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ECONOMIC THEORY AND NATIONAL ACCOUNTING

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Abstract

This paper describes the relationship between economic theory and national accounting. This relationship is often misunderstood, by economic theorists and national accountants alike. Attention is drawn to the consistency required in a national accounting system, to national accounts figures as a transformation of primary data and to the fundamentally different valuation principles employed in economic theory and national accounting (forward looking and analytic versus backward looking and descriptive). The gap between economic theory and national accounting can only be bridged by satellite accounts, as in these accounts consistency with the overall system and valuation at current exchange value are not strictly required.

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1. Introduction

The relation between economic theory and national accounting can be investigated from two sides:

- the importance of national accounts for economic theory;
- the importance of economic theory for national accounting.

In this paper we will focus on the importance of economic theory for national accounting.

After the second world war, national accounting came to be dominated by the international guidelines ('the era of the international guidelines'). A new generation of international guidelines will be implemented in the forthcoming years:

- the System of National Accounts published in 1993 (the 1993 SNA);
- the European System of National and Regional Accounts to be published in 1995 (1995 ESA).

The 1993 SNA applies to all countries over the world; the 1995 ESA is consistent with the 1993 SNA but focuses on the circumstances in the European Union². Considering the important role of these guidelines, our discussion on the relation between economic theory and national accounting will be centered around these international guidelines.

Section 2 provides an introductory overview of the relationship between economic theory and national accounting.

The national accounts are a bookkeeping system which requires many types of consistency. This consistency determines the extent to which economic theory can be incorporated in the national accounts. This is the topic of section 3.

National accounts figures are transformations of primary data with the aid of statistical techniques and conceptual conventions. The latter conventions are partly based on economic theory. This transformation process is discussed in section 4.

Valuation is at the heart of both economic theory and national accounting. Section 5 investigates therefore in more detail the relationship between principles of valuation in economic theory and national accounting. Conclusions are drawn in section 6.

² The main differences between the 1995 ESA and 1993 SNA are summarized in para 1.25 of the 1995 ESA.

2. Economic theory and national accounting: an introductory overview

National accounting and economic theory have a long joint history, both in persons and in concepts³. Some important cases in point are :

- King and Petty are not only the founding fathers of national accounting, but are also to be memorated for their other contributions to economic theory⁴. King's law of demand can be regarded as the first statistical demand curve. Petty is known for his work on the velocity of money. He also acknowledged the importance of the concept of human capital: he even estimated the value of human capital in England.
- Kuznets' work on economic growth and historical time series has been important to both national accounting and economic theory. The same applies to Leontief's pathbreaking work on input-output analysis.
- Hicks and Frisch are generally known for their contributions to economic theory and econometrics. However, they also made important contributions to national accounting. The reverse situation holds for Stone: his role in the development of international guidelines on national accounting is his most outstanding contribution, but he is also to be remembered as one of the pioneers of econometrics.
- The Keynesian revolution was important to both economic theory and national accounting. It stimulated the development of the national accounts all over the world. The drastic increase in the availability of national accounts figures reinforced the Keynesian revolution in economic theory (and policy). Furthermore, during the second world war, Keynes, at that time a high ranking official in the UK, asked Stone and Meade to develop and estimate a system of national accounts for improving the planning of the war-budget.

Since the second world war, the role and nature of national accounting has drastically changed. National accounting became well established and also institutionalized:

- National accounting concepts are now internationally agreed upon and laid down in international guidelines;
- Compiling national accounts figures became to be regarded as an official task of the government (and not of individual researchers);
- The 'standard' national accounting figures became the framework of reference for social and economic policy all over the world.

The institutionalization with respect to the concepts used, the compilation of national accounts time-series and the use of the national accounts reduced the room for

³ On the history of national accounting, see Bos (1992a) and Kenessey (1994).

⁴ See Schumpeter (1954), p. 213.

interaction with economic theory. National accounting became a separate branch of economics and relatively inaccessible in two respects:

- the concepts are specific, complex and partly based on compromises, which are always difficult to understand for outsiders (see Denison, 1971, p. 38);
- the compilation methods are usually not well-documented and made public.

Furthermore, during the most recent revision of the international guidelines, the starting point was that the basic concepts should not be changed drastically. Attention should be focused on clarifying and extending the accounting system recommended. The continuity of basic concepts has clear advantages for compilers and users of national accounts. However, such a starting point may discourage the development of new concepts and limit the interaction with economic theory.

Nevertheless, despite the decreased room for interaction, the national accounts are still important for economic theory in four fundamental ways⁵:

- National accounts figures meet data needs of economic theory that can not be fulfilled by primary data, because:
 - * primary data can only describe some aspect or part of the national economy; the national accounts provide a comprehensive overview of the whole national economy. It shows many interlinkages and aspects at the same time. As a consequence, national accounts figures can also show the importance of some aspect in relation to the whole national economy. A case in point is the relative size of manufacturing in terms of value added.
 - * primary data can be inconsistent; the national accounts figures are necessarily consistent, conceptually as well as numerically;
 - * by combining data from many sources, the national accounts can describe aspects on which no good primary data exist.
- Furthermore, as national accounts figures are compiled all over the world following the basic concepts of the international guidelines, cross-country analyses can be made, ratios like GDP per capita can be compared and figures of various countries can be linked to each other, e.g. those on imports and exports (see Bos, 1994c); ⁶
- The national accounts concepts should be relevant and applicable all over the world. They are therefore formulated in general terms but contain also

⁵ There are also schools of economic thought which are sceptical to the use of statistical information for testing and improving economic analysis. For example, the Austrians are fully micro-oriented and therefore discard the use of macro-economic statistics like national accounts figures. A quote from Hayek can illustrate this: "I don't deny that statistics are very useful in informing about the current state of affairs, but I don't think statistical information has anything to contribute to the theoretical process" (in Kresge and Wenar, 1994, p. 148).

⁶ For economic theory, this is the positive effect of the institutionalization of national accounting.

a lot of detail reflecting the many differences in economic and institutional structure. For economic theory, this rich and practical conceptual framework, can be a source of inspiration for refining and improving their concepts (cf. Malinvaud, 1994, p. 7).

- Economic theorists can develop their own supplementary or alternative national accounting systems (figures) and use this as a basis for analysis. This applies for example to the development of satellite accounts, extended accounts, historical national accounts, world accounts and inter-regional input-output tables.
- The national accounts figures are used in monitoring and deciding on national and international economic and social policy, e.g. the criteria of convergence for the European Monetary Union have been defined in terms of national accounts figures (government deficit, government debts and GDP). National accounts figures are therefore important in studying the behaviour of the government and in investigating the merits of policy targets in terms of national accounts figures.

