenditures, user charges, real investments and net financial wealth in Norway at the aggregate level, assuming that local public disposable income is exogenous. A new project analysing differences in local government expenditures at the municipal level was started in 1995. The aim of the project is to find the importance of different factors for the level of expenditures in local government services.

Another project, which also was started in 1995, analyses factors of importance for supply and demand for 18 professional groups in health and welfare services by a separate model for these sectors. The analysis is linked to the analyses made by MAKKO on the demand side, MOSART on the supply side and the analyses of labour market imbalances.

Project workers: *Audun Langørgen and Knut Olav Oftedal.*

Financial support: Ministry of Local Government and Labour, Ministry of Health and Social Affairs.

Documentation: DP 153, ØA 4/95, ØA 5/95, NOT 95/56.

Staff

Stølen, Nils Martin, *Director of Research*

Aslaksen, Iulie, *Research Fellow*
Andreassen, Leif, *Research Fellow*
Brunborg, Helge, *Senior Research Fellow*
Stambøl, Lasse S., *Research Fellow*
Texmon, Inger, *Research Fellow*

Aarbu, Karl Ove, *Economist*
Arneberg, Marie W., *Economist*
Dahl, Øystein [Conscientious objector], *Economist*
Fjærli, Erik, *Economist*
Fredriksen, Dennis F., *Economist*
Gravningsmyhr, Hanne, *Economist*
Hansen, André H., *Executive Officer*
Hansen, Kirsten, *Senior Executive Officer*
Ivås, Eva, *Executive Officer*
Langørgen, Audun, *Economist*
Lian, Bård, *Adviser EDP*
Moe, Ann Synnøve, *Clerical staff*
Oftedal, Knut Olav, *Economist*
Thoresen, Thor Olav, *Economist*
Åvitsland, Turid, *Economist*

Personnel and budget

The total staff in 1995 was roughly 100 in total number of persons. The distribution by division is given by the table below.

The financial resources of the Research Department stem partly from the government budget as allocated within Statistics Norway. About 42 per cent of total total expenditures in 1995, or approximately Nkr 14.2 million are project financed. The bulk of the project revenues comes from research grants from the The Research Council of Norway and from contracts with Ministries, primarily the Ministry of Environment, the Ministry of Finance, the Ministry of Industry and Energy, the Ministry of Local Government and Labour, and the Ministry of Foreign Affairs.

Staff

Vaagen, Otto Gerhard, *Head of Administration*

Dihle, Anne Kari, *Senior Executive Officer (Personnel)*

Rambøl, Hanne, *Senior Executive Officer (Finances)*

Karlsen, Anne Strandli, *Executive Officer (Publications)*

Gundersen, Marit Berger, *Executive Officer*

Johansen, Rune, *Computer Scientist*

Kronlund, Tone, *Clerical staff**

Lysell, Kari Anne, *Clerical staff*

Salvesson, Sigmund G., *Clerical staff*

Skoglund, Anne, *Clerical staff*

Veiby, Tone, *Clerical staff*

Vogt, Yngve, *Computer Scientist*

Vågdal, Marit, *Executive Officer*

Walseth, Aud, *Clerical staff*

* on leave

Distribution of operating costs in 1995. 1000 Nkr

	Government Budget	Project	Total
Personnel	17 000	11 480	
Office expenses etc.	2 637	2 696	
Total	19 637	14 176	33 813

Distribution according to occupational group (including personnel on leave) Personnel in Research Department (1995)

Division/Unit	Government Budget	Project	Total
Head of Department	1	2	3
Public Economics	12	8	20
Resource and Environmental Economics	14	13	27
Macroeconomics	15	10	25
Microeconometrics	7	5	12
Administration and Computer Services	11	1	12
Research Department	60	39	99

Age structure of the Research Department (including personnel on leave). Women, Men

Division/Unit	20-29		30-39		40-49		50-59		>60	
	W	M	W	M	W	M	W	M	W	M
Head of Department/Administration and Computer Services	3	-	3	2	4	-	-	2	-	-
Public Economics	3	1	3	9	2	1	1	1	-	-
Resource and Environmental Economics	4	3	8	9	1	2	-	1	-	-
Macroeconomics	1	2	4	11	4	4	2	-	-	-
Microeconometrics	-	1	-	5	-	2	-	1	-	-
Research Department	11	7	18	36	11	10	3	5	-	-

Social and Economic Studies (SES)

- 89 **N.M. Stølen:** *Wage Formation and the Macroeconomic Functioning of the Norwegian Labour Market.* 1995.
- 91 **T. Kornstad:** *Empirical Life Cycle Models of Labour Supply and Consumption.* 1995.
- 92 **H.C. Bjørnland:** *Trends, Cycles and Measures of Persistence in the Norwegian Economy.* 1995.

