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Discussion Paper

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THE SCANDINAVIAN CONTRIBUTION TO NATIONAL ACCOUNTING

by

ODD AUKRUST:

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Session 8 A
History of National Accounts
and the
Development of National Accounting concepts

SUMMARY

This paper surveys developments in national accounting theory and methodology in Scandinavia, with the focus on the period from around 1930 to around 1955 when modern national accounting was born. Sections 2-4 provide a chronology by countries and authors, with particular attention paid to the pioneering efforts of Ragnar Frisch and Erik Lindahl. Drawing on these, sections 5 and 6 summarize by subject matter the ideas contributed to national accounting by Scandinavian economists. Developments since 1955 are noted briefly in section 7.

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1. Introduction

1.1 Plan of the paper

1. National accounts, as we know them today, are essentially a creation of the late 1940s and early 1950s. It was during this period that the ideas were brought together and clarified which a decade later enabled the United Nations to achieve almost universal acceptance for the 1968 version of its System of National Accounts ("SNA Mark II"). However, important work had been done prior to 1940 in different corners of the world. In addition to an influential Anglo- American tradition, much original thinking had been done elsewhere, for example in Scandinavia. It is the aim of this paper (1) to review work in Scandinavia (Denmark, Norway and Sweden) from around 1930 to 1955, by which time Scandinavian ideas had taken their final shape, (2) in so doing, to emphasize points where Scandinavian thinking showed originality and/or deviated from mainstream ideas elsewhere, and (3) to consider the extent to which Scandinavian ideas may have exerted an influence on the present SNA.

2. With three countries to be covered, the paper is rather lengthy. It is organized as follows: Sections 2-4 contain a chronology of Scandinavian national accounting work 1930-1955, by country and author; in particular, the works by Ragnar Frisch and Erik Lindahl are described in some detail. The reader, if not particularly interested, may pass quickly over these sections. Sections 5 and 6, drawing on the above, summarize Scandinavian efforts (1930-1955) by subject matters. Section 5 deals with issues for which it may be claimed that Scandinavian economists contributed significantly to the pool of ideas out of which grew the 1968 revision of the SNA. Section 6 records, as a matter of historical interest, how a selected number of conventional issues, much discussed in the standard literature, were treated by Denmark, Norway and Sweden in the early days when international recommendations had not yet been agreed. Section 7, finally, rounds off the paper with a brief account of developments in Scandinavia after 1955.

1.2 Chronology of Scandinavian work

3. It may be helpful, as an introduction, to sketch the main trends, from the early beginning until today, in the development of national income accounting in Scandinavia. For the purpose of this paper five, slightly overlapping, phases may be distinguished. The first phase was characterized by studies aiming at estimating the value of "the national income", typically based on tax assessment statistics. This phase has limited methodological interest and will not be treated here¹. The second phase witnessed the work of two first rate economists: Ragnar Frisch in Norway and Erik Lindahl in Sweden. During the 1930s they spent much of their time on conceptual problems, considered by both as a necessary

¹ The first work of this kind in a Scandinavian country was A.N. Kiær's estimates for Norway for the year 1891, (Kiær, 1893). It is possible that Kiær's interest in the field dates further back; Frisch (1939) has a reference to 1874: ".... the year when Kiær wrote his seminal treatise on the national income". I have found no traces of such a study by Kiær. According to information given in (Wederwang, 1926), the earliest studies for Denmark and Sweden are from 1917 and 1924 respectively. According to Wederwang both studies were rather rough and not to be taken very seriously. In Scandinavia's neighbouring country to the East (Finland) an estimate of national income seems to have been carried out as early as in 1869 by K.E.F. Ignatius (Niittamo, 1982).

starting- point for fruitful macro-economic research². Similarly, for long periods, both of them also engaged in empirical national accounting work. Frisch worked intensively for many years around 1940 on the design of a general national accounting system; empirical work on implementing the system was started on an experimental basis but never completed due to events during the war. Lindahl headed the team which during the early 1930s produced the monumental study "The national income in Sweden 1861-1930" (Lindahl et.al, 1937). This work by Lindahl et.al, while conceptually having its roots in phase two, is for our purpose more conveniently considered the start of phase three. Phase three lasted from the first half of the 1930's to around 1945. It was characterized by empirical work in all the Nordic countries, largely applying (and occasionally improving upon) Lindahl's methodology.

4. A new epoch began in 1945/46 when Scandinavian economists learnt about the important developments in the field of national accounting in the English speaking countries during World War II. This marked the beginning of phase four, characterized by the introduction in the Scandinavian countries of national accounting systems as we know them today. The challenge facing those responsible for the work (Ingvar Ohlsson in Sweden, Kjeld Bjerke and Paul Milhøj in Denmark, and Odd Aukrust in Norway) was obviously to combine the best of Scandinavian and Anglo-American thinking. This task was completed well before 1955 by which time all Scandinavian countries had established new national accounting systems. These systems were retained largely unchanged until, just before 1970, a switch was made to "SNA revised". This switch marked the start of the last of our five phases during which new statistical practices led to steadily improving quality of data. However, phase five will be considered only briefly in what follows.

² Sir John Hicks reports that he met Lindahl during his stay in London in 1934 and 1935. Hicks must have been impressed; in a retrospective article in *Economica*, 1973 (p. 8) Hicks in a passing sentence refers to Lindahl as "the father of social accounting theory". Had Hicks known Scandinavian economics better, he might well have included Frisch in his appraisal.

2. The Scandinavian pioneers: Ragnar Frisch and Erik Lindahl

2.1 Frisch's system of economic concepts: The Eco-circ System

1. Economic theory in the 1920s, when Frisch started his professional career, was constrained by the fact that no unified system of concepts and terminology existed for use by economists. This created problems for an efficient exchange of views: It made precise presentation difficult, was a source of misunderstandings, and sometimes resulted in disagreements where no real differences existed. Frisch felt strongly that this confusion had to be cleared up if advances in economic theory were to be possible³. During a period of more than 20 years, starting in 1928, Frisch devoted an astounding amount of his time (and of that of his assistants) to conceptual issues, culminating with his "Eco-circ System", a first version of which was ready in 1942. One additional reason why Frisch considered the work important was his vision of a national accounting system which, based on Eco-circ concepts, at some future date would provide the data needed for turning macro-economics into an empirical science and serve as a base for macroeconomic policy. The latter, obviously, was the ultimate aim of it all⁴.

2. Frisch approached the problem of standardizing concepts for use in economics in the following spirit:

"The standardization must aim at various things: The logic of the concepts and of the relations between the concepts, the terminology, the notation in the form of letters, the graphical representation, and the accounting system. All these various forms of expression must be made as conform to each other as possible so that from one of them

³ It has been speculated (Andvig, 1986, p. 203) that at some stage Frisch's ambition may have been to construct a system for economics comparable to Linné's system for botanics. Bjerve (1986) denies this, but thinks that Frisch may well have hoped that his concepts, terminology, and symbols could be accepted as an international standard. A pointer in this direction, according to Bjerve, is Frisch's choice of mnemonic notation for his variables (Appendix A) and also the fact that Frisch in 1940 prepared, in English, a draft of 93 typewritten pages entitled "Suggestions for a coordinated system of notations in monetary theory". (As so often with Frisch this manuscript was never sent off to the printers.)

⁴ In writing the above I have relied heavily on a review article by Petter Jakob Bjerve tracing the history of Frisch's work in this field from 1928 to 1948. (Bjerve, 1986). During a great part of this period, from 1939 onwards, Bjerve was actively involved in the work, as Frisch's trusted assistant, and later, as his close associate. Bjerve's impressions of his co-operation with Frisch, then and later, are recalled vividly in (Bjerve, 1989). - According to Bjerve the first sketch of what was to become the Eco-circ System was given in a series of lectures on economic theory which Frisch gave in 1928-1929. Frisch returned to the theme in lectures on "macro-dynamics" in 1933-1934 and also in the introduction to his famous article in the Cassel "Festschrift" (Frisch, 1933) where the terms micro - and macro-economics may have been used for the first time in print. An important milestone was A general system of concepts and symbols (mimeographed, 1935) prepared as part of lectures on "modern monetary theories" with the idea of facilitating the comparison of theories of different authors. Frisch's work on conceptual issues took on an additional aspect when his institute, some years later, started experimental work on national accounting. During this period the conceptual system from 1935 was revised and presented not only algebraically, but also graphically and in accounting terms. The graphic presentation caused problems. Bjerve recollects (1986): "I took part in numerous discussions lasting for hours of what in the end became the Eco-circ graph. Unbelievable many drafts ended in the waste-basket before Frisch at long last felt happy with the result". The result was the Eco-circ system published in a mimeographed text in October 1942 (Frisch, 1942); a printed, but abbreviated version of the text appeared in a Swedish journal the next year (Frisch, 1943). After a break Frisch, assisted by Bjerve and Aukrust, returned to the problems four years later. The result was (Aukrust, Bjerve, Frisch, 1948), which may be considered a modified version of the original system from 1942.

any of the others may be read off". (Frisch, 1943, p. 106, also in Aukrust, Bjerve, Frisch 1948, p.2).

In other words, the system should allow the concepts and the relations between them to be described, alternatively, in terms of definitional equations, graphs, or sets of accounts.

3. The Eco-circ System in its original (1942) version was general in the sense that it was applicable to any sector. The system allowed for a detailed description of what went on inside each individual sector, each sector being considered in turn, and of that sector's transactions with all other sectors combined; when aggregated hierarchically over all national sectors a picture of the total economy would result. What the system did not allow for was a description of external flows between *pairs* of sectors, i.e. there was no place for "from whom to whom" analysis. In contrast, a revised version of the system from 1948 distinguished between a private and a government sector and showed the flows between the two explicitly while in other respects retaining the system unchanged⁵. The graphic representation of the original Eco-circ System is reproduced in Appendix A.

4. More relevant for our purpose than the graphic representation are the economic ideas of the Eco-circ System. A selection of them, including in particular, ideas which have subsequently influenced work on national accounting in Scandinavia, are noted in the following.

5. One favourite idea by Frisch was his insistence that the concepts used in national accounting must be established in an axiomatic manner. For instance, in (Aukrust, Bjerve, Frisch (1948) Frisch writes:

"It is through these [definitional] *relations* that the logical content of the various variables is established. The meaning of any given variable can indeed never be exhaustively defined through an enumeration, however extensive, of concrete elements which the variable is assumed to embrace. To be logically complete the definitions must therefore be established by an axiomatic procedure, and the essential part of this axiomatic procedure is the setting up of the definitional relations between the variables.when this logical structure is established it becomes a matter of practical convenience and convention to decide how much of the concrete data shall be thrown into one of the variables and how much into another" (p. 18).

In Frisch (1949) and (1955) he reasons along similar lines in an attempt to come to grips with the market price - factor cost issue.

6. To me, there are two ideas which more than anything else give Frisch's system its distinctive character. One is his insistence that "real" phenomena must be clearly distinguished from "financial" (monetary) phenomena. The other is a recognition that economic life (and therefore national accounting) is about economic objects. The two ideas

⁵ The 1948 version of the Eco-circ system clearly reflected the data requirements of the recently initiated national budgeting work. (Bjerve, 1989, p. 42). The system no longer related to sectors in general. Instead, it referred directly to the national economy as a whole, focusing, in particular, on the interactions between the public and the private sector. The influence from contemporary British White Papers is noticeable.

are interrelated (all quotations in this and the following three paragraphs are from (Aukrust, Bjerve, Frisch 1948):

"The distinction between the *real circulation* and the *financial circulation* of the economy is a distinction according to the nature of the economic objects that make up the flows in question, the real circulation being the flows and stocks of *real objects* (goods and services) and the financial circulation being the flows and stocks of *financial objects* (economic claims and counterclaims, in a wide sense)".(p.6).

The nature of real and financial objects respectively is described in the next paragraphs as follows:

"One of the main characteristics of the real objects is that they would be of economic importance even if no property rights existed. In such a case there would be no financial objects at all. A real object may be defined without taking any regard to ownership, while a financial object can only be defined in relation to a certain creditor and a certain debtor. Even if it has an owner (a creditor), a real object has as such no debtor, a financial object has both creditor and debtor (p. 6) ... It should be noted that the property right to a real capital is something different from the real capital itself ... the property right may be sold ... without moving the real capital object If this is done the property right should be considered as a financial object" (p. 7).

In general (though Frisch does not say so) it is possible to consider a real capital (a farm) as being an asset of one sector (agriculture) while at the same time treating the corresponding property right as a financial object with some other sector (the farmer) as creditor and the first sector (agriculture) as debtor. This construct may be used for example for classifying real capital by industries.

7. Having defined economic objects it is possible to give precision to the definitions of transactions and flows:

A *transaction* ("micro-phenomena", "micro-flow") is something which happens to an economic object, e.g. "... the fact that say 1.3 Kg. of a specific commodity is being handed over from the store N.N. to the housewife P.P. ..." (a real transaction) or "... the fact that the housewife P.P. hands over to the store N.N. a certain amount of money ..." (a financial transaction). Flows ("macro-flows") are aggregates of transactions ("micro-flows") (p.4).

8. Frisch's picture of *the real circulation* (any sector) was as follows (symbols refer to the Eco-circ graph, Appendix A, starting from the bottom): Services rendered by labour, real capital and organization belonging to a sector (R^n, R^k, R^o) combine to create the net product, or real income, (R) of that sector. The net services of the factors of production (R) together with depreciation (D) defines gross value added (E). Looked at from another angle gross value added (E) is defined alternatively as gross output (A) minus intermediate input (H). Gross output (A) is used either for gross investment (J), or consumption (C), or intermediate input (H), and possibly for (real) "taxes" (T) (When the sector under consideration is the national economy, T may be thought of as government consumption (T_{in}) and/or contributions to other countries). Net investment (I) results in an increase in the sector's

stock of real capital (K) and an equally large negative change in its "real funds" corresponding to its savings (S). The real capital may change not only as a result of investment but also because of occasional gains/losses (F and G). In an open sector most of the above flows must be split in order to describe the real flows to and from other sectors separately. Note, in particular, that real factors of production "belonging" to ("resident" in) the sector may be active in production outside the sector. This issue is taken up in 5.7 below.

9. In the original (1942) version of the Eco-circ System Frisch made the *financial circulation* an exact mirror picture of the real circulation⁶. The correspondance related to concepts as well as their graphic and symbolic representation: Corresponding to net real investment ("real" saving) there was net financial investment ("financial" saving). Corresponding to real capital there was financial capital. While real capital generates real income (i.e. services of real capital, or rent), financial capital generates financial income (interest and dividends). Real and financial categories may be added: The sum of the sector's real capital and net financial capital is its total capital. The sum of the sector's real income (net value added) and its net financial income is its total income⁷. In the later version of the Eco-circ System (Aukrust, Bjerve, Frisch, 1948) only three financial concepts were retained: financial income, financial saving, and financial investment.

10. Before we leave Frisch's work on conceptual issues a few word must be said about his views on the market price-factor cost issue. Frisch did not accept the view that national income or product at factor cost, and national income (or product) at market price, as usually defined, were two measures of the same total, only valued differently. Rather, Frisch maintained that the former should be considered a *part* of the latter, and therefore itself a market price concept. He wrote at least two papers on the issue (1949, 1955) in which he reasoned roughly as follows: Assume that the value of the national product is estimated directly by valuing its components (e.g. consumption, investment, net exports) at market prices. Then any deduction from this total with the idea of arriving at the "true" costs (the "factor costs") of producing the total must imply *either* that some part of the national product was not created by the factors accounted for, but by something else; *or* that someone who has not himself contributed to the creation of the national product (e.g. general government) exploits those who have (e.g. through indirect taxation). Frisch clearly preferred the latter way of looking at things.

