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Use of Macro Accounts in Policy Analysis

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NOTE

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List of abbreviations and acronyms

ACP	African, Caribbean and Pacific Group of States
ARIMA	auto-regressive integrated moving average
BOK	Bank of Korea
CAS	country assistance strategy (World Bank)
CCIS	Cross-Classification of Industry and Sector Accounts
CGE	computable general equilibrium
CIBCR	Center for International Business Cycle Research (Columbia University)
COFOG	Classification of the Functions of Government
COICOP	Classification of Individual Consumption according to Purpose
CPA	Classification of Products according to Activities (EU)
CPC	Central Product Classification
CPI	consumer price index
CPM	capability poverty measure
DMB	deposit money bank
DS	demographic survey
EAI	economic activity indicator
ECB	European Central Bank
ECF	environmentally adjusted net capital formation
EDP	environmentally adjusted net domestic product
ES	establishment survey
ESA	European System of Accounts
EU	European Union
EUROSTAT	Statistical Office of the European Union
FIBER	Foundation for International Business and Economic Research
FISIM	financial intermediation services indirectly measured
FoF	flow of funds
G-7 countries	group of seven major industrialized countries
GDP	gross domestic product
GFCF	gross fixed capital formation
GFS	government finance statistics
GIS	Geographic Information System
GNI	gross national income
GNP	gross national product
HDA	human development accounts index
HDI	human development index
HPI	human poverty index
HRA	human resources accounts
HS	household survey
IBRD	International Bank for Reconstruction and Development
ICOR	incremental capital output ratio
ICT	information and communication technology
IDA	International Development Association
IEA	Integrated Economic Account
IFS	international financial statistics
ILO	International Labour Organization
IMF	International Monetary Fund
INSEE	Institut national de la statistique et des etudes econorniques
I-O	input-output
ISCED	International Standard Classification of Education
ISCO	International Standard Classification of Occupations

ISIC	International Standard Industrial Classification of All Economic Activities
ITU	International Telecommunication Union
LES	linear expenditure system
LFS	labour force survey
LI	leading indicator
MERCOSUR	Common Market of the Southern Cone
MNSDS	minimum national social data set
MPS	Material Product System
MTPDP	medium-term Philippine development plan
MUV	manufacturing unit value of the G-5 countries (France, Germany, Japan, United Kingdom and United States)
NACE	General Industrial Classification of Economic Activities within the European Communities
NAFTA	North American Free Trade Agreement
NAIRU	non-accelerating inflation rate of unemployment
NAMEA	National Accounting Matrix including Environmental Accounts
NBER	National Bureau of Economic Research
NDI	net disposable income
NDP	net domestic product
NIPA	national income and product accounts
NPI	non-profit institution
NPISHs	non-profit institutions serving households
NSCB	National Statistical Coordination Board
OECD	Organisation for Economic Cooperation and Development
PARE	price-adjusted rates of exchange
PPI	producer price indexes
PPP	purchasing power parity
Project LINK	International Research Group of Econometric Model Builders, with headquarters at the Department of Economic and Social Affairs of the United Nations Secretariat
PSNA	Philippine System of National Accounts
R and D	research and development
RMSM	revised minimum standard model (World Bank)
RMSM-X	revised minimum standard model - extended (World Bank)
RNFPS	reduced non-financial public sector
SAM	social accounting matrix
SAS	sector assistance strategy
SDRs	special drawing rights
SEEA	System of Integrated Enviromnental and Economic Accounts
SESAME	system of economic and social accounting matrices and extensions
SNA	System of National Accounts
SUT	Supply and Use Table
UNDP	United Nations Development Programme
UNSD	United Nations Statistics Division
VARMA	vector auto-regressive moving average
VAT	value added tax
WDI	World Development Indicators

Acknowledgements

0.1. The present handbook is part of an effort by the United Nations Statistics Division (UNSD) to improve the guidance of countries in the development of policy uses of statistics and national accounts. It was for that purpose that an interdisciplinary expert group meeting was convened from 5 to 9 October 1998 on the use of macro accounts in policy analysis, and the present handbook was prepared. It is hoped that this will be the start of more intensive cooperation between national accountants and other disciplines, with the ultimate aim of a more target-oriented development of statistics in support of policy uses.

0.2. Experts from different disciplines were invited to the meeting. The meeting brought together experts from planning offices, central banks, statistical agencies, universities and international organizations, dealing with national accounts, modelling, monetary, fiscal and financial analysis, as well as experts on environmental and social issues.

0.3. At the expert group meeting, technical papers, on which the present handbook is based, were discussed. UNSD is grateful for the expertise, time and experience that the experts of national and international agencies and institutions brought to the meeting and for their subsequent cooperation in the incorporation of the materials in the present handbook. Without those contributions, the preparation of the handbook would not have been possible. UNSD, however, takes all responsibility for the actual presentation of the materials in the handbook and for any deficiencies that may come with it.

0.4. The names of the experts, their institutional association and the sections of the handbook, that they helped to prepare are as follows:

Jan van Tongeren	UNSD	introduction sect. II.A
Lawrence R. Klein	University of Pennsylvania	sect. II.B
Graham Pyatt	Institute of Social Studies Netherlands	sect. II.C
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Estrella Domingo	National Statistical Coordination Board, Philippines	sect. III.D
Eun Soo Lee, Jan van Tongeren	National Statistical Office, Republic of Korea and UNSD	sect. IV.A
Terry McKinley	United Nations Development Programme	sect. IV.B
Michael Ward	World Bank	sect. IV.C
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Jozsef Becsei	EcoStat, Hungary	sect. V.G
Victor Zarnowitz	Foundation for Business and Economic Research, New York	sect. VI.A
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I. INTRODUCTION

1.1. The present handbook is one in a series of handbooks based on the 1993 Standard National Accounts (SNA). Most of these handbooks have dealt with issues of compiling national accounts. The two most recently published handbooks dealt with the non-financial corporate sector and the household sector, while a further handbook dealing with the non-profit institution (NPI) sector, is in preparation. The present handbook is different from the previous ones, which dealt mainly with national accounts concepts and compilation practices. The present handbook emphasizes the use of the data once they have been compiled, and reviews concepts and compilation practices in the light of those uses.

1.2. The material in the handbook has been based on written and verbal contributions by participants of the expert group meeting organized by the United Nations Statistics Division (UNSD) in October 1998. As the participants included national accountants, policy analysts and econometricians, the present handbook should be considered as a joint product of interdisciplinary research, addressed to researchers of all three groups. The sections of the chapters are based on papers that were prepared by the participants for the expert group meeting. In most instances, the papers have been adapted and shortened, where necessary, to provide a coherent presentation of the topic in the handbook. However, to the extent possible, the original intent of the papers has been maintained. That sometimes meant that topics covered by the papers were dealt with later in more detail and, in some instances, repetitions could not be avoided if the topics repeated were important in the context of the original papers. As the presentations originated with different authors, the points of view expressed in each section, and in particular with regard to the 1993 SNA, may differ and, in some cases, may even be critical of some of the features of the System. Also, misconceptions about present SNA concepts by non-SNA specialists could not be entirely avoided, as the elimination of those would distort the ideas that were presented in the original papers. Some of the critical comments, as well as the unavoidable misunderstanding by non-SNA specialists using SNA data, are helpful as they may be taken into account when implementing the System and bring it closer to the needs of users. In order to integrate the original papers into a coherent text, cross-referencing has been used throughout the handbook.

1.3. The title of the handbook requires some explanation. The term “macro accounts” is used to refer not only to national economic accounts but also to satellite accounting and, in particular, integrated economic-environmental and socio-economic accounting, in which monetary as well as physical data are used. The 1993 SNA embodies all these elements of macro accounting, although it does not use the term itself. Traditionally, policy analysis makes use of statistics in order to monitor developments and take decisions in order to influence them. In this context, macro accounting is dealt with as one of those statistical areas, which policy users mainly associate with gross domestic product (GDP) and related production statistics. The present handbook, however, emphasizes the role of macro accounting as an instrument rather than as a data set. It refers in particular to the feature of macro accounts to reconcile separate statistics into a coherent set of data. In this sense, the handbook offers macro accounts as an instrument to policy analysts and not as a unique data set. In the course of the handbook it will be shown that the macro accounts instrument can be applied to many different data sets, each one of which can be associated with different types of policies.

1.4. The handbook does not enter into any traditional description of the national accounts compilation procedures, in which data sources are identified and adaptation of the data from those sources to the national accounts are described in "recipe" format in great detail. Instead, the handbook focuses, as far as the compilation is concerned, on a systems approach to national accounts compilation, which is easier to reconcile with econometric and related approaches to measurements used in analysis than the traditional national accounts compilation approaches. Details of this approach are described in A Systems Approach to National Accounts Compilation,[1] which is another United Nations publication in the Handbook of National Accounting series.

1.5. In particular, the present handbook deals with the interaction between three phenomena, namely, the scope of macro accounting, the compilation of macro accounts and analysis. Analysis refers to two types: one type is known as indicator analysis and is used to study developments in the past and present; the second one is modelling, which uses data of the past and present to make projections for the future. Analysis and accounts may take various formats, depending on their policy use. In various parts of the handbook, it will be shown that different types of analysis require different accounting formats, which can all be based on the principles laid down in the 1993 SNA.[2] Throughout the handbook, the interactions between the three themes mentioned are studied, but all elements may not always be present in all chapters and sections of the handbook.

1.6. The interaction between macro accounting and analysis is a relatively new topic of interest that until now has been little explored in the literature and in country practices. Therefore, the handbook does not make final recommendations, but only identifies the issues that need to be studied further. The selection of the material for the various sections and chapters, including reference to the discussion in the expert group meeting, may help researchers to direct their future studies, and this may ultimately result in a firmer basis for future recommendations.

1.7. The handbook comprises six chapters. Chapter II sets out the themes that may in the future dominate the interaction between policy analysis and macro accounting. These themes are presented from two perspectives. The first perspective is that of Lawrence R. Klein (sect. B), who approaches the topic from a modeller's point of view, both in a United States context and also taking into account his extensive experience with international modelling efforts through the so-called project LINK. Graham Pyatt presents the second perspective (sect. C). Through his past work on the 1968 SNA and Social Accounting Matrices (SAMs), he is in a position to present a critical review of the 1993 SNA in the light of what was intended in 1968 and provide guidelines for SNA implementation based thereon. Many of the themes for future research dealt with in the two sections are elaborated in more detail in later chapters and sections. These two main sections are preceded by a brief presentation of the main features of the overall SNA accounting framework (sect. A).

1.8. The next three chapters deal with the interaction between the scope of the accounts and the scope of analysis. Chapter III reviews various types of analyses that are based on data of the economic core of the 1993 SNA. The emphasis in chapter III is on the identification of economic indicators defined within accounting frameworks of different detail and scope and their use in so-called indicator analysis. Chapter IV extends the indicator analysis beyond the economic core of the SNA to satellite accounting, dealing not only with economic but also with social and environmental indicators. It refers to the growing use of indicators in analysis, particularly at the regional and international levels, and shows how the use of the accounting approach could help to rationalize indicator development and eliminate internal data in consistencies between the indicators. Chapter V shows how international and regional organizations and countries use accounts for monitoring and assessments in national and international reports, as well as for administrative purposes.

1.9. The last two chapters review not only the comparative scope of accounting and analysis, but also the impact of compilation methods on analysis. Chapter VI deals with the impact of indicator ratios used in compilation on the analysis of the ultimate data estimated. As this impact is greatest in the short term, the chapter reviews in particular two fields in which short-term indicators are used to make projections for the future through simple modelling, that is, short-term accounting and the use of "cyclical indicators" to predict upturns and downturns in business cycles. The last section of chapter VI presents a formal approach to the simultaneous use of indicators in compilation and analysis, with particular emphasis on its use in short-term accounting. Chapter VII extends the simple modelling based on indicators to more complex modelling. The main emphasis in the chapter is on the relations between the scope of models and accounts. The last section of the chapter contains a discussion of the differences between estimation methods used in national accounts compilation and related methods used when models are applied to make projections of the accounts for recent periods.

1.10. Indicators are a central theme of the present handbooks, as they are frequently referred to in analysis. However, as terminology is not uniformly applied by national accountants and analysts, there is a need to develop some terminological conventions for the purpose of the present handbook. In general, indicators refer to all information items used by analysts. Within the context of macro accounts, these may include national aggregates such as GDP, national saving, gross capital formation, consumer price index, or more detailed items, such as orders of manufacturing establishments, changes in business inventories, money supply aggregates, and so forth. They may also include ratios or coefficients, such as value added as a percentage of output, capital output ratios, per capita aggregates, as well as growth rates of aggregates and detailed data over time. In general, no distinction is made in the handbook between different types of indicators, except in sections III.A and VI.D, where the term indicator is used to refer to indicator ratios, such as growth rates, coefficients, and the like.

Notes

[1] United Nations publication, Sales No. E.99.XII.10.
[2] Commission of the European Communities, International Monetary Fund, Organisation for Economic Cooperation and Development, United Nations and World Bank, System of National Accouonts, 1993 (United Nations publication, Sales No. E.94.XVII.4).

II. THE ROLE OF MACROECONOMIC AND SOCIAL ACCOUNTING IN POLICY ANALYSIS

2.1. The present chapter contains two wide-ranging and long-term views on how macro accounting and policy analysis should be developed in conjunction with each other.

2.2. The first one, presented by Lawrence R. Klein in section II.B, was written from the point of view of an analyst using macro accounts data in modelling and other forms of analysis. The chapter presents in some detail six topics related to various aspects of future interdisciplinary research between macro accounting and analysis. Some of these are further discussed in subsequent chapters of the handbook. They include the use in modelling of comprehensive data sets, which are reconciled between national income and product accounts (NIPA) (US SNA), input-output accounts (I-O) and flow of funds (FOF) (sect. B.1(a)) and their extension through satellite accounting to demographic, income distribution and environmental data (sect. B.1(b)). It is argued that accounts play a useful role as a medium for integration of these diverse data sets (sect. C.1). Once this information is available for a considerable number of countries, data links may be established through international models (sect. B.2(b)). Furthermore, attention should be paid to the integration of frequent and voluminous data sets for short-term and long-term analysis over time, which will become increasingly available through the use of high-speed computers and communications software (sect. B.2(c)).

2.3. Section II.C, written by Graham Pyatt, is a critical review of the 1993 SNA in the light of what was intended when the 1968 SNA was developed and taking into account more recent developments. It argues for the development of country-specific versions of the SNA to be presented in matrix format (known as social accounting matrices (SAMs)), so that the data can be immediately used in analysis. Section C.1 presents a stylized view of the context within which a system of national accounts is a useful contribution. Some key aspects of the 1968 SNA from this perspective are then identified. In section C.2, some of the changes since 1968 are noted, which together define both the opportunities and the need for a fresh look at the official SNA. These are grouped under four headings: section C2(a) brings together and discusses both the new priority issues facing economic decision makers -- characterized here as people issues and price issues -- and some new developments in economic theory, which can be helpful in addressing these new emphases; section C2(b) refers to new developments in primary data collection, particularly household surveys, which can support the SNA; section C2(c) notes the rapid change over 20 years in computer technology; and section C2(d) discusses two important contributions to the new generation of methodologies. These refer to micro-simulation methods and general equilibrium modelling. The concluding section (C.3) sketches the future orientation of SNA implementation. In particular, it makes some suggestions for SNA implementation in the direction of simplification, so as to give greater emphasis to essential concepts, and for flexibility, with encouragement for each country to develop its own format within a general conceptual framework as a response to domestic issues and priorities. It suggests that general equilibrium models replace input-output as the central conceptualization of the system, leading to an equal emphasis on prices and quantities. Furthermore, it recommends an equal concern within the SNA for income distribution, factor markets and production structure, set in the context of external flows and balances.

2.4. The two main sections are preceded by a brief exposition of the overall SNA accounting framework and its separate segments (sect. II.A). The presentation of the SNA in this section of the handbook does not repeat what has been presented in considerable detail in the publication of the 1993 SNA. However, it does summarize the main features of the System before entering into the different forms of analysis that can be based on it. The format for presenting the SNA, as is done in diagram II.1, is different from what has been used in the SNA itself. Instead of presenting the accounts and tables as they appear in the publication of the SNA, a schematic format is used, which facilitates summarizing the System and – as is done in later chapters — presenting alternative formats of accounts that are used in other forms of analysis.

A. SNA accounting framework and concepts

2.5. The comprehensive SNA accounting framework is presented in diagram II.1. The elements or segments of the SNA are represented in the diagram by data blocks. The boxes in the diagram represent data sets that define distinct segments of the 1993 SNA. Horizontally, they are grouped together by the three main segments of the 1993 SNA, that is, the Supply and Use Table (SUT), with data detail by industries and products, the Integrated Economic Accounts (IEA) for institutional sectors, and the Cross-Classification by Industry and Sector Accounts (CCIS) of production-related data. In vertical columns the data blocks are grouped together by the main sectors of the SNA. The seven columns refer to the total (resident) economy and the rest of the world, with a breakdown of the total economy by four main resident institutional sectors, that is, non-financial corporations, financial corporations, Government, households and non-profit institutions (NPI) (serving households). Each sector could be broken down into subsectors in order to carry out more detailed analyses. As the 1993 SNA also covers satellite accounts, an additional last column has been included in the diagram, representing the non-economic sector of natural resources.

2.6. The SUT includes several data blocks related to analysis of production. Two refer to supply of products (e.g., goods and services), that is, output and imports; five refer to uses, that is, intermediate consumption, capital formation, final consumption of government and households and exports; one refers to value added, and two additional ones cover employment and the stock of produced capital. The data detail of each block is determined by activity (ISIC) and product (CPC) classifications that apply.

2.7. The IEA includes, for each sector, data on a series of so-called transactions, which describe the behaviour, of the corresponding sector, including data on production, income and use of income (in final consumption), and capital and financial flows as well as including balance sheets of each sector. The data blocks of the IEA represent SNA accounts, which are groupings of data for each sector that are used to define analytically useful concepts. For instance, the data block of the production and generation of income accounts groups together data on output and intermediate consumption to derive value added. The data of the income and use of income accounts are used to derive concepts such as disposable income and saving. The data of the capital and financial accounts and balance sheets are needed to derive concepts such as net lending, net worth and net wealth.

2.8. The CCIS refers to data on production, which are common to the SUT and IEA and therefore may be cross-classified by industry and sector. The cross-classification may be applied to data on value added, employment, output, intermediate consumption, capital formation, and so forth, that is, all data needed to analyse production. The industry classification of the CCIS represents the traditional grouping of production units or establishments that is used to analyse production from an input-output point of view. The sector classification represents the institutional dimension of production. By cross-classifying the establishments from the two points of view, the CCIS shows, for instance, that agriculture is largely organized by small production units of the household sector, that manufacturing is organized both in large corporate units and in small household production units, and that some of the services activities are predominantly household production activities, while other services are mainly carried out by large corporate units. By including in the CCIS more detail in the sector classification, it is also possible to distinguish between public, foreign-controlled and other private units. When comparing the data segments of the CCIS over time, it is possible to see how production in certain activities is shifting from small household to large corporate units, or from public to private units.

2.9. Three separate price vectors, which are normally not presented in national accounts, are made explicit in the presentation of the diagram. They include (a) price vectors for GDP, CPI and other deflators, as well as wage rates; (b) an exchange rate vector, which includes the conversion rates used in compiling external sector or rest of the world data, which are normally quoted in foreign currency units (US$), and (c) an interest vector, which links data on financial assets and liabilities to property income recorded in the income accounts.

2.10. A separate data block presented as the first one in the household sector column refers to the social dimensions of the population and may include such data as illiteracy rate, access to public services, level of education, and so on. Physical instead of monetary units are used to present the data in this data block. The social data block has been used in so-called human resources accounts (HRAs), which are satellite accounts for integrated socio-economic analysis.