Statistical Analyses

- 7 Natural Resources and the Environment 1995.

Reports (REP)

- 95/2 **B.E. Naug:** *En økonometrisk modell for norsk eksport av industrielle råvarer* (An econometric model of Norwegian exports of industrial commodities).
- 95/4 **I. Texmon:** *Ut av redet: En demografisk analyse av flytting fra foreldrehjemmet* (Leaving the parental nest: A demographic analysis).
- 95/8 **A. Bruvoll and G. Spurkland:** *Avfall i Noreg fram til 2010* (Waste generation in Norway towards year 2010).
- 95/9 **T. Fæhn, L.A. Grünfeld, E. Holmøy, T. Hægeland and B. Strøm:** *Sammensetningen av den effektive støtten til norske næringer i 1989 og 1991* (The composition of effective assistance to Norwegian industries in 1989 and 1991).
- 95/10 **O.T. Djupskås and R. Nesbakken:** *Energibruk i husholdningene 1993: Data fra forbruksundersøkelsen* (Energy use in the households 1993: Data from a consumer survey).
- 95/12 **K. Rypdal:** *Anthropogenic Emissions of SO₂, NO_x, NMVOC and NH₃ in Norway.*
- 95/14 **B.M. Larsen and R. Nesbakken:** *Norske CO₂-utslipp 1987-1993: En studie av CO₂-avgiftens effekt* (Norwegian CO₂ emissions 1987-1993: A study of the effect of the CO₂ tax).
- 95/18 **T. Bye, T.A. Johnsen and M.I. Hansen:** *Tilbud og etterspørsel av elektrisk kraft til 2020: Nasjonale og regionale framskrivinger* (Supply and demand for electric power towards 2020: National and regional projections).

Statistics Norway monographs are published in the series Social and Economic Studies and Statistical Analyses, other research reports and documentation in the Report series or as Documents/Notater. The Discussion Papers series comprises research papers intended for international journals or books. There is also a Reprint series of journal articles and book chapters by staff employees. The Research Department publishes two periodicals: Økonomiske analyser, in Norwegian with 9 issues a year, and Economic Survey, in English with 4 issues a year.

- 95/19 **M.W. Arneberg, H.A. Gravningsmyhr, K. Hansen, N. Langbraaten, B. Lian and T.O. Thoresen:** *LOTTE – en mikrosimuleringsmodell for beregning av skatter og trygder* (LOTTE – a microsimulation model for calculation of taxes and pensions).
- 95/21 **N. Keilman and H. Brunborg:** *Household Projections for Norway, 1990-2020. Part I: Macrosimulations.*
- 95/24 **L. Brubakk, M. Aaserud, W. Pellekaan and F. van Oostvoorn:** *SEEM – An Energy Demand Model for Western Europe.*
- 95/25 **H. Lurås:** *Framskrivning av miljøindikatorer* (Projections of environmental indicators)
- 95/27 **K.H. Alfisen, B.M. Larsen and H. Vennemo:** *Bærekraftig økonomi? Noen alternative modellscenarier for Norge mot år 2030* (Sustainable economy? Some alternative model scenarios for Norway towards year 2030).
- 95/28 **L.S. Stambøl:** *Flytting og arbeidsstyrken: Flyttetilbøyelighet og flyttemønster hos arbeidsledige og sysselsatte i perioden 1988-1993* (Regional migration and the labour force; Migration behaviour and migration pattern among unemployed and employed 1988-1993).
- 95/29 **G. Dahl, E. Flittig, J. Lajord and D. Fredriksen:** *Trygd og velferd* (Social security and welfare).
- 95/30 **T. Skjerpen:** *Seasonal Adjustment of First Time Registered New Passenger Cars in Norway by Structural Time Series Analysis.*
- 95/31 **A. Bruvoll and K. Ibenholt:** *Norske avfallsmengder etter årtusenskiftet* (Norwegian waste generation after the turn of the century).

