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THE USE OF TENDENCY SURVEYS IN EXTRAPOLATING NATIONAL ACCOUNTS*)

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Abstract

A well-known way of using tendency survey indicators is the construction of so-called Composite Leading Indicators (CLIs). It is rather peculiar that CLIs pretend to predict the value of macroeconomic aggregates, while their construction is not consistent with the way in which the actual macroeconomic statistics are compiled. This paper contains the first results of an attempt to integrate B&C survey indicators into the framework of the Dutch Quarterly (National) Accounts. We conclude that tendency survey indicators can contibute to an explanation of trends in "real" economic variables. Many of these indicators lead the regular Quarterly Accounts indicators. They can, therefore, contribute to an extrapolation of National Accounts.

Keywords: tendency surveys; leading indicators; National Accounts; extrapolation; integrated statistics

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1. Introduction

Evaluations and anticipations of businessmen and consumers often show a remarkable lead on the "general" business cycle. Therefore, tendency surveys can play an important role in an early description of the business cycle and its turning points. A well-known way of using tendency survey indicators is the construction of so-called Composite Leading Indicators (CLIs). A CLI combines both quantitative statistical information and qualitative tendency survey data in one single indicator, which then serves to describe one aspect of the macroeconomic process. In general, some sort of production volume is chosen as reference series, e.g., industrial production or real GDP (EC (1982); OECD (1987); Strigel (1985); Klein and Nerb (1985)). Sometimes, another macroeconomic aggregate plays that role, e.g., the various components of GNP (Goldrian and Strigel (1985)). Occasionally, no explicit reference to an existing time series is made. Instead, a rather vague concept of "aggregate economic activity" is employed which "cannot be defined precisely and no single time series measures it adequately" (US Department of Commerce (1984), p. 65).

In general, a CLI aims at describing (some part of) the economic process at the macro level. However, the purpose of this index is not always clear. It can vary from predicting the growth pattern of a time series to merely signaling the turning points.

There are two striking elements in the way business and consumer (B&C) survey indicators are used in the construction of CLIs. First of all, qualitative early indicators are seldomly regarded as a coherent component within the entire system of economic statistics. This is probably mainly due to their qualitative nature. A second point worth noting is that in the construction of a CLI hardly any reference is made to the methodology of the National Accounts, which is a generally accepted statistical framework for the description of macroeconomic processes. Consequently, it is rather peculiar that CLIs pretend to predict the value of macroeconomic aggregates, while their construction is not consistent with the way in which the actual macroeconomic statistics are compiled.

This paper contains the first results of an attempt to integrate B&C survey indicators into the framework of the Dutch National Accounts, or, more specifically, the Dutch Quarterly Accounts. Note that Quarterly Accounts are provisional National Accounts on a quarterly basis. Both are based on the same concepts and accounting system. A prerequisite for incorporating B&C survey indicators and quantitative data in a framework for statistical integration, such as the Quarterly Accounts, is that both types of data can be directly linked at a rather low level of aggregation. Bearing this in mind, section two of this paper describes the organization of economic statistics in the Netherlands. Special attention is given to the incorporation of tendency surveys in the Dutch macroeconomic statistics. Section three gives an example of the application of tendency surveys within the framework of the Quarterly Accounts. In that section, a methodology is presented for estimating very early Quarterly Accounts, known as the "Quarterly Flash". Some preliminary results of this incorporation process are presented in section four. Section five contains a summary and some conclusions.

2. Tendency surveys within the Dutch system of economic statistics

One of the most prominent aspects of the organization of statistics in the Netherlands is its almost complete centralization in a Central Bureau of Statistics (CBS). This centralization has stimulated the development of a coordinated and coherent system of annual and short-term statistics including the tendency surveys. Consequently, there exists a clear relationship between the various annual, quarterly, monthly and tendency statistics.

This is illustrated in table 1, which classifies various economic statistics according to their thoroughness as well as their integration. Thoroughness captures the phenomenon that statistics on a specific subject are adjusted at regular intervals, when new information on that same subject becomes available. The earliest and least thorough information stems from data on expectations and other leading indicators. These indicators are then followed by monthly and quarterly data. Finally, annual statistics are compiled, which describe the economic process most thoroughly. However, it takes a long time before all data needed for their compilation are available.

Table 1. A view on the structure of the Dutch system of economic statistics

INTEGRATION / THOROUGHNESS	SINGLE STATISTICS	PARTIALLY INTEGRATED STATISTICS	INTEGRATED STATISTICS
EXPECTATIONS & LEADING INDICATORS	Business & Consumer surveys	Composite Leading Indicators [1]	-
MONTHLY INDICATORS	Statistics on . products . prices . foreign trade . consumption	Index of Industrial Production	-
QUARTERLY INDICATORS	Quarterly statistics on Manufacturing Industries (sales and employment)	Deflated Quarterly statistics on Manufacturing Industries (sales and employment)	Quarterly Accounts
ANNUAL STATISTICS	Production Statistics	p.m. [2]	National Accounts

1) CLIs are not compiled by the CBS, but see e.g., De Nederlandsche Bank (1988) and OECD (1987).
2) Partially integrated annual statistics are of a very specific nature; an example of them in this table would require too much explanation.

Analogously, statistics can be grouped according to their degree of integration:

a) fully integrated statistics,
b) partially integrated statistics and
c) unintegrated or single statistics.

Integrated statistics are the result of a statistical process in which the reliability of data from various sources is evaluated before they are combined within a consistent statistical framework, like the System of National Accounts. Because such a system imposes certain restrictions on the data, (e.g., total income must be equal to total outlays), the original figures are subjected to some sort of external quality control. Partially integrated statistics are the result of combining (e.g., weighting and/or deflating) various unrelated statistics. The test of the identity restrictions is not applied in this case. An example of partially integrated statistics is the index of industrial production. Unintegrated or single statistics provide information on their own.

Combining the horizontal and vertical relations in table 1 reveals a dual sequence of statistical confrontations in the sense of both using more thorough data and integrating statistical information. However, the various confrontations are only fruitful if coordination within the system of economic statistics is guaranteed. This need for coordination refers to both the statistical concepts and the statistical units. As said before, the centralization of statistics in the Netherlands has greatly facilitated this coordination. Because the Dutch tendency surveys belong to a coordinated system of statistics, the total population as well as the classification of economic activities is the same as in other economic statistics. Consequently, the business and consumer surveys can directly be linked to the National Accounts, thereby serving as one of the inputs of the process of statistical integration. In this respect, the input-output method of statistical integration, as applied in the Netherlands, is of great help: all Dutch National Accounts figures with respect to the production and expenditure process (including the quarterly data) are based on fully balanced input-output tables (IO-tables). The construction of IO-tables, however, is not an end in itself but mainly a means to improve the quality of the data through various consistency checks. This will be discussed in more detail in the next section.

