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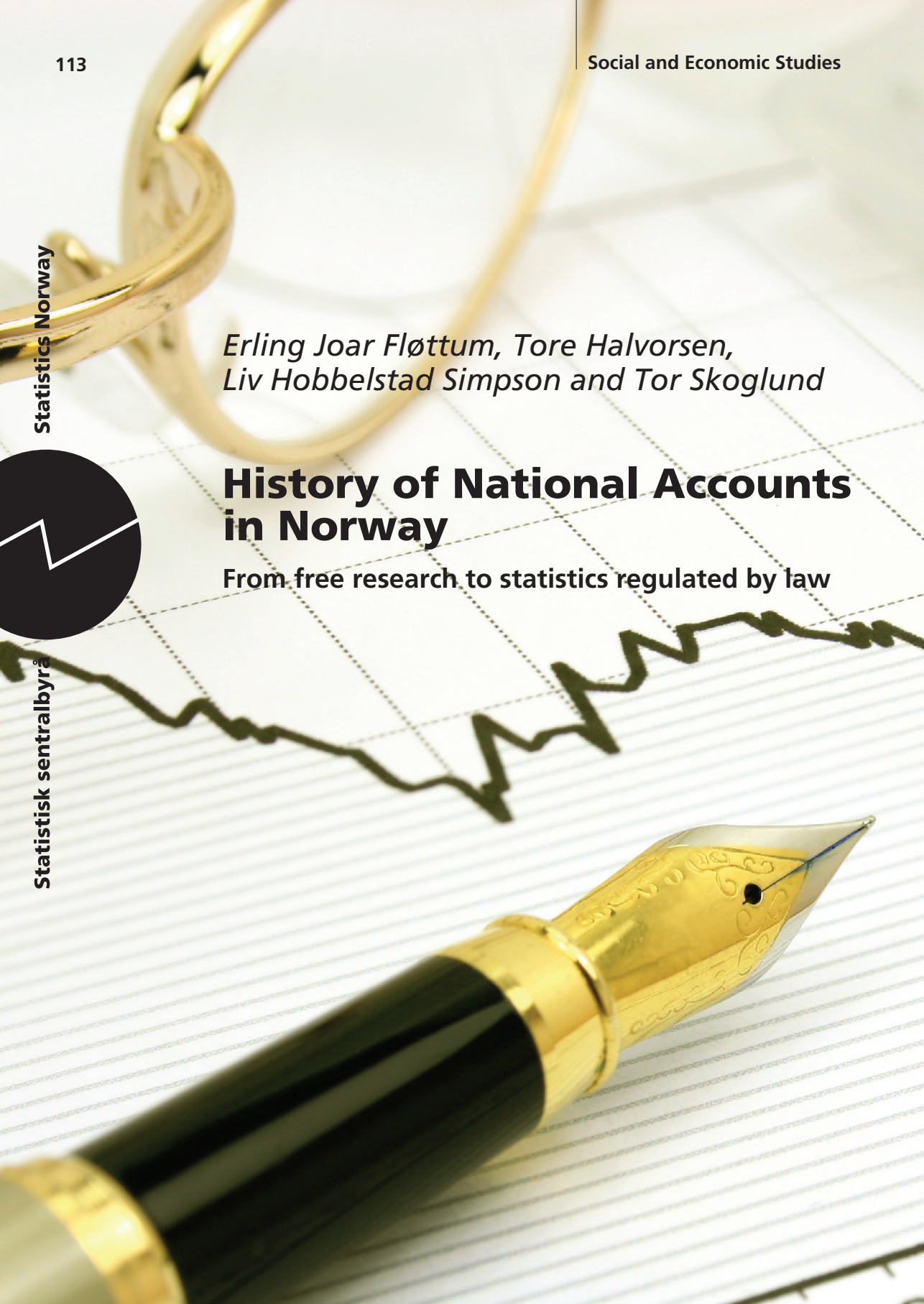
Erling Joar Fløttum, Tore Halvorsen,
Liv Hobbelstad Simpson and Tor Skoglund

History of National Accounts in Norway

From free research to statistics regulated by law



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Preface

The first plans for national accounts in Norway were developed in the 1930s by Professor Ragnar Frisch at the University of Oslo. In Statistics Norway, the National Accounts Unit was set up in 1946, and Odd Aukrust was appointed as the first head of the unit. The field of national accounts has therefore existed in Statistics Norway for 65 years. In all these years, national accounts have played an important role in the development of economic statistics and research within Statistics Norway, and in the economic policy in Norway.

Many of the issues that have been discussed in national accounts in recent years have a previous history attached to them. What defines the boundary of GDP, and how constant prices should be calculated are just two of the issues that have been discussed throughout the history of national accounts. The present day national accounts of Norway are based on a long series of decisions taken at various junctures in time. These decisions have normally been deeply rooted in international recommendations.

This is the first comprehensive description of the development of national accounts in Norway. The periodic main revisions, which have normally introduced new definitions or led to changes in methods of estimation, have been important milestones in the history of national accounts. These are therefore given a great deal of coverage in this publication. The strong international orientation has also been highlighted, as have the efforts to expand the national accounts to new areas, such as regional accounts and a number of so-called satellite accounts. The issues are mainly described in chronological order and are covered right up to the present day.

The publication has been translated from *Nasjonalregnskapets historie i Norge: Fra fri forskning til lovregulert statistikk,* Sosiale og økonomiske studier 112. The authors (Tore Halvorsen, Liv Hobbelstad Simpson and Tor Skoglund) have worked in the National Accounts Unit of Statistics Norway for a long time, which of course has influenced the presentation. An external historian would most likely have used other approaches to present these matters. Tor Skoglund was the editor for the publication. Erling Joar Fløttum translated and edited the English version, and made it somewhat shorter than the original Norwegian version.

The presentation to a large extent builds on written documentation published by Statistics Norway. Some of the basic material was made up of internal and unpublished notes from the archives of the national accounts. In addition, Dag Bjørnland, Erling Joar Fløttum, Randi Hallén, Ragnhild Lied Johansen, Knut Kvisla, Karin Snesrud and Aud Storholt, all with national accounts experience dating back to the 1960s, have made important contributions. Olav Bjerkholt, Ann Lisbet Brathaug and Ådne Cappelen have provided supplementary information and commented on preliminary drafts.

Statistics Norway
Oslo/Kongsvinger, 30 January 2012

Hans Henrik Scheel

Abstract

The first phase of the history of national accounts in Norway started in the 1930s when Professor Ragnar Frisch at the University of Oslo tried to design a general national accounting system. The National Accounts Unit was established in Statistics Norway in 1946 and was led by Odd Aukrust. The empirical results were first published in 1952 and covered the periods 1930-1939 and 1946-1951.

Already in the pioneering years of Frisch and Aukrust there was the standpoint that "real phenomena" was what mattered. It also reflected the particular interest public authorities showed in the real flows in economy. The statistical base early became considerably better for production statistics than for income and financial statistics. Therefore, the production approach was the main approach for calculating GDP. Norway is one of few countries that very early (since 1952) had input-output tables integrated in the annual national accounts. They played a considerable analytical role in the economic models constructed by Statistics Norway in the 1960s and later, as an empirical basis for use in the work on national budgeting and macroeconomic planning as a whole.

The first estimates from quarterly national accounts were published in 1953, but were temporarily stopped in the 1970s. A new model for the quarterly national accounts was developed at the beginning of the 1980s and has been used since 1985. The quarterly national accounts have been given high priority in the last decades and are now an important statistical basis for analyses of business cycles and economic forecasts both inside and outside Statistics Norway.

Statistics Norway has carried out six main revisions of the national accounts, including the last one published in 2011. The 1973 and 1995 revisions were the most important ones. The 1995 revision focused on implementing 1993 SNA and ESA 1995. Norway had an obligation to implement ESA 1995 according to the European Economic Area Agreement. The 1995 revision amended quite considerably earlier estimates; gross domestic product was revised upwards by about 10 per cent.

The first regional national accounts were published in 1970, and yearly from 1997. Statistics Norway started in the 1990s to construct and publish results from health satellite accounts, tourism satellite accounts and satellite accounts for economy and environment.

The oil industry, entering the Norwegian economy in the 1970s, has created challenges to the national accounts, in terms of compilation principles. Major changes in the oil price contributed to base-year-problems in the volume calculations in the 1980s. GDP Mainland Norway (GDP exclusive the oil and ocean transportation industries) has become an important and frequently used variable in the Norwegian national accounts.

Statistics Norway has participated actively in the processes of revising the international standards of the national accounts and other international meetings discussing accounting principles. Many Norwegian experts have worked in various projects to improve national accounts in developing countries (chapter 9).

Sammendrag

Professor Ragnar Frisch ved Universitetet i Oslo startet på 1930-tallet arbeidet med å stille opp et nasjonalregnskap for Norge. Etter krigen ble arbeidet videreført i Statistisk sentralbyrå under ledelse av Odd Aukrust. En viktig drivkraft var behovet for statistikk til nasjonalbudsjettet – statsadministrasjonens nye rammeverktøy for økonomisk planlegging og politikk. Arbeidet ble også påvirket av tilsvarende prosjekter i andre land og det internasjonale standardiseringsarbeidet som ble påbegynt i de første etterkrigsårene. Beregningene resulterte i et nasjonalregnskap som ble publisert i serien Norges offisielle statistikk i 1952.

Det norske nasjonalregnskapet var bygget opp rundt en krysløpskjerne som viste tilgang og anvendelse av varer og tjenester på et svært detaljert nivå. Norge var blant de første landene som etablerte et integrert krysløpsregnskap i nasjonalregnskapet, med en godt utbygd industristatistikk som den sentrale datakilden. Norge var også tidlig ute med å ta i bruk elektronisk databehandling (EDB) i nasjonalregnskapet rundt 1960. Samtidig startet arbeidet med utviklingen av økonomiske modeller i SSB, som bygde på nasjonalregnskapet som statistikkilde.

FNs nasjonalregnskapsstandard System of National Accounts (SNA) 1968, som var basert på viktige innspill fra Norge og andre land, ga grunnlaget for en omfattende hovedrevisjon av nasjonalregnskapet på 1970-tallet. I tillegg til innarbeiding av nye definisjoner ble kvaliteten på nasjonalregnskapet forbedret ved at nye statistikkilder ble tatt i bruk.

Den sterke veksten i oljevirksomheten etter 1970 stilte nasjonalregnskapet overfor store metodemessige utfordringer, og har dessuten bidratt til at begrepet "Fastlands-Norge" er blitt en sentralt begrep.

En ny, omfattende revisjon av nasjonalregnskapet ble gjennomført på 1990-tallet basert på nye internasjonale anbefalinger i 1993 SNA, og den europeiske standarden ESA (European System of Accounts) 1995, som Norge er forpliktet til å tilpasse seg som en del av EØS-avtalen. Også ved denne revisjonen ble det innarbeidet nye definisjoner i nasjonalregnskapet. Den finansielle delen av regnskapet, som helt siden 1950-tallet hadde vært dårligere utviklet enn realdelen, ble styrket ved etableringen av et institusjonelt sektorregnskap. Bruk av nye statistikkilder bidro til at bruttonasjonalproduktet ble om lag 10 prosent høyere enn tidligere beregnet.

Nasjonalregnskapet har gjennom årene blitt utvidet på flere områder. Det første kvartalsvise nasjonalregnskapet ble publisert allerede på 1950-tallet, men det var først på 1980-tallet at dette regnskapet fikk en sentral plass som grunnlag for konjunkturanalyse i Norge, blant annet i SSBs egne konjunkturrapporter. Fylkesfordelt nasjonalregnskap har røtter tilbake til 1970-tallet, mens flere såkalte satellittregnskaper har gitt nasjonalregnskapet ytterligere bredde de siste 15 årene.

Norge har deltatt aktivt i internasjonalt samarbeid på nasjonalregnskapsområdet og har bidratt med rådgiving i mange utviklingsland.

Contents

1. Introduction

1.1. The scope of national accounts

The current national accounts have been developed in a long historic process. In the first post-war years, important decisions were made with respect to which direction to follow. In the wake of World War II, the challenges faced in reconstructing the country helped strengthen the economic planning, which led to commodity balances, investments and real economy measures becoming essential components in the tradition of the national accounts of Norway. The first input-output table presenting supply and use of goods and services was prepared for the year 1948. Thus, Norwegian national accounts were constructed around an input-output base that contained more details than found in most other countries. The number of industry classifications has however increased from 47 in the first comprehensive presentation of national accounts in 1952 to approximately 190 today. Fish farming, oil and gas extraction and data processing are examples of new industries, while whaling is one of the industries that have disappeared.

One important characteristic of the Norwegian national accounts from the early days was the large emphasis on production, consumption expenditure and capital formation accounts as opposed to income, outlay and capital finance accounts. Income and capital accounts were established relatively late; in the 1980s, depicting the institutional sectors of the economy and leading to institutional sector accounts in the 1990s. In recent years, "complete national accounts" have been developed, enabling the consistent treatment of production, incomes and a wide spectre of financial items. Balance of payments for Norway, contrary to the situation in many other countries, became an integral part of the national accounts as early as the 1950s.

The development of quarterly national accounts is interesting from a historic perspective. While the first quarterly accounts were established as early as the 1950s, these accounts today possess a rather different quality and status. The demand for quick and precise information on economic trends has escalated, and economic dependence between countries has contributed to business cycles spreading much faster now than 50 years ago.

In the 1970s, national accounts were extended to cover regional accounts, i.e. national accounts broken down by county. Since then, labour accounts and a number of so-called satellite accounts have been added, thus broadening the national accounts to serve more user groups.

The data basis for the current national accounts is definitely much better now than in the first post-war years, particularly with respect to statistics on service industries and accounting statistics. The development of national accounts has resulted in statistics emerging in areas that were poorly covered before. Due to the totality of the national economy in national accounts and the strong emphasis on

consistent treatment in describing the various parts of the economy, incompleteness and weaknesses in the data basis would be easily visible. National accounts have been more important to the development of the statistical system in Norway than has been the case in many other countries. National accounts have also played a central role in coordinating concepts and classifications that are used in economic statistics. This may be due to the relatively centralised statistical system that has been in place in Norway since 1945, and the lack of interest from competing institutions in how to develop statistical data.

There has been a rapid technical development with respect to methods of estimation used in national accounting. In the 1950s, national accounts were prepared and processed manually. Norway was one of the first countries to introduce EDP in national accounts, in around 1960. When PCs were seen as useful devices in statistical work in the 1980s, national accounts played a leading role in their implementation in Statistics Norway. As advanced electronic computation systems have been created, it has become possible for huge quantities of data to be treated quicker and more efficiently than ever. This is necessary in a world that is putting ever-greater demands on topicality.

1.2. National accounts staff

National accounting involves special challenges due to the changing nature of its framework. The statistical basis does not remain the same over time; it is constantly changing, and new international guidelines and requirements emerge at regular intervals. When changes in economic policy occur, e.g. in taxes and excise duties, this often means that estimation routines have to be amended. The proficiency and experience of the staff in assessing preconditions and results are therefore crucial to the quality of national accounts data.

When the National Accounts Unit was established in Statistics Norway in 1946, four persons were appointed. The number of staff increased to some 15 persons in the 1960s and 1970s. Today, the Unit has a staff of approximately 30.

Traditionally, national accounts staff have been economists. During the first years of the post-war period, economists had their breakthrough in importance in public administration as a whole. Other occupation groups have also subsequently participated in national accounting work. Since the early 1990s, the share of female economists in national accounts has increased considerably.

In recent decades, graduate economists have learned little about national accounts in their university education, and many have therefore spent two or three years in Statistics Norway in order to upgrade their education in this area. National accounting entails good training in assessing and using statistics, at the same time providing an insight into the basic concepts in macroeconomic analysis. The appointing of previous national accounts staff in the Ministries and other public

and private sector institutions has created qualified users and contributed to greater diffusion of national accounts competence.

Heads of National Accounts Unit 1946-2011

Odd Aukrust	1946-1951
Otto Chr. Hiorth	1951-1955
Thomas Schiøtz[1]	1955-1966
Erik Homb[1]	1966-1978
Tormod Andreassen	1978-1979
Nils Terje Furunes	1979-1982
Erling Joar Fløttum	1982-1991
Liv Hobbelstad Simpson[2]	1991-2003
Ann Lisbet Brathaug	2003-

[1] Schiøtz was on leave for around a year from June 1964, when he worked with national accounts in OECD, during which time Homb was the acting head.
[2] Changed named from Liv Bjørnland in 1986.

During the period from the end of the 1950s to the beginning of the 1960s, very few economists graduated from the University of Oslo (just two in 1960!). The share of national accounts staff without a university education increased in this period. This "non-academic" group has been of great use to the national accounts, especially in the core areas of the computations. In recent years, however, the share of staff without a university or college education has been reduced dramatically in national accounts.

Many of those working with national accounts have made a lasting impression, some more clearly than others. The strongest impression was made by Odd Aukrust (1915-2008), who established national accounts in Norway in the first post-war years, was appointed the first head of unit, and was awarded a doctorate in the subject of national accounts. As head of the Research Department and director of research in Statistics Norway until 1984, he had overall responsibility for the Norwegian national accounts for more than 30 years. Aukrust was also a key person in the international arena of national accounts for many years. Petter Jakob Bjerve (1913-2004), director general of Statistics Norway for more than 30 years, worked with national accounts at the beginning of his career.

1.3. International cooperation

Throughout the whole post-war period, international contacts were important for national accounting. The pioneers of national accounts quickly recognised the potential for these kinds of statistics to serve as a basis for international comparisons. In the 1950s and 1960s, however, the national accounts in Norway used different definitions to those recommended internationally in the first UN standard 1953 SNA (System of National Accounts). Here, the opinion prevailed that the Norwegian system was better than this first international standard. When 1968 SNA took effect in the early 1970s, however, the Norwegian national accounts adopted this new international standard, and since then Norway has placed a great deal of emphasis on adhering to international recommendations. In

1995, Norway was the first country to publish national accounts estimates in accordance with the EU's guidelines ESA 1995 (European System of Accounts), despite not being a member of the EU. ESA 1995 is based on the revised global standard 1993 SNA. Norway is committed to complying with the European standard as part of the EEA (European Economic Area) Agreement.

The European Commission and Eurostat have carried out evaluations of the national accounts in all countries that are subject to the EEA Agreement. This is due to the great importance of national accounts estimates in the EU system, both as a basis for contributions to the EU budget, and for assessing the financial and economic situation in the countries. In relation to the Norwegian national accounts, Eurostat concluded in 1997: "The Norwegian national accounts are of a high quality, soundly based on reliable and exhaustive sources, integrated in a system with a detailed product breakdown".

The favourable international reputation of the Norwegian national accounts has paved the way for Norwegian experts in national accounts to work with international organisations in this field, primarily in the UN, OECD and Eurostat. Many of those employed in the National Accounts Unit in Norway have also over the years acted as advisers in developing national accounts systems in other countries.

1.4. Main revisions

Quality assuring the national accounts is an ongoing process that requires constant focus. The so-called main revisions are a vehicle for this work, in which improvements in the data basis and methods of estimation have been made. In the main revisions, changes in the international guidelines are adjusted to Norwegian conditions and implemented in Norwegian national accounts. In particular, the main revisions in the 1970s and 1990s were comprehensive and resource-demanding, and had a major effect on the estimates.

Revisions of national accounts in Norway

Year of publication	Year of comparison	Results, measured in terms of percentage change in level of GDP	Main cause
1962	1958	0.6	New statistics
1973	1969	-11.3	Definitional changes; implementation of 1968 SNA
1995	1990	9.3	Definitional changes; implementation of ESA 1995 and 1993 SNA; new statistics for services
2002	1997	1.4	New statistics for industries (structural statistics)
2006	2003	1.1	Definitional changes; implementation of EU regulation on indirectly measured banking and financial services

1.5. Use of national accounts estimates

The main purpose of national accounts is to play a role in enabling a more fact-based discussion on the Norwegian economy in society. Thus, national accounts are also extremely useful outside Statistics Norway. National accounts were needed in order to establish the national budget in the Ministry of Finance just after World War II. National accounts today constitute a central foundation for the work on economic analyses and projections by the Ministry of Finance, Norges Bank and other large institutions and banks. Eurostat, the UN, OECD and other international organisations are also important users of national accounts estimates. The long time series of national accounts have been utilised in several historical studies.

Statistics Norway has a large Research Department compared to other central statistical agencies. In Norway, the National Accounts Unit ("10. kontor") was part of the Research Department until 1991. Well developed national accounts have been vital to the development of macroeconomic models in Statistics Norway and to other kinds of research here. Throughout the post-war period, national accounts provided data as a basis for projections and the current business cycle reports produced by Statistics Norway. In Economic Survey, which is published early in the year with the first annual estimates of the previous year, national accounts have been the main source for analysing the development in many areas of the Norwegian economy since the 1950s.

The development of electronic data banks and dissemination systems in Statistics Norway over the last 15 years has made national accounts estimates more easily accessible, for professional users in public administration and research, as well as businesses and the general public. The Internet has to a large extent replaced the telephone and mail as channels of dissemination, and contributed to greater dissemination of national accounts data as a source of knowledge on the Norwegian economy. Nevertheless, the complexity and level of detail of the national accounts are a heavy burden on the dissemination process.

1940s and 1950s:

2. National accounts introduced as official statistics

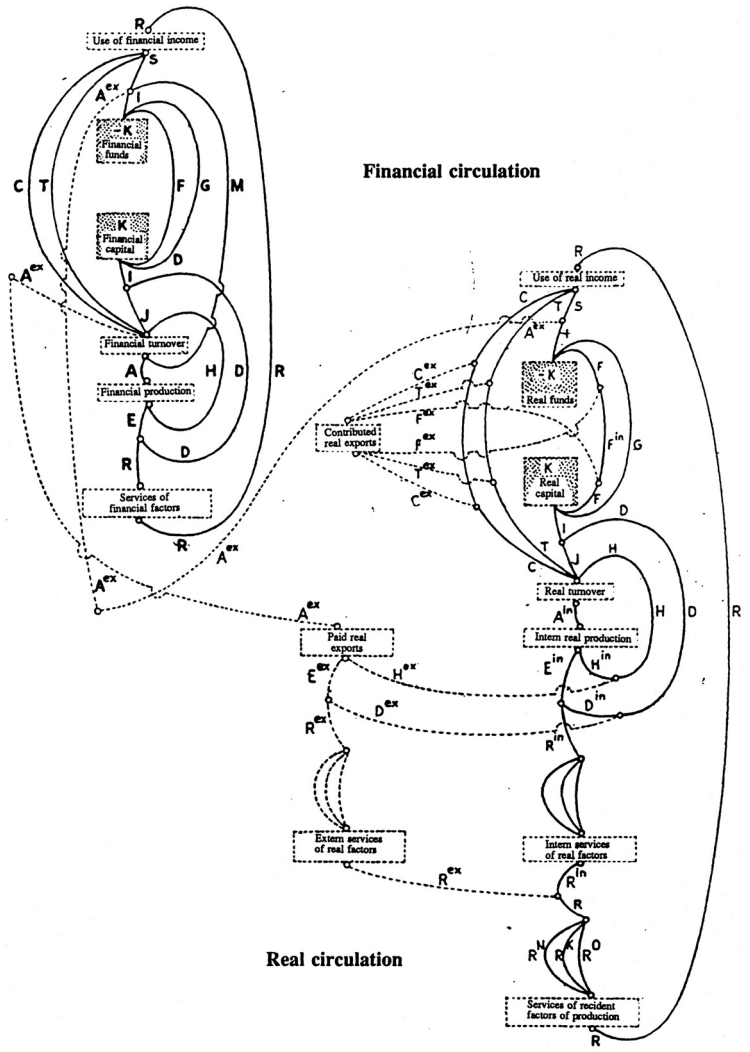
Professor Ragnar Frisch at the University of Oslo was a key inspiration when, in 1946, the unit of national accounts was formally established in Statistics Norway. The driving force behind this move was the need for statistics to support national budgeting – a new tool for central government's economic planning and policy. From the outset, the results of the national accounts work were published in the NOS (Norway's Official Statistics) series. The national accounts' central position in the Research Department of Statistics Norway meant that estimates were soon used for analyses of the Norwegian economy and for economic models. This was a time for extensive international involvement in drawing up national accounts methodology. In several areas, the countries had taken different positions in their systems of national accounts. The 1950s also saw considerable interest for long time series to be established in national accounting.

2.1. The early days

Professor Anton Martin Schweigaard was one of the great pioneers in the academic fields of economics and statistics in the 19th century in Norway. As early as 1840, he had published calculations on contributions to national income from the various industries. In particular, the calculations for primary industries and ocean transport were fairly comprehensive in order to illustrate the relative importance of the respective industries. A publication on this subject was issued in 1848 by the Table Office in the Ministry of Interior, which was the precursor to Statistics Norway when the latter became an independent institution in 1876.