11. Very little about the Eco-sirc System, or about Frisch's work on conceptual issues as a whole, was ever published in print, and even less in an international language. By the end of World War II, therefore, this part of Frisch's work was largely unknown outside Scandinavia and it had no influence on work done internationally at the time. To future generations of Scandinavian economists, however, the Ecocirc System has, as we shall see,

⁶ Bjerve (1986) recalls the origin of the first financial graph (probably in 1942): "When the graphic representation of concepts and relationships relating to the real circulation was finished, Frisch suddenly got the idea that there ought to be a corresponding graph describing the financial circulation and he hurriedly drew such a graph. The idea was certainly not bad. Surely, the analytical usefulness of concepts such as e.g. "financial value added" (E) and "financial depreciation" (D) may be doubted ... but ... it helps avoiding the confusion of real and financial concepts ..." (p. 27).

⁷ At the national level, where real income (in Frisch's terminology) is the national product, this implies defining national income as "the national product plus net financial income from abroad".

provided a solid conceptual foundation for empirical work. Through their efforts Frisch's ideas may, indirectly, have come to influence the international thinking in the field.

2.2 Frisch's empirical work on national accounting

12. Frisch seems to have toyed with the idea of constructing a "nasjonalregnskap" already in the early 1930s and the term was used by him in print in 1933 (Bjerve, 1989)⁸. The plans materialized when, in 1937, funds were made available to the University Institute of Economics for a project aiming at "a structural analysis of the Norwegian economy" (Økonomisk strukturundersøkelse for Norge, 1937). The project was to include a detailed empirical description of Norwegian economic life, industry by industry, in national accounting terms. The national accounting part was to be Frisch's contribution to the project. For some years, until the University was closed by Nazi authorities in 1943, Frisch had a small group of assistants working numerically on the project. At the theoretical level work proceeded in parallel with work on the Eco-circ System, aiming at an accounting system in conformity with the latter, but accomodating much more detail than could be conveniently shown in a graph. At the empirical level the system was tested for one year (1935) by numerical estimates for selected sectors.

13. No published document exists which describes in full detail Frisch's vision of a numerical national accounting system. However, his main ideas may be judged from his project proposal in (Økonomisk Strukturundersøkelse, 1937) and, in particular, from his prepared statement (Frisch, 1939) to a conference of Nordic Statisticians in 1939 at a time when the project was well under way. Some points from the latter document are noted in the following paragraphs.

14. Frisch's definition of national accounting sounds modern even today:

"By national accounts we mean not only a picture of the national income in a given year or the national wealth at a given point of time, but a reasonably complete survey of the *total economic activity of a nation* in a year, presented in a way which allows the interrelationships between different data to be clearly demonstrated. The presentation must be such that relationships which are particularly interesting show up by *accounting necessity*. For instance, change in wealth should by accounting necessity correspond with data on income, consumption and saving. And the correspondance between the real and the "personal" method for estimating national income should show up automatically ..." (Frisch, 1939, p. 141-142. My translation).

Note, however, that Frisch when talking about " ... interrelationships between different data ..." did not have in mind inter-sectoral flows; as explained above, the 1942 Eco-circ System related to only one sector and its transactions with all other sectors combined, and this characteristic was retained in the accounting system. Consequently, the weight was on

⁸ Thus Stone is clearly wrong when he suggests (1946) that the term "Social accounting" was used for the first time in 1942 by Professor Hicks.

defining a standard system of accounts for this sector which, when aggregated hierarchically over all sectors, would comprise the national economy.

15. The sector division envisioned treated the economy without geographic specifications, but was in other respects extremely detailed:

"We apply a classification of sectors in two directions. First, according to the *organizational form* of the individual units, this leads to the *organizational sectors* shown horizontally ... second, according to an *industrial* classification shown vertically. A cell in this two-dimensional grouping - e.g. the collection of all one-person enterprises in the wood industry - will be called a *structural sector*. And it is for such structural sectors that a description in accounting terms will be attempted ... Within each structural sector there may be *individual sectors* ... we may also try a sub-grouping according to the size of the enterprise ..." (p. 146-147).

The set of accounts to be used for each sector was no less ambitious⁹. Obviously there would have to be a standard system for use everywhere since " ... a hopeless confusion would result if we were to use different systems for different sectors ..." (p. 147). The accounts should distinguish clearly between real activities and financial activities, and it would be useful to organize the accounting structure in such a way that each production account showed value added as its balancing entry.

16. The problem of valuation was discussed at considerable length. Ideally, Frisch said, one would like to value goods and services by valuation coefficients reflecting their utility. At some future date this might be possible. (Frisch was a believer in cardinal utility.) For the time being one would have to fall back, in practice, on valuing things by their prices. According to Frisch three types of prices were of interest: (1) original cost, (2) current market prices, (3) "anticipated values" (by which Frisch meant the value of things - especially capital goods - when a firm was valued as a going concern). Other possible concepts of value, e.g. reproduction cost, insurance value, scrap value, were less interesting and did not have to be considered.

17. A final point worth noting is Frisch's observation (1943 p. 121) that a set of national accounts may be drawn up *either* according to "the principle of centralized description" or, alternatively, according to the principle of "de-centralized description". In the former case the estimates are prepared by one single observer applying the same principles of evaluation consistently to all sectors, and a numerical balancing of the system is guaranteed. In other cases the estimates may be prepared by different observers for different sectors according to different principles; this is a case of de-centralized description, and numerical discrepancies will arise. Differing economic valuations by different transactors have a role to play in the business cycle, and there may well be a case for adopting decentralized description in a system of national accounts intended primarily for business cycle analyses. (This foreshadows a point made by Ingvar Ohlsson in his discussion of the purposes of

⁹ For instance, in the experimental accounts for the sector "public and semipublic banks" (for which Bjerve was responsible) there were 127 individual accounts which could be aggregated hierarchically into 14 major accounts. The two-fold classification of sectors into "organizational" and "industrial" corresponds to what is nowadays termed "institutional" and "functional" sectors.

national accounting, see later.) However, in the actual work of Frisch and his assistants, the principle of centralized description was applied throughout.

18. The empirical work on national accounting started by Frisch in 1937 never was completed. It was, perhaps, too ambitious for its time. Lindahl, at the conference of Nordic Statisticians referred to above, commented: "Frisch, as usual, has a more imposing program than the rest of us, and we are grateful to him for showing us at this early stage the goal which statistics on national income and wealth should ultimately aim at. I believe, however, that for practical reasons we are better advised to start with something on a lesser scale". (Lindahl, 1939, p. 160, my translation). Lindahl's scepticism may not have been completely misplaced. Yet, in retrospect, Frisch's pioneering efforts remain an expression of the remarkable creativity of a great mind¹⁰.

2.3 Lindahl's conceptual work

19. It is useful to distinguish two lines of development of conceptual systems in Sweden during the 1930s, both of them connected with the name of Erik Lindahl. One related directly to empirical national income work, culminating with the publication of (Lindahl et al, 1937). This line is considered in the next section as auguring phase III of the Scandinavian national accounting tradition. The other line related to the design of theoretical systems of concepts intended primarily for economic analysis. Lindahl's immediate purpose seems to have been that of presenting the ex ante and ex post analysis of the Stockholm school in systematic form. The standard reference here is (Lindahl, 1939) which we shall consider in the following paragraphs¹¹.

20. Like Frisch, Lindahl strived to achieve a system of concepts as general as possible. In Lindahl's case generality meant that the system had to be applicable both to ex ante and ex post values, and equally suitable for the description of micro-economic and macro-economic phenomena. By suitable interpretation of the terms involved, the description at the micro level should be equally applicable to firms, households, or any other economic subject. At the macro level the terms might be thought of as primarily referring to the national economy but other interpretations were also possible.

21. Lindahl starts his exposition by setting out the relationships valid at the micro-economic level. He distinguishes two chief categories of economic subjects: (1) "firms", which engage

¹⁰ It may perhaps be claimed that Frisch's creativity was paired, on occasion, with a certain lack of realism. Yet, Andvig (1986) in his study of Frisch clearly exaggerates when he writes as follows: "Frisch's major work on theoretical national accounting from the first half of the 1930's ... was a curious mixture of useful abstractions such as the sector-concept, overambitious attempts to classify everything in economics, and a surprising number of analysis of various types of non-operational concepts" (p. 237). In another connection Andvig, with loving criticism, characterizes Frisch's research style: "... he was carried away by his usual enthusiasm for whatever he was thinking about and jumped to strong conclusions about the real world significance of his thinking as a kind of afterthought..." (p. 102). And again: "His research style, here as elsewhere, was erratic - more like a firework spreading in all directions than a carefully managed, singlepurpose rocket" (p. 107).

¹¹ In distinguishing between these two aspects of Lindahl's work I follow Ingvar Ohlsson (1953). According to Ohlsson, Lindahl's second line of work (his theoretical studies of concepts) "... is of interest for the methodology of national accounting primarily because it contains the germ of many lines of developments in later works" (p. 266), obviously including the works of Ohlsson himself.

in production and "possess" all capital, and (2) individuals, or private households, who "own" the firms; households get their income partly from selling labour services to the firms and partly in the form of "financial income" resulting from their ownership of the firms (their "financial capital"). Identical sets of equations are used both for firms and for households. Some relations are valid both for ex ante and ex post values of the variables ; they are the results of estimates made at the same point of time. Other relations describe the *differences* which may exist between estimates made ex ante and estimates made ex post. There are also relations concerned with "subjective valuation" of capital and income, either ex ante or ex post, and the whole system of micro-economic relationships and symbols ultimately becomes rather complicated. We shall not consider the micro relationships any further.

22. By aggregating the micro-economic equations for all subjects belonging to a group, we get macro-economic equations valid for that group. If the group is "the nation", the resulting equations will be definitional equations relating to the national economy. A selection of such equations, valid ex post, with Lindahl's symbols and terms (Lindahl 1939, pp. 114-115), is set out in the diagram on the opposite page. A "receipts-expenditure" equation, which at the micro level was a cash equation, at the macro level becomes the balance of payments. The "earnings equation" shows national income (E) to equal value added (A-B+I) plus net income from capital abroad (R*) Other equations relate to the use of the national income, or show saving to equal net (real) investment plus net financial investments abroad, or the national wealth to equal (real) capital plus net claims on other nations.

2.4 Kindred souls

23. As originally set out in (1939) Lindahl's system of correlative definitions did not immediately address national accounting work, the value and feasibility of which he rather doubted, see his comments on Frisch quoted above. Yet it had obvious implications in that direction. That this was the case was made clear by Lindahl himself 14 years later when, commenting on Ingvar Ohlsson's dissertation, he returned to his system in an article called "Nationalbokföringens grundbegrepp" (The basic concepts of national accounting, Lindahl 1953). This work by Lindahl shows more explicitly than (Lindahl, 1939) how Lindahl's views on important points coincided with those of Frisch and deviated from thinking outside Scandinavia.

24. Indeed, Lindahl's work in Sweden had striking similarities with Frisch's work in Norway. We have noted how both scholars were led to work on conceptual issues as a preliminary to analytical work. Both aimed at generality. Both obtained generality by deriving their concepts from systems of definitional equations, general enough to be applicable to any economic subject, or group of subjects. The definitional equations of Lindahl (1939) were identical in important aspects with those of Frisch (1935), and so were - whether by intention or accidentally - some of the symbols and notations used. Lindahl and Frisch of course knew of each others work and, as far as is known, thought highly of

Lindahl's system of macro-economic equations

All equations are valid ex post for the national economy. All variables are in value terms. The "equation of international payments " corresponds to what at the microlevel was termed "the cash equation". The "earnings equation" shows national income (E) to equal value added (A - B + I) pluss (net) income from capital abroad. The remaining equations relate to the use of the national income, or show saving to equal net (real) investment pluss (net) financial investments abroad, or the national wealth to equal real capital pluss (net) claims on other countries.

All equations are valid ex post for the national economy. (All variables are in value terms)

Equation of international payments:

$$\underbrace{A^* - (B^* + C^*)}_{\text{Exportsurplus}} + \underbrace{R^*}_{\text{Income from capital abroad}} + \underbrace{(-T^*)}_{\text{Gifts, etc. from abroad}} = \underbrace{F^*}_{\text{Net lending to abroad and net import of securities}} + \underbrace{\dot{M}^*}_{\text{Net import of gold and cash}}$$

The earnings equation

$$E = \underbrace{A - B + I}_{\text{Income from factors}} + \underbrace{R^*}_{\text{Income from financial capital (neglecting accrued but not yet realized interest on investments abroad)}}$$

The use of income equation

$$E = C + T^* + S$$

The saving investment equation:

$$S = I + J + \dot{M}$$

The equation of wealth:

$$W = K + H^* + M^*$$

List of terms and symbols

(* used as superscript indicate relationships with other economies)

A = sales	A* = Export, (sales to abroad)
B = purchases for production	B* } = import (purchases from abroad)
C = purchases for consumption	C* }
E = net income	F* = net lending to abroad
F = net lending	H* = net value of financial capital
I = net investment	M* = holdings of international money
J = financial investment	R* = income from capital abroad
S = saving	T* = taxes and transfers to abroad
K = value of real capital	
R = income from capital	
T = taxes and transfers	
W = net value of wealth	

each other¹².

25. Lindahl's article from 1953 made clear that the kinship between himself and Frisch extended beyond the formal properties of their systems to substance as well. Lindahl, like Frisch, considered a distinction between "real" and "financial" to be important. Real factors of production are real capital and labour; the services of real capital and labour generate the (homeproduced) income (which Lindahl in 1953 calls national product in accordance with what by then had become accepted Scandinavian terminology); ownership of real capital is financial capital; financial capital generates financial income (interest, dividends, etc.). As I read Lindahl, financial capital includes "direct investments" and financial income includes income from such investments, at least at the national level:

"... If a foreign firm has a branch within the country we must *imagine* that the branch is a national firm, even though it is controlled by foreign interests This construction, which is based on the distinction between real and financial capital, makes it possible for the national product [domestic product in SNA terms, my remark] to embrace the total product value generated by factors of production (labour and real capital) within the country It follows, moreover, that all the capital investment which one country makes in another is considered as financial investment ..." (Lindahl, 1953, p. 88; here and elsewhere in what follows quotations and references are from the English version of the paper.)

These were ideas which were consistent with those of Frisch. They were at the same time in sharp opposition to contemporary Anglo-American thinking, a fact about which Lindahl was very explicit¹³.

26. A related point, admittedly more a convention than a principle, where Lindahl seems to side with Frisch, concerns the question of residence and in that connection the delimitation of the national economy. Finally, Lindahl is in complete agreement with Frisch,

¹² It is fairly clear that Lindahl (1939) to some extent was inspired by Frisch (1935). (Andvig, 1986, p. 203). However, it is equally obvious that Lindahl's ideas on conceptual issues evolved gradually over a long period of time dating back to the late 1920s. When finally written out and included as a separate section in Lindahl (1939) this was done with the following introduction: "The 'Algebraic Discussion' which concludes this part is an endeavour to give a general formulation of some basic economic concepts, in such a way as to make them directly applicable to real situations; and to give a systematic account of the relations between these concepts. Although the task may seem elementary, it is of fundamental importance, and my exposition shows that it presents certain difficulties .." (Preface, p. 11-12).