As indicated in table 1, the thoroughness of source data determines the thoroughness of the integrated statistics. The most thorough statistics, the annual National Accounts, are a framework for the integration of annual statistics, while the Quarterly Accounts can be regarded as the framework for the integration of Quarterly Accounts indicators, which are based on monthly and quarterly short-term indicators. Therefore, almost all statistical information, be it monthly indicators or annual statistics, is used in one or another framework for statistical integration. Only expectations and leading indicators remain unintegrated. Therefore the top right cells of table 1 are left empty. To date, a framework for the integration of this type of data is lacking. In principle, however, the input-output framework can also be applied here, as will be seen below.

The first question is how to incorporate expectations and leading indicators into a framework for statistical integration which is suited to an early estimation of macroeconomic aggregates. From the point of view of the Quarterly Accounts, which are the most timely integrated statistics, one can distinguish at least three possibilities.
Expectations and leading indicators can be used

1. to check the plausibility of current Quarterly Accounts indicators (quality control);
2. as stand-ins for delayed Quarterly Accounts indicators (safe-guarding the production schedule);
3. as early substitutes for Quarterly Accounts indicators (accelerating the compilation of the Quarterly Accounts).

At the moment the Dutch CBS is doing research in the field of incorporating expectations and leading indicators in the compilation of the Quarterly Accounts. The objectives of this research project are twofold: improvement of the Quarterly Accounts' quality and, if possible, accelerating their date of release.

Moreover, a broader perspective is evolving. If it is possible to substitute the regular Quarterly Accounts indicators by a complete set of leading Quarterly Accounts indicators, based on early available information of both a quantitative and a qualitative nature, a very early estimate of the Quarterly Accounts might become feasible. This

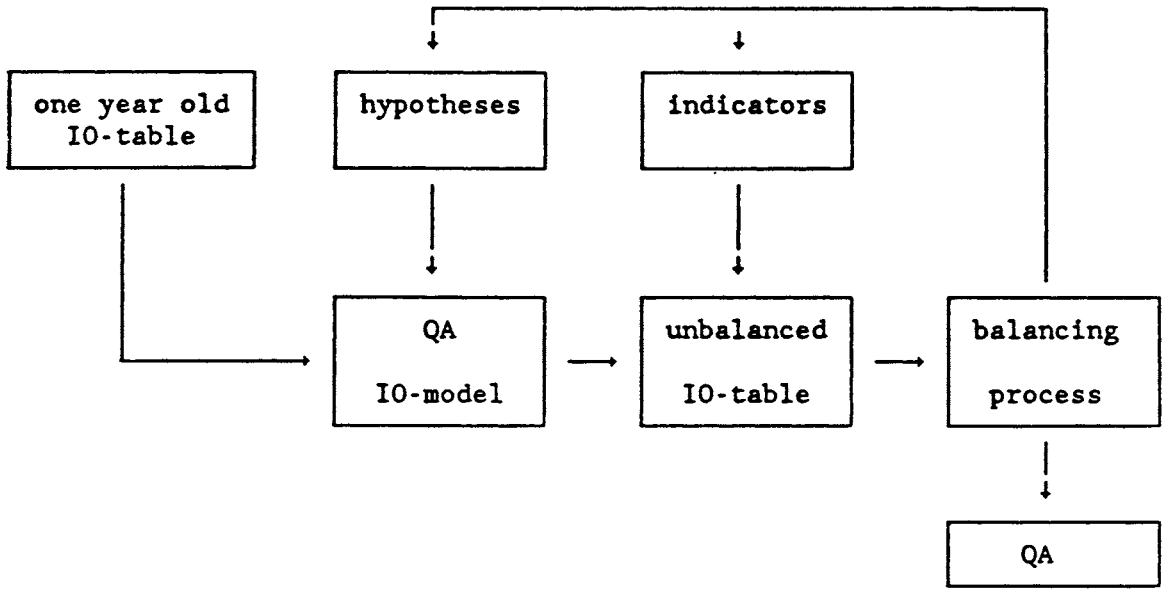
idea has been called the Quarterly Flash. If the Quarterly Flash can be realized, it will become a framework for integrating early quantitative and qualitative indicators. For that reason the Quarterly Flash could be placed in the empty top right cell of table 1. Nevertheless, this would not do full justice to the character of the Quarterly Flash. Depending on the (shortest) lead of the set of leading Quarterly Accounts indicators, it would, in theory, be possible to compile a sort of "integrated leading indicator" for short-term forecasting. The Quarterly Flash, however, is meant to be no more than an early statistic. It will be restricted to an estimation of the latest quarter on the basis of very recent information. Therefore, the quarterly indicators used as input in the Quarterly Flash will lead the regular Quarterly Accounts indicators but they lag the quarter under review. A new methodology is needed in order to integrate early quantitative and qualitative indicators in the Quarterly Flash. This methodology will be discussed in the next section.

3. The Quarterly Flash: methodology

The methodology of the Quarterly Flash has been developed as an extension of the methodology of the Quarterly Accounts. In this way the Quarterly Flash is a logical step forward in the process of supplying more and more timely, integrated data.

In comparison to the final estimates of the annual National Accounts provisional accounts (annual and quarterly) have to cope with a lack of data. The sooner the accounts are to be published, the more serious this lack of data is. Various techniques have been developed for the compilation of provisional National Accounts, such as the Quarterly Accounts, in order to solve this information problem. Figure 1 represents the compilation process of the Quarterly Accounts in the Netherlands. We refer to Janssen and Algera (1988) for a detailed description.

Figure 1. Compilation process of the Dutch Quarterly Accounts.



To put it simply, the techniques used in the compilation process of the Quarterly Accounts amount to the extrapolation of a one-year old quarterly IO-table by means of price and volume indicators. The original quarterly IO—tables were obtained by breaking down an annual IO-table into four quarterly tables. The extrapolation is based on some crucial, albeit preliminary, hypotheses.

These hypotheses are:

1. The various branches of industry (columns in the IO-table) are supposed to be homogeneous with respect to their inputs, and the input coefficients are supposed to be stable over the period of extrapolation. This means that no technical change or substitution between inputs is taken into account and that production is subject to constant returns to scale. As a result, a single volume indicator suffices to extrapolate the volume of production and the intermediate consumption of each branch of industry.
2. The commodity flows (rows in the IO-table) are supposed to be homogeneous. Consequently, price discrimination within a row of the IO-table is not taken into account. As a result, for each row a single price indicator suffices to inflate intermediate consumption and final domestic demand.
3. With respect to final demand, the distribution of each commodity flow over the various categories is supposed to be stable.