Diagram II.1. Accounting framework of the 1993 SNA, including satellite accounts

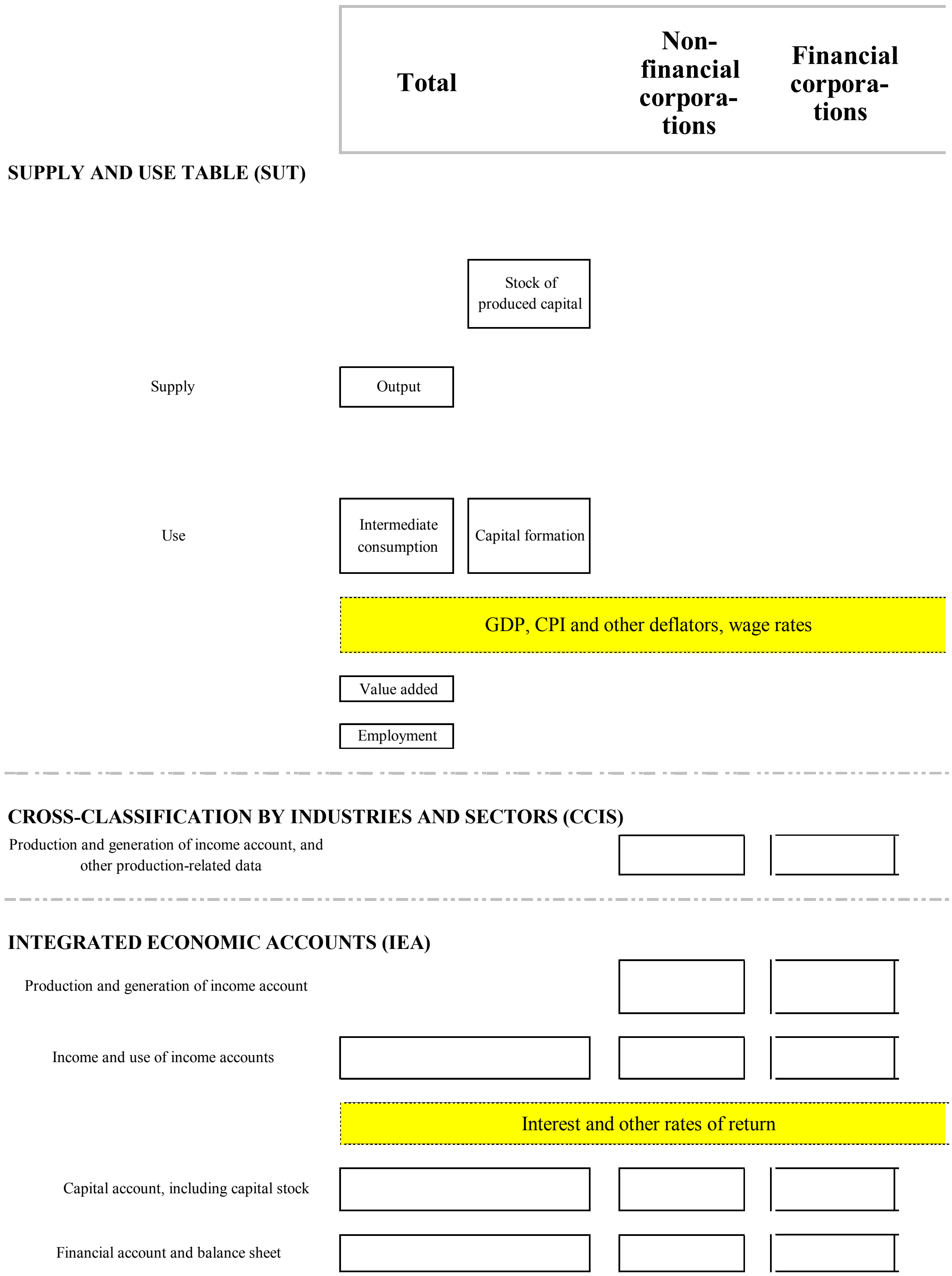
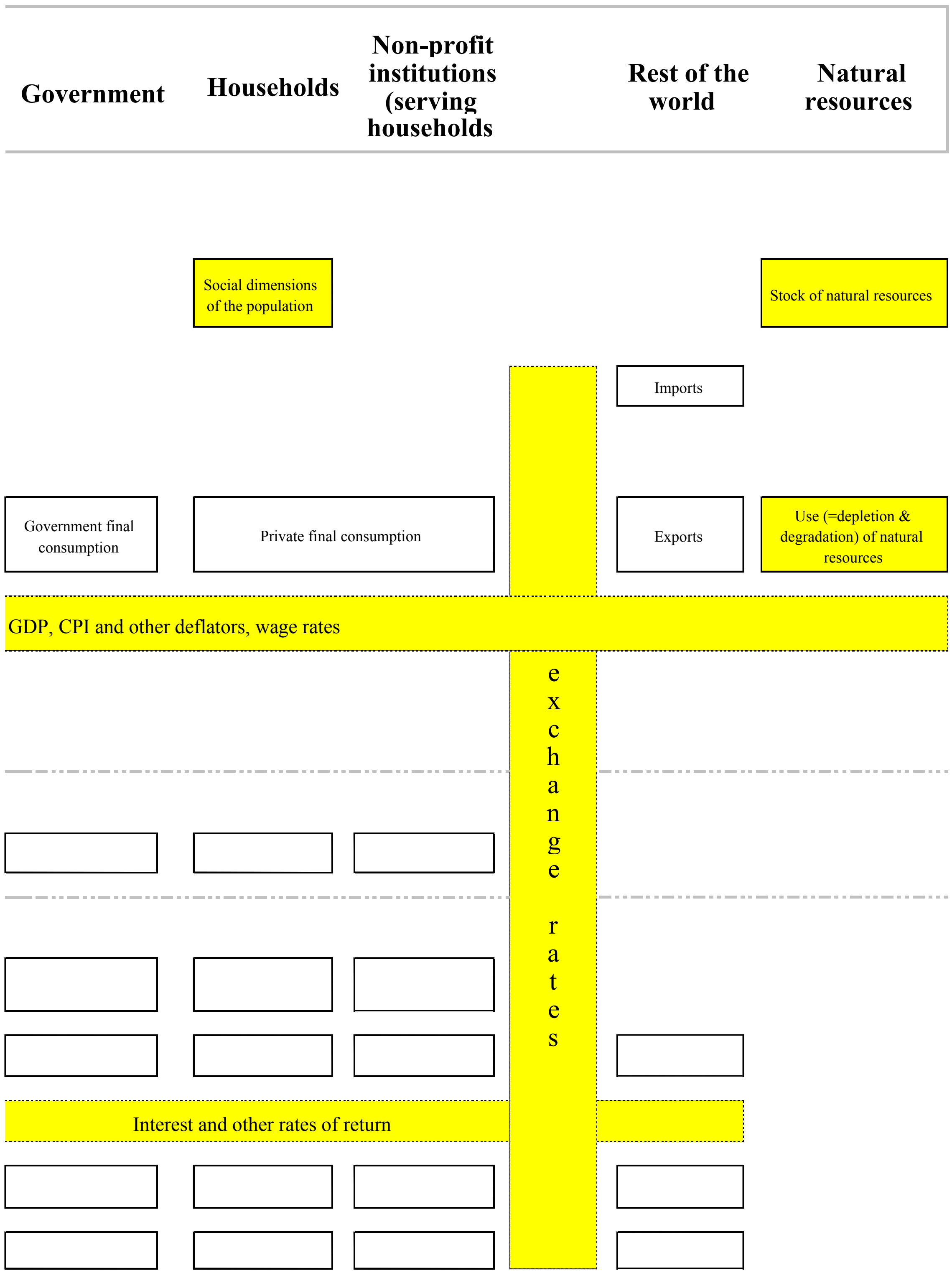


Diagram II.1. (continued)



2.11. A further satellite extension, dealing with natural resources, has been presented in the last column of the diagram. It includes two data blocks. The first one refers to the stock of natural resources and may include information in physical terms on the stock in volume terms of mineral resources, forests, groundwater, fish and animals, as well as data on the quality of air and water and also on land and forests. The second block records the changes in the first block between two successive periods, as a consequence of depletion (changes in quantity) and degradation (changes in quality).

B. The foundation of macroeconomics

2.12. Macroeconomic theory or analysis is closely associated with macroeconomic accounting. Macroeconomic theory is best taught, from the very beginning, in terms of the accounts. Historically, macroeconomic theory as a separate academic subject had its fundamental origins in connection with the rise to prominence of Keynesian macroeconomics of the General Theory of Employment, Interest, and Money and the ensuing scholarly discussion that tried to convey a clear meaning of the Keynesian theory.[1] That is not to say that there were no precursors. It is possible to find macroeconomic theories and mathematical models of the aggregate economy before the publication of the General Theory, but the earlier models were not engaged in system building to the extent that Keynes and his colleagues were.

2.13. Modern macroeconomics, in some versions, assumes that the theories can be adequately expressed in terms of representative agents or that macroeconomics can be derived in a straightforward way from microeconomics by simple summation of the underlying relationships and associated variables. That is definitely not the case because it neglects important matters of distribution (income, wealth, individual price indexes, interest rate spectra and so on). Some parts -- very important parts -- of economic behaviour and relationships are inherently macroeconomic in character and cannot be derived by summation from microeconomics.[2]

2.14. It is interesting to note that Keynes, in very early applications of his macroeconomic system of thought, namely, the guidance of British financial policy during the Second World War, promoted the efforts of James Meade and Richard Stone on building a system of national accounts that would reveal the quantitative magnitude of the inflationary gap and other relevant indicators for war finance.

2.15. At an earlier stage, Simon Kuznets and other American pioneers were putting together estimates of United States national income, and these were key inputs for the first macro-econometric models. These developments in the United States, the United Kingdom and several places on the European continent are in sharp contrast with modern macroeconomics, which gives relatively light treatment to underlying statistical data of the economy and pays little attention to the "fit" between reality and macro model performance. Prevailing empirical macroeconometrics at the present time is strongly empirical, without much of a base in economic theory, especially macroeconomic theory.

Much of it is single-equation analysis or analysis of very small systems, without regard to detailed interrelationships within the economy as a whole.

1. Integration of comprehensive data sets for use in modelling

(a) Integration of economic data

2.16. Economic modelling needs guidance from the structure of economic accounts. If we look upon a national economy as one large producing and consuming unit, essentially a giant firm, then it makes sense to construct for the country an analogue of the accounting statements that are crucial for the efficient operation of any large firm. These statements of national income and product (NIPA) and flow of funds (FoF) correspond to the firm's income or profit-and-loss statement (national profit appears on the income side of NIPA) and its balance sheet. The flow of funds (FoF) is essentially a statement of the first differences, in time, of successive balance sheets.

2.17. If we add the input-output (I-O) accounts to the analytical group, we have, in effect, a statement of the country's productive operations. The I-O statement shows the flows of goods and services among an exhaustive set of the pairs of sectors that have economic interaction. At a later stage, social and environmental accounts to supplement NIPA, FoF and I-O will be discussed.

2.18. While the accounting statements for the individual firm serve as a framework or inspiration for NIPA, FoF and I-O, it must be stressed that some macro accounting principles are different from those that are applicable for the firm. In the first place, the national accounts must eliminate double or multiple counting as goods pass from firm to firm in roundabout production processes. At the firm level, the accountant must also avoid double counting, but what is double for the firm is not the same thing as what is double for the country. Also, capital gains and pure transfers should be consolidated out or be absent for the country as a whole but not necessarily for the individual firm. Some financial firms or households specialize in profiting from capital gains transactions.

2.19. At the environmental level, what is good for society may be bad for the individual or vice versa. There are also differences of opinion about the valuation of military operations or facilities. Some of these differences are concerned with market valuations of military production by either the private or public sector. What is personally profitable may not be socially profitable in this area of the economy.

2.20. An interesting and fruitful strategy for macro model builders is to lay out the three groups of accounts (NIPA, FoF and I-O) for a country and attempt to design a model that will explain the dynamic movement of all the accounting statement entries in the system. In the process of model construction, the macroeconometrician will have to set out the implied or explicit accounting identities plus all the behavioural, technological and market-clearing equations that will be able to generate values for each of the variables.

2.21. In this process, it will soon become apparent that the accounting identities, or balances, are not enough to explain all the variables of the system. These relationships are crucial, and must be included, but they are not large enough in number to explain all the variables of the system.

2.22. A summary pedagogical exposition of models that can be built around the entries of the three macro accounting systems (NIPA, FoF and I-O) is provided by L. R. Klein in Lectures in Econometrics and some of these examples are well known in the field of macroeconometric model building on the basis of NIPA and I-O systems, but the role of FoF at the empirical level may be less well known.

2.23. The macroeconometrics of the Keynesian system fits neatly with NIPA values. This is seen most clearly for demand-oriented models based primarily on equations for the components of national expenditure expressed as consumption, investment and export and import equations that sum to total GDP.

2.24. Crude interpretations of prevailing macroeconomics of the post-war period through the early 1960s focused on that feature, but all the while, model builders were constructing equations of production, wage formation, price formation, labour supply and interest rate determination. This necessitated use (and explanation) of the income components of NIPA, which should, in principle, also sum to GDP. The fact that the two sums -- from the expenditure and the income sides of the accounts -- do not come to the same total, in practice, is an important issue to be taken up later.

2.25. There are, however, two economic features of the NIPA system that need elaboration, namely, the treatment of market-clearing variables such as prices, wage rates and interest rates, and the treatment of intermediate flows.

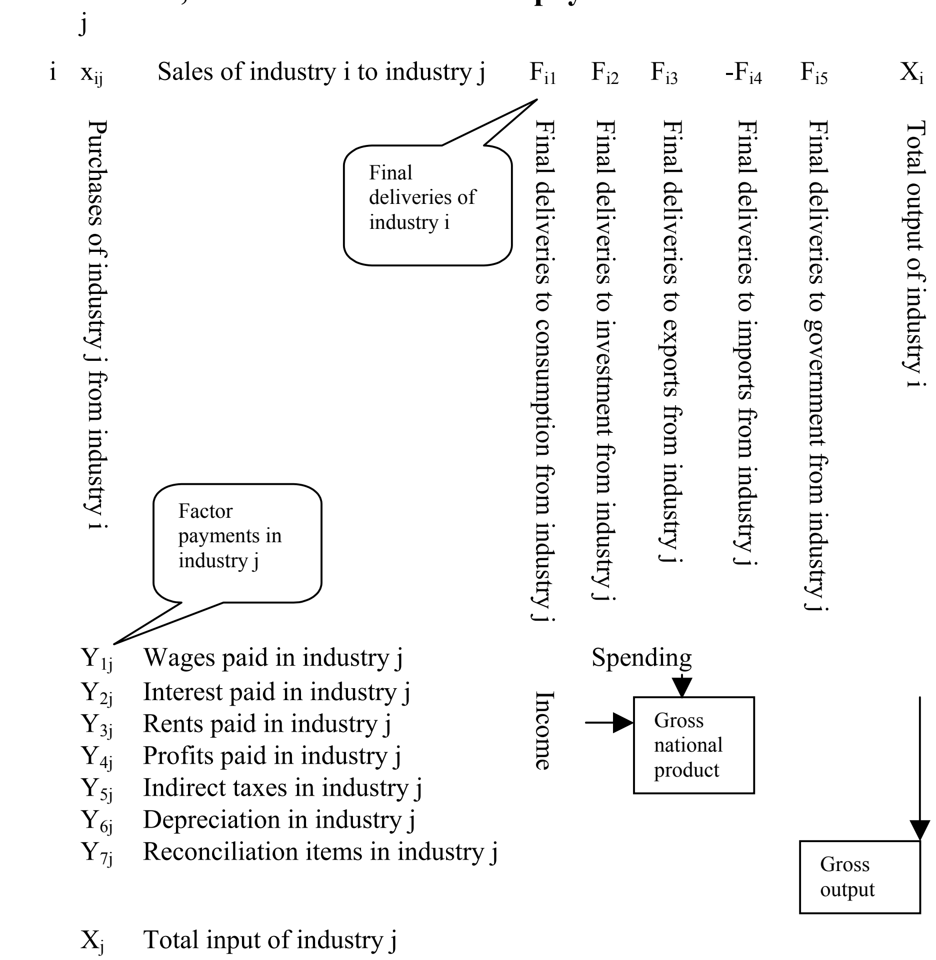
2.26. The strict accounting structure of NIPA holds in value terms, most easily stated in current prices. If market-clearing variables such as prices, wage rates and interest rates are to be determined within the model, attention should be paid to real variables, for supply and demand for outputs and factor inputs (labour and capital) must be brought into balance with one another in order to determine the variables that are associated with market clearing.

2.27. On the expenditure side of NIPA, it is possible to devise real accounts, although such constructs are not unique. There are no unique systems of price indexes, but there are useful systems that may be able to reveal interesting properties about price movements.

2.28. It is clear, therefore, that NIPA systems, by themselves, are not sufficient for determining everything that the model builder needs by way of data for constructing a system that has a complete mathematical solution; there must be data on the functioning of market clearing in addition to those that are directly associated with NIPA entries; real supply-demand discrepancies are needed to round out the model solution process.

2.29. In economics, production functions are expressed in terms of outputs and inputs, where the latter use the original factors of production, say labour and capital inputs. They are the real, that is, physical, counterparts of NIPA items for wage payments (to the labour-input factor) and capital costs (to the capital-input factor).

Diagram II.2 Relationship between inter-industry transactions, final demand and factor payments



Source: R.S. Preston, The Wharton Annual Industry Forecasting Model (Philadelphia, University of Pennsylvania, 1972), p. 2.

2.30. In some models, a short cut is taken and output for the production function is measured as value added. In a sense, GDP is value added for the whole economy. Of course, there is private value added, public value added and sector value added for any subsector of the economy. At this point, the economist (or econometrician) makes the short cut by constructing real value added. There is no such tangible output stream as value added, real or nominal, but it is often a useful short cut. Real value added is not visibly separable into a price times physical quantity, but the econometrician or economic statistician deflates nominal value added by some price index (not unique) and calls deflated value added real value added.

2.31. This is a synthetic approach and has some advantages, but the concepts of gross output, labour input, capital input, land input (for some sectors) and intermediate input are preferable. This is a macro classification. In fact, there are many kinds of gross output, and many kinds of labour input, capital input, land input and intermediate input.

2.32. The value added production function is a third best concept and the KLEM production function is a second best concept. By that is meant

$X = f(K,L,E,M)$
X = gross output
K = capital stock (or the flow of capital services)
L = employment (or the flow of labour services)
E = energy input
M = material input.

Both E and M are intermediate, not final, inputs.

2.33. In order to gain a full appreciation of what happened to the macroeconomy during the oil crises of the 1970s, the KLEM production function should be embedded in a full macroeconometric model of an economy. Many people lacked a full appreciation of the impact by observing that oil, or total energy, is small relative to GDP and summarily dismissed the major changes in relative prices as being of highly limited importance.

2.34. But, useful as the KLEM production function is in analysing the supply side of an economy, it does not provide as much information as a full-fledged input-output system, especially such a system that is fully integrated with a macroeconometric model in a feed-back relationship, that is, an I-O system that cannot be solved without the macro model and vice versa.

2.35. The columns of a standard input-output table go beyond the aggregative E and M inputs of the KLEM function. The entries in the j column, for example, show the flows of intermediate inputs from each of n sectors into the j production function, as in diagram II.2 above.

2.36. These, together with the factor inputs, in a column from bordering rows, show the full range of inputs that are associated with gross output. Symbolically,

$X_j = f_j(X_{1j},\ldots,X_{nj}, L_j, K_j)$
X_j = gross output (=total output) of industry j
X_{ij} = intermediate flow from industry i into j
L_j = labour input of industry j

K_j = capital input of industry j.

2.37. The input-output accounts can be said to constitute a model by itself. The well-known fundamental equation is

$$X = (I-A)^{-1} F$$

where X is a column vector of gross outputs, I is an identity matrix, A is a matrix of coefficients

$$A = (a_{ij}) = \frac{X_{ij}}{X_j},$$

and F is a column vector of final demand. F can be defined so that its column sum is GDP, measured from the expenditure side. The production function above can be associated with GDP from the income side provided that labour and capital income are exhaustive. In practice, some other factor incomes (rent and government receipts of indirect taxes), together with some reconciliation items, can be measured so as to provide a row sum that also equals GDP. In this sense, the input-output accounts, together with NIPA, form a detailed system for both the economics of supply and the economics of demand. Of course, in order to have a complete system, market-clearing equations for all sector outputs and factor inputs must also be included.

2.38. It is of interest to point out that the I-O accounts can be instrumental in arriving at another way of measuring GDP, by starting with gross output of each sector and subtracting intermediate input (column sums of the I-O table to get each sector's net contribution to GDP in the form of sector value added). Since this results in an estimate of value added for each sector, this way of looking at GDP accounting is the same thing as estimating factor income payments by sector. One can subtract intermediate flows from gross output or add the factor payments. If these two pieces of arithmetic are done from independent sources, there can be a statistical discrepancy, so it could stand as a third method of computing GDP.

2.39. We have thus seen how NIPA and I-O accounts are related to econometric model building. What is the role of the flow-of-funds account?

2.40. In the macro models of Keynesian economics, the liquidity preference theory of portfolio choice, between the holding of cash or bonds, makes money demand a function of some aggregate income variable (national income, personal income or GDP) and a representative interest rate (called the interest rate). The theoretical reasoning for this interpretation comes from the fundamental paper of Tobin (1958).[3] It can also be considered as a generalization of the classical quantity equation, by making velocity a function of the interest rate instead of treating velocity as a parameter. This idea goes back to Kalecki [4] and also to an early treatment by Keynes.

2.41. By adding one aggregative equation to determine the rate of interest, with money supply exogenous, it is possible to go outside the confines of the NIPA in order to determine the interest rate, but in any practical or policy sense, this is not a very satisfactory treatment. There have been frequent instances, such as in 1991/92, when central banks lowered short-term rates, which they could control as exogenous variables, but failed to stimulate their economies because they were not able to exercise effective policy influence on longer-term rates, which are crucial for capital formation.

2.42. That is why the interest rate is emphasized. There is an entire spectrum of rates covering mortgages, bills, notes, medium-term bonds, long-term bonds, sovereign bonds, private corporate bonds, and so on. Many econometricians have tried to finesse this issue by introducing a yield curve, showing the relation among debt securities of different maturities, with identical risk. National government securities are generally displayed in such a yield curve.

2.43. In place of a yield curve, the entries in a complete flow-of-funds table show the values of financial instruments issued from sources of funds and flowing to the users of funds. The balancing items in each of the tables of NIPA can be looked upon as sources and uses of funds, but the FoF accounts show from whom to whom, by instrument. The main institutions are non-financial firms, private financial firms, public financial firms, including the central bank and treasury, households, private non-profit bodies, foreign firms (financial and non-financial), foreign central banks and foreign treasuries.

2.44. Through the process of market clearing, financial instrument by instrument, the whole spectrum of interest rates can be determined. This allows the econometrician to estimate a much richer distribution of interest rates, rather than use synthetic equations to depict the yield curve without examining the individual supplies and demands (sources and uses).

2.45. Just as velocity, at the macro level, can be related to some interest rates, ratios of flows of funds to total stock values of an institution, to total sources of funds, or to total uses of funds, can be treated like velocity ratios (GDP/Mi) as functions of interest rates. Different rates will be associated with different financial flow ratios.

2.46. Just as we learned during the energy crises of the 1970s how important it was to have reasonable estimates of demand and supply price elasticities in conjunction with input-output tables that provided up-to-date flow coefficients in order to gain economic appreciation of the energy impacts on major economies, it is equally important to have estimates of interest elasticity of different investment flows, together with associated entries in the FoF accounts.

2.47. In the case of the energy crises, as noted above, many analysts simply concluded that the large changes in terms of trade for energy products would be of limited economic importance because the total expenditures on energy were small percentage portions of

GDP. This was a highly misguided rule-of-thumb estimate that overlooked both the strategic importance of energy input and its pervasiveness in use in practically every economic sector. In the same sense, finance is pervasive and strategic, so interest rate changes in nearly all sectors of the economy merit a separate study of sensitivities, and these can be ascertained in an FoF system linked in feedback mode with the rest of the economy.