- 95/33 **T.A. Johnsen and B.M. Larsen:** *Kraftmarkedsmoell med energi- og effekt-dimensjon* (A model of the electricity market with energy and effect dimensions).
- 95/34 **F.R. Aune:** *Virkninger på de nordiske energimarkedene av en svensk kjernekraft-enutfasing* (Effects on the Nordic energy markets of a decommissioning of Swedish nuclear power).
- 95/36 **T. Kornstad:** *Vridninger i lønnsstakernes relative brukerpris på bolig, ikke-varige goder og fritid 1985/86 til 1992/93* (Distortions in relative user prices between housing, non-durables and leisure for wage earners 1985/86 to 1992/93).
- 95/38 **G.J. Limperopoulos:** *Usikkerhet i oljeprosjekter* (Uncertainty in oil investments).
- 96/1 **E. Bowitz, N.Ø. Mæhle, V.S. Sasmitawidjaja and S.B. Widoyono:** *MEMLI – The Indonesian Model for Environmental Analysis. Technical Documentation.*
- Discussion Papers (DP)**
- 135 **T.O. Thoresen:** *Distributional and Behavioural Effects of Child Care Subsidies.* January 1995.
- 136 **T.J. Klette and A. Mathiassen:** *Job Creation, Job Destruction and Plant Turnover in Norwegian Manufacturing.* February 1995.
- 137 **K. Nyborg:** *Project Evaluations and Decision Processes.* February 1995.
- 138 **L. Andreassen:** *A Framework for Estimating Disequilibrium Models with Many Markets.* February 1995.
- 139 **L. Andreassen:** *Aggregation when Markets do not Clear.* February 1995.
- 140 **T. Skjerpen:** *Is there a Business Cycle Component in Norwegian Macroeconomic Quarterly Time Series?* January 1995.
- 141 **J.K. Dagsvik:** *Probabilistic Choice Models for Uncertain Outcomes.* February 1995.
- 143 **A. Bruvoll, S. Glomsrød and H. Vennemo:** *The Environmental Drag on Long-Term Economic Performance: Evidence from Norway.* May 1995.
- 144 **T. Bye and T.A. Johnsen:** *Prospects for a Common, Deregulated Nordic Electricity Market.* June 1995.
- 145 **B. Bye:** *A Dynamic Equilibrium Analysis of a Carbon Tax.* June 1995.
- 146 **T.O. Thoresen:** *The Distributional Impact of the Norwegian Tax Reform Measured by Disproportionality.* June 1995.
- 147 **E. Holmøy and T. Hægeland:** *Effective Rates of Assistance for Norwegian Industries.* July 1995.
- 148 **J. Aasness, T. Bye and H.T. Mysen:** *Welfare Effects of Emission Taxes in Norway.* July 1995.
- 149 **J. Aasness, E. Biørn and T. Skjerpen:** *Distribution of Preferences and Measurement Errors in a Disaggregated Expenditure System.* December 1995.
- 150 **E. Bowitz, T. Fæhn, L.A. Grünfeld and K. Moun:** *Transitory Adjustment Costs and Long Term Welfare Effects of an EU-membership – The Norwegian Case.* August 1995.
- 151 **I. Svendsen:** *Dynamic Modelling of Domestic Prices with Time-Varying Elasticities and Rational Expectations.* August 1995.
- 152 **I. Svendsen:** *Forward- and Backward Looking Models for Norwegian Export Prices.* August 1995.
- 153 **A. Langørgen:** *On the Simultaneous Determination of Current Expenditure, Real Capital, Fee Income, and Public Debt in Norwegian Local Government.* August 1995.
- 154 **A. Katz and T. Bye:** *Returns to Publicly Owned Transport Infrastructure Investment. A Cost Function/Cost Share Approach for Norway, 1971-1991.* October 1995.
- 155 **K.O. Aarbu:** *Some Issues About the Norwegian Capital Income Imputation Model.* October 1995.
- 156 **P. Boug, K.A. Mork and T. Tjemsland:** *Financial Deregulation and Consumer Behavior: the Norwegian Experience.* October 1995.
- 157 **B.E. Naug and R. Nymoan:** *Import Price Formation and Pricing to Market: A Test on Norwegian Data.* November 1995.
- 158 **R. Aaberge:** *Choosing Measures of Inequality for Empirical Applications.* November 1995.
- 159 **T.J. Klette and S.E. Førre:** *Innovation and Job Creation in a Small Open Economy: Evidence from Norwegian Manufacturing Plants 1982-92.* December 1995.
- 160 **S. Holden, D. Kolsrud and B. Vikøren:** *Noisy Signals in Target Zone Regimes:*

Theory and Monte Carlo Experiments.
December 1995.