In the international guidelines of national accounting, the influence of economic theory is manifold:

- The idea of bookkeeping is applied to nations, regions, sectors and industries⁷;
- The national accounts concepts are to a main extent statistical definitions of economic concepts known for centuries, e.g. capital formation, final consumption, imports and exports, taxes, compensation of employees, collective services, the government, financial assets, inflation, purchasing power and employment.
- Economic theoretic constructs and considerations have helped designing national accounts concepts in the guidelines:
 - * The definition of changes in prices and volumes include references to various index number formulae, e.g. Paasche, Laspeyres, Fischer and Tornquist. The latter two are superlative indices, i.e. indices that provide exact measures for some underlying functional form that is "flexible", the homogeneous quadratic and homogeneous translog functions being particular examples of such flexible functional forms (see chapter XVI in the 1993 SNA);
 - * Changes in quality are treated as changes in volumes. Differences in prices due to price discrimination do not reflect a difference in quality. Changes in the relative importance of high priced and low priced products should then be treated as changes in prices.

⁷ On national accounting and bookkeeping, see Postner (1994).

- * The description of the symmetric input-output table includes economic-theoretic assumptions (industry technology versus product technology) for transforming supply and use tables into symmetric input-output tables (see chapter IX in the 1995 ESA and chapter XV in the 1993 SNA);
 - * The (extra) operating surpluses of fiscal monopolies are treated as a type of tax.
- National accounts concepts can be better understood by interpretation in terms of economic theoretic concepts like utility, uncertainty, external costs, rationing, monopoly, net present values, production functions, elasticity and substitution. Investigating systematically whether and how these concepts are dealt with in the national accounts clarifies what is measured by the national accounts figures and what not. For example:
- * the guidelines explicitly state that the national accounts figures do not intend to measure the theoretic concepts utility and welfare. The decision not to measure welfare has been taken after some long theoretical debates about the intermediate and final use of goods and services in the 1940s (see Bos, 1992a, p.9).
 - * Recently, during the Williamsburg Conferences (see Bureau of Census, 1991 and Economic Classification Policy Committee, 1993) an effort has been undertaken to identify the economic-theoretic foundations of the *industry and product classifications* used in the national accounts. This amounted to looking whether the present classifications group establishments with similar production functions (a supply-approach) or group products that are close substitutes from the point of view of the consumer (a demand approach). The conclusion of these investigations was that the present classifications reflect a mixture of various approaches and practical considerations. Furthermore, it does not seem possible to apply one approach for the classification of all industries and products. The industry and product classifications of the future national accounts will thus always have to be a mixture of approaches.

Several other examples are given in section 5, where principles of valuation in economic theory and national accounts are discussed.

Furthermore, it is evident that the data needs of some theories/types of analysis are better taken into account than others ⁸, e.g.:

⁸ See Bos, 1993, which contains also a discussion of the link with economic theory for the main national accounting concepts in the successive international guidelines, e.g. with respect to the production boundary, to factors of production and to the concept of capital formation.

- * *Keynesian analysis* is served by the introduction of a sector government, the distinction between public and private enterprises and by the stress on expenditure, e.g. by recording expenditure on consumer durables as final consumption. However, it is also true that the link with two major Keynesian policy targets, namely employment and unemployment has not been very strong in the international guidelines. The concept of employment was absent in the 1968 SNA and in the 1993 SNA there are still no definitions for unemployment and the labour force⁹. Furthermore, the national accounts expenditure concepts are only partly really expenditure concepts. For example, capital consumption is included in government final consumption expenditure and final consumption expenditure by households includes the services of owner-occupied dwellings.
- * *Input-output analysis* is served by the inclusion of the supply and use tables and symmetric input-output tables.
- * The influence of *neo-classical growth theory* could be discerned in the concept of capital formation, which does not include intangible assets like human capital, and in the concepts of employment and compensation of employees, because no classification is made by type of labour, e.g. by level of education. However, just recently neo-classical economists have started to realize that valuation in the national accounts is fundamentally different from their theoretical framework, it is not based on prices under perfect competition or on net present values (see section 5 for a discussion of valuation in national accounts and economic theory).
- * *Monetary analysis* is served by the separate sector Financial intermediaries and its many subsectors, by the presence of financial accounts and by the introduction of balance sheets (the latter only in the most recent international guidelines).
- * *Applied general equilibrium analysis* and *analysis of the labour market* is served by drawing up a Social Accounting Matrix.

Examples of types of analysis whose data needs have been less well recognized in the standard system of national accounts are (see also Bos, 1993):

- * Analysis of welfare;
- * Analysis of the role of multinationals;
- * Analysis of the economies of scale and transaction costs analysis¹⁰;

⁹ These concepts have been introduced in the 1995 ESA. However, these definitions have been left vague on purpose, as in fact their exact definition is not yet agreed upon internationally (in fact: there exist various international agreed upon more precise definitions but they are contradictory in various specific points).

¹⁰ Transaction costs analysis needs data on contracts and on the structure of enterprises. According to Coase, the present absence of such data are a main obstacle faced by researchers in transaction costs analysis and industrial organization (Coase, 1991, p. 234).

- * Micro-macro links in income and expenditure by households;
- * Human capital theory;
- * Analysis of production for consumption in the same household;
- * Analysis of the relation between the economy and the environment.

According to the most recent international guidelines, these data needs should be met by satellite accounts or by introducing supplementary classifications.

In sections 3 and 4, we will discuss why the data needs of some types of analysis have been better taken into account than others.

3. National accounts, economic theory and consistency

The national accounts requires consistency throughout the system of accounts. Consistency is a great merit of national accounts figures. Due to consistency, figures can be related to each other throughout the whole accounting framework. This guarantees also that ratios derived from this framework are consistent. This may pertain to e.g. value added per hour worked, National Disposable Income per capita and government debt as a percentage of Domestic Product. The consistency also serves to check the consistency of basic data or to make residual estimates, e.g.:

- estimate saving as the difference between disposable income and final consumption expenditure;
- estimate final consumption of a product as the difference between domestic production of this product and the net exports of this product (assuming no intermediate consumption nor capital formation of this product).