2.48. A way of estimating interest rate effects, taking account of the whole spectrum of rates, is to specify an analogue of the linear expenditure system (LES), in which each type of asset or liability holding is related to all the interest rates, just as individual expenditures are related to the whole price spectrum in the LES. An important added advantage of such a specification is that adding-up accounting identities can be automatically satisfied. This type of specification for FoF systems has been estimated by M. Saito.[5]

2.49. History and practice are better documented for NIPA and I-O research than for flow of funds. As domestic monetary policy plays a more active role in economic stabilization, there is a need for more frequent, more detailed and more informative FoF accounts to support policy decision-making. This is because an enriched menu of financial instrument holdings is available and also being taken up in the investment planning of many or most citizens. Developments in financial markets and policy interventions affect nearly all people in this modern information age.

(b) Satellite extension to social and environmental data sets

2.50. Let us now consider the expansion of scope of national models. The United Nations Development Programme (UNDP), in its Human Development Report and in many other studies that are not in the realm of traditional economics, has emphasized that GDP is not all inclusive. From the modelling point of view, there are new econometric studies that cover both demographics and income distribution beyond the NIPA and I-O accounts.

2.51. For developing countries, in the present instance the Philippines and Chile, there are suitable data on demographics and related social indicators but only limited data on income distribution; so, our examples refer to systems jointly based on NIPA, I-O and demographic data, with some quintile distributions of income in the Philippine case. [6]

2.52. An overview of two segments of the model are given as a long-term and a medium-term system. The latter uses an 11x11 input-output model for the Philippines in 1985. Of course, it would be desirable to have annual I-O tables from which to model the industrial composition of Philippine economic activity, but such frequent data are not available. It is only in a few advanced industrialized economies that databases are more plentiful in terms of frequent I-O tables. Even the richest industrialized country, the

United States of America, does not produce official I-O tables annually, although it certainly could do so if appropriate priorities were assigned to the task.

2.53. The most interesting components of the long-term model are in the population module, which deals with fertility, mortality and migration. Age-specific fertility and mortality rates depend directly on public spending for health and education and indirectly on female literacy. Fertility and mortality affect population and the labour force. Through the latter variable, there are effects on production and income distribution. The quintile size distribution is determined by population and production, but changes in the income distribution in the future are affected by incidence of poverty and income taxes. Income distribution then feeds back to population, poverty levels, rural and urban fertility, death rates and migration -- both internal and international.

2.54. Standard dynamic simulation techniques have been used to study macroeconomic and social policies. In the baseline case, government expenditures on health and education are kept fixed at 1991 proportions (5.5 and 19.1 per cent, respectively). In this baseline case, the percentage of income going to the upper quintile remains at 52.2 per cent. In another simulation, total government investment is lowered by 10 per cent, but expenditures on health and education are increased by 100 per cent and 25 per cent, respectively. Some estimated consequences are presented in the table below.

	1990	**1995**	**2000**
	Percentage		
Employment	-0.08	-0.27	-0.22
Consumption	-0.05	-1.47	-3.00
Public deficit	-0.15	-0.46	-0.39
Rural employment	-0.11	-0.39	-0. 32
Fertility, 20-24	0.00	-14.81	-17.06
Fertility, 25-29	0.00	-3.12	-4.00
Fertility, 30-34	0.00	-10.88	-11.53
Population	+0.02	-0.19	-0.20
Infant mortality	-0.06	-0.07	-0.07

2.55. These are, of course, representative changes and are point estimates. If stochastic simulation techniques were used, which is fully within the realm of possibility given present computer power, confidence intervals for these values could be estimated.

2.56. It is worth pointing out that the components of the human development index (HDI) of UNDP, consisting of per capita GDP (modified by some international distribution considerations), longevity and literacy, are all derivable from a much more detailed model for the Philippines. The Philippine model includes the NIPA, demographics and education information in much greater detail, and many other developing countries will have the same kind of data base, but the Philippine model developing countries will have the same kind of data base, but the Philippine model shows what can be done. For developed countries, it should be generally possible to make such estimates.

2.57. The same kind of model that was estimated for the Philippines was also estimated for Chile, combining NIPA, I-O, demographics by age and sex, education and social spending. In addition, Chile's important primary production, especially copper, was specifically featured in the model. Scenario analysis by dynamic simulation techniques was implemented, as in the studies of the Philippine economy.

2.58. The NIPA and the I-O systems are well developed, yet, as ever in quantitative economics, there is ample room for improvement. In the spirit of recognition that GDP and closely related measures do not give an adequately rounded view of an economy, an obvious candidate for the addition of important information is the environment. With proper social accounting, it is possible to make NIPA "green".

2.59. That remark is meant to introduce the associated factor costs, on the income side, for producing GDP or other output measures that take environmental quality into account. Instead of building models that focus on an estimation of conventional GDP, we should seek a consistent and balanced set of accounts that generate a higher-quality GDP. The associated macroeconomic model building would then seek to "explain" the entries in this "green" NIPA in much the same way that models try to do this for the NIPA that is currently available.

2.60. There have been interesting estimates of "green" GDP, but not a detailed "green" NIPA. There are, however, ongoing research activities on this issue.

2.61. For environmental studies, energy, water supply or other critical needs for a modern economy, as well as for social well-being, it is convenient and often necessary at a first stage of investigation to build satellite models that take up the details of the data base and structural relationships that are important for the satellite area, in the form of an energy model, a pollution model or a water supply model. These satellites investigate the direct relationship within the confined area of analysis and have feedback relationships that are more superficial but manageable and informative, with a large-scale macroeconometric model. The two systems are, after estimation, simulated in tandem with each other -- the energy model, for example, affecting the macroeconomy and the latter affecting the energy model. In a particular example, the LINK system, as an overall macroeconometric model, has been used in tandem with a satellite energy model, known as the Tracing Gas Account System (TGAS), to study the policy effects of carbon taxation to reduce emissions in the atmosphere.[7] Their technique is flexible for studying many different policy problems, provided satellite models can be prepared for each case.

2. Improved access and use of data

2.62. Quantitative economics, which encompasses both macroeconomic accounting and econometrics, will always undergo steady scholarly development, but three technological areas have brought major changes in these fields. They are:

- High-speed, large-memory computing capability;
- Telecommunications facilities for direct and speedy access to data;
- voluminous data flow.

2.63. These three developments define the information age, and certainly make a difference in the way we do our work, both in research and in delivery of economic A information.

2.64. These three developments open the accounting approach beyond traditional economic accounting, and facilitate ventures into environmental, demographic and broad social issues. Regardless of the technological advances, work would be taking place on these new horizons, but it has much greater scope and relevance in the information age.

2.65. Also, the technological advances have led to globalization of economies. Model building and the data foundations are now strongly international.

(a) Reconciliation of data through the use of macro accounts

2.66. The averaging of forecasts is one technique for reducing the risk associated with forecast error. In forecasting entries for a NIPA system, there are at least two possible forecasts for GDP, one from the expenditure side of the accounts and one from the income side. If there were independent estimates of gross and intermediate output, there could be a third estimate for net output (value added).

2.67. In the case of the United States high-frequency models, separate forecasts of GDP are built up from the components of total expenditure and also from the components of total income. There is also a third estimate that is computed from principal components of major macro indicators, such as industrial production, personal income, key interest rate spreads, price indexes, stock market prices, dividends, hours worked, orders, shipments, exchange rates and other variables.

2.68. Regressions from past history have been established for GDP and the price deflator of GDP on principal components. The latter are extrapolated, and forecasts of GDP and its price index are estimated from these regression equations. Three estimates of GDP and its deflator are then averaged to obtain the forecasts at the most aggregative level. Separate forecasts of expenditure and income components are also provided.

2.69. Three forecasts are of unusual importance in this part of the system calculation. They are for: (a) profits, (b) the stock market price index, and (c) the statistical discrepancy (between the expenditure and income sides of NIPA).

2.70. Profits are estimated from past profits, the wage rate, the producer price of intermediate inputs, the 10-year treasury interest rate, capacity utilization in manufacturing, retail sales and industrial production.

$$\Delta\pi = -0.20(\Delta\pi)_{-1} + 3.72\Delta S + 11.56\Delta P - 0.58\Delta RW_{-1}$$
$$-2.39\Delta PI - 218.91\Delta(1+r) - 5.68\Delta CU - 6.29$$

(1967, second quarter to 1997, fourth quarter, sample period)

π = corporate profits
RW = real wage
S = retail sales
PI = real price of intermediate goods
P = industrial production
r = yield on 10-year treasury bonds
CU = index of capacity utilization

2.71. The estimation of the stock exchange price index is based on the capital asset pricing model, that is, price is defined, theoretically, as the discounted value of future earnings. This translates into price as a positive function of profits and a negative (inverse) function of interest rates.

$$\ln SE = -0.38 \ln (1+r)_{-1} + 0.034 \ln (SE \cdot E/SE)_{-1} + 0.98 \ln SE_{-1} + 0.067$$

SE = New York Stock Exchange index
r = yield on 10-year treasury bonds
E/SE = earnings-price ratio, market average
(July 1974 to March 1998 sample period)

2.72. The statistical discrepancy between total final sales and total factor payments, allowing for adjustments of indirect taxes and subsidies, is not a random variable. It has fluctuated in a wavelike pattern that is significantly correlated (negatively) with profits, the net foreign balance and inventory investment, all in current prices.

$$\Delta SD = -0.088\Delta\left(\pi - 1/12\sum_{1}^{12}\pi_i\right) + 0.94\Delta II + 0.034\Delta\left(NE - 1/12\sum_{1}^{12} NE_i\right) - 0.66$$

$AR = 0.096AR_{-1} - 0.094AR_{-2}$
SD = statistical discrepancy
II = inventory investment

π = corporate profits
R = residual error
NE = net exports
(1963, first quarter to 1997, fourth quarter, sample period)

2.73. Leading up to July 1998, the discrepancy was as large as -$100 billion. In July 1998, estimates from improved measurement techniques and revised concepts led to a reduction of the discrepancy by a factor of one half, but it did not remain this low in the second quarter. This is definitely a step forward, but it is worthwhile considering how policy decisions were made during the past few years when the discrepancy was large and swinging by wide amounts in a non-random pattern, from large positive to large negative values. This is a real possibility for happening again.[8]

2.74. It has already been noted how quickly economists conclude that a component of GDP that constituted a small percentage could not have a very significant effect on the total outcome. This is dangerous reasoning in a highly interrelated system with many secondary or indirect effects.

2.75. The context of the considerations about economic performance of the United States during the past few years and the appropriate policies can be stated as follows: the guiding performance characteristics have been growth of the macroeconomy, measured by real GDP growth, in relation to its potential -- GDP growth at its highest level consistent with no tendencies towards inflation. Closely related to GDP growth are labour market conditions measured as minimal unemployment without accelerating inflation -- the so-called non-accelerating inflation rate of unemployment (NAIRU) level. Labour market conditions could also be stated in terms of job creation.

2.76. Broadly speaking, the measures have been widely interpreted as real GDP growth of about 2.0 to 2.5 per cent annually and the non-accelerating inflation rate of unemployment (NAIRU) of about 6.0 per cent, lowered in recent years to about 5.5 per cent.

2.77. For some years, the leading economic policy makers tried to impose these criteria by invoking or threatening restrictive policies if there were violations of the above guidelines. Recently, fear of upsetting sensitive world markets led to enough humility that policy makers became more experimental and did not intervene when the output or employment limits were violated. Many billions of foregone GDP realization were the costs of adhering to these guidelines.

2.78. It can be argued that forecasting errors are as serious, if they lead to underperformance, as are errors that lead to excessive performance. How are these issues analysed in terms of short-run forecasting, especially involving profits, the stock market and the statistical discrepancy?

2.79. Large positive values of the discrepancy are associated with high values for the expenditure side of the accounts, while large negative discrepancies are associated with high values for the income side. Some countries average the different estimates of GDP and some might try to allocate the discrepancy among different sensitive components on the two sides of the accounts. In the United States, the expenditure side has been used for policy formation, and no attempt is made to allocate the discrepancy.

2.80. Although the discrepancy is a small percentage of GDP (less than 2 per cent), it is big enough in very short-run decision-making to cloud the appropriate policy issue. Since the discrepancy is definitely not random, the clouding can persist for some time.

2.81. It has been well known for some months that income-side estimates of GDP lead to significantly more favourable judgements about productivity growth and thus can support a lower NAIRU and higher potential growth rate.

2.82. It is also the case that the historical values of the discrepancy are negatively correlated with corporate profits. The negative correlation suggests that the discrepancy is involved with profit dynamics, possibly in a very complex way, as was revealed by the measures that were introduced in July 1998 when there was a shift between personal and corporate saving as a result of the treatment of mutual fund distributions. Although the shift constituted a "wash" on the income side, it can have substantial effect on investment behaviour. Other changes that were made lowered the absolute size of the discrepancy and also raised the growth rate of the economy. It was an enhanced growth rate that did not induce inflationary tendencies. Since the discrepancy represents a difference between final sales and factor payments, it does, in fact, lead to some contamination of reported profit figures.

2.83. Is the United States stock market overvalued? This frequently posed question should be approached through capital-asset value relationships of the general sort that are proposed for the high-frequency model using the macroeconomic accounts and their underlying short-run (monthly, weekly or daily) indicators. It is important, therefore, to reduce the discrepancy, even below $50 billion, in absolute value, if the data in the accounts are to be used to estimate the capital-asset pricing relationship with a higher degree of confidence.

2.84. If modern macroeconomics were taken back to a deeper concern with national income and associated social accounting, the formulation of economic stabilization policy would be greatly improved. The pioneers of national accounting had the right instincts, and there is all too little attempt to build macroeconomics as an enhancement of their work.

(b) International links between data sets

2.85. The econometric studies of the Philippines and Chile raise some issues about international model building and lead to the matter of specifying models for the world economy that fit with available databases. Evidently, it is possible to build models suited to each economy's individual characteristics and data availability. To some extent, there are uniform databases for several countries, but the true flavour of individual policies, local institutions, natural resources and socio-cultural features can be had only by specifying made-to-order relationships of each autonomous economy. This leaves open the methodology for piecing together the parts of the world economy into a consistent whole. This problem is approached differently in the various international research centres, but the design of project LINK, which is analysed by Anatoly Smyshlyaev and Pingfan Hong in a separate presentation in section VII.B, is preferred. At this point, the author simply wants to outline the treatment of a basic accounting identity, namely

2.86. world exports = world imports.

2.87. Sometimes, this identity is stated as the condition that the world's current account balance (or net trade balance) is zero. Also, it should be noted that this balance should be imposed for both nominal trade and real trade. It should also hold for individual goods or services.

2.88. This restraint is imposed for LINK by constructing world trade matrices of bilateral flows, forming coefficients as in input-output analysis

$$a_{ij} = \frac{x_{ij}}{x_j} = \frac{\text{exports from } i \text{ to } j}{\text{total imports of } j}$$

and computing each economy's exports as

$$\sum_j a_{ij} x_j$$

2.89. In other words, a country's exports are a weighted sum of its partners' imports, the weights being the appropriate row of the trade matrix (in coefficient form). Correspondingly, each country's import price is a column-weighted sum of its partners' export price.

2.90. With each economy's model specified according to its own characteristics, a consistent world system can be formed if the individual export equations and import price equations are as stated above. The aij coefficients are not constant; therefore, much of LINK's econometric analysis is associated with modelling or estimating aij so as to keep the balance close between world exports and world imports. It is within that international accounting framework that separate models for each economy can be put together so as to form a consistent whole from which to study international repercussions.

2.91. The earlier observation about the pervasiveness of financial instruments in personal or business lives is also important for international policy analysis and international model building. Project LINK began as a result of export-import flows having major effects on the world economy, but 30 years later we find that many of the large effects are closely related to capital movements. These give rise to trading activities for exports and imports, but they are very large, very quickly moving and not fully understood. There is no doubt that a large effort should be devoted to building an accounting base for movements of financial assets and liabilities throughout the world. First, it is necessary to develop the conceptual framework for such financial flows; then, the related tables must be prepared. A massive, detailed, user-friendly international flow-of-funds tabulation is needed. After the database takes shape and the accounting framework becomes clear, the modelling exercise can then be started in full force.

(c) High-frequency monitoring and forecasting

2.92. The model of the Philippines, described in rough terms above, is noteworthy not only because of its accounting characteristics and its excursion beyond NIPA systems that generate GDP, but also because of its different time horizons. The NIPA-based model is structured for the intermediate term of one- to five-years extrapolations. The I-O system and the demographic equations are more suited to a time horizon of a decade or more. If the NIPA system is solved first, it can be used as input from which to generate final demand for the I-O system year by year. The NIPA-based system would have to be stretched for as long as a full decade to accommodate the complete horizon of the I-O system, or the I-O system would have to secure other databases in order to make longer-run extrapolations of final demand, for example, by the use of family budgets and other cross-section samples of data for the business sector.

2.93. It is a plausible research strategy to build models of sequenced horizons in order to provide inputs of initial conditions for dynamic longer-run systems. In this information age, this procedure is being followed in the development of high-frequency systems for the initialization of quarterly and annual frequency systems that are used in multi-year extrapolations.

2.94. At present, monthly data, with occasional use of even higher-frequency data, can create extrapolations that can be used to fine-tune or initialize lower-frequency systems of quarterly or annual data. There are many ways of doing this. A particular system that has been used by the author for several years is described below.

2.95. The high-frequency system has two types of relationships, based on two major data sources:

- Monthly or higher-frequency indicators (weekly, daily or nearly real time)
  m_{i_τ} = i^{th} monthly indicator
  $\tau = \tau^{th}$ month
- Quarterly NIPA variables, including nominal, real, associated prices
  q_{it} = i^{th} quarterly variable
  $t = t^{th}$ quarter

2.96. The relevance of this approach to high-frequency modelling in the present context is that the NIPA system is kept fully intact. Accounting relationships play a fundamental role in the structure of the system.

- Bridge equations : $q_{it} = f(1/3(m_{i\tau} + m_{i\tau-i} + m_{i\tau-2})) + error_t$
- Time-series equation to estimate m_{i_τ} : $m_{i_\tau} = g(m_{i_\tau-1}, m_{i_\tau-2}, ...) + error_\tau$

2.97. Some words of explanation are needed to interpret these equations. In the bridge equations, an attempt is made to relate quarterly NIPA values to closely related quarterly averages of monthly indicators. The obvious type of example is that quarterly consumer expenditure in NIPA would be estimated by quarterly averages of retail sales. Helpful dynamics can be introduced, namely, percentage change in qit = percentage change in 1/3 (miτ + miτ-1 + miτ-2) or in other specific variables that may account for discrepancies between qit and 1/3 (miτ + miτ-1 + miτ-2). The level of details is much finer than total retail sales and total consumer expenditure in actual practice.

2.98. There is some guidance in the choice of miτ. These indicators should adhere as closely as possible to those that official statisticians use in building up their estimates of qit. For the most part, the indicators that are, in fact, used are well known. In high-frequency economics, speed carries a premium; therefore, it is important to look for unusual data, especially new data that become available early in the quarter, to provide guidance for the future movement of qit. New sample surveys, economic commitments, indications of intention, forward market positions, futures prices and similar variables are all candidates as right-hand-side arguments for the bridge equations, either as principal or supplementary variables.

2.99. In the case of time-series equations, values of indicator variables are generated as extrapolations to establish or roundout quarterly information.

2.100. Single-equation Box-Jenkins methods are used for the estimation of auto-regressive integrated moving average (ARIMA) functions. Some interesting and highly plausible cross-lag effects are also estimated, such as housing starts as supplemental variables in ARIMA equations for retail sales of house furnishings and household appliances.

2.101. At the present time, experimental work is under way to estimate vector auto-regressive moving average (VARMA) equations instead of ARIMA equations for well-knit subgroups such as types of consumer durables, consumer non-durables, business capital formation, foreign trade variables, labour market variables and the like.

2.102. The equations above are not generally structural behaviour equations or theoretically specified equations. They are put forward to do what official economic statisticians do in building NIPA. That provides our main guidance. They are empirical equations and are re-estimated as soon as new monthly data are released and data files are brought up to date, usually within hours of data release periods.

2.103. High-frequency forecasts can be generated as often as is wished. It has been found useful to take stock at the end of every week, say, on Friday at the close of business, to update, re-estimate and forecast many NIPA variables for two quarters ahead, that is, for two unpublished quarters. These extrapolations are examined in the context of business news and are available with interpretation each Monday for the United States.

2.104. At the present time, experiments with VARMA systems are being pursued in order to try to improve very short-run NIPA forecasts -- up to two quarters. Similar systems have been constructed for Japan and France. They are regularly used in NIPA forecasting, and a system for Hong Kong is in the early stages of construction.

2.105. For the most part, such high-frequency systems are mainly applicable for advanced industrialized economies, where there is an abundance of data released at timely intervals for monthly or higher-frequency periods. Experimental systems have been built for Canada and the United Kingdom. Some developing countries can, however, be considered as candidates for high-frequency modelling if they have as many as 25 or more monthly data series on retail sales, orders, tourists, industrial production, construction activity, employment, wages, prices, interest rates, money supply, exchange rates, and similar indicator variables. At the present time, Mexico is under consideration for the construction of a high-frequency system.

C. The SNA, SAMs and national accounting capabilities[9]

2.106. The present section contains a review of the 1993 SNA that has much in common with some earlier contributions to the debate, notably those of van Bochove and van Tuinen[10] and Ruggles[11]. They approach many of the same issues, from an information technology perspective in the former case, and, in the latter case, from a point of view that owes much to the recent developments in micro-simulation methods. By comparison, the position to be argued here gives greater emphasis to developments in economic theory and the supporting modelling techniques, on the one hand, and to those policy issues, on the other hand, that are likely to remain high on the agenda of Governments for the foreseeable future. It draws on the experiences with the System of National Accounts, published by UNSD in 1968[12], and its supporting manuals, which for over 25 years have been the central reference documents for economic statistics at the national level. They also provided the basis on which many countries received technical assistance, partly through UNSD; in turn, such activities were reinforced by the requirement on countries receiving aid from most multinational agencies to prepare national accounts of an acceptable standard. In practice, this requirement may be one of the main reasons why national accounts are afforded the priority they enjoy in a number of countries that have a limited capability to collect and compile statistical data. For the developed countries, the SNA is no less important, and the present system has an antecedent that was promoted by the Organization for European Economic Cooperation (OEEC) for the benefit of its own members.[13] Similarly, the European Union (EU) has developed a variant of the SNA to meet its current requirements.