Anders Nicolai Kiær, a pupil of Schweigaard, became the first director of Statistics Norway. Kiær published estimates of national property and national income for 1850 and 1880 initially, later followed by national income estimates for the years 1891 and 1898. During the period from 1900 to 1940, Kiær and others continued to make these types of calculations. The emphasis was on the single item of national income, which was based on income figures in tax assessments (the so-called "personal method").

In the 1930s, the foundation was laid for more comprehensive national accounts to be developed by Ragnar Frisch at the University of Oslo. The historical background was the international crises of the time. Frisch felt it necessary to develop a conceptual and analytical means to handle this, which included important structural relationships of the economy. In an article in 1933 he described "a complete financial plan" that can act as a complete system of national accounts - probably the very first time the term "nasjonalregnskap" was used officially in Norwegian (Frisch 1933). For Frisch this was quite a leap from the earlier calculations of national income. National accounts should from now on include all parts of the economy and emphasise the relationships between those parts.



The Eco circulation system was developed by Professor Ragnar Frisch. Frisch put a lot of work into the graphical representation of this system in the 1930s and 1940s, together with Petter Jakob Bjerve, director general of Statistics Norway 1949-1980. This graph was published in 1948 and reprinted in Aukrust (1992), p. 55.

Frisch called the theoretical basis for national accounts the "Eco circulation system", the central idea being that of a circuit. In the Eco circulation system, importance was given to graphic illustrations. Frisch developed a complicated set of rules on how to draw these illustrations and how the graphs should curve etc. A swarm of new terms were contained in this system, many of which were taken on board later as national accounts terms. Another important aspect was to provide for precise definitions of the concepts. Frisch's system clearly distinguished between variables of the real economy and financial variables, and also between flows and stocks, and thus provided a good frame of reference for the discussion on national accounts concepts and relationships in Norway (Bjerve 1986).

The practical work in developing national accounts started in 1937 at the Institute of Economics at the University of Oslo. The aim of the work was to create an overview of the structure of the Norwegian economy. The work on national accounts, led by Frisch, was defined as part of the coordination in this work. The proposal for a national accounts system was very ambitious. It was based on the principle of double-entry book-keeping, using a comprehensive accounting system and detailed classifications. Many people were sceptical to this approach, including the director of Statistics Norway at that time; Gunnar Jahn. Regrettably, and despite its valuable intentions, Jahn found it impossible to believe that Frisch's proposal could be implemented in a way that would be of practical importance.

At a Nordic statistical meeting in 1939, Frisch reported that national accounts should aim at providing approximately the same kind of review of total economic activities for the residents and institutions as for a single establishment, through the use of common double book-keeping (Frisch 1940). The term "accounts for the establishment Norway" was later commonly used to describe or define national accounts.

The empirical work of the first national accounts was full of challenges, as Frisch's ambitions were far ahead of the statistical possibilities at that time. Estimations were indeed attempted for some industries, such as banking and ocean transport, but the empirical work at the University during 1937-1943 failed to cover the Norwegian economy as a whole. However, Frisch had a long-term perspective for this work. The lectures held by Frisch on the Eco circulation system and the structural overview had a major impact on the national accounting work in Norway.

In 1943, the University of Oslo was closed by the German occupying power and work on national accounts was transferred to Statistics Norway. Participants in this work included Petter Jakob Bjerve, later director general in Statistics Norway from 1949-1980, and Stein Rossen, the first head of the Research Department in Statistics Norway from 1950 to 1952. Both of these had previously been in the team with Frisch at the University and thus experienced the shaping of the Eco circulation system and national accounts. During World War II, the work in Statistics Norway was camouflaged as a project to calculate war expenses as a

basis for claims against England in the future! The results of that effort were concluded at the end of the war, and finally published the following year in the series Norway's Official Statistics (Statistics Norway 1946). Figures were calculated on the development of national income for the years 1935-1943, as well as changes in the real (non-financial) capital from 1939 to 1945. In retrospect, Bjerve noted "For the first time, we had integrated harmonized national accounts for Norway, although of the simplest kind" (Bjerve 1989).

The 1946 publication provided a thorough overview of principles, methods of estimations and statistical sources, and many tables of figures. National income was still used as a main item in the publication, and illustrations were provided of alternative calculation methods. In addition to estimates in current prices, the net national product was also calculated in constant 1939 prices. The high inflation during the war resulted in 40 per cent growth in national income from 1939 to 1943 measured in current prices, but a decrease of 11 per cent when measured in constant prices.

The calculations were mainly based on production statistics for the different industries. Figures were compiled for the net national product, value added and wages and salaries for 13 main industries. Final consumption expenditure and investment were summarised, and the harmonization was made at aggregate level in both areas. The figures were particularly uncertain due to weaknesses in the statistical basis for many industries. When more complete national accounts were drawn up after the war, it was noted that all war years were omitted from the results.

The figures on national income and estimated costs of the occupation were also used in the book *Hva krigen kostet Norge* (Cost of World War II for Norway) by Petter Jakob Bjerve and Odd Aukrust. Aukrust worked in the Ministry of Supply during the war, but later held a central position in the national accounts work of Statistics Norway. The estimations carried out during the war by Statistics Norway were continued by the Ministry of Finance and Ministry of Commerce during the period 1946-1951 and published together with the national budget, which was a new development. Work on the national budget was strongly influenced by Erik Brofoss, Minister of Finance 1945-1947 and Minister of Commerce 1947-1954. The national budget – a term also coined by Frisch as the analogy to the national accounts – was developed as a framework tool for economic planning and policy.

The first national budget was published on 12 March 1946 as an appendix to the Government budget. Included in this document was a presentation of the principles and definitions of national accounts; a fairly new element to most people in the political arena. Data consisted of the estimations made in Statistics Norway during the war, supplemented by new estimates for 1944 and 1945. This publication was entitled Nasjonalregnskapet og nasjonalbudsjettet (*National Accounts and National Budget).* While the 1946 National Budget was of a limited scope (38 pages), the 1947 edition was much more extensive (306 pages) and contained a great deal

more detail. More than half of the document was made up of appendices drawn up by the various ministries and other government institutions. Provisional national accounts estimates for 1946 served as a basis for the budget. Data for 13 aggregate industries were also included, with comparable estimates for years 1935-1943, but not 1944 and 1945. Petter Jakob Bjerve headed the work on these first national budgets, and was succeeded in 1947-1948 by Trygve Haavelmo, who later became a professor at the University of Oslo and Norway's second Nobel Laureate in economics (in 1989). Frisch had received the same recognition 20 years before. Interestingly, Haavelmo worked on national accounts issues for a short period, and was also, for a brief period before the war, part of Frisch's national accounts team at the Institute of Economics at the University.

In presenting national accounts estimates in the national budget, an important consideration from an analytical perspective was to distinguish between the public and the private sector, including income transfers between the two sectors. Public sector was defined as both general government and public corporation sectors. National economic grouping of all government items (incomes and outlays in particular) was introduced at that time, and this entailed the reclassification of administrative groupings in government accounts and budgets. Until 1961, figures had to be converted to calendar years, with the fiscal year running from 1 July to 30 June. Later, the specifications in government accounts and budgets were aligned to better serve the aim of national accounts.

Statistics Norway contributed to the work carried out by the ministries on national accounts in these first years. Figures were revised whenever new relevant statistics became available. Odd Aukrust wrote an article describing the work on national accounts for 1945-1947 as an appendix to the National Budget document issued in 1948. This article paved the way for a new era of national accounts estimations in Statistics Norway (Aukrust 1948a). Thus, it was agreed that the main responsibility for national accounts should be transferred to Statistics Norway.

2.2. National accounts as a separate subject area in Statistics Norway

In 1946, the National Accounts Unit was established in Statistics Norway in order to strengthen the empirical basis for national budgeting work in the Ministry of Finance. Odd Aukrust was appointed head of the new unit. At the same time, a reorganisation took place in Statistics Norway, in which the National Accounts Unit was to be known as "10. kontor" (Office no. 10). After first being officially known as the "Office for compiling national income and banking statistics", the unit was renamed the "National accounts office" in 1949. The name "10. kontor", however, continued to be used for almost 40 years!

Petter Jakob Bjerve was appointed director general of Statistics Norway in 1949. One important requirement for accepting this appointment was that a research department should be established as part of Statistics Norway. The Research

Department was established in 1950, with national accounts, tax research and business cycle analysis as individual subject areas, and Stein Rossen at the helm. Rossen had previously been an associate of Frisch, and later held several positions in the United Nations.

Odd Aukrust was appointed head of the Research Department in 1953 (from 1973 known as the director of research), where he remained for more than 30 years until his retirement in 1984. Bjerve as director general and Aukrust as director of research (and second in command) formed a long-term leadership in Statistics Norway by two persons well-qualified in and with a great interest in national accounts. This was immensely beneficial to the development of national accounts in Norway.

With respect to the new National Accounts Unit in 1946, Aukrust wrote: "The staff was modest: two economics graduates (Jahn Halvorsen and Hans Th. Pedersen) and my former assistant in the Department of Supply (Ingebjørg Vestøl) as assistant. Setting up new national accounts was a demanding job for a few economists with no experience in the field. Our three weeks of training in Denmark and England were extremely helpful. Furthermore, I paid a brief visit to the Netherlands on my return journey, mainly to report back to the Ministry of Finance, where I also had the opportunity for a discussion with national accounts staff there."

In relation to the study visit, Aukrust wrote: "In Denmark we could see how national accounts were built up through flows from producer/importer to final users ("commodity flow approach"). The same technique was followed in the Netherlands. In England, we studied in detail a draft of the national accounts system devised for the League of Nations by Richard Stone (Stone 1947). The basic idea in Stone's approach was to trace and register all money flows between the institutional sectors ("payment flow approach")." [1]

For Aukrust, the transaction concept of payables was a problem. What should national accounts measure: "payments", or "the subject of payment"? The position of Frisch was to distinguish between the real economy and the financial transactions, which clearly deviated from what Stone suggested. Terms such as "real transactions" and "real accounts", later to become central concepts in national accounts aimed at reflecting real economy elements, meant that clear parallels in English terminology were not always possible to find.

Odd Aukrust published his first plans for the work in new national accounts in Norway in an article in 1947 (Statistiske Meddelelser). The article gives an overview of earlier compilations of national income in Norway and how the new system will deviate from the previous national income estimations based on ideas by Frisch and Stone. The planned system was illustrated with simplified numerical

[1] The quotations are translated from Aukrust (1993).

examples showing relationships between items, sectors and accounts, and an accounting system containing 51 accounts. Thus, a degree of moderation was shown, although a more detailed approach would have been preferred. Before doing so, economic statistics would need to be improved as a basis. Improvements were soon made, and the number of staff in Statistics Norway increased from 123 in 1945 to 259 in 1951.

In another article (Aukrust 1948b), Aukrust explained his choice of national accounts concepts, with a reference to the concepts used in the Eco circulation system. He argued for using four different main aggregates in the system: gross domestic product, net domestic product, factor income and disposable national income, of which the first three had a clear relation to the real economy. It is interesting to note that when using the term "domestic product", this referred to the net domestic product. In 1952, tables were published showing both the gross and net product, in both cases distributed by industry and by category of use. Regional breakdowns in national accounts were considered at an early stage (Aukrust 1947), but were rejected from the point of view that too many accounts would be needed for this. The first regional national accounts in Norway were published 20 years later.

Aukrust's ideas were further developed in a seminar lecture held at London School of Economics in spring 1949. The lecture was subsequently given as a contributed paper at the first meeting of IARIW (International Association for Research in Income and Wealth) in Cambridge, England, that autumn, followed by publication in the Review of Economic Studies (Aukrust 1949-50).

Aukrust acknowledged that national accounting work in Norway was influenced by Frisch and Stone, and also by Wassily Leontief, who is considered the father of input-output analysis (input-output tables). The input-output analysis method was developed in the USA in the years before and during World War II, and became known to Norwegian economists right after the war. Bjerve and Aukrust were quick to recognise the potential in using this input-output methodology in national accounts compilation in Norway. Aukrust studied this methodology at closer hand with Leontief at a seminar in Salzburg in summer 1948.

Aukrust wanted to combine the best of the contributions from the three future Nobel laureates (Frisch, Stone and Leontief). The legacy from Frisch was strongest, with the fundamental delineation between the real economy and the financial, and between requited and non-requited transactions. Consequently, the interest was to be considered as an income transfer (i.e. financial transaction) and not as remuneration of capital (income component of GDP), as was standard in Anglo-American tradition.

The statistical basis was considerably better for the real economy part than the financial part, thus making it easier to adopt the commodity-flow methodology in Norwegian national accounts. Good production statistics were in place at that time for industries such as agriculture, fishery and manufacturing, all of which are

important industries in Norway. In particular, with annual commodity data dating back to 1927, the manufacturing statistics underpinned the statistical system. Accounting and income statistics - data sources that were vital to the Anglo-American approach - had not been developed to any great extent in the first post-war years.

New national accounts estimates were published in *Nasjonalregnskap (National accounts) 1930-1939 and 1946-1951* (Statistics Norway 1952) after six years work. In addition to the time-consuming work in creating a new system, several thousand items had to be quantified. A detailed accounting system aimed at producing more reliable figures was used. This approach increased the possibilities to have "everything included" and also enabled more controls to be undertaken during the compilation process (Aukrust 1955, p. 63-73). Developing the primary statistics in Statistics Norway to best match the needs of national accounts entailed a harmonization of concepts and groupings, and the definitions of national accounts became the standard in manufacturing statistics and subsequently in primary statistics of other industries. New activity and commodity classification standards in Statistics Norway were introduced to great benefit for national accounts. National accounts could be compared with a puzzle: all bits had to fit with each other, with the full picture becoming clearer the more bits that were fitted together.

The original plan for the new national accounts was to include just one pre-war year (1938), but in order to strengthen the compilations this was changed to include all years from 1930 to 1939. This improved the statistical basis and enabled the Establishment Census 1936 and other periodical censuses to be utilized more directly. Another reason may have been the increased interest in the 1950s to establish long historical time series. The war years 1940-1945 were not included, however, due to statistical deficiencies. No written documentation has been found showing how the compilation for the war years was assessed. It should be added that these years have been dealt with recently in calculations of employment and wages in 40 industries (Hansen and Skoglund 2008), but apart from this the situation is still unchanged in national accounts with respect to that period.

In light of the limited personnel resources (staff of 2–7 persons) and modest technical equipment, the abundance of figures published by Statistics Norway (1952) during these years was quite impressive. The publication contained figures covering 16 years, however, simpler methods were used for provisional estimates for the last three years (1949-1951). Many tables were accompanied with footnotes and explanations (at most 19 notes to one table!). GDP, net domestic product, compensation of employees and operating surplus were distributed by 47 industries (adapted to ISIC) and private consumption expenditure was distributed by a total of 122 consumption groups. The estimates were made available in current prices as well as in constant prices (1938 prices), and man-years were published for all industries. Disposable income for Norway was used as a global income item instead of national income, although the latter income concept had been most in use earlier.

All estimates were assessed according to a scale of "reliable figures", "moderately reliable figures" and "uncertain figures", assessing both level and change. Among the industries, agriculture, manufacturing and financial activities attained the best scores, while wholesale and retail trade and personal services were given the poorest score of reliability. Aggregates were considered to be more reliable than their components. Based on rather subjective evaluations, a maximum 3 per cent error limit was set for GDP, as previously recommended by Frisch. This system of reliability was not adopted internationally – Sweden and the Netherlands were among the few countries to have published such indicators (Bos 2009, p. 951) – and was also eventually abandoned in Norwegian national accounts.

The new national accounts estimates deviated quite significantly from those published earlier. For the first post-war years, GDP was approximately 20 per cent higher than the corresponding national accounts estimate published in the National Budget document. The explanation given for this was that new areas had been covered.

"It is commonly experienced in national accounts work in all countries that the more thorough the calculation is, the higher the figures tend to be." (Statistics Norway 1952, p. 66). This experience has also proved to be valid since that time. The harmonization of national accounts in the EU states in recent years has led to considerable upward adjustments of GDP estimates, with some countries increasing almost 20 per cent (Bos 2009, p. 953).

Made up of 250 pages of tables, *Nasjonalregnskap (National Accounts) 1930-1939 and 1946-1951* was a very comprehensive national accounts publication for its time. The USA was the only country to match this (Aukrust 1992, p. 26). This publication formed part of Aukrust's doctoral thesis, together with a presentation of the theoretical principles behind the estimations, and an attempt to provide an axiomatic treatment of the classification and valuation problem in national accounts (Aukrust 1955). Aukrust discussed here what he believed to be the four main types of problems encountered when compiling national accounts: the classification problem (inter alia, the definition of concepts and the choice of sector groupings), the valuation problem (choice of prices), the observation problem (quantification of concepts) and the presentation problem (choice of tables and terminology). The aim of the axiomatic treatment, which was relatively technical, was to establish a set of fundamental concepts (axioms) that could be used to deduce the most important other concepts and relationships in national accounts.

The classification problems have been among the fundamental themes discussed throughout the history of national accounts. Some of the difficult definitional problems have been referred to in various places in this book.

Aukrust defended his thesis in 1956, with Ragnar Frisch as the first opponent. The theoretical part of the thesis was groundbreaking work, but since it was written in Norwegian it received little attention outside Norway. A summary in English was,

however, published 10 years later (Aukrust 1966). In retrospect, Aukrust recognized laconically that "the idea to determine the national accounts concepts axiomatically has not had an overwhelming follow-up in international literature" (Aukrust 1993, p. 18).

The lack of qualified labour was a major problem for the national accounting work in the early years. Economists that graduated in these years were very much in demand, inter alia in the ministries. In the mid-1950s, 8 economists and 1-2 assistants were appointed. Two of the economists worked with manufacturing estimations, while the other six worked in other areas of the accounts, in addition to quarterly estimations and dissemination. Otto Chr. Hiorth succeeded Aukrust in 1951 as head of the National Accounts Unit. With respect to national accounts staff requirements, Hiorth once wrote: "National accounts estimations do not, in principle, require better staff than other statistical work, but in many ways they put special requirements on executives in national accounts, such as the initiative and drive to collect information in cases where primary statistics are inadequate, and the ability to ignore details and instead critically interpret what the rough features of the figures express" (Hiorth 1955, p. 17). Despite the improvement in primary statistics, these are qualities that are highly praised, even today.

After Petter Jakob Bjerve was appointed director general in 1949, he discussed with Aukrust a plan for a large part of the national accounts work to be performed in the statistical offices. The aim here was that the National Accounts Unit could carry out its part of the job with a minimum of effort, but this plan later turned out to be completely unrealistic (Bjerkholt 2000, p. 240). The division of labour between the National Accounts Unit and the units responsible for the primary statistics used in national accounts has also been a topic of discussion in later years, especially the relations to financial statistics and government statistics.

In 1954, a new national accounts publication was issued containing revised and final estimates for the years 1949-1951 and provisional estimates for 1952 and 1953 (Statistics Norway 1954). The publication also included a more detailed description of estimation methods. Results from a comprehensive overhaul of the manufacturing statistics for 1949 were implemented, including a new activity classification, which caused a break in the time series for manufacturing with previous years. The other time series remained compatible with the figures in the 1952 publication, however.

In the years that followed, national accounts aggregates were issued successively in the annual Economic Survey publications and the monthly Statistical Bulletins. The Economic Survey of the past year was initially published in early January, changing to early February after a while. The early deadline was of course quite a challenge with respect to providing early estimates for many industries, in particular for services industries, and for national accounts staff to work intensively in the run up to Christmas. The first provisional national accounts estimates adopted a central role in the annual analyses of the Norwegian economy. The

Economic Survey was, for many years, without any real rival in the provision of comprehensive analyses of the past year, and therefore had a great impact in the media of the time.

The next national accounts publication in the series Norway's Official Statistics – containing tables only - was issued in 1961: *National Accounts 1938 and 1946-1958*.

During the years 1956-1962, Statistics Norway accomplished its first comprehensive revision of national accounts, later known as a main revision. The figures were somewhat revised based on better primary statistics for the post-war years and improved methods. Some minor definitional changes were also implemented (Statistics Norway 1965a, p. 55). The new GDP estimates were slightly higher than before. The pre-war figures were also revised. The full revised series, with some aggregates dating back to 1865, were issued in *National Accounts 1865-1960*; a very comprehensive publication. Statistics Norway also issued two booklets with figures in a more analytical and aggregated form (1965c, 1966a), which also contained time series of commodity flows, employment, real capital and figures to illustrate productivity changes during the period 1949-1961.

2.3. Unpaid household work

The definition of production has been an important topic of discussion throughout the history of national accounts. Before World War II, the general view of the economists was that unpaid domestic work should be regarded as part of the productive activities of society. In 1912, the first director of Statistics Norway, Anders Nicolai Kiær, had calculated unpaid domestic services by women to 15 per cent of national income. His estimate included maids, housewives and farmers' wives (Lie and Roll-Hansen 2001, p. 339). Population census figures were used, and the value was calculated from annual wages (including board and room) for maids in rural areas and cities respectively.

In the first national income estimations made during and immediately following the war, unpaid domestic services were included (Statistics Norway 1946, p. 82), but only for women. The value of unpaid domestic services was actually published as part of the national budget until 1949, and the national budget for this year reported: "In Norway, it is common to include the value of housewives' work, contrary to the practice followed in other countries. For international comparability purposes, the calculated value is added at the end, in order to provide domestic product estimates both including and excluding unpaid domestic services in the 1949 national budget" (Ministry of Commerce 1949, p. 137).

Unpaid domestic services were no longer included in the first complete national accounts publication of Statistics Norway in 1952. As already mentioned, international comparability was an important reason behind this decision. Unpaid domestic services were excluded in the first recommendations by the United

Nations in 1953, and this was continued in all subsequent revisions of the international standard of national accounts. It is argued that these kinds of imputation add to the uncertainty in national accounts aggregates. Also, domestic production is less interesting for macroeconomic analytical purposes, since this production is not marketed, but consumed in the household.

The United Nations later recommended, however, that countries provide calculations of unpaid domestic services as a supplement to ordinary national accounts, i.e. in a so-called satellite account. In 1988, Statistics Norway was called upon by 11 women's organisations in Norway to make such calculations. This challenge was met and the results were published by Statistics Norway in Brathaug (1990) and Dahle (1993). Time use censuses were important sources for the calculations; censuses that were conducted every 10 years or so, with the first one covering 1971/1972. These censuses provide detailed information on time spent on cooking, child care and other activities that form part of the domestic work. Putting a "price" (wage) on hours spent on each of the activities enabled the value of unpaid domestic services to be calculated and broken down by gender. Such calculations made it possible to demonstrate the contribution of women to value added in society, see Aslaksen (2009).

2.4. International cooperation

The first UN document to draw up international guidelines for national accounts was available in 1947: *Measurement of National Income and the Construction of Social Accounts,* which also contained an appendix written by Richard Stone.

The OEEC National Accounts Research Unit, headed by Richard Stone, was established at Cambridge University in England in 1949 in order to support efforts to devise an international standard for national accounts. Odd Aukrust became involved with this project and spent six months in Cambridge in 1949. The following gives us some insight into this work.

"In November, Milton Gilbert appeared from Paris. He was the one who assigned the task for Stone, had led earlier national accounts work in the USA, and was a friend of Stone from cooperation during the war. A "simplified system" was to be adopted, but all the proposals drawn up by Marczewski[2] and myself for this meeting were rejected. Instead, Stone and Gilbert adopted a caricature of a system of national accounts in which financial flows were described in great detail and flows of the real economy were merely summarised. Not exactly what was needed during the post-war reconstruction (Aukrust 1993, p. 19).

The final recommendations were published in 1952 as the OEEC's Standardised System of National Accounts (OEEC 1952), and an almost identical System of National Accounts was adopted by the UN the following year as the international

[2] Marczewski was a French professor working together with Aukrust.

