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Use, misuse and proper use of national accounts statistics

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*The views expressed in this paper are those of the author(s)
and do not necessarily reflect the policies of Statistics Netherlands*

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Explanation of symbols

.	= data not available
*	= provisional figure
x	= publication prohibited (confidential figure)
–	= nil or less than half of unit concerned
0 (0,0)	= less than half of unit concerned
–	= (between two figures) inclusive
blank	= not applicable
2005–2006	= 2005 to 2006 inclusive
2005/2006	= average of 2005 up to and including 2006
2005/'06	= crop year, financial year, school year etc. beginning in 2005 and ending in 2006
2003/'04–2005/'06	= crop year, financial year, etc. 2003/'04 to 2005/'06 inclusive

Due to rounding, some totals may not correspond with the sum of the separate figures.

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Abstract

This paper, the relevance of national accounts statistics and their underlying conceptual framework is investigated for their four roles: description and object of analysis, tool for analysis and forecasting, tool for communication and decision-making and input for alternative accounts, budgetary rules and estimates. For each role, the merits and limitations of national accounts statistics are described and discussed. Proper use should be stimulated by improving education and marketing and by supplementing national accounts with information about their meaning and reliability.

Keywords: national accounts; relevance and reliability; forecasting; economic and fiscal policy.

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1. Introduction

Worldwide use of national accounts statistics

Since the Second World War, the national accounts have become the universal overview statistic on the national economy. Its key-indicators, like gross domestic product (GDP)-volume growth, national income per capita and government deficit as a percentage of GDP, play a central role in managing and analysing national economies all over the world. Many decisions, income and expenditure are directly influenced by national accounts statistics. For example, private and public contracts contain (official forecasts of) national accounts indices on price- or volume-changes and contributions to the UN and EU are levied as fixed percentages of national income.

For various types of applied economic analysis, national accounts statistics are the reference frameworks for analysis. Examples are input-output analysis, analysis of balance of payments, analysis of government finance, monetary analysis, analysis of economic growth, analysis of the consequences of alternative government policies and forecasting tax revenue and the development of the national economy.

The new set of international guidelines (SNA93, ESA95) has been implemented almost universally. In Europe, the ongoing unification is a great stimulus to national accounts statistics. In some years a substantially extended, more timely and more comparable set national accounts statistics will be available for all EU-Member States. Potential Member States should also meet these data requirements.

Widespread lack of understanding

The worldwide use of national accounts statistics for many important purposes raises fundamental questions about the national accounts as a measuring tool. Are the national accounts statistics sufficiently suited for these jobs? How fair and relevant are the underlying concepts? What are the major differences with concepts used in economic theory or for administrative purposes? How comparable and reliable are the national accounts statistics of the various countries?

Despite the worldwide use of the national accounts, the answers to these questions are not commonly known. The problem is that national accounts are a language not very well spoken and understood anymore. This applies to economic researchers, policy-makers and national accountants alike.

Among economic researchers there is a worldwide illiteracy in national accounting. A decade ago, national accounting has been dropped as a separate topic of research on the list of the Journal of Economic Literature. The economic researchers skilled in national accounting have become more and more extinct. Furthermore, the introduction of new guidelines on national accounting has made a substantial part of their knowledge obsolete. However, for the analysis of economic statistics solid knowledge of the merits and limitations of their concepts and measurement is indispensable. According to Schumpeter (1945, p. 14):

'We need statistics not only for explaining things, but also in order to know precisely what there is to explain. ... It is impossible to understand statistical figures without understanding how they have been compiled. It is equally impossible to extract information from them or to understand the information that specialists extract for the rest of us without understanding the methods by which this is done- and the epistemological backgrounds of these methods. Thus, an adequate command of modern statistical methods is a necessary (but not a sufficient) condition for preventing the modern economist from producing nonsense'.

In this paper, the use of national accounts statistics will be investigated for their four roles:

1. Description and object of analysis (section 2).
2. Tool for analysis and forecasting (section 3).
3. Tool for communication and decision-making (section 4).
4. Input for alternative accounts, budgetary rules and estimates (section 5).

For each role, the merits and limitations of national accounts statistics are described and discussed. This indicates the potential relevance of national accounts statistics. However, national accounts statistics not used at all or not used in a proper way are not very relevant. So, the actual relevance of national accounts statistics depends also on their actual use and their proper use. This is therefore a central topic in all four sections. Proper use of national accounts statistics can be stimulated by improving the national accounts as such and by marketing and education. These are the topics of section 6 and 7. A summary is provided by section 8.

The literature about the various uses of national accounts statistics is limited. Major exceptions are Kendrick (1972), SNA93 (United Nations, 1993) and United Nations (2002). A historical view of the national accounts as a tool for analysis and policy is provided by Bos (2003, pp. 8–40), Bos (2006b) and Vanoli (2005).

Distinctive features of this paper are:

- National accounts statistics and their concepts are regarded as stocks of knowledge.
- Discussion of the merits and limitations of bookkeeping explanations.
- National accounts statistics and their concepts are regarded as a tool of communication.
- The focus on misuse of national accounts statistics in practice.¹⁾

¹⁾ About misuse of the national accounts from a modelling perspective see also Richter (1994) and Holub and Tappeiner (1997).

2. Description and object of analysis

Merits and limitations as a description

The national accounts provide a unique overview of national economies, their major groups of economic actors and the various economic flows, stocks and economic processes. National accounting concepts *give a concrete and specific meaning to the national economy and national accounts statistics show us the resulting facts.*

National accounts statistics are the overview-statistic on the national economy. As a consequence, they also serve as *frame of reference for specific statistics and administrative data sources.*

No neutral description of economic reality is given: the description is focused on what can be readily observed in monetary terms, it contains substantial transformations of what can be observed and is based on a specific way of labelling economic reality. Different choices would have resulted in a different picture of economic reality.

The national accounting concepts are based on *one universal model.* This contributes substantially to the quality, stability, neutrality and international comparability of their concepts. It is also essential for describing groups of national economies or showing links between different national economies. However, the national accounting concepts are also based on the national operational models. Substantial differences may exist in this respect, e.g. for prices and volumes. This is a serious danger for international comparability.

The universal model is a model of the national economy as a whole. However, it is in fact a *synthesis and compromise between eight different models* (see Bos, 2003a, chapter 6):

1. The national economy as a whole (economic growth, inflation, business cycles, income, expenditure and wealth per capita).
2. Non-financial corporations (business accounts).
3. Financial institutions (monetary policy).
4. Government (budgetary policy, government finance).
5. Households (personal income, wealth and consumption).
6. Rest of the world (balance of payments).
7. Industries (production, employment, productivity and input-output analysis).
8. Other (e.g. the environment, human capital and the welfare state).

Each model describes a different perspective of the national economy and each justifies some of the specific national accounting conventions. The universal model smartly combines these models in one accounting framework. As a consequence, the universal model presents overviews for each of these specific perspectives and can also show all kinds of interactions between them and with the national economy as a whole.

For some parts of the national economy, *competing overviews can exist*; these can be overviews purely for national purposes (administrative or statistical), but they may also be subject to international guidelines. Examples of competing overviews are the balance of payments by the central bank, an overview by the central bank on the financial position of the banking sector, an overview by the federal government of the revenues and expenditure of several layers of government or the consumer price indices published by statistical offices.

The merits of the specific overviews by the national accounts vis-à-vis purely national overviews are:

- The same concepts are applied for a long time.
- The same concepts are also applied by other countries.
- The overview can be more complete, as also units may be covered which are not directly supervised by the central bank or the federal government.
- The overview is presented in a macro-economic context, i.e. interactions with the rest of the national economy are also shown.

- Assuming the competing overviews are used as inputs in compiling the national accounts statistics, the data are likely (but not necessarily) more reliable.

So, the specific national accounts overviews are likely to be more comparable over time, more internationally comparable, more complete, are embedded in a statistical overview of the national economy and are likely to be more reliable.