1. The 1968 SNA

2.107. While the 1968 SNA was in many ways an important achievement,[14] it can be suggested that the period since 1968 has not seen any marked improvement in national accounting capabilities around the world. On the contrary, there has been a noticeable deterioration in many countries so that, perhaps in one country out of every three, the quality and timeliness of the accounts has regressed the SNA over the years. This unfortunate deterioration is, of course, hardly the fault of the SNA as such, but it is an important part of the context in which the revision has taken place. An aspect of the challenge posed by the SNA revision is, therefore, to articulate a perspective for future implementation. This should encourage the development of national accounting capabilities while, at the same time, building on what is essential from the 1968 SNA and rejecting only those parts that have been superseded by developments during the intervening years in theory or technology, or by a shift in current policy issues.

(a) The SNA as a link between theory and practice

2.108. From the perspective to be developed in the present section, the SNA is central to the process whereby the interplay of theoretical constructs and practical issues together determines the national accounting capability that a country would like to have. Through the translation of these ambitions into actual capability, it develops the ability to monitor performance, to provide policy analysis, and hence to advise and comment on contemporary issues. Diagram II.3 represents an attempt to locate the SNA in this general context of theory, issues and policy analysis.

2.109. Starting points for the interpretation of diagram II.3 are with economic theory at the top left of the chart and the issues that need to be addressed at the top right. These are the natural starting points for our discussion if the development of an SNA is to be demand driven in the sense of being a response to real issues. The eventual nature of this response is represented at the bottom of the diagram and involves both measures of actual economic performance and the advice that follows from analysis. The role of the SNA is not, therefore, simply to define such performance measures as GDP or the rates of saving and investment. These are incidental to the main purpose, which is to provide a frame of reference for the development within each country of a capacity to analyse economic problems and to monitor progress. The SNA is centrally located in diagram II.3, where it is associated with the national or social accounting capability that countries would like to have. This seems to be an appropriate interpretation of the purpose of the SNA. Certainly, it is consistent with the view that guided the previous 1968 revision, as expressed in the following:

> *"The scope of the new system is such that a source of misunderstanding must be removed at the outset. While the new system provides a target for statistical development ..., it is not to be supposed that this target will everywhere be reached quickly or that the order of priorities in the development of statistics will be the same in all countries" (1968 SNA, para. 1.76).*

2.110. In arriving at such a target, there are a number of steps to be gone through and diagram II.3 is an attempt to give these some essential structure.

2.111. The first step is to translate economic theory into a set of concepts and definitions, which build into an overall conceptual framework. Following Hicks,[15] this can be referred to as a social accounting framework. It embodies such basic distinctions as domestic versus foreign, current versus capital, and so forth, together with the fundamental notions of a transaction and the definition of institutions, factors of production and so on. Following Stone,[16] the interrelations between these concepts can be expressed in a matrix format, which is referred to here as a social accounting matrix (SAM). This is demonstrated in table II.1.[17] Various aspects of the table require some comment at this point.

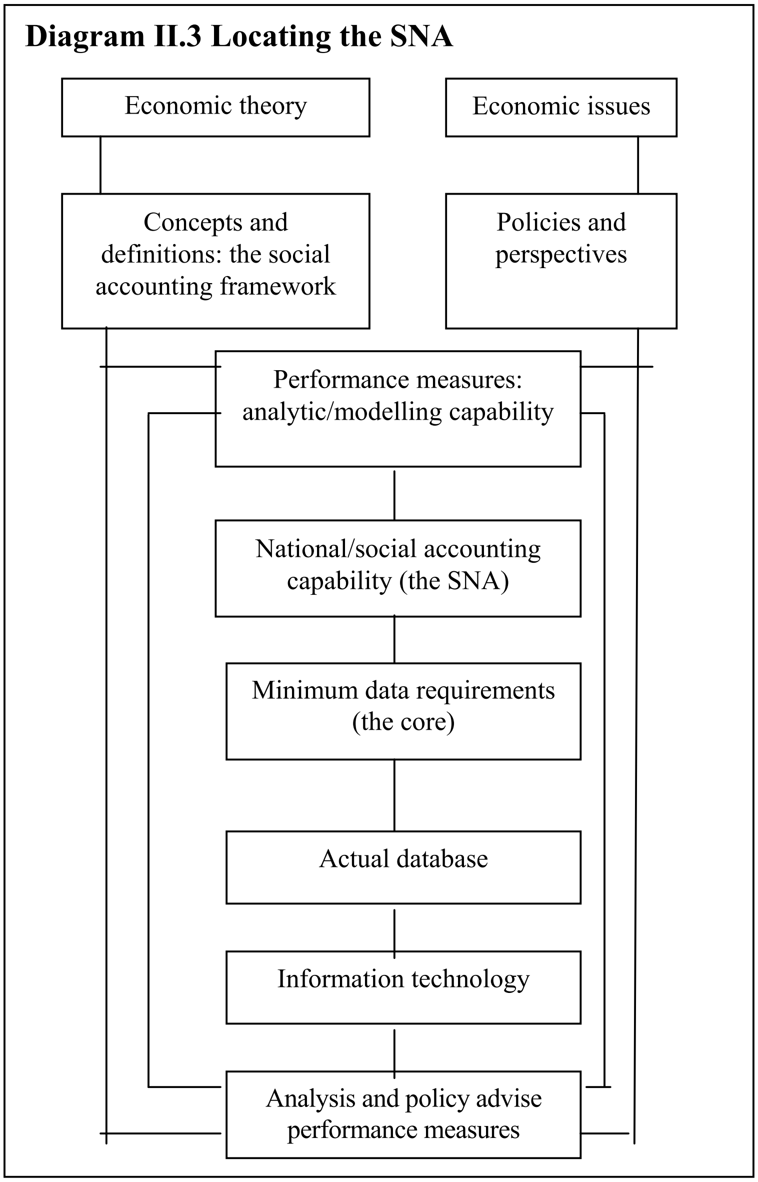
2.112. First, it can be noted that there is no attempt to account for assets in the table, as was done in the 1968 SNA matrix and is further elaborated in the 1993 SNA. This is a useful simplification insofar as there is little prospect of being able to construct asset accounts for most countries in the foreseeable future. However, it would be perfectly possible to extend the conceptual framework, which is shown as diagram II.3 so as to include asset accounts in the schema. Indeed, it would eventually be most desirable to do so. Such a development is not required for the present argument, however. Secondly, the various entries in the table are understood to be current value flows, with all transactions valued at purchaser or market prices. Thirdly, there is no explicit disaggregation within any of the six blocks of accounts that are shown in the table, but such disaggregation is to be understood. Institutions may therefore be disaggregated so as to recognize different types of households, companies, and different levels of government. Each of these may have its own current and capital account within the framework of table II.1. Similarly, there can be many different types of labour, capital and natural resources recognized within the factor accounts. There can also be numerous distinct products and there can be separate accounts for each of a variety of activities. Fourthly, the rest of the world can be disaggregated into currency areas, regions or individual countries. Fifthly, and independent of whatever system of taxonomies or disaggregations is adopted, the corresponding row and column totals of table II.1 must be equal. Such equivalence follows directly from the concepts that are embedded in the table and their interrelationship, that is, the symmetry is inherent in the concepts themselves. Finally, and following from this last point, the table embodies all the fundamental identities of national accounting. Indeed, it can be seen as the conceptual framework within which any system of national accounts must be developed. In this sense, it is the essential starting point and any more specific system has to be the result of imposing on this general schema a particular perspective as to the issues that matter and the policies that a particular data system is needed to support. Accordingly, diagram II.3 suggests that in order to decide on the performance measures and the analytic or modelling capabilities that a country would like to have, it is necessary to give some specific content to the general framework set out as table II.1 by reference to the policies and perspectives that are eventually to be served or supported. Not least, it is necessary to develop systems of classifications based on concepts that are useful and on levels of disaggregation that yield the detail that is thought to be necessary. Whatever national accounting capability is eventually created, it will be expected to serve a variety of purposes. A certain range of statistics will be needed to monitor performance; probably, a greater range will be wanted for analytic reasons; and perhaps most demanding of all, there will be a need to support overall macroeconomic analysis of the economy as a whole.

if not explicitly, macro-economic analysis has to be based on a model of the economy. It is important here to note two related points:

- Corresponding to every complete macroeconomic model there is an accounting framework;
- All such frameworks are a special case of the social accounting matrix framework set out as table II.1.

2.113. Accordingly, if an SNA is to be capable of supporting macro-economic analysis, then it must fit within the framework of table II.1. It also follows that the selection of any one SAM as being the unique SNA would restrict the range of models and analyses that could then be supported. Such selection is, of course, a matter of conscious choice. Accordingly, diagram II.3 shows the desired social accounting capabilities (the SNA) as being derived from those performance measures and analytic capabilities that are deemed to be useful in this context by the authors of the system.

2.114. The next step in diagram II.3 is to derive the (minimum) data requirements needed to support the desired accounting capability. Taking this step raises an important set of issues, which can be approached as follows. If notation T is used to indicate a particular social accounting matrix, that is, a particular realization of table II.1, then the entries in T are of two types. Hence, T can be written as T = U + V, where the elements of U are to be thought of as actual cash transactions in the economy. Elements of U can



be measured directly, therefore. In contrast, the elements of V are imputed transactions, which therefore have to be estimated indirectly. The data needed to sustain a given social accounting capability are evidently those data that are needed to estimate both U and V. With respect to imputations, it is apparent that both the desired range of imputations and their quality will determine the data that are needed. There is therefore no single answer to the question: what data are necessary in order to estimate V? Much the same is true for the estimation of U as well, but in this case there is an additional consideration, which should be discussed.

2.115. The actual database that emerges in a country is shown in diagram II.3 as being derived from the data requirements of the desired system. Through information technology, this actual database will then condition the range and quality of analysis that is available within each country, and the scope and timeliness of its performance monitoring. The actual achievements in this regard will also be conditioned by the analytic capability that a country would like to have. As an intervening step in the process whereby desires are translated into realization, the SNA can be seen as having a critical function to perform. By the same token, the intent that underlines implementation of the SNA should be to enhance its role in helping countries to realize their aspirations and, where possible, to remove any hindrances that might stand in their way.

(b) The economic and practical rationale behind the 1968 SNA

2.116. In 1968, full employment was normal in OECD countries and this was typically regarded as a triumph of Keynesian economics. The Organization of the Petroleum Exporting Countries (OPEC) was undreamed of at that time and neither privatization nor the environment received much attention. Some early concern was being expressed about the failure of economic development to make significant inroads into the problems of poverty in many parts of the world, but some growth was considered normal and the debt crisis had yet to cast its shadow over the aspirations of the South. Many countries were engaged in some form of economic planning, with encouragement from the World Bank for those in the third world. Economic structure and growth were therefore the main concerns at that time and this was reflected in a preoccupation among economists with growth theory on the one hand and, on the other, with linear models derived from the work of Leontief. Rapid strides had been made in information technology in the 20 years of development from the original Atlas machines at Manchester and Cambridge so that, by 1968, it was a relatively straightforward task in a developed economy to approximate the Leontief inverse for a 40-sector model. In the field of national accounting, most of the important conceptual issues had been resolved by 1968, not least through the work of the Cambridge Growth Project.[18] It was therefore appropriate to record that:

> *"The work of the last fifteen years, which is relevant to this report, has proceeded in two directions: the elaboration and extension of national accounting and the construction of disaggregated economic models. Each of these developments has helped to make possible the formulation of the new system and at the same time has made a new system necessary if international standards and international reporting are to keep pace with the work that is going on in a large and increasing number of countries" 1968 SNA, para. 1.4).*

2.117. These were some of the important considerations when the 1968 SNA was drafted. As a result, a number of major innovations were introduced. One of the most important was to emphasize structure by presenting the SNA in a matrix format, that is, as a particular realization of table II.1, with relatively little emphasis on aggregate measures. As an aspect of this, particular attention was given to the distinction between products and production activities. Indeed, crucial parts of the text were devoted to the generalization of the Leontief input-output model which follows from this distinction.

Table II.1 A basic SAM

				Outlays						
				Our economy					Rest of the world	**Totals**
				Institutions		Production				
				Current	Capital	Factors	Products	Activities		
Incomes	Our economy	Institutions	Current	Current transfers		Factor income	Taxes on products	Taxes on activities	Current transfers from abroad	Current disposable income
			Capital	Savings	Capital transfers				Capital transfers from abroad	Available funds
		Production	Factors					Payments for factor services	Factor incomes received from abroad	Factor incomes
			Products	Consumption expenditure	Investment expenditure			Intermediate demand for products	Exports of products	Demand for products
			Activities				Sales of products			Revenue
	Rest of the world			Current transfers to abroad	Capital transfers to abroad	Factor income paid to abroad	Imports of products			Use of foreign exchange
Totals				Use of income	Use of funds	Allocation of factor incomes	Supply of products	Allocation of revenue	Available foreign exchange	

2.118. The focus on production structure in the 1968 SNA was at the expense of details about people or regions. Consequently, it was left to a subsequent system of social and demographic statistics[19] to discuss the distribution of income in a way that was compatible with the SNA. Correspondingly, the general availability of household income and expenditure data was not anticipated by the architects of the system. Rather, they had in mind that the national accounts would be estimated by adopting a commodity balance approach. This approach was made easier if reliable household expenditure data were absent: in such circumstances, consumption can be estimated residually, thereby making it much easier to achieve the overall balance of the accounts.

2.119. This short-cut approach to the reconciliation of inconsistent data could be defended on the grounds that the balancing of SAMs using full information and formal statistical techniques was precluded by the limitations of computing capacities. Stone, Champernowne and Meade[20] previously addressed this problem, but it was not until Byron[21] that it was shown to be tractable for a moderately sized SAM using the hardware then available.

2.120. Computing capacity is almost certainly the explanation for another feature of the 1968 SNA, which has caused a great deal of trouble. As was noted above, the conceptual scheme set out in table II.1 envisages that all transactions will be recorded at purchasers or market prices. If we now combine this conception with the Leontief rule that prices should be homogeneous along each row of an input-output table, then we are confronted with the prospect of having a very large number of commodities. This is because a given output from production activity can easily become several different commodities that are differentiated from one another not by their physical characteristics, but by season of the year and/or distributive margins and taxes, and, hence, by price. Since, in 1968, the commodity balance approach was to be implemented manually in most countries, with the results recorded on large worksheets, it followed that there was a physical limit to the number of commodities that the statistician could accommodate in practice. Therefore, something had to be done to constrain the number of commodities that it was necessary to distinguish separately.

2.121. The "ideal" method arrived at in 1968 was to regard each commodity as a linear combination of basic commodities so that each actual commodity could be treated as a combination of three elements, namely, its own "essence", a transport and distribution margin, and indirect taxes (taxes on products in the 1993 SNA). Given a theory as to how prices are formed, a value can be attached to each of these components so that purchases of actual commodities can be represented for accounting purposes as purchases of each of the three elements. The value of that part of each commodity that is independent of transport and distribution margins is referred to in this approach as its basic price. The advantage of the scheme is that any variants of a commodity that are differentiated only by margins will all have the same "essential" element with the same basic price. Hence, proliferation of the number of commodities through variations in margins and taxes is avoided. The disadvantages of this approach are twofold. First, to compute basic prices requires the inversion of what is potentially a very large matrix. It was thought that this might be beyond the capability of many statistical offices. An approximation, yielding a system of evaluations known as approximate basic prices, was therefore proposed as an alternative. The second difficulty is that, as noted above, in order to be able to compute either actual or approximate basic prices, a theory is needed as to how market prices are formed from costs. This depends, inter alia, on a particular view as to the nature of the underlying technology. In recommending the use of approximate basic prices, the 1968 SNA has, therefore, recommended the imposition on primary data and agreed concepts set out in diagram II.3 of a particular theory, which is contentious of how the economy actually works.

2.122. The nature of this imposition was discussed in an article by Pyatt in 1985[22] and is shown there to involve a transformation of the matrix shown in table II.1, as a result of which the original detailed data cannot be recaptured. This manipulation entails an important loss of information and the value of the data is seriously compromised by it. This is because the theory that "justifies" the manipulation is modelled on strict Leontief assumptions. It is, therefore, an extreme expression of the rigidity of technology and its independence of changes in relative prices.[23]

2.123. The limitations of information technology circa 1968 may also contribute to an explanation of why the 1968 SNA recommends only one particular SAM rather than a range of SAMs corresponding to a range of purposes. Given the demands of the commodity balance approach in an environment of large worksheets and soft pencils, it is not to be expected that countries would produce more than one SAM each year. The fact that in practice they often have, owes much to a lack of coordination between central banks, statistical offices and ministries of planning. This is no doubt born of frustration over delays in providing results and a lack of mutual sympathy for each other's problems in attempting to implement the SNA. By the same token, the International Monetary Fund (IMF) and the World Bank now produce their own (and yet again different) estimates of the national accounts and their major components for many of the developing countries.[24]

2. Developments since 1968

2.124. Developments over the past 20 years in various subject areas influenced the revision of the 1968 SNA to the 1993 SNA and should be taken into account when implementing the latter. At the risk of omitting some of the more important ones, developments to be noted in the present paper can be grouped under four general headings:

- Issues and theories;
- New data sets;
- Developments in technology;
- Advances in methodology.

(a) Policy issues and theory

2.125. Changes in economic circumstances and perspectives since 1968 have brought to the fore two important themes, which are likely to characterize the foreseeable future. People, poverty and living standards are one theme. The other emphasizes prices, incentives and the role of the market versus that of the State. The 1968 SNA was not particularly attuned to either of these themes; some of them have been better addressed in the 1993 SNA.

2.126. With reference to the first of the above themes, it can be noted that there is no disaggregation of the household sector in the 1968 SNA, although this would not be difficult to remedy, as noted in Towards a System of Social and Demographic Statistics.[25] Indeed, Stone[26] has supported the suggestion that the household sector should be disaggregated, and this has now been incorporated in the 1993 SNA. Based on research since 1968, the problems of disaggregating the household sector in order to show income distribution among socio-economic groups within the overall framework of a SAM have largely been resolved.[27] Incorporation of such details in the 1993 SNA goes some way towards establishing the point that people and their living standards are (or should be) the primary concern of economic policy and that their importance in the national accounts is (or should be) central. Here, we can usefully step back from contemporary concerns and note that this is exactly how Gregory King saw the matter some 300 years ago.[28] We should also note, however, that simply to disaggregate the household sector within the SNA does not take us very far. Such a development is sufficient to provide a record of income levels and consumption baskets for different socio-economic groups. However, that is not enough to sustain an analysis of how those income levels are determined or how they might be affected by policy interventions. For that we need data on the structure of the economy as a whole and hence the need to review the structure of the SNA in its entirety. As will be argued subsequently, such a review will involve, inter alia, an explicit recognition of differences in factor endowments by socio-economic groups and consequently a disaggregation of factors themselves, not least so that different types of labour can be recognized. These same developments are also called for in any analysis of employment that goes beyond the treatment of labour as if it were homogeneous.

2.127. No new theory is needed to address the issues touched on above, although the experience and findings of model builders, developed since 1968, is highly relevant. However, relatively recent theoretical developments may be invoked as a conceptual basis for some other developments, which are relevant to national accounts and might also be considered desirable. In particular, questions of time use play an important role in an increasing range of subject areas, for example, subsistence production, poverty, education, the role of women, do-it-yourself activities, and the hidden economy. Becker[29] provides a generalization of the classical theory of consumer behaviour, which is most helpful in allowing these issues to be addressed, and it is evidently important in the relevant contexts to implement his approach, at least to some degree. Just how far one should go is probably not a matter for universal prescription but, if the general viewpoint is accepted, then it follows that the SNA should adopt an open-ended attitude on imputations of time: as at present, some imputations should be urged as being highly desirable in most contexts while others should be considered as options that may or may not be important in particular cases.

2.128. Similarly, there are major problems that arise in deciding what might be the best way to handle the hidden economy and illegal activities in any particular country. Again, theory is available to offer some guidance. Consider, for example, a quota restriction on imports of some particular commodity. If the restriction is binding then the shadow price of the commodity exceeds its import price and the difference is correctly represented in theory as an implicit tariff, which accrues as revenue to those who receive allocations within the quota. The considerable importance of non-tariff barriers suggests, perhaps, that when implementing the SNA, the above scenario would need to be calibrated as a part of the national accounts. Another approach is simply to record actual cash transactions and ignore the implicit tariff. This simpler approach will work in a narrow accounting sense provided there is no illegal behaviour associated with the restriction. However, if an importer has to bribe a government official to obtain an import licence, thereby making the tariff become explicit to some extent, then evidently the national accounts will be out of balance if the bribes are ignored. A more flexible approach to SNA implementation would allow Governments and analysts to choose how they address such difficulties, even allowing them to adopt different approaches in internal documents and published reports.

2.129. This last example touches on a limitation of the 1968 SNA that has previously been commented on, namely, that the input-output model that underpins much of the approach assumes explicitly that relative prices are independent of the level of economic activity (see, also, sect. III.B). This is clearly not so when import quotas restrict the physical flow of goods. Indeed, the fixed coefficient input-output model breaks down much more generally as, for example, when an economy manages to reduce its reliance on oil imports through substitution effects or by efficiency gains, which are prompted by an increase in the price of oil. These then are further reasons why the valuation of transactions at approximate basic prices is regrettable.[30] They imply that the 1968 SNA was not an appropriate information base for analysing relative price effects on inter-industry relations and import substitution. Yet, such effects are crucial to an evaluation of policy alternatives in relation to the structural adjustment of an economy, be it a poor country trying to get out of debt or a European economy responding to the changes of 1979 (oil prices) or of 1982 (interest rates). It is not surprising, therefore, that there have been new developments in economic theory, focusing on the open trading economy, which are increasingly supplanting the closed economy model of unreconstructed Keynesian economics. Within this new framework the distinction between traded and non-traded goods is crucial, leading to the important notion of a real exchange rate within the economy. There is, as a result, an emphasis on classifications and prices that is new and significant, not least because it is basic to the policy advice that the developing economies are now receiving, and to the policy analysis that many of the developed economies are currently adopting for their own benefit. These theories did not exist in 1968.