The concepts in the national accounts are based on consistency in four respects:

- (1) All transactions must be recorded twice, once as a resource (or a change in liabilities) and once as a use (or a change in assets). The total of transactions recorded as uses must be equal to that of resources, thus permitting a check on the consistency of the accounts;
- (2) Most transactions involve two institutional units. Each transaction of this type must be recorded consistently by the two transactors involved in respect of timing, valuation and, if relevant, volume.
- (3) Resources and uses must be equal per account. For the goods and services account, this implies that the supply of goods and services must be equal to its uses. For the Production Account, this implies that output is equal to intermediate consumption plus value added. For the other accounts, similar identities hold;
- (4) The accounts are interconnected via balancing items: the balancing item of an account is usually the start of the subsequent account. This establishes consistency between the various accounts and in the overall system.

The national accounts requirements of *consistency determine the extent to which economic theory can be incorporated in the national accounts*, because:

- some economic theoretic concepts may violate these requirements and can thus never be incorporated in a consistent system of national accounts;
- some combinations of economic theoretic concepts may be impossible to incorporate;
- some economic theoretic concepts may be difficult to combine with specific types of statistical information, e.g. with business accounts data or household budget survey information.

Some examples may serve to illustrate this role played by consistency.

Consistency requires that if activities are regarded as production and their output is to be recorded, then the concomittant income, employment, final consumption, etc. are also to be recorded. For example, the own-account production of housing services by owner-occupiers is recorded as production, so is the income and final consumption expenditure it generates for these owner-occupiers. The reverse holds when activities are not recorded as production: domestic services produced and consumed within the same household do not generate income and final consumption expenditure and thus no employment is involved.

Consistency is also required between the production and asset boundary. For example, as the guidelines do not regard the services of consumer durables and human capital as production, expenditure on consumer durables and human capital are also not regarded as capital formation (related to these types of production).

So, arguments for choosing a particular production boundary can be relevant to the choice of the concept of capital formation and vice versa. Similarly, the arguments for particular concepts of income and employment can be relevant for choosing the concept of the production boundary.

The national accounts require consistency between the concepts of production, income, employment, final consumption and capital formation. This implies e.g. that Keynesian expenditure concepts of final consumption and capital formation can not be combined with a welfare-oriented or extended approach to national accounting. The latter approach amounts e.g. to the inclusion of unpaid household services as production or the introduction of the concept of human capital. Only one approach can be chosen.

Different notions exist of the distinction between 'factors of production' and services. For example, as in the international guidelines compensation of employees can be regarded as a payment to a factor of production. However, it is also possible to treat it as a payment for a service (see UN, 1947, pp. 55, 56; Bos, 1993, pp. 16-18; this idea is applied in a human capital module in Bos, 1994d). Similarly, interest is at present by convention regarded as a payment to a factor of production but could also be treated as a payment for a service (proposed by e.g. Ruggles, 1990). In a consistent accounting system, only one option can be chosen.

Different perceptions also exist of the treatment of employers' contributions to life insurance and private pension funds (see e.g. Ruggles, 1990, p. 416-417). The international guidelines regard them as part of current compensation received by employees. As a consequence, when the households actually receive the benefits of these employers' contributions (in the form of a pension), they can not be recorded as income of households, as this would amount to double-counting. An alternative

treatment is to record the employers' contributions not as part of current compensation of employees. It becomes then possible to record the receipt of such a pension as income of households. This improves the micro-macro linkage from the point of view of households. Both accounting treatments have their merits. However, one thing is clear: both treatments can not be incorporated simultaneously in one (consistent) system of national accounts.

By introducing a satellite account supplementing the standard set of accounts and tables, justice can be done to mutually inconsistent concepts and data needs. This satellite account can show the consequences of using alternative concepts. In order to maintain a good overall system of accounts, the satellite account should also contain a table where the conceptual differences with the standard accounts are shown.

Incorporating an economic theoretic concept does not pose problems of consistency if it requires only a supplementary classification. This pertains e.g. to:

- the concept of multinationals;
- the concept economies of scale (by classifying producers by size-class).

The role played by domestic and foreign multinationals could be made explicit in the classifications of domestic sectors and the Rest of the World¹¹. Such a classification would make sense in view of the specific characteristics of multinationals, e.g. in transferring technology, in financing their production processes or simply because of their size. The intra-firm flows of a multinational may be imports and exports to a country. It seems likely that the determinants of this type of imports and exports differ from imports and exports between independent enterprises. The sector classifications in the international guidelines include resident units pertaining to a foreign multinational. However, they have ignored resident units pertaining to a domestic multinational. Furthermore, the Rest of the World Account does not contain a distinction between intra-firm flows and other flows.

¹¹ This is done in the Research and Development module by Bos, Hollanders and Keuning (1994).

4. National accounts figures as transformations of primary data

In order to provide a consistent and complete statistical description of a national economy, primary data should be transformed into national accounts figures. This transformation is often not very straightforward, as consistency and completeness can only be attained by using a very heterogeneous set of primary data. This set is likely to include data pertaining to different years, data on values, volumes and prices, data based on different concepts (e.g. about compensation of employees), data available regularly but also incidental data (e.g. a population census) and data of high reliability and data with serious biases. These data should be compared, combined, extrapolated, modified and integrated. Compiling a consistent set of national accounts figures amounts thus to the creative and systematic processing of many types of primary data.

An extended, well-coordinated set of basic statistics drastically reduces the need to use assumptions and low-quality information (incomplete, outdated or unreliable) for compiling national accounts figures. In such a case, national accounts figures provide a solid statistical description of a national economy.¹² However, if assumptions and low-quality information dominate the compilation process, the national accounts figures are different in nature: they are less a description of the economy and more an assumption about the economy. Hidden in the compilation process, certain developments in the national economy are then ruled out by definition, e.g.:

- when constant ratios of output/intermediate consumption are assumed for some industries during several years;
- when for small enterprises below the survey threshold the ratios and developments of the bigger enterprises are applied;
- when the composition of household consumption expenditure is held constant for years where no results from the family budget survey are available.

Of course, it should be realized that despite such assumptions, the national accounts figures will still present the best available description. Furthermore, these national accounts figures can only be improved upon by making better assumptions or by exploiting some statistical information not yet used.

Assumptions¹³ are particularly more important for compiling detailed figures, historical times series and short term figures. A crucial advantage of short term figures is that comparison with definite, annual figures can provide a regular check on the validity of the assumptions.

¹² Cf. the basic statistics and assumptions used in the compilation of final estimates of Dutch GNP, see Bos and Gorter (1993).