However, some of the major national administrative overviews (e.g. balance of payments and government finance statistics) have become more and more subject to international standardisation and these standards are more and more harmonised with those of the national accounts. As a consequence, the major differences with the national accounts are disappearing and all these overviews become part of a big statistical framework under the roof of the national accounts.

The fully *consistent and simultaneous description of eight perspectives has also clear disadvantages*. As a description for any specific perspective, the standard national accounts description contains an excessive number of accounts, is not very comprehensible and contains sub-optimal concepts. This can also be a disadvantage vis-à-vis competing national overviews. This disadvantage can be resolved by developing for all these perspectives supplementary concepts and tables. These supplementary concepts and tables can be derived by simply rearranging the basic standard national accounting concepts. The central framework then starts to serve as a flexible building-block system, like pieces of LEGO.

The universal model *does not aim to measure welfare*. This is clearly stated in the new international guidelines. As a consequence, from a welfare point of view, the universal model also does not ensure full international comparability. Such biases and limitations from an economic theoretic point of view of the universal concepts have different implications for different countries. This depends on the specific institutional structure (e.g. differences in the importance of tax expenditure or non-tariff barriers or the distribution of tasks between the government and the market), the natural environment (e.g. differences in the climate), the demographic situation (e.g. differences in the age-structure of the population) and the economic importance of phenomena in a national economy (e.g. differences with respect to unpaid household services, hyper-inflation, computers). For example, ignoring the role of unpaid household services implies that by comparing domestic product per capita the living standards of developed countries are overestimated and those of developing countries are underestimated.

The universal model *does not contain any corrections for the influence of seasons, business cycle or incidental events*. However, for a proper interpretation of national accounts statistics such corrections are often essential, e.g. does the government deficit deteriorate due to the business cycle or due to changes in economic policy?

A core-set of national accounts statistics is available for nearly all countries in the world. However, the available national accounts may also differ enormously from one country to another in nearly all respects, e.g. scope, detail, timeliness, reliability, frequency, presentation and the presence of time-series. This reflects differences in available data, resources for compiling national accounts statistics, compilation skills and policy, e.g. differences in priority. Information on the reliability of national accounts statistics and the underlying operational concepts is generally not available.

Object of analysis: the concepts

The merits and limitations of national accounts statistics as a description give a first impression of national accounts statistics as an object of analysis. However, what is suitable for a description is not necessarily suitable as an object of analysis. Furthermore, in order to serve as an object of analysis also the implications of these merits and limitations should be well understood.

In order to describe the economic importance of a phenomenon, an estimate to a great extent based on assumptions may be useful. This can apply to e.g. the welfare costs of the congestion of traffic, the value of unpaid household services, the services of owner-occupied dwellings and the value of leisure time. However, in order to use the estimates of a phenomenon as an object of analysis assumptions should play a minor role. Otherwise, the assumptions themselves have become the object of analysis.

By leaving out quantitatively very big imputations, like the value of unpaid household services, the value of leisure time and the costs of traffic congestion, national accounts aggregates of product and income are not suited as indicators describing welfare. However, this is essential for safeguarding national accounts aggregates of product and income as objects of analysis.

Official national accounts statistics include various smaller imputations, like the services of owner-occupied dwellings. The implication is that these are not suited as objects of analysis. So, the development of the value and price of the services of owner-occupied dwellings should not be an object of analysis (only the volume can be an object of analysis). When a major part of the rental activities in a country consists of services of owner-occupied dwellings, this applies also to all rental activities. For bigger aggregates including the services of owner-occupied dwellings, like final consumption expenditure by households, the impact of the imputation can still be substantial. So, for a proper interpretation of the development of the value and price of final consumption expenditure by households, the impact of the services of owner-occupied dwellings should be isolated and shown separately.

More in general, in using national accounts statistics as an object of analysis the implications of the underlying concepts should be well understood. For example, for analysing the price of government final consumption expenditure knowledge of the underlying definition is essential. Broadly speaking, government final consumption expenditure is equal to intermediate consumption, consumption of fixed capital, compensation of employees minus sales.²⁾ It implies that the price change of government final consumption expenditure is a weighted average of the price change in these components. Furthermore, it implies that relatively fast price increases in government sales (e.g. garbage disposal fees, school fees and revenues for collecting import duties on behalf of the EU) reduce the price increase of government final consumption expenditure. Some other examples from the universal model are:

- Final consumption expenditure by households exclude social security benefits in kind (e.g. health care financed via social security) and social assistance benefits in kind (e.g. rental financed via individual rent allowances).
- Compensation of employees exclude wage subsidies and payments for people working via temporary agencies.
- Gross fixed capital formation includes the sale of fixed assets (negative capital formation).
- Gross capital formation excludes expenditure on education, training and Research & Development.
- Using up the environment is not recorded as negative capital formation.
- The volume of health care services or education services is the volume of services delivered and does not indicate the outcome of these services, e.g. the health of the population is also affected by many other factors.
- Economic growth excludes unpaid household services and (changes in) leisure time. For example, according to Landefeld and McCulla (2000, p. 304–305), the growth of post-war GDP in the United States has been overstated by ignoring household production.
- Economic growth, productivity and final consumption are affected by recording some (former) final consumption expenditure as intermediate business expenditure. This

²⁾ Assuming subsidies received, taxes on production paid and own-account capital formation are relatively small compared to the other items.

- partly explains the post-1973 productivity decline in OECD-countries. Some examples may illustrate the issue: 'Business' travel, entertainment expenses, company gyms, day-care centres, cars, pollution control, environmental preservation expenditure and improvements in workplace safety and amenities (see Diewert and Fox, 1999, p. 262).
- Different concepts of household saving could be derived, e.g. including or excluding holding gains on housing stock, financial assets and pension claims (see OECD, 2004, p. 4).

Also the specific national operational model can be important, e.g. in explaining economic growth the operational definitions of prices and volumes can reveal what is actually to be explained.

Object of analysis: lack of sufficient reliability and comparability

Lack of sufficient reliability and comparability can also be a reason to ignore some national accounts statistics as an object of analysis. However, usually no information is provided about the reliability and comparability of national accounts statistics. As a consequence, only rather general impressions can be used to decide whether a specific national accounts statistics are sufficiently reliable for conducting some specific analysis. This will imply that in some instances national accounts statistics are not used, due to unwarranted distrust. In other instances, national accounts statistics are used as an object of analysis where it is not very meaningful. The fundamental lack of reliability can be due to e.g. the important role of assumptions in constructing these data (like the use of a specific function or fixed ratio) or because it concerns estimation as a residual and its development over time is therefore likely to be full of errors.

Information on the reliability and compilation methods is not only important for deciding whether or not to use national accounts statistics as an object of analysis. It is also important in order to choose the best method of analysis and to draw the right conclusions. Some examples may illustrate this.

A common assumption in time series analysis is that all observations are equally reliable (i.e. are subject to the same measurement error). However, for national accounts statistics this often does not apply. For example, in compiling historical annual time series (e.g. for 1870–1960) often first relatively detailed estimates are made of some benchmark years (e.g. 1870, 1900, 1915, 1930, 1940, 1950 and 1960), which are then interpolated in order to complete the time series. Estimation of a regression model on the basis of the annual growth rates is then not the best method. It is better to regard the volume change in each period between benchmark years (1870–1900, 1900–1915, 1915–1930, 1930–1940, 1940–1950, 1950–1960) instead of the annual growth rates as primary (blocks of) observations. Furthermore, it is likely that the estimates for some of these periods are more reliable than others, e.g. periods including major wars are likely to encounter more data problems.

Similarly, constructing quarterly time series mainly on the basis of annual time series seems very attractive for econometric analysis as it drastically increases the number of observations. In several countries this has actually been a research project. However, it is generally misleading. When the quarterly national accounts statistics are constructed by the use of an explicit seasonal pattern actually no observations have been added. When the quarterly national accounts statistics are constructed with the aid of some real data, the estimation method should still take account of the way these data have been constructed, e.g. treat the annual growth rates as the primary observations and the quarterly growth rates of four quarters as the secondary observations (with a lower degree of reliability attached).