Two persons of utmost importance to the development of national accounts: Odd Aukrust and Richard Stone. Odd Aukrust (1915-2008) set up national accounts in Norway in the first post-war years, and was also a central person in the international arena. Richard Stone (1913-1991) was a leading person internationally for several decades. He was awarded the Nobel prize in economics for "his fundamental contributions to the development of systems of national accounts." This picture is from a conference in the International Association for Research in Income and Wealth (IARIW) in Noordwijkerhout, the Netherlands, held in 1985.

standard (United Nations 1953). The standard was based on the Anglo-American philosophy of national accounts, while the Nordic efforts to influence the outcome had failed. Prior to the finalisation of the UN standard, the Nordic countries had already adopted their own national accounts systems and did not want to change back to the UN system, which was regarded as less useful (Aukrust 1993, p. 19). One major deviation was the definition of investment, with the international standard defining it narrowly to exclude repairs and maintenance, while the Nordic definition (jokingly referred to as "gross-gross") was wide enough to maintain or increase the productive capacity of the capital (Aukrust 1992). Consequently, GDP in Norway was approximately 10 per cent higher than according to the international definition. Statistics Norway therefore had to prepare special tables for international reporting, in which the international standard definitions were respected (see tables 55-64, Statistics Norway 1965a).[3] After the comprehensive main revision in the 1970s, however, Norway adapted to the international recommendations set by 1968 SNA, and also gave up its previous and wider definition of gross capital formation. Additionally, 1968 SNA was more in line with Scandinavian national accounts philosophy than previous standards (Aukrust 1992).

[3] See also OEEC (1953).

In the 1950s and 1960s, national accounts attracted a great deal of attention internationally. National accounts methodology was discussed in various meetings at the UN in Geneva and the OEEC (precursor to the OECD) in Paris in particular, and also at the conferences of IARIW (International Association for Research in Income and Wealth, founded in 1947). Experts with the right experience were sought as advisors to help countries lagging behind with respect to their national accounts systems (Aukrust 1993, p. 20).

International Association for Research in Income and Wealth (IARIW)

Foundation of IARIW

The International Association for Research in Income and Wealth (IARIW) was founded in Washington on 15 September 1947, at a meeting of the International Statistical Institute, where Petter Jakob Bjerve participated. The purpose of this organisation was to bring scientists or researchers in the field of national income and social accounting analysis together. In the early years, membership was based on personal invitation. In the first General IARIW Conference, Odd Aukrust was the only participant from Norway. Here he presented two contributions from the Norwegian national accounts arena: On the Theory of Social Accounting and Recent Experiences in the Use of Social Accounting in Norway.

IARIW's organisation and purpose

The IARIW is led by a Council that is made up of elected members and a chairperson elected by the Council. Chairpersons have been well-known economists and national accounts experts from Western Europe, Canada and in three periods also from Hungary. Odd Aukrust was chairperson from 1963 to 1965, and Liv Hobbelstad Simpson from 2004 to 2006.

The original purposes of the IARIW were listed as follows:

- "definition and measurement of national income and wealth
- social accounting and its use in economic budgeting
- international comparison and aggregation of national income and wealth
- problems of statistical methodology and related matters"

IARIW's conferences

Since 1949, IARIW conferences have been held every two years, with the 50th anniversary held in 1998 in Cambridge where it all started (Carson 1999, p.385). The success of the IARIW conferences is down to their format; a meeting place for different environments from many countries, with adequate time for social contact and where good professional discussions can be freer than at the formal international meetings. In the period 1963-1979, more than 80 per cent of contributions related to national accounts in accordance with the first aforementioned statute "definition and measurement of national income and wealth". Since then, the share of microeconomics issues and income distribution has increased considerably with the use of parallel sessions.

Most IARIW conferences have been held in Western Europe. Two successful conferences have been organised in Norway; the first by Odd Aukrust in Lom in 1965, with 100 participants plus accompanying family members. Odd Aukrust remained active at a series of conferences until his last attendance in Switzerland in 1992. At his last conference, Aukrust presented a historic paper, The Scandinavian Contribution to National Accounting (Aukrust 1992), with a special focus on the period 1930-1955 when modern national accounts were established. After his contribution, Aukrust was given a standing ovation by the audience for his work for IARIW stretching back many years. The second IARIW conference in Norway was held at Lillehammer in 1996, with the National Accounts Unit of Statistics Norway playing a key role in the arrangements. The conference was opened by Petter Jakob Bjerve, who told the participants about the meeting in Washington in 1947 when the plans to found IARIW were made.

The Review of Income and Wealth

The first edition of the periodical Income and Wealth (later renamed The Review of Income and Wealth ("the Review") was published in 1949. Many articles from Norway appeared in the early years, including a contribution from Ragnar Frisch at the 1953 conference in Italy: From National Accounts to Macro-economic Decision Models (Frisch 1955). Here, Frisch described how this work in Norway was organised in three centres: at the Institute of Economics at Oslo University led by Frisch himself, at Statistics Norway under the leadership of director general Petter Jakob Bjerve and Odd Aukrust as head of the Research Department, and the National Budget Office in the Ministry of Finance led by Eivind Erichsen. At the conference in Denmark in 1955, Odd Aukrust presented Trend and Cycles in Norwegian Income Shares (Aukrust 1957). Two years later, Petter Jakob Bjerve and Mikael Selsjord presented a paper called Financial Accounting Within a System of National Accounts", when for the first time a full session on financial accounts was introduced at an IARIW conference, organised by Petter Jakob Bjerve.

Odd Aukrust took over as editor, and Per Sevaldson as assistant editor of the Review of Income and Wealth from 1965 until 1971. Odd Aukrust wrote in 1966: "In future textbooks on the history of economic thought, our time will be remembered as "the early period of quantitative economics, IARIW has played a significant role in this development. Ever since it was founded in 1947, the Association has provided a unique meeting place for producers and consumers of national accounting statistics". Selected papers that had been discussed at the Lom conference in 1965 were published in this edition of "the Review". Important contributions from Norway were An Axiomatic Approach to National Accounting: An Outline by Odd Aukrust (Aukrust 1966), and The Use of Computers in the National Accounts of Norway by Thomas Schiøtz (Schiøtz 1968).

From 1966, "the Review" was issued on a quarterly basis, covering not just papers from IARIW conferences, but also a selection of manuscripts sent directly to the editor and accepted for publishing.

In 2005, all editions of The Review of Income and Wealth from 1949 to 1966 were scanned and published on IARIW's website.

In 1996, Norway hosted a conference in the International Association for Research in Income and Wealth (IARIW), held at Lillehammer. At this conference, the Norwegian traditions of hiking, wearing a rucksack, sitting on a mat, a quick lunch and other outdoor meals were introduced for the traditional excursion day. All 250 conference participants, plus family members, were active participants on this hiking tour. The main route was over the edge of Besseggen, while others opted for an easier route.

Over the years, the Nordic countries have always been in close contact in relation to national accounts matters. In Sweden and Denmark, as in Norway, important pioneering work was carried out in the 1930s. From 1946, annual Nordic meetings were held in this field. According to Aukrust (1992), the Scandinavian countries had a fairly common view of the main controversial issues raised and discussed during the pioneer years of national accounts. Norway and Denmark mainly adopted the same solutions in their systems; in both countries national accounts have detailed commodity flows around a core of input-output methodology.

"From a methodological point of view the most noteworthy contribution by Scandinavian national accountants has probably been their development of the commodity flow method" (Aukrust 1992, p. 37).

2.5. Input-output tables

The first of several international input-output conferences was held in 1950 in the Netherlands. Frisch, Aukrust and Bjerve all participated in this conference, as did Wassily Leontief, the originator of input-output analysis. Important impulses were gained from Leontief in relation to national accounts work in Norway, which helped put input-output analysis on the research agenda in Statistics Norway.

From the very beginning, input-output figures became an integrated and central part of the national accounts in Norway. Thus, input-output tables were not just important for the use of national accounts, but also for compiling national accounts to ensure consistency between the figures. This role in the compilation is still held in Norway, while most countries do not have such a tradition.

In the early publication *National Accounts 1930-1939 and 1946-1951,* we find an input-output table for Norway for the year 1948 with 35 sectors. In *National Accounts 1938 and 1948-1953,* issued in 1954, there is an input-output table for 1950.

"Norway – and Statistics Norway – can undoubtedly be seen as a pioneer with regard to constructing a comprehensive accounting system and regular compilation of annual national accounts estimates. Furthermore, no other country was integrating input-output tables in the national accounts before Norway did so" (Bjerkholt 1992, p. 49).

Input-output analysis in Statistics Norway started in 1952. The work was led by Per Sevaldson, who was closely connected with the national accounting work. The publication *Kryssløpsanalyse av produksjon og innsats i norske næringer (Input-output analysis of Norwegian industries) 1954* (Statistics Norway 1960), which contained almost 500 pages of very detailed descriptions and 123 industry tables, was quite a milestone. Basic assumptions concerning the stability of the input-output coefficients in the various industries were discussed, and examples of uses were presented. The Institute of Economics at the University of Oslo also engaged in such work during the 1950s. In Statistics Norway, input-output analysis

continued with the MODIS (MOdel of DISaggregated type) models (I–V) throughout the 1960s, 1970s and 1980s. The first version, MODIS I, had 129 industries and was constructed from the 1954 input-output figures directly. MODIS I was used for the first time in autumn 1960 for the national budget 1961. Statistics Norway got its first electronic computer; Deuce, in 1958, which was utilized for this purpose.

Other models were also constructed in Statistics Norway (MODAG, MSG and KVARTS). All macroeconomic models in Statistics Norway have had a core of input-output quantified by means of figures from national accounts. Thus, national accounts figures have played an important role for the model-based analytical work carried out during the last 50 years in Statistics Norway and the Ministry of Finance.

"The emphasis on model development work in Statistics Norway also entails a high priority to national accounting work. In many ways, solutions devised for national accounts were reflecting the needs of the modelling work" (Bjerkholt 1992, p. 60).

In 1968, another input-output publication was issued containing figures for 1954, 1959 and 1964 (Statistics Norway 1968). This was mainly an update of the publication from 1960. In the following years, input-output figures were published both for regions and the country as a whole, in terms of national accounts by county published every 3 or 4 years. A more comprehensive publication on input-output tables came later (Mæhle 1992). In the meantime, SNA 1968 recommended distinguishing between supply and use tables on the one hand, and traditional input-output square tables by sectors, so-called Leontief-tables. In Mæhle (1992) and Fløttum (2006), the conversion from the first (rectangular) to the second (square) type of input-output tables is shown. It should be added that input-output figures are available for users on request, despite not always being published.

International Input-Output Association (IIOA)
After the first international conference in 1950, several meetings were held in "The International Conference on Input-Output Techniques". Wassily Leontief, who was dubbed "the sole and unchallenged creator of the input-output technique", was a key participant at these meetings, and Frisch, Bjerve, Aukrust and Sevaldson participated from Norway.

International conferences on "Problems of Compilation of Input-Output Tables", which were organised by the Austrian Statistical Office, were held in Baden, Austria in 1986 and 1988, with participants from many national accounts offices in Europe. It was decided to found the "International Input-Output Association" (IIOA) in order to formalise the international network of economists with an interest in input-output analysis based on national accounts. Contributions were given from Norway at the 1988 conference[4], as well as later conferences, including Beijing 2005, Istanbul 2007 and Sao Paulo 2009. Input-output analysis was also on the agenda at several IARIW conferences.

[4] This conference had two contributions from Norway: Fløttum (1989b) and Simpson (1989).

2.6. Historical national accounts

The national accounts publication from 1952 contained figures dating back to 1930. As early as 1953, a new national accounts publication was issued with series for the period 1900-1929 (Statistics Norway 1953a). These calculations were carried out by Arne Øien and Juul Bjerke, who were students at the time and went on to hold prominent positions (Øien as director general in Statistics Norway from 1980 to 1990 and Bjerke as director of economic statistics in Statistics Norway from 1973 to 1983). The Ministry of Finance had requested this work as a basis for an analysis of the economic and social development in Norway in the period 1900-1950.

National accounts figures for the years 1900-1929 contained estimates for GDP and other main aggregates in both current and constant prices. The same definitions as for later years were used, but fewer details were published. GDP by industry (16 industries) and private consumption by function (34 groups) were published for 1910 only, despite basic calculations also being carried out for the other years in that period. It was emphasised that "only the years around 1910 were sufficiently well covered by statistics" (Statistics Norway 1953a, p. 55). With respect to reliability of the national accounts figures, it was concluded that the figures for years 1900-1929 were weaker than the corresponding figures for the period 1930-1950. In particular, it must be borne in mind that the basic statistics were less comprehensive in earlier years (Statistics Norway 1953a, p. 66). The uncertainty was considered to be particularly high for the estimates of wholesale and retail trade.

Twelve years elapsed before the next comprehensive publication of historical national accounts figures was available (Statistics Norway 1965a). It contained new figures for the period 1865-1899, revised figures for the years 1900-1939, and revised and updated figures for the post-war years 1946-1960. Revisions for the years 1900-1939 were modest, and mainly due to minor definitional changes. New calculations of consumption of fixed capital were carried out, however. For the period 1865-1899, figures were published for GDP by main group of demand in current prices and in constant 1910-prices only, and for real capital. "For its time the publication brought Norway to the top of international historical national accounting" (Grytten 2004, p. 243).

An analysis of long trends in the Norwegian economy 1865-1960, written by Juul Bjerke, contained somewhat more details with respect to the pre-1900 period (Statistics Norway 1966b). Figures for gross fixed capital formation by type, compositions of exports and imports, and income and outlay of central government and local government sectors were published. In this publication, national accounts figures were used to describe main trends in the development of the Norwegian economy since the mid-1800s. For analytical purposes, summary calculations of GDP by main industry were prepared for some of the years before 1900. The analysis was part of an international study of economic growth, organised by the International Association for Research in Income and Wealth (IARIW).

The publication also contained an assessment of margins of error in the historic national accounts calculations. Margins of error for GDP of maximum plus/minus 3 per cent for the years after 1930, plus/minus 7-8 per cent around the turn of the century, and plus/minus 20 per cent for 1865 were suggested. For the years before 1930, it was emphasised that a particularly high degree of uncertainty surrounded the services industries. For goods-producing industries, the calculations were mainly based on production statistics for some benchmark years, and interpolation made for the years between.

The work on long trends in national accounts and the economic-historical analyses in Statistics Norway all took place within the Research Department. Odd Aukrust, as head of the department, was active in both these areas. He worked, inter alia, on analyses of factors that determined growth in the Norwegian economy, based on historic national accounts figures (Aukrust and Bjerke 1958). He was also the editor of the review publication *Norges økonomi etter krigen (The Norwegian post-war economy),* issued in 1965, in which the national accounts were the most important data source (Statistics Norway 1965b). Some of his articles on economic growth are reprinted in Aukrust (1990).

The long time series in national accounts have given economic–historical research in Norway a better quantitative foundation. The figures have been used in many connections outside Statistics Norway. Professors Fritz Hodne and Ola H. Grytten at the Norwegian School of Economics and Business Administration in Bergen have been among the most active users. In addition, they have provided supplements to the figures from Statistics Norway by carrying out their own calculations for the period 1830-1865, based on work by Anton Martin Schweigaard and M. Braun Tvethe, see Grytten (2004). Participation in a Nordic project with the aim of supporting and harmonizing work on historical national accounts figures in Nordic countries is also worth a mention. This included several Nordic workshops with participation from universities, colleges and the national statistical institutes. Several doctoral thesis have also been undertaken in this area (in the subjects exports, government services and manufacturing).

Backward revisions have been undertaken in connection with main revisions of national accounts. In the revision in the early 1970s, estimates were revised dating back to 1949, and in the late revisions conducted after 1990, estimates were revised dating back to 1970. Relatively long and consistent time series have been given a priority in order to satisfy data needs for econometric and macroeconomic analyses (Brathaug and Fløttum 2004). Due to a lack of resources and relevant data, there were several "gaps" compared with the original time series dating back to 1865. In Hansen and Skoglund (2008, 2009), however, new estimates for employment and wages dating back to 1900, and including the war period 1940-1945, were calculated. These figures are compatible with the current estimates. Skoglund (2009) contains backward calculations of GDP by industry and by demand dating back to 1946.

2.7. Balance of payments – one part of national accounts

Statistical data on relations with the rest of the world have a long tradition in Norway. Foreign trade statistics (on goods through customs) are available from 1835, and these were published on an annual basis from 1850. Initially, only quantity figures were published (every three years), but as from 1866 value figures were also published, the latter being improved from 1922 when detailed value declarations became available for exports of goods, and likewise for imports of goods from 1932. Full values of repairs and processing abroad were registered from 1948. Svalbard was considered abroad until 1951. Since 1835, some official statistics on ocean transport have been available, and on gross freight earnings particularly from 1875. Figures on operating expenditure in ocean transport, however, were not published until 1974. In 1919, the first census was conducted on the nation's claims on and debts to the rest of the world. This census was conducted annually from 1924. Full balance of payments then became available from 1925 (Statistics Norway 1926, p. 488).

In 1945, Statistics Norway formed an agreement with Norges Bank on the utilisation of the foreign exchange data being collected by the bank as part of the foreign exchange regulation instituted after the war. These control data then became Norges Bank's foreign exchange statistics; one of the important sources for the balance of payments statistics that were published on a quarterly basis in Statistics Norway. Norges Bank published its foreign exchange statistics until the mid-1960s.

In *National accounts 1930-1939 and 1946-1951,* one table on the Current Foreign Account of Norway was included (Statistics Norway 1952, p. 48), which subsequently became a regular feature. Later, such figures were calculated, although on a relatively summarised basis, all the way back to 1865 (Statistics Norway 1969 p. 108-109).

Balance of payments was compiled in the National Accounts Unit from the outset, reflecting the view that balance of payments is an integral part of national accounts. "Rest of the world" was regarded as a "sector", recording flows and stocks seen as a mirror of the corresponding balance of payments, i.e. the balance surplus of the former to equal the balance deficit of the latter. Users in Norway, therefore, have been spoiled, since the transaction figures in the balance of payments and national accounts are in fact the same. In other countries, however, it was standard practice to have some considerable difference between balance of payments figures issued by the central bank and corresponding national accounts figures issued by the national statistical institute. Integration with national accounts also provided clear large-scale advantages in compiling estimates in areas like exports of goods and services, earnings and expenditure of ocean transport, and income and expenditure in the institutional sector accounts (external balance of primary incomes and current transfers).

2.8. Financial national accounts work

As already mentioned, Norwegian national accounts concentrated on the nation's real economy. This focus can be understood based on several conditions. First, Professor Ragnar Frisch in his theoretical work on national accounts concepts made a strong division between the real economy and the financial economy in constructing a complete system of the economy. The real economy is about physical goods and services; things that can be defined whether or not ownership of these has been determined, while the financial economy is about assets and liabilities between physical and juridical persons. This strong division postulated by Frisch had a great impact on his pupils, among them Petter Jakob Bjerve and Odd Aukrust.

Second, the practical work on constructing national accounts started when the data situation in Norway favoured the real economy part of the accounts. Relatively good production statistics existed in part, while income statistics were less developed. Third, Norwegian national accounts were developed during a time of post-war reconstruction; a situation that called for scarce goods and services to be distributed to various good causes. This did not mean that the financial economy was without importance, on the contrary the aim of national accounts was to describe both "spheres" and not least the relationship between the two. Odd Aukrust's thesis on national accounts clearly notes: "The objects that are of interest to us are two-fold, i.e. real objects (goods and services) and financial objects (assets of all kinds, including money)" (Aukrust 1955, p.20). In the post-war years, nevertheless, the real economy accounts were given the highest priority of the two parts of national accounts.

Work on developing financial national accounts still took place in the 1950s, partly because there was an increased need for such statistics due to the authorities' more active monetary and credit policy, and partly from a more general need for complete national accounts to also throw light on the financial side of the economy. Commissioned by the Ministry of Finance, in 1952 Frisch devised a financial accounting system aimed at analysing the liquidity and lending development. When attempting to quantify this system, however, weaknesses in the credit market statistics were revealed in terms of dissimilar definitions of assets and liabilities (Bjerve 1996, p. 11). Statistics Norway, therefore, initiated work on standardising these definitions, giving Mikael Selsjord a central role in this. The first results were presented in *Credit Market Statistics 1955* (Statistics Norway 1957), in financial tables by sector or "financial matrices", showing both the creditor and debitor sector for each financial object. As from the mid-1950s, these were published annually. The tables showed closing stocks at the end of each year, and thus also the total change in the stocks from the end of one year to the end of the next. No explanation was given of what these changes in stocks meant, i.e. decomposition into number of transactions made, or price variations for the financial objects in the period were not attempted.

At the 5th conference of IARIW in 1957, Selsjord and Bjerve presented a pioneering work entitled *Financial Accounting within a System of National Accounts;* a paper later published by Bjerve and Selsjord (1959), the purpose of which was to construct an accounting system on monetary and credit relations integrated in national accounts. The paper proposed an accounting structure, uniform definitions, full description of balance sheets and decomposition of balance sheet changes in transactions and revaluations, and discussed classifications of sectors and objects, principles of valuation and problems of reconciliation. Their sector classification was later implemented and remained for many years, in which "other domestic sectors" were split into sub-sectors of central government enterprises, local government enterprises and other Norwegian sectors, and the latter further split into private non-financial enterprises, households and non-profit institutions serving households.

Following the theoretical and practical work performed in the 1950s, several initiatives were taken in the decades to come aimed at complete national accounts containing tables of financial and non-financial transactions and corresponding stocks. Despite the relatively good circumstances with regard to data availability, professional comprehension and theoretical solutions, it took another 50 years until Statistics Norway was able to publish tables of "complete" national accounts on a current basis! Why was it so difficult? In part, there were organisational reasons; national accounts and credit market statistics were located in two different units and two different departments in Statistics Norway. The two had divergent views on matters of classification and treatment of various principles, and this hampered cooperation between the two units for years.

2.9. Quarterly accounts – first efforts

Statistics Norway approached the Ministry of Finance in 1947 for additional resources to establish quarterly national accounts. Due to the ongoing pioneering work aimed at annual national accounts in those years, quarterly figures were first published in autumn 1953 covering the period from the first quarter of 1951 to the second quarter of 1953. Only main aggregates were published, and not value added figures by industry, taking the view that the information provided by production indices for manufacturing and output information for other industries was sufficient (Statistics Norway 1953b, p. 280). The basis of compilation for local government consumption and changes in stocks was seen as particularly weak. No seasonal adjustment was suggested at that time.

Quarterly national accounts figures were published in Statistical Bulletin until 1956, when they were discontinued in order to prioritise other tasks. Thus, in the second half of the 1950s, quarterly national accounts were not available as a basis of information for the business cycle reports that were written in the Research Department of Statistics Norway. However, this situation very much changed for the better in later years, and is described in chapter 5.1 on the 1980s.

2.10. Real capital estimation

Immediately following World War II, Statistics Norway published an estimate of real capital for 1939 and the corresponding reduction that occurred during the war (Statistics Norway 1946). The aim was to calculate losses brought about by the war. The total capital reduction was calculated at 18 per cent from summer 1939 to summer 1945. More detailed figures on real capital were presented in Aukrust and Bjerke (1958) as part of a research project on economic growth. Calculations were based on the use of the retrospective method. Annual figures in constant prices of four groups of real capital were presented for the period 1900-1955, excluding the war years 1940-1945. Detailed stock estimates were provided for four base years: 1899, 1920, 1939 and 1953. For some types of capital, direct volume information could be utilised, while for other types, fire insurance or book values were used. The figures were reconciled with annual gross investment figures from the supply side in the national accounts. By using assumptions on capital consumption shares, figures on consumption of fixed capital and capital stocks by end of year were calculated for all years during the period, thus ensuring consistent treatment of gross fixed capital formation, consumption of fixed capital and stocks of real capital.

1960s:

3. Introducing EDP and new international guidelines

For the national accounts, the 1960s were characterised by adaptations to new technical innovations. Statistics Norway was quick to utilise the new electronic computers, which enabled the national accounts staff to improve the efficiency and quality assurance of the calculation routines. Use of figures from national accounts increased in that period, inter alia for price and wage analyses. In the late 1960s, a great deal of focus was given to the new international standard of national accounts; 1968 SNA, which was to have a major impact on the development of national accounts in Norway.

3.1. EDP revolution

The calculation routines used in the first work on national accounts in 1952 were performed manually, and figures were presented in hand-written worksheets.

"Technically speaking, separate sheets referring to each of the accounts were used with the years appearing in the columns (colloquially referred to as "the main ledger"). Here, series of figures were recorded as they were verified, whilst checking for conformity between corresponding debit and credit entries" (Aukrust 1955, p. 70). The final harmonization was personally undertaken by the unit head.

In the mid-1950s, punch card machines were introduced in the calculations. When Statistics Norway got its first electronic computer; Deuce (Digital Electronic Universal Computing Engine), in 1958, this paved the way for further mechanical possibilities in the calculations. Thus, Statistics Norway as a producer of statistics was quick to introduce electronic computers, and Norway was probably the first country in the world to make use of EDP in national accounts (Statistics Norway 1976, p. 101) around 1960.