¹³ "It has not yet become usual in national accounting to distinguish between a) "real capital", which is a factor of production consisting of concrete production facilities, together with certain rights attaching to their exploitation, such as patent rights, the name of the firm, goodwill etc., and b) "financial capital", which is a distribution factor and comprises claims (and debts) usually referring to monetary transactions. The traditional view is that what is here called financial capital can be traced back to some underlying real capital and that financial income can be looked on as income derived from this real capital. Thus when the shareholder collects his dividends this is considered as income from the company's real capital in which he participates through his shares. In this case it is possible to make the imputation, but in many other cases it is difficult to find the real capital that is supposed to correspond to the financial capital. For instance, it is not very acceptable to consider interest on the national debt as income from the real capital at the disposal of the government..." (p. 83). Lindahl continues by saying that he agrees "whole-heartedly" with the following statement by Ohlsson: "The insistence on treating realized interest as a type of factor remuneration is the reason why national income is often presented with interest as an income share. This procedure seems rather meaningless. Interest payments are contained in an income redistribution process based on the ownership of financial capital. It may be of interest to record the distribution of income before or after this redistribution and to register net interest payments for each sector" (p. 84, note 25). It seems that what Ohlsson and Lindahl is asking for is what the 1993 SNA intends to do in the primary and secondary distributions of income accounts.

and in opposition to Anglo-American thinking, on the issue of market price-versus-factor cost valuation, and, in this connection, the meaning of the concept factor incomes itself. Lindahl's views are neatly expressed by him in one single sentence: "Factor income is thus the part of product value accruing to the factors of production after the government has taken its share in the form of indirect taxes" (p. 82).

27. As a final point it is worth noting Lindahl's choice of product and income totals for use at the national level. Here, again, he is in accordance with Frisch and his Norwegian followers but in strong opposition to mainstream Anglo-American writing: The *national product*, net or gross, is defined by Lindahl as the sum of all the product values, at market prices, that relate to resident factors of production. If indirect taxes (the product value seized by the government) are deducted we arrive at *total factor income*. To the national product may be added (net) financial income from abroad, this gives *national income*¹⁴ which should be used only as a net concept. Finally, there is *total disposable income* which exceeds national income by the amount of any (net) gifts or other transfer payments received from abroad; this is a measure of the income at the disposal of the nation for consumption and (real or financial) investment purposes.

¹⁴ "This definition of the national income concept corresponds most closely to what is usually (internationally, e.g. in OEEC (1952)) called "national income at market prices". However, it is more common to speak of "national income at factor cost", and more common still to understand the concept of national income implicitly in this sense. I have long been critical of this latter concept ... convinced ... that ... we ought to use some more succinct terms, such as "total factor incomes" or perhaps "total factor incomes plus total net financial income". This entirely avoids the troublesome distinction between estimates "at market prices" and "at factor cost" ... "I am also of the opinion that we ought to try if possible to avoid the distinction between "gross national income" and "net national income" and content ourselves with the latter. A gross calculation seems more natural for national product than for national income ..." (loc. cit pp. 91-92).

3. Empirical work in the Lindahl tradition (1930-1945)

3.1 The birth of commodity flow accounting

1. While Frisch's work on national accounting during the 1930s had a distinct theoretical bias, Lindahl during much of the same period was engaged in purposeful empirical work. As early as in 1926 Lindahl was given responsibility for a project which, more than a decade later, resulted in "The national income in Sweden 1861-1930", a monumental study in two large volumes (Lindahl et.al. 1937)¹⁵. This study, in which Lindahl was assisted by Einar Dahlgren and Karin Kock, marked the beginning of phase three of the history of national income calculations in Scandinavia. It was succeeded, with differences in timing, by work by official institutions in all the three Scandinavian countries in the following years¹⁶.

2. A common characteristic of the statistical systems of the Scandinavian countries at the time was that, as compared with other countries, they all had well developed industrial statistics while statistics on incomes were weaker. This favoured estimating national income from "the production side", i.e. building the national totals from estimates by industries using industrial statistics when available, the industry classification being adapted in each case to the statistics available. As initiated in Sweden and developed further in Denmark, this approach led to a fairly advanced form of "commodity flow" accounting which, methodologically, may have been the greatest Scandinavian contribution from phase three. The first step was taken by Erik Lindahl when he planned the Swedish study referred to above.

3.2 "The national income in Sweden 1861-1930": Erik Lindahl et.al.

3. At the end of the 1920's there was very little guidance for Lindahl and his co-workers to be had from national income estimates elsewhere in the world¹⁷. He knew, of course, of the theoretical definitions of the concept of income in the standard economic literature, but when it came to translating these definitions into practical guidelines, he had to work out his own solutions. For this reason, and also because it gave direction to later work elsewhere in Scandinavia, a short summary of the theoretical discussion in this book is in order.

¹⁵ The study was part of a major project "Wages, cost of living and national income in Sweden 1860-1930" by the Institute for Social Sciences at the University of Stockholm. The project was initiated by Professor Gösta Bagge and financed by a long-term grant from the Rockefeller Foundation. Over the years the project came to engage a number of the best, young economists of Sweden. In addition to the study of national income, the project resulted in "The cost of living in Sweden 1830-1930" by Gunnar Myrdal, and in "Wages in Sweden 1860-1930", in two volumes, by Gösta Bagge, Erik Lundberg, and Ingvar Svennilson (1933-1935).

¹⁶ In Sweden the historical series of Lindahl et.al. were updated in several steps by Einar Dahlgren (1936, 1941), then working within one of the ministries. In Denmark (around 1935) and in Norway (1943) studies similar to the Swedish one, but covering much shorter spans of time, were initiated by the respective national statistical offices.

¹⁷ It is symptomatic that the bibliography included in (Lindahl et.al, 1937) lists only one empirical study from a foreign country dating further back than 1926; this honour goes to "Income in the United States, its amount and distribution 1909-19" by the staff of the National Bureau of Economic Research, (Vol. 1-2, 1921-22, New York).

4. Lindahl began his analysis by observing (chapter 1, volume 1), that the national income could be defined either as (1) total income produced within a country, or as (2) total income received by the inhabitants of the country, the difference consisting of net income received from abroad. Lindahl "for several reasons" preferred national income concept (1), amplified as "... the total income from agents of production functioning within the country ..." (p. 2) In principle, the estimate should include "... everything possessing an exchange value evaluated at current market prices" (p. 6) but, admittedly, the exact borderline would have to be drawn by convention. Thus, Lindahl's concept of national income came close to what has become known later, in the SNA, as "net *domestic* product at market prices", and in Scandinavia as "net *national* product".

5. Having defined national income Lindahl proceeded with a theoretical discussion of how it could be measured. He described four different methods summarized as follows (p. 33):¹⁸

- 1) by adding together the net incomes of the different industries,
- 2) by adding together the net results of national production, i.e. the total consumption and total net investments, plus or minus, respectively, any export or import surplus,
- 3) by adding together the incomes accruing to the owners of agents of production in return for their contributions¹⁹; or
- 4) by adding together the incomes accruing to the inhabitants of the country, less their receipts from investments abroad, and plus the incomes of foreigners from investments within the country" ("national income received")."

6. Lindahl's detailed discussion of the four methods led him to consider a remarkably large number of problems which, later, have become standard in national income literature. Thus, in connection with method 1) he discusses i.a. problems of valuation of goods not traded on a market or traded at prices distorted through price control, monopolies and indirect taxation; the many-faceted problems connected with the treatment of the public

¹⁸ It is of some historical interest to compare Lindahl's list with a similar listing in Studenski (1958, pp. 168-169) describing the situation in national income literature in the early 1930s. According to Studenski national income might be measured (1) as a aggregate of net output of various branches ("national income produced", "Wertschöpfung"), (2) as an aggregate of incomes earned by individual producers ("national income paid out", "Verteilung"), (3) as a sum of final goods and services ("national income consumed", "Verwendung"). (The English and German terms given in brackets seem to have been used in an American study by Mitchell and Kuznets (1934) and a German study by the Statistisches Reichsamts (1932) respectively.) - The three methods described here by Studenski are the same as methods 1)-3) of Lindahl, only listed in a different order. In addition Lindahl adds one method (no. 4) not mentioned by Studenski, observing that incomes can be measured not only when paid out (Studenski no. 2, Lindahl no. 3) but also when received.

¹⁹ Note Lindahl's choice of words in his description of method (3): What he means by "agents of production" is labour (including work by self-employed), land, and real (physical) capital. Method (3), therefore, in Lindahl's interpretation amounts to measuring income as a sum of "functional" income shares, in the tradition of classical economic theory.

sector²⁰; the problem of drawing the borderline between current input on the one hand and consumption or investment on the other; and of the allowance to be made for the depreciation of durable goods (loc.cit. pp. 6-15). More or less identical problems are met with, according to Lindahl, when national income is estimated as a sum of consumption, investment and net exports by method 2). Method 3), estimating national income as an aggregate of functional income shares, meets with the problem of estimating the contributions of labour, entrepreneurship and (real) capital from observed payments of wages, interest on borrowed (financial) capital, dividends, rents on leased capital, undistributed profits of corporations etc. Again there are problems related to the public sector, for instance the treatment of interest on the public debt and measuring the contribution to the national income of publicly owned durable goods (pp. 18-22). Finally, estimating national income as an aggregate of incomes received (method 4), meets with wellknown data problems resulting from tax evasion and the concept of income used in tax assessment statistics (pp. 22-24). Lindahl's discussion of the above issues is valuable even today.

7. Leaving aside conceptual issues for the time being (some of them are returned to in section 6) we turn to a description of how the estimates were carried out in practice. The statistical material did not allow a free choice among the methods described above. Methods 1) and 2) based on production statistics were preferred, but method 3) had to be resorted to for industries where production statistics were missing. The calculations were carried out industry-wise. Ten activities were distinguished²¹. For each activity, first net output (or value added), as a step towards estimating national income by method 1), and then the amount of gross output flowing to consumption and investment, as a step towards estimating national income by method 2) were calculated. Different procedures were chosen for calculating net and gross output depending on the statistics to hand. For activities where production statistics were available (commodity producing activities (1-4), except handicrafts) the calculations could be carried out "from the top and down", i.e. starting by estimating the value of gross output and ending by net output after deducting the value of inputs and depreciation. For the remaining activities mostly producing services (5-10), the calculations had to be carried out "from the bottom and up", i.e. starting by calculating incomes paid out as a measure of net output (method 3), afterwards adding debit items to arrive at gross output.

²⁰ General government is treated by Lindahl as producing services for the benefit partly of producers, partly of consumers; thus government is not itself a consumer of the services. "The point is here to determine how much of the current public expenditure should be included in the total production costs of agriculture, manufacturing and other industries" (p. 11). On the valuation of government services he reasons: If a public service is supplied against payment that payment measures its value. In other cases the value of the services is measured by the costs of providing them, including imputed ("real") interest on the (real) capital used while producing them. - Lindahl mentions the possibility of measuring the value of services rendered to private producers by the rates and taxes that the producers pay. This procedure (which he possibly may have seen discussed in the literature) is dismissed by Lindahl as unrealistic "at least in Sweden".

²¹ 1. Agriculture, 2. Forestry, 3. Manufacturing, mining and handicrafts, 4. Building and construction, 5. Transport and communications, 6. Commerce, hotels and restaurants, banking and insurance, 7. Professional services, 8. Domestic work, 9. Services rendered by durable consumers goods, 10. Public administration. - Note activity 9: Not only dwellings, but all kinds of consumers durables were treated as capital, i.e. treated as invested when bought and producing services when used.

8. The most noteworthy feature of the Swedish inquiry, in some way heralding commodity flow accounting, was the method invented for computing the costs of raw materials etc. used as inputs when passing from "gross output" to "net output" in the case of the commodity producing activities: These costs were not computed from the financial statistics of the activity in question (such statistics were generally not available) but, instead, as the sum of inputs received by that activity from other activities as computed from the production statistics of those other activities (adjusted for imports and exports). In order for this to be possible some form of commodity flow analysis had to be undertaken which would show, for each activity, the destination of raw materials etc. delivered from it. In most cases it was possible to judge from the nature of a commodity or a service how it was used. However, in two cases (bank services and public services to business) this was not found possible; instead, when estimating national income, the value of these services was deducted in total, as unallocated input, from the sum of net product of activities.

9. In retrospect the Swedish study must be deemed an admirable piece of work for its time. It was well thought out theoretically, and resulted in coherent and detailed data on the national income by industrial origin, on consumption and investment by commodity groups, and on the industrial structure. It included an original methodological idea which a few years later in Denmark came to be developed into a fullfledged commodity flow approach to national accounting²². The study established Sweden as the first country in the world to have national income statistics on an annual basis spanning back to the middle of the nineteenth century²³. The careful documentation of sources and methods, described in great detail in over 600 pages in a separate volume, set a high standard to strive for by others in similar studies in the future.

3.3 Denmark: Viggo Kampmann

10. The Swedish study inspired a similar study by the Danish statistical office (Det statistiske Departement) around 1935, aiming at estimates for 1930-1939. Responsibility for the project during its critical stages rested in the hands of Viggo Kampmann, a competent economist who later (1960 - 1962) became Danish Prime Minister. The plans for the study, together with some tentative results, were described in a paper read by Kampmann to the Economic Association in Copenhagen (Kampmann, 1942). The discussion which follows is based on this paper which provides livelier reading than the official reports written by others later²⁴.

11. Kampmann's methodological approach was clearly patterned on the Swedish experience. The object of the study, according to Kampmann, was to measure "the income of factors

²² Outside Scandinavia the commodity flow approach was used probably for the first time by Kuznets (1938). There was, of course, also the related early works by Wassily Leontief.

²³ Admittedly of a somewhat shaky quality as more recent research has shown. See, for instance (Krantz, 1988).

²⁴ Official results from the project were released for the first time by Statistisk Department in its news bulletin in the autumn 1945. (Statistiske efterretninger, no 52, 1945). The final report of the project was "Nationalproduktet og Nationalindkomsten 1930-1946" (Det Statistiske Departement, 1948) which also included some preliminary estimates for the war years.

of production working within the country" including Danish ships in foreign waters. These incomes were to be estimated from production statistics and similar sources, industry by industry, in a way which would at the same time provide information on the national income by consumption and investment. The first step involved, for each industry, estimating the value of gross product (gross output). Then:

"In order to move from the value of gross product to net product (or income) one has to deduct the value of goods and services used in production; this value may be found either directly through estimates based on costs statistics ["driftsstatistiske beregninger"] for each single industry, or indirectly by classifying the gross product of industries by uses. Furthermore, the last mentioned method allows consumption and investment to be found as a residual, namely as that part of gross output which is not used in production, either immediately or delayed, since it goes directly to consumption, or which is used in production only gradually in the form of buildings and machinery ..." (Kampmann, 1942, p. 370, my translation).

12. The "indirect method" which Kampmann describes here is what later has become known as "the commodity flow method". The method was applied by him with commendable consistency. Industry by industry (ten industry groups)²⁵ and commodity by commodity the value of gross output was estimated at market prices. Then, additions were made for imports, and exports were subtracted. The result was "total supply". Finally it was decided, for each commodity, how total supply was distributed by uses (consumption, gross investment, intermediate input by industries). Throughout a distinction was made between "durable" and "non- durable" goods and services.