A common assumption in time series analysis is also that the measurement errors of the observations are independent. However, for national accounts statistics this often does not apply. For example, when the volume change is estimated as the value change

deflated by the price change, measurement errors in the volume change will reflect measurement errors in price change. Similarly, when domestic product is estimated by the expenditure approach, domestic product figures will reflect measurement errors in imports and exports.

In compiling national accounts statistics various assumptions are used, e.g. fixed ratios or a productivity increase for the government of 1% per year (see section 7.3). When these assumptions are unknown to the data user, assumptions are mistaken for observations, e.g. in estimating an econometric model or in validating a hypothesis.

Measurement errors in domestic product figures can directly affect the conclusions of growth accounting. For example, alternative estimates of Chinese domestic product since the 1978 reforms indicate lower growth rates. *Ceteris paribus* this implies a much more limited role of technological progress. This favours the view that China's economic development since 1978 has been almost entirely dependent on factor inputs (Harry X. Wu, 2000).

The availability of national accounts statistics can also influence the structure of econometric models. For example, in the Netherlands, the absence of statistics on capital stock stimulated the successful application of the clay-clay vintage production function in the models of the CPB (see Verbruggen, 1993, p. 157–158).

The lack of reliability and comparability could be overcome by making alternative or supplementary estimates, e.g. for remedying inconsistencies between national accounts output and employment data or for overcoming differences and imperfections in the price indices for ICT capital goods (see Collecchia and Schreyer, 2002).

3. Tool for analysis and forecasting

National accounts statistics have five major merits as a tool for analysis and forecasting:

1. The universal model is a stock of knowledge of applied economic analysis.
2. National accounts statistics and their underlying operational model are a stock of knowledge of the specific national institutional and economic structure.
3. The compilation process is based on a stock of knowledge and skills how to make the best estimates with the specific national data sources.
4. The concepts and data are consistent.
5. A core set of data is readily available nationally and internationally.

The latter three merits are rather evident. However, the universal and operational models as stocks of knowledge need some further clarification.

The universal national accounting model is not only designed to estimate and present a set of facts. It is also a tool designed to help explaining these facts. These explanations make use of the economic, bookkeeping and institutional relationships described by the national accounts and explicitly take account of the economic importance (size) of the various actors and phenomena. Two examples may illustrate this: explaining GDP-volume growth and explaining the development of government deficit.

Bookkeeping explanations of GDP-volume growth

The volume growth of GDP can be explained following the three basic approaches in estimating GDP: the production method, the expenditure method and the income method.

The production method explains GDP volume growth in terms of the difference between volume growth of output and the volume growth of intermediate consumption in the various industries (or institutional sectors). This explanation of GDP volume growth can be easily elaborated on the basis of the supply and use table, e.g. the volume growth of output in a specific industry can be explained in terms the volume growth of the various ways of final and intermediate use of this output.

The expenditure method explains GDP volume growth in terms of the various final expenditure categories (capital formation, final consumption by households, final consumption by the government, exports and imports). This explanation can also be easily refined and elaborated. For example:

- The volume growth of final consumption by households can be explained in terms the volume growth the various product-groups involved.
- The volume growth of final consumption by households can also be explained by a link with income and wealth, e.g. changes in the real disposable income of households and real holding gains.

The income method explains GDP volume growth in terms of the contributions of the various categories of value added (compensation of employees, net taxes on production, mixed income, operating surplus) and the underlying factors of production (labour and capital). This is the growth accounting approach developed by Denison. However, this approach requires some further transformation of national accounts statistics, e.g. the splitting of mixed income into a compensation for labour inputs and a compensation for capital inputs.

Bookkeeping explanations of government deficit

The development of government deficit can be explained in terms of changes in the various government revenue and expenditure, but can also be first explained in terms

of the government deficits of the various layers of government (central, state, local and social security funds). Each category of revenue and expenditure can then be explained further by exploiting the accounting framework (see Bos, 2003b and Bos, 2006a), e.g.:

- The development of total taxes can be explained in terms of the development of the various types of taxes.
- The development of specific types of taxes can be explained in terms of the development of the tax base and the tariffs, e.g. excise duties on beer rise due to increased sales of beer and a higher tariff.
- The development of compensation of employees can be explained in terms of a change in the volume of labour and the average salary for the whole sector government, but also for the various industries in which the government is active (e.g. public administration, defence and education).
- The development of interest payments can be explained in terms of government debt and interest rates.
- The development of government debt can be explained in terms of the government deficit, differences between cash and accrual (e.g. for taxes and social contributions) and the net purchase of financial assets.
- The developments of social benefits can be explained in terms of various types of social benefits; this can then be further explained in terms of the number of social benefits and the average benefit.³⁾ The number of social benefits can then be explained in terms of changes in the labour supply and demand (i.e. employment in the national accounts).

The universal model can also be used to analyse or forecast the consequences of specific events. For example, the consequences of a change in the prices of oil or a general wage increase can be calculated on the basis of input-output tables.

The universal model as a stock of knowledge

The universal model reflects some very successful traditions of applied economic science. It is in fact a stock of knowledge about the best way to define and classify the national economy for economic analysis. It has many merits as a tool of analysis:

- It combines in one model many different perspectives on the national economy.
- It contains bookkeeping identities and classifications that are useful for understanding economic and institutional relationships all over the world.
- It contains several different levels of aggregations. As a consequence, it can clarify and explain the development of aggregates by showing the developments at a less aggregate level.
- It contains also many specific conventions considered to be for many purposes satisfactory solutions to old standing conceptual problems, e.g. about the production boundary, the asset boundary, the valuation of government output, the valuation of insurance and banking services and the treatment of reinvested earnings on direct foreign investments.
- Employing the identities and conventions from the universal model are a safeguard for proper reasoning.
- It contains definitions that reflect modern national economies, e.g. the treatment of zero-coupon bonds and the distinction between operational lease and financial lease are explicitly discussed.

³⁾ A distinction between volumes and average social benefit is absent in the international guidelines on national accounting. This part of the bookkeeping explanation of government deficit has therefore no counterpart in the universal model.

- It is based on a relatively elaborate, accurate and consistent set of definitions, e.g. what is economic growth, what is the government, what is capital formation and what are subsidies. The national accounts definitions clearly indicate what is included and what is not included in a specific concept. These accurate definitions can not only help to understand what we want to explain, but also how it should be explained.
- It is a flexible tool, as its concepts and classifications can be combined and rearranged to formulated alternatives more relevant for a specific purpose (see Bos, 2003a, chapter 6, in particular section 6.7).

These merits indicate that the universal model is not only useful for quantitative economic analysis, but can also serve as a source of inspiration for qualitative, more theoretic, economic analysis. A quote from the Nobel lecture by Prescott (2006, p. 215) may illustrate this: 'The importance of Simon Kuznets and Richard Stone in developing the national income and product accounts cannot be overstated. These accounts reveal a set of growth facts, which led to Solow's (1956) classical growth model, which Solow (1970) calibrated to the growth facts. This simple but elegant model accounts well for the secular behaviour of the principal economic aggregates' (F.B.: This work by Solow was rewarded by the Nobel Prize).

The operational model and the compilation process as stocks of knowledge

The operational model reflects a stock of knowledge of the specific national institutional and economic structure and how to describe these into operational concepts. For example, the operational model contains knowledge about which taxes exist in a country, which are taxes on products, which are other taxes on production, which are current taxes on income and wealth and which are capital taxes and how is the borderline drawn with alternative concepts, e.g. sales by the government.

National accounts statistics incorporate also the consequences of specific institutional changes and events. For a proper explanation and interpretation of national accounts statistics, it is in particular important to know the impact of major institutional changes (e.g. a reorganisation of the social security or tax system) and major specific events (e.g. strikes, reduction of the workweek in some industries, earthquake, the sale of telecommunication frequencies, a rise in the general VAT-rate) on national accounts statistics. Quantifying their impact should be part of compiling national accounts statistics, as it amounts to verifying the plausibility of the estimates (see Bos, 2007). Describing major institutional changes and specific events and quantifying their impact on the national economy should also be part of presenting national accounts statistics.