The introduction of EDP led to many advantages in the compilation of national accounts compared to the old regime of manual calculations (Fløttum 1980, p. 259):

- Potential for calculation errors was reduced
- Processing of data was more systematic and a better overview was achieved
- More extensive controls were possible using machine controls
- Large amounts of data could be processed much quicker
- Complicated calculations such as matrices were simplified considerably
- Primary statistics could be reclassified easily using computer-generated reclassification lists
- Electronic storage of figures enabled tables to be produced mechanically

Deuce – First computer in Statistics Norway
"The machine had already created a stir before being installed. A big hole in the wall was needed to make way for the machine, which was too big for the lift and the window. Its size, however, was a positive thing for the technician when walking around it looking for faults. He carefully knocked on the electronic components with a rubber hammer to see if the regular sinus curve of the gauge had been disturbed. If it had, he was close to identifying the fault" (Aurbakken 1999, p.19).

"I believe that the reliability of our national accounts figures is considerably higher now than before we introduced the punch card. Letting the computers do the routine work following fixed instructions also reduces the effects of changed human judgements and the effects of change in staff" (Schiøtz 1968, p. 17).

Later in the 1960s, Deuce was replaced by computers with a much higher capacity and better operational reliability (IBM 1401, IBM 360/40). In 1973, cooperation was initiated with a new state institution to use their computer; Honeywell-Bull 6060, which was subsequently installed at the premises of Statistics Norway.

Most machine-processed data in the national accounts in the 1960s was stored on punch cards. This applied to central data sources such as manufacturing statistics, with 3 000 punch cards, and foreign trade statistics, with almost double that. However, much of the data punching was carry out by the National Accounts Unit, in addition to reclassifications (in so-called master cards) to match the codes used in national accounts. The capacity of the most modern machine at that time was 64 000 punch cards per hour. When all data had been punched in, the computer calculated the difference between supply and use for each commodity group in an iterative process that eventually became the estimate of changes in inventories. All changes had to be punched in. "Commodity balancing" is still a central element in today's national accounts, while the calculation process is simpler nowadays and much quicker. What took several hours in the 1960s only needs seconds with today's IT technology.

The next steps in data processing; the distribution of commodities by supply and use categories and the deflation and calculation of sector flows, were processed by machine, as was the calculation of trade margin rates (Schiøtz 1968).

Final estimates were also on punch cards in the early years, and these contained information on supply and use sectors, types of commodity, use categories, and values in current and constant producers' prices and current and constant purchasers' prices. The machine processing system enabled the preparation of printing tables - including indices, growth rates and percentage distributions – to be automated to a large degree. Prior to this, all tables to be printed had to be prepared on paper, then typed up on an ordinary typewriter, and finally proofread.

In the late 1960s, most calculation routines in national accounts switched from punch cards to magnetic tapes. This meant no more resource-demanding manual sorting of punch cards, and major new gains in efficiency.

Programming cooperation
"The working method mainly consisted of the head of the National Accounts Unit coming to my office, cigarette in hand, to discuss the details of a computer program being worked on, or which functions to incorporate in a new program to be devised, sometimes supplemented with illustrative figures on a piece of paper. I tried my best to memorize what was being said, and then created a program as I understood it. Sometimes it was perfect, but most of the time adjustments or amendments had to be made. This working method obviously entailed a great deal of trial and error, and progress controls were approximate or lacking, and time was sometimes a factor" (Knut Kvisla, programmer).

3.2. Separate data collection

The quality of data to be used in national accounts varied considerably in the 1960s. Separate data collection was therefore proposed as a solution to this. During his time as head of the National Accounts Unit from 1955-1966, Thomas Schiøtz initiated separate data collection (accounting statements) from the six largest central government enterprises, including personal visits (and "was unusually well received everywhere"). Results from this kind of survey demonstrated that errors occurred in the regular data collection of manufacturing statistics and accounting statistics. Thus, separate collection and proposals for changes in the forms etc. led to an improvement in the quality of statistics.

Statistics from airlines was another area in which separate data collection was applied at that time. The national accounts units in Norway, Sweden and Denmark collected accounting data from SAS and uniform treatment was agreed in special meetings. In principle, the uniform treatment agreed at that time has been kept, with amendments made when special circumstances so dictate. The smaller airlines were also covered through separate data collection by the National Accounts Unit for several years, until becoming part of the transportation statistics.

3.3. Detailed commodities in national accounts

In the 1960s, the structure of national accounts was more complicated and data-demanding than the 1968 SNA structure that was later introduced. Commodity balancing applied to 1 700 goods and services for which both supply sectors (domestic producers and importers in separate sections) and user sectors had to be determined. Before routines were automated, these commodity distributions were carried out using coloured pencils (red, green and blue, e.g. red for small and one-person establishments). The IARIW paper by Thomas Schiøtz entitled *The Use of Computers in the National Accounts of Norway* from 1965 attracted international attention, and led to a number of study visits to Statistics Norway (from Denmark, Israel and Egypt almost simultaneously in the late 1960s). Below is shown an illustration from this paper, the balancing of a single commodity.

TABLE I

COMMODITY No. 1

Supplying sector \ Using sector and category	Intermediate input: Sector No. 1	...	Sector No. X	...	Sector No. 130	Exports	Private consumption: Sector No. 1	...	Sector No. 125	....	Increase in Inventories	Total
	V_1 V_2		V_1 V_2		V_1 V_2	V_1 V_2	V_1 V_2		V_1 V_2		V_1 V_2	V_1 V_2
Domestic sector No. 12												X
" " No. 14												X
" " No. 17												X
" " No. 20												X
Import sector No. 17												X
Customs duties												X
Total	X X		X X		X X	X X	X X		X X		X X	X X

V_1 = producers' value.
V_2 = purchasers' value.
X = known figures.

As indicated in the figure, a detailed balancing of each commodity took place based on information from both suppliers (sectors, imports) and users (sectors, consumption, exports etc.).

3.4. Constant-price estimates

Constant-price estimations were part of the routines performed manually in national accounts at the beginning of the 1950s, and 8 of the 42 tables in Statistics Norway (1952) presented constant-price estimates. The changeover to machine calculation routines was immensely beneficial for the constant-price estimations, as these were held at the same level of detail as the current-price estimations and therefore needed a large volume of price data. For each commodity group, price indices for output, imports and exports were provided, and constant-price estimates were prepared in both producers' prices and purchasers' prices.

For some items, the constant-price development was calculated from quantity indicators. For services like health, education and public administration, output development was represented by employment figures. The double deflation method was used, as in later international recommendations, i.e. value added in constant prices derived at from subtracting intermediate consumption in constant prices from output in constant prices. Aggregated items from details were based on the use of Laspeyres quantity indices and Paasche price indices.

The choice of base year was important, as relative prices of the base year were a matter of vital importance in these estimations. In the 1952 publication, 1938 was chosen as the base year, but 1948 was also used since prices had altered so much during the war. The results were quite different, for instance private consumption increased in volume by 22 per cent from 1938 to 1948 using 1938 as the base year, while the corresponding figure using 1948 as the base year was 16 per cent (Statistics Norway 1952, p. 69).

For the post-war estimations, 1955 was chosen as the base year because this was a year that was economically stable with small price variations. 1961 became the next base year, and remained so until main revision estimates were published in 1973 using 1970 as a base year. When the United Nations recommended that countries

change the base year every 10 or preferably 5 years, this was loyally followed in Norway until annual changes of the base year were introduced in 1989 (see below).

In *National Accounts 1865-1960,* constant-price estimates were presented for three sub-periods because major changes had taken place with respect to assortments and relative prices in that period. Constant-price estimates for the period 1865-1929 were in 1910 prices, the period 1930-1939 was in 1938 prices, and the period 1946-1960 used 1955 prices. Chained volume and price indices with 1961 equal to 100 were also published, making 1961 a year of overlap between the historic constant-price series and the new constant-price estimations for the 1960s. For the years 1865-1939, the constant-price estimations were more summarily than for the post-war years.

For the purpose of historical analyses, for which the growth of GDP and other macroeconomic aggregates are primarily focussed upon and over a long period, constant-price estimates are normally more suitable than current-price estimates. National accounts estimates in constant prices are inter alia utilised in Aukrust and Bjerke (1958), in Statistics Norway (1966b) and in Grytten (2004). The latter analysis covers a period of 173 years with constant-price estimates for the main aggregates of national accounts, prepared in 2000 prices.

3.5. Quarterly accounts using EDP

As already mentioned, the first quarterly national accounts were developed in the early 1950s. Work was resumed in 1959 based on new methodology and machine-based routines, after a two-year hiatus. In the new system, sector groupings were the same as in the annual accounts, but without commodity specifications. A maximum of six quarters could be handled simultaneously by the computer at that time.

Complete harmonized input-output accounts in both current and constant prices were compiled. On the supply side, estimates in producers' prices were first prepared and then distributed on items of user categories. Then, constant-price estimates in purchasers' prices and current-price estimates in producers' and purchasers' prices were estimated. Trade margin rates as percentages of purchaser's value remained unchanged from the base year. The compilation approach was based on the use of volume and price indicators relative to the base year, which was the same as in the annual accounts and changed every five years.

For all industries, volume indicators were prepared based on producer indices, various quantity measures, or employment figures. Foreign trade statistics provided information on values and price indices, mechanically recalculated from commodity groups to import sectors (defined as domestic main delivery sector of commodities). Final demand categories got their volume indices, including 125 categories for private consumption! All input data was punched and matched with punch cards from the last final annual accounts. As in the annual accounts, the residual of changes in inventories played an important role in the internal consistency control.

Automation of the routines of compilation meant faster compilations.

"From the moment the indexes, etc., are punched the whole routine takes less than one day. After 1-2 weeks checking the adjusted flows are punched on cards. Then the adjustment routine takes two hours" (Schiøtz 1968, p. 24).

The figures were published 7-8 weeks after end of quarter. From 1966, seasonally-adjusted figures were also published.

Quarterly national accounts estimates were prepared using the same methodology until 1969. For the years 1970-1971, a simpler approach was used (Bjørnland 1974). Quarterly national accounts were then discontinued in order to give priority to main revisions of annual national accounts.

The data basis for quarterly accounts and provisional annual accounts in national accounts became weaker going into the 1970s, when the quality of the retail sales index became poorer. This was due to a switchover from retail sales tax to value added tax from 1970. Monthly employment statistics were then discontinued when health (sickness) insurance was incorporated into the National Insurance in 1971. These two changes of administration systems were later described as "catastrophic" for short-term statistics in Statistics Norway (Statistics Norway 1976, p. 95). For national accounts, estimates on private consumption and employment (or based on employment statistics) became weaker than before for a period. A new retail sales index and new labour force statistics were later established.

Quarterly national accounts were reformed and given a new methodology when they resumed in 1985 (see chapter 5.1).

3.6. Wage Settlements Calculation Committee

Price information contained in national accounts estimates was eventually used in various studies. Especially important was the work related to The Norwegian Technical Calculation Committee for Wage Settlements established in 1967. The chairman until 1985 was Odd Aukrust, which gave rise to the committee being referred to simply as "the Aukrust committee". Later, this committee was chaired by directors from Statistics Norway, normally the director general. Early work by Aukrust and two other economists (Professors Fritz C. Holte and Gerhard Stoltz) resulted in the price and income model PRIM, later incorporated into MODIS, and the so-called main course theory. A central element of this theory is that wage development in Norway is mainly determined by price development, productivity development and earning conditions in the competition-exposed industries. This was based on an analysis of national accounts estimates on prices and wages in competition-exposed and sheltered industries, a work already started in the 1950s (and described in Aukrust 1987).

The Norwegian Technical Calculation Committee for Wage Settlements provides summaries and analyses of the development of prices, incomes and wages in Norway prior to the income settlements each spring. National accounts estimates for the preceding year, and other past years, constitute the central data basis. The income policy cooperation between employers and employees in Norway is thus founded on confidence in national accounts data.

3.7. 1968 SNA – "blue book"

In the mid-1960s, revision work started on the latest version of the international standard of national accounts (SNA) from the United Nations. While the 1953 version of SNA had been influenced to a large extent by early Anglo-American experiences in national accounts, the 1968 version of SNA had a much wider basis in that respect. The preface says: "It reflects the practice, experience and views of the statistical authorities of countries which vary in economic and social systems and differ in stage of economic and social development."

Important preparatory work was carried out by the OECD and EU at that time. Thomas Schiøtz was involved in this work at the OECD from 1964-1965 whilst on leave from his post as head of national accounts in Norway. Odd Aukrust participated in a UN expert group in preparation of this new standard; not an easy task, and the discussion was particularly intense at the United Nations Economic Commission for Europe (UNECE), lasting in several instances up to two weeks. The main authors of the final publication were Richard Stone and Abraham Aidenof (director of National Accounts branch at the United Nations). In 1968 SNA, flows and stocks of both non-financial and financial objects were closely connected to become a very comprehensive integrated accounting system. The new production accounts paved the way for input-output analysis, and a separate chapter was devoted to this: "The system as a basis for input-output analyses" (United Nations 1968, chapter III). This reflected the keen interest in input-output analysis in many countries.

At the same time, and coordinated with 1968 SNA, the revised version of the United Nation's international standard of industrial classification was launched. The Norwegian version of this international standard was published in 1972 and also formed a basis for national accounts work in the 1970s. Statistics Norway decided to adopt the 1968 SNA guidelines and to closely adapt the Norwegian national accounts to these. Earlier experience had shown that separate national definitions caused inconvenience and extra work, but the stronger influence from our own viewpoints in the 1968 SNA also made this easier to follow.

This table illustrates the full integrated system of national accounts. The square form was inspired by earlier Social Accounting Matrix (SAM) presentations. Each account of the integrated system of national accounts is represented by a row and a column that are balanced. The core of this square table covers the accounts of the real

Table 1.6. A primary disaggregation of the national accounts, including balance sheets

			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Opening assets	1	Financial claims										1,249		165				
	2	Net tangible assets										661						
Production	3	Commodities				245	166		6	41			50					
	4	Activities			443		44											
Consumption	5	Consumer goods/purposes						210					2					
	6	Income and outlay			14	241						−19	13					
Accumulation	7	Increase in stocks										6						
	8	Fixed capital formation										41						
	9	Financial claims										58		18				
	10	Capital finance	1,217	693				27			59				−23	44	1,253	764
The rest of the world	11	Current transactions			51	1	2	12										
	12	Capital transactions	197	−32							17		1		0	−2	214	−33
Revaluations	13	Financial claims										−21		−2				
	14	Net tangible assets										42						
Closing assets	15	Financial claims										1,286		181				
	16	Net tangible assets										731						

Note: In the columns: opening and closing assets are balanced by opening and closing liabilities; and, net tangible assets are balanced by net worth.

Table that illustrates central relations in the UN standard of national accounts (1968 SNA). Source: United Nations (1968), p. 9.

economy, whilst also providing a clear illustration of the relation to the institutional sector accounts.

The table has served as a basis for the project set out by the National Accounts Unit to prepare the new structure and the new accounting system of national accounts. Most important was the change from sector-commodity-sector balancing to the more simplified approach enabled by the format of supply and use tables. In terms of the 1968 terminology, this means:

- Supply tables: Industries x commodities, and Imports x commodities
- Use tables: Commodities x Intermediate consumption, Consumption, Gross fixed capital formation, Changes in inventories, and Exports

National accounts work in the 1960s
"The National Accounts Unit was a pleasant place to work for young economists. Sometimes the staff had their sandwiches together with the head of division - Schiøtz - at his office, accompanied by professional or technical discussions. In a way, national accounts became the link between primary statistics and model-based analysis. The National Accounts Unit developed well-established procedures to fit primary statistics into the system of national accounts. This applied to both final and provisional national accounts, for instance the use of national accounts for the annual economic survey at the turn of the year." (Dag Bjørnland, economist at the National Accounts Unit in the 1960s).

"Very few economists graduated in the late 1950s and early 1960s. Statistics Norway therefore decided to train non-academic staff to perform part of the work previously carried out by young economists. Training was institutionalised at "the Bureau school" in Statistics Norway, founded in 1959. At that time, about half of the staff in the National Accounts Unit were non-academic, all were women, and most of them completed the course at "the Bureau school". The course lasted for one year, two hours per day, and the subjects consisted of economics, theoretical and applied statistics, industrial economics and administration. Lecturers were senior economists at Statistics Norway, including from the Research Department. Grades were given in all subjects. It was embarrassing not to receive proper grades, so cramming was essential.

At the start of their career, non-academic staff was obliged to attend training at "Regnestua" (Office of calculating). We had to use the "touch" method on the calculating machines. We were trained to use our left hand (the right hand had to be ready for writing down the results), and the keyboard was covered with a screen. We could not leave until we achieved a reasonably good speed, preferably without making errors. Most of the calculations were done using these calculating machines. By assisting the economists we gained an insight into many work tasks, we executed calculations faster, especially for percentages, and we had a more advanced technique than the economists.

In the 1960s, both provisional annual national accounts and quarterly national accounts were made. The format was sector by sector, calculated from the latest annual final accounts. Inputs were punch cards; volume and price indices, exports and imports from external trade statistics and balance of payments. The calculation results were also stored on punch cards in the early years, later to be replaced with magnetic tapes. Results were available in so-called ledgers; one sorted by sector of supplier, another by sector of receiver. Manual work was needed at the end to control the mechanical balancing. In order to analyse or complete the accounts, analytical tables were prepared for the final evaluation and approval of the figures by the persons responsible in the National Accounts Unit and the Research Department before publishing. Changes were made after each evaluation, and often right before figures were to be released. All changes were corrected manually by using punch cards, fed into the mechanical systems for new balancing to be made. Numerous checks were made on inputs, especially manufacturing statistics, where the best possible commodity details were available. Master cards linked 8-digit codes for commodities in manufacturing statistics to 4-digit commodity codes in national accounts, and likewise between national accounts and exports and imports of commodities in external trade statistics. These master cards were updated every year from information made available by the units responsible, and new lists were then drawn up from this stage.

Part of the work involved providing responses to enquiries from the public. This could be by post, although most often was by telephone. In addition, there were a number of personal visits to Statistics Norway. On several occasions, people were not fully aware of the kind of information they were looking for, but we did our best to provide something they could use. GDP growth often served the purpose." (Randi Hallen, Ragnhild Lied Johansen, Karin Snesrud and Aud Storholt, assistants and clerks at the National Accounts Unit in the 1960s).

1970s:

4. Main revision and institutional sector accounts work

Work in Statistics Norway to adopt the 1968 SNA guidelines in the national accounts of Norway started in 1969. The new UN guidelines were followed in every detail on all essential points. New data sources and new estimation methods were introduced in this comprehensive main revision, also including the constant-price estimations. The main revision was a major undertaking for Statistics Norway, and required extensive resources and efforts in the National Accounts Unit in the 1970s. Also at that time, the preparation of regional accounts was put on the agenda to meet needs from regional economic research and planning. Furthermore, work on institutional sector accounts had a new start.

4.1. "Fatal mistakes in national accounts"

This was the heading of an article in The Norwegian Journal of Commerce and Shipping on 6 December 1971, written by Johan Seland, director of the Norwegian Shipowners' Association. His main concern was related to the operating surplus in national accounts. That the calculation of the operating surplus as a residual had created a problem of accumulated errors had been known in Statistics Norway for some time. As early as the mid-1960s, published income statistics indicated that operating surplus estimates in national accounts were considerably overestimated. That such differences existed drew attention to improvements in the quality of the accounting statistics, both by having a better valuation basis for comparisons and by serving as a basis for developing institutional sector accounts in Statistics Norway. In 1969, results became available on accounting statistics and income statistics for the year 1967.

The said newspaper article began: "This is not just a big statistical error; it is dangerous for a society if politicians and employees are misled to believe that the establishments have great amounts of income to distribute, when most of this income does not actually exist".

Odd Aukrust confirmed in an interview with Aftenposten (newspaper with the largest circulation in Norway at the time) that the uncertainties in operating surplus figures were well known and had to be corrected in the forthcoming main revision. Another interview, with Erik Homb (then head of National Accounts Unit) in the newspaper Dagbladet, led to the heading "Confirms errors in national accounts".

Revised figures published for manufacturing in 1973 were much lower than before (about 50 per cent below). Later, in 1978, the Norwegian term for operating surplus ("eierinntekt", literally "owners' income") was replaced by a term aimed at reducing incorrect associations ("driftsresultat").

4.2. Preparing for potential EC membership

In 1972, the candidate countries Denmark, Ireland, Norway and the United Kingdom signed the Accession Treaty for membership in the European Communities. In the same year, these countries were informed in a meeting about the "European System of Integrated Economic Accounts" (ESA 1970). The text of ESA 1970 was made available, without tables however. Financial statistics would be the greatest challenge for the countries to meet the ESA system requirements.

When Norway's proposal for membership to the EC was rejected in 1972, another 20 years elapsed until it was necessary again for national accounts staff to study ESA. Nevertheless, back in 1972 and 1973, Liv Bjørnland was on a study tour to the Central Statistical Office in London and the Central Bureau of Statistics in Haag, having meetings with Reginald E. Beales, responsible for the national accounts in UK, and Director C. A. Oomens in Haag. Information on using tax data in national accounts, and a note on making plans for economic statistics, provided useful experience and input to the main revision underway in Norway and a possible adaptation to ESA.

4.3. Revised constant-price estimates

Calculations of constant-price estimates have a long tradition in Norwegian national accounts. While being more uncertain than corresponding current-price estimates, the estimates in constant prices did in fact serve many purposes. An initiative was therefore taken to improve the routines for these calculations, and for the estimates to be implemented with the ongoing main revision.

In connection with the main revision work, Svein Brenna, who was a research officer in Statistics Norway, adapted price indices in foreign trade statistics for use in national accounts (Brenna 1973). He developed a method for the selection of price-homogeneous goods, and utilised the basic material in foreign trade statistics at a detailed level (7-digit level in tariff schedule). Goods for exports and goods from imports were deflated (to base year prices) using official exports and imports price indices (unit value prices).

Mainly, the following methodology was applied to output: manufactured goods to be deflated by wholesale price indices or elsewhere unit prices for goods. For consumer services, consumer price indices were used. For transportation of goods, output in the base year was extrapolated using the development in ton-kilometres and for some other services using the development in employment from the base year. For each of the government sectors, input-price indices were calculated, weighted by price indices for intermediate consumption, consumption of fixed capital and special wage indices. These wage indices were Laspeyre indices, and showed changes in wage rates of the various classes of wages in government wage scales using wage classes in the base year as weights. The latter included some embodied labour productivity in government. Another improvement introduced with this main revision was a more detailed treatment of value components,

defining basic value (basic price) as a residual in that respect. A problem given much attention was related to shift effects caused by price discrimination for identical or homogeneous goods, a problem discussed in a Norwegian paper at an international conference in Geneva in 1973 and at the IARIW conference in Finland two years later (paper entitled *Analysis of the structure of production and national accounts in constant prices in Norway*[5]*)*. The Norwegian approach to this problem – unchanged in the main revision - had no effect on output in constant prices, against what later was recommended in the UN manual from 1979, paving the way for volume increase (shift effect) from splitting flows by introducing different goods for the particular markets (United Nations 1979).

Analysis and revision of private consumption
In 1971/72, Petra Vestbye (former head of price statistics and household consumption surveys in Statistics Norway) analysed private consumption groups in the national accounts and made comparisons to the household surveys and price data, suggesting changes here and there in private consumption flows in the national accounts. Such studies helped improve the quality of the data on the Norwegian economy. External expertise for these kinds of studies has not been used much over the years.

4.4. Results of main revision 1973

The last NOS publication according to the old system was issued by Statistics Norway in 1972 and contained figures for the years 1954-1970. The first results from the main revision were then published in March 1973 in a short article (five pages) in *Weekly Bulletin no.10/73* and in *Economic survey for 1972*, which was delayed that year for this reason. The latter contained revised figures for the years 1968-1972 in this first edition.

The most important change related to the definition of investment. All Nordic countries had the "gross gross" treatment in the former system, while the new system eliminated maintenance and ordinary repairs in order to adhere to the current international definition of gross fixed capital formation. This meant approximately a 30 per cent lower investment value compared to before. Consumption of fixed capital was also given a considerable downwards adjustment.

Private consumption was reduced by some 4 per cent. This was partly due to the new treatment of imputed bank service charges (now an item for deduction of GDP, while previously being part of private consumption). In 2006, another new treatment of this item was implemented, where part of the output was allocated to private consumption. Before the 1973 main revision, all output of these services had been recorded there. Upward adjustment from the new treatment of imputed dwelling services and from the introduction of new statistics on household surveys also took place. A new classification of private consumption was also introduced.

[5] See also Bjørnland (1975a).

Main aggregates of government consumption, exports and imports were only slightly affected. In total, the revised GDP was around 11 per cent lower than previously published, and most of this reduction was caused by definitional changes. Total factor income was down by approximately 5 per cent, compensation of employees revised upwards by 3 per cent, and operating surplus was down 22 per cent. The final year of 1969 is the year of comparison here.