- 161 **T. Hægeland:** *Monopolistic Competition, Resource Allocation and the Effects of Industrial Policy.* January 1996.
- 163 **S. Grepperud:** *Soil Conservation as an Investment in Land.* February 1996.
- 164 **K.A. Brekke, V. Iversen and J. Aune:** *Soil Wealth in Tanzania.* Forthcoming.
- 165 **J.K. Dagsvik, D.G. Wetterwald and R. Aaberge:** *Potential Demand for Alternative Fuel Vehicles.* February 1996.
- 166 **J.K. Dagsvik:** *Consumer Demand with Unobservable Product Attributes. Part I: Theory.* February 1996.
- 167 **J.K. Dagsvik:** *Consumer Demand with Unobservable Product Attributes. Part II: Inference.* February 1996.
- 168 **R. Aaberge, A. Björklund, M. Jäntti, M. Palme, P.J. Pedersen, N. Smith and T. Wennemo:** *Income Inequality and Income Mobility in the Scandinavian Countries Compared to the United States.* March 1996.

Reprints

- 72 **S. Kverndokk:** Coalitions and Side Payments in International CO₂ Treaties. Reprint from **Ekko C. Van Ierland (ed.):** *International Environmental Economics, Theories, Models and Applications to Climate Change, International Trade and Acidification,* Developments in Environmental Economics Vol. 4, 1994, 45-76.
- 73 **K.A Mork, Ø. Olsen and H.T. Mysen:** Macroeconomic Responses to Oil Price Increases and Decreases in Seven OECD Countries. Reprint from *The Energy Journal* 15, No 4, 1994, 19-36.
- 74 **J.K. Dagsvik:** How Large is the Class of Generalized Extreme Value Random Utility models? Reprint from *Journal of Mathematical Psychology* 39, No. 1, 1995, 90-98.
- 76 **K.H. Alfsen, H. Birkelund and M. Aaserud:** Impacts of an EC Carbon/Energy Tax and Deregulating Thermal Power Supply on CO₂, SO₂ and NO_x Emissions. Reprint from *Environmental and Resource Economics* 5, 1995, 165-189.
- 77 **O. Aukrust:** The Scandinavian Contribution to National Accounting. Reprint from

Z. Kenessey (ed.): *The Accounts of Nations,* IOS Press, Amsterdam 1994, 16-65.

- 78 **O. Bjerkholt:** Introduction: Ragnar Frisch, the originator of Econometrics. Reprint from **O. Bjerkholt (ed.):** *Foundations of Modern Econometrics. The Selected Essays of Ragnar Frisch,* 1995, Vol. 1, pp. xiii-lit.
- 79 K.G. Lindquist: The Existence of Factor Substitution in the Primary Aluminium Industry: A Multivariate Error-Correction Approach Using Norwegian Panel Data. Reprint from *Empirical Economics* 20, 1995, 361-383.
- 80 **P.J. Bjerve:** Innverknaden frå Ragnar Frisch på norsk makroøkonomisk planlegging og politikk (The influence of Ragnar Frisch on macroeconomic planning and policy in Norway). Reprint from *Sosialøkonomen,* No. 10, 1995, 10, 26-35.
- 81 **R. Aaberge, J.K. Dagsvik and S. Strøm:** Labor Supply Responses and Welfare Effects of Tax Reforms. Reprint from *Scandinavian Journal of Economics* 97, No. 4, 1995, 635-659.