13. The final result was, for each year, an input-output table showing the supply of commodities by origin, and the absorption of these commodities by categories of uses. Through suitable aggregations, the table would provide estimates of gross domestic product, total final consumption, and total gross investment. As a by-product, the method automatically resulted in much useful information on the commodity composition of the output of industries, and on the composition of consumption and investment by commodity and by industrial origin. The Danish input-output tables for 1930-1939 may have been the first to have been produced routinely in connection with national accounting work. For this reason they deserve being reproduced, in English translation, for one year in Appendix B.

14. As regards methodological details Kampmann deviated from solutions chosen by Lindahl et.al. on a number of points, for instance in the treatment of durable consumers' goods and of domestic and public services. (These deviations are discussed in a wider context in sections 5 and 6.) In many respects, in my opinion, Kampmann's study was a significant advance on its Swedish model. Thus, an attempt was made for one year to

²⁵ 1) Farming, 2) horticulture, forestry, fishery, 3) manufacturing, 4) handicrafts, 5) building and construction, 6) commerce and banking, 7) transport, 8) liberal professions, 9) public services, 10) services of dwellings.

estimate the distribution of the national income by functional shares²⁶, and there were tables giving the net product of industries both at market prices and at factor cost. The greatest advance was, however, that the Danish study included estimates of the national aggregates at constant prices, something which had not been attempted in the Swedish study nor, to my knowledge, anywhere else. Clearly, Kampmann was one of those who earliest and most consistently exploited the opportunities offered by the commodity flow approach to national accounting, and his work deserves unreserved admiration.

3.4 Norway: The Central Bureau of Statistics

15. While Lindahl's work in Sweden was followed quickly by a study along similar lines in Denmark, empirical work in the Lindahl tradition was not initiated in Norway until 1943 when a project was started at the CBS as a result of rather remarkable events²⁷. The project was assigned to a team of young economists including former assistants of Frisch, among them Petter Jakob Bjerve. The aim was to provide data needed for the planning of post-war reconstruction work, not primarily to copy what had been done earlier in Sweden and Denmark. Yet the estimation methods used to a large extent copied those used in Sweden. As Bjerve has recounted: "The Swedish study was the Bible". However, true to the Frisch tradition, Bjerve, responsible for the theoretical part of the final report, conducted his discussion of concepts and methods within an accounting framework, something which must have been rather unusual for its time²⁸.

16. The study covered the period 1935-1943. It aimed primarily at an estimate of net (domestic) product by industry. The estimates were carried out industry- wise, for 13 main industries and 23 subgroups. For each industry, and for the economy as a whole, the net product was split into "wages" and "other incomes", and according to its origin in private or public activity. (These were distinctions not attempted in the Swedish study, and they were clearly inspired by similar distinctions made in Frisch's experimental national accounting system.) Market prices were applied throughout. Estimates at constant prices

²⁶ "By source ... incomes ... may be split into interest, wages and operating surplus. If interest is charged on all capital used in production, irrespectively of whether it is owned by the entrepreneur or not, the surplus becomes payment for the entrepreneur's labour plus what is called profit. An estimate of imputed interest for 1935 gives as a result slightly more than one billion kroner or one fifth of total national income; and a very rough estimate of wages amounts to a total wage bill of about 2.5 billion kroner. There remains as income for the entrepreneurs 1.7 billion kroner, a very considerable part of which must be seen as remuneration of their labour ..." (loc.cit. p. 378).

²⁷ The project was triggered when the German controlled Quisling government asked Statistisk Sentralbyrå to provide an estimate of the costs of the war to the Norwegian economy, the estimates to be used after the war as a basis for claiming war damages - from England! The request provided a pretext for Statistisk Sentralbyrå to start an inquiry for a much different purpose, namely (1) to provide annual estimates of the national income from 1935 to 1943, (2) to estimate the value of the stock of Norway's real capital in 1939, the capital losses during the war, and the costs of the German occupation, which would provide a basis for claiming damages from Germany. The project team included, in addition to Bjerve, E. Erichsen, O.D. Koth Norby, S. Rossen and F. Wedervang. The resulting publication (Statistisk Sentralbyrå, 1946) was the outcome of the joint efforts of the team-members.

²⁸ The accounting structure consisted of a set four accounts which could be used for any sector (a person, an industry, the total economy). It showed how the (real) income of the sector could be estimated, by three different methods, as balancing items on three independent accounts, namely (1) as the sector's net product (value added), (2) as the sum of the services provided by the sector's factors of production (labour, organization, real capital), (3) as the sum of the sector's consumption, real investment, and export surplus (corresponding to Lindahl's methods 1, 3 and 2 respectively) Intersectoral flows were not shown.

were found by deflation with suitable price indices, industry by industry. Commodity flow accounting was not attempted; thus, no estimates of investment and consumption were forthcoming automatically. Instead, a crude direct estimate of gross investment, exports and imports was made for selected years, and consumption for those years was found as a residual. Other points of interest are returned to in sections 5 and 6.

17. The study described above was published in 1946. In the meantime national budgeting work (planning) had been started in the Ministry of Finance with Bjerve, who had left the CBS, in charge as head of the national budget unit. To cater for the immediate and long-term data needs of the national budget a division of work was arranged with the CBS: While the Ministry of Finance, with only limited assistance from the CBS, would update and continue on a year to year basis the national income series just published, the CBS would be given the time and resources needed for developing a revised and extended national accounting system suitable for the needs of the future²⁹. This will be considered in the next section.

²⁹ With the needs of the national budget in mind Bjerve in 1946 designed a revised national accounting structure highlighting the interrelationship between the government and the private sectors, adding new variables and new accounts and at the same introducing certain terminological changes, (Bjerve, 1946). Responsibility for current national income estimates for Norway remained with the Ministry of Finance through 1950.

4. The beginning of modern national accounting (1945-1955)

4.1 Influences from outside

1. Interest in national income work in the Scandinavian countries got a strong boost at the end of World War II when post-war economic problems greatly increased the demand for national income statistics. It was natural, therefore, that work done during the war on national accounting in the UK and USA attracted attention. In particular, Sir Richard Stone's work for the League of Nations (Stone, 1946), with its focus on the interdependence of sectors, soon became an important source of inspiration; this was an aspect of national accounting which had been completely neglected in the systems of Frisch and Lindahl. Leontief's work on input-output provided evidence on the usefulness of commodity flow accounting. Obviously the task now facing Scandinavian economists was to construct a national accounting system which would incorporate the best ideas from the West into established Scandinavian traditions.

2. The new wave of interest in national income work started earliest in *Sweden* where Konjunkturinstitutet, at the initiative of its chief Erik Lundberg, started work on national income statistics in 1944 under the direction of Ingvar Ohlsson. The CBS in *Norway* followed with plans for a revised national accounting system in 1946 with Odd Aukrust in charge. In *Denmark* the push forward came in 1948, when better data were needed for national budgeting purposes in connection with the Marshall plan. Responsibility for national income work in Denmark had by then been taken over by Kjeld Bjerke, with Poul Milhøj a close co-worker.

3. The differing starting dates should be noted. Ohlsson and Aukrust completed their national accounting systems by the late 1940s, before international recommendations were available; they therefore had to work out their own solutions, starting from the conceptual foundation inherited from Lindahl and Frisch. This necessitated some original thinking on their part, and resulted in two dissertations (Ohlsson, 1953, Aukrust, 1955). Bjerke and Milhøj, on the other hand, continued their work well into the 1950s and had to pay attention to the international recommendations of OEEC (1952) and United Nations (1954) and to a considerable degree were influenced by the solutions indicated there³⁰.

4. Methodologically the developments in the three countries during the post-war period took different paths. Denmark continued to use as their main tool the commodity flow method which had already been successfully used before the war. Norway followed Denmark's example, but with considerably more commodity and industry detail. Sweden, on the other hand, discontinued completely her industry by industry estimates of the national product finding it more convenient to build her estimates from the expenditure side. (Ohlsson 1953, p. 245)

³⁰ Their decision may have been influenced by the fact that Bjerke and Milhøj probably did not take the same strong interest in theoretical and conceptual issues as Ohlsson and Aukrust. They were pragmatists, more attracted by empirical work than by theoretical refinements. Bjerke, furthermore, had to divide his interest between national accounting work and the collection of primary statistics within fields assigned to the statistical division of which he was chief. The greater acceptance by Denmark of international recommendation did, however, give rise to some differences in the developments of national accounting in the three countries.

4.2 Sweden: Ingvar Ohlsson

5. Ohlsson's activities at the Konjunkturinstitutet from 1944 to 1953 combined responsibility for the empirical national income work of Sweden with theoretical studies. The first couple of years were spent on preliminary studies. Figures based on a new approach, applying a national accounting framework for the first time in Sweden, was published in 1946 (Meddelanden Serie A:14, 1946). The following years saw successive improvements of methods and data until, by the autumn of 1951, the empirical work was crowned with the publication of "Nationalbokføring 1946-1950" (Meddelanden Serie B:13, 1951). Two years later followed Ohlsson's main work, a dissertation under the title "On national accounting" (Ohlsson 1953). This was a major treatise in which Ohlsson, against the background of existing international literature, justified in great detail the principles which he had adopted for his empirical work.

6. Ohlsson's main thesis was that in the design of a national accounting system attention should be paid to the institutional conditions of the country in question (a market economy and a centrally planned economy needing different systems), the types of primary statistics available and, in particular, the purposes for which the resulting statistics were to be used. Four different purposes were singled out for discussion: Measurement of results, (production and/or welfare); analysis of income behaviour (including business cycle analysis); analysis of economic structure; and national budgeting. The bulk of Ohlsson's book was a systematic discussion of how the choice of purpose ought to influence the solutions chosen to key problems in national accounting: Boundary problems, sectoring and accounting design, principles for recording transactions, valuation, treatment of the government, banking and insurance sectors, definition of national aggregates.

7. Ohlsson's theoretical argument was reflected in his empirical work, most notably in the fact that the national accounts for Sweden in (Meddelanden Serie B:13, 1951), were given in two alternatives, each constructed according to its own principles with a particular purpose in mind: Alternative 1 was designed for measuring output and welfare and was drawn up so as to facilitate estimation of national aggregates; alternative 2 was intended primarily for business cycle analysis. The two alternatives differed in important respects: While alternative 1, since it was intended for measuring results, had to contain a number of unrequited (imputed) real flows, alternative 2 recorded with few exceptions only realized monetary transactions. There were other differences also, relating for example to accounting structure and to the treatment of depreciation charges, of repairs and maintenance, of non-monetary benefits, etc.

8. Notwithstanding Ohlsson's empirical work it is his theoretical studies, in particular his dissertation from 1953, which remains of interest to the profession today. This study continues to rank as a major contribution to the international national accounting literature. Indeed, most issues known in the literature was considered by Ohlsson in some context or other, and his profound analysis of them nearly always make rewarding reading even today. The book was widely read, and its message was quickly and generally accepted as valid. Those of us who participated at international meetings at the time will remember that, during the 1950s, hardly any discussion of national accounting concepts and practices could take place without somebody taking the floor to remind his fellow statisticians that the purpose would have to be agreed for a sensible conclusion to be possible. Yet, in statistical

practice Ohlsson's dictum - that alternative national accounting systems should be published for different purposes - was nowhere lived up to as far as I know. Rather, the trend has been everywhere to develop the national accounts into a general purpose economic information system by adding steadily new information and more detail³¹.

9. With 350 large pages Ohlsson's 1953 study is too rich for anything like a complete summary of it to be possible here. For our purpose we shall have to content ourselves with a sample of ideas, selected with a view to their significance for the development of national accounting theory and as expressions of Ohlsson's originality. This, however, can be most conveniently done in connection with our discussion of particular issues in sections 5 and 6 below.

4.3 Norway: Odd Aukrust

21. When Odd Aukrust took on responsibility for the national accounting project of the Norwegian CBS in 1946, it was fairly clear that the new Norwegian national accounting system would have to be based on concepts and definitions taken over from Frisch's Eco-circ System, combined with an accounting structure along the lines proposed in Stone's League of Nations paper (Stone, 1947). Empirically the data situation invited, equally obviously, an application of the Danish commodity flow approach, coupled with an analysis of public sector accounts according to principles already established by Bjerpe at the Ministry of Finance. This approach promised to result in a national accounting system which would provide detailed mapping of flows of goods and services, including annual input-output tables, which were precisely the type of data most needed for policy-making purposes during the post-war re-construction period³².

22. By the autumn of 1948 Aukrust felt that he had arrived at a satisfactory synthesis of ideas adapted (mostly) from Frisch and Stone. The outcome was a paper contributed to the 1949 IARIW conference [Aukrust, 1949], where it shared the normal fate of contributed

³¹ For instance, Aukrust in Norway argues in his dissertation: "In our work the guiding principle has been to aim for a national accounting system which will be suited "best possible" to the many different uses for which the data are to be used and - equally important - to the primary statistics available. There has been no explicit discussion of which purposes should be given priority in the event of conflict between them (to construct two or more alternative systems is hardly practical), since it has been a basic premise of our work that most reasonable demands may be met by making the system sufficiently detailed" (Aukrust, 1955, p. 24).

³² While having some knowledge of Frisch's Eco-circ System Aukrust was in 1946 a total new-comer to the field of national accounting. At an early date, he joined on a three weeks study-trip to Copenhagen and London which provided him with an opportunity to learn about the commodity flow approach used in Denmark by Viggo Kampmann, and about the work in England by James Meade and Richard Stone. The visit to England came about at the initiative of Bjerpe with the consent of the Minister of Finance. The group visiting London included i.a. Ohlsson from Sweden. This is a welcome opportunity to recall, with gratitude, the many sessions when Stone gave freely of his time, guiding his Scandinavian visitors through the intricacies of his League of Nations paper (Stone, 1947) which was available in 1946 in mimeographed form. The meeting with Stone is described with great humour, unfortunately in Swedish, by Ohlsson (1987), and also in Bjerpe (1989). - Aukrust, on his way home stopped briefly in the Hague to have a look at what was being done in the Netherlands. The visit provided additional evidence in favour of commodity flow accounting and was the start of a lasting contact between the Netherlands and Norway.

papers of not being widely read³³. In the meantime empirical work speeded up under the supervision of Aukrust's associate Otto Chr. Hiorth and resulted in "Nasjonalregnskap 1930-1939 og 1946-1952" (Statistisk Sentralbyrå, 1952)³⁴. A theoretical discussion of the principles underlying the estimates was ready in manuscript form early in 1954 and was published as Aukrust's dissertation one year later [Aukrust, 1955]. This publication, which was written in Norwegian, contained as an appendix an attempt to establish an axiomatic foundation for the theory of national accounting. A summary of the axiomatic system was made available in English at an IARIW meeting 10 years later (Aukrust, 1966). Again it is convenient to postpone a detailed discussion of Aukrust's theoretical ideas to sections 5 and 6, where they will be considered in a wider context.

4.4 Denmark: Kjeld Bjerke and Poul Milhøj

23. In Denmark work on national income statistics continued for some time along the lines laid down by Kampmann before World War II with only minor extensions and improvements. The break came in 1948 when a national accounting framework was applied for the first time and new concepts were introduced. Early results were published in 1951 with data back to 1947 (Det Statistiske Departement, 1951). A full description of the new system, written by Milhøj, appeared in 1955 (Det Statistiske Departement, 1955).