Other important changes included the following points:

- Tax definition changed to accrued values, while previously a combination of accrued values and recorded values (taxes actually paid) was used
- New activity classification introduced based on international standard
- Foreign seamen on Norwegian ships now treated as residents and their wages included in GDP
- Increase in standing timber no longer capital formation and not included in output of forestry
- Part of livestock in agriculture now treated as fixed assets and corresponding changes in livestock as gross fixed capital formation, and not changes in inventories

The timing of the revised national accounts figures for publication was not very fortunate, as the Government's long-term programme for the period 1974-1977 with old figures was published in April 1973; one month after Statistics Norway had published the new figures that were delayed from the summer in the preceding year. A new overall tax percentage of 45.7 for year 1972 confused the issue, and this was later revised to 46.4 per cent; as much as 6 percentage points higher than in the old figures by the Ministry of Finance.

The leader of the Finance Committee in Parliament, Lars T. Platou, characterised the new national accounts figures as "most sensational". However, he would "not endorse the critical opinion of having misled and given incorrect information on purpose. It is good that statistics are continually making improvements, that effort is simply praiseworthy. One should, however, have attached more importance to uncertainties in the material before giving it as a basis for assessment" (newspaper Næringsrevyen, Norsk Handel, 12.5.1973). So, director general Petter Jakob Bjerve had to meet in Parliament to brief the Finance Committee on this case. On that occasion, he used an example from medicine to illustrate the revision of national accounts: it is of no consequence to a patient whether temperature is measured in Fahrenheit or Celsius; fever is the same. He stated that the revision results did not alter the total picture of the Norwegian economy "that much". Statistics Norway held a press conference two months after the release of revised figures, about the main revision, and presented a detailed statement in *Weekly Bulletin no. 21, 1973*[6]. The statement contained a description of the background for having a main revision and the most important changes made. Moreover, it explained why figures of

[6] Statistics Norway (1973b).

operating surplus – being a residual – were particularly uncertain. Many tables were presented in order to illustrate the revision from old to new figures, as well as how much of the difference could be explained as changes in definitions and how much was due to other changes (new sources and new methods). Furthermore, it was indicated that the revision had less effect on the year-to-year movements in the figures and thus was of less importance to the business cycle analysis.

The great external interest for the revision results showed that national accounts had gained a central position in providing important terms for the discussion of economic issues in society. These experiences from the 1970s sent a message to Statistics Norway to be more concerned about the dissemination part in future. In 1995, therefore, work on dissemination was given a high priority when new main revision results were next published.

4.5. Further work on main revision 1973

Main revision 1973 was not finalised in 1973. The revision work continued, and a new revision report was issued in 1975 in the series Statistical analyses. This report reproduced the written statement from the weekly bulletin in 1973, together with an updated set of analytical tables, plus new tables for the years 1970-1974. Minor revisions in the previous publication were also made, which led to an upward revision of GDP of 0.5 per cent compared with the 1973 revision (Statistics Norway 1975).

The first NOS national accounts publication after the main revision arrived in 1978: *National Accounts 1967-1977,* here also with some minor revisions. Despite having defined the 1967-1975 figures as final, another national accounts publication was issued the very next year with some new changes that were not just minor. First, the share of National Health Insurance of health expenditure at government health institutions was reclassified from private consumption to government consumption. This meant 2–3 per cent lower figures for private consumption, while government consumption was adjusted upwards by approximately 10 per cent compared to the previous year's publication. The publication issued (Statistics Norway 1979a) contained series of revised estimates dating back to 1962.

The finalisation of the main revision of 1973 came in 1981 with the publication of *National Accounts 1949-1962;* the revision had taken a total of 12 years from start to finish. More summary methods were applied for the earlier years – and for main aggregates only - than for the years after 1962. The revision backwards stopped with year 1949 when manufacturing statistics were considerably altered that year. The revised 1949 estimates of GDP and gross capital formation were 8 and 20 per cent lower respectively than before.

Documentation was considered an important part of the main revision. During the 1970s, a number of documentation reports were published that described statistical

sources, principles and methods of estimation used in the new national accounts; in total 14 reports that covered separate areas and issues. A comprehensive synopsis of the Norwegian national accounts following the main revision was published in Fløttum (1980), with a somewhat shorter edition in English the following year (Fløttum 1981). "Publication of such a detailed documentation is extraordinary in an international context, as national accounts staff are usually hesitant to share this kind of methodology with the public" (Thage 1978, p. 24).

4.6. Methods of estimation system

Norwegian national accounts had a detailed commodity balancing formulated before the 1973 revision, so adaptation to 1968 SNA did not entail much alteration of the EDP system, which was mainly confined to adjustments and improvements developed in the 1960s (Homb 1975).

Supply and use tables were introduced (format of product x sector from that of sector x sector), and the change from sales tax to value added tax called for different treatment from 1970. Gross treatment (output as well as intermediate consumption inclusive of VAT) was applied to VAT, which remained in place until net treatment was introduced in the mid-1980s.

The technical system and programming structure in the final accounts of the 1970s are described in Kvisla, Nordseth and Røgeberg (1978). Calculations were programmed in Cobol and executed on Statens Driftssentral's computer (Honeywell-Bull H6060).

Work on the final accounts took about six months, and the estimates were published in Economic Survey two years after the end of the accounting year. The input-output part of the calculations could be described in six points:

1. Compilation of supply of each commodity by supplier in producers' prices (VAT excluded)
2. Compilation of uses of each commodity by receiver in purchasers' prices (VAT included)
3. Decomposition of uses in purchasers' prices
4. Balancing of commodities
5. Compilation of supply of each commodity by supplier in decomposed values
6. Balancing the ledgers

Basic statistics in the areas of foreign trade, manufacturing and government sector were forwarded to the National Accounts Unit on magnetic tape. Final computation was available in so-called ledgers that contained all the details in terms of specifications and value elements. One of the ledgers was sorted by supplier, the other by receiver. It should be noted that commodity and ledger balancing were considered to be core national accounting work.

"The function of the ledger is partly administrative (centre of communication), technical (in relation to the computerized system) and professional (in relation to balancing and harmonization and insight in all details in national accounts), not surprisingly a most central place in the tasks of national accounts" (Thage 1978, p. 12).

4.7. Regional national accounts

Statistics Norway started work on regional national accounts in the late 1960s in response to many users wanting to see this on the statistical programme. Thus, regional accounts for the year 1965 were published in 1970. Availability of basic statistics and user needs led to these accounts being based on the administrative level of counties (20 in number, later 19). Accounts for Northern Norway had been prepared earlier, however; as far back as 1948 for the year 1939.

As can happen in such pioneering work, uncertainty became an issue: "It should be emphasised that the quality of the statistical basis for distribution by county of national accounts items varies considerably, and for certain aggregates, such as private consumption, the figures are so weak that they must be regarded as rough estimates to be handled with the utmost care" (Statistics Norway 1970, p. 8).

Some activities – inter alia exports, imports, ocean transport, railway transport and air transport - could not be distributed by county, and were instead entered into "county no. 21" (extra county). In 1965, this undistributed part of GDP for the extra county amounted to approximately 14 per cent. When oil activities on the Continental shelf in the North Sea later became important for the Norwegian economy, this percentage increased to 22 per cent in 2007.

Estimates by industry were in focus when the first publication came out in 1970. Value added by county was available for 23 industries, as were industry by industry figures (input-output type) for all counties, showing output of goods and services in each county and the use distributed by industry (intermediate consumption), consumption and capital formation. However, the uses could not be given by county of origin. In order to undertake input-output analyses for the counties, additional assumptions on flows of goods and services within and between the counties had to be made.[7]

The second edition of national accounts by county was published in 1978 for the year 1973 and contained more details than the first. Until 1997, such regional accounts were issued every two, three or four years, and from then on every year. The various editions are not always comparable due to changes in definitions and methods of estimation. It takes more than three years to prepare these accounts, since final national accounts for the country need to be available in order to break down the national estimates by county.

[7] The problem was discussed in Sevaldson (1973).

The regional accounts have been used extensively in regional planning and regional finances analyses. The Ministry of Environment (created in 1972) has driven and financed much of this work. The University of Trondheim has been engaged since the mid-1970s in the analysis and development of analytical tools for regional planning based on national accounts data by county. Other institutions at regional level have also had a need for such data (Norwegian Institute for Urban and Regional Research, The Institute of Transport Economics). In addition, several research projects in Statistics Norway have been based on regional accounting data (Skoglund 1980, Mohn, Stambøl and Sørensen 1994).

4.8. Oil activities – a new challenge in national accounts

Estimates of oil activities in the North Sea were published for the first time with the main revision of 1973. Extraction of crude oil and natural gas was considered part of mining and quarrying, while oil drilling belonged to construction - in line with the activity classification then in force in Statistics Norway (drilling became part of the extraction industry, services incidental to oil and gas extraction, in 1995 with the next main revision).

Treatment of the oil activities turned into quite a challenge both for national accounts and Norwegian statistics. This applied to principles related to resident activities and lack of basic statistics for the first years (Bjørnland 1975b). In oil activity, units were created that needed special treatment in the statistics. Production in border fields in the United Kingdom and Norway was distributed among the two countries according to ownership of oil and gas reserves (Fløttum 1980, p. 121). Extensive correspondence was exchanged and numerous meetings were held between the two countries in the 1970s aimed at securing the consistent treatment of oil activity in the North Sea in both countries' national accounts. In particular, price data were urgently needed in pipeline transportation (export price). This was solved by introducing administrative norm prices on petroleum from 1975 (potential sales price in a free market set by the Ministry of Petroleum and Energy). Another problem was obtaining information on intermediate consumption of goods and services delivered directly to the fields. In all these efforts, effective cooperation was needed with the units of foreign trade and manufacturing statistics. During the 1970s, value added share of oil and gas activities increased from 0 to 14 per cent of GDP.

4.9. Institutional sector accounts work

In the foregoing chapters covering the 1940s and 1950s, reference is made to the first efforts to construct financial accounts in Norway. Mikael Selsjord, whose background was in the unit of financial statistics, was a leading figure in this work. In the 1970s, he prepared a number of documents describing a system of institutional sector accounts in national accounts. However, his work was not adopted nor fully appreciated by the National Accounts Unit. Instead, a separate project was initiated. An NOS publication (Statistics Norway 1971) presented estimates of disposable income from the two sides of income accounts and

financial accounts for five main institutional sectors: public sector, private credit institutions, other private corporations, persons and personal enterprises, and rest-of-the world. This was an important step in the integration of financial and non-financial accounts, although incomplete with respect to stocks and revaluations, and capital stocks were not shown for all sectors.

The next effort came in the form of a working paper some years later by Stenseth and Ystgaard (1975), in which tables for the years 1967-1969 were presented containing incomes and expenditures, disposable income and saving, changes in stocks for both non-financial and financial capital, as well as the decomposition of these changes into purchases/sales and revaluations.

Selsjord continued his effort, and a proposal he submitted for institutional sector accounts for the credit market statistical system was approved by the director general in 1978. The Research Department in Statistics Norway did not have much faith in this, which reflected the two conflicting approaches to the institutional sector accounts within the same institution (Statistics Norway) at that time. Selsjord's proposal was nevertheless initiated, and organised in a committee in which the central bank also participated. However, this work was discontinued when the National Accounts Unit later gained acceptance for an overlapping project. The two conflicting projects actually reflected two different approaches prevailing on the international stage at that time: between the Anglo-American tradition based on income and accounting statistics for the various institutional sectors, and the Scandinavian tradition based on production statistics and the commodity-flow approach. In retrospect, it is clear that a synthesis of the two was needed in order to succeed in constructing a complete national accounts system.

This kind of work prepared in the National Accounts Unit in the 1970s was summarised in Hvidsten and Kalstad (1982), with tables annexed to it. It was announced that estimates of institutional sector accounts should be prepared and published on a regular basis as part of the national accounts.

However, annual national accounts publications until around 1980 did not encompass this fully; only disposable income for Norway distributed by public and private sector was published, plus one table on increases in capital stock. During the first half of the 1980s, the set of tables was expanded to cover separate income tables for households, financial corporations, non-financial corporations, general government and rest-of-the world (balance of payments in mirror). Even three sub-sector tables for households were released for some years.

At the financial statistics unit in Statistics Norway, balance sheets for institutional sectors had been prepared on an annual basis since the 1950s. Provisional and final balance sheets of the institutional sectors and their sub-sectors were published in the annual credit market statistics; a formidable task. In 1976-1977, measures were taken to make these balance sheets available sooner. Good accounting statistics were available for central government enterprises and local government

enterprises, while accounting statistics for non-financial corporations were lacking. Therefore, "other Norwegian sectors" continued to have a role as a residual sector, covering private non-financial corporations, households and non-profit institutions serving households. The new financial sector balance sheet publication in 1978 for the years 1971-1976 (Statistics Norway 1978a) with a detailed description of principles and items, used almost the same institutional sector classification as in banking statistics, which was also more or less the same as the one adopted in the national accounts. In Hvidsten and Kalstad (1982), however, the residual sector "other Norwegian sectors" was split and converted to market values.

In Rømo and Lea (1988), a new initiative was taken to expand the national accounts by integrating financial balance sheets. This played a role in the main revision that started in 1991. A complete accounting system was drawn up for complete national accounts, and an IT system was established for the institutional sector accounts. This work to integrate the financial accounts with the rest of the national accounts was to a large extent based on previous work to automate financial sector balance sheets; an initiative taken by Liv Bjørnland (Hobbelstad Simpson) back in 1976, and subsequently on the reporting system approach for banking statistics from which information from both sides (credit and debit) could be utilised.

1980s:

5. Business cycles and oil economy

In the changeover period from the 1970s to the 1980s, a number of documentation papers were published to mark the end of the main revision and transition to 1968 SNA. In the same period, the development of new statistics in Statistics Norway uncovered level-related errors in the current national accounts figures, for service industries in particular, which highlighted the need for another main revision. More than 10 years elapsed before this was effectuated. In the meantime, other vital problems for national accounts were put on the agenda. Strong business cycle movements and a growing oil economy created new challenges for national accounts. In the 1980s, new quarterly accounts were developed, and labour accounts were also introduced. These two developing projects were driven by the need for economic research and analysis data both within and outside Statistics Norway.

5.1. New quarterly national accounts

In the late 1970s, a new project on quarterly accounts was launched. The approach of the project and its contents etc. were defined in several notes during the years 1977-1978, and the project was finalised in 1979 in a so-called ”accounting model” as a joint undertaking between the National Accounts Unit and the Research Department of Statistics Norway. This was actually adapted to a special version of accounts connected to the analytical model MODIS IV (Statistics Norway 1979b). The Research Department had a special need for data for their quarterly model for business cycle analysis (KVARTS), which was under development simultaneously. However, the very first attempt was crammed with too much detail and consequently failed.

Before making a new attempt to establish quarterly accounts for current operation, long series of retrospective quarterly national accounts data were made by splitting annual data using monthly and quarterly indicators. The result was published in 1983 and covered the period of 1966–1977 (Statistics Norway 1983). The new quarterly national accounts system (QNA for short) was operational from 1985, after four years in the making, and by utilising a new data tool for model and estimation procedures called TROLL. The Research Department had a crucial role in developing the new system, in cooperation with the National Accounts Unit, while operating it became the full responsibility of the National Accounts Unit.

The new system used an almost completely mechanical routine, where certain variables were calculated in advance. The results were then fed into a model of balancing in which some non-observed variables and balancing items were calculated within a consistent framework. Basically, the quarterly accounts were presented as non-seasonally-adjusted accounts to record the actual transactions of each quarter. Second, seasonally-adjusted figures were calculated for analytical

reasons, but initially these were only published in special tables and diagrams in the textual part of the business cycle analyses.

National accounts and retail sales index
The retail sales index is one of the most important indicators of business cycles in Statistics Norway, as well as a good indicator of consumption of consumer goods in households, and is particularly useful for the quarterly national accounts. Later, in final national accounts, use of this indicator was replaced by data from business statistics for retail trade.

In Norway, during an extraordinary boost in household consumption in the mid-1980s, it was revealed in 1987 that the retail sales index underestimated development of turnover in retail trade. For 1985, the first estimate had shown 5 per cent growth, while the final figures had 10 per cent! This dramatic revision in national accounts was even debated in Parliament, where the Minister of Finance was asked what measures could be taken to increase the quality of statistics on which economic policy is based. The Minister of Finance responded by proclaiming a high priority to national accounts in connection with annual budgets and long-term programmes.

New methods were implemented for the retail sales index following the evidence that new retail trade units were given too modest an influence on the index, i.e. a misrepresentation of newly established units. An updated supplementary sample of units and a new method of stratification were implemented (Solheim and Harildstad 1989). The retail sales index had also caused problems for the national accounts 10 years earlier, leading to an underestimation in national accounts. On that occasion, the cause was a programming error in the index.

It might be added that the National Accounts Unit separately publishes an index of consumer goods within the context of household consumption, and efforts were made to obtain a high level of consistency between the preparation of this index and the retail sales index, also in terms of deflation approach and publication cycle

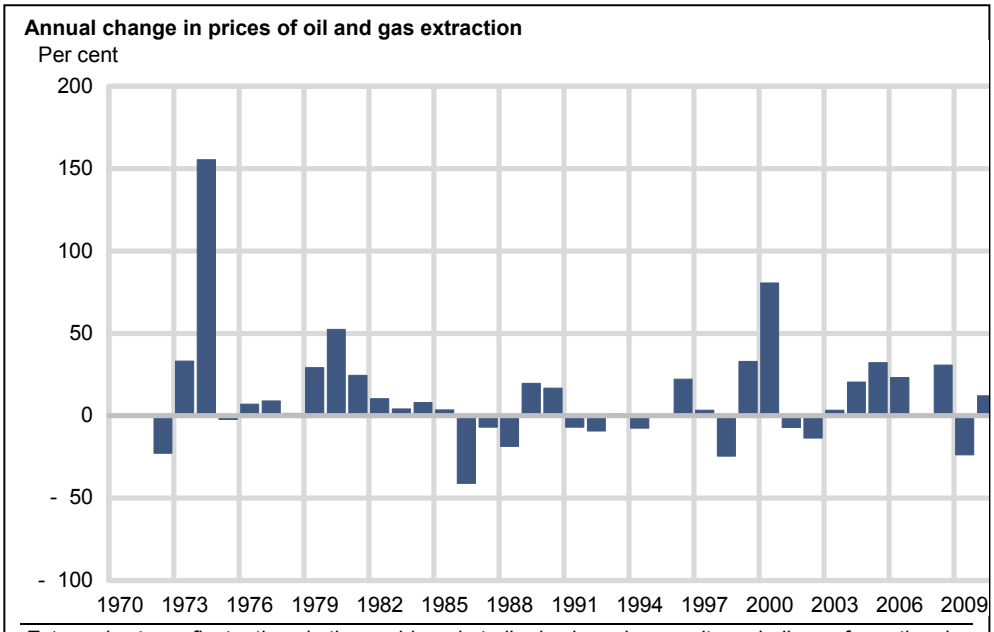
The first publication of QNA took place in January 1985 in *Economic Survey 1984*, and presented figures from 1st quarter 1983 to 3rd quarter 1984. The KVARTS model was introduced by Statistics Norway in 1985. Twenty-five years later, the QNA system is virtually the same, both in scope and design (but adapted to new national accounts definitions). System failures have never resulted in a delay in publication. Incidents happened in the beginning, however, that threw doubt on the quality of QNA. One such stormy incident from 1985 concerned high growth in operating surplus in agriculture. Farmers were angered, and Statistics Norway was forced to respond explicitly and emphasize the uncertainty in early figures. When these figures were revised some months later, it became clear that an error in distribution by industry of one particular item within subsidies had caused this debacle. The incident was highly embarrassing for Statistics Norway as it had also occurred a few years earlier, and led to revised figures on agricultural incomes (Bragstad and Kalstad 1984). One of the lessons learned was that placing too much confidence in automated calculations could be risky when manual judgments are left out. Quarterly calculations nowadays involve a large number of staff, not just within the National Accounts Unit but also elsewhere in Statistics Norway. This

applies to the evaluation of basic primary statistics and the various conditions, as well as results of calculations made (Evensen 2004a).

5.2. Choice of base year in an expanding oil economy

In *Economic analyses no. 2 – 1989,* Statistics Norway released revised GDP growth for 1987 at 3.4 per cent, while having published 0.9 per cent growth in GDP earlier the same year. The box above highlights one important reason for this strong revision, but another important reason was related to choice of base year. Traditionally, Statistics Norway had changed the base year every five years, in line with international recommendations, under the implicit condition that relative prices do not change dramatically through such a period (Fløttum 1989a). However, this was exactly what happened when oil activities made their entry in the Norwegian economy. In periods with more than 10 per cent growth in value added of oil activity, it became very important what relative weight should be attributed to this activity when compiling growth in GDP.

In this 1989 revision, two aspects of the base year policy were identified that had to be changed. First, transition from quarterly to annual accounts' calculation routines meant that the base year changed from t-1 to t-3, i.e. for the year 1987, quarterly accounts used 1986 as a base year in order to represent an optimum updated price structure. In addition to this, 1984 was used as a base year in annual accounts for five years, since this particular year was considered more representative in terms of oil price for this period and for deflating purposes than the high oil price of 1985.



Extremely strong fluctuations in the world market oil price have been quite a challenge for national accounts, particularly in the preparation of constant-price estimates. The figure shows estimates of national accounts on annual price change for output (at basic price) of crude oil and natural gas.

However, it became difficult to defend the use of two different weighting bases; one for quarterly accounts and another for annual accounts. It had also become apparent that the oil activities had become so important for the Norwegian economy, and the oil price so volatile with extreme fluctuations, that the choice of base year had a major effect on the GDP growth rate. The oil and gas quantity produced increased by 17 per cent from 1986 to 1987, while the oil price level in 1986 was approximately 40 per cent below the level of 1984. No wonder, the change of base year affected GDP! Thus, from the publication of final estimates for 1987, annual chaining (t-1) was also introduced in the system of annual national accounts.

The last chapter in this turbulent period was written when the OECD released its figures with 5 per cent growth in GDP for Norway in 1989, while our own figures showed 1 per cent growth. Again, different base years explained the discrepancy, in a year when output of oil and gas increased by 25 per cent, and the oil price was 60 per cent lower in 1988 than in 1985 (base year chosen by the OECD). Norway presented the issue in a note for an international national accounts meeting held at the OECD, and from then on the discussion of base year policy was moved up on the international agenda, and lasted for several years. The eventual result was what we wanted: annual chaining was adopted as a main principle in 1993 SNA and ESA 1995. However, because many countries had problems in implementing the new principles, they were not made mandatory until 2007 with respect to reporting constant price estimates to Eurostat in t-1 prices. Norway was therefore quick to implement the internationally agreed practice in this area.

5.3. Treatment of oil investments

Another technical issue related to the oil economy discussed in the 1980s was treatment of oil investments, in particular oil platforms at sea that took more than one year to construct. The principle followed in the national accounts had been to record these investment costs as work in progress (changes in inventories) until platforms were towed to their oil fields at sea. In the period when platforms were being towed, their full value was recorded as gross fixed capital formation with a corresponding negative value in the work in progress account. The principle of accrued investments was introduced instead, in spite of certain asymmetric aspects, such as recording part of capital stock (not finished, but under construction) to the oil extraction industry without taking part in production at sea. The transition to the principle of accrued values was adopted with the main revision in 1995.

5.4. “Mainland Norway” – a new concept in national accounts

Mainland Norway has been introduced in national accounts tables, in tables broken down by industry and by main aggregate. GDP for Mainland Norway is probably the main aggregate item that is most used in national accounts. This aggregate is defined as totals of value added except in oil and gas extraction, services incidental to oil and gas extraction, pipeline transportation, and ocean transportation and

supply boats. This new concept was introduced in Norwegian national accounts in the late 1980s. For a decade before then, it had been used in different economic analyses, but was not part of the tables in the national accounts.

Oil was discovered in the North Sea in the late 1960s and entered the Norwegian economy in the early 1970s. *Economic Survey 1975* describes GDP excluding oil activities for the first time. No explicit explanation is given, however, of why oil activities are excluded. Intuitively, it could be understood from the fact that inputs were mostly imported and output mostly exported, and thus only affected other activities of domestic production to a small extent. *Economic Survey 1979* describes GDP excluding oil activities and ocean transportation for the first time, and in the same year oil activities surpassed manufacturing in importance for the first time, when measured in terms of GDP share.

Thus, Mainland Norway was introduced as a negation. It is difficult to find any explanations of why this concept became so important in the publication of official economic statistics. Formulations that even point in the opposite direction are sometimes found in analyses. What criteria are behind the definition of this concept?