(b) New data sets

2.130. Given that new issues have emerged during the past 20 years, it is not surprising that new types of data have been collected in response to them. Developments in the field of household surveys provide an important illustration of how new approaches can and should have an influence on a country's social accounting capability. Household expenditure surveys have a long tradition, but it is largely as a result of the greater emphasis on people and poverty since 1968 that a much-expanded effort in the survey field has developed in recent years. The United Nations Household Survey Capability Programme in the past signalled the importance of the ongoing work in this field. Similarly, a prominent example of the more recent developments has been the introduction of living standards measurement surveys in various African as well as other countries that receive adjustment loans from the World Bank.[31] These surveys contain collections of data on a variety of topics, including health, nutrition, housing and education, as well as the economic parameters of living standards such as income, consumption and employment (see, also, sect. IV.A).

2.131. Consumption data are especially important for national income accounting because they can contribute to the overall commodity balances for an economy that we have previously identified as being the typical starting point for estimation. However, as we have also noted previously, many countries do not use survey data for this purpose, preferring instead the simpler approach of estimating consumption expenditure essentially as a balancing residual within the commodity balance approach. This convenient and inefficient practice will be more difficult to sustain if the new SNA calls for separate details of consumption for different socio-economic groups. However, this consideration is only a starting point for the rethinking needed if people and their living standards are to assume (or resume) their rightful place at the centre of social accounting. The living standard measurement surveys, in common with many others for third world countries especially, call for a collection of data simultaneously both on income and on expenditures. Hence, they provide an important source of information for a detailed income and outlay balance for all the institutions of an economy. Such balances are different from, and an important adjunct to, the commodity balances, which currently play the primary role in estimating the national income. It is only by combining both sets of balances that a full description of the interrelations between income distribution and production structure can be obtained. It can be suggested that such a development is essential to providing an adequate basis for analysis of the determinants of living standards and how they are affected by policy change. Such analysis is, of course, of primary interest to many Governments and to students of their policies alike. Arguably then, when implementing the 1993 SNA, one should not let the opportunity pass of encouraging those Governments that have the necessary statistical sources and a concern for the issues to develop their national accounts in ways that are both feasible and relevant to these important concerns.

(c) Developments in technology

2.132. Molding inconsistent sets of primary data so as to strike a balance simultaneously and consistently between uses and supplies of products, on the one hand, and income and uses of income accounts on the other, is evidently a difficult task. It is therefore some encouragement for the statistician that new technology can be helpful in addressing the problem. The formal mathematical characteristics of this problem are relatively straightforward to state, especially when the basic accounts are expressed as a SAM, and alternative methods have been proposed to assist the statistician in deriving a solution.

2.133. One of these, which has already been mentioned, uses a generalized least-squares formulation that was originally suggested in Stone, Champernowne and Meade[32] and has now been developed by Byron[33] to allow large problems of data reconciliation to be solved using today's hugely expanded computing capacities. An alternative approach, which relies ultimately on linear programming, is also under development (see sect. VI.D), and this may have greater appeal to the practising statistician because it builds more directly on expert understanding of data sources and their relative reliability. The approach allows the statistician to specify bounds (which do not have to be symmetric) on the accuracy of each basic data set and generally to impose any other restrictions that are linear on the relationship between true values and estimates of them. Assuming that these bounds and restrictions permit a feasible solution to the problem of balancing the accounts (and, if they do not, then the bounds must be too tight) a range of objective functions, such as GDP, foreign savings or total consumption, can be both maximized and minimized in order to identify (through the shadow prices of the constraints) those aspects of the economy on which, in the longer term, more accurate information would be helpful and, meanwhile, those bounds that have to be tightened in order to reduce the feasible space for final estimates based on the data that is currently available. Such an approach allows statisticians to express their confidence in alternative data sources, to focus on areas of weakness in the primary data, and to revise and update initial estimates as new information becomes available simply by adding the new data to the accumulating information base, along with a statement about the bounds of accuracy that should be associated with them. The flexibility of this linear programming approach presents the prospect of being able to compile various alternative sets of national accounts, using different systems of classification and levels of aggregation, without a prohibitive amount of extra effort. Pilot studies in this area have already demonstrated the feasibility of the approach for relatively simple economies, and reference can be made to the dramatic improvements over 20 years in data storage and retrieval. Such developments provide a potentially robust infrastructure to support the information base that must underlie the national accounts of every country. Formalizing the methods of estimation that are applied to the primary data is not just desirable in terms of flexibility, documentation and replicability, but also becomes necessary at some point as the information base expands.

It seems, then, that the SNA should anticipate a break with the large pieces of paper or worksheets that have characterized the past towards a future in which primary information is suitably stored in large databanks and custom-made software packages permitting a variety of tabulations to be developed, each of them tailored to a different set of user requirements.

(d) Advances in methodology

2.134. The development of computing capacities has encouraged vigorous new developments in economic modelling as a response to the new issues and perspectives that have previously been discussed and the new data sources that have started to emerge. Two developments in particular are relevant to the present discussion. One is the comparatively recent evolution of micro-simulation techniques. The other is variously referred to as computable or applied general equilibrium modelling.

2.135. The essence of the micro-simulation approach is to model in detail the behaviour that is observed at the micro-level of individual firms or households. To do this often calls for different microdata sources to be used, which first requires that these data sets be rendered consistent, one with another. The approach, which owes much to Orcutt, has developed rapidly in recent years because of the growing body of micro-survey data and the capacity of computers to retain the large amounts of information that are inherent in such exercises. One obvious use of micro-simulation is to provide estimates of how various aggregates may change in response to policy innovations. It is therefore helpful if the national accounts aggregates are consistent with the micro-simulations. The advent of micro-simulation has raised in a particular guise the problems of reconciling inconsistent data and of treating household consumption in particular as a balancing residual rather than as a key component to be estimated directly.

2.136. General equilibrium models have by now been built for a great many countries and accordingly have a growing pedigree. Decaluwe and Martens[34] reference 73 models for 26 economies, mostly drawn from developing country experience and based in part on the pioneering work of Adelman and Robinson.[35] There is an even longer tradition in the developed world that goes back to Johansen[36] working on Norway and continues with the Cambridge (United Kingdom) Growth Project[37], the work of Shoven and Whalley[38] on the United States, and Powell and others working on the Orani model in Australia.[39] These are some of the more important contributions but by no means exhaustive of activity in this field, which is now supported by various user-friendly software packages and a growing number of textbooks.

2.137. While improvements in computing capacities have been critical to the development of general equilibrium models, it has also proved helpful to recognize that the accounting systems, which correspond to these models, can usefully be expressed in a matrix format. Hence, social accounting matrices (SAMs) and general equilibrium models can be explicitly linked, and should be, as argued, for example, by Hanson and

Robinson.[40] The basic requirements of general equilibrium modelling can therefore provide a ready agenda for SNA implementation, just as the requirements of input-output were similarly relevant back in 1968. To address this agenda is, perhaps, the primary challenge for today's implementation of the SNA.

3. Future directions

2.138. The main conclusion invited by the above argument is that when implementing the 1993 SNA, countries may be encouraged to adapt the System to their own needs, capabilities and priorities, resulting in country-specific social accounting matrices.

2.139. The starting point for this more flexible approach is the conceptual framework that is set out in diagram II.3 and a first task when implementing the 1993 SNA should be to provide an explanation of the framework and the concepts on which it is based. From there on it is a matter of recognizing various policy issues and perspectives and of demonstrating how these translate into SAMs or sub-components thereof.

2.140. To begin this process, the SNA could usefully recognize that for certain purposes a limited set of international comparable data is required. It is highly desirable, for example, to have internationally recognized definitions of gross domestic product and the national income. However, it is probably not necessary, and ultimately impossible, to have common definitions for all countries of all the different types of institutions to be encountered around the world. On the other hand, a consistent treatment among countries of international financial transactions and, inter alia, of offshore activities, embassies and so forth has obvious merit. The SNA should bring together the legitimate requirements for an internationally comparable set of data and proceed to define the simplest SAM that is consistent with them. This would be one of the SAMs that countries would be encouraged to have the capability to implement.

2.141. Apart from this minimum SAM that is required for comparative purposes, the SNA should encourage variety across countries in response to different needs and circumstances. In practice, this means that individual countries will want to develop their own system of classification for disaggregating the various accounts in table II.1 and their own way of describing the various mappings that are represented by the non-zero sub-matrices of the table. For example, some countries may want to disaggregate production by form of organization rather than according to the principal product produced. Similarly, for some purposes it may be preferable to disaggregate value added into types of payment (wages, social security, payments in kind and so on) rather than according to factors employed for example, a disaggregation of the labour force by sex and skill level, or by occupation). There seems to be no particular reason why national accounts based on the 1993 SNA should take a position on such choices, beyond pointing out that alternatives exist and that different disaggregations are useful for different purposes. Countries may, for instance, be encouraged to develop a minimum SAM, which is needed to support the basic models used by the World Bank and IMF in their policy dialogues with borrowing countries (see, also, sect. VII.C).

2.142. If one of the purposes is to support a computable general equilibrium model or, more generally, a macroeconomic analysis that has within it a concern for people and their living standards, then there is a further set of considerations that must enter into the choice among alternative classification systems. This can be approached by noting that if the linkages between accounts shown in table II.1 are reproduced as a flow diagram, the picture that then emerges is as set out in diagram II.4. Diagram II.4 makes it clear that, within the macroeconomy, there is a circular flow process and that what happens at one point on the circuit will have implications for experience at other junctures. This observation translates into the notion that, at some point, there is a need for being equally concerned with all the different aspects of technology and behaviour that together describe the circular income flow and the connections (or lack thereof) that characterize an economy. This is the full force of the general proposition that production structure and income distribution are inextricably interwoven, so that the one cannot be analysed properly without reference to the other. In illustrating this argument, the diagram shows that the income that institutions derive from their contributions to productive activity is transmitted through, and therefore modified by, the markets for factor services. It therefore follows that if one is interested in the distribution of income across socio-economic groups, that is, in how different types of people are affected by policy change or exogenous events, then it is necessary to examine in corresponding detail what is happening in labour markets. It is not realistic to expect that poverty can be analysed without reference to unemployment. More generally, to the extent that labour services are far from homogeneous, for example, with respect to location, education, age, sex or race, then different labour markets must be recognized in the SNA if it is to be relevant from this point of view.

2.143. A further point that is implicit in the above arguments is that richness in the system of classification that is used to describe one aspect of an economy is lost as we go around the circuit in diagram II.4 unless a similar richness is adopted for the classification of all other aspects. If there is only one type of labour distinguished in the SAM, then changes in export demands are not allowed to have much influence on income distribution. If exports are produced mainly by a plantation sector, with its own identifiable and separate labour force, then an increase in export demand for plantation crops will obviously favour those who work on the estates and be of indirect benefit at best to subsistence farmers or the urban sector. Whether or not such essential characteristics of an economy are captured in its system of national accounts will depend entirely on the classification systems adapted within the general framework of table II.1. Within such general guidelines it is essentially for countries to develop their own systems of classification to meet their particular needs and institutional realities. In EU countries it makes little sense to talk of a plantation sector. Elsewhere, it is self-evident that agriculture is far from homogeneous and must be disaggregated, not necessarily by crop produced, but by forms of organization and the different methods of production that distinguish subsistence farms, sharecroppers, smallholders, ranches and plantations.

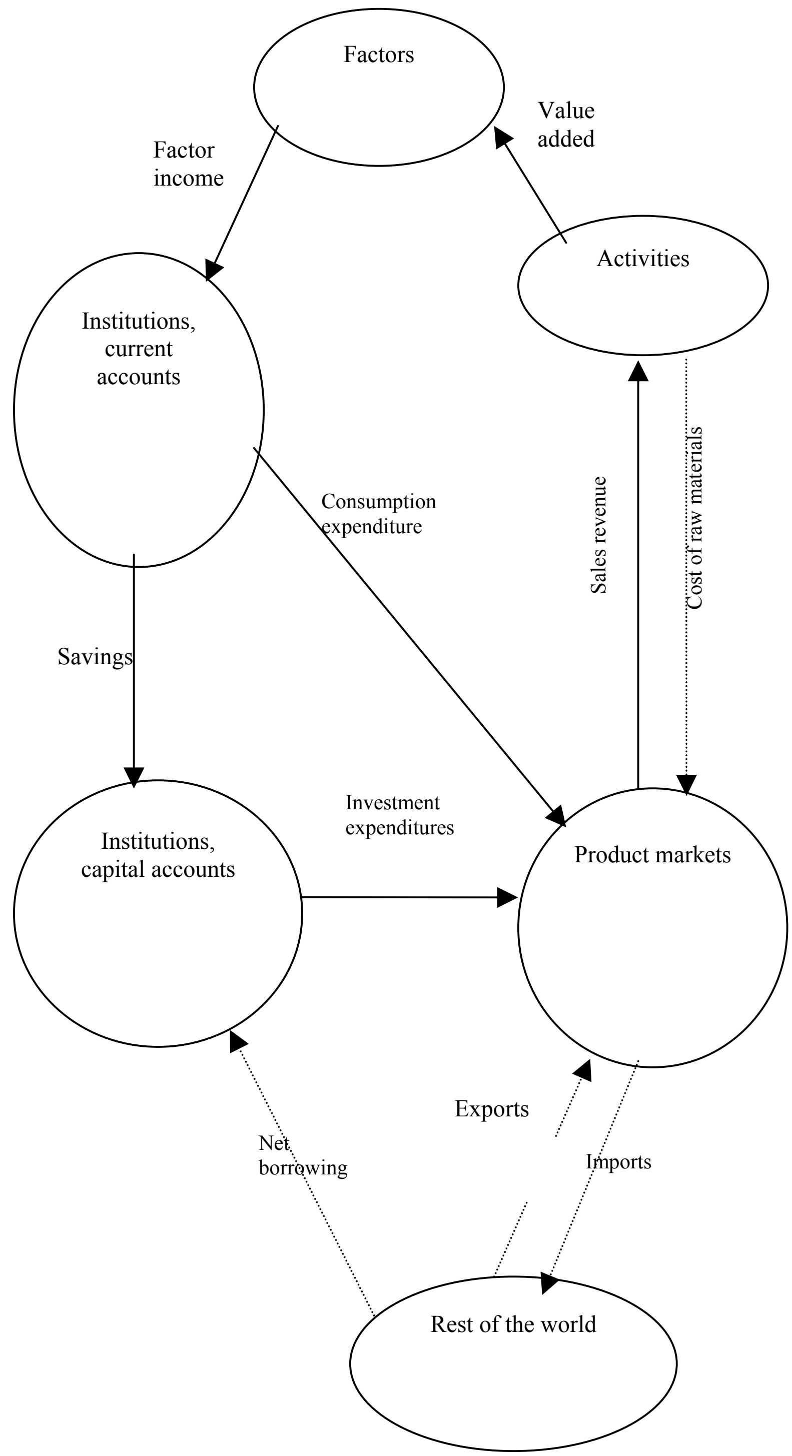
2.144. In a similar spirit to these arguments, it can be suggested that the incorporation of environmental statistics within the national accounting capability is a matter to be left to separate initiatives at the national level. The environmental problems of national and global economies alike are belittled by the suggestion that they can be dealt with as a side show in a system of satellite accounts. Equally, there is no consensus as yet on which to base the specification of internationally comparable data that all countries should be urged to supply. Research is moving quickly so that this situation may evolve quite rapidly. If a flexible approach to SNA implementation were developed, it would be relatively easy to promote the new ideas that may soon emerge in this or other fields. The possibility that progress in monitoring our environment may otherwise be held back is perhaps reason enough for thinking that a monolithic SNA is not what is needed in today's world.

2.145. From the perspective that has been argued in the present section, there is little more to be said about the form that a country-specific SNA might take. However, other authors have given a much greater emphasis to the data aspect of the issues, moving upwards from the foot of diagram II.3 in order to arrive at their preferred form for the SNA that is implemented, rather than the top-down approach that has been followed here. Given that there is a mutual sympathy between the conclusions suggested here and those of other authors, it is useful to make the connection with their views. According to the position taken in the present paper, the development of a national accounting capability involves, in the first instance, developing the ability to construct alternative SAMs involving alternative systems of classification, different mappings and different degrees of disaggregation within the framework of the structure that is shown as table II.1. This, in turn, necessitates an adequate database and the ability to use the information within it for SAM construction. Accordingly, the data that are required are the data that are sufficient to sustain a given set of SAMs. These data may therefore be thought of as a sufficient statistic for the given set of SAMs. As such, they can be thought of as a relatively basic and non-transformed set of details on actual transactions at market prices, for which the parties to the transaction and the nature of what is being transacted can be readily identified.

2.146. This notion of the data set as a sufficient statistic for building alternative SAMs takes us very close to the concept of a core, which has been suggested by van Bochove and van Tuinen, who write:

> *"...if the SNA is to serve as the basis for the construction of SAM's, the need to bring it closer to institutional reality and subjective experience of transactors bulks large".* [41]

Diagram II.4. The circular flow of income



And then go on to say that

> *"... instead of trying to provide the comprehensive framework for the statistical description of economic systems, [the SNA should] be comprehensive in the sense of facilitating the construction of all the alternative descriptions that are relevant for science, policy and business, both now and in the future. The best way to achieve this is by means of a systems structure that consists of, on the one hand, a core and on the other a range of modules".*[42]

(The "building blocks" referred to here are specific multipurpose tabulations that can be derived from the core, such as an input-output table.)

2.147. Support for this general approach has been expressed by other authors and, in a notable contribution to the debate, the late Nancy Ruggles argued that:

> *"...although additional subsectoring, intermediate accounts, satellite accounts, and supplementary tables can furnish some of the needed additional information about distributive questions, they do not provide the type of data needed for microanalytic modeling and simulation. In a number of countries, governments and research organizations are not engaged in carrying out studies of this kind on such topics as the distributional impacts of the tax system or government expenditure programs. The availability of microdata bases for both households and enterprises is increasing rapidly, but the possibility of linking these micro-data bases to the macro accounts is still quite limited. The [van Bochove and van Tuinen] paper, with its core consisting of simple aggregation of the micro transactor accounts, provides the basis for such an integration, while at the same time encompassing the content of the existing SNA".*[43]

2.148. The fact that these arguments ultimately take us back to SAMs has also been noted by Hanson and Robinson in the following terms:

> *"Both micro-simulation and CGE [computable general equilibrium] models focus on the underlying structure of the economic system. They both emphasize market and non-market linkages among micro actors. It is through these linkages that the structural adjustment processes we are observing will work themselves out. With the increased need to support structural analysis in an economy-wide framework, the SAM accounting system provides the best available framework for reconciling the accounts of micro actors with the macro aggregates which have traditionally been the focus of statistical agencies."*[44]

2.149. It would seem that there is a growing consensus on future directions emerging in the literature. How it is arrived at or expressed may be a secondary matter, but it would seem that the monolithic SNA that has served in the past is not what is wanted for the future. What is wanted instead is first a framework for data on actual transactions at actual prices and by actual institutions and, secondly, some guidance on the appropriate design of social accounts to serve particular policy concerns. One must then look to the evolution in information technology for access to whatever database is available, and for the capability to process its contents in support of quantitative analysis of contemporary issues.

Notes:

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[1]J.M. Keynes, The General Theory of Employment, Interest, and Money (London, Macmillan, 1936).

[2]L.R. Klein, 'What is macroeconomics?', Monetary Theory and Thought, H. Barkai and others, eds.. (London, The Macmillan Press, 1993), pp. 35-51.

[3] J. Tobin, "Liquidity preference as behavior towards risk," Review of Economic Studies, vol. 25 (February 1958), pp. 65-86.

[4]M. Kalecki, "The short-term rate of interest and the velocity of cash circulation", Review of Economic Statistics, vol. 23 (May 1941), pp. 97-99.

[5] M. Saito, "Household flow-of-funds equations", The Journal of Money Credit and Banking, vol. 9 (1977), pp. 1-20.

[6] See L. Klein and others, "Complementarity and conflict among population and other policies: policy models/applications". Phase A, the Philippines (1994) and phase B, Chile (1996) United Nations Population Fund/ Department for Economic and Social Information and Policy Analysis of the UN Secretariat).

[7] R. Kaufmann and Peter Pauly, "International aspects of carbon taxation, "LINK Proceedings 1991-1992, B.G. Hickman and L. Klein, eds. (Singapore, World Scientific Publishing, 1988), pp. 119-152

[8] Later, by mid-1999, the discrepancy exceeded $100 billion again, in absolute terms. The problem remains.

[9] Permission was obtained from the editors of the Review of Income and Wealth, to incorporate this slightly revised version of an article published in that journal (series 37, No. 2 (June 1991)).

[10] C.A. Van Bochove. and H.K. Van Tuinen, "Flexibility in the next SNA: the case for an institutional core", Review of Income and Wealth, Series 32, No 2 (1986).

[11] N. Ruggles, "Comment" on papers on the structure of the SNA, "Review of Income and Wealth, series No. 32, No 2 (1986).

[12] A System of National Accounts, Studies in Methods, Series F, No. 2, Rev. 3 (United Nations publication, sales no. E.69.XVII.3).

[13] See A Standardised System of National Accounts, Paris, OEEC, 1952.

[14] This has been recognized in many ways, not least by the award of the Nobel Prize in Economics to the principal architect, Richard Stone.

[15] John Hicks, The Social Framework, (Oxford, Claredon Press, 1942).

[16] Richard Stone, "Social accounting aggregation and invariance", Economie Appliquée, vol. 11 no.l (1947).

[17] A matrix representation of the transactions among a group of people is adopted in R. Frisch, 'Circulation planning; a proposal for a national organisation of a commodity and service exchange", Econometrica, vol. 2, pp. 258-336 (1934). However, the Stone reference cited is the earliest traced to date for the matrix representation of the social accounts. The transition from the former to the latter is explained from first principles in a paper presented at the General Conference of the International Association for Research in Income and Wealth held in Lahnstein, Germany in August 1989.

[18] See Cambridge University, Department of Applied Economics, A Programme for Growth, vols. I-XII (1962-1974), (Cambridge, Chapman and Hall).