Detailed tables on the various transfers received and paid by the government can play an important role in this. These tables can show for each type of transaction (e.g. taxes, social contributions, social benefits, subsidies and capital transfers) the composition by national scheme, regulation, law or specific purpose (e.g. wages subsidies, subsidies for public transport and a subsidy to compensate for the damage of pig fever). Combining these detailed tables with the aggregate national accounts tables provides already much information of the impact of institutional changes and specific events, e.g. on government deficit and household income. However, such detailed tables on government transfers only show net changes and do not provide information on the underlying causes of these changes, e.g. changes in tariffs, changes in the tax base or the substitution of a subsidy or social benefit by tax expenditure.

Official national accounts statistics should therefore preferably be accommodated by a booklet explaining the developments in the national economy in terms of national accounts statistics and including the impact of major institutional changes and specific events. Only in this way a proper interpretation of national accounts statistics can be ensured, e.g. only in this way a data user can distinguish between trends, business cycle-effects and the consequences of major institutional changes and specific events.

The merits of national accounts statistics as a tool for analysis and forecasting are evidenced by the statements of an eminent data user:

'At times, I have been tempted to build an econometric model out of the primary data that feed into the national income and product accounts (F.B.: NIPA), to link retail sales to payroll employment, plant and equipment to publicly reported returns, sales surveys, and capital costs, and measures of markets and output derived from industrial data. But even with its limitations the NIPA data set adds so much through its logic, consistency, and data interpretation that it is still preferable to use it as the organizing principle of the analysis' (Eckstein, 1971, p. 315).

Limitations as a tool for analysis and forecasting

However, national accounts statistics have also five major limitations for explaining national accounts statistics and for analysis and forecasting in general.

Firstly, the *variables used are too limited in view of economic theory*, e.g. they exclude the impact of human capital, unpaid household services, expectations, uncertainty, adverse selection, moral hazard, changes in replacement rate, potential growth, natural rate of unemployment (NAIRU) and do not have a clear micro-economic underpinning. As a tool for analysis and forecasting, national accounts statistics and its underlying model are therefore often used in combination with other models and data.

Secondly, *no behavioural relationships* are explicitly specified, e.g. what are the causal relationships, what is the functional form, what are the time-lags and what are the parameters.

Thirdly, *information about the reliability of national accounts statistics and the operational concepts is generally not available*.

Fourthly, in order to keep a model balanced and neat and tidy, *a lot of information from national accounts statistics should be ignored or combined*.⁴⁾

What to include and what to leave out for a specific type of analysis for a specific country is not always straightforward. For example, should a model explicitly show that part of government output is sold and that part of these sales are to households, e.g. school fees and garbage disposal fees? For showing the consequences of raising school fees on final consumption expenditure by households this is of course essential. For analysing the development of final consumption expenditure by households over time this can be important, but it may also be a secondary issue which can be abstracted from. Similarly, for an analysis combining information from the input-output tables and the sector accounts, how much effort should be spend on specifying the exact link between industries and institutional sector accounts, e.g. should the government sector and the financial intermediation sector be broadly equated to the sum of some industries?

A fifth limitation of the national accounts as a tool for analysis and forecasting is that the *standard national accounting concepts should preferably be rearranged or supplemented* in a specific way. This was a major step in the path breaking work on dynamic business cycles by Kydland and Prescott (see Prescott (2006, p. 216): 'Prior to our work, macro-economics was concerned with developing a theory of national account statistics. With our approach, preferences and technology are the given, not the national accounts statistics. This means that we had to modify the national accounts to be consistent with the theoretical abstraction or model we used. The most important modification when studying business cycles is to treat consumer durable expenditures as an investment in the same way that expenditures on new housing ad home improvement are treated as investments in the national accounts. Once this is done, services of consumer durables

⁴⁾ Modules (see Bos, 2003a, section 6.6) can illustrate this too.

and consumer durable rental income must be imputed, in much the same way as is currently done for owner-occupied housing. This increases investment share and has consequences for the cyclical behaviour of the economy. What led us to think about this issue is that consumer durable expenditures are highly variable, behaving very similarly to producer durable investments and not like consumer expenditures on nondurable goods and services'.

Two examples from the user practice at the Dutch Centre for Economic Policy Analysis may also illustrate the importance of this flexible use.

For analysing *labour costs* and their interaction with the labour market, the standard national accounting concept compensation of employees is not suited, as it ignores taxes and subsidies on wages. This can be resolved easily by formulating the concept labour cost in terms of standard national accounting concepts, i.e. as compensation of employees plus wage taxes minus wage subsidies. A requirement for this flexible use is of course that the national accounts statistics show separately wage taxes and subsidies (by industry or institutional sector). Such flexible use is not possible when they are an implicit part of taxes on production or subsidies on production.

The standard national accounts shows *government expenditure* by type of expenditure and by function only in current prices. It does not shed any light on the roles played by prices and volumes. It is therefore not well suited for understanding and explaining changes in the size and composition of government expenditure. The bookkeeping explanation of the government deficit presented above was in fact already making use of price- and volume-changes pertaining to government expenditure. By taking two supplementary steps, a simple overview of the development of prices and volumes of government expenditure vis-à-vis the price and volume change in domestic product can be obtained.

Firstly, all government expenditure is deflated by the price change in domestic product (or national income). In this way, a deflated set of government expenditure ('real government expenditure') can be compared for different types of expenditure /functions and with the volume change of domestic product.

Secondly, for some types of government expenditure specific price changes are available within the national accounts (e.g. compensation of employees, intermediate consumption, capital formation), outside the national accounts (e.g. some social benefits) or can simply be obtained from existing information (e.g. the price of interest can be approximated by the total amount of interest payments divided by the average government debt). These specific price changes vis-à-vis the price change in domestic product could be labelled as the '*exchange rate of government expenditure*'. By deflating the real changes in government expenditure with the change in this exchange rate, volume changes of government expenditure are obtained. These two supplementary steps decompose changes in government expenditure into the price change of domestic product, the relative price change vis-à-vis the price change of domestic product and changes in the volume and to compare them by type of expenditure or function. In this way, a simple framework is developed for bookkeeping explanations about government expenditure and as a frame of reference for more sophisticated analyses and stories.

Dangers of not using national accounts statistics and concepts

Ignoring national accounts statistics as a tool for analysis and forecasting can result in conceptual and statistical pitfalls.

For example, a productivity figure on manufacturing calculated on the basis of a national accounts statistic on output or value added and an other statistic on the volume of labour can be very misleading, as the units covered and the frame of reference for grossing up surveys can in practice differ substantially.

Similarly, final consumption expenditure by households according to the national accounts should not be explained by changes in the national Consumer Price Index

(CPI), as the scope, concepts and measurement methods are substantially different. For example, some consumer taxes like a tax for owning a car are not part of the price of final consumption in the national accounts, but are generally included in the CPI . Furthermore, the impact of government policy on government deficit figures according to the national accounts can only be analysed or forecasted when the concepts underlying government deficit are well understood. For example, financial transactions like the sale of equity in government enterprises or loans to students and specific companies are irrelevant for government deficit. Finally, the impact of social benefits on households final consumption expenditure and individual consumption depends on whether they are provided in kind or not: social benefits in kind are by definition all spend on goods and services, while social benefits in cash can also be used for saving by households.

4. Tool for communication and decision-making

A major role of national accounts statistics is also to serve as a tool for communication and decision-making. This role is discussed in this section.