¹³ In the near future, in compiling historical time series and short term figures, assumptions will be replaced more and more by econometric models or equations. This implies that an econometric model estimated on the basis of figures partly generated with an econometric model is likely to give a misleadingly good fit, as it is likely that often the same variables will be chosen in both models.

Knowledge of the compilation process is thus essential to understand what is described and what is assumed. Statistical offices should therefore also provide information about the assumptions used in the compilation process (see in a similar vein Richter, 1994).

The choice of the national accounts concepts determines the empirical content of national accounts figures, because:

- The concepts and classifications chosen for the national accounts influence the extent to which primary data should be transformed. The closer the national accounts concepts and classifications resemble those in the primary data sources available, the less transformation is required. Similarly, the more national accounts concepts and classifications deviate from those in the available data sources, the more national accounts figures will be based on transformation. For example, a relatively close link to the concepts, detail and classifications used in administrative data sources (business accounts, tax data, social security data) reduces the transformation required when using such data for compiling national accounts figures. Analogously, by also treating expenditure on education as capital formation, also capital consumption corresponding to these expenditure should be defined and calculated. This is avoided when expenditure on education are recorded as intermediate or final consumption (see also Bos, 1992b).
- The concepts chosen for the national accounts also influence the range of variables (scopes) on which good quality primary data should be available. Some production boundaries are more data demanding than others; enlarging the production boundary with unpaid household services enlarges the national accounts demand for data.
- Some national accounts conventions in the guidelines can be interpreted as assumptions that replace statistical information. For example, the convention to record the use of all the collective services as final consumption and not partly as intermediate consumption. Another example is the convention to record all expenditure by households for private purposes as final consumption and not partly as intermediate consumption (e.g. the costs of transportation when shopping).
- Other national accounts conventions in the guidelines can better be interpreted as moulding reality into simple but misleading forms. This happens when the use of financial intermediation services indirectly measured are allocated on the basis of a reference rate of interest and only to depositors or non-banks. Another instance is the allocation of VAT to regions in order to calculate a regional product at market prices. Both are examples of arbitrarily imposing a micro-macro link.¹⁴

¹⁴ See also Bos, 1989, section 6.2 'The whole should be unequal to the sum of its parts' in the national accounts.

According to the 'Dutch' view on national accounting¹⁵, the core-set of accounts and tables should be consistent, general purpose and stay close to "the economic agents' perceptions of themselves and of their transactions" (Van Bochove and Van Tuinen, 1986, p. 140). This last requirement can be interpreted as that the concepts in the core should aim at maximizing the empirical content of the national accounts figures while minimizing the role of analytic constructs. The satellites ('modules') supplementing this core should be more analytic and reflect special purposes and special theoretic views.

The core set of accounts and tables in the international guidelines meets these requirements rather well, as most of the analytic constructs included are the direct result of the requirements of consistency¹⁶ (see also section 3). Furthermore, the classifications in the guidelines show as explicitly as possible where analytic constructs enter, e.g. a distinction is made between income in cash and in kind. However, the 'Dutch' distinction between core and satellites implies that the supply and use tables are part of the core, while the symmetric input-output tables are a satellite, because construction of the latter tables depends substantially on the assumptions made.

Satellites are very useful for incorporating statistics in non-monetary units and showing their links to the core. This applies e.g. to statistics on the environment, statistics on education and statistics on time use. The linkage is established by using, as far as possible, the classifications employed in the core, e.g. the classification by type of household or the classification by industry. In this way, a consistent extended framework is drawn up¹⁷. This framework can then serve as a data base for the analysis and evaluation of all kinds of interactions between the variables in the core framework and those in the extended part. If an effort is made to transform the statistics in non-monetary units into statistics in monetary units, the role of the transformation process is drastically increased. As a consequence, *the resulting figures are more the outcomes of a model and less a statistic; changing the model (assumptions) may drastically change the figures* (cf. Keuning, 1993 on green national income). This applies e.g.:

¹⁵ For an overview of the ideas of the 'Dutch School', see Den Bakker (1994) and Reich (1993). Various articles on the past, present and future of the Dutch national accounts, can be found in De Vries et al. (1993), which commemorates 50 years of national accounts in the Netherlands.

¹⁶ This is also revealed by comparing the design of a typically 'Dutch' core in Gorter (1988) with the new international guidelines. The major difference is the treatment of the services of owner-occupied dwellings: in Gorter's core this is not regarded as production. Considering these relatively minor differences and in order to align to the international standards, the Dutch national accounts will have a core set of accounts and tables consistent with the international guidelines (see also Bos, 1994b).

¹⁷ Keuning (1994) proposes even the development of a much extended integrating framework, a SESAME which is a SAM extended and integrated with all kinds of statistics in non-monetary units. The requirement of consistency in such an extended statistic is a great merit for all kinds of analysis, but to what extent and detail such consistency is possible from a statistical point of view is less clear. Current compilation practice shows already great problems in obtaining consistency between the financial accounts and the non-financial accounts or between employment in the national accounts and in all kinds of labour statistics. Nevertheless, all extra plausibility checks and increased consistency obtained by trying to implement such an ambitious framework can be regarded as significant improvements in the overall statistical system.

- to estimates of capital stock and capital consumption based on the Perpetual Inventory Method;
- to using hedonistic price models to approximate changes in the quality of health care or computers.
- to assuming zero-productivity growth for government and other non-market services.
- to value the services of owner-occupied dwellings at a 'market rent' (see section 5.4);
- to estimates of the value of unpaid household services and leisure time in extended accounting systems (see Eisner, 1988);
- to calculations of 'green' national income;
- to generational accounting (see section 5.3).

All these are clear examples of the general methodological principle that measurement can not be fully independent from theory (assumptions), as measurement is only possible after that a certain theoretical position is taken (some assumptions are made). This applies not only to the natural sciences, but also to economics and national accounting.

5. Principles of valuation in economic theory and national accounting

5.1 Introduction

Valuation is at the heart of both economic theory and national accounting. This section investigates therefore the relationship between principles of valuation in economic theory and national accounting.

In section 5.2, valuation in the international guidelines is described in general terms. In the subsequent sections, valuation is discussed in view of two specific principles of valuation:

- net present value (section 5.3);
- production costs (section 5.4).