[19] Richard Stone, Towards a System of Social and Demographic Statistics, Studies in Methods, Series F, No. 18 (United Nations publication, sales no. E.74.XVII.8).

[20] Richard Stone, D.G. Champernowne and J.E. Meade, "The precision of national income estimates", Review of Economic Studies, vol. IX no. 2, pp. 111-125 (1942).
[21] R. Byron, "The estimates of large social accounting matrices", Journal of the Royal Statistical Society, series A, vol. 141, part 3 (1979), pp. 359-367.
[22] G. Pyatt, "Commodity balances and national accounts: a SAM perspective", Review of Income and Wealth, series 31, no. 2 (1985).
[23] The argument presented here may need amendment, as it is based on the 1968 recommendations for the treatment of product taxes (terminology of the 1993 SNA). These taxes were excluded from output and also from intermediate consumption in order to arrive at value added in so-called approximate basic prices. In the 1993 SNA this treatment has been amended. The same valuation for output is used, excluding product taxes, but for intermediate consumption, the 1993 SNA recommends to use market prices, including product taxes that are levied on these inputs. Value added derived as the difference between output at basic prices and intermediate consumption at market prices is called value adder in basic prices.
[24] Such duplication of effort has, in the past, led to some confusion and acrimony in debating the impact of World Bank structural adjustment loans in sub-Saharan Africa.
[25] See note 19.
[26] Richard Stone, "The disaggregation of the household sector in the national accounts" in Social Accounting Matrices: A Basis for Planning, G. Pyatt. and J.I. Round, eds., Washington, D.C., World Bank, 1985.
[27] See A. Harrison, "National accounting and income distribution", Review of Income and Wealth, series 37, no.3 (1991).
[28] G. King, Natural and Political Observations and Conclusions upon the State and Condition of England, , Baltimore, Johns Hopkins University Press, 1936.
[29] G. Becker, "A theory of the allocation of time", The Economic Journal (September 1965).
[30] See note 24.
[31] 'While the World Bank programme in Africa, known as the Social Dimensions of Adjustment, is of relatively recent origin, the work of the Living Standards Measurement Study goes back to 1980; Living Standards Measurement Study, working papers nos. 1-32 and ongoing (Washington, D.C., World Bank, 1980 to present).
[32] See note 20
[33] See note 21.
[34] B. Decaluwe and A. Martens., "COE modelling and developing economies: a concise empirical survey of 73 applications to 26 countries", Journal of Policy Modeling, vol. 10, no. 4 (1988).
[35] I. Adelman and S. Robinson, Income Distribution Policy in Developing Countries: A Case Study of Korea (Oxford, Oxford University Press, 1978).
[36] Johansen, A Multi-sectorat Study of Economic Growth, Amsterdam, North Holland, 1960.
[37] The work of the Cambridge growth project dates from 1959. Among the most recent of many publications is T. Barker and W. Petersen, eds., The Cambridge Multisectoral Dynamic Model of the British Economy (Cambridge, Cambridge University Press, 1987).
[38] Shoven, J. B. and Whalley, J., A General Equilibrium Calculation of the Effects of Differential Taxation on Income from Capital in the U.S., Journal of Public Economics, 1, 281-321, 1972.
[39] The Australian contributions in this field are discussed, for example, in A. Powell and B.R. Parmenter, The IMPACT project as a tool for policy analysis: brief overview, Australian Quarterly, vol. 51, no. 1 (1979), pp. 62-74, while a useful survey is presented in J.B. Shoven. and J. Whalley, "Applied general equilibrium models of taxation and international trade: an introduction and survey", Journal of Economic Literature, vol. 22 (1984), pp. 1007-1051.
[40] "See also G. Pyatt, "A SAM approach to modelling", Journal of Policy Modelling, vol. 10, no. 3 (1988) and J. De Melo, "SAM-based models: an introduction. Journal of Policy Modelling, vol. 10, no. 3 (1988), both of which are contributions to a special issue of the Journal of Policy Modelling on SAM-based models.

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[41] See note 10, p. 137.
[42] Ibid., p. 139.
[43] See note 11, p. 216.
[44] K.A. Hanson and S. Robinson, Data, Linkages and Models: U.S. National Income and Product Accounts in the Framework of a Social Accounting Matrix, United States Department of Agriculture, Economic Research Service (Washington, D.C.1989), p. 150.

III. USES OF NATIONAL ACCOUNTS IN ECONOMIC ANALYSIS

3.1. The present chapter includes a number of analysis formats that may be considered traditional and that are based mainly on the data contained in the economic core of the 1993 SNA. The first section (sect. A) presents a version of the SNA framework dealing with analysis of production, income and saving. It includes aggregate SUT data and also IEA data for the main sectors of the SNA, covering the production, income and use of income and capital accounts. The analysis in this section is represented by a selection of indicator ratios that can be derived from the format of the accounts as presented. As it is the first section dealing with indicators in relation to macro accounts, the section reflects on the facilities that macro accounts provide to improve the internal coherence of indicator analysis and establish an effective link between the development of indicators, policies and data development. Section B enters into the details of I-O analysis, which is based on the SUT segment of the SNA. It discusses how the new features of the SUT segment in the 1993 SNA would influence existing approaches to I-O analysis. Section C supplements the "real economy" analysis of the first two sections with the remaining elements of economic analysis, including fiscal, financial and monetary analysis, based on the financial accounts and balance sheets of the System. The section presents the accounting framework for this type of analysis and identifies an additional set of indicator ratios, which would supplement the analysis as described in section A. The chapter ends (sect. E) with a presentation of indicator analysis in the practice of one country, the Philippines

A. Indicator analysis of production, income and saving

3.2. The analysis pursued in this section covers the link between the generation of value added by industries and disposable income received by sectors, after distribution of value added to production factors of labour and capital and redistribution through social and other transfers. Thereafter, the use of disposable income for final consumption and capital formation is confronted with output resulting from production.

3.3. A set of national accounts data – even if reduced to the format presented in this section -is generally too large and conceptually too complex for users to handle in analysis. They therefore require that the data set be summarized into a smaller set of indicators that could be used to assess economic conditions and development of a country. This type of analysis has been referred to in the introduction as indicator analysis. A special type of indicators, namely, indicator ratios, are used in the present section. The reason for using ratios between data rather than the data themselves is that data generally provide little information, unless they are related to other data. Thus, a GDP figure becomes only meaningful if its growth over time is analysed, a per capita figure is derived that makes it possible to compare the data between countries, or a percentage breakdown by expenditures or activities is presented. Similarly, data about the level of imports are not very informative unless they are related to exports or to domestic output, or a breakdown by products is shown. The remaining part of the section refers exclusively to indicator ratios, but often the overall term "indicators" is used, as many of the statements also apply to indicators that are not indicator ratios.

3.4. This and subsequent sections of the present chapter, as well as other sections in this and later chapters (in particular, sects. III.A, C and D, chap. IV, and sects. VI.A, C and D), emphasize the use of indicators in the context of macro accounts, with two objectives in mind. On the one hand, analysis using indicators based on macro accounts would improve the use in analysis of macro accounts. On the other hand, defining indicators within a framework of macro accounts would improve the consistency of the indicators, as they would be based on data that are reconciled within the accounts.

1. Accounting framework

3.5. Table III.1 sets out the accounting framework underlying the analysis of the present section. It is based on the accounting framework of diagram II.1 described in the previous chapter, but includes several simplifications of the SUT and IEA by aggregating sectors and transaction items and also by eliminating some of the accounts. The CCIS has not been included in this framework. Also omitted from table III.1 are the financial accounts and balance sheets, which will be dealt with in section C below. The scope of the accounts is typically an aggregate presentation for a country with medium development of national accounts (roughly, milestone 4 as defined by the Inter-Secretariat Working Group on National Accounts).[1]

3.6. For each item in table III.1 there are two data items describing the economic conditions and development of a fictitious country in and between periods (t) and (t+1), respectively. The data for period (t) are entirely based on the illustrative data set included in the 1993 SNA and the data for period (t+1) are an extension of these data, based on assumptions of economic development.[2] In section VI.D, it is explained how the (t+1) data have been derived on the basis of a newly developed estimation technique, which formalizes the present compilation methodology used in national accounting.

3.7. The columns of table III.1 refer to sectors of the economy and the rows to accounts. The first column contains the aggregate data on industries, while other columns refer to the rest of the world and three aggregate resident institutional sectors, that is, Government, corporations and households. The rows of accounting data for each sector are grouped together by four segments. The first segment refers to the SUT and covers rows (1) through (3). The second segment, covering rows (4) and (5), refers to the main product, income and related aggregates, including GDP, at current and constant prices, disposable income before and after taxes, and saving, and the corresponding employment and population data needed to derive product and income aggregates per worker and per

Table III.1 National accounts data (illustrative)

TOTAL ECONOMY

(units: million US dollars, thousand m/years, thousand inhabitants, 100= price index in base year)

INDUSTRIES (column 1)

		(t)	(t+1)
row (1)	[1] Output, incl. product taxes less subsidies	3,737	4,034
row (2)	[2] Intermediate consumption	1,883	2,033
row (3)	[3] Gross capital formation, total economy	414	490
row (4)	[4] GDP, market prices, current prices	1,854	2,001
row (5)	[5] GDP, market prices, constant prices	1,160	1,228
row (6)	[6] Compensation of employees paid and mixed income , gross	1,204	1,252
row (7)	[7] Employment, thousand m/years worked	33.350	33.657
row (8)	[8] Taxes on production and imports, less subsidies	191	206
row (9)	[9] Operating surplus, gross (excl. mixed income)	459	544

REST OF THE WORLD (column 2)

		(t)	(t+1)
row (1)	[10] Imports	499	543
row (2)	[11] Exports	540	567
row (4)	[12]=[11]-[10] External balance of goods and services	41	24
row (6)	[13] Compensation of employees, received by residents less paid to non-residents	4	3
row (8)	[14] Taxes on production less subsidies plus taxes on income and wealth, received by resident government less paid to non-resident government	1	0
row (9)	[15] Other incomes, receipts by residents less payments to nonresidents	-8	-10
	[16]=[12]+[13]+[14]+[15] Net lending, rest of the world	38	17

Production taxes less subsidies have not been allocated to sectors, but only recorded for the total economy ([8])

Gross capital formation includes the value of improvements to land and the cost of ownership transfers of non-produced assets ([3], [18], [2], [27])

Disposable income of households ([28]) includes adjustment for the change in net equity of households on pension funds, and is after deduction of taxes on income and wealth. In the case of disposable income before taxes ([29]), no tax deductions have been made.

Other incomes, receipts less payments ([15], [20], [24], [26]) include operating surplus gross, property income and non-tax current and capital transfers. Capital transfers received less paid include acquisition less disposal of non-produced non-financial assets. In the case of households ([26]), operating surplus excludes mixed income and capital transfers, which are presented separately. In the case of the Government ([20]), other incomes have been replaced by other outlays, which are equal to payments less receipts of property income and non-tax current and capital transfers, less operating surplus gross.

Table II.1 (continued)

<<OF WHICH>>

GOVERNMENT (column 3)	(t)	(t+1)	NON-FINANCIAL AND FINANCIAL CORPORATIONS (column 4)	(t)	(t+1)	HOUSEHOLDS, incl. NPISHs (column 5)	(t)	(t+1)	
[17] Final consumption, Government	368	385				[26] Final consumption, households	1,031	1,102	row (2)
[18] Gross capital formation, Government	40	41	[22] Gross capital formation, corporations	287	316	[27] Gross capital formation, households	87	133	row (3)
									row (4)
									row (5)
						[31] Compensation of employees ar mixed income, received	1,208	1,255	row (6)
									row (7)
[19] Taxes on production less subsidies plus taxes on income and wealth, received by Government	404	366	[23] Taxes on income and wealth, paid by corporations	34	29	[35] Taxes on income and wealth, p by households	178	131	row (8)
[20] Other outlays, payments less receipts by government	46	48	[24] Other incomes, receipts less payments by corporations	257	259	[36] Other incomes, receipts less payments by households	229	312	row (9)
						[37] Capital transfers households, receipts less payments	11	11	row (10)
						[29]= [31] +[36] Disposable income before taxe gross	1,437	1,567	row (11)
						[28]= [29] -[35] Disposable income, gross	1,259	1,435	row (12)
						[30]= [28] -[26] Saving, gross	228	333	row (13)
[21]=[19]-[17]-[18]-[20] Net lending, government	-50	-107	[25]=[24]-[23]-[22] Net lending, corporations	-64	-87	[38]=[30] +[37]-[27] Net lending, households	152	211	row (14)
						[34] Increase of population, thousai inhabitants	1.300	1.200	row (15)
						[32] Size of population, thousand inhabitants, beginning of year	88.700	90.000	row (16)
						[33] Size of population, thousand inhabitants, end of year	90.000	91.200	row (17)

capita. The third segment, covering rows (6) through (8), refers to receipts and payments of compensation of employees, taxes and other income and outlay data. The last segment of row (9) includes net lending for each sector; it is considered in the analysis of the present chapter as the main analytical balancing item, except for the household sector, for which disposable income and savings are also shown.

3.8. The individual elements may be explained with the help of the data for year (t). The elements of the aggregate SUT are reflected in rows (1) to (4). They include elements of supply (row (1)), that is, output ([1]: 3,737) and imports ([10]: 499), and elements of use (rows (2) and (3)), that is, intermediate consumption ([2]: 1,883), exports ([11]: 540), final consumption of Government ([17]: 368) and households ([26]: 1,031), and gross capital formation ([3]:414, [18]:40, [22]:237 and [27]:87). In the intersection of rows (4) and (5) and columns (1) and (2) two main aggregates are presented, that is, GDP in current market prices ([4]: 1,854), GDP in constant prices ([5]: 1,160) and the external balance of goods and services ([12]: 41). The way in which the elements of the SUT are integrated with those of the IEA has implications for the presentation of some of the flows. Gross capital formation is presented as a total for all industries ([3]: 414) in column (1) and row (3) and at the same time as a breakdown by sectors ([18], [22] and [27]: 414=40+287+87) in row (3) and columns (3) to (5). Compensation of employees, together with mixed income paid by industries ([[6]: 1,204), is presented in row (6) and column (1), received by workers less paid to abroad ([13]: 4) in column (2), and the total of the two received by households ([31]: 1,208 = 1,204 + 4) is presented in column (5). Mixed income is added to compensation of employees, and the combined item is used as a proxy for labour income corresponding to total employment. The latter item ([7]: 33.350), presented at the intersection of column (1) and row (7), also includes data on employment. In the case of taxes, presented in row (8), the total amount received by the Government ([19]: 404) is shown in column (3). This is the sum of the taxes on production and imports less subsidies ([8]: 191) paid (and received) by resident industries as presented in column (1), taxes on income and so forth paid by corporations ([23]: 34) and households ([35]: 178) as presented in columns (4) and (5), and production and income taxes less subsidies received by the Government from abroad less those paid to non-resident Governments ([14]: 1) as presented in column (2).

3.9. The same transactions could be looked at from a sector perspective. This is reflected in the institutional sector accounts, which are only presented for three aggregate groupings of institutional units, that is, Government, corporations covering non-financial as well as financial enterprises, and households, including non-profit institutions. The rest of the world is treated as a separate column of the total economy. The institutional sector accounts are structured in such a way that they highlight the specific features of each sector.

3.10. In the case of the government sector, taxes are identified and juxtaposed to three types of main expenditure categories, that is, government consumption ([17]: 368), capital formation ([18]: 40) and other outlays less receipts ([20]: 46). The latter ones are the total of social and other current and capital transfers, that is, payments less receipts, to which is added operating surplus; consumption of fixed capital is not separately identified and therefore operating surplus is gross, and capital transfers include disposals less acquisitions of non-produced assets. The total outlays of the Government ([17]+[18]+[20]: 454=368+40+46) are not identified in table III.1, but they are used when defining indicator ratios in table III.2 (see below). Government deficits are assumed to be reflected in net borrowing of this sector, which is equal to the difference between total expenditures made and total taxes received ([21]: -50= 404-454).

3.11. For corporations (column 4), all revenues before taxes ([24]:257) are lumped together in one item, which covers operating surplus, gross and also property income and current and capital transfers, receipts less payments. Total revenues are confronted with the taxes on income and wealth ([23]: 34) and gross capital formation ([22]: 287). The difference between revenues on the one hand and taxes and gross capital formation is equal to net borrowing of this sector ([25]: -64=257-287-34).

3.12. For households (column 5), two revenue items are identified, namely, compensation of employees, including mixed income ([31]: 1,208) and other revenues less payments ([36]: 229), which cover operating surplus (not including mixed income) and current transfers and property income, receipts less payments. The outlay items are final consumption of households ([26]: 1,031), gross capital formation ([27]: 87) and taxes on income and wealth ([35]: 178). As household spending "behaviour" is determined by disposable income before taxes ([29]: 1,437=1,208+229) and after taxes ([28]: 1,259=1,437-178) and by saving ([30]: 228=1,259-1,031), these aggregates, together with net lending of the household sector ([38]: 152=228+11-87), are identified separately. In order to do this, capital transfers, received less paid ([37]: 11)) were also separately identified. Also included in this sector are data on the size of the population at the beginning ([32]: 88.700) and end ([33]: 90.000) of the accounting period and the population increase between those points in time ([34]: 1.300). The population data are included as a means of deriving the per capita indicators.

3.13. The limited breakdown of revenue and expenditure categories in the three sectors of the national economy is also reflected in the rest-of-the-world accounts. They include, in addition to exports ([11]: 540), imports ([10]: 499) and the external balance of goods and services ([12]: 41=540-499), compensation of employees received from less paid to abroad ([13]: 4), taxes on income, wealth and production received less paid ([14]: 1), and the sum of property income and current and capital transfers received less paid to non-residents ([15]: -8). Also, net lending by the rest of the world is identified; it is the sum of the external balance of goods and services plus the three types of revenues less payments mentioned ([16]: 38= (540-499)+(4+1-8)). In order to keep the presentation of the accounts as simple as possible, corresponding items for the total economy, such as gross national income, gross national disposable income and net lending, were not explicitly identified, but can, of course, be derived.

Table III.2 Indicator values (derived from national accounts data of table II.1)

Aggregates per capita and per worker

			(t)	(t+1)
[28]/[33][a]	@1	Household disposable income/capita (thousand US dollars)	13.989	15.739
[26]/[33]	@2	Household final consumption/capita (thousand US dollars)	11.456	12.083
[4]/[33]	@3	Per capita GDP (thousand US dollars)	20.599	21.944
[4]/[7]	@4	Value added (= GDP) per worker (thousand US dollars)	55.589	59.461
[5]/[7]	@5	Value added (= GDP) constant prices per worker, labour productivity (thousand US dollars per m/year)	34.782	36.476
[6]/[7]	@6	Average labour remuneration per worker (thousand US dollars per m/year)	36.101	37.184

Prices

			(percentage)	
[4]/[5]	@7	GDP price deflator	159.8	163.0
([4]/[5]) / ([4] -1/[5]-1)-1	@8	Inflation rate		2.0

Balance of payments

			(percentage)	
[10]/([1] +B7+[10])	@9	Import/supply-use	11.8	11.9
[12]/[4]	@10	Export- import gap as percentage of GDP	2.2	1.2
[16]/[4]	@11	Net lending to abroad/GDP	2.0	0.9

Notes

[a] Numbered symbols generally refer to the values of valriables in periods (t+1) or (t), depending on the period for which the indicator ratios are defined. If ratios are defined between values of variables of periods (t+1) and (t), this is explicitly indicated.

[b] absolute figure(s) (not percentage)

Production

			(t)	(t+1)
			(percentage)	
[4]/[1]	@12	Value added /output coefficient, total	49.6	49.6
[6]/[4]	@13	Labour share in value added (= GDP)	64.9	62.5
[3]/[4]	@14	Investment share in value added (= GDP)	22.3	24.5
$[3]/([4]_{t+1}-[4]_t)$	@15	Incremental capital - output ratio	[b]	3.3
$([5]_{t+1}/[7]_{t+1}/ ([5]t/[7]_t) -1$	@16	Value added (= GDP) constant prices per worker, labour productivity increase	0.0	4.9
$([5]_{t+1}-[5]_t)/[5]_t$	@17	GDP real growth	0.0	5.8
[16]/[3]	@18	Net lending to abroad/capital formation, total economy	9.2	3.6

Behaviour and participation of corporations in the economy

			(percentage)	
([24]-[23])/[22]	@19	Earnings (after taxes)/gross capital formation, corporations	77.7	72.6
-I25]/ ([16]+ [38])	@20	Corporate net borrowing/total net lending of the economy	33.7	37.9

Population, employment and labour income

			(percentage)	
[31]/[29]	@21	Labour income as share of disposable income of households, before taxes	84.1	80.1
[28]/[4]	@22	Household disposable income/ GDP	67.9	71.7
[7]/[33]	@23	No. of employees/population	37.1	36.9
([7]-[7] -) / +H12([7]-1)	@24	Employment growth	0.0	0.9
[34]/[32]	@25	Population growth	1.5	1.3

Table III.2 (continued)

Behaviour and participation of Government in the economy

(percentage)

			(t)	(t+1)
[17]/([17]+[18]+[27])	@26	Government consumption/ total expenditures of Government	81.1	81.2
[18]/([17]+[18]+[27])	@27	Government capital formation / total expenditures of Government	8.8	8.6
[27]/([17]+[18]+[27])	@28	Other expenditures of Government/ total outlays	10.1	10.2
[21] / ([17]+[18]+[27])	@29	Net borrowing/total expenditures of government	11.0	22.6
-[21] / ([16] +[38])	@30	Government net borrowing/total net lending of the economy	26.3	46.8
-[21]/[4]	@31	Government net borrowing/GDP	2.7	5.3

Taxes

(percentage)

[23]/[24]	@32	Taxes/revenues of corporations	13.2	11.2
[35]/[29]	@33	Income tax ratio of household disposable income before taxes	12.4	8.4
[8]/[4]	@34	Production taxes less subsidies/value added (=GDP)	10.3	10.3
[19]/[4]	@35	Total taxes/GDP	21.8	18.3

Behaviour and participation of households in the economy

(percentage)

[26]/[28]	@36	Propensity of households to consume	81.9	76.8
[27]/[30]	@37	Capital formation/saving, households	38.2	40.0
[17]/[26]	@38	Government/household consumption ratio	35.7	34.9
[26]/[4]	@39	Household consumption/GDP	55.6	55.1
-[38]/([16]+[38])	@40	Net lending of households/total net lending	80.0	92.4

2. Indicators to assess economic conditions and developments

3.14. Table III.2 presents a selection of indicator ratios that can be compiled on the basis of the data of table III.1. Together, they define the analysis that can be carried out on the basis of the accounting framework. The indicator ratios are roughly grouped together by types that describe economic conditions and development of segments or aspects of the economy of a country and/or policies aimed at influencing developments and/or conditions with respect to them.