National accounts statistics provide a coherent set of concepts and facts about national economies all over the world. They serve as the empirical frame of reference for thinking and communicating about national economies and its major components. This pertains to a wide range of private and public actors, e.g. households, enterprises, non-profit organisations, various layers of government, international organisations, economists, journalists, trade-unions etc. They all think and communicate in terms of national accounting concepts, like economic growth, final consumption expenditure by households, capital formation, government deficit, taxes and the current external position with the Rest of the World. Forecasts of national accounts statistics are also available all over the world. The monopolistic position of national accounts statistics and their world-wide use and acceptance reinforce this role as universal facts and language. In this way, national accounts statistics and their underlying concepts shape and modify the general perceptions about the national economy and how it works.

Decision-making is affected by national accounts statistics. This can be indirect by shaping our general perceptions about the performance of the national economy and how it works. However, it is often also quite direct. Decision-making is often even formulated in terms of national accounts statistics or official forecasts of them.

Explicit use of national accounts statistics in decision-making

Four types of explicit use are very common:

1. Frame of reference for decisions on investment, consumption and wages.
2. Target of public policy.
3. Tax or aid measure for nations and regions.
4. Automatic adjustment for price changes.

National accounts statistics are often explicitly included in the *decision-making on investment, consumption and wages*. Statistics on the absolute and relative growth of national economies are used as an indicator of financial strength and economic performance. As a consequence, they can influence e.g. foreign direct investments, the purchase and sale of equity and currencies and the granting and conditions of international loans. These changes can then influence many other variables, like exchange rates, interest rates, consumer prices and imports and exports. National accounts statistics indicating poor economic growth can also cause governments to lose elections. Wage negotiations by trade unions can be partly based on forecasts of the macro-economic productivity increase according to the national accounts. Negotiations on big investments projects (e.g. planes, dwellings and infrastructure) can be partly based on forecasts and statistics of economic growth, capital formation, wage increases and the general change in prices.

National accounts statistics as a *target of policy* includes e.g.:

- The supply of money should grow in line with the nominal growth of domestic product corrected for changes in the velocity of circulation (monetary policy target in order to avoid excessive inflation).
- The government deficit should not exceed 3% of national income (entrance-criterion for the European monetary union).
- Economic growth should be high and stable (under some restrictions).

- The government expenditure on education as a percentage of domestic product should increase to 5%.
- Expenditure on Research and Development as a percentage of domestic product should increase to 3%.
- Development aid should be at least 0.7% of national income (international norm of development aid).
- Government expenditure should not exceed 60% of domestic product (an old target in the Netherlands, i.e. the ‘Bert de Vries-norm’).
- All EU-countries should fairly contribute to European military expenditure, i.e. military expenditure as a percentage of domestic product should not deviate too much among EU-member states.
- The burden of taxes and social security contributions as a percentage of national income should be reduced with 5%point during the next four years.
- The European budget for stimulating Research and Development should grow in line with the average nominal growth of European national income.

For some of these targets, it is essential to have very timely national accounts statistics (/reliable forecasts), e.g. for monetary and budgetary policy. For most other targets, timeliness is less relevant.

National accounts statistics as a tax or aid measure includes e.g.:

- The contributions to the international organisations like UN, OECD and IMF and to supra-national economic and political unions, like the EU. These contributions are generally based on national income figures.
- Development aid should be 1% of national income (national policy on development aid).
- Development aid is only provided to the 20 countries with the lowest domestic product per capita (national policy on aid).
- Regions with a relatively low gross domestic product per region per capita receive funds from the European Structural Funds.

Price-indexes from the national accounts can also serve as an automatic adjustment for price changes. Examples from the Netherlands are:

- Real expenditure ceilings for the budget of the state government are adjusted with the price-change in domestic product.
- Multi-annual agreements on capital expenditure by the state, e.g. on defence and infrastructure, are adjusted with the price change in capital formation by the government; agreements on current expenditure on goods and services are adjusted with the price change in net material consumption by the government.
- Multi-annual contracts by local authorities and non-profit institutions are adjusted with the price change in net material consumption by the government and of wages and salaries by the government. These contracts could pertain to e.g. the rents of school-buildings and sport accommodation and the levies of polder-boards.
- The budget by local authorities and non-profit institutions can be determined by using for the various types of expenditure and for some sales and tariffs indices from the national accounts.

Merits and limitations as a tool for communication and decision-making

These uses of the national accounts demonstrate its clear *merits* as a tool for communication and private and public decision-making:

- National accounts statistics provide new opportunities for decision-making due to their unique focus (a coherent set of macro- and meso-economic aggregates), their universal model (which makes it relatively independent to national political pressure), their universal availability (including forecasts) and their compilation by often politically independent institutes (e.g. a national statistical institute).

- Due to national accounts statistics, decision-making need not be based on fragmentary, inconsistent, incomparable and often subjective information about macro- and meso-economic developments.
- Due to national accounts statistics, targets of policy can be linked explicitly to macro- and meso-economic developments and can be monitored and agreed upon internationally.
- Due to national accounts statistics, contributions by countries or aid to countries can be based on universal standards of economic performance and financial strength.
- Due to national accounts statistics, many agreements and contracts can be adjusted for price-changes in a much more meaningful way, e.g. in comparison to using a CPI.

National accounts statistics also have clear limitations as a tool for communication and decision-making, e.g.:

- No neutral description of economic reality is given (see Bos, 2003a, chapter 6).
- The underlying concepts seem incomprehensible as the relationship with specific uses is generally not explained.
- The reliability, comparability and availability of national accounts statistics may have clear limits.
- Specific events and institutional changes can have unintended consequences.
- Information about the operational concepts and about reliability is generally absent.

Disregarding limitations?

Considering the unique merits of official national accounts statistics, disregarding these limitations may seem beneficial for communication and decision-making. For example, why bother about the best concepts for a specific purpose: all concepts have some drawback and for most decisions the exact concepts do not matter. Similarly, why bother about reliability: national accounts statistics will always have substantial margins of unreliability and they are sufficiently reliable to indicate trends and the relative size of national economies. Furthermore, quarrelling about national accounts statistics simply amounts to reducing its unique role as a widely accepted tool for communication and decision-making without providing any viable alternative.

However, disregarding these limitations will frustrate efforts to overcome or better deal with these limitations, e.g. by developing standard concepts for major specific purposes, by improving comparability or by disclosing information about reliability. Furthermore, it will cause miscommunication, badly informed decision-making and decision-making based on sub-optimal concepts. Some examples may illustrate this.

A common argument in the Netherlands is that work pressure is relatively high because Dutch domestic product per hour worked is relatively high. The high work-pressure is then used to explain (defend) the high number of people receiving disablement insurance (WAO). However, this is a non-sense argument, as working hard is only one of the many possible explanations for a high value added per hour worked.

Domestic product or national income per capita are often regarded as indicators of welfare, e.g. by a Dutch Minister for Economic Affairs. He argued that increasing the labour participation of women is important for increasing Dutch welfare, e.g. vis-à-vis the USA, and for financing the Dutch welfare state. However, a lower domestic product per capita in the Netherlands than in the USA need not indicate lower welfare. For example, the number of hours worked per capita is much lower in the Netherlands, while the economic importance of unpaid household services is much higher. Domestic product per capita is much more suited as an indicator of the possibility to finance the welfare state, i.e. how much tax and social contributions can be raised. The Dutch Minister should therefore only have argued that increasing the labour participation of women is important for financing the welfare state.

National income is used as a measure to tax countries. The economic importance of unpaid household services like cooking, caring and cleaning is unevenly spread over

countries, e.g. it is relatively important in developing countries and it is in some developed countries (e.g. Netherlands) much more important than in other developed countries (e.g. France, Sweden, the USA). From a welfare point of view this implies that the fixed tax rates on national income are actually progressive taxes (developed countries pay relatively more) and that developed countries with a relatively low labour participation of women pay less than other developed countries. The latter is probably an unintended consequence of using national accounts statistics.