National Accounts Statistics 1987 (Statistics Norway 1989c) offers an explanation (p.120): "When defining the scope of Mainland Norway, efforts are made to exclude activities that are alien to the Mainland Norway economy in the sense that production does not directly involve much of the domestic demand for the given goods and services."

This is a clear case for excluding oil activities. Another issue is to what extent factor demand is directed against Mainland Norway. This explains why ocean transportation is excluded, but in this case is not really an argument for excluding oil activities, since there are strong demand impulses to Mainland Norway through capital formation as well as intermediate consumption, but few impulses in the opposite direction. Most important is that the national accounts concept of production in oil and gas extraction includes a large element of resource rent, and it may thus be added that oil activities have just a moderate influence on employment, making them less interesting for business cycle analysis purposes.

5.5. Competing and sheltered industries

The PRIM model was introduced in the late 1960s (see above), and with it a need for analytical industrial groupings in which competing industries were distinguished from protected or sheltered industries. This distinction was made by way of three main items in national accounts tables: sheltered, export-oriented and import-competing industries (Fløttum 1980, annex 3). The criteria behind this grouping were not very well documented, and were partly based on empirical analysis and partly discretionary. An industry was regarded as export-competing when more than half the output of its characteristic product was exported, while an

industry was seen as import-competing when delivering mainly to the domestic market in competition with imports. On the other hand, sheltered industries were assumed to offset their costs by increasing their prices.

This grouping by type of competition was last reviewed in the late 1970s, and in the 1980s it became more and more questionable, such as the treatment of all service industries (except ocean and pipeline transportation) as sheltered industries. Demand for such a grouping for analytical purposes seemed to diminish. Globalisation and internationalisation also questioned the need to continue with this, and thus the grouping by type of competition was discontinued in the main revision of 1995. The former grouping by type of competition had, in fact, been mainly relevant and used to characterise manufacturing industries. As an alternative, Statistics Norway has now introduced a grouping by type of commodity as part of the European statistical cooperation, however, not in national accounts.

5.6. Labour accounts

Compensation of employees is one of the most important aggregates in national accounts. Additionally, there has been a long tradition for including employment in tables of national accounts in Norway. As early as 1952, with the first publication of modern national accounts, employment figures by industry dating back to 1930 were included in the tables (man-years worked by employees and the self-employed). The employment figures of national accounts were used inter alia in productivity analyses in Aukrust and Bjerke (1958). In the decades that followed, estimates of compensation of employees and man-years worked by industry were regularly published as an integrated part of the national accounts.

In the beginning of the 1980s, work began on building a new ambitious system of labour accounts. The Research Department in Statistics Norway initiated this work due to its need for more detailed employment data in the model projects. Svein Longva, later to become director general of Statistics Norway (1991-2004), was a key driving force in this effort. Figures on hours worked were needed in particular, but also employment broken down by gender, education and occupation. The project was inspired by the work done in the Netherlands on “Labour Accounting Systems”, and the discussion going on in the International Labour Organization (ILO). In Statistics Norway, the National Accounts Unit was given the responsibility to carry out this effort, and was supported by other units (Division for labour market statistics and Research Department).

Putting together the diverse statistics on the labour market to provide a consistent and reliable overall picture was quite a challenge, and was not always well coordinated. Consistency with other concepts in national accounts was given a high priority. Many issues had to be addressed: which sources to use, how to harmonize the various sources, how to define the variables. A central issue was the

coordination between figures from labour force surveys (LFS), the register-based employment statistics and business statistics (Harildstad 1986).

The final results of the labour accounts work were released in 1989. Time series dating back to 1962 were published and covered employed persons, full-time equivalents and total hours worked, all by activity, employees and self-employed and by gender (Harildstad 1989). Figures by occupation and education were not presented at that time. The concept of jobs was introduced in labour accounts from the year 2000. Labour accounts on a quarterly basis were available from 1997.

In *Economic Survey 1988,* the new figures on full-time equivalents and hours worked were used to describe the development in the labour market (Statistics Norway 1989a, pp. 38-39), and derived measures of relatives like increase in wages per hour worked and per full-time equivalent person. Figures on wages and their development over time are extremely useful in business cycle analyses and in the reports of the Wage Settlements Calculation Committee, thus the quality of figures is given a large focus. The software used for the calculations in labour accounts was CalcIT. By the time this was replaced (not that long ago), it had been in operation for more than 25 years!

When employment was given a more prominent place in national accounts with the 1993 SNA, the established labour accounts in Norway gained a major advantage compared with other countries in having consistent figures with other items in the national accounts.[8]

5.7. Net treatment of value added tax

The use of market prices in national accounts in terms of valuation was originally interpreted as entailing gross treatment of value added tax (VAT). Net treatment was later to become the principle to follow in international reporting. In Norwegian national accounts, product flows are described in great detail, and because value added tax is specified as one of the value components of a producer's value, it should not be much of a problem to meet the valuation requirement defined for international reporting. The decision was also made to apply net treatment in Norwegian national accounts tables. This was realised when final accounts for 1985 were published by Statistics Norway (1988). The new VAT treatment was introduced in a "mini revision" in order to obtain time series dating back to 1970; the year when value added tax was introduced in Norway.

5.8. Introduction to new main revision

New statistics on business services had already revealed in the beginning of the 1980s that estimates for this industry were too low in the national accounts. Observed levels were not, however, to be implemented right away, instead the development was to be executed in the national accounts compilation throughout

[8] See Skoglund (2001).

the 1980s, i.e. a new indicator used with the old incorrect levels, while the correct levels had to wait for a new main revision to take place. A census of establishments from 1974 also had to be accommodated, from which certain figures were available for industries no longer covered by current statistics.

Over the years, the disalignment of levels and other errors detected became increasingly burdensome to the national accounts, and gave rise to new ideas for how to execute a revision using limited resources (e.g. having a "block revision"). However, before making detailed plans, it was decided to postpone the main revision until a new edition of the international standard was available.

As international revision preparations proceeded throughout the 1980s, it became clear that the revision work would be more extensive and time-consuming than originally anticipated, and the revision project was postponed time and time again. Thus, a new main revision of national accounts in Norway had to be linked and integrated, and despite envisioning a main revision to be carried out at least every 10 years, it was agreed to wait for the SNA revision.

Voorburg Group for service statistics
The Voorburg Group for service statistics was founded in 1986 when it was ascertained that statistics on services were far behind statistics on goods in terms of quality and availability, despite the fact that service activities accounted for more than 50 per cent of GDP in the Western world. The mandate of the group was to develop further service statistics in general, inter alia definitions, classifications, measuring output and external trade on services, price and volume measures.

Development of a new product classification by the United Nations – the Central Product Classification (CPA) - was a primary focus in the first meetings. A connection to UN work was also present in the field of price and volume measures for services, for which Erling Joar Fløttum was asked to contribute to the price and volume manual for the UN. In 1993, it was Statistics Norway's turn to host the meeting in Oslo, which was a heavy burden on the National Accounts Unit, with close to 40 persons from 20 countries and international organisations participating. The meeting was a success, or as the leader of the group, Mr Jacob Ryten from Canada concluded: "..an impeccable arrangement…". In 2009, Statistics Norway once again hosted a successful meeting of the Voorburg Group.

1990s

6. Reorganisation and stronger European cooperation

6.1. Exit to Research Department

In 1991, Statistics Norway underwent a major reorganisation of its activities. One of the most notable elements was the transfer of the Division for National Accounts from the Research Department to a newly-established Department for Economic Statistics. This became one of three departments established by splitting the former statistical department. In addition to national accounts, the new department covered resources and environment statistics, manufacturing and foreign trade statistics, business cycles and price statistics, government and credit market statistics, and employment statistics.

The reorganisation in 1991 stimulated a great deal of involvement in various quarters of the institution. A proposal had been made to transfer the National Accounts Unit to a new department for national accounts and economic statistics in order to have proximity to basic statistics in a consistent and integrated system of standardised concepts, definitions and classifications. The national accounts' role in the Research Department had weakened somewhat; while making up half the staff in the Research Department in the 1960s and 1970s, this share had been reduced to a fifth by 1990.

The final decision meant that national accounts were deleted in the name of the new department. At that juncture, national accounts moved from a department with approximately 100 staff to a new department almost twice the size. In 2008, however, the time had come to slim down the department, and interestingly, the national accounts returned to about the same size of department as in the days of the Research Department (115 staff in 2010, national accounts together with financial and accounting statistics). In retrospect, the move from the Research Department seemed to work better and without such negative effects for national accounts as predicted by those against the move. The joint efforts and teamwork in quarterly accounts and analysis continued to be as strong as before. On the down side, however, the general knowledge and interest for national accounts in the Research Department have weakened during the last 20 years, which has led to less research on the theoretical basis for national accounts.

6.2. Continuation of coordinating role

As a supplement to the reorganisation in 1991, a statistical committee of coordination was established to harmonise the statistical activities in Statistics Norway. The forthcoming main revision of national accounts was on the agenda of this committee during the first years, and later this committee was reorganised as

the "statistics meeting ", held at director level. The coordinating function of national accounts was mainly taken care of in the yearly process of discussing and preparing the operating plans of the various departments and divisions.

Meetings between the National Accounts Unit and divisions that provide data for national accounts are often held, and particularly when revisions of national accounts estimates are undertaken. When the 1999-2002 revision was in progress, these meetings were held frequently. In recent years, much work has been aimed at harmonizing routines for the transfer of data to national accounts with respect to specifications and deadlines.

The National Accounts Unit has played an active role in achieving better harmonization of statistics in several areas, such as oil activities (Evensen 2006), and employment and compensation of employees (Hansen and Skoglund 1997). Furthermore, during the last 20 years, a number of courses have been held by the training institution in Statistics Norway aimed at increasing knowledge on national accounts. One important target group is the staff in other divisions of Statistics Norway who prepare data for national accounts.

6.3. Professional independence

The Statistics Act of 1989 asserts that Statistics Norway is an independent institution professionally. Thus, in the 1990s, Statistics Norway was able to deal with controversial issues relating to the public debate on the economy (Lie and Roll-Hansen 2001, p. 410). In the area of national accounts, Statistics Norway has normally enjoyed a large degree of independence, though advice from the Ministry of Finance and others has been listened to. In Norway, there is no evidence to suggest that the national accounts have ever been the subject of political control to influence the figures.

In general, Statistics Norway's publication guidelines treat all users in the same way. An exception was made for provisional national accounts figures to be used for the Revised National Budget in the spring (the Ministry of Finance had early access to this data), but this informal practice ceased in the 1990s. At that time, there was a growing awareness of such matters (on equality and independence) internationally. See for instance, Special Data Dissemination Standard (SDDS) by the IMF, which was adopted by Statistics Norway in 1997, and principle 6 for European Statistics – "Code of Practice").

6.4. From guidelines to formal acts: 1993 SNA and ESA 1995

The new global standard of national accounts was issued in 1993, entitled System of National Accounts 1993 (1993 SNA), and was undertaken this time under the joint responsibility of five international organisations. The EC/EU has had its own standard since 1970: European System of Integrated Economic Accounts (ESA), which applies the same principles as SNA, although using more precise definitions

that are adapted to conditions and purposes for European countries and the EU. The new EU standard was issued two years later as ESA 1995.

As a non-member state, Norway had not been following the previous ESA standards. This had to change when the European Economic Area (EEA) Agreement came into force on 1 January 1994. National accounts were among many statistical topics to be included in the final agreement, the consequence being that Norwegian national accounts had to be adapted to ESA 1995. Earlier, international statistical cooperation had been on a voluntary basis. However, now with the EEA Agreement, the countries had to comply with its formal acts. For national accounts, the EEA obligations were formulated in Regulation (EF) no. 2223/96 of 25 June 1996 on the European System of National and Regional Accounts in the Community (for short: the GNI Regulation). It contained definitions and classifications, and also the frequency of publication and documentation. Technically speaking, ESA 1995 is an annex to the GNI Regulation. Parliament, therefore formally required the full ESA standard to be translated into Norwegian, which was also published (Statistics Norway 1999a).

In order to meet the conditions for documentation, all EEA countries are obliged to prepare a comprehensive and detailed description of sources and methods used in their national accounts; a so-called inventory. The very first inventory for Norway was available in 1996 and consisted of 930 pages.[9] The inventories also contributed to greater openness on sources and methods because this information could be made available to other users as well. The inventory and routine visits of Eurostat experts in "audit missions" form the basis for Eurostat's evaluation of national accounts in the respective countries. In this evaluation, Eurostat focuses especially on the sources and methods behind the main aggregates of GNI and GDP.

Under the EEA Agreement, Norway also had an obligation to establish its own routines for reporting national accounts estimates to Eurostat. Requirements are detailed and comprehensive and consist of quarterly estimates, annual estimates, regional estimates and input-output data. The list of reporting commitments has subsequently been extended, and deadlines made shorter.

Statistical cooperation under the EEA Agreement also became important for national accounts indirectly, since other statistics that serve as a basis for national accounts were changed or rearranged, including the business statistics. The latter had a major effect when the next revision was held in the years 1999-2002.

6.5. Regional accounts and new regional grouping: NUTS

The EEA Agreement committed Statistics Norway to adapting regional accounts – in the same manner as for the rest of national accounts – in order to meet the EU

[9] Fløttum (1996).

directives in ESA 1995. The first regional accounts for Norway published in this way were drawn up in 1996 for the year 1992.

A regional grouping was established based on the regional grouping NUTS used by the EU, which was determined by the Ministry responsible. Among several alternatives, the result was NUTS III, at the lowest level, in total 49 regions. Thus, most counties were divided into smaller regions. The National Accounts Unit compiled figures on gross region product per inhabitant at this level, see Eek et.al (1993). Basically, the compilations were carried out at municipality level using summary methods.

Later, however, NUTS III level was redefined to be identical with county level (19 counties). This meant that figures from national accounts by county could be reported directly to Eurostat.

6.6. Luxembourg – the new destination of travel

The most important international organisations for cooperation in the area of national accounts before 1990 were the United Nations (meetings in Geneva and New York), OECD in Paris, and World Bank and IMF in Washington. The EEA cooperation brought about considerable travel activity for national accounts staff to Eurostat in Luxembourg. In Eurostat, regular meetings with participation from Norway were held in:

- Committee of Monetary Financial and Balance of Payments Statistics
- Gross National Income Committee
- The Balance of Payment Committee
- National Accounts Working Party
- Balance of Payments Working Party
- Financial Accounts Working Group

In addition, there were a number of ad-hoc meetings, inter alia in connection with the initiation and development of satellite accounts, and when Eurostat wanted to explore certain methodological issues in so-called task forces. In total, there were normally about 10-15 meetings per year in Luxembourg with participants from national accounts in Statistics Norway.

The Gross National Income Committee plays an important role in the professional evaluation of national accounts in the countries that take part in the EEA cooperation. Another important part of the EEA Agreement involves the engagement of national experts in Eurostat. Several persons from national accounts in Norway have stayed in Luxembourg for a period of time (Erling Joar Fløttum, Halvard Hansen, Steinar Todsen). Norwegian experts have also been hired by Eurostat to be involved in the evaluation of national accounts for other countries, in connection with EU membership applications. Eurostat also conducts training in national accounts, in which several persons from national accounts in Norway have participated.

Nordic group for national accounts - NUNA
Already from the infancy of national accounts there was close contact between the Nordic countries aimed at sharing experiences and discussing methodical issues. Formally, this cooperation took place in a Nordic group for national accounts called NUNA, founded in 1955 and continued mainly on a yearly basis. During the period of close contact with Eurostat in connection with the EEA Agreement, the Nordic cooperation was given a lower priority. However, the heads of national accounts in the Nordic countries come together for a separate meeting before the annual national accounts meeting in the OECD. Also, NUNA seminars for national accounts staff take place every two years. The five Nordic countries take their turn hosting these seminars.

Cooperation with Central and East European countries
In 1989, the European Commission started so-called Phare projects, with the aim of improving official statistics in Phare Candidate Countries (at that time comprising Bulgaria, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia and Slovenia). A number of Phare projects have been undertaken with the implementation of ESA 1995 in these countries, some of them undertaken by experts from Statistics Norway. Knut Ø. Sørensen participated in 1997 giving assistance to Bulgaria, Hungary, Poland, Romania and Slovakia in the area of household consumption. Later, Erling J. Fløttum, Liv H. Simpson, Knut Ø. Sørensen and Steinar Todsen participated as experts in Phare projects on dwelling services, constant-price compilation, household consumption and compilation of input-output tables.

In accordance with ESA 1995, the countries are obliged to prepare Supply and Use Tables (SUT) and Input-Output Tables (IOT). Contracts between Norwegian expertise and Bulgaria, Czech Republic and Slovenia were established in order to provide methodology for enabling them to prepare annual supply and use tables in current as well as constant (t-1) prices, and financed by Eurostat through the Phare programme.

7. 1995 main revision implementation

During the 1980s, a strong need emerged for a main revision of the Norwegian national accounts, as described earlier with reference to the new international standard and adopting ESA 1995 in accordance with the EEA Agreement requirements. Better conditions with respect to human resources and new IT technology were also important factors.

7.1. Planning for 1995 main revision

In the beginning of the 1990s, several internal strategy notes were prepared when planning for the 1995 main revision. A revised accounting system was on the agenda based on new international standards on activities and products. The proposed "block revision" in several steps and phases was discussed in an article in Economic Survey (Fløttum 1991). The Ministry of Finance informed Statistics Norway that they expected to see top priority given to the main revision and development of institutional sector accounts, while fearing that the block revision could cause a disorderly situation for the users. The Research Department of Statistics Norway referred to several problem areas to be given focus in the main revision work, such as discrepancies between energy accounts and national accounts, and weaknesses in the estimation of dwelling services.

A new plan with the following objectives was formulated for the 1995 main revision:

- Adapting to 1993 SNA and ESA 1995
- Changing to a new accounting system for a complete integrated system of national accounts
- Introducing a new standard of activity classification and new product classification based on new international standards
- Revising the accounts of the real economy by implementing new statistics, particularly for the service industries
- Developing and improving the integration of institutional sector accounts in national accounts
- Coordinating the balance of payments and national accounts
- Coordinating financial sector balances and national accounts
- Improving the labour accounts in national accounts
- Establishing more efficient solutions for IT and technical operation.

Complete coordination of definitions, classifications and accounting rules between the divisions of national accounts and government accounts and credit market statistics was one important goal set for the main revision work. Another was further development of institutional sector accounts, based on new accounting statistics for the private and government sectors, organised as a common project of the two aforementioned divisions (see also description of the 1970s). Several working and steering groups were established for the various sub-projects. In some of them, highly qualified personnel from other divisions and the Research

Department participated as advisers. The revision work was partly integrated into the current work of the two divisions. From outside Statistics Norway, two experts were engaged in the revision work in the areas of communication and sea transport (on price indices and on capital consumption).

7.2. New international guidelines

The new international national accounts manual "System of National Accounts 1993" (1993 SNA) was published by the UN, OECD, IMF, World Bank and EU/Eurostat jointly in 1993, but its contents were already known from a series of documents submitted from expert group meetings responsible for the new guidelines.

The "European System of National and Regional Accounts" (ESA 1995) then became an important framework and reference for constructing the Norwegian national accounts, and before it was finally published by Eurostat in 1996. According to the EEA Agreement, detailed national accounts estimates had to be reported to Eurostat for the year 1995 and onwards. Norway was permitted to report estimates according to 1993 SNA/ESA 1995 in the period until 1999, whereas the EU countries had to report according to the old ESA.

7.3. New accounting system, new concepts and new terms

Institutional sector accounts needed an accounting system for the full set of accounts. The design of the new accounting system was based on the sequence of accounts for the complete integrated system of national accounts in 1993 SNA. The accounting structure adopted contained 2-digit codes for main accounts and 3-digit codes for the grouping of institutional sectors, income types, industries etc. The specifications were made in such a way that aggregates could be derived from the detailed groupings. The accounting system of the institutional sector accounts was devised in cooperation between the two divisions (national accounts, government accounts and credit market statistics). The sequence of institutional sectors was determined in order of data reliability: first government, then financial corporations, non-financial corporations, households and last non-profit institutions serving households. In addition, the sector rest-of-the world was fully integrated into the system.

In the activity grouping, the new distinction between market and non-market industries was introduced, the latter further divided into production for own final use, production in central government, local government and non-profit institutions serving households respectively. Production for own final use and in non-profit institutions serving households had not previously been dealt with. The activity breakdown for the government part was coordinated with the other division, while the National Accounts Unit decided on the remaining part, including definitional issues. The implementation of a new activity grouping in national accounts thus became a challenge and caused a great deal of extra work in the main revision. The main reason for this extra work was due to slow progress with respect to the

general work on implementing the revised activity classification in statistics in Statistics Norway. Because national accounts had to implement the new activity classification before other statistics did, it was quite a challenge for the national accounts staff to keep track of movements of units between industries. Much of the recoding had to take place in the national accounts division, also for preceding years.

The product classification implemented in national accounts was adapted to the EU's CPA, and thus coordinated with NACE. Grouping of consumption groups was also changed and specified on the various sectors (households, central government, local government, non-profit institutions serving households). Final consumption of non-profit institutions serving households corresponded with the corresponding grouping used in production. The new main grouping of consumption into individual and collective was also implemented. Several new types of incomes were introduced, inter alia mixed income and primary incomes. See Brathaug and Fløttum (2004), pp. 9-11, for more information on the implementation of the standards.

Basic price was now used for presentation, although producer's price was kept as an alternative for various user needs.

The concepts and Norwegian terms used in national accounts had been largely unchanged since the 1950s. There had been a couple of changes in the 1970s and 1980s, but with the adoption of 1993 SNA and ESA 1995 a more comprehensive review of terms was necessary and a good number of new concepts needed to be implemented. It was time to look for more suitable terms in Norwegian, and to clarify the difference between industry and sector. Until the beginning of the 1990s, these two terms had been mixed up when describing the various production activities in national accounts. From the main revision 1995 therefore, the sector concept was earmarked for the classification of institutional sector accounts only.

In Norway, output (or value added) at factor cost was never used in national accounts. The pioneers Ragnar Frisch and Odd Aukrust found such a concept useless, and maintained that it was an income concept and not a production concept.[10] There had, however, been a strong tradition for analyses using factor income and its distribution into compensation of employees and operating surplus. The PRIM model describing inflation in small open economies was developed from studies of movements in these two main components of factor income. Therefore, there was some opposition to removing factor income from the tables of national accounts, particularly among researchers. The reports prepared by the Technical Calculation Committee for Wage Settlements continued to use factor income.

[10] See Aukrust (1992).

Further efforts to introduce more adequate and modern terms were made for the area of consumption. Household consumption replaced private consumption and the dual concept of actual consumption was introduced with a suitable proper term in Norwegian. In retrospect, this modernisation could hardly be called a success as many users continued to use the term "private consumption", even in official documents.

7.4. New data sources

Utilising all relevant statistics available for the work on national accounts was an important goal for the main revision of 1995. Main tasks were introducing right output levels in service industries, new accounting statistics for private non-financial corporations and sample surveys for households, and this also applied to new statistics in progress for wages (register-based). Government accounts were revised in parallel with national accounts statistics. In effect, not only government accounts, but also the full range of accounts including balance sheets of government and financial corporations were reviewed, and in order to limit the original residual sector called other Norwegian sector, this was split into private non-financial corporations, households and a reconciliation sector.

7.5. Further development of the IT system

In 1992, at the start of the main revision, a pilot project to assess the possibility of developing a new alternative interactive system for processing and conciliating annual national accounts was introduced. The pilot was carried out by an external consultant (Hans Kristian Langva, an ex-employee of Statistics Norway), and the report of the project group was approved by the director of Statistics Norway as a basis for further work.

A new technical platform for national accounts was established, named SNA-NT (System of National Accounts – Norwegian Technology). This reorganisation was part of the general change of technology in Statistics Norway, phasing out the previous big computers. The new approach was based on work stations with a UNIX operating system in combination with PCs. For annual national accounts, a client-server application was developed, in which data were stored in a database (Oracle) at the work station, while the users had a Windows application on their PCs for the development, interactive correction and updating of annual estimates in national accounts. This meant greater user-friendliness and flexibility, providing significant efficiency gains. A key person in this IT work was Sverre Nordseth, who has been involved in developing system solutions for national accounts ever since the1970s.

In relation to the main revision work, common database solutions were established to enable better integration between the central national accounts part, the institutional sector accounts and the balance of payments. This contributed to a secure automatic consistency between the various parts of national accounts. Earlier, intervention had to be made manually to achieve consistency. More

efficient data transmission from other divisions to the division for national accounts was also accomplished through the new IT approach.