Documents (DOC)

- 95/1 **A.R. Swensen:** *Simple Examples on Smoothing Macroeconomic Time Series.*
- 95/2 **E. Gjelsvik, T. Johnsen, H.T. Mysen and A. Valdimarsson:** *Energy Demand in Iceland.*
- 95/3 **C. Zhao, O. Bjerkholt, T. Halvorsen and Y. Zhu:** *The Flow of Funds Accounts in China.*
- 95/4 **Nordic Indicator Group:** *Nordic Environmental Indicators.* Draft document.
- 95/5 **H.A. Gravningsmyhr:** *Analysing Effects of Removing Survivors' Pensions, Using the Microsimulation Model LOTTE.*
- 95/6 **P. Boug:** User's Guide. *The SEEM-model Version 2.0.*
- 95/7 **E. Bowitz, N.Ø. Mæhle, V.S. Sasmitawidjaja and S.B. Widoyono:** *MEMLI – An Environmental Model for Indonesia. Technical Documentation of Data Programs and Procedures.*
- 95/8 **K.H. Alfsen, T. Bye, S. Glomsrød and H. Wiig:** *Integrated Assessment of Soil Degradation and Economic Growth in Ghana.*

- 95/9 **O. Bjerkholt:** *Ragnar Frisch and the Foundation of the Econometric Society and Econometrica.*
- 95/10 **P.J. Bjerve:** *The Influence of Ragnar Frisch on Macroeconomic Planning and Policy in Norway.*
- 96/1 **D. Kolsrud:** *Documentation of Computer Programs that Extend the SEEM Model and Provide a Link to the RAINS Model.*
- 96/2 **E. Bowitz, V.S. Sasmitawidjaja and G. Sugiarto:** *The Indonesian economy and emissions of CO₂. An analysis based on the Environmental - Macroeconomic Model MEMLI, 1990-2020.*

Notater (NOT)

- 95/5 **D. Fredriksen:** *MOSART. Teknisk dokumentasjon (MOSART. User guide).*
- 95/7 **K. Olsen:** *Nytte- og kostnadsvirkninger av en norsk oppfyllelse av nasjonale utslippsmålsettinger (Cost-benefit effects of fulfilment of national emission targets).*
- 95/15 **T.W. Karlsen:** *Optimal karbonbeskatning og virkningen på norsk petroleumsformue (Optimal carbon taxation and the impact on Norwegian petroleum wealth).*
- 95/17 **Å. Cappelen, T. Skjerpen and J. Aasness:** *Konsumetterspørsel, tjenesteproduksjon og sysselsetting. En mikro til makroanalyse (Consumer demand, service production and employment).*
- 95/24 **H.T. Mysen:** *Nordisk energimarkedsmodell. Dokumentasjon av delmodell for energi- etterspørsel i industrien (A Nordic energy model. Documentation of the submodel of energy demand from manufacturing).*
- 95/26 **I. Aslaksen, T. Fagerli and H.A. Gravningsmyhr:** *Produksjon og konsum i husholdningene (Production and consumption in households).*
- 95/29 **B.E. Naug:** *Eksport- og importlikninger i KVARTS (Export and import equations in KVARTS).*
- 95/31 **B.E. Naug:** *Etterspørsel etter arbeidskraft - en litteraturoversikt (Demand for labour - a survey of the literature).*
- 95/35 **T.J. Klette:** *Vekst og produktivitet i norsk industri. Hovedrapport fra et NFR-prosjekt (Growth and productivity in Norwegian manufacturing).*

- 95/40 **L. Lerskau:** *Oversikt over konjunkturindikatorer i databasen NORMAP på FAME (Short term economic indicators in the database NORMAP in FAME).*
- 95/46 **B.E. Naug:** *Estimering av eksportrelasjoner på disaggregerte kvartalsdata (Estimation of export equations using disaggregated quarterly data).*
- 95/47 **K. Moum:** *Beregning av bruttoproduksjon og eierinntekt i boligsektoren i nasjonalregnskapet - noen metodiske synspunkter (Estimating the value of housing services from owner-occupied housing in the national accounts - some methodological considerations).*
- 95/52 **T. Kornstad:** *Simulering av konsum og arbeidstilbud i et livsløpsperspektiv (Simulation of lifetime consumption and labour supply).*
- 95/56 **A. Langørgen:** *Faktorer bak kommunale variasjoner i utgifter til sosialhjelp og barnevern (Explaining variations in municipal social security and child welfare expenditures).*
- 95/58 **T.W. Karlsen:** *Energimarkedet fra 1973 og fram mot 2010 (The energy market from 1973 and towards 2010).*
- 96/3 **I.M. Smestad:** *Valg under usikkerhet: En analyse av eksperimentdata basert på kvalitative valgbehandlingsmodeller (Choice under risk: an analysis of experimental data based on qualitative choice models).*