Based on these preliminary hypotheses and on the available indicators, an unbalanced IO-table is compiled. In the subsequent balancing process either the indicators or the hypotheses are adjusted. So the hypotheses are used in a flexible way.

Together, the structure of the base-period IO-table and the preliminary hypotheses can be regarded as a statistical "model". In economic terms this model is known as a static IO-model with fixed technical coefficients and a simplified demand structure (Leontief IO-model). The function of this model is to fix part of the structure of the economic process, primarily the structure of production and final demand. Data which cannot be obtained in time are derived from information available by means of model coefficients. The more data are lacking, the more structural information on the economic process is needed.

The Quarterly Flash is to be compiled very shortly after the reference period, e.g., a few weeks. At that time, even the regular Quarterly Accounts indicators are, to a large extent, lacking. So additional structural information concerning the economic process is needed for the compilation of the Quarterly Flash. This structural information concerns the relations between the leading Quarterly Accounts indicators and the regular Quarterly Accounts indicators. Thus, the Quarterly Flash requires a much more comprehensive model than the the Quarterly Accounts. Therefore, the Quarterly Accounts model must be supplemented with a Quarterly Flash model. However, the structural information needed for the Quarterly Flash model differs from that for the Quarterly Accounts model. There are differences in character, origin and techniques used.

With regard to the difference in character, the methodology of the Quarterly Accounts appears to be dominated by definition equations (total input = total output) and static technical relations. For instance, the production structure laid down in a one-year old IO-table and the assumption of constant returns to scale, implicitly specify a production function for each branch of industry. The additional hypotheses needed for the Quarterly Flash model mainly concern behavioural relations. Future economic behaviour may be revealed by expectations and leading indicators. To give an example, changes in input costs are

usually ahead of changes in output prices and the production of some (upstream) branches of industry leads the production of others (downstream). Consequently, the Quarterly Flash needs dynamic behavioural relations in stead of definitions and technical relations.

The differences in origin of the structural information are closely related to the differences between static and dynamic relations. As the Quarterly Flash model envisaged has a dynamic character, its coefficients cannot be derived from the observations of a single quarter. The estimation of the Quarterly Flash model will therefore be based on a set of time series.

As a result, the techniques used in order to obtain the structural information are different. The Quarterly Accounts model hardly needs any special techniques. The model is primarily based on hypotheses, which are, to some extent, "tested" in the balancing process. To the contrary, the Quarterly Flash model will be based on regression and time series analysis.

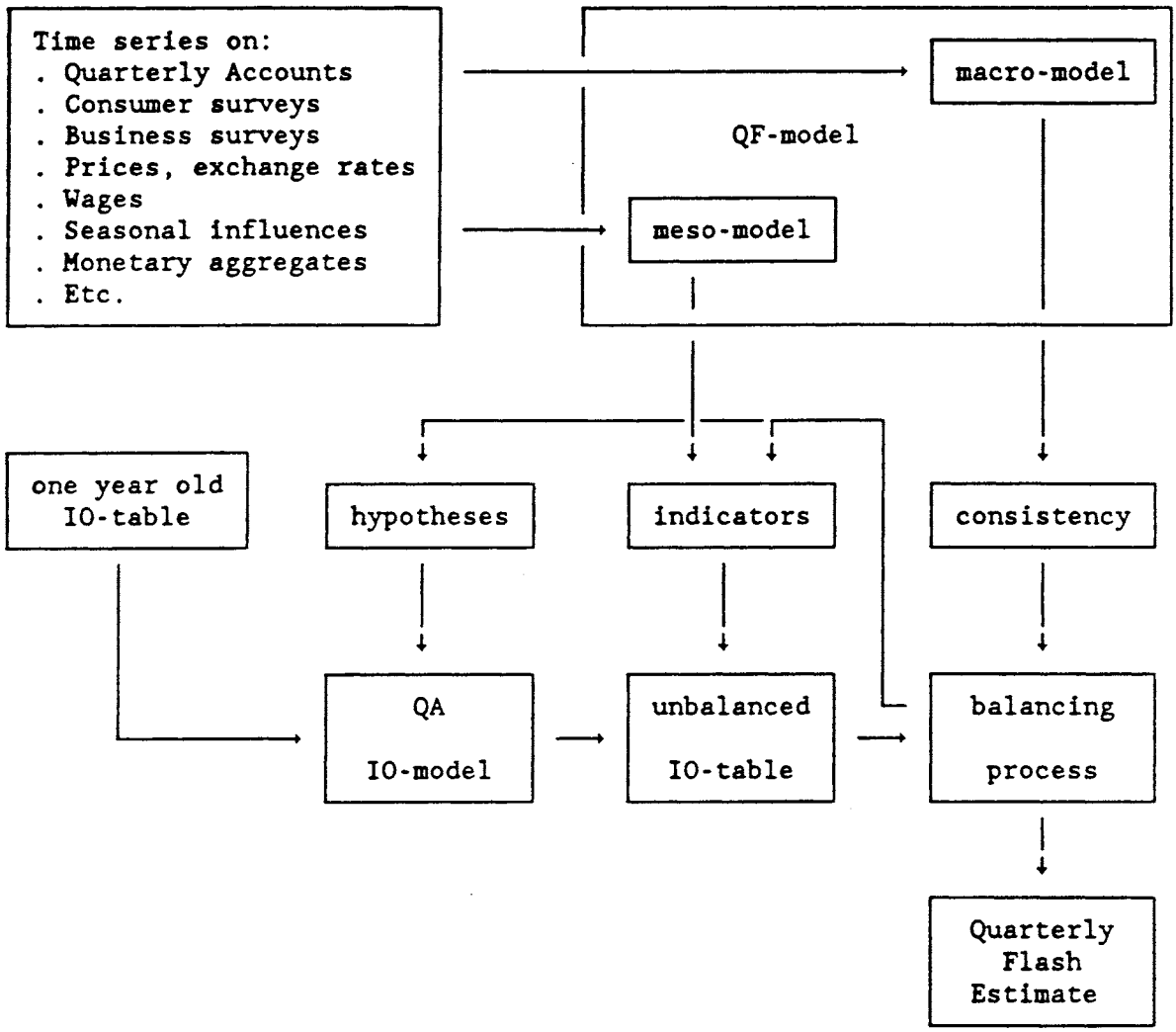
The Quarterly Flash model we envisage will ideally be composed of two separate sub-models: a mesoeconomic and a macroeconomic one. How these models fit into the traditional Quarterly Accounts model is shown in figure 2.