5.2 Principles of valuation in the international guidelines

According to the international guidelines, the *general principle of valuation* in the national accounts is the *current exchange value*, i.e., "the values at which goods and other assets, services, labour or the provision of capital are in fact exchanged or else could be exchanged for cash (currency or transferable deposits)" (1993 SNA, para 3.70). This principle of valuation is a *strictly descriptive* principle to the extent that exchange for cash actually takes place; analytic considerations are then reduced to a maximum. The current exchange value does not correspond to theoretical notions of prices under perfect competition, because it will reflect all kinds of imperfections in the market mechanism. For example, when there is a monopoly, the current exchange value will be a monopoly price.¹⁸ (see also Bos, 1993, pp. 14-21)

Valuing output and intermediate consumption at current exchange values implies that value added does not include holding gains and losses.¹⁹ In order to attain consistency with the balance sheets, these are recorded as other changes in assets.

Valuing output and intermediate consumption at current exchange value also implies that the (unrealised) external costs of institutional units are not taken into account, e.g. the costs of cleaning polluted land and water. However, if and when an other institutional unit bears these costs, e.g. the government, then they are registered in the accounts of that unit.

¹⁸ The guidelines make only one exception: transfer pricing. However, this exception is usually wishful thinking as it is just too difficult and time-consuming for statisticians to try to distinguish a transfer price from a real market price.

¹⁹ But there are also clear exceptions to this rule, see Bos, 1994c, section 10.

The current exchange value is optimally suited for attaining consistency, because if some item is in fact exchanged for cash this value has a clear counterpart in the financial flows. Furthermore, if it concerns a transaction between institutional units, it is relevant for both parties involved.

However, the perception of the current exchange value may differ for the parties involved. Therefore, in the guidelines two types of current exchange values are used for valuating flows of products:

- *basic prices*: supplies of products, i.e. production and imports are valued at basic prices;
- *purchasers' prices*: uses of products, i.e. intermediate consumption, final consumption, capital formation and exports are valued at purchasers' prices.

In contrast to basic prices, purchasers' prices also include taxes less subsidies on products (but exclude e.g. deductible VAT) and transport charges paid separately by the purchaser to take delivery at the required time and place.

The supply and use tables are drawn up in such a way that both types of valuation are used in a consistent manner. The proof of this consistency is that two types of identities hold in the supply and use tables:

- (1) the identity by industry: Output by industry = Input by industry. So for each industry: Output = Intermediate consumption + Value Added;
- (2) the identity by product: Total supply by product = Total use by product. So, for each product: Output + Imports = Intermediate consumption + Exports + Final Consumption + Gross capital formation.

For the supply and use of labour only one principle of valuation is used in the guidelines, because there is only one definition of compensation of employees. However, differences in perception between the employer and the employee of the current exchange value of labour are partly taken into account by showing the employers' social contributions separately (but as part of compensation of employees).

The current exchange value is well-defined for items that are in fact exchanged for cash. However, for other transactions 'the value at which they could have been exchanged' is still to be defined. This pertains, for example, to wages and salaries in kind, barter and production for own final use.

Arranged from most to least preferred, three supplementary principles of valuation are distinguished in the guidelines:

- (1) prices of similar items exchanged for cash elsewhere;
- (2) production costs;

- (3) net present value (discounted present value of expected future returns)
(see 1993 SNA paras 3.70-3.75).

The first supplementary principle is to use prices of similar items exchanged for cash elsewhere. The perception of the current exchange value may differ between the producer and the consumer (or between the employer and employee). In the guidelines, the point of view taken is always that of the producer. For example, in case of wages and salaries in kind, the goods and services should be valued at basic prices when produced by the employer, and at purchasers' prices when purchased by the employer (that is, the price actually paid by the employer).

The second supplementary principle of valuation is production costs. For market output and output for own final use, production costs includes "a mark-up that reflects the net operating surplus or mixed income attributable to the producer" (1993 SNA, para 3.73). For other non-market output, "no allowance should be made for any net operating surplus"²⁰. However, for logical and practical reasons, in fact valuation at production costs excluding a mark-up is recommended not only for other non-market output but also for market output and output for own final use.²¹ The production costs include thus only intermediate consumption, compensation of employees, capital consumption, other taxes on production²². They exclude interest payments.

²⁰ For other non-market output, always production costs should be used, even if similar products are exchanged for cash elsewhere, e.g. in case of health care or education.

²¹ Logically the mark-up can not be based on the valuation for similar products under similar circumstances as this would amount to applying the first supplementary principle of valuation. Similarly, logically the mark-up can not be based on the discounted present value of expected future returns as this would amount to applying the third supplementary principle (and not the second). The position taken by the guidelines seems to be that:

- in principle, the mark-up should be based on the discounted present value of expected future returns;
- however, such a mark-up is to be rejected, because it is not practical and leads to speculative results;
- therefore, production costs without mark-up are to be preferred.

The following quotation illustrates this position: "[when an entertainment, literary or artistic original] is not sold, its valuation may be difficult because it depends on the future benefits that the owner expects to derive. These benefits may be very difficult to estimate in advance. In the absence of other information it may be necessary to value the original by its costs of production, as in the case of many other kinds of output produced for own gross fixed capital formation" (1993 SNA para 10.95, cf. also para 6.144).

²² The 1993 SNA is a bit confusing: the definition of production costs of output for own-final use and other non-market output suggests that subsidies on production should be deducted (paras 6.85 and 6.91). This is no real problem provided these subsidies are rather small. However, if these subsidies cover say 80% of the compensation of employees, deducting these subsidies is clearly erroneous: it amounts to mixing valuation from the revenue side and valuation from the cost side: subsidies should only be deducted when valuing from the revenue side, but not when valuing from the cost side.

The third supplementary principle of valuation is the net present value. As can be derived from our discussion of the mark-up, the net present value plays a very minor role. The guidelines state e.g. that "Although this method is theoretically entirely justified, it is not generally recommended since it involves many assumptions and as a consequence the outcomes are highly speculative" (1993 SNA, para 3.75).

5.3 Net present value

This subsection investigates the role net present value can play in the national accounts. The net present value is a dominant concept in economic theory. For example, since Hicks' classic book *Value and Capital*, standard micro-economic theory is fully based on the net present value, i.e. the discounted present value of expected future returns. Nevertheless, its role in national accounting is thus far very limited. This is a source of confusion between economic theorists and national accountants, and, as the 1993 SNA reveals (see section 5.2), also among national accountants.