A similar argument can be applied to other biases. For example, the use of gross national income generally amounts to taxing capital intensive countries more than capital extensive countries (see Bos, 1992). Similarly, national income does not include corrections for damage due to war and natural disasters. Using national income as a tax measure may therefore seem unfair for countries heavily hit by war and natural disasters. The former *MPS69-measures of economic growth* used in the former communist countries stressed the importance of manufacturing and ignored the importance of various types of paid services. This can have stimulated the misallocation of resources and have played a crucial role in the bad economic performance of communist countries. Similarly, using the volume growth of domestic product as a strict target for policy can harm the welfare and the economic performance of a country. For example, aiming at maximising this measure of economic growth can amount to accepting enormous negative spill-over, e.g. pollution, congestion, exhaustion of natural resources, bad working conditions and very limited leisure time.

The *EMU-targets of government deficit and debt* may also have harmed welfare and the optimal allocation of resources. For example, government deficit can be reduced for many years by leasing instead of buying new fixed assets, like buildings, planes, cars and computers. An alternative strategy is to substitute income transfers and investment grants by loans at non-market interest rates. Similarly, government deficit can be reduced by decreasing interest payments only in nominal terms. This was the Italian strategy in meeting the EMU-target of government deficit: by a monetary policy reducing inflation to zero, nominal interest payments can be reduced to the level of the real interest payments (Modigliani, 2001, p. 230–233). This strategy is in particular relevant for a country with enormous government debt, corresponding interest payments and inflation substantially above zero. Furthermore, the target of gross debt can be met by selling and leasing back fixed assets, by selling the equity of government corporations, by selling natural resources (Dutch natural gas resources declined from 90% GDP in 1970 to 20% GDP in 2006!) and by reducing the loans to third parties, e.g. students and government corporations. These are all unintended incentives and consequences of the EMU-targets.

Like all price indices, national accounts price indexes can have problems in taking into account all kinds of quality improvements. This implies that price changes have a tendency to be overstated, as they partly reflect quality improvements. As a consequence, price changes used for decision-making and price compensation are too high. The mirror-image of this measurement error is likely to be too low volume changes. The European structural funds are allocated to regions that have a low gross domestic product per region per capita. The latter concept is an example of inconsistency between numerator and denominator. Gross domestic product per region refers to the value added created by production in the region. Gross domestic product per region per capita can be very low in a region where a substantial part of the inhabitants work outside the region. This occurs for example in the Dutch region Flevoland, where many inhabitants work in Amsterdam. As a consequence, this not very poor region was granted a substantial amount of money from the European Structural Funds for restructuring and stimulating its economy.

5. Input for alternative accounts, budgetary rules and estimates

National accounts statistics can also serve as an explicit *conceptual frame of reference for alternative accounts, budgetary rules and policy targets*. Examples are:

- The accounts of the state or local government can be influenced by national accounting concepts, e.g. by adopting the same concept of capital formation, by ignoring the opportunity costs of financing investments or by fully adopting the national accounts' classification and definitions of economic transactions. In the Netherlands, there are plans to adopt the national accounting concepts of economic transactions (e.g. compensation of employees, intermediate consumption, capital formation, sales and taxes) for the accounts of municipalities. This would increase national and international comparability of such data, would limit the possibilities of 'creative' accounting and would improve the link with the macro-economic perspective on government finance, i.e. with the national accounts and the norms applied for the European Monetary Union (see Bos, 1991 and Tongeren and Keuning, 2004). In some other countries, e.g. France, the accounts of the various government bodies are already based on national accounting concepts.
- The real expenditure ceiling of the Dutch State government includes most expenditure on a cash basis, but interest is defined on an accrual basis in accordance with the universal national accounting concepts. In this way, reducing interest payments on a cash basis by issuing deep-discounted bonds does not change the margin for state government expenditure.
- In the Netherlands, the official government measure of micro-tax burden is influenced by national accounting concepts, e.g. by adopting the same delimitation of taxes versus sales by the government.
- The national regulation for business accounts can be inspired by national accounting concepts. This is the case in France. As a consequence, targets like profit and rate of return can also be influenced by the national accounts.

By serving as a conceptual framework for other purposes, private and public decision-making will be more based on one consistent set of concepts, i.e. those of the national accounts. As a consequence, time and efforts are saved in defining and deciding about the non-national accounting concepts, links with the national accounts are improved and decisions based on both sets of information will be more consistent.

A drawback can be that sub-optimal concepts are used. For example, ignoring in the government accounts the opportunity costs of financing investments understates the costs of infrastructure and defence. Similarly, not recording expenditure on education in the government accounts as capital formation, may underscore the importance of education for the national economy in general and for economic growth in the long run particular. With tight government budgets and a drastic increasing demand for education, this can lead to too low investments in education.

Official national accounts statistics can also be *supplemented by non-official national accounts* statistics. Universal examples are the Penn-series on purchasing power parities and the historical time series by Maddison (2003). An example from the Netherlands are national accounts statistics on government expenditure. By the Netherlands Centre for Economic Policy Analysis, these statistics in current prices are allocated to functions and translated into price and volume-changes per year (see Bos, 2003b). These data sets serve data needs not (sufficiently) served by the official national accounts statistics.

National accounts statistics can also serve as an input for *really alternative estimates*, like welfare-oriented measures of national income, green national income, generational accounts and cost-benefit analysis. From this point of view, national accounts statistics are a very cheap, well-designed, universal semi-manufactured product. Of course, all these uses require a proper understanding of the logic, merits and limitations of national

accounts statistics. Some of these alternative estimates, like welfare-oriented measures of national income and green national income, are intended to overcome the conceptual limitations of the standard national accounts.

6. Improving the national accounts

The national accounts can be improved by a better link to specific data needs (modules) and by giving guidance to the use and proper use. Also some changes in basic concepts and presentation could be considered (see Bos, 2003, chapter 6).

Modules

More attention should be paid *to specific purposes* by drawing up modules and by adjusting the national accounts statistics in view of the national economic circumstances. This is explicitly recommended by the international guidelines.

By drawing up modules, links can be established with non-monetary data (e.g. on the environment, education, health care and the population), with micro-data (e.g. household panel-data, household budget survey data and labour force survey data) and with administrative data (e.g. business accounts, government accounts and VAT-registers).

For establishing these links and for serving specific data needs, the use of alternative concepts can be required, e.g. tax concepts, concepts used in national economic policy or concepts for applied economic analysis. In Bos (2003a, chapter 6), also many examples have been given how the link with specific purposes can be improved.

Modules should preferably not be developed in isolation by national accountants. Interaction with data users is essential in order to ensure that the focus of the module is right, that the presentation is sufficiently accessible and comprehensible and that the potential new data users become aware of the new product.

Guidance about the use and proper use

More attention should be paid to *giving guidance to data users about the proper use and misuse of national accounts statistics*.

This can be achieved by:

- General research on concepts and compilation methods.
- Investigating user practice.
- Modifying the guidelines.
- Supplementing national accounts statistics with other information.
- Changes in the presentation of national accounts statistics.

General research on concepts and compilation methods

A systematic investigation of *the links between economic theory and national accounting concepts* is important to further develop and understand the national accounting concepts and to clarify the link with economic theory to those familiar with economic theory or working in this field. Examples of this type of research are Vanoli (2005), Bos (1993, 1995, 1996a, 1997 and 2003a, chapter 6).

A lot of systematic research is required for investigating the *consequences of alternative concepts and alternative estimates for various types of use* (see also Richter, 1994). An example of specific user-oriented research is Bos (1992), which focuses on the choice between net and gross figures of income and value added. Another case in point is Whelan (2002) which addresses pitfalls in using chain indices.

Investigating user practice

The major uses of national accounts statistics in a country or a group of countries should be investigated critically. Such an investigation can identify major cases of misuse, sub-optimal use and proper use. Specific cases of misuse or sub-optimal use can be remedied by taking proper action, e.g. change the national accounts statistics or change the specific way the national accounts statistics are used.

However, the investigation generates also much more general knowledge, i.e. about:

- Major imperfections of national accounts statistics for specific purposes.
- Common misinterpretations and misuses of national accounts statistics.
- Smart and practical ways to use national accounts statistics for specific purposes.
- How to best overcome specific types of limitations of national accounts statistics.
- The usefulness of standard national accounting concepts for non-national accounting purposes, e.g. for increasing the comparability of the accounts of various government units.