The meso-model and the macro-model serve different purposes, which is revealed in the character of the model equations. Because the prospective Quarterly Flash model has to yield early estimates of the Quarterly Accounts indicators, the meso-model will consist of forecasting relations for price and volume indicators.

After these forecasted indicators have been balanced within the traditional IO-model of the Quarterly Accounts, a descriptive macro-model will provide a consistency check at the macro level. In this way, the forecast error caused by a possible instability of the forecasting relations of the meso-model can be reduced. A descriptive model at the macro level is prefered above a forecasting model for two reasons. Firstly, a descriptive model better fits into the macroeconometric model building tradition. Although these models are built for forecasting,

most of the model relations are descriptive. The forecasts are then essentially generated by postulating future values for the exogeneous variables of the model. Secondly, a descriptive macro-model can also be used in the compilation process of the Quarterly Accounts as a check on consistency and coherence.

Figure 2. Structure of the Quarterly Flash model.



4. In search of early quarterly indicators: some preliminary results

In order to investigate the feasibility of substituting the regular Quarterly Accounts indicators by expectations and other leading indicators, we have undertaken a pilot-study concerning the output price and volume indicators of a few manufacturing industries. In view of the

Quarterly Flash methodology, special attention was paid to the "forecasting" capabilities of these model relations. As stated before, the term "forecasting" should be read here as: leading the regular Quarterly Accounts indicators but lagging the quarter under review.

From the quarterly IO-table three closely related branches of industry were selected, namely paper and boardmills, paper products manufacturing, and publishing and printing. This selection of interconnected branches of industry was motivated by our wish to investigate the possibility of dynamic relations between them, e.g., a sort of production chain or cost-price effects. Before discussing the results of the pilot-study, a few remarks are made here concerning the time series used, the manipulation of the data and the estimation technique.

Many early available time series (input series) can be expected to lead the regular Quarterly Accounts indicators (output series). Thus, for each output series a large number of potential input series were selected from a comprehensive database. This database contains time series on a range of economic phenomena at various levels of aggregation, such as: indices on production, foreign trade, consumer expenditure, wholesale prices, import and export prices, consumer prices seasonal influences, monetary variables and indicators on expectations and evaluations from B&C surveys. All time series contain quarterly indices indicating the rate of change with respect to the same quarter of the previous year.

In fact, many monthly time series have also been employed as input series. These monthly series have been transformed into quarterly figures.

The time series used in the pilot-study were not smoothed. In many economic time series, irregular short-term fluctuations can be quite disturbing, particularly in the case of time series that are expressed as rates of change. In the construction process of e.g. a CLI, erratic fluctuations are commonly reduced by means of a smoothing technique. Smoothing has its price: one looses either lead or information. Both aspects are undesirable from the point of view of compiling early indicators.

A second, decisive, reason for not smoothing the time series used in the pilot-study is that the nature of the Quarterly Accounts and the Quarterly Flash fundamentally differs from that of e.g. a CLI. A CLI is a kind of summary measure designed to indicate changes in the trend of aggregate activity. Therefore, in order to compile a reliable CLI, its source series must be corrected for erratic fluctuations. The Quarterly Accounts and the Quarterly Flash, on the other hand, are statistics which possess a stochastic character that should not be suppressed, for it cannot be assessed a priori whether these erratic fluctuations are in accordance with "reality" or an inevitable by-product of the statistical process (e.g., sample errors).
However, not smoothing also has its price: the random component in the early indicators may be relatively large. Two elements of the Quarterly Flash methodology take care of reducing these random components: the IO-framework at the meso level and the macro-model at the macro level.

The aim of the pilot-study was to estimate forecasting relations for the regular Quarterly Accounts indicators, using expectations and other leading indicators as input series. To take into account the information within the output series themselves we used Box and Jenkins' cross correlation method for transfer function modeling (Box and Jenkins (1970)). We restricted ourselves to transfer functions with only one input series, as our main interest was to investigate whether forecasting relations could be estimated or not. The input series were selected beforehand, using economic plausibility as the most important criterion. The estimation period runs from 78-I to 87-IV.

The pilot-study yielded satisfactory results. A transfer function could be found for each indicator. In fact, many transfer functions were considered acceptable, so that we had to develop a selection procedure using the following criteria:

1. economic plausibility of the input series
2. level of significance of the input series
3. plausibility of the lag structure of the input series
4. length of the lead of the input series
5. acceptability of the noise model (e.g., MA(3)-processes were rejected)
6. visual judgement (fit on a single peak/trough only)

7. fit relatively to the ARIMA model
8. correct timing of turning-points
9. transparancy of the model
10. forecasting accuracy
11. fit.

Below, the selected transfer functions for the production indicators of the three aforementioned manufacturing industries are presented. We start with the volume indicators. The capital B represents the back-shift operator, defined as $X_{t-1} = B\,X_t$.

Volume indicators

All variables are presented as deviations from their means. The values in parentheses are t-values.

$$V1 = \underset{(2.1)}{(1 + 0.36\,B)}\,a - \underset{(4.4)}{0.045\,B\,X1_{-2}} \qquad R^2 = 0.49$$

$$V2 = \underset{(2.6)}{\frac{(1 - 0.55\,B^4)}{(1 - 0.45\,B)}}\,a + \underset{(2.2)\quad(3.1)}{(0.015 + 0.020\,B)\,X2_{-2}} \qquad R^2 = 0.64$$