Økonomiske analyser (ØA)

- 1/95 *Konjunkturtendensene for Norge og utlandet (Business cycle report)*
D. Fredriksen: *MOSART - en modell for framskrivinger av befolkningen (MOSART - a model for projections of population, education, labour force and social security).*
S. Kverndokk and K.E. Rosendahl: *CO₂-avgifter og petroleumsformue (CO₂ taxes and the petroleum wealth).*
H. Næsheim and S. Drevdal: *Utvikling i sysselsetting, ledighet og yrkespassivitet i de nordiske land (Employment, unemployment and non-participations in the Nordic countries).*
K.-G. Lindquist: *Konkurransesevnen i norsk industri (The competitiveness of Norwegian manufacturing industry).*
Å. Cappelen and M. Rolland: *Makroøkonomisk utvikling på mellomlang sikt (Macroeconomic developments in the medium-term).*

- 2/95 *Økonomisk utsyn over året 1994* (Economic survey 1994)
- 3/95 **H.A. Gravningsmyhr:** *Pensjonister, pensjon og skattlegging* (Pensioners, pensions and taxation).
N.M. Stølen and T. Åvitsland: *Regional arbeidsmarkedsutvikling 1990-2000* (Developments in regional labour markets 1990-2000).
E. Bowitz: *Hva er MODAG?* (What is MODAG?).
H.A. Gravningsmyhr: *LOTTE – en modell for beregning av skatt og trygd* (LOTTE – a model for calculation of taxes and pensions).
- 4/95 **E. Berg:** *Utviklingen på det europeiske gassmarked* (Projections of the European gas market).
B.M. Larsen and R. Nesbakken: *Norske CO₂-utslipp 1987-1993* (Norwegian CO₂ emissions 1987-1993).
A. Langørgen: *Kommunenes økonomiske tilpasning over tid* (Time-inertia in the economic behaviour of local governments).
- 5/95 *Konjunkturtendensene for Norge og utlandet* (Business cycle report)
E. Bowitz: *MODAG-modellenes prognoseegenskaper 1991-1994* (The forecasting properties of MODAG 1991-1994).
A. Langørgen: *Virkninger av politiske reformer på antall tilsynsplasser og sysselsettingen i barnehager* (Projections for employment and the number of children in day care centres).
- 6/95 *Konjunkturtendensene for Norge og utlandet* (Business cycle report)
H. Vennemo: *Økt levestandard, men dårligere miljø?* (Increased standard of living, but a deteriorated environment?).
J.P. Nossen and L. Sundell: *Revisjon av finansstatistikken for offentlig forvaltning* (Financial statistics for government administration).
- 7/95 **F. R. Aune, T. Bye and T.A. Johnsen:** *Kostnader ved nedleggelse av svenske atomkraftverk* (Costs of decommissioning Swedish nuclear power).
K. Nyborg: *Nytte-kostnadsanalyser og politiske vurderinger* (Cost-benefit analyses and political decisions).
B. Justad and K. Halvorsrud: *Finansielle sektorbalanser 1988-1993. Hovedresultater og metoder* (Financial sector balances 1988-1993, results and methods).
B.E. Naug: *Importandeler, relative priser og konkurranseevne. En analyse basert på importandelsmodellen i MODAG* (Import shares, relative prices and competitiveness. An analysis based on the import model in MODAG).
- 8/95 **I. Aslaksen, H.A. Gravningsmyhr and J. Aasness:** *Fordelingseffektivitet av ulike typer direkte beskatning – en analyse av "barnerelevante" ordninger* (Distributional efficiency of various types of direct taxation – analysis of "child relevant" tax schemes).
K.O. Aarbu: *Skattereformens betydning for endringen i skatt for aksjeselskaper fra 1991 til 1992* (The impact from the tax reform on the change in the corporate tax from 1991 to 1992).
I. Texmon: *På egne ben. Om ungdoms flytting fra foreldrehjemmet* (The leaving of home among young adults).
L.S. Stambøl: *Flytting i ulike grupper på arbeidsmarkedet* (Regional migration in different groups of the labour market).
A. Bruvoll and K. Ibenholt: *Framskrivning av avfallsmengder i Norge* (Projections of the amount of waste in Norway).
E.J. Fløttum: *Publiseringen av reviderte nasjonalregnskapstall – hvorfor Statistisk sentralbyrå ikke ventet på de andre landene* (Revised national accounts).
- 9/95 *Konjunkturtendensene for Norge og utlandet* (Business cycle report)
Å. Cappelen and E. Bowitz: *Norsk økonomisk utvikling 1996-2000* (Economic developments in Norway 1996-2000).
K.A. Magnussen and M. Rolland: *Den internasjonale konjunkturutviklingen mot år 2000* (International economic trends towards 2000).
T.O. Thoresen and K.O. Aarbu: *Skattereformen og progressivitet i skattesystemet* (The Norwegian tax reform of 1992 and tax progressivity).