24. The new system was strongly influenced by the international "standardized systems" which were under development. Thus, the accounting framework adopted for Denmark by Bjerke and Milhøj was nearly identical with the accounting framework recommended in (United Nations, 1954). The routing of transactions through the accounts was also identical, but with one important deviation: Whereas the UN system treated payments of interest and dividends (except interest on public and consumers' debt) as payments to factors of production, Bjerke and Milhøj remained loyal to the Scandinavian view of considering interest and dividends a special category of transfer payments, and recording them as such. Under foreign influence the Danish accounts strived to find a place for each of the bewilderingly many national product and income concepts so characteristic of the UN system: Using SNA terminology there were "domestic" and "national" totals (differing by the treatment of (net) interest and payments from abroad), each of which capable of being measured "gross" or "net", "at factor cost" or "at market prices". For domestic use, however, Denmark kept to Scandinavian terminology: The term "product" was reserved exclusively

³³ An early version of the paper was presented at a Seminar at London School of Economics during a stay there in the early months of 1949. Advice and criticism received from professor Meade on that occasion is recalled with gratitude. I remember, for instance, that the terms "required" and "unrequired" were suggested by him.

³⁴ This publication, edited by Aukrust, contained some 250 pages of tables together with a non-technical description of concepts and methods. Input-output tables (35 industries) were included for the postwar years. On the whole the amount of detail was rather large for its time and comparable to that of the corresponding US publication which in some ways served as a pattern. In fact, one of the tables in the Norwegian publication, with data on "Full-time equivalent employment, by industry", measured in man-years, was a direct copy of a similar table for the United States. (The popularity of this table makes one wonder why tables on labour input have not been included among the standard tables of the new SNA.) Other tables analyzed receipts and expenditures of general government in detail. Tables rather than accounts were preferred as a format for publishing the resulting statistics. A small set of accounts in the text served mainly to explain the interrelationships between important flows and aggregates, and as a framework for describing their operational definitions.

for use with reference to real flows, i.e. as a measure of value added, while the term "income" was applied whenever financial income was also included.

25. In their empirical work Bjerke and Milhøj continued Kampmann's practice of applying the commodity flow method and input-output accounting, supplemented with an analysis of general government fiscal accounts. However, they improved the results by increasing the number of industries and commodities. Relatively detailed input-output tables (aprox. 30 industries) were estimated carefully for two selected years (1947 and 1949), and by summary methods for other years (1948, 1950-1952). The number of different categories of goods and services distinguished was not reported; from information given in the text, however, it appears that in the "make" table somewhere between five hundred and one thousand groups of goods and services were distinguished. The resulting statistics were published partly within the framework of the accounting system mentioned above, partly as input-output tables, but mostly in the form of a large number of analytical tables.

5. Contributions to national accounting theory and method

5.1 "Real" versus "financial" phenomena. Definition of transactions and flows

1. The work by Scandinavian economists on national accounting in the early post-war years was strongly influenced by the pionering work during the 1930s by Frisch and Lindahl. Two ideas, in particular, gave a direction to their work which distinguishes it from Anglo-American thinking on fundamental points.

2. One was the insistence, by Frisch and Lindahl alike, that "real phenomena" were what mattered, and that real phenomena be kept clearly distinct from phenomena in the financial sphere. Real phenomena, Frisch used to say, would exist even in a world without property rights. Real phenomena, therefore, are capable of being described in purely real terms and, in the interest of clarity, they should be thus described. This did not mean, however, that the financial superstructure was not also of interest. On the contrary, important problems in economics concern precisely the interplay between the two spheres. A good national accounting system should cater for both. The other idea was the observation that economic phenomena always are related to economic objects (real or financial), which suggests that the entries in the national accounts should be thought of as representing flows and stocks of real and/or financial objects.

3. These ideas of Frisch/Lindahl were worked out in considerable detail in (Aukrust 1949). Aukrust took as his startingpoint the concepts of *economic objects* and *sectors*. Economic objects are of two kinds: *Real objects*, a category which includes not only tangible goods, but also services, and *financial objects* by which is meant money and claims and property rights of any kind, including the ownership of a real asset as distinct from the asset itself. The sector concept is used in a rather abstract sense, simply indicating some part (a factory, a company, an industry, a country etc.) of the economic totality. The concepts of economic objects and sectors are interrelated:

"The sector will ... command certain real assets, and it will hold a certain amount of financial assets (positive or negative) against other sectors, and it will have a certain production and consumption capacity (positive or zero)" (p. 171).

Knowing what is meant by objects and sectors, a *transaction* may be defined as the passing over from one sector to another of an economic object, real and financial transactions corresponding to real and financial objects respectively. Transactions in the same type of objects may be grouped together, thus constituting what we shall call *flows* (real or financial). Flows passing from one sector to another are *intersectoral flows*. We may be interested also in what is going on within a particular sector. This may be described by a system of *intrasectoral flows*, one example would be a flow of goods which is produced within a sector and consumed within that same sector. Very often a transaction, and consequently the flow which is made up of transactions of that kind, is intimately connected with another transaction moving in the opposite direction, that is, each of the two transactions presupposes the other. We shall talk in this case of (two) *requited transactions* and, consequently, (two) *requited flows* (real against real, or real against financial, or financial against financial). In contrast to this, we shall talk of *transfer transactions* and

transfer flows when some objects (real or financial) are passing from one sector to another without any objects moving in the opposite direction.

4. The idea that an economic transaction is something which happens to an economic object was adopted by Ohlsson in his work for Sweden:

"Economic transactions occur when goods and/or financial assets and liabilities in one way or another change hands, change place, change functional type, and/or when a service is performed (Ohlsson 1953, p.11)

Danish economists were less inclined towards theorizing than their Norwegian and Swedish colleagues. When they started work on national accounting in the late 1940s, they seemed to be quite happy to accept the idea, taken over from Anglo- American literature, that national accounting had to do with measuring "transactions" - without caring much about the precise content of that concept. What little was said about the issue, however, was clearly of Scandinavian origin;

"Transactions may be classified as *real* (goods and services) and *monetary* (payments). Transactions are mostly *two-sided* in that goods are exchanged against goods, claims against money, or goods against money. In addition there are *one-sided* transactions in the form of gifts, social grants, taxes etc." (Det Statistiske Departement, 1955, p. 28. My translation)."

Thus, all Scandinavian countries define transactions in terms of "something happening to economic objects". With this intellectual legacy they found it difficult to accept the Anglo-American view that national accounting had to do with the recording of flows of "payables" and "receivables" (actual and imputed). "Payables" and "receivables" arose in the Scandinavian way of thinking as the ex post consequences of transactions and could not be clearly identified conceptually without a prior understanding of the more basic notions of a transaction and the objects involved in a transaction.

5.2 Towards an axiomatic foundation

5. Aukrust returned to the ideas set out in 1949 a few years later. Following a suggestion by Frisch, he tried to deal in an axiomatic manner with the problems of definition, classification, and measurement in the national accounts in an appendix to his dissertation (Aukrust, 1955). The main ideas may be summarized in the form of a lengthy quotation from a more recent work (Aukrust, 1966):

"We shall consider the elementary units to be classified in national accounting work to be economic objects (real and financial) rather than economic transactions ... We want to demonstrate that ... some of the most important aggregates in the national accounts can be defined as classes of such elements ..."

"For a classification to be possible, we have to postulate that certain distinguishing characteristics (properties) attaching to the individual objects are given, which can form the basis for their classification. In selecting these characteristics we note that, typically,

the aggregates to be defined have reference to particular transactors (sectors), and that they have a time dimension. This suggests that the categories of "sector" and "time" will have to be introduced into the system ... Finally, we shall have to assume that certain types of events (transactions or transformations) are given, to which objects may be subject and which are of interest to us in the national accounts, e.g. sales..."

"We shall postulate, therefore, that for each individual object the following characteristics are given: (i) Information as to whether the object is a real or financial object. (ii) Information as to the points of time at which the object is in existence. (iii) Information as to which transactors the objects are related to at any particular point of time during their existence. (iv) Information as to which transactions (events of the given types) the object is subject to during its existence; and, for every such transaction, further information as to the time interval when it takes place. These types of information constitute the distinguishing characteristics which will make a classification possible ...".

With this information given, a number of entries in the national accounts may be conceived of as classes ("baskets") of real and/or financial objects, either as sub-classes of objects existing at a certain point of time (stocks), or as sub-classes of objects subject to certain types of events during a certain period of time (flows). There are, however, important entries in the national accounts (value added, net worth and other "balancing items") which cannot be conceived of as classes³⁵, but which exist only in value terms:

"Next a set of evaluation coefficients (prices) is postulated for all objects ... With such a set of evaluation coefficients given, the way is open for establishing, in the form of a scalar number, what we may call the value of a class; furthermore, it can be shown that those national accounting entries that can not be defined as classes ... such as value added or saving, can instead be defined as value concepts ... Finally, if we further postulate that "exchange of objects always occurs according to the prices that are postulated", it can be shown that simple relationships (...eco-circ relationships ...) will exist between the value concepts established..."

6. Aukrust started work in the belief that realizing these ideas would be a simple job. The task turned out to be not all that simple. By the time he was through he found that it had taken no less than twenty postulates to construct what was no more than the rudimentary framework of a viable national accounting system. Three postulates served to introduce the *basic categories* of sectors, economic objects, and time (points of time, and intervals). A subset of six postulates described the *real circulation* by introducing the idea of "ownership" of real objects, and by defining, and dating, the types of events ("transactions") which real objects could be subject to (production, consumption, change of ownership). A further sub-set of six postulates described the *financial circulation* by introducing the ideas of "creditors" and "debtors" of financial objects, and by defining, and dating, the types of events ("transactions") to which financial objects could be subject (creation, cancellation, change of creditor or debtor). Three postulates described the interplay between the real and

³⁵ The reason why balancing items cannot be defined as classes is that while, in logic, classes may always be added, subtraction is only allowed when the subtrahend is a sub-class of the minuend: We may conceive of a basket containing three apples and two oranges, but not one containing three apples minus two oranges.

the financial circulation and introduced the distinction between *requited* and *unrequited* transactions. Two postulates related to *evaluation* and *measurement*. They stated, in essence, (i) for every object a number ("price") is given, which expresses the value of that object, (ii) two requited transactions (flows) have always the same value (the postulate of "the preservation of values in exchange")³⁶.

7. The most important new insight gained from the exercise may have been the realization that most entries in the national accounts can be conceived of as representing stocks and flows ("baskets") of real and/or financial objects, but also that there are others (the balancing items) which cannot be thus defined and which exist only in value terms. This distinction is relevant i.a. for the problem of deflation in the national accounts. Another recognition brought out clearly is that numbers representing entries in the national accounts are functions equally of quantities and prices, and the same goes for relationships derived from such numbers. Once this is realized it is no longer surprising that the growth rate of GDP computed at constant prices tend to change whenever the base year is changed, or that an export surplus at current prices may turn into an import surplus when measured at the prices of some other year. Finally, certain terminological requirements are suggested: In formulating verbal definitions the terminology chosen should clearly reflect the quantity/price dimensions of the aggregates to be defined³⁷.

5.3 The purposes of national accounting

8. Ingvar Ohlsson's most noteworthy contribution to the theory of national accounting, no doubt, was his analysis of the extent to which, and how, national accounting practice should be influenced by the purposes which the resulting statistics are intended to serve. Admittedly, Ohlsson was not the first to see that different purposes might call for different statistics. Only a few years earlier the famous market price-factor cost discussion between J.R. Hicks, Simon Kuznets and I.M.D. Little, in *Economica*, had taken place. But Ohlsson was the first one who studied systematically how different purposes might call for different answers to problems selected from the entire field of national accounting theory.

9. In general, Ohlsson found that different purposes called for different solutions to a number of problems encountered in national accounting work. The most obvious conflicts were between accounting principles suitable for the measurement of results on the one hand, and those suitable for analysis of economic behaviour on the other. When measurement of results was the purpose, there was a further conflict between the production/productivity and welfare aspects. Analysis of economic structure called for much the same type of data as does analysis of production. National budget work used elements of all the other purposes. Here is a selection of Ohlssons conclusions:

³⁶ Alternative systems of postulates are of course possible. Some might lead to national accounting systems different from the one described here, in much the same sense as non-Euclidian geometries are different from Euclidian geometries. An example is given in (Benard, 1972).

³⁷ The definition of gross value added in an early draft of "SNA mark III" is entirely satisfactory on this score. It reads: "The concept of gross value added is defined as the increase in value between a set of inputs of goods and services and the set of outputs of goods and services which results from transforming, or consuming, those inputs in the process of producing those outputs". (Draft, Ch. VII, para 65).

- (i) Goods and services should be valued at factor cost for the purpose of analyzing output and productivity, but at market prices when the purpose is measurement of welfare. If national accounts data are to be used for analyzing economic behaviour, the valuation should reflect the valuations set by the economic units themselves.
- (ii) The sector division should be strictly institutional when the national accounts are to be used for analyzing economic behaviour; for measurement of results a functional sector division is preferable.
- (iii) For analysis of results the boundary of production should be drawn so as to include non-market production whenever feasible; for analysis of economic behaviour it is better, as a rule, to select only monetary transactions.
- (iv) Expenditures on maintenance and repairs, since they add to capital values, should be included in gross capital formation for the purpose of measuring results, but should be treated as current input, in accordance with business practice, for the analysis of behaviour.
- (v) While depreciation charges in the enterprise sector should be calculated at current market prices for measurement of results, they should be measured in accordance with actual business practice (which may be different) for the purpose of economic behaviour analysis.

10. Faced with such findings Ohlsson concluded, in a summary chapter (1953, pp. 320-321), that the national accountant has to choose between three alternatives for the form of presentation of official national accounting statistics:

- (i) the construction of a general purpose NA-system from which to extract the specialpurpose systems
- (ii) the construction of different NA-system for different purposes, and
- (iii) the construction of one special purpose NA-system with a list of corrections for the main items for which different treatment for different purposes is required

It was "at least conceivable", Ohlsson admitted, that a general purpose system (alternative 1) could be constructed that might be used "for all reasonable purposes". However, this would be "an extremely complex matter". For his empirical work Ohlsson preferred different systems for different purposes (alternative 2), as has been described earlier. However, Ohlsson's experiment in that direction was no-where followed up and remained an episode even in Sweden.

5.4 The nature of government and financial institutions

11. Another original contribution by Ohlsson, also arising from his discussion of purposes, was his analysis of the nature of general government and financial institutions and their role in economic life. According to Ohlsson, general government engages in four different functions: Production, consumption, income redistribution, and investment. The services produced are of three types depending on whether they "promote" (Ohlsson's term) (i)

production directly, such as maintaining ports and roads for the benefit of identifiable producers; or (ii) consumption directly, such as supplying medical attention and educational facilities for the benefit of identifiable consumers; or (iii) consumption collectively, such as maintaining a national defence or a foreign service (Ohlsson, 1953, pp. 21-23). The treatment of these services in the national accounts, Ohlsson argues, ought to depend upon the purposes for which the accounts are to be used. His discussion of how they should be valued is fairly standard and offers few new insights. His discussion of how they should be allocated to users, however, is original. Two alternative treatments are suggested, each suited to a particular purpose: In a national accounting system intended for business cycle analysis and national budget work it is convenient to look upon government simply as itself being the consumer of the services produced ("government consumption"). In a system intended for analysis of production and welfare a more complicated treatment is preferable: Services benefiting producers (type i) should be considered "intermediate products" and charged as (non-marketed) input to the enterprise sector and thus excluded from the national product. Services benefiting identifiable consumers (type ii), though paid for by government, should be imputed to households and considered part of private consumption. Finally, services of type (iii) might be treated as consumed collectively and considered a special category of final expenditure ("collective consumption"). Part of this discussion sounds very modern! However, the ideas were only partly followed through in empirical work.