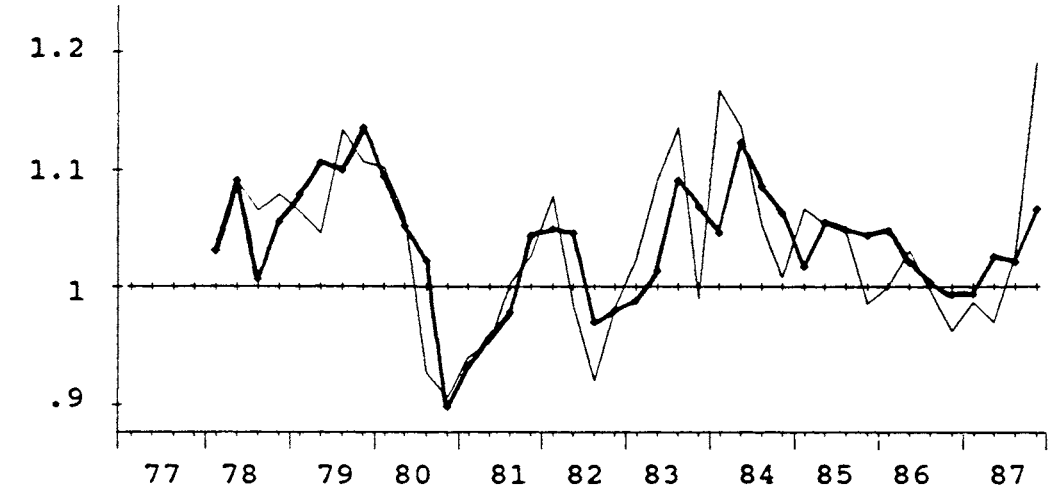
$$V3 = \underset{(6.0)}{\frac{1}{(1 - 0.70\,B)}}\,a + \underset{(2.6)}{0.017\,V1_{-2}} \qquad R^2 = 0.58$$

(3.1)

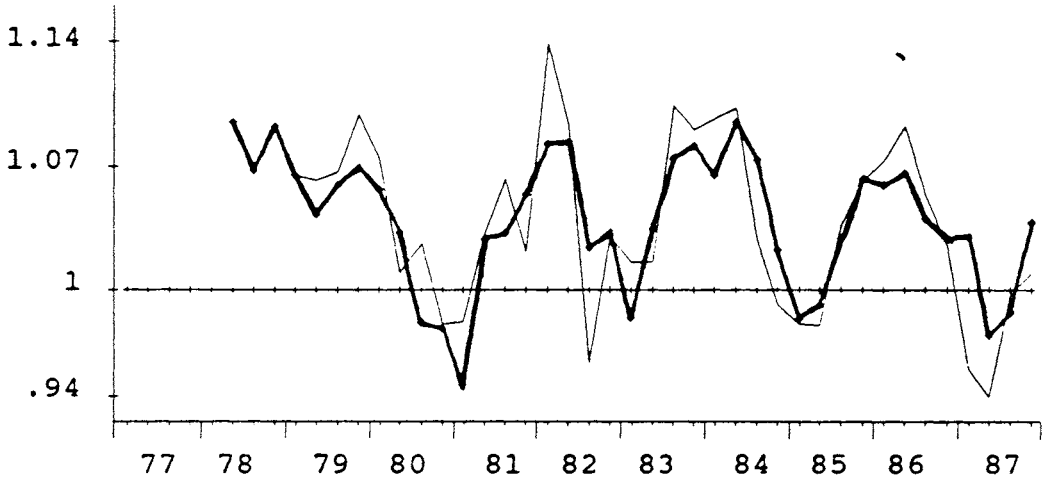
V1 = paper and boardmills volume indicator
V2 = paper products manufacturing volume indicator
V3 = printing and publishing volume indicator
X1 = judgement on stocks of finished products in the intermediate goods industry (three month average)
X2 = inflow of new orders in the intermediate goods industry (three month average)

All transfer functions contain significant input series with a two quarter lead. The values of the multiple correlation coefficients are almost twice as high as those of the ARIMA-models. The input series of

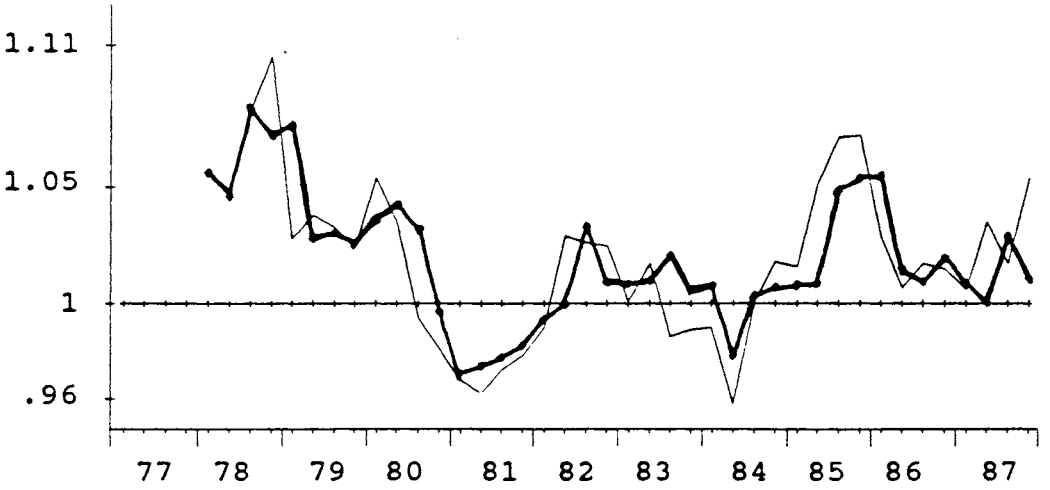
Figure 3. Production volume indicators, actual versus fitted (—) values.
(Indices of four-quarter rates of change)



Paper and boardmills



Paper products manufacturing



Publishing and printing

both paper and boardmills (X1) and paper products manufacturing (X2) originate from the business surveys of the intermediate goods industry. Both paper and paper products are primarily intermediate goods. The paper and boardmills production volume indicator (V1) is the best input series for the printing and publishing transfer function. Evidently a dynamic relationship between these two branches of industry exists.
As the graphs show, the fitted values of the volume indicator closely correspond to the actual values.