According to Malinvaud (1994), the net present value should play a more prominent role in the national accounts. He argues that in some cases the net present value should even replace the value at which items are in fact exchanged for cash ('the market value'), because:

- for many economic subjects, the market value is not directly relevant; they buy, sell, produce and consume mainly as a function of longer term plans;
- most uses of national accounts figures refer to analyzing annual or even longer term developments (Malinvaud, 1994, p. 9).

However, the role of net present value is limited in the national accounts for many good reasons.

A first reason is that it can *only be used to value a project or an asset with a distinct stream of revenues and costs*, e.g. an office building or dwelling rented out, bonds or copy-rights. The net present value can not be used to value non-financial assets that are only one of the inputs of a production process. For example, a building used in producing tv's. The net present value of this building depends on the net present value of the production of tv's (the project). However, the net present value of the building can not be derived as its contribution can not be isolated from that of the other inputs. So, for valuation of this building, the net present value is no viable alternative to the current exchange value.

A second reason is that the *value is speculative*, as it depends on the discounting rate used and on the assumptions made about the expected revenues (and costs). A different discount rate and different assumptions may result in quite different values. This is the reason given in the 1993 SNA.

A third reason is that up to date and precise estimates of net present value are *often not used by enterprises and households for deciding on projects (investments/purchase of assets)*:

- For them, it suffices to select for a limited range of projects/investment the one with the highest net present value. This can often be done without exact calculation of the net present value.
- Furthermore, when a project has already been started, there is no need to make new calculations of the net present value, because it would not influence the decision making process. For example, the project will be continued despite a drastically declined net present value, because there are substantial sunk costs. So, the net present value will at most be used in deciding on new projects/investments.
- In situations of substantial uncertainty, the net present value is not a suitable (sole) decision criterion; general strategic considerations about the developments of the market are then much more important. This applies e.g. for investment in equity.
- Empirical research has revealed that even when the net present value is a useful criterion in deciding on investments, it is often not used by enterprises and households (cf. Faulhaber and Baumol, 1988).

When the net present value does not play a clear and dominant role in the decision-making by enterprises and households, its merits for statistical description of the value of assets are of course also limited.

A fourth reason is that the net present value is *not very interesting for comparisons over time*, because changes over time in this value can be very volatile and will reflect to a main extent changes in expectations and relative prices.

A fifth reason is that the net present value is *not well defined*, because it is not clear which revenues and expenditure should be discounted. From the point of view of enterprises and households, their net present value should also take account of expected holding gains and the fiscal treatment of revenues. This applies for example to the net present value of natural resources and equity. However, following the basic national accounts concepts, the net present value should ignore expected holding gains and the fiscal treatment of revenues.

A sixth reason is that the net present values are ex ante values and therefore likely to be *inconsistent*. For example, the expectations of the producers of machinery are likely to be inconsistent with the expectations of producers that use such machinery in producing other goods and services. As a consequence, the net present values of their enterprises will also be inconsistent. The same applies to the net present value of financial assets: their net present values should be estimated on the basis of a consistent set of expectations, e.g. with respect to interest rates, exchange rates and economic growth all over the world. However, some financial assets are even based on the

existence of differences in expectations, e.g. options. Only ex post values like the current exchange value achieves the consistency required by the national accounts.

The seventh reason is that valuation of assets at net present value *does not really fit in a national accounting system mainly based on current exchange values*. Valuation of assets at net present value is a forward-looking concept of capital stock. It should therefore be accompanied by a forward-looking concept of income. This concept is generally known as Hicksian income, as it originates from Hicks' classic book *Value and capital*. This concept of income is often misunderstood, but is fundamentally different from the income concepts employed in the international guidelines.

Hicks' definition of a persons' income is "the maximum value which he can consume during a week, and still expect to be as well off at the end of the week as he was at the beginning" (Hicks, 1946, p. 172)²³. Hicksian income is best understood as a type of real interest on capital stock. Suppose that inflation is absent, that expectations and wants are constant over time and that a person has a deposit of \$ 1 million on which he receives 4% interest annually. Hicksian income is then \$ 40,000, because by consuming this amount, he will be as well off at the end of the year as he was at the beginning.

The most common misunderstanding of Hicksian income is that it includes all holding gains and losses in income (see e.g. 1993 SNA, para 8.15). Nevertheless, Hicks is very clear about this: "if [holding gains] occur, they have to be thought of as raising income for future weeks (by the interest on them) rather than as entering into any effective sort of income for the current week. Theoretical confusion between income ex post and ex ante corresponds to practical confusion between income and capital" (Hicks, 1946, p. 179). In terms of our example, suppose that our person has made a holding gain of \$500,000 on selling his options, and this money is also put on the deposit. Hicksian income is then 4% of \$ 1,5 million, i.e. \$ 60,000. Similarly, suppose instead that the person has made a holding loss of \$ 500,000. Hicksian income is then 4% of \$ 0,5 million, i.e. \$20,000.

Our examples have illustrated Hicksian income with the help of simplifying assumptions. If we gradually relax these assumptions, Hicksian income becomes much more complex. For example, if prices rise, our person will be less well off if he spends his revenues from interest: Hicksian income will then be less than these revenues. In principle, Hicksian income should take account of many aspects, e.g. expected changes in prices, expected interest rates, uncertain other revenues and life-cycle considerations. Hicks defined his concept of income for a person. If we want to apply this concept to a nation, it becomes even more complicated.

²³ We do not agree with Reich that Hicks definition is "caught in a logical circle" (Reich, 1991, p. 238): future income determines the value of present capital and changes in the value of present capital should be interpreted as changes in future income. However, we fully agree with Reich's general conclusion that "there is a principal cleavage between the Hicksian concepts and the national accounts" (Reich, 1991, p. 239).

Hicks fully realized that his concept of income was merely a theoretical construct. It is therefore not very surprising that the income concepts actually used in the national accounts differ in many respects from Hicksian income. In contrast to Hicksian income, the national accounts focus mainly on describing the revenues and expenditure during the accounting period. The national accounts make no effort to account for expected revenues and expenditure. The national accounts do not take account of expected changes in interest rates, prices or wants (e.g. due to a changing composition of the population).

The concept of Hicksian income is a typical product of standard micro-economic theory. Our comparison of Hicksian income with the concepts in the national accounts²⁴ is therefore a good illustration of the fundamental cleavage between economic theory and national accounts: *the main part of economic theory is in terms of expectations about the future, while the national accounts focuses on describing the present flows and stocks without explicit reference to future events*. This is also the most fundamental reason why the national accounts has adopted the current exchange value as its basic principle of valuation and not the net present value.