12. Ohlsson observes that banks and insurance companies are like general government in that they produce services the costs of which are recovered only in part through sales on a market. This similarity makes him think that the services rendered by banks and insurance should be treated in the national accounts in exactly the same way as services rendered by general government:

"In my opinion banking, insurance, and pure government are on an equal footing as regards the assignment of their services. It seems then rather peculiar to me that nowadays in official estimates government services are assigned to the government sector, but banking and insurance services are assigned to the benefiting sectors. They should all be treated in a similar manner" (loc. cit. p. 148).

Thus, in a system intended for business cycle analysis, banking and insurance services should be considered as being consumed by the bank and insurance companies themselves, as "enterprise consumption" (a kind of collective consumption in analogy with government consumption)³⁸. For the purpose of analyzing production and welfare bank and insurance services should be imputed in part to enterprises and in part to households as recommended in Stone (1947). (As in the case of government services the recommendations were only partly followed through in Ohlsson's empirical work).

³⁸ In this context Ohlsson observes, quite logically, that once the concept of "enterprise consumption" is allowed into the system, this category ought to be broadened so as to contain "... not only the value of banking and insurance services, but also the cost of collective arrangements for the employees in the enterprises, such as holiday places, medical attendance, sports fields, lunch rooms. Consumptions of this kind is similar to government consumption and could also be assigned to the producing sector. Many imputations would be avoided by such a compromise" (loc. cit. p. 149). This interesting suggestion was not followed up in Ohlsson's empirical work, however, presumably because of lack of data.

5.5 Accounting design. Quadruple accounting

13. In the years immediately following World War II, national accounting pioneers invested considerable effort in searching for the design of an "ideal" national accounting system. The design should be analytically useful, and it was sometimes believed that the logic of the design might help in deciding how national accounting aggregates should be defined.

14. In Sweden, Ohlsson (1951) designed his two alternative accounting systems with an explicit view to the two different purposes which they were to serve. The first set of accounts was intended for measurement of results; consequently, the design was chosen so as to allow various national aggregates to be easily calculated. The second set of accounts was intended for business cycle analysis, and the design in this case aimed at giving a picture of purely monetary transactions taking place between economic subjects. The same set of four institutionally defined sectors was used in both alternatives, but the accounting structure within sectors was different.

15. In Denmark, the first estimates by Kampmann for the 1930's were presented within an input-output like framework. Later, Bjerke and Milhøj (1955) adopted for their work the accounting structure recommended by the international organizations, with some minor changes.

16. In Norway, sets of accounts were used partly as a pedagogical device, partly as a means for controlling the internal consistency of historical data (Statistisk sentralbyrå, 1946) or of forward-looking data in the national budget (Bjerve, 1947). Aukrust (1949) experimented with accounting designs based on a three-fold classification of flows into real-financial, requited - unrequited (transfers), and current-capital. The logic of the system was formal: Real flows were shown on real accounts (current or capital), requited financial flows on current or capital financial accounts, while transfers were recorded on income accounts. Aggregates not representing flows (value added, saving etc.) showed up as balancing items. This meant "double book-keeping" in respect of each sector, e.g. a financial transfer received would be recorded as an in-flow to a financial account and as an income element on income account. In a system with two or more sectors "quadruple accounting" would result since inter-sectoral flows would give rise to two entries in the accounts of each of the pair of sectors affected. This *principle of quadruple accounting* has been adopted and made explicit in the SNA Mark III (Draft, ch. II, para 88).

17. Whereas Ohlsson in Sweden used accounts as a convenient framework for presenting statistics this was not the practice followed by his colleagues in Denmark and Norway. In these countries the accounts were considered merely a convenient means of making the system of definitional equations known to the readers. For this purpose a highly aggregated set of account for the national economy as a whole was deemed sufficient, with some details added in order to depict the interrelationship between general government and the rest of the economy. Detailed systems of "accounts" or "work-sheets" were used exclusively as office tools during the estimation process. For the purpose of presenting the result to the public the format of traditional tables was preferred.

5.6 Valuation: The idea of factor cost

17. In the standard literature the two concepts of "national product at market prices" and "national product at factor cost" used to be thought of as two measures of the same total, only valued differently. Ohlsson in his discussion of valuation went along in the same direction, as did Bjerke and Milhøj in Denmark. Lindahl in Sweden and Frisch and his followers in Norway took a different position. They had, of course, no problem with the idea that goods and services, in principle, may be valued at alternative sets of prices. They argued, however, that valuation "at factor cost" was neither practical nor very useful in an economy where taxes and subsidies are shifted back and forth within a complicated network of sales and purchases. (The compromise idea of valuation at "basic prices" might have been more acceptable.) They observed, further, that in actual practice the alternative evaluation was never undertaken: "National product at factor cost" was generally nothing more than *total factor income* which was found by deducting (net) indirect taxes from the value of product measured at market prices. The same applies at the level of individual industries. Lindahl (1954) expressed the thought very clearly.

"Factor income is that part of value added which is left for distribution to factors of production when government has taken its share in the form of indirect taxes" (my translation from the Swedish original, p. 103).

Thus, Lindahl considered "product at factor cost" not the *same* total as "product at market prices", valued differently, but as a *part* of the latter and as such, in a sense, itself a market price concept. The same standpoint was taken by Frisch and others in Norway. In the national accounts of Norway, Aukrust made "factor income" a key concept both at the industry level and for the economy as a whole, while aggregates "at factor cost" were never referred to.

5.7 Definition of product and income aggregates. The concept of residence

18. The Scandinavian countries have agreed to choose the concept of (gross or net) "*nationalprodukt*" as their main national accounting aggregate. It is defined as the value added by resident factors of production. It is nearly, (but not quite) identical with what is called "domestic product at market prices" in the SNA. The difference has to do with the different content given to the idea of "residence" in the two systems. In the SNA, residence relates to economic units, and "domestic product" is a measure of values created by resident producers. In Scandinavian thinking, residence is a characteristic of factors of production,

and "nationalprodukt" is a measure of values created by resident factors³⁹. The difference may be quantitatively unimportant but it becomes conceptually significant when a factor of production (e.g. a border worker) resident in country A works in a producing unit resident in country B. The values created (added) by this factor would be counted as part of the "nationalprodukt" of A according to Scandinavian practice, while according to SNA rules it would be part of the "domestic product" of B. As a corollary, a payment to A from B in respect of the services rendered by that factor would be treated as a payment for export of services in Scandinavia but as factor payment in SNA.

19. Whereas the Scandinavian countries agreed at an early stage to adopt (gross or net) "nationalprodukt" as their main measure of product (and of "income generated" or "originating") they went different ways in their choice of additional national accounting totals. In *Denmark* Bjerke and Milhøj (1955) chose to include the large number of measures of product and income, at market price and at factor cost, so characteristic of the UN system (section 4.4). In *Norway* Aukrust (1952), believing that confusion was likely to result from presenting the reader with too many nearly identical concepts, went to the opposite extreme. In addition to national product, gross or net, which could be interpreted not only as a measure of output but also as a measure of "income originating", he restricted his choice of income totals to two: (1) "Factor income" (wages + operating surplus), a measure of "primary income" left for distribution to factors of production after government had taken its share in the form of indirect taxes. At the national level "total factor income" could be shown by industrial origin or, alternatively, by receiving institutional sector. (2) Disposable income, a measure of "redistributed income" available for consumption and/or saving, defined at the national level as the sum of "nationalprodukt" (income originating) and net income received from abroad in the form of interest, dividends and other transfers. "Disposable national income" could be broken down by institutional sectors. The concept of "national income" as defined in SNA was rejected as being ananalytically not very useful:

"A concept which includes net interest and dividends from abroad, but excludes net mutual aid, etc., received, is too narrow as a measure of welfare (where Disposable National Income is the better concept), and at the same time too broad as an indicator of productivity (where Geographical Product ["nationalprodukt"] is more illuminating" (Aukrust 1949, p. 181).

³⁹ The Scandinavian view has its roots in the works of Frisch and Lindahl. Frisch, noting that the factors of production of a sector may be active in production outside the sector as illustrated in the Eco-circ graph (Appendix A), argued that the concepts of "residence" and "sector" are logically interrelated: "The logical startingpoint [for defining a sector] is a criterium which decides whether a person or a piece of capital (any element which can generate value added, in short any *factor*) is resident "by us", i.e. in the sector which we are studying. E, R, J etc. relates to these resident factors. Thus, the residence criterium gives content to the concept of the sector". (Frisch, 1943, p. 113). Frisch's reasoning, at the national level, logically led to the product (value added) generated by resident factors being considered "the product of the nation". Frisch did not discuss how the borderline between "resident" and "foreign" factors of production should actually be drawn. In the empirical work of the Scandinavian countries the issue is resolved by treating land and stationary real capital always as resident of the country in which it is located, while special conventions have been laid down in respect of labour and movable equipment (ships, airplanes etc.). Compare the theoretical discussion by Lindahl (1954), p.88.

The main concepts introduced by Ohlsson (1953) for *Sweden* were in many respects similar to those chosen by Aukrust for Norway. In particular, the concept of "disposable national income" is common to both systems except that the terminology is different.

20. To summarize: In comparison to the SNA it appears that the Scandinavian countries tended to replace the concept of "national income" with the concept of "total factor income". Two of them (Norway and Sweden) also made use of the concept "disposable national income", a concept which is only now about to be introduced into the SNA.

5.8 Commodity flows, input-output, and double deflation

21. From a methodological point of view the most noteworthy contribution by Scandinavian national accountants has probably been their development of the commodity flow method. It started when Lindahl and his colleagues applied a rudimentary form of commodity flow analysis in their national income estimates for Sweden in the early 1930s. The credit for having demonstrated the full power of the commodity flow approach to national accounting must, however, go to Kampmann in Denmark who in a project initiated around 1935 applied the method with great consistency i.a. publishing annual input-output tables (sections 3.3). Kampmann's work in Denmark became known to Norwegian statisticians in 1946 when Norway embarked on a project aiming at a revision of the existing national accounts. It seemed natural for many reasons to make the commodity flow method the cornerstone of Norwegian work also. The estimates published in (Statistisk Sentralbyrå, 1952) were based on an analysis of probably near 1000 different groups of commodities, including 350 categories of consumers' goods. The commodity flows were shown in condensed form as a sector-sector input-output table distinguishing some 35 industries.

22. The commodity flow method has continued to serve as the cornerstone of national accounting work in all later years in both Denmark and Norway. More details have of course been added as improved statistics have become available. A major overhaul of the Danish system was initiated by Bent Thage in 1968 patterned on the make and use matrix framework of the SNA Mark II. The Danish system at present contains about 2 500 groups of commodities, 130 industries, and about 75 categories of final demand (Thage, 1990, p.2). In Norway the same numbers are 1 750, and 180 respectively.

23. With input-output tables available both at constant and current prices, "double-deflation" of the estimates of product (value added) at the industry and national level followed more or less automatically. Norway has used double deflation since 1952. In Denmark the method seems to have been used for the first time in (Det Statistiske Departement, 1955) for the purpose of revaluing the 1947 input-output table at 1949 prices.

24. Given the availability of input-output tables on a regular basis Scandinavian economists, quite naturally, were among the first to explore their potential for economic analysis. Studies based on Norwegian and Danish data were presented at international conferences on many occasions in the early 1950s (see e.g. Aukrust (1950); Bjerke, Milhøj and Nørregaard Rasmussen, 1954). In Norway, chief responsibility for input-output work was in the hands of Per Sevaldson who, with annual data at his disposal, did pioneering research on the stability of input-output coefficients (Sevaldson, 1954, 1961), and on the

incorporation of input-output structures in macro-economic models. Aukrust as a consultant to the UN Economic Commission for Europe assisted in exploring the use of input-output methodology in economic analysis in general (Economic Commission for Europe, 1956).

5.9 Flows of financial objects

25. While input-output accounting very early became a regular part of national accounting in Scandinavia, accounting for flows of financial objects took longer to develop. The need for such data was felt first in Norway in connection with national budget work. Early attempts (Statistisk Sentralbyrå, 1947) made it clear that financial statistics would have to be improved for financial accounting to be possible. Consequently, during the 1950s work proceeded in parallel on theoretical and practical issues in Norway and to some extent in Sweden and Denmark as well. A paper (Bjerve and Selsjord, 1959), describing the principles guiding work in Norway, was presented to the 1959 IARIW conference, in many ways anticipating ideas which some years later became part of SNA Mark II. Numerical work was a different matter, however, and an integration of accounts for financial objects (stocks and flows) with the already existing national accounts could only be achieved gradually over a number of years.

5.10 Reliability indicators

26. The national accountant faces the problem of conveying to his readers a picture of the reliability of his estimates. The best way of doing this is through a detailed description of estimation methods. In addition some authors (e.g. Geary in Ireland) experimented with attaching to individual series a "reliability figure" expressing the subjective evaluation of the quality of that particular series by the person responsible for the estimate⁴⁰.

27. Such reliability figures, on a scale from 1 to 5, were used for the first time in Scandinavia in Sweden in 1949 (Meddelanden Serie A:17). Noting that some series may be reliable with respect to level (because they are based on reliable bench-mark data) but doubtful with respect to year-to year movements, while the opposite may hold true for others, Ohlsson in Sweden and Aukrust in Norway tried to improve on the standard practice by using a combination of two reliability figures for each statistical series: One in respect of level and one in respect of trend. Ohlsson in addition warned his readers by adding a "± x" to particular weak figures such as estimates of depreciation and saving. The use of

⁴⁰ The use of reliability indicators was recommended by Frisch as early as in 1939: "As far as possible ± limits should be indicated for the individual entries in the accounts, e.g. as done systematically by Sir Josiah Stamp in his estimates from 1919 of the national income of different countries" (Frisch, 1939, p. 143, my translation).

reliability figures was never attempted in Denmark⁴¹.

28. Since the use of reliability figures, perhaps regrettably, did not catch on internationally, Sweden and Norway also soon decided against continuing their practice.

⁴¹ The decision against adopting this practice was defended by Bjerke and Milhøj with the following words (my translation): "Such a system, in which data are characterized according to a more or less detailed scale, ranging from highly reliable to rather doubtful, no doubt gives more information than indications of the reliability of estimates given at scattered places in the text. We have, nevertheless, hesitated in adopting such a system, mainly for fear that it might add further arbitrariness. In reality, it would be no more than an application of personal judgement which, admittedly, the persons responsible for the estimates are best placed to exercise, but which can nevertheless never be exercised according to some objective norm. To this may be added the fact that the majority of aggregates will be composed of reliable and less reliable components to such an extent that the reliability of the total will be even more difficult to judge. Finally, there is the difficulty that the reliability of the estimates may vary over time new or revised primary statistics may change the reliability of estimates fundamentally from one year to the next" (Det statistiske Departement, 1955, p. 68* - 69*).

6. Definition and classification by convention

1. There are many controversial issues in the national accounting literature which has little to do with principles and which, therefore, require conventional solutions. It may be of interest for the record to note how some of the more well-known issues were treated in Scandinavia in the early days when international recommendations were yet to be agreed.