3.15. The first three groups of indicator ratios (aggregates per capita and per worker, prices and balance of payments describe the total economy and its relations with the rest of the world. The second group (production, behaviour and participation of corporations in the economy) includes indicator ratios describing production by industries and also the behaviour and participation of corporations therein. A third group of indicator ratios (behaviour and participation of Government in the economy, taxes) describes the elements of fiscal policies and the impact of those on other sectors. And the last group of indicator ratios (population, employment and labour income; behaviour and participation of households in the economy) measures the economic counterpart of social policies affecting employment, and labour income as well as describing the behaviour and participation of households in the economy. It should be noted that the indicator ratios included in table III.2 are merely a selection, which could be extended for alternative analyses, but of course, within the data constraints of table III.1. The selection, however, shows that a relatively large number of indicator ratios can be derived from a relatively small data set.

3.16. The values of the selected indicators in table III.2 may serve to assess the main features of the economy of the country in period (t) and its development between periods (t) and (t+1). The following illustrates the type of analysis that may be based on the indicator values for periods (t) and (t+1), as shown in table III.2:

- The country is a high-income country, with a per capita GDP (@3) of 20,599 in year (t), GDP per worker (@4) of 55,589, labour income per worker (@6) of 36,101, and household disposable income per capita (@1) of 13,989;
- Exports are growing, but imports are growing even faster. This results in a reduction of the export-import gap as a percentage of GDP (@10) from 2.2 to 1.2 per cent and an increase of the import share of total supply (@9) from 11.8 to 11.9 per cent between periods (t) and (t+1);
- Real GDP of the economy is growing (@17) at a rate of 5.8 per cent, labour productivity (@16) at a rate of 4.9 per cent, the marginal capital-output ratio (@15) is 3.3, and the share of investments to GDP (@14) increased from 22.3 to 24.5 per cent;
- At the same time, there was inflation (@8) of 2 per cent in period (t+1);
- Even though the above results in an employment growth (@24) of 0.9 per cent, this is slower than the growth of the population (@25) of 1.3 per cent in year

(t+1), which results in a reduction in the employment population ratio (@23) from 37.1 to 36.9 per cent;

- The effective tax rates have decreased between periods (t) and (t+1): the income and wealth tax rate for corporations (@32) decreased from 13.2 to 11.2 per cent and for households (@33) from 12.4 to 8.4 per cent; the rate of production taxes less subsidies as a percentage of GDP (@34) remained stable at 10.3 per cent and the total tax rate as a percentage of GDP (@35) decreased from 21.8 to 18.3 per cent;
- This has resulted in an increase of government net borrowing as a percentage of total net lending (@30) from 26.3 to 46.8 per cent and also in an increase of government net borrowing as a percentage of GDP (@31) from 2.7 to 5.3 per cent;
- At the same time, the Government increased its expenditures on consumption and capital formation, resulting in a slight increase of government consumption as a percentage of total government expenses (@26) from 81.1 to 81.2 per cent and a decrease of capital formation as a percentage of government expenses [(@27) from 8.8 to 8.6 per cent;
- Corporations reduced their own funding of capital formation through retained earnings (@19) from 77.7 to 72.6 per cent and, accordingly, increased their reliance on total net lending from households and the rest of the world (@20) from 33.7 to 37.9 per cent;
- Households increased their consumption and capital formation, however not at the same rate as their income. This results in a reduced propensity of households to consume (@36) from 81.9 to 76.8 per cent, an increase in their investment-saving ratio (@37) from 38.2 to 40.0 per cent, and a reduction in household consumption as a percentage of GDP (@39) from 55.6 to 55.1 per cent. At the same time, the Government reduced its contribution to total consumption (@38), as reflected in a decrease from 35.7 to 34.9 per cent. Nevertheless, net lending of households to total net lending (@40) increased from 80.0 to 92.4 per cent.

3.17. The above illustrates two related aspects of measurement. On the one hand, it shows how indicators are used in analysis to assess economic conditions and developments over time. On the other hand, it illustrates that this assessment is fully dependent on the indicators selected, and may change if other indicators are selected for the assessment. For instance, the above analysis highlights (point e) the reduction in employment as a percentage of the total population (@23) from 37.1 to 36.9 per cent. However, there would be a different perception when assessing this development on the basis of alternative indicators. For instance, the ratio of household disposable income over GDP (@22) increases from 67.9 to 71.7 per cent, the ratio of the labour share of GDP (@13) reduces from 64.9 per cent to 62.5 per cent, and labour income as a share of disposable income of households, before taxes (@21) reduces from 84.1 to 80.1 per cent.

3. Reflections on indicator analysis within macro accounts

3.18. The above use of indicators in assessing economic conditions and developments is not new. It has been around for a long time in the form of the less structured and less explicit use of indicators in official and non-official reports evaluating socio-economic conditions and developments of countries. Given that the simple format of this analysis with the help of indicators generally requires data for one or a few periods only, many analysts have used it extensively. The World Bank and UNDP, when they began to publish their series of World Development Reports and Human Development Reports, formalized this type of indicator analysis.[3, 4] The two publications focus in particular on country comparisons through ranking countries and determining how those ranks change over time. UNDP also publishes Human Development Reports for individual countries, describing, with the help of indicators, the socio-economic conditions of those countries and their development over time. Indicators such as per capita GDP are used by many international organizations to determine the contributions of member countries to the budget of those organizations, and to determine countries' access to international and bilateral financial aid. More recently, the European Monetary Union (EMU) has used another indicator --government deficits as a percentage of GDP -- to determine initial access of EU countries to EMU and thereafter to guide overall government budgetary policies. As these international uses of indicators are generally not coordinated with each other, a considerable proliferation of indicators at the international level has resulted. In response to this, the United Nations Economic and Social Council has recently begun discussions on a coordinated framework of indicators.[5]

3.19. Defining indicators within a macro accounting framework, as was done above, addresses a number of issues that are currently raised with regard to indicators. The first one is that, at present, indicators are mainly used separately and not in a joint analysis of the type suggested above. However, if they were used in a joint analysis, while they continued to be compiled separately, they may give messages that are incompatible with each other or lead to incorrect conclusions, as the data underlying the indicators are inconsistent. Thus, from measuring two indicators related to employment, that is, employment growth that is negative and an increasing labour share in value added, one might conclude that the average income per worker has increased or that productivity has increased or both. However, these conclusions may be incorrect if employment and labour income data do not refer to the same scope of the labour force. This danger of incompatibility increases with the number of indicators that are used together in one analysis. The UNDP and World Bank reports, which contain a large number of indicators, clearly reflect this danger. Even for the same country, data may be derived from different data sources that are not compatible with each other; this danger is compounded even further if indicators are used to rank countries while the underlying data are not comparable across countries. Incorporating the underlying data of indicators in an integrated macro accounts framework, such as the SNA, which is standardized internationally, may resolve this problem, as incorporation of data in an SNA-type framework would require that they be made compatible within and across countries. As the indicator ratios would be based on these data, there would also be improved compatibility of indicators within and across countries, and this would lead to their more effective use in the type of joint analyses within and across counties, as suggested above.

3.20. A second issue is that indicators do not provide much guidance for developing statistical programmes. They are generally compiled independently, with the help of a variety of statistics, some based on statistics by statistical agencies, others are compiled by specialized government and private and public research institutes, some are based on well developed statistics and others are estimated roughly. As a result, statistical agencies with limited budgets have no clear indication of which statistics to develop so that the indicators are more reliable in the future. The more recent proliferation of indicators recommended and/or developed by international agencies may lead, contrary to the intention, to less rather than more guidance with regard to policy use and statistical development. Policy makers may be less clear about which indicators to use. Also, the task of statistical agencies may become more difficult in determining priorities in statistical development. The large number of indicators cover a very large number of statistical fields, and it is clearly impossible for these agencies to improve all statistics. Furthermore, as indicators are compiled mainly by international organizations, statistical agencies of individual countries have less control over the use of statistics in the derivation of such indicators, less than they would have if national agencies had developed such indicators. By linking indicators to a macro accounts framework, a link would be established between indicators and statistical development, as a very close link between statistical development and national economic accounts has already been established, by present practices. With the increasing use of satellite accounts, an indirect link may also be established between statistical development and other non-economic indicators that are defined in satellite accounts.

3.21. The last issue concerns the lack of a link between indicators and policies. Policy makers often do not know how to respond to what is measured by the indicators. For instance, if the per capita income of a country is low as compared to that of other countries, policy makers do not get a clear message of how to respond in order to improve the country's ranking. Nor will that be improved if per capita GDP is replaced by a more sophisticated measure, such as HDI, in which the literacy rate and the life expectancy at birth are incorporated in the measure as well. The difficulty of what to do with the information provided by the indicators is reflected in the reactions of countries and their policy makers to their publication by international agencies. Some countries, which have been ranked low, complain that their statistics have been incorrectly used, while other countries express their appreciation for what indicators measure, as they have been ranked very favourably in comparison with other countries. It has been shown above how the macro accounts scope and detail would be determined by policies.

3.22. By linking the indicators to such a framework, it would be possible to identify not only the issues but also the underlying variables that could measure the impact of policies addressing the issues. Furthermore, as a macro accounts framework is generally used to address policy issues within a country, the development of indicators based thereon would stimulate the use of those indicators by national Governments in their assessment of national conditions and developments, in addition to the present use of indicators by international agencies.

3.23. The grouping of indicator ratios in table III.2 illustrates how a link could be defined between indicators and policies. For instance, when assessing the impact of fiscal policies, one might use the indicator ratios listed in the two indicator blocks of taxes and behaviour and participation of Government in the economy. Or the impact of employment and other social policies could be described by the indicator ratios listed in the indicator blocks of population, employment and labour income and behaviour and participation of households in the economy. The indicator ratios may be influenced directly or only indirectly by policies. Thus, a fiscal policy may directly influence the tax rates and also be reflected in indicator ratios describing the outlay structure of the government budget, while only indirectly influencing the value of indicator ratios such as government net borrowing as a percentage of total net lending of the economy or net borrowing as a percentage of GDP (EMU criterion). Similarly, links between policies and indicator ratios exist when the latter are used to project the impact of policies. This is explained and illustrated in section VI.C for national economic accounts and in section IV.A for socio-economic satellite accounts.

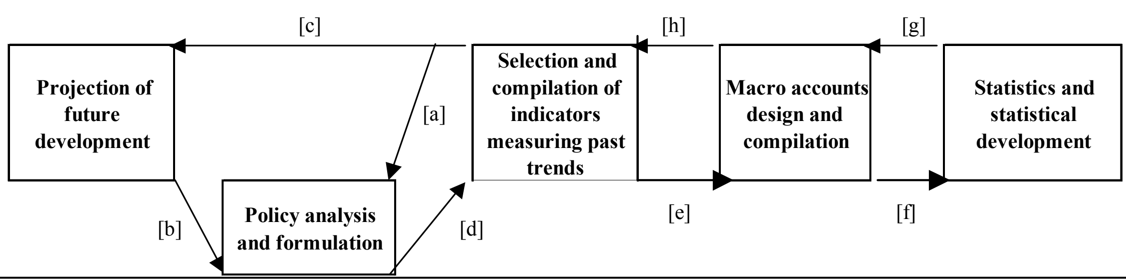
3.24. When using indicator ratios in the context of macro accounts, one should be aware of two other uses of indicator ratios in or closely related to macro accounting. It is necessary to estimate data indirectly when no direct estimates are available, or alternatively to check the relations between national accounts data. Thus, a national accountant may use indicator ratios such as input-output coefficients to estimate value added if only output data are available, or vice versa. The accountant may also use prior knowledge on indicator ratios such as average wage rates to determine whether a data set that includes both employment data and data on compensation of employees is mutually consistent. Trade and transport margins may be used to estimate value of output of the trade industry, value added tax (VAT) and other tax ratios to estimate the total value of product taxes received by the Government on an accrual basis. This use of indicator ratios in national accounts practices usually applies to a limited subset of the indicator ratios that are used to assess socio-economic conditions and developments.

3.25. The other use of indicator ratios is in simple models that project present data and trends to the future, using simple functional relations between two data items, such as input-output coefficients, tax rates, ratios between investments and GDP, and so on. Projections may, in principle, also use more complex ratios, which are based on more than two data items, such as, for instance, HDI, which includes data on GDP per capita, life expectancy at birth and literacy rate.

3.26. Diagram III.1 below summarizes the above and shows how indicators and macro accounts could play a central role in statistical development and policy formulation. The arrows in the diagram represent the interactions between the different elements. Thus, policy formulation could be based on the use of indicators measuring past and present trends [a], and may also take into account future developments that are based on alternative values of the indicators in the future [b]. The use of indicators in projections is reflected in a direct link with the indicators measuring past trends [c]. In order to define statistical development that would support policy formulation, links are needed to translate policy formulation into indicators [d], indicators into the design and compilation of macro accounts [e] and macro accounts into statistical development [f]. The derivation of values of indicators are represented by the reverse links between statistics and the compilation of macro accounts [g], and between the macro accounts data and the derivation of indicator values [h].

3.27. The diagram also shows how the three uses of indicators in assessment [a], compilation [g], and projection [c], interact with one another. Thus, using indicator ratios as coefficients in the compilation affects their use in the assessment of past and present trends and in the projections of future trends. At present, there is no coordination between the three uses; those assessing past and present trends or making projections are generally not aware of the methods used in the compilation, and vice versa. Studies of the interaction between these three uses are urgently needed, as the use of indicators in international and national assessments and also in simple projections is growing rapidly.

Diagram III.1 Links between statistics, macro accounts, indicators, projections and policies



3.28. Subsequent chapters and sections contain additional information on the actual use of indicator ratios in compilation and simple projections. In chapter VI, section D, the interactions between the uses of indicator ratios in assessment, compilation and projection are examined in quantitative detail and a formal approach is developed there to coordinate those uses of indicator ratios so that the impact of compilation approaches on assessment and projections is limited. Chapter VI, section B, gives an example of how indicator ratios are currently used in national economic accounting to make “estimates” for recent periods for which relatively few data are available. Section A of the same chapter shows how leading indicators are used to project upturns and downturns of cyclical movements in the near future. Similarly, in chapter IV, section A, socio-economic indicator ratios are used to project in a simple manner present and past trends of socio-economic variables to future periods. In chapter VII, the use of macro accounts in complex modelling for projections is discussed.

B. Input-output requirements of national accounts

3.29. The input-output framework has transcended its role as a tool for economic analysis and is now an important organizing principle for national accounts and a statistical instrument to balance supply and use of products in considerable detail. Many statisticians and economists feel uncomfortable using the supply and use tables, when the latter include make and use matrices that are rectangular, or even square but with different classifications for the rows and the columns. A first purpose of the present paper is to demonstrate that there is no need for this concern. Supply and use tables are fine from a modern input-output analytic perspective.

3.30. A second purpose is to discuss the role of data reliability in economic analysis. There is much need for information on this, to enable economists to produce confidence intervals for their results. Conversely, the need to know some scenario results relatively precisely identifies the data for which the quality must be enhanced.

3.31. Reliability is a large issue for the services industries. The measurement of output (net versus gross) and the eventual way to analyse it -- the determination of stocks by industry -- is discussed in the present section.

3.32. Some of the theoretical and practical consequences of SUTs developed by national accountants, and how I-O analysis can be adapted to the use of the SUT instead of the square I-O table, are reviewed below.

1. The SUT framework of the 1993 SNA

3.33. The SUT framework was presented in diagram II.1 as part of the comprehensive SNA framework and was briefly described in section II.A. It consists of two separate segments of the SNA, that is, the SUT proper and the CCIS. Details of the two data segments are described in the 1993 SNA -- chapters 2 (Overview) and XV (Supply and use tables and input-output) -- and also in the United Nations Handbook on Input-Output Table Compilation and Analysis -- chapter 2 (SNA framework of supply and use tables).[6] The main features, which are relevant for the analytical issues dealt with below, are summarized in the following paragraphs.

3.34. The SUT proper includes two matrices, that is, an output and an intermediate consumption or input matrix, instead of a square input-output matrix used in traditional i-o analysis. The first one classifies output by CPC[7] categories of goods and services (products) produced in the rows and ISIC[8] categories of producing industries in the columns. The input matrix classifies intermediate consumption by CPC categories of products used and the same ISIC categories of industries, which are using the products in their intermediate consumption. The number of CPC product categories is typically much larger than the number of ISIC categories, so that output and input matrices are generally rectangular. This rectangular feature of the two matrices derives directly from differences in the detail and structure of ISIC and CPC and also from the definition of establishment unit used in classifying industries, as defined in the SNA (for further details, see 1993 SNA, paras. 15.13-15.18).

3.35. I-O analysis has traditionally been applied to data that are organized by industries, where the data are limited to output, intermediate consumption and value added. The output and intermediate consumption data may be broken down by products, and value added by compensation of employees and other value added components, in order to serve i-o analysis. The 1993 SNA has extended the traditional industry vector to allow for the inclusion of other elements that can be observed for establishments, such as information on employment, capital formation, capital stock used in production and so forth. In principle, the industry vector could be extended to any other data set that can be observed for industries, such as environmental data that are compiled for the purpose of environmental-economic accounts.

3.36. Furthermore, in addition to the separate SUTs, the 1993 SNA introduced another new feature, namely, the CCIS of data related to production. This matrix serves to link production analyses, which are based on establishments and products and units of classification, with mainly income and financial analyses that use enterprises and other institutions (government, households, non-profit institutions) as units of classification and analysis. The CCIS regroups the data on output, intermediate consumption, value added, employment, capital formation, capital stock and other production-related data, which have traditionally been analysed by industries, to sector groupings. Thus, it is possible to determine to what extent manufacturing activities are managed by large corporations (non-financial corporations sector), by households as small household production units, and/or are managed by private or public agencies. The CCIS is thus an important instrument to determine the institutional organization of production. It can show, for instance, how, over time, production is moving from public to private management or from small household to large corporate units.

3.37. The type of valuations used in recording the flows in the SUT proper is another feature that i-o analysts should take into account. The SNA recommends using two different valuations for recording supply and use in the table. The supply, that is, output and imports, of products is valued at basic prices[9] and the use of products in intermediate consumption and final demand is valued at market (purchasers') prices. The basic prices exclude trade and transport margins as well as product taxes, such as value added tax, sales tax and the like. As a consequence, value added for each industry, which is derived as the difference between output at basic prices and intermediate consumption at market prices, is recorded at basic prices, excluding the product taxes. As a consequence, valuation at basic prices in the first row of the table is not the same as the value at market prices of uses in the second row of the table. The difference consists of trade and transport margins and product taxes less subsidies. Those are recorded in separate columns of the table with a classification by product, which is in line with the product detail in which supply and use matrices are recorded in the SUT proper.

3.38. Imputations and valuations of output at cost are other features that may impact on i-o analysis (for more details, see 1993 SNA, paras. 6.90-6.146). Analysts in general are familiar with the inclusion of imputations such as subsistence farming for own final consumption, own-account use of dwelling services by owners of dwellings, and own-account construction of dwellings, other buildings and roads by the same establishments that add those assets to their capital formation. However, there are other imputations that may impact on analysis. One group includes the services produced by government and non-profit institutions, which are not marketed. In the SNA, they are assumed to have a value equal to their cost and are allocated to final consumption of government and NPIs. The cost used to calculate the output includes intermediate consumption elements, compensation of employees and also consumption of fixed capital, but excluding any operating surplus. Then, finally, there are the imputed insurance and financial intermediate services and their allocation to uses, which are approximated with the help of imputations. For banks, the output is estimated as the difference between interest received and paid, and the allocation may be done on the basis of the difference between actual interest rates and a reference rate. Insurance output is estimated as the difference between claims and premiums, plus interest on actuarial and other reserves, and the allocation to users is based on premiums as an allocation key.

3.39. Capital formation and capital stock concepts are important for dynamic i-o analysis. They refer to fixed assets and inventories. In the previous section it has been argued that the further development of this information is essential for the application of i-o analysis to services, where the main components of such analysis are labour and capital. When considering this, however, one should take into account the many changes in the scope and treatment of capital assets that have been incorporated in the 1993 SNA. The main changes are briefly reviewed below. For a more extensive review, the reader is referred to annex V of the 1993 SNA.

3.40. The inventory concept has been extended (see 1993 SNA, paras. 10.96-10.115) to reflect the growth of natural resources managed by man, including the growth of agricultural crops and livestock (for meat production), the growth of trees planted for use in industrial production and the growth of fish stock in fishing ponds. Also included in changes in inventories is work in progress on large projects such as ships, as well as bridges and other parts of the infrastructure that cannot be used until they are finalized. On the other hand, work in progress on buildings, roads, and so on, are treated as gross fixed capital formation under the assumption that unfinished works can already be used in production. Also treated as gross fixed capital formation is the growth of natural assets, such as orchard trees producing fruits, or the growth of livestock for the production of milk or used for reproduction. Gross fixed capital formation, furthermore, includes the production or acquisition of intangible assets, including literary-artistic originals, expenses on the exploration of minerals, software development, and so forth. The growth of research and development (R and D) is not treated as gross fixed capital formation, however. The stock of non-financial assets in the SNA refers to produced as well as non-produced assets. The non-produced assets mainly include natural assets, such as mineral resources, forest resources and water resources, and also assets such as patents, which are considered non-produced assets, as the output of R and D activities is not considered as capital formation. Growth and other changes in non-produced assets are not treated as gross capital formation.