The eight reason that net present value plays a minor role in national accounting is that in order to calculate an accounting system in terms of net present values, the best way is to extrapolate the figures from an accounting system in terms of current exchange values. A good example of this is Kotlikoff's generational accounting (Kotlikoff, 1992). Kotlikoff argues that the government deficit as can be derived from a conventional national accounting system is an entirely misleading concept, because it is not forward looking. Conventional government deficit does not take account of future assets and liabilities and does not show the shifting of the tax burden from one generation to another. However, in order to make the calculations necessary for drawing up generational accounts, conventional government accounts are a good starting point: they should be projected to the future (e.g. per year) and then be discounted. This implies that national accounts based on current exchange values will always remain indispensable, but that they could be supplemented with the generational accounts²⁵.

²⁴ The Hamiltonian is a mathematical expression which can also be interpreted as a concept of income (see Usher, 1994). Quite like Hicksian income, this theoretical concept is also fundamentally different from the national accounts concepts of income.

²⁵ Generational accounts probably better address some of the main decision problems of the government. However, generational accounts can only be drawn up on the basis of a lot of assumptions (about discounting rates, about demographic developments, about future economic growth, about the exact meaning of present commitments for the future liabilities, etc.). This large role of assumptions is of course a problem for economic policy. The best solution is probably to derive several generational accounts, each based on a different set of assumptions and scenarios for the future.

5.4 Production costs

In the guidelines, production costs are used to value other non-market output and, if no similar items are exchanged for cash elsewhere, also for output for own-account capital formation and output for own final consumption (see section 5.2). The concept of production costs used does not include interest payments. This can be regarded as an understatement of the production costs, because if these costs are not covered one way or the other, production can not be maintained in the long run.²⁶

Not including interest payments for measuring output from the costs side leads also to statistical anomalies. For example:

- according to the draft 1995 ESA, market producers should have sales that cover the major part of their production costs²⁷. Suppose that the operating expenses of some housing corporation consists for 40% of production costs and for 60% of interest payments. This implies that covering the major part of production costs is identical to covering 20% of operating expenses. So, if 30% of operating expenses are covered, this corporation should already be regarded as a market producer.
- if a non-market producer decides to sell his own buildings and rent them back, production costs and value added are likely to increase by amount of an operating surplus for the new owner, i.e. including a charge for the cost of interest.

This anomaly can be solved by including interest as a production cost. The United Nations guidelines of 1947 recommend for the government to include interest payments as production costs as far as it arises "in connexion with government enterprises or the provision of ordinary peace-time services such as education, public sanitation, etc.". Excluded are however interest payments related to public debt that "has been incurred in meeting such charges as the cost of war or temporary deficits on social security funds and as a consequence has little or no counterpart in the form of productive assets" (UN, 1947, p. 72). Applying this principle to the government is difficult, because it requires to split interest payments by the government in two parts: the part related to current production and the part related to old production, transfers or expenditure on exceptional events. However, for all other non-market producers except the government this problem does not exist. Their production costs are therefore best defined including their interest payments.

²⁶ This reasoning applies also to persistent holding gains and losses.

²⁷ At present, the exact distinction between market and other non-market has not yet been decided for the 1995 ESA. The draft text suggested a 50 % criterion (the major part of the production costs should be covered by sales), but the most recent proposal is to take a more institutional point of view: all private enterprises are market producers and only in some cases the 50% criterion is to be applied. This last proposal avoids that some farmers and public transport companies are to be classified as other non-market producers and thus pertain to either the sector government or the sector Non-profit institutions serving households.

Furthermore, for the government as a producer, there is no need to split the interest payments, because all their interest payments should be included. All the interest payments are costs which should be covered by tax or other revenues of the government. The existence of interest payments related to war debts just induces a higher price for the delivery of the goods and services produced by the government. Without the war debts, the same set of goods and services could have been provided cheaper. However, if war debts exist it is necessary to charge a higher price for this set of goods and services.

A somewhat similar logic is also used by enterprises: if they can, they will make old losses (expenses) good by charging higher prices to their present customers, e.g. in case of insurance companies who miscalculated their risk. Analogously, some enterprises charge higher prices for one product in order to cover their losses on another product.

Our proposal is to include actual interest payments in production costs²⁸. From the point of view of opportunity costs, not the actual interest payments should be included but the interest received if the money invested in the production process would have been invested elsewhere, e.g. in the form of a deposit. However, we do not favour such an accounting procedure, because:

- the opportunity revenue is an arbitrary concept, e.g. depending on the interest rate chosen (market interest rate, rate used in the present loans, etc.);
- imputing interest distorts the analysis of the financial flows (though imputed interest and actual interest flows can be shown separately);
- if a non-market producer does not have to pay interest, financing its production does not require to finance interest payments. In case of government institutions and other non-profit institutions it is also evident that there is no need for the payment of dividends.

The anomaly with a non-market producer owning or renting buildings can also be solved by including in production costs *the rental value of buildings owned and used* by non-market producers. This was recommended in the UN-guidelines of 1953 and was also recommended in initial drafts of the 1993 SNA (see Bos, 1994a).

²⁸ The issue dealt with here is how to measure output by adding up the costs of various inputs (costs). A related, but somewhat different, issue is how to explain fluctuations in output and economic growth in terms of fluctuations in inputs. In this other context, which is in fact most meaningful for output actually sold, the costs of financial capital can also be regarded as a payment for services (see also Bos, 1993, p. 16). This allows to show that cheap financial capital can stimulate economic growth and high interest rates can be a serious barrier to economic growth. This is the type of analysis of economic growth proposed by Keuning (1994b, see in particular section 2.2).

Capital consumption is a cost for owning a building. So, in imputing a rental value for owner-used buildings, capital consumption on these offices and buildings should be excluded in order to avoid double-counting. A similar argument pertains to the interest payments: if these are to be included in production costs, those related to financing the purchase of buildings should be excluded. For the opportunity interest costs, this exclusion is no problem. However, for the actual interest payments this split is problematic. As a consequence, a concept of production costs which includes actual interest payments plus an imputed rental for owner-used buildings is also problematic.

We reject including in production costs a rental for owner-used buildings. The reasons are rather the same as for our rejection of the inclusion of the opportunity interest:

- the rental value is an arbitrary concept as similar buildings rented are difficult to find;
- if the rental value is to be used for buildings, this suggests that also imputations are to be made for the use of other non-financial assets, e.g. infrastructural works. However, the rental value of these is certain to be non-existent in nearly all cases.
- if a non-market producer does not have to pay a rental, financing its production does not require to finance a rental.