6.1 The boundary of production

2. Early Scandinavian studies adopted a broad concept of production. Lindahl et al (1937) set the standard by including "... everything possessing an exchange value...". Denmark and Norway followed, Aukrust (1952), for instance, even going so far as to include in national product the value of wild berries picked for own consumption. The increase in the value of *standing forests* was included in some studies (Ohlsson 1951, Aukrust 1952) but excluded in others (Denmark, earlier studies for Sweden and Norway). The exception to defining production broadly was Ohlsson (1951) who in one of his two alternative systems (the one intended primarily for business cycle analysis) included only "realized monetary transactions".

3. Considerable attention was paid to the treatment of *consumer durables*. All Scandinavian studies included the services of dwellings in the national product. Lindahl et. al (1937) included also the services rendered by all kinds of other consumer goods, ranging all the way from household china and glass to automobiles; the value of the services was calculated as the annual amortization of the goods plus a yield of 5 per cent on their remaining value. Ohlsson (1953) followed Lindahl part of the way by including, in principle, the services of automobiles (in practice putting the capital costs of the services equal to the value of acquisitions). Kampmann (1942) agreed with Lindahl in theory, but decided in practice to take the output of consumer durables in a given year as a measure of these services. CBS (1946) and Aukrust (1952) in Norway and Bjerke and Milhøj (1955) in Denmark considered consumer durables, apart from dwellings, as consumed when bought.

4. Practice with respect to the treatment of *unpaid domestic work* varied amongst countries and over time. In Sweden, Lindahl et.al. (1937) published two alternative measures of the national product, one excluding and one including the value of non-paid domestic work. Preference was given to the former. In Ohlsson's (1951) system for business cycle analysis only monetary transactions were considered, thus the issue did not arise. In his alternative system intended for analysis of results, the value of the services of housewives etc was "unfortunately" also excluded due to "problems of valuation". In Denmark both Kampmann (1942) and later Bjerke and Milhøj (1955) followed Lindahl in excluding unpaid domestic work in their principal system yet offering, as an option, an estimate of the values of these

services⁴². In Norway, CBS (1946) chose to include the value of unpaid domestic work in the national product. Aukrust (1952) excluded it.

6.2 General government

5. All Scandinavian studies made a distinction between government enterprises, which were included in the enterprise sector, and general government which was treated always as a producer, and sometimes also as a consumer, of government services. The value of the output of government services was estimated at costs in all studies. Costs were always taken to include maintenance and amortization costs of government buildings and plants. In Denmark, but not in Norway and Sweden, an imputed interest on government buildings was also included, as required by OEEC (1952). The different practice in the three countries presumably reflected the fact that the fiscal accounts of Denmark included such an entry while the fiscal accounts of Norway and Sweden did not.

6. When it came to allocating government services to users, different solutions were chosen. In the earlier studies, before the idea of considering general government a (collective) consumer had been generally accepted, the issue was the distribution of these services between private consumption and intermediate business input and, if the latter, between individual industries. Lindahl et. al. (1937), by convention, routed one half to consumers and the other half as (unallocated) current input to business, to be deducted as a correction item from the sum of value added by individual industries when estimating national product. CBS (1946) in Norway tried to judge the allocation of government services between consumption and current input to business on the basis of the types of services rendered, following Lindahl in treating the business part as a correction item rather than charging it to individual industries. Kampmann (1942) in Denmark followed an argument by Kuznets of treating 15 per cent of government services as current input to business and the rest as components of consumption; the part treated as current input was allotted to individual industries in proportion to the value of their output. With the arrival of Stone's study from 1946 for the League of Nations it became usual to consider the output of government services to be consumed by government itself as "government consumption". This treatment was adopted by Aukrust (1952) for Norway and by Bjerke and Milhøj (1955) in Denmark. In Sweden Ohlsson (1953) argued, as explained in 5.4, that, in theory, a more differentiated treatment was called for. In practical work, however, he agreed to treat the total of government services as consumed by government itself, adding a sub-classification of government consumption into "intermediate" and "final" consumption in the variant of his system intended for the analysis of results.

7. Data for the general government accounts could only be derived from a detailed analysis of the fiscal accounts of central and local government, aiming at regrouping the various

⁴² The arbitrariness necessarily involved in this kind of exercise is illustrated by a quotation (my translation): "..... it is assumed, first, that the value of the work of a wife may be set equal to the average income of domestic servants increased by 10 per cent. Thereafter, this income has been imputed with its full amount to the following categories of persons from the population census: Married women assisting in the activities of their husbands; widows below the age of 65; divorced women, and daughters active in domestic work at home. Married women with an outside activity have been imputed one half of this income ..." (Det Statistiske Departement, 1955 p. 44-45*).

entries of receipts and outlays into categories as defined in the national accounts. This was achieved in different ways, and typically required the co-operation of the competent authorities. In Norway, for instance, a major budgetary reform was carried through in the middle of the 1950s, one purpose of which was to make the format and specifications of the fiscal budget conform to the needs of the national accountant; similarly, directives laid down by the central authorities for the budgeting practice of municipalities were revised with the same purpose in mind.

6.3 Banks and insurance companies

8. The output of banks and insurance companies was valued at costs in all Scandinavian studies, the exact method by which this was done varying somewhat in practice. Different methods were used for allotting the services of banks and insurance companies to users. As for government services, the issue was the distribution of these services between consumption and intermediate business input and, if the latter, between individual industries.

9. Lindahl et al (1937) charged, conventionally, all banking services, unallocated, to business, and all insurance services, unallocated, to consumption, well aware that a finer division might have been preferable. In Norway, CBS (1946) followed Lindahl in charging all banking services to business, but differed by charging insurance services partly to business and partly to consumption. Kampmann (1942) made an attempt to distribute the services both of banks and of insurance companies between business and consumption. As with government services the part charged to business was allotted to individual industries in proportion to the value of their output.

10. Later authors were faced with the recommendations in Stone's League of Nation paper (1947), but the recommendations given there had little impact. Ohlsson (1951), true to his view that banking and insurance services were similar to government services and should be treated analogously, treated all the services rendered by banks and insurance companies as consumed by these institutions themselves as "enterprise consumption", i.e. as a separate category of "final output". Aukrust (1952) and Bjerke and Milhøj (1955) took a pragmatic view: They disliked the idea of having to show "imputed bank charges" as part of consumers' expenditure and as a corresponding imputed element of household income, and they objected even more to having to chase imputed bank charges through their input-output tables, thus distorting the estimates of value added of all industries. Rather than introducing fictitious flows, difficult to explain, at numerous points in the system, they preferred to concentrate all difficulties in one single entry by treating the value of the services of banks and insurance as a correction item to be deducted from the sum of value added by individual industries when estimating national product. (This was the solution adopted later in SNA, Mark II.) This correction item equalled Ohlsson's "enterprise consumption" in magnitude and, like the latter, it served to balance the accounts.

6.4 The concept of "gross-gross" capital formation

11. A standard problem in national accounting relates to the borderline to be drawn between current input and capital expenditure. The issue primarily concerns the treatment of expenditures on daily upkeep, maintenance, and minor and major repairs.

12. The Scandinavian countries agreed shortly after World War II to adopt what became known internationally as the "gross-gross" concept of investment. (If I recall correctly the term was suggested, humourously, by Geary). According to Scandinavian practice, gross investment included, in addition to new equipment and new construction, all kinds of repair and maintenance to equipment and structures. Only "daily upkeep" was treated as current input. The arguments leading to the choice of the wide "gross-gross" concept had to do partly with statistical convenience and partly with analytical usefulness. The following quotation from Bjerke/Milhøj (1955) may be taken as representative of the Scandinavian view (my translation):

"The reason why it has been decided not to follow international practice and the proposals of OEEC and UN, according to which only new investments, major alterations etc. are considered as investment, has to do with the difficulties involved in drawing a borderline between those (major) repairs which should be included and those (minor) which one would like to exclude. While any borderline will have to be drawn arbitrarily it is considered easier to distinguish between repairs on the one hand and ordinary daily upkeep etc. on the other. To this may be added that investment in the narrow sense and repair works overwhelmingly call for the same sort of materials etc. which suggests that they should both be included as investment. Finally, scarce supply of goods, e.g. in time of war, may lead to much increase in repairs activity, which in such a situation in a sense replaces new investments" (p. 15-16).

The argument was not accepted when the issue was up for discussion at OEEC in 1951 in connection with the proposed "OEEC Simplified System": The gross-gross concept lost narrowly when a vote was taken amongst the experts present.

6.5 The classification of transfers

13. Scandinavian authors have tended to use the word "transfer" as a synonym for "unrequited", i.e. "without a quid pro quo". The problem of classifying transfers has been approached by asking: Why are they paid? Ohlsson and Aukrust, in particular, have argued that a classification based on the motives of the payer and/or the reactions of the receiver (e.g. "current" versus "capital") is unlikely to result in well-defined categories; therefore more formal criteria are needed. Ohlsson (1951) proposed a four-fold classification of transfers based on their economic and legal background (essentially on extension of a classification scheme borrowed from Ralph (1948)): (i) voluntary transfers, e.g. gifts, grants, non-obligatory fees, dividends etc., entrepreneurial withdrawals, (ii) contractual transfers, e.g. interest, wages, rents, insurance claims, pensions, (iii) compulsory transfers, e.g. taxes, fines, war damage payments between nations, (iv) "conditional" (or "indirect") transfers e.g. indirect taxes and subsidies ".... closely connected or conditioned by market transactions ..." Aukrust (1955) reasoned along similar lines:

"In traditional literature one criterion used for grouping transactions has been the supposed motives or repercussions that gave rise to, or resulted from such transactions. Pivotal national accounting items such as national income, private saving, exports, etc, are so defined that their exact content is dependent upon the distinction drawn between "direct" and "indirect" taxes, between "current transfers" and "capital transfers", etc. In other words, the definitions presuppose that distinctions are drawn on points for which the possibility of drawing precise distinctions may not exist.... In order to achieve the sharpest possible definition of the national aggregates, we have decided to use a system of classification which allows us to define the national aggregates solely by formal criteria Classifications based upon the "repercussions" of or "motives" behind the transactions appear only at a later stage in the classification system" (p. 109).

14. It is noteworthy that in Ohlsson's classification scheme "factor payments" do not appear as a separate category. It is also noteworthy that wages are considered transfers:

"If the production result is the center of interest, wages (and salaries) ought to be treated as transfers on a contractual basis on the income redistribution accounts. ... The treatment of wages involve a question of assigning production. The value added in a sector generally means the value added by all factors of production which are organized in the sector. ... In that case the wages ought to be treated as transfers, in order to obtain certain additive characteristics of the accounting design ..." (Ohlsson 1953, p. 209, text and footnote).

This becomes especially desirable when, as in Norway, the system has production broken down by industries. Aukrust thought of employees in one capacity, as factors of production to be classified by industry, transferring to themselves in their capacity as consumers, as wages, their share in the value added of that industry, in much the same way as entrepreneurs, as consumers, make entrepreneurial withdrawals.

6.6 Capital transfers

15. The principal view of Ohlsson and Aukrust on the classification of transfers was reflected in their attitude to capital transfers. Ohlsson admitted that a distinction between current and capital transfers had a natural place in a national accounting system intended for business cycle analysis; in such a system it might even be correct "that a transaction should be considered as a current transfer in one sector and a capital transfer in the other" (1953), p. 152). In national accounting systems intended for analysis of results ("R- statements") however, the distinction between current and capital transfers could not be maintained:

".... All transfers must be treated as current, i.e. must become items in the calculation of final income. The transfer has altered the economic position of the recipient sector as much as savings out of other income have. The transfer in question should consequently be taken account of in the income calculation for R-statements" (1953, pp. 152-153).

In the system of Aukrust, which was primarily intended for analysis of results, the category of capital transfers did not exist. He was aware, of course, that transfers of a capital nature would have to be treated differently from other transfers in the analysis of many problems. He preferred, however, to provide the necessary data in the shape of suitable sub-classifications of transfers in general.

6.7 The classification of taxes

16. With respect to taxation Aukrust (1952) decided to discard the traditional two-fold classification of taxes into "indirect" (assumed to be passed on) and "direct" (assumed to be carried as levied). Instead, he looked for a classification based on objective criteria which in this case could only be a classification by the "object" of taxation. The result was as follows (Statistisk sentralbyrå, 1952, p. 192):

1. *Taxes on certain plant and equipment, production and trade ("indirect taxes").*
 - a. Customs duties. b. General sales tax. c. Taxes on certain plants and equipment (mainly automobile duties paid by business) d. Special excise taxes. e. Concession duties and taxes on the establishment of new businesses. f. Export duties. g. Stamp duties (paid by business).
2. *Taxes on income and property, social security premiums etc.*
 - a. Taxes on income and property. b. Taxes on consumer goods. c. Income from lotteries etc. d. Inheritance tax. e. Fines and confiscations. f. Special tax on property increase during the war. g. Extraordinary taxes levied in the early post-war years. h. Social security premiums.

A classification remarkably similar to the above from 1952 has now been proposed for use in SNA mark III. (Draft, chapter VIII)

6.8 The treatment of fees and charges

17. A controversial issue in the early days of national accounting, inherited from the theory of public finance, was the treatment of fees and similar payments from the private sector to general government. When paid by business such fees and charges were treated by OEEC (1952) and UN (1954) always as indirect taxes. When paid by persons and organizations, they were treated in one of three different ways (presumably following Anglo-American practice): Either as payments for goods and services (catalogues and postcards from museums), or as indirect taxation and considered part of consumers' expenditure (real estate taxes, motor vehicle duties, dog licences), or as "transfers" to be treated like direct taxes (passport fees, school and hospital fees).

18. The Scandinavian countries followed the international recommendations in treating fees and charges as indirect taxes when paid by business. Practice varied with respect to fees paid by consumers. *Sweden* (Ohlsson), as far as can be seen, followed the international recommendations on all points, including treating real estate taxes, motor vehicle duties and

dog licences as indirect taxes and part of consumers' expenditure. *Denmark* (Bjerke and Milhøj) deviated by treating real estate taxes not as an indirect tax, but as a direct tax to be paid out of personal income. In other respects the international recommendations were followed. *Norway* (Aukrust) took the position that, logically, consumers never pay indirect taxes. Fees and charges paid by consumers, therefore, had to be considered either as payments for goods and services, or treated as direct taxes paid out of income. (This position, incidentally, has been adopted for the SNA, Mark III). The former category was taken to include passport fees etc. and also, again anticipating SNA mark III, school and hospital fees. The latter category included motor vehicle duties, real estate taxes, fines etc.

7. Epilogue: towards SNA, and beyond

1. The "simplified" and "standardized" systems of national accounts of the early 1950's (OEEC 1950, 1952; United Nations 1953) were largely the work of English and American economists. Not unreasonably, they reflected Anglo-American thinking at the time; there are no traces, for instance, of Scandinavian ideas⁴³. On the other hand the international standards came too late to influence to any significant degree the developments in Scandinavia.