This knowledge can then be described, discussed, tested and applied internationally.

The role of the guidelines

The SNA93 and ESA95 contain already some guidance in the introductory and other chapters, e.g. explicit warnings that GDP and national income are not welfare measures. The ESA95 chapter on the input-output framework (drafted by the present author) is an effort to provide simultaneously guidance to data compilers and data users. Attention is paid to the statistical and analytical purposes of input-output tables, to alternative calculations on the basis of these tables, to specific types of analysis served by these tables, to data problems in compiling these tables, to national accounts conventions crucial for a good understanding of these tables and to modifications to serve better some specific purposes. This approach should be elaborated and extended to the sector accounts and other parts of the national accounts.

When for some specific purposes or circumstances the core-concepts induce serious misuse, internationally agreed upon modifications can be introduced that pertain only to such purposes or circumstances. This can apply e.g. to correcting national income as a tax measure for the damage due to natural disasters or to correcting government net lending for holding losses (and gains) on loans. Such *standardized supplementary concepts* should be included in the international guidelines and could be included in standard modules (see also chapter 6).

Accompanying national accounts statistics with supplementary information

National accounts figures reflect the operational concepts, data sources, statistical techniques and compilation strategies used. Providing information on these (e.g. publish statistics and sensitivity analyses about national accounts statistics) is therefore indispensable for a proper use of national accounts figures (see Bos, 2003a, chapters 7 and 8).

International data bases of specific sets of national accounts statistics from various countries seem to be a major help for data users. However, if they do not provide information on the meaning, comparability and limitations of these statistics, they serve in fact as a major stimulus for misuse and misinterpretation ('statistical crimes'). A case in point is the International Sectoral Data Base by the OECD.

According to Kets and Lejour (2003), the time series about the period 1970–1990 confirmed 'the stylised fact that Total Factor Productivity growth is relatively high in

agriculture and relatively low in services'. These results were used to calibrate a general equilibrium model about sectoral developments in European countries and the world. However, for such use the OECD data base has clear limitations, e.g.:

- For agriculture, the role of land, i.e. one of the major capital inputs, is ignored, as the data base records only capital formation.
- For major parts of services, e.g. the government services, health care and financial services, the operational concepts used for the prices and volumes of output are likely to be incomparable and not very reliable.

Individual researchers do not have a real alternative: they may be aware of some of the fundamental measurement problems, but they lack the relevant supplementary information, do not have time and resources to start investigations themselves, want to draw conclusions about a large group of countries and simply imitate established user practice. Such researchers therefore do not complain about reliability and comparability of the data in this data base and about the lack of supplementary information in the data base. Sometimes they even express their gratitude for having such a nice, user-friendly and very encompassing data base. However, such absence of critical consumers is misleading and should not be an excuse for accepting the current major imperfections in comparability and reliability.

For a proper interpretation of national accounts statistics, also *the role played by specific events and institutional circumstances* should be taken into account. The national accounts should therefore be supplemented with such information, preferably including a quantitative assessment of their impact.

For some specific purposes and circumstances *more encompassing sets of official national accounts statistics are definitely required*. This applies e.g. to the convention to ignore the decrease in the value of subsoil-assets in measuring production and income. This limitation of the production and income concepts in the international guidelines is best overcome by also taking into account the balance sheet and net worth: depleting subsoil-assets will turn up as a reduction in the net worth of e.g. an oil producing country. The same applies e.g. to holding gains (an other changes in the value of assets accounts should be drawn up) or to environmental damage (a satellite on the link between the environment and the national accounts can best deal with this data need).

A major merit of the present national accounts conventions is that they require only a limited amount of modelling, e.g. in estimating capital consumption via the Perpetual Inventory Method or in estimating the value of the services of owner-occupied dwellings. However, *for a balanced comparison of national economies sticking to 'statistics' does not always suffice*.

For example, comparing social benefits from one country to another is seriously distorted as in some countries social benefits are net of taxes and social premiums while in others still taxes and social premiums are to be paid. Correcting for this difference between net and gross social benefits amounts to 'modelling', as only sophisticated calculations can do justice to the common fact that the taxes and social premiums depend also on many individual circumstances (e.g. being married, age or sex). Similarly, modelling is also required for calculating more welfare oriented or forward-looking concepts or for forecasting. So, for various data needs, national accounts statistics need to be supplemented with model-estimates.

As a consequence, *national accounts statistics and model-estimates should be developed and presented more as joint and complementary products*. Only by joining efforts, national accountants can avoid some types of serious misuse and meet important data demands.

Nevertheless, a clear division of tasks with model-builders is wise in order to stress the differences between national accounts statistics and model-building, to keep an independent position and in order to profit from efficiency gains of specialisation. Modelling results should also be presented differently in the national accounts, namely as part of supplementary tables or concepts.

Efficient and accessible presentation of national accounts statistics

Providing guidance to users also implies that the *presentation of national accounts statistics should be straightforward and simple* (e.g. distinguishing only two main sets of statistics: the sector accounts and the input-output framework) and not leaving too many, only slightly different, options open.

For example, there is a tradition of emphasising the subtle differences between net domestic product, gross domestic product, gross national income and net national income. However, for most users, these differences are irrelevant: they only want to use what they always used or what is the best according to official or international standards. Furthermore, in most cases, the numerical differences in terms of growth are marginal and within the bounds of statistical insignificance. By stressing these 'bookkeeping' differences, attention has been drawn away from the real content of national accounts statistics and national accounts has come to be regarded as an unattractive and inaccessible subject.

Providing guidance to users can also imply the *reduction of the publication of fake statistical information*. Examples of the latter are:

- Very detailed input-output tables sometimes based on outdated and fixed ratios.
- Statistics published in million euros but whose margins of reliability are better indicated in terms of hundreds of million euros.

Providing guidance to users may even imply an explicit link to standard software on economic modelling, e.g. for conducting simple input-output analyses or for drawing up generational accounts.

Other improvements

European unification has been improving the official national accounts as a product. Similar changes at a global level will also be an improvement of the national accounts.

The *international comparability* of national accounts statistics can be improved, e.g. by international audits and by developing international standards on the quality and coverage of the inputs for the national accounts. This requires a substantial initial investment. However, in the longer run it need not mean that compiling national accounts statistics will be much more expensive. Furthermore, a better international comparability will substantially improve the national accounts as a description and tool for economic analysis and policy.

The *product range* of the national accounts statistics published by the various countries should *be extended*, e.g. with quarterly accounts, supply and use tables, balance sheets, good linkage to employment statistics, some standard modules and historical time series on e.g. economic growth, productivity and government finance. As a consequence of such extensions a more balanced and timely picture of the national economy will be given. This will also greatly improve the national accounts as a description and tool for economic analysis and policy.

The *product range* of the national accounts statistics published by the various countries should also *be much more standardized*. At present, the substantial differences in product range do not only reflect differences in national preferences and resources, e.g. the role played by national accounts statistics in the national political-decision-making processes. The differences are also to a great extent the fruit of history, i.e. the direct consequence of the qualities and preferences of the individual data compilers and data users. Furthermore, a much more internationally standardized product range will drastically increase the merits of the national accounts as a tool for analysis and policy. For example, the scope for international comparisons and for communication by means of national accounts statistics will be drastically extended. Furthermore, the costs of communication and acquiring knowledge about the various product ranges will be substantially reduced, as there are significant economies of scale.

7. Marketing and education

Marketing

Like most public services, national accounts statistics are commonly not well marketed. For a monopolistic product this also does not seem necessary. However, the trend towards more market-oriented government reinforces a drastic improvement in the marketing of the national accounts. This marketing can take various forms: improve the presentation of the national accounts statistics, link the national accounts statistics better to specific data users and current popular issues, give courses for users of national accounts statistics and ensure all kinds of publicity.