In the Division for government accounts and credit market statistics, a new IT system (FIBA) was developed to make compilation and reconciliation of financial sector balances more efficient. The accounting system for this was harmonized with the accounting system for institutional sector accounts (FIIN) that was developed in the National accounts division. The complete IT system for annual accounts was documented, both in Norwegian and English, and presented at several international conferences and seminars.

The system of quarterly national accounts (QNA) was also revised. While the operating system for compilation had previously been programmed and stored in TROLL format on Norges Bank's mainframe, it was now directed to UNIX and work stations being developed in FAME and TROLL in Statistics Norway. This enabled a much more rapid compilation of quarterly national accounts.

A technical reorganisation of the compilation of labour accounts was also considered. Labour accounts were developed in the 1980s, based on relatively complicated worksheets that were not very integrated with the rest of the national accounts. For various reasons, no changes were made to this system for the 1995 main revision, but changes were initiated by the end of the 1990s. New basic statistics developed for employment and wages could be utilised at this time, see Skoglund (2006).

7.6. Reorientation and documentation of balance of payments

The balance of payments had its origin in the 1950s as an integral part of the national accounts, initially published on a quarterly basis, and from 1960 on a monthly basis. The two basic sources; external trade statistics and foreign exchange statistics, were both available on a monthly basis. Statistics Norway resumed publishing data quarterly when foreign exchange statistics were discontinued in 2005.

The balance of payments was recorded manually until 1980. Statistics Norway received foreign exchange statistics from Norges Bank in the form of payments being balanced (Current account equal to Capital account), and when received, certain corrections were made from statistics produced by Statistics Norway. Most importantly, external trade statistics on goods replaced corresponding payment data, and corrections were also made in the area of ocean transport statistics and bank statistics. The system also ensured balance after corrections were made. The compilation system was not computerised until 1981, at that time in a separate routine independent from the rest of national accounts, and with a separate coding system.

In the 1995 main revision, however, the balance of payments was completely and technically integrated into the national accounts, as a system, and as part of the module FIIN of institutional sector accounts. This was the ultimate manifestation that the balance of payments is a mirror image of the rest-of-the world account (International Monetary Fund 1993). The new compilation approach for balance of payments was described in Nørgaard (1998). Balance of payments data have always been reported to the IMF in Washington, and Statistics Norway has loyally followed its recommendations. The close integration with national accounts could mean, however, that the balance of payments in Norway deviated from the recommendation on a few points. For instance, the Norwegian statistics offered a much more detailed breakdown of exports and imports of services, again to meet national accounts needs. In the 1980s, a stronger demand internationally for such data details emerged, to which Norway was able to respond quite positively. Norway was also able to meet recording principles in the area of ocean transport, principles that later became international guidelines, among them the residency issue (see Bakke and Halvorsen 1988). Another issue that attracted a large interest in the mid-1990s was foreign investment. Analyses were made in this area, and these gained attention in several issues of Economic Survey during that time.

From the 1950s to 1990s, balance of payments work in the National Accounts Unit was handled by just one person. Some data were calculated by staff responsible for areas like ocean transport and oil activities in the national accounts. More resources were needed (two man-years rather than one) when a new technical system became necessary and more extensive international reporting and communication took place.

7.7. Results of 1995 main revision: GDP strongly adjusted upwards

The first revised figures were originally planned to be issued in 1994, but more time was needed. The revised plan was explained in Economic Survey in the same year, i.e. new figures for years 1988-1992 to be published in summer 1995 (Simpson and Skoglund 1994).

Main revision results were presented on 6 July 1995 in an extra issue of Weekly Bulletin. Emphasis was given to a relatively popular presentation, with journalistic input from the editor of Weekly Bulletin. The method of presentation and publication had been planned in several meetings with the director of Statistics Norway, taking into account the experience from the previous revision (main revision in 1973). The presentation highlighted the improved quality of national accounts estimates through new basic statistics, and many definitions and classifications had been changed to reflect Norwegian commitments to the EEA Agreement. Figures for years 1988-1992 were presented in a comprehensive set of tables. In the text illustrating the changes, 1990 was used as a year of comparison. Revision results were also presented at a press conference the same day, followed

by a seminar for main users of national accounts estimates (Ministry of Finance, Norges Bank and other invited guests).

The main message was that GDP had been strongly adjusted upwards; by approximately 10 per cent, mainly due to new basic statistics and improved methods of estimation. This again was due to the long time elapsed since the last main revision more than 20 years ago. The contribution from definitional changes this time was a moderate 1 percentage point for GDP. Last time, the definitional changes had been the dominating force behind a similar level of reduction of GDP. The revision in the 1990s, on the contrary, was mainly caused by increases in the service industries. Total value added in service industries excluding the government part was 20 per cent higher than published earlier in the national accounts.

Dwelling services were among those most strongly affected, the main part representing imputed dwelling services. The Research Department contributed to main revision work in this area (Moum 1995). Alternative methods were reviewed, and at this stage Norway changed to the European main method based on observed rents, and the level of the revised estimates became closer to the normal seen in other countries. The share of GDP for dwelling services increased from 4.9 to 7.0 per cent (Statistics Norway 1995, p. 12).

Other important changes made were:

- National Insurance expenditure for health services and medicaments was redefined from private consumption to government consumption as "purchase of products for households"
- Military expenditures of durables, which alternatively could be used for civilian purposes, were redefined from government consumption to investments
- Definitions of gross fixed capital formation in extraction of oil and natural gas were changed to reflect accrued values, resulting in considerably higher values than before

Methods of estimation were also changed in the electricity industry. Output was to a larger extent based on physical units (GWh) and prices were differentiated in relation to different products. This was in accordance with quantity data for electricity in energy statistics prepared in Statistics Norway. It has, however, proved difficult to retain this consistency in later times, since value estimates should be in accordance with energy costs in energy accounts, and price developments should be in line with the consumer price index and energy prices in the electricity statistics. For other types of energy products, attempts have been made to harmonize energy products with those used in energy accounts. The relationship between energy accounts and national accounts has been the subject of several projects in Statistics Norway in recent years.

The main revision results were positively received by users. The media emphasized the strong upward revision of GDP, and the fact that Norway had become a nation of services.

"External users did not really criticise Statistics Norway in a negative way upon the publication of sensational large revisions in 1995. Presenting the new NA estimates as being more qualitative – expressed in a positive way by the Director of Statistics Norway rather than pointing to admittedly wrong estimates in the past - and as a very fast adoption to the new international NA standard, meant that this was seen as a comfortable and positive event for Statistics Norway" (Brathaug and Fløttum 2004, pp. 4-5).

The Finance Committee of Parliament was invited to Statistics Norway on 26 September 1995 to be informed about the main revision and the revised estimates, in particular for the years 1993 and 1994 as a basis for the National Budget 1996.

Norway was the first European country to publish national accounts estimates according to ESA1995, thereby falling out of step with the other EEA countries, who reported their national accounts estimates according to the new standard for the first time in 1999.

In Economic Survey 6/95 in September 1995, annual estimates were published for 1993 and 1994, plus quarterly estimates as far as the 2nd quarter of 1995. The quarterly estimates were harmonized with the revised annual estimates with respect to definitions and classifications, and were reconciled with the new annual estimates. In the same issue of Economic Survey, the development from 1988 to 1994 was illustrated using the new estimates. The revisions did not provide a basis for major changes to the description of trends in the Norwegian economy that Statistics Norway had presented earlier.

More detailed estimates for the years 1988-1993 and a summary analysis of the revision results were published in Statistics Norway (1996a, 1996b). Four different publications were released at the same time: national accounts describing the real economy, and institutional sector accounts, both in Norwegian and English. This publication programme continued until 2009, when main aggregates from the two parts were united in one publication.

Work on backward estimation started just after the first round of the publication of revised estimates was completed. Users had a strong demand for this, and particularly the Ministry of Finance who wanted to use it in the Long-Term Programme to be issued in early 1997. The EEA Agreement also called for long backward time series. Figures dating back to 1978 were published in May 1997.[11] Simultaneously, revised estimates for fixed assets and consumption of fixed capital became available.

[11] Statistics Norway (1997). More details in Statistics Norway (1998a) and Statistics Norway (1998b).

For consumption of fixed capital, there was a change in the estimation method from linear to geometric depreciation, and the estimated average lifetime of fixed assets was revised (Todsen 1997). This contributed to higher estimates than before, also from the higher level of investments in several industries. In total, consumption of fixed capital increased by 20 per cent. This meant that national income and disposable income for Norway increased by 6 per cent for the reference year 1990, which was a smaller increase than for GDP (Statistics Norway 1997).

In 2001, the main revision work was finally completed with estimates published dating back to 1970. The calculation back to 1970 was confined to annual estimates for the real economy. Time series for quarterly estimates (Statistics Norway 1999b) and for institutional sector accounts were reconciled with the annual estimates for the real economy dating back to 1978.

2000s:

8. New statistics and new revisions

Further development in several areas succeeded the comprehensive main revision of national accounts that took place in the 1990s. Satellite accounts were established for health, tourism and environment, followed by satellite accounts for non-profit institutions in 2010. Quarterly national accounts were expanded to include new systems for estimating labour and providing institutional breakdowns. These projects were developed to meet demand from Norwegian users and obligations towards Eurostat. In addition, the need for a new revision of national accounts emerged when Statistics Norway published new statistics with a higher quality than some of those that had formed the basis for main revision 1995. Changes in the statistical basis also led to changes in the balance of payments. One milestone was the publishing of "complete national accounts" by Statistics Norway for the first time in 2009.

8.1. Data revision 2002

Business statistics in the form of structural statistics for enterprises were developed and established in Statistics Norway in the second half of the 1990s. These statistics replaced former production statistics (establishment-based) and provided new levels of output, intermediate consumption and gross fixed capital formation in quite a number of industries. In industries like construction, wholesale and retail trade, business services, and hotels and restaurants, changes from previous statistics were so extensive that it became impossible to implement this new information on a current basis in the national accounts. Thus, another main revision of the national accounts was needed, this time termed a "data revision" as it had a more limited scope than the main revision 1995.

The new data sources were utilised, and in addition, the method used to calculate fixed assets and consumption of fixed capital in government was changed to the geometric method - as used for other industries. New international classifications by purpose of household consumption and functions of government consumption were implemented. Additionally, in the case of government consumption, the level was raised, partly due to new figures on consumption of fixed capital. Institutional sector accounts were also revised, inter alia because data from new accounting statistics for private non-financial enterprises were incorporated.

New price indices were implemented in the national accounts, among them quality-adjusted indices for PCs and some other capital goods. In addition, some new price indices had been devised in foreign trade statistics in the 1990s. Use of these new price indices indicated that the growth in manufacturing income, to a larger extent than was previously known, was a result of gains in prices rather than favourable productivity development. The increase in costs was weaker than for producer prices in manufacturing according to this new price information.

The calculation of dwelling services was again altered. While the main revision 1995 had resulted in a much higher output of these services than before, the revised figures were now reduced somewhat. This was due to new figures from surveys of rents that were implemented.

The cooperation or contact with other units within Statistics Norway was closer this time than before, with many meetings held, and a steering group was established for this purpose. The question of how far back the time series should be revised was discussed again, but since there was relatively little new data for the period 1991-1995, the old estimates were kept for the years pre-1990. However, since the new estimations provided higher output in several industries for the last half of the 1990s, the growth rates for the 1990s as a whole were somewhat higher than previously estimated.

The results of the data revision for the years 1991-2001 were presented in Fløttum, Halvorsen and Skoglund (2002). In total, the GDP figures were revised moderately upwards for the reference year 1997 by 1.4 per cent. Value added for construction and hotels and restaurants, however, was increased by 10 and 20 per cent respectively.

Later in 2002, revised estimates dating all the way back to 1970 were published, and these implemented the geometric method assumption for consumption of fixed capital in government for the years 1970-1990 as already done for the years post-1990. This resulted in a moderate revision upwards for estimates of government consumption (0.8 per cent for 1970).

Simultaneously with the new annual estimates, quarterly figures for the 1st quarter of 1999 to the 1st quarter of 2002 were published in June 2002. Revised quarterly figures backwards were not published until April 2003. Reconciliation and a quality assessment of the quarterly estimates against the revised annual estimates were performed by a project group in which the Research Department also participated, see Tønjum (2003).

8.2. Main revision 2006

The results from another main revision of national accounts were published in December 2006. The main issue this time was to implement a new EU Regulation on FISIM (Financial Services Indirectly Measured), i.e. to allocate these services to their users (Brathaug et al. 2006). Allocation to household consumption and exports of these services resulted in higher GDP, by around 1 per cent. The methodology was also changed in the case of value added tax treatment, again due to a new EU Regulation, according to which total time-adjusted value added tax recorded in government accounts should be the amount reconciled in this case.

Annual time series were revised back to 1970, except the institutional sector accounts, which were taken back to 1978 in the revised series. At the same time, the quarterly estimates were also revised back to 1978.

A comprehensive change in the method used to calculate labour accounts was also presented, with revised estimates (Skoglund 2006). The new system of labour accounts was made much more flexible than before, utilising more statistical sources and improving data quality. Jobs were introduced as a new variable in the series from the year 2000, again according to international recommendations. Wages distributed by gender were calculated at this juncture. Previously, only employment estimates distributed by gender had been released. Except jobs, labour accounts estimates were all revised backwards to 1970.

In 2009, the work on breaking down employment and wages in labour accounts by education group was completed. The first calculations in this field were carried out in the 1990s, but were not comprehensive enough to include all industries with respect to wages. The results back then were however used by the Research Department in several analyses on education and its importance in the Norwegian economy (inter alia in Lindquist and Sagelvmo 2000).

8.3. Integration of financial and non-financial accounts and development towards "complete national accounts"

The Division for financial statistics had published financial sector balances since the 1950s. Norges Bank was among the main users of such data, and in the 1980s asked Statistics Norway if it could draw up quarterly financial balance sheets by sector. However, Statistics Norway was at that time reworking the system of financial statistics and could not therefore give any priority to the request from Norges Bank. Annual rather than quarterly financial balance sheets were aimed at in Statistics Norway. Norges Bank therefore decided to take on the quarterly project by itself, and a system of quarterly financial accounts was established around 1990 named FINSE. The data included stocks as well as transactions and revaluations. Thus, in the early 1990s, Norway had a complete set of national accounts, but the presentation was not uniform and was made difficult by shared responsibility between the two institutions.

The new development of institutional sector accounts was based on the international principles set out in 1993 SNA. In practice, however, it was difficult to integrate the financial sector accounts into a common way of publishing when the results of the main revision 1995 were presented. The national accounts statistics publication for institutional sector accounts for the years 1978-1996 included financial balances for the six main sectors (general government, financial corporations, non-financial corporations, households, non-profit institutions

serving households and rest-of-the world) attached to tables of income accounts by institutional sector.[12]

An important event occurred in 2007, when the statistical division of Norges Bank was transferred to Statistics Norway. Consequently, the three main parts of the national accounts - accounts of the real economy, income accounts and financial accounts – were all produced in the same institution and same department. Efforts to integrate the accounts into what was referred to as "complete national accounts" were quickly initiated. The result was published in an article in Statistics Norway's Statistical Magazine in February 2009 (under the title "Historically high public investments."). The main component of this publication was tables for the years 2005, 2006 and 2007 that incorporated complete national accounts for the main institutional sectors for production, via income generation and distribution, use of income and saving, to capital formation and revaluation of assets and liabilities. The table was rounded off with end of year stocks of both real capital and financial capital. The full table is now published on an annual basis under the title "National accounts, financial and non-financial institutional sector accounts".

Thus, it took 50 years from when Petter Jakob Bjerve and Mikael Selsjord presented their plans for such a table in Bjerve og Selsjord (1959) until Statistics Norway finally accomplished these ideas!

8.4. Discontinuation of foreign exchange statistics and reworking of balance of payments

In 2001, Norges Bank decided to discontinue the foreign exchange statistics at the end of 2004. Giving the payment figures some kind of reasonable economic interpretation in statistical terms had become more and more problematic. Statistics Norway, in cooperation with Norges Bank, therefore initiated the UT project ("UtenriksTransaksjoner", meaning transactions with rest of the world), with the purpose of establishing a new method for collecting data to replace the scrapped foreign exchange statistics. The balance of payments as such was changed to take into account the new calculations based on new sources. The new approach was presented in Halvorsen, Sande Olsen and Volden (2005), and the first results were published for the 1st quarter of 2005 in June the same year.

8.5. Advisory committee for balance of payments

Back in 1955, a committee had been appointed to examine the observed difference between current account and capital account, i.e. on net lending calculated from the two approaches. This was later renamed the Advisory committee for balance of payments, and was to act as a coordinating body in the balance of payments statistics. Members of this committee came from Statistics Norway, Norges Bank and the Ministry of Commerce initially, and subsequently also from the Ministry of

[12] See Statistics Norway (1998b).

Finance, and sometimes also from the Norwegian Shipowners' Association when relevant issues appeared on the agenda. Petter Jakob Bjerve was the first head of this committee. The committee discussed professional issues related to balance of payments, foreign trade statistics, ocean transport statistics and the financial census against abroad, and thus played an important role in monitoring the quality of control in these statistics. The frequency of the meetings changed over the years, from about six times a year in the first 25 years to once a quarter later on. In the light of the practice established to provide equal access to statistical data, it may seem odd to come together to approve data being released a few days later. The justification was partly the knowledge possessed by Norges Bank in the area of foreign exchange statistics and by the said ministries in ocean transportation etc.

In the 1990s, the meetings were held after (not before) the publication of balance of payments data, and twice a year only. With the discontinuation of the foreign exchange statistics in 2004, the committee ceased its activities.

8.6. Advisory committee for national accounts

Statistics Norway has also tried to establish an advisory committee for the national accounts in general. Such a committee was established for the first time in 1979 and held two or three meetings. In view of the diminishing follow-up by the participating institutions (inter alia based on their use of national accounts figures), Statistics Norway no longer gave priority to such meetings and they ceased for a while. In 2000, a new attempt was made to hold such a meeting. As before, the participants represented the most important users in ministries, organisations, banks and universities. In the first meeting, Statistics Norway informed the participants about its most important developing projects with regard to revisions, quarterly accounts, balance of payments, labour accounts and satellite accounts.

Another meeting was held in 2002, the main issue being the results of the recent main revision. International requirements for the quality of national accounts estimates were also an issue. Only a few invited participants met up, however. One reason for this seemed to be that there was little scope to have any influence since the international guidelines and requirements for international reporting were setting the agenda for the contents in national accounts. More recently, there has been some talk about resurrecting this committee, but so far this has not happened. There is satisfactory contact with the most important users, however, i.e. the Ministry of Finance, Norges Bank and business cycle analysts in other institutions, and in many cases the users have taken part in the development work.

8.7. Quality of national accounts estimates

Accuracy has traditionally been the most important quality requirement for national accounts, but in recent years this has been expanded to also include other dimensions. Sources of data and methods of estimation are two factors of utmost importance to the quality work. Incomplete accounting statistics have been mentioned above, as have weaknesses in the retail sales index. Quality

improvements in the national accounts are made both on an ongoing basis and in leaps through main revisions.

Quality analysis takes different forms, one type being a comparison between provisional and final estimates for a period of time. When items are systematically over- or underestimated in the provisional estimates, this could indicate a potential for improvement. Such revision analyses are described in Mæhle (1990) and Evensen (2004b). The conclusion from the last analysis was that provisional national accounts estimates published over the last 30 years have somewhat underestimated activity growth compared with final estimates, but have nonetheless provided a reasonably accurate illustration of the macroeconomic development. There has also been a tendency for revisions to become smaller over time (Evensen 2004b, p. 32). The biggest failures in the provisional estimates during the period 1972-2004 occurred in 1987 and 1988, mainly explained by the change in base year in those years.

Norwegian quarterly national accounts have been evaluated in a comprehensive survey, as part of a project on systematic quality work (SQW) in Statistics Norway. The evaluation was carried out at the request of the Ministry of Finance and included all elements of the compiling process, from data collection to presentation of estimates. The quality of sources and quality of methods were both evaluated. In addition to national accounts staff, the most important data suppliers took part in the project. The report from the project group, published in Evensen (2004a), concluded that there was a need to strengthen contacts between the Division of national accounts and other divisions, and for more systematic revision analyses to be undertaken. Calculations relating to oil activity in the national accounts were reviewed in another SQW project. Several measures were suggested in order to improve the connection between the various sources used in this important industry (Evensen 2006).

The European Commission and Eurostat have undertaken evaluations of national accounts in all countries that are subject to the EEA Agreement. When the Norwegian national accounts were evaluated in the 1990s, the conclusion read as follows: “The Norwegian national accounts are of a high quality, soundly based on reliable and exhaustive sources, integrated in a system with a detailed product breakdown” (Report on the sources and methods used in compiling GNP in Norway, Eurostat/B1/CPNB/237/EN, 9 December 1997, Luxembourg). Eurostat has since then evaluated the Norwegian national accounts in 2004 and in 2010, the conclusions from which seem to still be the same.

In an evaluation report in 2003, the IMF also gave positive feedback on the Norwegian national accounts: “The source data for both annual and quarterly national accounts are generally sound and timely, and sufficiently portray reality….The compilation processes are highly computerized for both annual and quarterly accounts, characterized by use of commodity flow method at a very

detailed level in the annual calculations, and more aggregated in the quarterly calculations" (Fløttum 2006 pp. 125-126).

These international evaluations also point to some deficiencies, inter alia the treatment of changes in inventories as a residual. In a project financed by Eurostat, the possibilities for utilising available statistical data for this aim were reviewed, which it was thought could improve the estimates (Gimming, Jakobsen and Løkkevik 2006).

Another quality problem in the national accounts is the treatment of cross border flows of employees. This issue is discussed in another project co-financed by Eurostat, see Halvorsen (2007).

8.8. Productivity analyses

Productivity analyses have been an important area of use for the national accounts for many years. As early as the 1950s, from estimating production functions for the Norwegian economy based on data for 1900–1956, it was found that by keeping capital and employment constant, national product will grow by 1.8 per cent per year as a result of improved techniques etc. (Aukrust and Bjerke 1958, p. 21). According to Odd Aukrust, it was sensational that the "human factor", as he called it, had such a large bearing on the economic growth (Aukrust 1993, p. 42).

Since then, productivity calculations in many contexts have been used to analyse economic development, both over time and between countries. An example of the former is calculating "total productivity". Statistics Norway has released such productivity estimates in recent years, published in Economic Survey. Several international organisations, among them the OECD and Bureau of Labor Statistics, publish current international estimates on labour productivity based on national accounts statistics.

Productivity calculations, however, raise a number of methodology problems frequently discussed in international fora, including what could be behind the so-called "productivity paradox". The Nobel laureate Robert Solow once remarked: "You can see computers everywhere but in the productivity statistics". After the 1995 main revision, calculations showed that Norwegian figures revealed much stronger productivity growth in Norway than in the USA (Fløttum and Skoglund 1997).

In Norway, estimates of hours worked have been calculated ever since 1989. It is generally accepted that hours worked constitute the measure of labour input best suited for productivity analyses. Whether to use output or value added to represent the numerator has often been discussed. The difference between the two could be highly significant, particularly for manufacturing industries. Holmøy and Todsen (2007) have argued that there may be theoretical reasons for using output figures

when analysing detailed industries, and for using value added in cases of more aggregated industries.

Productivity calculations are especially problematic in general government when output and prices are normally determined from the cost side. Estimates of government productivity have been attempted based on different considerations, for instance, in the 1960s based on wage statistics, and using the same basis again in the 1980s, by assuming that labour upward shifts could indicate productivity growth. The latter effort indicated a productivity growth between 0.1 and 1.0 per cent, except in defence where zero productivity growth was assumed. Conventionally, productivity growth in other government industries was fixed at 0.5 per cent (Fløttum and Skoglund 1997).

In a Eurostat project, Statistics Norway carried out calculations in 2003-2004 in order to improve estimates of government productivity through so-called quality-adjusted labour cost indices. The calculations were register-based (detailed wage information) and limited to collective services (Røgeberg, Skoglund and Todsen 2004). Results were 0.6 per cent for central government administration and 0.8 per cent for defence (averages for 2000-2002). These calculations have subsequently been extended to include local government and more industries therein on an annual basis.

In later years, work on developing direct output methods in government was started, thereby improving volume measures in government in the areas of health, social welfare and education.[13] Volume measures from the cost side ("input methods") are no longer accepted for individual services in general government according to Eurostat (2001).

8.9. Satellite accounts

Satellite accounts are defined as "special constructions that are partly integrated with the central framework of national accounts" (Fløttum 2006, p. 249), a main point being to provide detailed information on certain areas or themes.

Through satellite accounts, special purposes and user groups can have their interests satisfied. By involving main user groups of the various themes, national accounts have gained extra resources from external financing. Another benefit has been improved cooperation between national accounts and other divisions in Statistics Norway responsible for underlying data, both in developing data and in the operation phase. Work on satellite accounts has also meant a lot of international contact, since the projects are based on international recommendations.