2. Anticipating that the international recommendations some day would have to be revised. Sweden, Norway and Denmark decided to retain their recently adopted national accounting systems conceptually unchanged for the time being. However, a number of extensions were introduced successively during the 1950s and 1960s by various authors in answer to specific analytical needs. For example: Unbroken historical series covering 100 years or more were established in all three countries in order to allow studies of economic growth⁴⁴. International comparisons were facilitated when Denmark and Norway were found to be among eight countries with sufficient data allowing inclusion in the Gilbert-Kravis international comparison of national product and price levels. (Gilbert and associates, 1958). Quarterly national accounts data were estimated in Norway for the first time in 1953 and in Sweden on an experimental basis from around 1960. In Norway estimates of the stock of real capital, allowing studies of economic growth, became available in 1958 (Aukrust and Bjerke, 1958); regional national accounts were added in 1965, and estimates of holdings of financial assets and liabilities were developed gradually over a long span of years. In Sweden, where the national accounts originally designed by Ohlsson did not contain any industry detail, major efforts were made from 1960 onwards to fill the lacuna. A university initiative (Höglund and Weirin, 1964) resulted in an input output table for one year with 127 commodity groups/industries. A major extension of the official Swedish national accounts aiming at providing data needed for analysing industrial structure was initiated in 1963/64 when responsibility was taken over by the CBS from Konjunkturinstitutet: Estimates of GNP by 31 industry groups in current and constant prices, and with wages and gross operating surplus shown separately, were published in 1966; employment data followed in terms of hours worked (1968) and persons employed (1970); data on real capital stock were added in 1974. (Employment data had been available in Norway since 1952.) To accommodate the data needs of "the Scandinavian theory of inflation" (known in Sweden as "the EFO report") a classification of industries as "exposed" or "sheltered" (relative to competition from abroad) was introduced as an optional classification in the national accounts of Norway in 1966 and in those of Sweden shortly after.

⁴³ Together with, among others, Jean Marczewski from France, I worked as an assistant to Stone at the "OEEC national accounts unit" in Cambridge, England, during the autumn months of 1949 when the "OEEC simplified system" (1950) was drafted. None of us had the slightest influence on the outcome. Attempts by Ingvar Ohlsson, Kjeld Bjerke and myself to influence the system in 1951 when a later version of it came up for discussion by OEEC member countries were equally unsuccessful. - The Standardized system of the United Nations from 1953 was agreed without contribution by Scandinavian Experts.

⁴⁴ In Norway this was done by extending existing series backwards in two steps first to 1900 and then to 1865 (Statistisk sentralbyrå, 1953 and 1965), and in Denmark also in two steps to 1870 (Bjerke and Ussing, 1958) and 1720 (Hansen, 1970, 1974). Sweden obtained series back to 1860 as a result of work by O. Lindahl (1965) and Johansson (1967) bringing up to date the series given in Lindahl et al (1936). Some of these studies were financed as parts of Simon Kuznets' international "growth project".

3. Meanwhile, at the international level, the feeling was growing that the United Nations standardized system from 1953, with amendments in 1954, would have to be revised. Scandinavian economists were amongst those who most eagerly requested revisions; they hoped, naturally, that an overhaul of the system might bring it more in line with Scandinavian thinking. The final result (SNA Mark II) came after year-long discussions in which Scandinavian economists took active part (Aukrust, for example, was a member of the UN committee of experts supervising the work), and not without a certain amount of success: While the revised system obviously combined ideas drawn from a number of origins, making it hard to decide who contributed what, it is a fact that the outstanding features of SNA Mark II - input-output tables, dual sectoring, production accounts for industries, transactions in financial assets and liabilities - had existed for many years as characteristics of the national accounting systems in use in Scandinavia. Influences from Scandinavia might be traced also on other points, for example, in the treatment of banks, in increased consideration being given to real-sfere phenomena implying some shift of interest away from "national" to "domestic" totals, in the introduction of the concept "operating surplus" (a concept known in Norway since 1952 under the name of "owners income") allowing interests, dividends etc. to be treated as special categories of transfers. As a whole, the new system (United Nations, 1968) was greeted in Scandinavia as a blend of ideas to which the Scandinavian countries had contributed significantly and as a compromise solution with which they could easily live.

4. A switch to the new system started immediately. It was completed in Sweden in 1970, in Norway in 1973, and in Denmark in 1978, with complete numerical revisions carried out simultaneously as needed. Although these revisions, and the developments inside and outside Scandinavia since 1970 are not part of the present story, it is gratifying to note that the next version of the SNA now under preparation will include additional features consistent with Scandinavian thinking, e.g. quadruple accounting (chapter II), a revised classification of taxes (chapter VIII), and an improved treatment of factor incomes and property incomes (chapter IX) - even coming close (chapter I) to endorsing the old Scandinavian view that transactions should be defined in terms of events happening to economic objects.

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Appendix A

The Eco-circ graph

The Eco-circ graph is constructed according to the following principles: Every line represents an economic flow. All lines curve the same way, positive flows moving clock-wise. At each junction point the sum of the flows moving into the point equals the sum of the flows moving out of it. The graph as a whole may be interpreted as a closed system of definitional equations, or as a system of accounts. The graph may be made to represent a closed sector (as is shown for the real circulation on this page), or an open sector (as is shown on the page opposite) by splitting all relevant flows into two, those internal to the sector and those external to it, e.g. $A = A^{\text{in}} + A^{\text{ex}}$, where A^{ex} would represent (net) exports out of the country and $A^{\text{ex}} = E^{\text{ex}} + H^{\text{ex}}$.

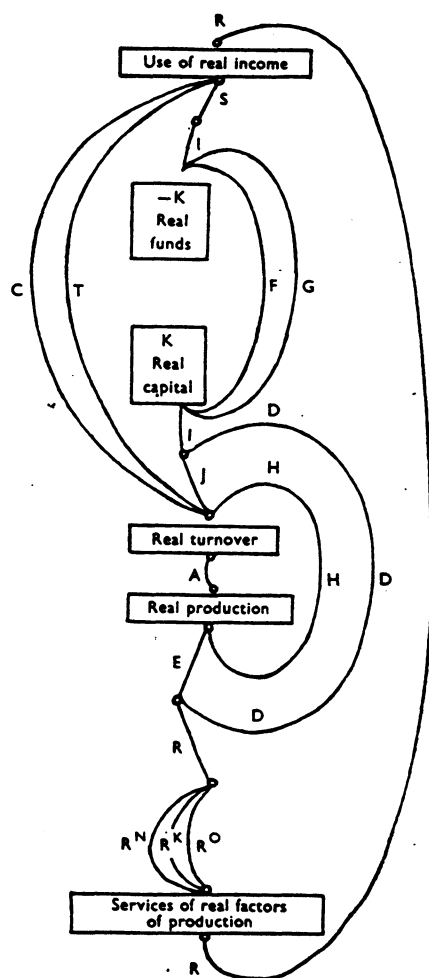
Ordinary letters A, C, T etc. denotes real magnitudes, heavy letters A, C, T etc. denotes financial magnitudes

+ and - used as superscripts indicate the positive and the negative component respectively of a given magnitude, e.g. $J = J^+ - J^-$

N, K, O used as superscripts indicate functional income shares R^N, R^K, R^O

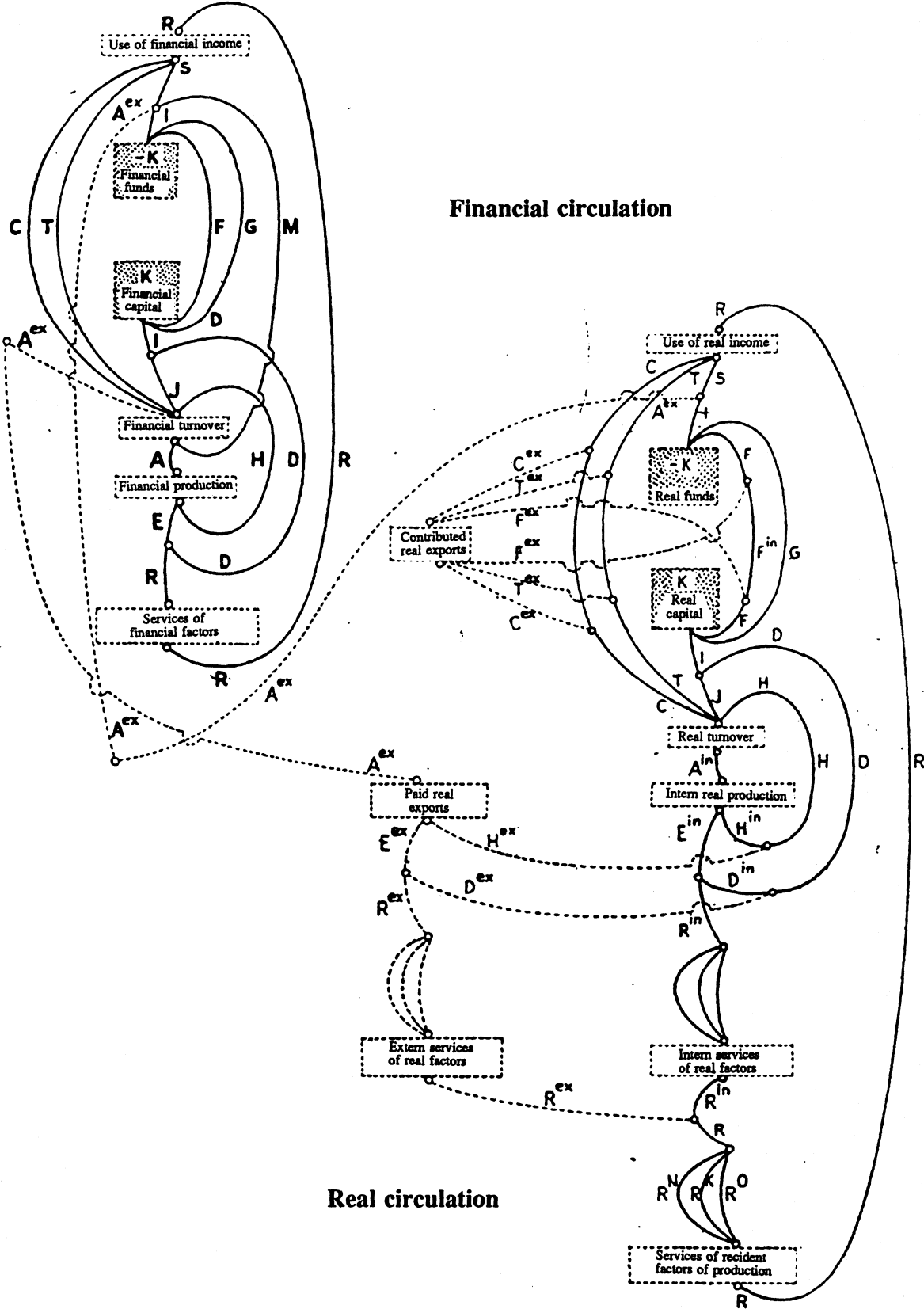
in = intern and ex = extern are added to distinguish internal flows from flows out of/into the sector, e.g. $A = A^{\text{in}} + A^{\text{ex}}$

The real circulation in a closed sector



- A = "All" the product, gross output
- C = "Consumption", "Consumption", "Comeamo"
- T = "Tax", "Taxe"
- I = "Investment", "Investissement", "Investition", "Investimento"
- J = Gross investment (the neighbouring letter to I)
- D = "Depreciation", "Dépréciation", "depreziazione"
- H = Intermediate input ("Hardware")
- E = Value added ("Earnings", "Ertrag", "Excédent", "Entrata")
- R = Net income ("Revenue", "Revenu", "Reinertrag", "Reddito")
- S = "Savings", "Spargeld"
- N = Labour ("Number", "Numerus")
- K = Capital ("Kapital")
- O = "Organization", "Organisation"
- F = "Free", "Frei". Windfalls, exogenous changes in asset holdings
- G = "Gain", "Gain", "Gewinn", "Guadagno" (revaluation, holding gains and losses)
- M = Money

The real and financial circulation of an open sector



Total domestic consum of goods and services 1935. Million kroner at market prices.

	Agruculture	Gardening forestry, fishing	Manu- facturing	Handi- crafts	Building and construc- tions	Commerce Banks Insurance	Transport	Professions	Public goods and services	Rent of devellings	All trades
Production value											
non-durables	1 604,8	172,1	2 111,5	771,9	278,1	1 531,4	695,3	277,9	523,1	572,2	8 538,3
durables	-	-	402,5	122,8	410,2	111,9	-	-	-	-	1 047,4
Total	1 604,8	172,1	2 514,0	894,7	688,3	1 643,3	695,3	277,9	523,1	272,3	9 585,7
Plus: Imports											
non-durables	277,9	18,6	925,7	-	-	-	-	-	-	-	1 222,2
durables	-	-	87,7	-	-	-	-	-	-	-	87,7
Total	277,9	18,6	1 013,4	-	-	-	-	-	-	-	1 309,9
Less: Exports											
non-durables	866,4	39,3	203,7	-	-	-	209,0	-	-	-	1 318,4
durables	-	-	104,0	-	-	-	-	-	-	-	104,0
Total	866,4	39,3	307,7	-	-	-	209,0	-	-	-	1 422,4
Domestic uses	1 016,3	151,4	3 219,7	894,7	688,3	1 643,3	486,3	277,9	523,1	572,2	9 473,2
of which:											
a. Materials etc. for:											
Agriculture	266,4	-	178,3	27,0	35,9	74,9	33,9	-	14,4	-	630,8
Gardening etc.	-	-	8,3	1,3	1,5	5,7	3,6	-	1,5	-	21,9
Manufacturing	316,7	21,4	764,3	114,5	20,5	112,9	42,7	-	22,5	-	1 415,5
Handicrafts	3,7	3,3	266,9	25,3	5,7	71,3	20,5	-	8,1	-	364,8
Build. & Constr.	-	3,9	229,6	69,3	-	69,2	32,8	-	6,3	-	411,1
Commerce, banks etc.	0,2	-	196,3	68,4	25,5	80,5	92,9	-	14,7	-	478,5
Transport	2,4	-	67,6	38,6	35,0	38,9	49,1	-	6,2	-	237,8
Profession	-	-	-	-	-	-	-	-	2,5	-	2,5
Public services	22,1	-	37,6	13,4	79,9	18,7	4,1	-	-	-	175,8
Dwellings	-	-	-	-	74,1	6,1	-	-	5,1	-	85,3
Total materials	611,5	28,6	1 708,9	357,8	278,1	478,2	279,6	-	81,3	-	3 824,0
b. Gross investments in:											
Agriculture	-	-	24,1	11,9	31,7	2,1	-	-	-	-	69,8
Gardening etc.	-	-	6,0	1,5	2,0	0,2	-	-	-	-	9,7
Manufacturing	-	-	68,2	29,9	44,1	6,1	-	-	-	-	148,3
Handicrafts	-	-	14,0	2,0	6,6	10,4	-	-	-	-	33,0
Build. & Constr.	-	-	5,9	1,5	-	0,4	-	-	-	-	7,8
Commerce, banks etc.	-	-	14,9	3,0	17,0	2,3	-	-	-	-	37,2
Transport	-	-	84,5	15,3	43,4	2,6	-	-	-	-	145,8
Professions	-	-	-	-	-	-	-	-	-	-	-
Public services	-	-	3,7	-	62,6	0,8	-	-	-	-	67,1
Dwellings	-	-	-	-	202,8	-	-	-	-	-	202,8
Total gross investm.	-	-	221,3	65,1	410,2	24,9	-	-	-	-	721,5
c. Personal consumption:											
non-durables	404,8	122,8	1 124,6	414,1	-	1 053,2	206,7	277,9	441,8	-	4 045,9
durables	-	-	164,9	57,7	-	87,0	-	-	-	572,2	881,8
Total consumption	404,8	122,8	1 289,5	471,8	-	1 140,2	206,7	277,9	441,8	572,2	4 927,7

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