In the guidelines, the services of owner-occupied dwellings are not valued at production costs:

"As well-organized markets for rented housing exist in most countries, the output of own-account housing services can be valued using the prices of the same kinds of services sold on the market ... the output of the housing services produced by owner-occupiers is valued at the estimated rental that a tenant would pay for the same accommodation, taking into account factors such as location, neighbourhood amenities, etc. as well as the size and quality of the dwelling itself" (1993 SNA, para 6.89).

This text suggests that the rental at purchasers' prices should be used. However, following the general principles in the guidelines (see section 5.2), this type of output and final consumption should be valued at basic prices. The distinction is important when subsidies (on products) are given to market producers of housing services in order to reduce the rentals they charge. In that case rentals at purchasers' prices for similar dwellings will differ due to the existence of such subsidies. However, rentals at basic prices will not differ and this is the value to be used.

Despite this solution, the convention to impute the rental value of owner-occupied dwellings remains problematic:

- The market for the rental of housing services may be well-organized, but dwellings, whether rented or owner occupied, are a very heterogeneous

product; probably one of the most heterogeneous products²⁹. The more heterogeneous the product and its prices, the more difficult it becomes to find sufficiently comparable prices for imputing values.

- Even if the market for the rental of housing services is well-organized, a comparable rental may not exist. For example, the most expensive categories of dwellings are usually never rented and in some neighbourhoods all dwellings are owner-occupied.
- The market for the rental of housing services may be well-organized, but very small in size compared the market for owner-occupied dwellings. It is not uncommon that the rental market covers only 30% of the dwellings. The larger the market for owner-occupied dwellings the larger the consequences of the imputation of arbitrary rental values.
- For owner-occupiers, the rental value of their dwelling is often irrelevant. For them, their real costs of housing are important, i.e. the costs of maintenance, the interest payments for mortgages and the fiscal treatment of owner-occupiers (are interest payments deductible? is a rental imputed in order to calculate taxable income?). Owner-occupiers are often owner-occupiers, because they would have to pay much more for a similar accommodation rented. They have *similar accommodation for a cheaper price*; this reflects just their perception.

The general principle in the guidelines is that if it is not possible to find a comparable price the production costs should be used. As interest payments constitute often a major part of the real costs of housing, valuation at production costs excluding interest payments is no attractive solution. However, for a valuation at production costs including interest payments this problem does not exist. This principle can be applied in two ways:

- only for owner-occupied dwellings which do not have a counterpart rented;
- for all owner-occupied dwellings.

The first way is just an application of the general principles of the guidelines (except that we favour inclusion of interest payments as a change in the general definition of production costs). The second way is much more drastic, but follows the perception of the producers of the housing services, i.e. the owner-occupiers. Their real costs of housing can be regarded as the basic price of their housing services³⁰.

²⁹ In most countries there are many types of dwellings, which differ in style, size, quality of maintenance and all kinds of facilities, like a garage and a garden. Each of these differences may drastically influence the price of a dwelling or its rental. Furthermore, the price of a dwelling depends often crucially on its location, differences of 30 % or more due to differences in location are no exception. For example, a dwelling at the main road may differ substantially in price with an identical dwelling situated one or two (quieter) streets further on. Similarly, some streets or neighbourhoods may be notorious and have therefore low priced dwellings. There also often substantial differences in the prices of dwellings between regions or between the city and the province.

³⁰ The fiscal advantages for owner-occupiers could be treated as a subsidy on housing services. This would reflect the real costs of housing to an owner-occupier, but may be difficult to estimate.

6. Conclusions

National accounting is the statistical language of macro-economic theory. Its international guidelines contain statistical definitions of e.g. production, capital formation, final consumption, collective goods, inflation, lending and employment.

With respect to valuation, national accounts figures differ fundamentally from standard economic theory: national accounts figures intend to describe the current exchange values, i.e. the values actually used in exchanging goods, services, labour and assets for cash; they do not intend to describe prices under perfect competition or the discounted present value of expected future returns (net present value).

In case there is no exchange for cash, the international guidelines use supplementary principles of valuation: prices of similar items exchanged elsewhere for cash, production costs and net present value (in order of descending preference). The concept of production costs in the guidelines fails to fulfil its descriptive role. This can be resolved by including also actual interest payments. Furthermore, the services of owner-occupied dwellings should also be valued at production costs. This follows from just applying the general principles in the 1993 SNA. This treatment is also descriptively superior, as it can show e.g. that owner-occupiers pay a price lower than the market rental value of similar dwellings. In satellite accounts, other valuation principles can be employed that are more analytical or more relevant to (some specific) economic policy, e.g.:

- valuation at production costs including an opportunity charge for interest foregone;
- valuation at production costs including an estimate of the external costs of pollution;
- valuation at world market prices, e.g. when national prices are distorted by huge subsidies and transfers; such valuation is proposed by Ward (1994) to drastically improve national accounts as an economic policy tool for developing countries and the Eastern-European economies in transition.
- valuation at net present value, e.g. in a human capital module or in a set of generational accounts;
- valuation of human capital formation at costs of education and training including an estimate of earnings foregone by students (see Bos, 1994d).

A system of national accounts requires all kinds of consistency. This consistency implies that the concepts of some theories can not be incorporated simultaneously in one set of accounts. This applies e.g. to Keynesian expenditure concepts of final consumption and capital formation and their more welfare-oriented (extended) counterparts. Justice can be done to both types of concepts by drawing up a satellite account supplementing the core set of accounts.

National accounts figures are transformations of primary data on the basis of statistical techniques and conceptual conventions. Minimizing the role of this transformation process maximizes the empirical content of the national accounts. This aspect is stressed in the 'Dutch' core and, to a lesser extent, in the core-set of accounts and the supply and use-tables in the international guidelines. By increasing the role of the transformation process, the national accounts figures become closer to being the outcomes of a model (theory) and less a statistic. Cases in point are symmetric input-output tables, extended accounts, 'green' national income calculations and generational accounts. All these tables and accounts are best regarded as satellites that supplement the more empirical core system.

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Statistics Netherlands
National Accounts Occasional Papers

- NA/01 Flexibility in the system of National Accounts**, Van Eck, R., C.N. Gorter and H.K. van Tuinen (1983).
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 compiling 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.
- 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.