The marketing efforts should stress the central purpose of the national accounts statistics (to provide an overview of the national economy and its major components), make the national accounts an attractive statistic by presenting concrete cases and point to the value added of national accounts statistics to efficient and democratic-decision-making.

This value added is often forgotten by the general public and politicians, while being taken for granted by the statisticians themselves. Here is clearly a task for marketing. For example, it should be stressed that the costs of producing national accounts statistics are relatively small compared to the costs of making wrong or untimely decisions (e.g. mis-estimates of tax revenues, overestimating the importance of an industry for the national economy, misjudging the seriousness of an economic crisis). For the EU-Member States, the costs of producing national accounts statistics are only a very small fraction of the contributions to be paid to the EU on the basis of GNI estimates and the political importance of the national accounts figures for the European Monetary Union is very great.

A good example of the marketing of statistics is the work by Eisner (1989, 1992 and 1994): he has entered public debates on various economic issues, like the government deficit, by stressing what we can learn from statistics.

Education

Decades ago, national accounts statistics were a major innovation for economic policy and analysis. National accounts was developed and stimulated by some of the best economists in the world (e.g. Kuznets, Hicks, Keynes, Tinbergen, Stone, Leontief, Frisch). Education in national accounting became a substantial part of economic curricula. The compilation of national accounts statistics was transferred from individual researchers to official institutes and government bodies. And national accounting concepts were entered into government accounts and official budgetary procedures, forecasts and analyses.

At present the availability of national accounts statistics is taken for granted. Historic memory about the logic, merits and limitations of national accounts statistics is gradually lost without being replaced by new up-to-date knowledge. National accounting is becoming a negligible and very dull part of economic curricula, economic researchers (e.g. those studying economic growth) often lack elementary knowledge of national accounting and national accounting has become a profession entirely separate from other parts of economic science. In contrast, the availability of national accounts statistics has increased substantially. However, hardly no new ways to make use of this relative abundance of data have been developed.

The current situation urgently demands a substantial investment in education. The general knowledge of data users and compilers should be raised and it should be made much more easy to acquire more knowledge and information (e.g. about the concepts and data sources used) when needed.

International and national courses should be developed for various groups of data users and at various levels. These courses should be very explicit about the four different roles played by the national accounts and about the logic, merits and limitations of national accounts statistics.

Furthermore, considering its importance for private and public decision-making, national accounting should get a more prominent place in economic curricula and in economic research. More attention should be paid to the differences and similarities between economic theoretic concepts, administrative concepts (e.g. business accounts and tax data) and national accounting concepts.

These investments in education will reduce misinterpretation, will increase interaction between data compilers and data users and can substantially lower the threshold for investing in knowledge about the national accounts, e.g. for economic researchers. In the long run, this will also improve the national accounts as a description and tool for analysis and policy.

8. Summary

National accounts statistics are important for economic policy and analysis. Four different roles are played by national accounts statistics:

1. Description and object of analysis.
2. Tool for analysis and forecasting.
3. Tool for communication and decision-making.
4. Input for alternative accounts, budgetary rules and estimates.

As a *description and object of analysis*, national accounts statistics are unique. They define and measure the national economy and its major components. They make the sizes and developments in national economies all over the world visible and put them into quantitative terms. As a consequence, the world economy, the national economies and their major components can be monitored and analysed.

Not all descriptions are suited as an object of analysis. National accounts statistics are partly built on assumptions. Assumptions are essential in combining and completing the basic set of data. Plausible assumptions are even to be preferred above unreliable data. The more encompassing, up-to-date, detailed and reliable the basic data set, the smaller the role played by assumptions can be. By changing the definitions of the universal model, the role of assumptions can be increased or decreased further. For example, by enlarging the production boundary with unpaid household services, the role of assumptions is increased. As a consequence, national accounts statistics based on such an enlarged production boundary are less suited as an object of analysis.

Using national accounts statistics as an object of analysis requires knowledge about their meaning, reliability and interpretation. Knowledge of the underlying concepts, the measurement process and the specific national circumstances is therefore essential.

As a *tool for analysis and forecasting*, national accounts statistics are built on three very useful stocks of knowledge: the universal model, the operational model and the national compilation skills. The universal model is a stock of knowledge about the best way to define and classify the national economy for economic analysis. The operational model is a stock of knowledge of the specific national institutional and economic structure. The national compilation skills are a stock of knowledge about how to translate a very specific and incomplete national set of data into a plausible description of the national economy.

Ignoring the national accounts as tool for analysis and forecasting can result in serious conceptual and statistical pitfalls. However, national accounts as a tool for analysis and forecasting has also clear limitations. For a proper use, national accounts statistics should often be rearranged or be supplemented with alternative concepts and data.

As a *tool for communication and decision-making*, national accounts statistics are unique. They serve as the universal facts and language for thinking and communicating about national economies and their major components. They provide new opportunities for decision-making by providing information about major macro-economic developments, by providing explicit targets for many types of policy and by providing price-indexes for inflating contracts and agreements in real terms.

A major merit of national accounts statistics as a tool for communication and decision-making is its monopoly-position. From this point of view, imperfections in terms of concepts, comparability and reliability are irrelevant. However, this will frustrate efforts to overcome or better deal with these limitations, e.g. by developing standard concepts for major specific purposes, by improving comparability or by disclosing information about reliability. Furthermore, it will cause miscommunication, decision-making with unintended consequences and decision-making based on sub-optimal concepts.

The national accounts can also serve as a source of inspiration for *alternative accounts, budgetary rules and policy targets*. In this way, the official national accounts actually extends its scope as a tool for communication and decision-making.

As an input for *alternative estimates*, official national accounts statistics serve as a very cheap, well-designed, universal semi-manufactured product. These alternative estimates may reflect fundamentally different perspectives on the national economy, e.g. welfare-measures or generational accounts. However, some of the major alternative estimates are best labelled as non-official national accounts statistics, e.g. by providing much longer time series or by providing a handsome set of domestic product figures in terms of purchasing power-parities.

For each of the four roles, (official) national accounts statistics have clear merits, but have also clear limitations. *Insufficient knowledge of their concepts*, reliability and specific national circumstances invites misuse and *can have unintended consequences*.

This can take various forms, like:

- A wrong interpretation of national accounts statistics as a description, e.g. misunderstanding of what is economic growth or final consumption expenditure by the government.
- Using parts of national accounts statistics as objects of analysis, while they are not suited for such a purpose, e.g. the services of owner occupied dwellings, productivity assumptions for government services, banking services and health care or specific cells in the supply and use tables estimated as a residual.
- Wrong methods to estimate a model, e.g. by assuming that all observations are equally reliable.
- Wrong conclusions of applied economic analysis due to unreliable national accounts statistics, e.g. about the role of technological progress for economic growth.
- Wrong policy targets or policy targets with substantial unintended side effects.
- Policy targets or decisions affected by specific national concepts, compilation methods or institutional and economic circumstances.
- Wrong decisions due to unreliable data or inappropriate concepts, e.g. devaluation of the national currency in view of a seemingly high deficit on the current external account.

In contrast, sufficient knowledge of the national accounting statistics and their backgrounds can lead to various forms of proper use e.g.:

- Modification of the concepts.
- Combine national accounts statistics with other concepts and data, e.g. by using them as inputs for alternative or more comprehensive estimates.
- A sensitivity analysis of reliability before actually using a specific national accounts statistic.
- Taking unreliability or specific features of national accounts data explicitly into account (biases, assumptions, blind spots).
- The development of international quality standards.
- Correct for conceptual biases by estimating their size/impact.
- Theoretical solutions to empirical problems, e.g. a model to remedy the absence of certain national accounts statistics.

In order to clarify the value-added of national accounting and to fight wide-spread illiteracy in national accounting, marketing and education should be taken up seriously, preferably by an international long term strategy and by making use of all the possibilities of internet.

Proper use of national accounting should also be stimulated by supplementing national accounts statistics with information about their meaning and reliability.

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