Price indicators

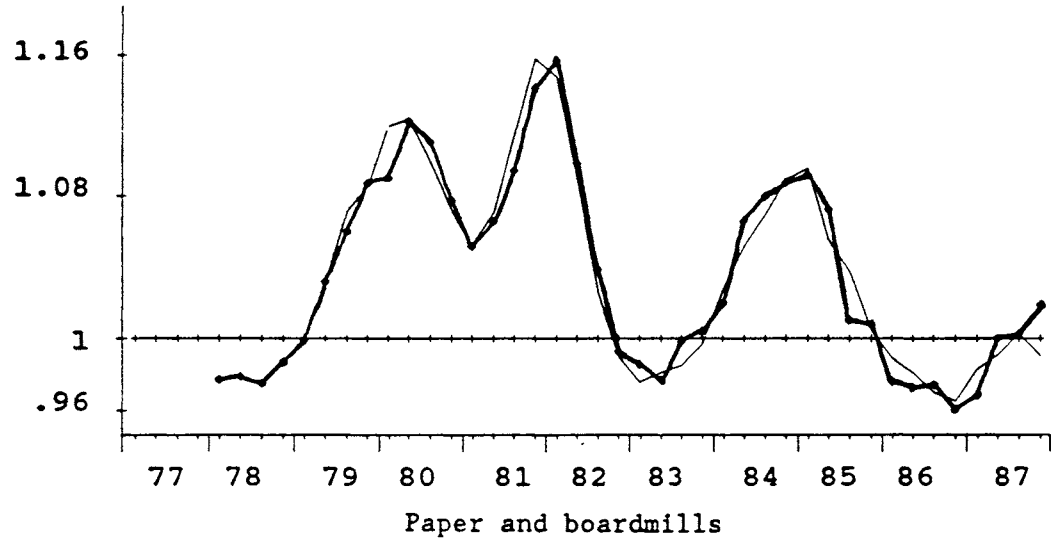
In most cases, time series on price changes are strongly autoregressive. In our research this phenomenon was confirmed for all three price indicators. The most suitable input series for the price indicator transfer functions are the price indices of intermediate consumption by the branches of industry themselves. These indices are better known as price indices of purchased raw materials, semi-manufactures and auxiliaries. For printing and publishing this price index is not available. In this case the price index of the intermediate consumption of paper and boardmills is used.

The paper products raw material price index has a somewhat shorter lead than the input series for paper and boardmills. The transfer function for printing and publishing fits remarkably less well than the other two price indicator transfer functions. For the latter phenomenon we could not find an explanation.
Again, the graphs of the actual versus the fitted values are satisfactory.

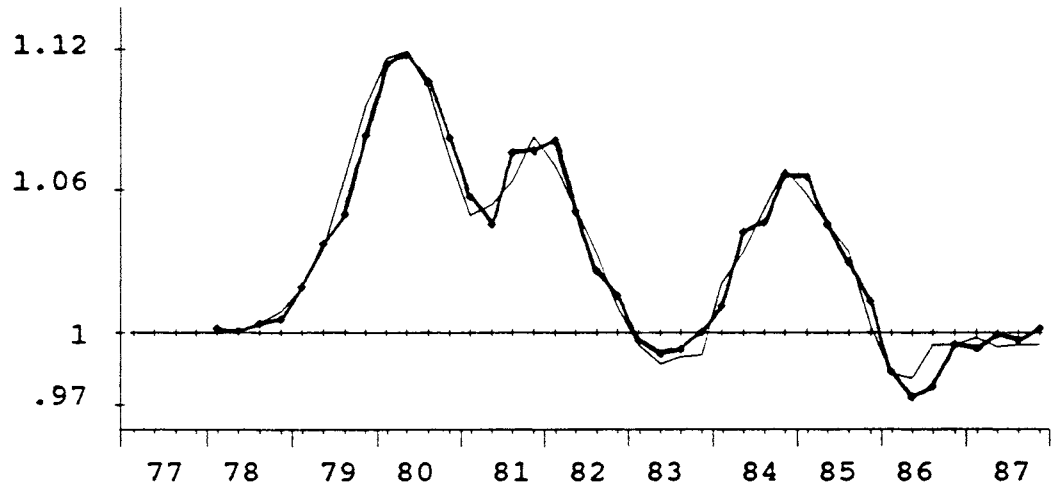
$$P1 = \underset{\substack{(6.6)\quad(3.1)}}{\frac{1}{(1 - 1.09\,B + 0.52\,B^2)}}\,a + \underset{\substack{(4.4)\quad(3.0)}}{(0.24 + 0.16\,B)\,Y1_{-1}} \qquad R^2 = 0.95$$

$$P2 = \underset{\substack{(7.2)\quad(2.5)}}{\frac{1}{(1 - 1.17\,B + 0.41\,B^2)}}\,a + \underset{\substack{(4.6)\quad(2.3)}}{(0.43 + 0.21\,B)\,Y2} \qquad R^2 = 0.97$$

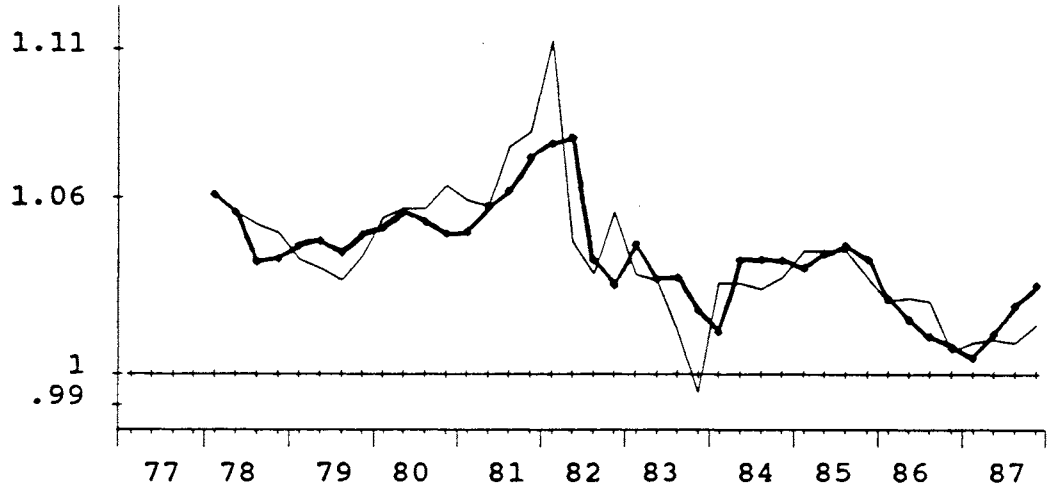
Figure 4. Production price indicators, actual versus fitted (—) values.
(Indices of four-quarter rates of change)



Paper and boardmills



Paper products manufacturing



Publishing and printing

$$P3 = \underset{(4.0)}{\frac{1}{(1 - 0.55\ B)}}\ a + \underset{(3.8)}{0.13\ Y1_{-1}} \qquad R^2 = 0.62$$

P1 = paper and boardmills output price indicator
P2 = paper products manufacturing output price indicator
P3 = printing and publishing output price indicator
Y1 = price index of raw materials, semi-manufactures and auxiliaries purchased by paper and boardmills (three month average)
Y2 = price index of raw materials, semi-manufactures and auxiliaries purchased by paper products manufacturing (first month of quarter only)

5. Summary and conclusions

Tendency surveys are often used for a description of the economic process at the macro level. However, tendency surveys are seldomly integrated within the entire system of economic statistics. For instance, hardly any reference is made to the methodology of National Accounts, which is the most pre-eminent framework for the description of macroeconomic processes.