Economic Survey (ES)

- 1/95 *Economic Survey 1994*
H. Lurås: *Rent from Norwegian Natural Resources.*
- 2/95 *Economic trends*
T. Bye and T.A. Johnsen: *Norway – the Nordic power House.*
M. Rolland: *Prospects for the world economy.*
- 3/95 *Economic trends*
Revised Norwegian National Accounts.
- 4/95 *Economic trends*
E. Bowitz and Å. Cappelen: *Economic Developments in Norway 1996-2000.*
F.R. Aune, T. Bye and T. A. Johnsen: *The Costs of Decommissioning Nuclear Power Stations. The Swedish Example.*
A. Bruvoll and K. Ibenholt: *Projections of Waste Quantities in Norway.*

Articles in international journals

- [1] **R. Aaberge:** The Impact of Non-Stationary Inflow Rates in Unemployment Duration Models. *Ricerche Economiche* (forthcoming).
- [2] **R. Aaberge, J. K. Dagsvik and S. Strøm:** Labour Supply Responses and Welfare Effects of Tax Reforms, *Scandinavian Journal of Economics* 97, No. 4, 1995, 635-659.
- [3] **A. Aaheim and K. Nyborg:** On the Interpretation and Applicability of a Green National Product, *Review of Income and Wealth* 41, No. 1, 1995, 57-71.
- [4] **K.H. Alfsen, H. Birkelund and M. Aaserud:** Impacts of an EC Carbon/Energy Tax and Deregulating Thermal Power Supply on CO₂, SO₂ and NO_x emissions, *Environmental and Resource Economics* 5, 1995, 165-189.
- [5] **I. Aslaksen, T. Fagerli and H.A. Gravningsmyhr:** Measuring Household Production in an Input-Output Framework: The Norwegian Experience, *Statistical Journal of the United Nations Economic Commission for Europe* 12, 1995, 111-131.
- [6] **O. Bjerkholt:** Ragnar Frisch, Editor of *Econometrica* 1933-1954, *Econometrica* 63, 1995, 755-765.
- [7] **O. Bjerkholt:** When Input-Output Analysis Came to Norway, *Structural Change and Economic Dynamics* 6, 1995, 319-330.
- [8] **H. Brunborg:** Demographic Consequences of AIDS, with Special Reference to Zambia, *Scandinavian Population Studies* 10, 1995, 396-417.
- [9] **H. Brunborg and N. Keilman:** A Combined Micro-Macro Model for Simulation of Households, *Scandinavian Population Studies* 10, 1995, 435-452.
- [10] **Å. Cappelen and J. Fagerberg:** East Asian Growth: A Critical Assessment, *Forum for Development Studies* 2, 1995, 175-195.
- [11] **J. Dagsvik:** How Large is the Class of Generalized Extreme Value Random Utility Models? *Journal of Mathematical Psychology* 39, No. 1, 1995, 90-98.
- [12] **R. Golombek, E. Gjelsvik and K.E. Rosendahl:** Effects of Liberalizing the Natural Gas markets in Western Europe, *Energy Journal* 16, No. 1, 1995, 85-111.
- [13] **S. Grepperud:** Soil Conservation and Governmental Policies in Tropical Areas: Does Aid Worsen the Incentives for Arresting Erosion? *Agricultural Economics* 12, 1995, 129-140.
- [14] **Z. Griliches and T.J. Klette:** The Inconsistency of Common Scale Estimators when Output Prices are Unobserved and Endogenous, *Journal of Applied Econometrics* (forthcoming).
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