An early attempt to apply the satellite accounts approach in the area of health based on a French tradition was made in Statistics Norway in the late 1980s. The

[13] See Dam and Sørensen (2008).

background was an increased demand for quantitative information on health services. The National Accounts Unit in this way also mapped the need for improved statistics in this area. In particular, weaknesses were revealed in the private health sector (Røstadsand 1989, p. 23).

Satellite accounting work on health had a lower priority during the 1990s, but was resumed in 2004 when the so-called health accounts were established, based on the OECD manual guidelines. This work was developed and operated through cooperation with the Division for health statistics in Statistics Norway, and the project was financed by the Directorate of Health (Brændvang 2008). There were various main objectives: to provide estimates of total health expenditures, to determine the producers as well as the users of the various health services, and to determine the financiers behind these expenditures. Statistics Norway publishes annual figures of health accounts with consistent time series dating back to 1997. Statistics Norway also took part in developing the OECD guidelines for the health accounts (OECD 2000).

At the end of the 1980s, the OECD began an initiative to utilise national accounts for analyses of tourism. Statistics Norway responded to questionnaires, but awaited further work in order to better coordinate this with the forthcoming main revision. New satellite accounts for tourism were developed and integrated with national accounts, presented for the first time in Evensen and Sørensen (1997). These were based on an international manual prepared by the OECD, World Tourism Organization, EU and UN. The manual clarifies the relevant definitions and how the effects of tourism are to be measured and presented. The National Accounts Unit publishes annual data at national level on an annual basis, and at regional level on an ad hoc basis. The development of satellite accounts for tourism was financed by the Ministry of Industries and Commerce.

Satellite accounts for the economy and environment were initiated in the second half of the 1990s, and developed within a project called NOREEA (NORwegian Economic and Environment Accounts), which was financed by the European Commission and Ministry of Environment.[14] This was a joint project between the National Accounts Unit and the Unit of Environment Statistics in Statistics Norway. Data have been available since 2002. Data on emissions to air are aligned with national accounts every year using common definitions and groupings.

The NOREEA project also includes natural resources, environmental costs and environmental taxes. In the Norwegian national accounts, there has been no understanding for constructing environmentally-corrected GDP ("green GDP"), rather developing supplementary data and analytical systems instead. How to evaluate different environmental factors is a difficult task, see Nyborg and Aaheim (1991).

[14] See Hass and Sørensen (1998).

Also, Statistics Norway was engaged in the work to develop a new international standard in this area; the System of Economic and Environmental Accounts (SEEA). Within the context of resources accounts, Knut Ø. Sørensen from the Division of National Accounts was asked to prepare a draft chapter on mineral resources. Towards the end of the process, Svein Longva, director general of Statistics Norway, was elected leader of "Friends of the Chair", a group set up to bring all the chapters to a final close. Work has been resumed in later years, the aim being a standard on a par with the SNA standard of national accounts. Knut Ø. Sørensen and Olav Ljones have participated from Norway, the latter through his role as leader of the Oslo Group for Energy Statistics.

The Division for National Accounts has also been involved in calculations of national income as an indicator for sustainable development, see Greaker, Løkkevik and Aasgaard Walle (2005).

In recent years, Statistics Norway has been engaged in work on satellite accounts for research and development (Sørensen 2008). The objective here is to establish a basis for analysing the connection between productivity and investment in research and development (R&D). Eurostat has found it appropriate to organise this work within the context of satellite accounts, also involving contributions from Norway, and later to implement calculations in national accounts.

In 2009, satellite accounts for non-profit institutions (including volunteer activities) were developed within the context of national accounts. The first results were published in January 2010 in Statistics Norway's Statistical Magazine. These satellite accounts were defined as official statistics in December 2010 and are to be published every year. The Ministry of Culture financed the development of this satellite accounting work, which is based on the UN Handbook on Non-Profit Institutions in the System of National Accounts from 2003 (United Nations 2003). An important objective is to measure the unpaid work carried out by volunteers. The accounts aim to calculate the value of the contribution from the voluntary sector, enabling comparisons with other countries and to prepare time series for this sector in order to study development over time.

National accounts by county as well as calculations of unpaid household work can also be characterised as satellite accounts (Fløttum 2006). Work in these areas is described earlier in this publication.

8.10. Extending quarterly accounts

In the second half of the 1990s, a project to develop quarterly labour accounts was initiated and became an integrated part of quarterly national accounts (QNA). This project was extremely sought after by the Ministry of Finance and other users, and furthermore, quarterly data on the labour market was one of the reporting requirements for Eurostat. In 1997, employment data by industry was published for the first time (as part of QNA). Before that, the Division of National Accounts had

prepared estimates on employed persons, hours worked and wages following a simplified approach for use in business cycle analysis by the Research Department. These estimates were never published.

Quarterly estimates of hours worked have been published since 1999, quarterly estimates on wages per full-time equivalent and compensation of employees from 2004. Seasonally-adjusted estimates have also been published for quarterly labour accounts since 2004.

In business cycle analyses, there is a need to eliminate seasonal variations. In particular, the occurrence of Easter in either the first or the second quarter is problematic for analysts when only non-seasonally adjusted figures are available. So, the preparation of seasonally-adjusted figures has been considered an important part of the quarterly national accounts computation. The method used is based on X12-ARIMA. The Research Department was originally responsible for making the seasonal adjustment, but this task was transferred to the National Accounts Unit in 2003, which resulted in the unit having to strengthen its competence in this area.

As from 2007, quarterly national accounts were published two weeks earlier (i.e. after 50-52 days) than before in order to meet the needs of national as well as international users.

Since 1998, the National Accounts Unit has been preparing a monthly index on the consumption of goods (volume index), with a somewhat more extensive content than the retail sales index. The index uses the same definitions and methods used in QNA, thus making it an indicator of household consumption of goods, and it is published with non-seasonally adjusted as well as seasonally-adjusted figures.

In 2005, the first quarterly institutional sector accounts were published. These have been confined to sector household and non-profit institutions serving household only, but will later be extended to include all sectors in institutional sector accounts (Frøiland 2005). Quarterly institutional sector accounts are harmonized with QNA and published just two or three days later.

8.11. What does value added mean?

During the pioneer years, the issue of whether to include unpaid household work in the national accounts was discussed. This activity was, in fact, included, and within the production boundary of national accounts, during and after World War II. When this treatment was not supported internationally, this activity was accordingly removed from the Norwegian national accounts. However, own production and corresponding use of food in the households have been part of value added in the national accounts. As already mentioned, Statistics Norway has calculated figures for services of unpaid household work in the context of separate satellite accounts, most recently for the year 2000, see Reiakvam and Skoglund (2009).

In satellite accounts for non-profit institutions, unpaid work in these organisations (not included in the national accounts) has been estimated. This includes inter alia unpaid work within sports and cultural activities, as well as various forms of club activities. Paid work in such activities is, however, included in GDP.

Estimate of value added of unpaid work not included in GDP. NOK billion

Unpaid household work	359 (2000), 24 per cent of GDP
Unpaid work in non-profit and volunteer organisations	55 (2008), 2 per cent of GDP

In construction, it can be difficult to determine what should or should not be included in value added for national accounts. As described earlier, repairs and maintenance were included in gross fixed capital formation and GDP in Norway until a main revision was carried out in the early 1970s, but from then on were excluded. Households' own construction, including second home construction, is regarded as part of production for own use in the national accounts and thus part of value added. In principle, "black" activities are to be included in the new main revision (see below) in order to try and improve these areas of national accounts.

Illegal activities have so far not been included in national accounts estimates in Norway. Despite doubts and presumably weak estimates, there has been increasing pressure from the EU for member states and Norway to carry out calculations on illegal activities in order to have better coverage in the national accounts and to improve comparability between countries. Several countries have prepared estimates on both the illegal economy and other kinds of hidden economies (Fløttum 2008). The OECD (2002) has prepared guidelines for such calculations. Norwegian estimates on prostitution, narcotics and smuggling are presented in Evensen (2011).

Sometimes also outside national accounts circles, there have been discussions on what value added means. In August 2010, based on value added estimates in the national accounts by county, the media initiated a debate on this topic. Many, including business people, characterised the estimates of Statistics Norway as "crazy" and "meaningless". Interestingly, those making such claims often had little understanding for services such as financial and IT services, and general government, being part of value added activities! The director general of Statistics Norway had to defend its position by referring to international guidelines and statistical requirements. The Minister of Trade and Industry even said: "It is strange that well-paid and qualified staff in Statistics Norway spend their time on such calculations" (Aftenposten, 13 August 2010).

8.12. New activity classification calls for new main revision

In 2007, the National Accounts Unit embarked on a new main revision published in November 2011. The main issue this time was to introduce a new activity classification, SIC2007, to the national accounts, based on the EU's revised standard (NACE Rev.2).

The new standard entails the number of major divisions increasing from 17 to 21. Revised estimations of most national accounts figures are carried out backwards to 1970, mainly using summary mechanical methods.

Also, the main revision has introduced figures from sample surveys on exports and imports of services, and from projects on mapping the extent of black work and illegal activities.

9. Consultancy in developing countries

9.1. The first tasks

Macroeconomic planning and national accounts

During the1950s and 1960s, it was jokingly said in certain circles: "Do the national accounts and see the world" (Aukrust 1993, p. 20). After establishing national accounts in the early 1950s in Norway, many Norwegian experts helped build national accounts in other countries. Thus, several countries, especially in Africa, have systems of national accounts that are influenced by Norwegian tradition and thinking. International organisations and the Norwegian Agency for Development Cooperation (NORAD) recruited many economists (Bjerve 1989, p. 207). Stein Rossen was in a central position attached to the UN system (from 1952 onwards) for tasks that Petter Jakob Bjerve and other Norwegian economists undertook in developing countries. Rossen had worked as an assistant for Frisch at the University of Oslo, where he gained experience in national accounts. He also served as the first head of the Research Department in Statistics Norway.

Consultancy groups at Harvard University

From 1954 to 1970, Harvard University in the USA engaged in a consultancy project in Pakistan, the first of many similar projects. In 1967-1968, Eivind Erichsen, whilst on leave from the Ministry of Finance in Norway, was leader of the Harvard group in Pakistan, and several Norwegian experts became attached to it, among them Arne Øien, who was later appointed director general of Statistics Norway (in the 1980s).

DERAP, Chr. Michelsen's Institute in Bergen

A similar consultancy group, DERAP (Development Action and Research Programme) was established in 1965 at Chr. Michelsen's Institute (CMI) in Bergen, the first in Europe. Several economists from Statistics Norway were engaged in short-term or long-term consultancies in developing countries for this institute.

Petter Jakob Bjerve was an adviser in five developing countries in the period 1964-1986. The first of these was in Zambia where he also constructed a simple input-output model in order to coordinate the real economy content of his report. He also dealt with items of financial accounts, following a Norwegian-built model, later in Pakistan to involve eight sectors and a number of financial instruments. Bjerve also emphasised the need for better data in national accounts, inter alia regrouping of government expenditure to meet national economy principles.

9.2. Escape of national accounts experts in 1960s, love of adventure or Norwegian missionary tradition?

Consultancy work under distant skies

In the early 1960s, Norwegian economists were in great demand as advisers in developing national accounts and economic planning in developing countries. One such economist was Anna Margrethe Martens, who had worked with national accounts in Statistics Norway from 1957 and went to Africa in 1963 to stay there for the rest of her career. The current director general of the National Statistical Office in Malawi, Charles Machinjili, once said he got his knowledge of national accounts from "Miss Martens".

Per Sevaldson from Statistics Norway was engaged in consultancy work in India in 1961-1963. Erik Homb, who was head of the national accounts division in Statistics Norway from 1966 to 1978, was appointed UN adviser for national accounts in Malaysia from 1963 to 1964. Reidar Øines, after working with national accounts in Statistics Norway since 1953, went to Zambia as a UN adviser in 1965. He later served at the UN Headquarters in New York, and then from 1970 to 1976 was an adviser in Malaysia as the successor to Erik Homb in the implementation of SNA1968 using Norwegian methodology. Commodity balancing from his time is still used in Malaysia. Mikael Selsjord worked as an expert adviser for NORAD in East-African countries in 1965-1967 in the planning of financial statistics, and in 1972-1976, carried out consultancy work for CMI at Bangladesh Bureau of Statistics.

Input-output tables in Puerto Rico and Nicaragua

In the 1970s, planners and politicians in many small countries wanted to use national accounts and input-output as a basis for macroeconomic planning. Erik Homb assisted Harvard University in Puerto Rico in such an effort. In Nicaragua, after the earthquake in 1972, Harvard University was engaged in a project on economic planning for reconstruction, and in 1973 two experts from Norway (Liv Bjørnland and Dag Bjørnland) were preparing input-output tables according to 1968 SNA.

9.3. National accounts projects in Botswana, Jamaica and Zimbabwe

Botswana 1977-1988

The Central Statistical Office in Botswana contacted DERAP for assistance in improving their national accounts, work which was later funded by NORAD. A total of five successive national accounts experts were contracted, each for a period of 1-3 years, the first of whom was Odd Ystgaard in 1977. The staff situation was later to become so critical that the Norwegian experts had to carry out current national accounts work. NORAD brought the project to a halt in 1988.

Jamaica 1979-1984 and 1995

In June 1979, there was an agreement between the authorities of Jamaica and Norway to prepare a macroeconomic planning model for Jamaica, this also financed by NORAD. Arne Øien led this model work, based on the input-output structure of the economy. The data basis for the model was handled by national accounts experts from Statistics Norway and a Norwegian IT specialist. Detailed supply and use tables (SUT) were prepared, as well as input-output tables (IOT), and carried out in three different phases:

- *Phase I (1979-1980):* Establishing new national accounts for Jamaica with integrated SUT/IOT for 1978.
- *Phase II (1981):* Further developing of methods and IT approach for annual updating of SUT and converting to aggregated IOT.
- *Phase III (1984*): Developing complete methods and IT system for annual updating of SUT in current and constant prices, with detailed publishing of SUT/IOT for Jamaica in 1984.

In 1995, the Jamaican national accounts office still had the same staff who had participated in the Norwegian project. SNACZ software developed for Zimbabwe was installed in this year and training was given.

Zimbabwe 1984-1990

In 1983, the Central Statistical Office (CSO) asked DERAP, CMI for a "preliminary mission to assess the possibility of setting up a project on the compilation of input-output tables for Zimbabwe". It was determined that experience from the Jamaican project would be relevant and should be utilised in Zimbabwe. In the follow-up project, Liv Bjørnland was hired by NORAD as project head, and during several short visits over the period 1985-1990, and a longer visit in 1986-1987, technical assistance and training in national accounts methodology for developing revised national accounts were provided, including integrated SUT/IOT for the year 1984. The SNACZ software that was developed for Jamaica by Hans Kristian Langva was also improved and adapted for Zimbabwe (for DOS on PCs) by Langva in cooperation with IT expert Kjell Stræte from Statistics Norway, and was well documented.

9.4. Short-term projects of technical assistance on adaption to the 1993 SNA

Statistics Norway had implemented 1993 SNA/ESA 1995 very early (in 1995, in fact). Shortly afterwards, several senior staff in the National Accounts Unit made short or long-term visits to other countries to advise and assist them in adapting the new national accounts system. Examples are 1993 SNA implementation for St. Lucia and other Member States in the ECCB (Eastern Caribbean Central Bank) in 1998, and satellite accounts on tourism for Belize in 2003.

In 1996, Statistics Norway made several short-term visits in order to provide technical assistance to the Palestinian Central Bureau of Statistics (PCBS) in Ramallah. A "master plan" was drawn up to construct national accounts in

Palestine based on 1993 SNA, and assistance was given to prepare the PCBS publication "National Accounts 1994: Preliminary Estimates".

Norwegian economists have contributed as national accounts experts in many developing countries. The picture at the top is from a national accounts project in Jamaica in 1980, with Liv Bjørnland (Hobbelstad Simpson). The picture below is from a national accounts project for Palestine Authority in 1996, with Liv Hobbelstad Simpson, Anna Rømo and Ann Lisbet Brathaug.

9.5. New challenges in Malawi and Eritrea

Malawi

For Malawi, aggregated input-output tables were constructed for the year 1994 in the National Statistical Office (NSO). National accounts were later updated in 1994 prices and inflated to current prices using consumer price indices. In introducing supply and use tables, available economic statistics were utilised in national accounts for the first time, such as import and export data (values and quantities) and production statistics for large enterprises. Three national accounts experts from Statistics Norway had long-term stays: Nils Amdal in 2004-2006, Steinar Todsen in 2007-2009 and Ann-Kristin Brændvang from 2010, in addition to experts on short-term visits. The Norwegian IT application SNA-NT is installed on PCs in NSO and is used for the computation of annual national accounts. Improvements to data sources for national accounts have been taken up in the project "annual economic survey", again with assistance from Statistics Norway. The first milestone was reached in March 2007 with the presentation of revised national accounts figures for 2002-2005. The Finance Minister declared that: "Malawi`s economy is 37.5 per cent bigger than previously estimateted" (Business Review, Supplement to The Nation, 29 March 2009). NSO has subsequently published national accounts containing detailed tables of national accounts and input-output tables for 2002-2005.

Eritrea

There was an agreement in 1999 between the National Statistical Office (NSO) in Eritrea and Statistics Norway on institutional cooperation on economic statistics including national accounts. An expert from Statistics Norway (Håvard Sjølie) was in place from 2005-2007 to establish new national accounts for Eritrea based on the IT application SNA-NT. In addition, several staff from Statistics Norway have been there on short-term visits to work on national accounts and other economic statistics, also improving their business register. The first national accounts for Eritrea (including SUT) were established for the year 2003. By 2007, national accounts figures for 2003 and 2004 had been established, and the following year also for 2005.

9.6. 50 years of experience with national accounts projects in developing countries

In countries of cooperation, the support from Statistics Norway has mainly related to building capacity at the national statistical offices and developing and implementing superior national strategies on developing statistics. The experts taking on these tasks with respect to national accounts, most often from their daily work in Statistics Norway only have experience from specific areas of national accounts, while gaining a broader experience from their work in developing countries. Training adapted to the needs of the particular country is important in order to ensure continuity after the expert has left. The challenge is to establish an

approach that conforms with international guidelines, and also takes into account the economic conditions in the particular country.

Projects in developing countries have given the Norwegian advisers experience in cooperating with leaders of national statistical offices with the aim of contributing to a plan to develop statistics in the country that are required for national accounts. The advisers have also gained useful experience from their contact with the main users of national accounts: central bank, ministries and international organisations, in particular the IMF.

Such development projects aim to provide a higher level of competency among the cooperation partners, but also among the Norwegian advisers. Many experts from Statistics Norway have been engaged in new tasks in developing countries for a period of time, which have been quite stimulating, and useful experience for their career in Statistics Norway. Working in a developing country for a period of time certainly involves new professional challenges, but also enables the Norwegian advisers to meet new people in a new environment.

10. National accounts going forward

10.1. More focus on level data

After 60 years of existence, the national accounts are deeply rooted in the public information base in Norway. National accounts data are essential in macroeconomic analyses, in tests of economic theory, in education and in public discussion of economic conditions and economic policies. Fairly recently, the national accounts have also been used as a base of taxes and for allocation of expenditures to EU countries relative to their national income position. The size requirements for government deficit in EU countries also relate to national accounts items. For these purposes, the focus on level data has become stronger. Most of the attention has traditionally been directed towards data describing development over time.

The new complete order of institutional sector accounts in Norwegian national accounts means that the level of size of the items is clearer than previously. The dual requirements for a correct description of economic development and size level mean more stringent quality requirements for sources of data, methods used and, not least, documenting national accounts arrangements. Completeness has become a key word, and more resources are needed to catch up with economic activities that fall outside normal registration routines. These activities also affect the levels and the internal consistency of the system. More frequent main revisions are needed to correct for wrong levels in earlier years, in order to have comparable figures over long periods of time. In future, it may be necessary to carry out main revisions every five years. How far back the revisions are needed for is another matter for discussion. Many users want to have long time series. Consequently, in the last main revisions, Statistics Norway established detailed revised series all the way back to 1970. This may not be necessary in the future for various reasons, it is costly and may not be beneficial to retain the same structure in national accounts over several decades. Alternatively, the very long time series could be kept at a relatively aggregated level.

10.2. Criticism of national accounts

Over the years, criticism has been levelled at the lack of consideration given to social conditions in the national accounts. One case often mentioned is unpaid household work being left out, which means that the total value of productive work is undervalued, while GDP growth is being overvalued in periods when women's participation in the labour market has increased. Another case is that GDP does not take into account the deterioration of the environment (subtractions for economic costs). A "green" GDP has not been introduced to the national accounts, however. Instead, the Norwegian way of thinking is to develop physical environmental indicators to be presented in satellite accounts, and not to be incorporated as economic items in the national accounts. Own household work, health and voluntary work are other areas for which satellite accounts have been set up, i.e.

tables where national accounts figures are combined with other information, redefined or reorganised to throw light on given phenomena. A desire for more supporting tables is anticipated in the years ahead.

The national accounts and GDP are also under the spotlight with respect to the recent discussion on the measurement of life quality and the population's well-being. For such purposes, the report by the Stiglitz Commission recommends a more systematic utilisation of the comprehensive information that exists in the national accounts (Stiglitz et al. 2009). More weight could be given to household-related items and figures that throw light on income distribution in society. A good deal of the information needed is already to be found in the national accounts, but is not presented in a satisfactory way, according to the Commission, which argues for greater use of satellite accounts. Hopefully, a "pink" GDP is not being called for, i.e. a component of well-being factored into GDP!

10.3. New international guidelines

It is essential for any system aimed at providing a reliable picture of the economy at a given time to capture new phenomena and adapt to the changing needs of the users. The international manuals of SNA and ESA provide the theoretical and principle formulation of the system. In 2004, the IMF hosted the first of several meetings to discuss the updating of 1993 SNA. Extensive work has thus been underway internationally to revise these manuals, with 2008 SNA published in 2009 and ESA 2010 to be finalised in 2012. New standards have also been drawn up for the balance of payments (IMF 2009) and input-output (Eurostat 2008). The new standards require a new main revision in Norway, which is planned for 2014 and is to be coordinated with EU requirements. To a large extent, the revisions build on already established principles. One example is the need for more details on the finance part of the system as a consequence of recent financial crises. An issue that has caught special attention in Norway is the new treatment of processing, i.e. production of goods abroad according to contract. The new net treatment as service production reflects payments and business accounting more than realities of the real economy measured through physical products. We find this unfortunate, in part because traditional analysis would be difficult. Increased focus on ownership also influences the classification of activities, and entails Norwegian ownership to goods production abroad being classified as manufacturing, despite no production at all taking place on Norwegian territory.

The information available for estimating the various items in the national accounts is a vital issue, and just as important as the principles issue. During recent decades, there has been a strong development of business statistics in the area of services in particular, based on increased access to accounting data electronically. This has strengthened main aggregates in the national accounts and the estimation of absolute level of GDP. With respect to product data, we have not seen the same positive development; service products and corresponding prices are missing, and in some cases the information on products has weakened (less frequent availability

of input data). Additionally, the quality of household survey data has diminished and the frequency has been reduced. Satisfactory basic data is necessary to maintain detailed product flows in the national accounts and to decompose values into price and volume components. Detailed product groups and detailed price information are both necessary in order to achieve good estimates in constant prices.

10.4. Globalisation calls for new challenges

More weight put on ownership to transactions abroad and greater use of accounting data belonging to legal units as a source for economic statistics mean more problems in interpreting the national economy. To the extent business activities abroad and at home are a part of the same accounts or consolidated, interpretation problems will occur both with respect to development over time and finding the right level of the national economy. More active evaluation and handling of the basic statistics are needed in order to tackle such problems and to be able to present economic results and status for each country separately.

Macroeconomic analysis is not the only purpose of the national accounts; the national accounts are also a database for studying economic behaviour. The greatest challenge for the national accounts probably lies here in the years to come. While national accounts draw up the delimitations of the rest of the world based on geographical territories, the actors in the economy to an increasing extent enter into decisions and behaviour across these borders. How then can the actors' adaptation and behaviour in a country be analysed if the national statistics only cover a small part of multinational economic activity? Or, would there be a risk that the national accounts provide an incomplete and distorted picture of total economic activity in a globalised world? In order to describe and understand this totality, it may be necessary to look to a higher unit (enterprise groups) than that normally used in national statistics. However, the need for such complementary statistics does not displace the existing statistical description of the national economy. International statistical arrangements are likely to become more important than before. Having both is a challenge that calls for even closer international cooperation and greater harmonization than is currently the case.

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