This paper reports on a preliminary attempt to integrate both tendency survey indicators and early quantitative indicators into the framework of the Dutch Quarterly Accounts. This integration is possible because the Dutch tendency surveys belong to a coordinated and coherent system of economic statistics. As a result, tendency surveys can be linked with other statistics in two ways. Firstly, they can be regarded as a preliminary "prediction" of more thorough statistics that are compiled subsequently. Secondly, tendency surveys might be used as source data in a process of statistical integration which serves to produce timely and reliable information on macroeconomic activity.

The Dutch CBS is investigating the possibility of incorporating tendency surveys and early quantitative indicators in the compilation process of the Quarterly Accounts. This research project aims at Quarterly Accounts of improved quality while shortening their compilation time. In addition, the feasibility of substituting all regular Quarterly Accounts

indicators by tendency survey indicators and early quantitative indicators is studied. This would mean, eventually, that a flash estimate of the Quarterly Accounts becomes available. By way of experiment, a methodology for this Quarterly Flash has already been developed. The main elements of this Quarterly Flash model are a meso-model for the estimation of early quarterly indicators and a macro-model for a consistency check on aggregate data.

In a pilot-study, we have tried to estimate forecasting relations for a few indicators of the regular Quarterly Accounts. Transfer functions were found for all of these indicators. In the case of price indicators no tendency survey data were used, because price changes could be predicted quite well by changes in production costs. Cost-push price changes seem to be important. With regard to the volume indicator transfer functions, tendency survey data performed reasonably well as input series. Moreover, a dynamic relation between the production volume of two closely connected branches of industry was found. Notwithstanding these results, the economic plausibility of the input series might be a matter of discussion. Future research could be directed to increasing the number of input series in the transfer functions, in order to attain more complete specifications.

Despite the limitations of our pilot-study, we may conclude that tendency survey indicators can contibute to an explanation of trends in "real" economic variables. Many of these indicators lead the regular Quarterly Accounts indicators. They can, therefore, contribute to an extrapolation of National Accounts.

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This paper sets out some of the main ideas of what gradually developed into the Dutch view on the fourth revision of the SNA. In particular it focuses on the validity and even desirability of the inclusion of a number of carefully chosen alternative definitions in the "Blue Book", and the organization of a flexible system starting from a core that is easier to understand than the 1968 SNA.

NA/02 **The unobserved economy and the National Accounts in the Netherlands, a sensitivity analysis**, Broesterhuizen, G.A.A.M. (1983).
This paper studies the influence of fraud on macro-economic statistics, especially GDP. The term "fraud" is used as meaning unreporting or underreporting income (e.g. to the tax authorities). The conclusion of the analysis of growth figures is that a bias in the growth of GDP of more than 0.5% is very unlikely.

NA/03 **Secondary activities and the National Accounts: Aspects of the Dutch measurement practice and its effects on the unofficial economy**, Van Eck, R. (1985).
In the process of estimating national product and other variables in the National Accounts a number of methods is used to obtain initial estimates for each economic activity. These methods are described and for each method various possibilities for distortion are considered.

NA/04 **Comparability of input-output tables in time**, Al, P.G. and G.A.A.M. Broesterhuizen (1985).
It is argued that the comparability in time of statistics, and input-output tables in particular, can be filled in in various ways. The way in which it is filled depends on the structure and object of the statistics concerned. In this respect it is important to differentiate between coordinated input-output tables, in which groups of units (industries) are divided into rows and columns, and analytical input-output tables, in which the rows and columns refer to homogeneous activities.

NA/05 **The use of chain indices for deflating the National Accounts**, Al, P.G., B.M. Balk, S. de Boer and G.P. den Bakker (1985).
This paper is devoted to the problem of deflating National Accounts and input-output tables. This problem is approached from the theoretical as well as from the practical side. Although the theoretical argument favors the use of chained Vartia-I indices, the current practice of compilating National Accounts restricts to using chained Paasche and Laspeyres indices. Various possible objections to the use of chained indices are discussed and rejected.

NA/06 **Revision of the system of National Accounts: the case for flexibility**, Van Bochove, C.A. and H.K. van Tuinen (1985).
It is argued that the structure of the SNA should be made more flexible. This can be achieved by means of a system of a general purpose core supplemented with special modules. This core is a fully fledged, detailed system of National Accounts with a greater institutional content than the present SNA and a more elaborate description of the economy at the meso-level. The modules are more analytic and reflect special purposes and specific theoretical views. It is argued that future revisions will concentrate on the modules and that the core is more durable than systems like present SNA.

NA/07 **Integration of input-output tables and sector accounts; a possible solution**, Van den Bos, C. (1985).
The establishment-enterprise problem is tackled by taking the institutional sectors to which the establishments belong into account during the construction of input-output tables. The extra burden on the construction of input-output tables resulting from this approach is examined for the Dutch situation. An adapted sectoring of institutional units is proposed for the construction of input-output tables.

NA/08 **A note on Dutch National Accounting data 1900-1984**, Van Bochove, C.A. (1985).
This note provides a brief survey of Dutch national accounting data for 1900-1984, concentrating on national income. It indicates where these data can be found and what the major discontinuities are. The note concludes that estimates of the level of national income may contain inaccuracies; that its growth rate is measured accurately for the period since 1948; and that the real income growth rate series for 1900-1984 may contain a systematic bias.

NA/09 **The structure of the next SNA: review of the basic options**, Van Bochove, C.A. and A.M. Bloem (1985).
There are two basic issues with respect to the structure of the next version the UN System of National Accounts. The first is its 'size ': reviewing this issue, it can be concluded that the next SNA must be 'large ' in the sense of containing an integrated meso-economic statistical system. It is essential that the next SNA contains an institutional system without the imputations and attributions that pollute present SNA. This can be achieved by distinguishing, in the central system of the next SNA, a core (the institutional system), a standard module for non-market production and a standard module describing attributed income and consumption of the household sector.

NA/10 **Dual sectoring in National Accounts**, Al, P.G. (1985).
Following a conceptual explanation of dual sectoring, an outline is given of a statistical system with complete dual sectoring in which the linkages are also defined and worked out. It is shown that the SNA 1968 is incomplete and obscure with respect to the links between the two sub-processes.

NA/11 **Backward and forward linkages with an application to the Dutch agro-industrial complex**, Harthoorn, R. (1985).
Some industries induce production in other industries. An elegant method is developed for calculating forward and backward linkages avoiding double counting. For 1981 these methods have been applied to determine the influence of Dutch agriculture in the Dutch economy in terms of value added and labour force.

NA/12 **Production chains**, Harthoorn, R. (1986).
This paper introduces the notion of production cains as a measure of the hierarchy of industries in the production process. Production chains are sequences of transformation of products by successive industries. It is possible to calculate forward transformations as well as backward ones.

NA/13 **The simultaneous compilation of current price and deflated input-output tables**, De Boer, S. and G.A.A.M. Broesterhuizen (1986).
A few years ago the method of compiling input-output tables underwent in the Netherlands an essential revision. The most significant improvement is that during the entire statistical process, from the processsing and analysis of the basic data up to and including the phase of balancing the tables, data in current prices and deflated data are obtained simultaneously and in consistency with each other.

NA/14 **A proposal for the synoptic structure of the next SNA**, Al, P.G. and C.A. van Bochove (1986).

NA/15 **Features of the hidden economy in the Netherlands**, Van Eck, R. and B. Kazemier (1986).
This paper presents survey results on the size and structure of the hidden labour market in the Netherlands.

NA/16 **Uncovering hidden income distributions: the Dutch approach**, Van Bochove, C.A. (1987).

NA/17 **Main national accounting series 1900-1986**, Van Bochove, C.A. and T.A. Huitker (1987).
The main national accounting series for the Netherlands, 1900-1986, are provided, along with a brief explanation.

NA/18 **The Dutch economy, 1921-1939 and 1969-1985. A comparison based on revised macro-economic data for the interwar period**, Den Bakker, G.P., T.A. Huitker and C.A. van Bochove (1987).

NA/19 **Constant wealth national income: accounting for war damage with an application to the Netherlands, 1940-1945**, Van Bochove, C.A. and W. van Sorge (1987).

NA/20 **The micro-meso-macro linkage for business in an SNA-compatible system of economic statistics**, Van Bochove, C.A. (1987).

NA/21 **Micro-macro link for government**, Bloem, A.M. (1987).
This paper describes the way the link between the statistics on government finance and national accounts is provided for in the Dutch government finance statistics.

NA/22 **Some extensions of the static open Leontief model**, Harthoorn, R. (1987).
The results of input-output analysis are invariant for a transformation of the system of units. Such transformation can be used to derive the Leontief price model, for forecasting input-output tables and for the calculation of cumulative factor costs. Finally the series expansion of the Leontief inverse is used to describe how certain economic processes are spread out over time.

NA/23 **Compilation of household sector accounts in the Netherlands National Accounts**, Van der Laan, P. (1987).
This paper provides a concise description of the way in which household sector accounts are compiled within the Netherlands National Accounts. Special attention is paid to differences with the recommendations in the United Nations System of National Accounts (SNA).

NA/24 **On the adjustment of tables with Lagrange multipliers**, Harthoorn, R. and J. van Dalen (1987).
An efficient variant of the Lagrange method is given, which uses no more computer time and central memory then the widely used RAS method. Also some special cases are discussed: the adjustment of row sums and column sums, additional restraints, mutual connections between tables and three-dimensional tables.

NA/25 **The methodology of the Dutch system of quarterly accounts**, Janssen, R.J.A. and S.B. Algera (1988).
In this paper a description is given of the Dutch system of quarterly national accounts. The backbone of the method is the compilation of a quarterly input-output table by integrating short-term economic statistics.

NA/26 **Imputations and re-routeings in the National Accounts**, Gorter, Cor N. (1988).
Starting out from a definition of 'actual' transactions an inventory of all imputations and re-routeings in the SNA is made. It is discussed which of those should be retained in the core of a flexible system of National Accounts. Conceptual and practical questions of presentation are brought up. Numerical examples are given.

NA/27 **Registration of trade in services and market valuation of imports and exports in the National Accounts**, Bos, Frits (1988).
The registration of external trade transactions in the main tables of the National Accounts should be based on invoice value; this is not only conceptually very attractive, but also suitable for data collection purposes.

NA/28 **The institutional sector classification**, Van den Bos, C. (1988).
A background paper on the conceptual side of the grouping of financing units. A limited number of criteria are formulated.

NA/29 **The concept of (transactor-)units in the National Accounts and in the basic system of economic statistics**, Bloem, A.M. (1988).
This paper provides a fundamental discussion of the dual actoring as used in the 1968 SNA. Special attention is paid to the transformation of legal entities into units more suitable for economic analysis. Criteria for a precise delineation of the units are formulated. 'Establishment-type units and 'institutional units' turn out to be both institutional, that is both are really decision-making entities.

NA/30 **Regional income concepts**, Bloem, Adriaan M. and Bas De Vet (1989).
In this paper, the conceptual and statistical problems involved in the regionalization of national accounting variables are discussed. Examples are the regionalization of Gross Domestic Product, Gross National Income, Disposable National Income and Total Income of the Population.

NA/31 **The use of tendency surveys in extrapolating National Accounts**, Ouddeken, Frank and Gerrit Zijlmans (1989).
This paper discusses the feasibility of the use of tendency survey data in the compilation of very timely Quarterly Accounts. Some preliminary estimates of relations between tendency survey data and regular Quarterly Accounts-indicators are also presented.

NA/32 **An economic core system and the socio-economic accounts module for the Netherlands**, Gorter, Cor N. and Paul van der Laan (1989).
A discussion of the core and various types of modules in an overall system of economy related statistics. Special attention is paid to the Dutch Socio-economic Accounts. Tables and figures for the Netherlands are added.

NA/33 **A systems view on concepts of income in the National Accounts**, Bos, Frits (1989).
It is argued that different purposes and actual circumstances lead (and also should lead) to the use of different concepts of income. Thus, in the National Accounts several concepts of income could be employed, e.g. differing with respect to the production boundary. Furthermore, these concepts do not necessarily constitute an aggregation of income at a micro-level.

NA/34 **How to treat borrowing and leasing in the next SNA**, Keuning, Steven J. (1989).
The use of services related to borrowing money, leasing capital goods, and renting land should not be considered as intermediate inputs into specific production processes. The proposals in this paper entail that the way of recording the use of financial services in the present SNA remains largely intact.

NA/35 **A summary description of sources and methods used in compiling the final estimates of Dutch National Income 1986**, Gorter, Cor N. and others (1989).
Translation of the inventory report submitted to the GNP Management Committee of the European Communities.

NA/36 **The registration of processing in make and use tables and input-output tables**, Bloem, Adriaan M., Sake De Boer and Pieter Wind (1989).
The registration of processing is discussed primarily with regard to its effects on input-output-type tables and input-output quotes. Links between National Accounts and basic statistics, user wishes and international guidelines are also taken into account.

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