3.41. Capital formation, changes in non-produced assets and the stock of produced and non-produced assets are recorded in the so-called asset accounts of the 1993 SNA (paras. 2.161-2.162, 10.15-10.19, 13.1-13.7). The asset accounts cover only economic assets, that is, produced and non-produced assets over which a property right can be established and which provide economic benefits to their owner. The asset accounts do not cover wild forests, fish in the ocean, unproved mineral reserves, water in the ocean, rivers and lakes, or air. However, for purposes of environmental accounts, the scope of asset accounts can be extended (see sect. IV.D). Also excluded is human capital, but selected aspects of human resources can be incorporated for satellite accounts analysis (see sect. IV.A). When asset accounts are restricted to economic assets, stocks and changes in stocks are recorded in market value terms, but when extending the scope of natural assets or human capital, the stocks and changes therein may be in physical terms.

3.42. The asset accounts record the opening and closing stock of assets and all changes that take place during the accounting period, and that explain the difference between the opening and closing stock. The main changes are gross capital formation and depreciation, which exclusively refer to produced assets, re-evaluation of assets and other volume changes of assets. So-called other volume changes include, in the case of produced assets, obsolescence, destruction of assets owing to other than economic causes, transfer of assets between sectors as a consequence of, for instance, privatization or nationalization of assets, and also changes in assets because produced assets that previously did not appear in the balance sheet of a country (e.g., historical buildings) are brought within the realm of produced assets used in production (e.g., tourism services). In the case of non-produced assets, other volume changes include depletion of mineral and other natural resources and degradation of assets owing to industrial pollution and other emissions. Also included as other volume changes is discovery of new mineral resources. What is important to note here is that capital formation is not the only reason for a change in the stock of assets, as is generally assumed in i-o analysis, but other volume changes and revaluation may also play an important role in explaining changes in the stock of assets used in production.

2. SUT features determined by analytical uses

3.43. With the help of selected analytical i-o examples, it is shown below that i-o analysis may be adapted to the new features of the i-o framework of the 1993 SNA, while other features, currently incorporated in the SUT of the 1993 SNA, may be given less emphasis as they are not needed for all types of i-o analysis.

(a) Input and output matrices

3.44. The traditional i-o matrix has made use of the square i-o table, with either industries or products in both the rows and columns. It is shown below, with the help of some analytical examples, that there is theoretically no need to force the separate input and output matrices included in the SUT framework of the 1993 SNA into the traditional input-output straightjacket. The SUT can be directly used in analysis.

3.45. If the use and make matrices are denoted by U and V, respectively, where the former represents dimension products by industries and the latter dimension industries by products, the V^{τ} (transposed) is also dimension products by industries, and the summation over industries by post-multiplication with the unit vector, e (all entries equal to one), yields the gross output of the economy, $x^{0} = V^{\tau}e$. Here, the superscript (0) stands for "observed". If it is dropped, gross output is obtained as a variable, the main one in input-output analysis. It is best to think of this by the replacement of e by activity vector s; $x = V^{\tau}s$ is the gross output of the economy when the activity level of industry 1 is inflated by a factor s, and so forth. Instead of using x as a variable, it is equally acceptable to work with activity vector s. This is merely a change of variable. For example, the net output of the economy is

$$y = (V^{\tau} -U)\ s = x - U\ V^{-\tau}\ V^{\tau}\ s = x-Ax,$$

provided that input-output coefficients are defined according to the commodity model,

$$A = U\ V^{\tau},$$

where -τ represents the combined operations of inversion and transposition.

3.46. Even when a symmetrical input-output coefficients table is wanted, for the purpose of cost decompositions or standard impact analysis, it is preferable to have raw use and make matrices without purified or otherwise manipulated industries. Input-output coefficients postulate proportionality between inputs, collected in use table U, and output, collected in make table V, to be transposed, according to

$$U = AV^{\tau}.$$

3.47. This equation requires no commonality of product and industry classifications. *U* and *V* may be rectangular. If there are more activities than products (*U* has more columns than rows), then the above system of equations will be overdetermined. In this case, an error term must be added and the equation becomes a regression equation. Indeed, input-output coefficients can be estimated as regression coefficients. This approach enables the analyst to determine their accuracies (variances) and to test hypotheses such as "input-output coefficients are constant". The latter hypothesis has been confirmed for the United States economy by Mattey and ten Raa.[10]

3.48. Thus, instead of working with fixed input-output coefficients A and variable x, one may just as well work with the supply and use tables directly in an activity model, without the need to compute input-output coefficients. To make this point, an investigation of some classical economic problems, and the determination of productivity, competitiveness and comparative advantages, is shown in the following paragraphs, and how they can be analysed in the SUT framework of the SNA, without calculating input-output coefficient matrices, is discussed.

(i) Productivity analysis

3.49. Productivity is the ratio of output to input. For a national economy, output comprises products and input comprises capital and labour. Prices are needed to measure output and input. The appropriate numerical values will be determined in the following section. As regards notation, commodity prices are listed in a row vector, p, and the prices of capital and labour are denoted r and w, respectively. Then, productivity is $py/(rM+wN)$, where y is the net output commodity vector of the economy and M and N are capital and labour inputs. If the commodity prices coincide with production costs, then productivity equals one by the equality of the national product (py) and income $(rM+wN)$. The formula becomes more interesting when it is used to account for the growth of productivity. The weights are held constant and factor productivity growth becomes the growth rate of the numerator, $pdy/(py)$, minus the growth rate of the denominator, $(rdM+wdN)/(rM+wN)$. In short, total factor productivity growth, within the constraint of the national accounts identity, equals

$$\rho\ (pdy-rdM-wdN)/(py).$$

3.50. A decomposition of total factor productivity growth by industries using the System of National Accounts is as follows. Let the use and make matrices be U and V. The commodity inputs and outputs of industry j are in column j and row j of U and V, respectively. $(V^{\tau}-U)$ is the net output vector of industry j. Let the sectoral employment row vectors be K and L, respectively. Then $y=(V^{\tau}-U)e$, $M=Ke$ and $N=Le$, where e is the summation vector (all entries equal to one). Substitution yields

$$\rho = [pd(V^{\tau}-U) - rdK - wdL]e/(py)$$
$$= \sum_j [pd(V^{\tau}-U)_j - rdK_j - wdL_j]/(py).$$

3.51. The numerator is the weighted sum over all industries of the growth of real value added per factor input. (The weights are still p, r and w.) It should be noted that this decomposition of total factor productivity growth does not require that the number of industries is equal to the number of products.

3.52. Intuitively, a large industry contribution to total factor productivity growth signals greater strength of the industry, and a larger likelihood that a comparative advantage resides in this industry. Comparative advantages can be determined by a model of free trade between at least two economies. For a number of reasons, such a model requires that there is a unique classification of products, common to both economies. First and foremost, total net exports are zero for each commodity, and this fact can be used to balance the accounts and to specify a model of trade with sensible feasibility constraints only if net exports can be summed on a commodity-by-commodity basis. The United Nations Statistical Commission recommends the Central Product Classification (CPC). The aggregation level can be selected by choice of digit level (1 to 5).

3.53. An industry is a segment of the economy where factor and commodity inputs are transformed into outputs. The statistical unit is the establishment. Ideally, a unit engages in only one productive activity at a single location. A number of complications seem to plague the System of National Accounts. First, reporting units may be large and, therefore, engage in more activities. The SNA distinguishes primary and secondary activities and recommends separation of the latter. Secondly, productive activities may include more than a single product. The SNA notes that, in practice, by-products are treated in the same way as secondary products, the products of secondary activities. Thirdly, there is the question of how to group statistical units. The SNA recommends identifying a principal activity on the basis of value added and grouping establishments that have the same principal activity in industries according to the International Standard Industrial Classification (1993 SNA, paras. 2.45, 5.5-5.14, 5.40-5.47, 15.13-15.19). It acknowledges that this procedure does not eliminate secondary activities, but outlines in great detail how the use and make matrices can be converted into product-by-product i-o tables (paras.15.137-15.157).

3.54. In many cases, there is no need to relate the industry classification to the product classification. An example is the above decomposition of total factor productive growth. The decomposition is by direct application on the use and make matrices, without invoking the usual input-output coefficients table. Not only is there no need to reconcile the industry classification with the CPC, but it is not even necessary to have a unique classification of industries. International comparisons and trade studies are perfectly feasible when reporting units accommodate country-specific industries. The need to classify statistical units by primary activity and the practice to separate secondary activities stem from the imposition of the International Standard Industrial Classification. If productive activities are specified not only by their inputs and outputs, but also by location, why group them according to primary activities by ISIC? It is in the spirit of input-output analysis that products, activities and industries are conveniently identified by means of the concept of an industry, but there are no analytical requirements on the international comparability of industries.

(ii) Comparative advantages

3.55. The extension of productivity analysis to the location of comparative advantages may illustrate the point. U and V are the use and make matrices of the home country. K and L are the industry factor employment row vectors, with totals M and N. A foreign country is introduced, with accounts given by $\widetilde{U}, \widetilde{V}, \widetilde{K}$ and $\widetilde{L}$ (and totals $\widetilde{M}$ and $\widetilde{N}$). The product classification is the same, but the industry classification may be different. U and $\widetilde{U}$ have the same row dimensions, but the column dimensions differ. For V and $\widetilde{V}$ it is the other way around. K and $\widetilde{K}$ have different dimensions, as have L and $\widetilde{L}$. The net output vectors, $y=(V^{\tau}-U)e$ and $\widetilde{y} = (V^{\tau} - \widetilde{U})\widetilde{e}$, reside in the common product space (e and $\widetilde{e}$ have all entries equal to one but are of different dimensions). Net output consists of domestic final demand, f, and net exports, g: $y=f+g$ and $\widetilde{y} = \widetilde{f} + \widetilde{g}$. In a two-country model, $g + \widetilde{g} = 0$, since the net exports of one country are the net imports of the other. If π is the row vector of terms of trade, then πg is the trade surplus of the home country or the deficit of the other country. To locate the comparative advantages, the reallocation of activity prompted by competitive markets, including free trade, should be determined, making the conservative assumption that the economic agents want to stick to the observed domestic final demand proportions. If this assumption is dropped, further reallocations would take place. In other words, the comparative advantages will be conditioned on the observed patterns of domestic final demand. Furthermore, the conservative assumption is made that no substitution takes place within industries. (These are considered ideal statistical units in the sense of the 1993 SNA (paras. 5.21-5.24). It is consistent with the country-specific classification of activities. If the assumption is not fulfilled, further reallocation effects are to be expected.)

3.56. Invoking the relationship between general equilibrium and Pareto optimality, the allocation of activity under free trade can be determined by the maximization of the domestic final demand level subject to a foreign final demand level, the product balance for the products and the factor input constraints:

$$(V^{\tau} - U)s + (\widetilde{V}^{\tau} - \widetilde{U})\widetilde{s} \geq fc + \widetilde{f}\widetilde{c}$$

max c subject to

$$Ks \leq M, \ \widetilde{K}\widetilde{s} \leq \widetilde{M}, \ Ls \leq N, \ \widetilde{L}\widetilde{s} \leq \widetilde{N}, s \geq 0, \widetilde{s} \geq 0$$

3.57. The commodity accounts are pooled and the factor input accounts are separate, assuming mobility of the former and immobility of the latter. These specifications can be altered in accordance with the facts. In general, mobile inputs have pooled balances and immobile inputs have separate balances. Now, the distribution of final demand should be considered. The bigger the foreign level of final demand, $\tilde{c}$, the smaller the domestic level of final demand, c, s and $\tilde{s}$ determine the allocations of activity under free trade. Net exports are the difference between net output and domestic final demand: $(V^{\tau}-U)s-fc$ for the home country and $(V^{\tau\prime}-U')s'-f'c'$ for the foreign country. In the solution, the product balance will be binding and the net export vectors have opposite signs. Their value is the deficit. The deficit of the foreign economy is a monotonic function of parameter $\tilde{c}$, its consumption level. Equation with the observed deficit fixes the value of this parameter. The resulting net export vector determines the pattern of free trade and locates the comparative advantages on a product-by-product basis. The underlying activity vectors, s and $\tilde{s}$, identify the competitive industries. If an industry component exceeds unity, that sector would expand under competitive conditions.

3.58. The relationship with factor productivities is established by the shadow prices to the constraint of the maximization programme. Active industries break even and inactive industries are unprofitable. Consequently, the ratios of value added and factor costs are one and smaller than one, respectively. For the national economies, factor productivities are r per unit of capital and w per worker and their rates of change Δr and Δw. Total factor productivity growth is obtained by weighting by the factor input stocks and the result coincides with the traditional total factor productivity growth expression, ρ, by differentiation of the main theorem of linear programming. It is the values of these shadow prices that should be used in the total factor productivity growth measure.

3.59. Hallmarks of economic analysis, such as measurement of productivity, allocation of comparative advantages and identification of competitive industries, can be based on SNA data broken down by industries, but, in theory, without a standard industrial classification. International comparisons by industries can be made in terms of productivity, but do not depend on a common industry classification scheme.

3.60. One could consider, for example, the question whether agriculture is more efficient at home than abroad. Typically, agriculture is the first category of an industry classification. One might compare s_1 and $s_{1'}$ in the solutions to the above maximization programme. One might also evaluate the value added/factor costs ratios of the industries. But, strictly speaking, the issue of efficient agriculture boils down to the question of which industry produces those products, and there is no reason to limit the candidate industries to the first category of the industrial classification of the respective economies. It is conceivable that the products will be produced as secondary output of some other industries. The very industrial organization or products, as determined by the make table, may in one country be different and possibly more efficient than in another.

3.61. Once it is fully recognized that activities are location specific, the identification of industries across countries becomes redundant. A more formal approach is given by simply rewriting the constraints of the above model. The product balance reads

$$\begin{pmatrix} V \\ \tilde{V} \end{pmatrix} - (\mathrm{U}, \tilde{\mathrm{U}}) \begin{pmatrix} \mathrm{s} \\ \tilde{\mathrm{s}} \end{pmatrix} \geq \mathrm{fc} + \mathrm{fc}$$

and the factor constraints are

$$\begin{pmatrix} K & 0 \\ 0 & \widetilde{K} \\ L & 0 \\ 0 & \widetilde{L} \end{pmatrix} \begin{pmatrix} \mathrm{s} \\ \widetilde{\mathrm{s}} \end{pmatrix} \leq \begin{pmatrix} \mathrm{M} \\ \widetilde{\mathrm{M}} \\ \mathrm{N} \\ \widetilde{\mathrm{N}} \end{pmatrix}.$$

3.62. The tables can be conceived as a system of world accounts in which activities remain reported separately when they take place at different locations. For example, the world use table, $(U\ \widetilde{U})$, has a row for each commodity and a column for each national industry. The industries are simply stacked next to each other and there is no need to have equal numbers of them in the different countries, let alone a standard classification.

(b) Impact analysis

3.63. An important application of input-output tables is impact analysis. What are the effects of domestic final expenditures on input, output, employment and income? Domestic final expenditures are paid by households, Government, corporations (gross capital formation) and, possibly, the non-profit institutions serving households (most of the demand is not final, but intermediate). Net exports are not included.

(i) Imports and impact analysis

3.64. Analysis of the impact of domestic final expenditures on input, and particularly on imports, is given by the Leontief inverse of the full input-output coefficients matrix. An assessment of this impact can be made following the corresponding presentations in the United Nations Handbook on I-O tables. The Handbook uses the terms "input" and "output multipliers".[11] An input multiplier translates final demand into total demand. To determine the effect on output, employment and income, one must model the division of input between domestic and foreign sources, that is, trade. Output multipliers are defined in the Handbook as the Leontief inverse of the domestic input-output coefficients matrix. Its typical elements are the coefficients representing the amount of domestically produced product i needed per unit output of product j. The relationship between input and output multipliers is determined by the model of trade that is implicit in the presentation of the Handbook. It may be made explicit as follows: the product (see Handbook equation (13.3)), reads

$$x = Ax + s + e - n,$$

where x is the vector of outputs, A the matrix of input-output coefficients, s the vector of domestic final expenditures, and e and m the vectors of exports and imports, all classified by products. (The meaning of the symbols s and e differs from that in the subsection above.) Impact analysis is concerned with the effects of changes in s on x. Employment and income effects are obtained by pre-multiplying the changes in x by the labour and value added coefficients (that is, per unit of output). The Handbook input multipliers are obtained by imposing:

> **Assumption 1**. Assume net trade: $e - m = constant$.

3.65. When imposing the constraint of the product balance, the change in output is given by the Leontief inverse of A times the postulated change in s. The Handbook output multipliers are obtained by imposing:

> **Assumption 2.** Assume $e = constant$, but let imports be linearly dependent on output: i.e., $M = M^{id}x + constant.$

3.66. Here, $M^{id}x$ is the matrix of intermediate import coefficients and the constant is the vector of final demand products imported.[12] Now, the product balance yields that the change in output is given by the Leontief inverse of $(A- M^{id}x)$ times the postulated change in s. The output multipliers are smaller than the aforementioned input multipliers because imports are assumed to increase and exports are not, so that a part of activity output "leaked" to abroad. Matrix $A\text{-}M^{id}x$ is called the matrix of domestic input-output coefficients (A^d) in the Handbook.[13]

3.67. Assumption 2 is justified if domestic and foreign input components are in fixed proportions, like different products. Strictly speaking, however, this assumption is only appropriate for non-competitive imports. Competitive imports are defined in the Handbook to "include imported products that are also being produced by the domestic economy", as distinct from "non-competitive imports [which] include products that are either not producible or not yet produced in the country".[14] By applying the assumption to all imports included in the product balance, that is, to competitive as well as non-competitive imports, an increase in imports m results in a parallel increase in output x. Competitive imports, however, are perfect substitutes for domestically produced inputs, yielding straight isoquants in input space, rather than the L-shaped curves underlying assumption 2. Thus, assumption 2 is inappropriate for impact analysis based on the product balance. Indeed, import coefficients do not show the same stability over time as input coefficients.

3.68. The conclusion is that for competitive imports it is irrelevant what their distribution across industries is. The very concept of an import coefficient is ill conceived for competitive imports. For instance, in New York State, industries may consume Quebec electricity as well as New York electricity. One wants to know the total import of Quebec electricity; its allocation by consuming industry is irrelevant. On the other hand, there is no need to know explicitly imports by industry for non-competitive imports, as they are automatically identified in a product classification of the supply and use table.

3.69. Another way of appreciating the complications surrounding assumption 2 is by considering the balance of payments. When trade is modelled by assumption 2, any final expenditure programme deteriorates the balance of payments. This is not realistic. It is more common to assume that additional imports must be paid for. A simple way is assumption 1, where neither exports nor imports need to be fixed, but only net exports. A more flexible way is to use a balance-of-payments constraint in the model.

(ii) Household consumption and impact analysis

3.70. Another candidate for economizing statistical effort, at least from the viewpoint of impact analysis, is personal consumption expenditures. Again using the presentation in the Handbook,[15] it shows how household final consumption can be "endogenized" to assess the impact of government final consumption expenditures, exports, changes in inventories, and gross capital formation, not only through inter-industry multipliers, but also through household consumption multiplier effect. It argues that such an analysis requires the assumption of constant consumption behaviour, fixed expenditure shares and statistics on household final consumption expenditures. However, this is not strictly true. It is true that household consumption reinforces inter-industry multipliers and yields greater income and employment multipliers. Theoretically, input-output coefficients a_{ij} are augmented by $a_i v_j$, where a_i is the household consumption coefficient on commodity i and v_j is the value added coefficient for industry j. To produce one unit of j, not only a_{ij} of i in production is needed, but also a_i times the additional income v_j in household consumption. As before, income multipliers are obtained by pre-multiplying changes in output by the row vector of value added coefficients. The changes in output (for final expenditure changes in the respective products) are determined by (the columns of) the Leontief inverse. Now, the replacement of a_{ij} by $a_{ij} + a_i v_j$ has a special structure (the added matrix has rank one), in fact so special that all income multipliers are inflated by the same amount, namely, the Keynesian multiplier. The latter is the inverse of the propensity to save, which is a macroeconomic entity, independent of the microeconomics of consumption, such as expenditure shares. For proof of this result, reference is made to theorem 3.1 of ten Raa.[16] The analysis for employment multipliers is somewhat different, but has the same implication: production input-output statistics suffice for impact analysis.

3. Requirements of detail and compilation

(a) ISIC and CPC classifications

3.71. The United Nations objective is to harmonize national accounts across countries in order to facilitate international comparisons and linkages of national models. The Handbook is quite explicit in promoting ISIC:[17]

"Countries and groups of countries may develop their own industrial classification to meet their specific requirements, but they should be able to link with ISIC".

"Similar to industries, countries and groups of countries may develop their own product classification to meet their specific requirements, but they should be able to link with ISIC." [18]

3.72. In view of the previous arguments, there is agreement on the use of a common product classification, but not strictly on a common industrial classification. A common product classification, at least for the tradable products, is required to link models by trade relations and to make international price comparisons. For the type of analysis discussed, a standard classification is not required for industries, let alone a common classification for industries and products. In the absence of this, it may be hard to compute input-output coefficients, but one should realize that the latter are only tools for solving economic problems. It is not too difficult to replace these tools by other ones, which keep the supply and use tables intact, without the need to force them into a traditional input-output straightjacket.

3.73. Unlike the classification of products, there is no economic analytical requirement for uniformity across national economies. Moreover, since the industrial classification is independent of the commodity classification anyway, it may be refined to accommodate enterprise data that are otherwise difficult to classify. In other words, the national industry classification may reflect the industrial organization of its economic activities. The classification of products must be as disaggregated as possible, and be uniform across national accounts.

3.74. There is no need to have a correspondence between ISIC and CPC. [19] By the same token, the use by the European Union use of the Classification of Products according to Activities (CPA) and the detailed classification of products for community surveys on manufacturing industries (PRODCOM) as national classifications since 1993, in order to build a better correspondence between product and activity classifications, is also not crucial.[20]

3.75. While it has been argued above that there is no strict need for a standard use of ISIC across countries, ISIC is a useful device to organize enterprise data in a system of national accounts.

(b) Reliability of data and coefficients

3.76. Not all input-output statistics are reliable. While manufacturing statistics tend to be accurate, services industries are notoriously not. This may suggest that more accurate studies are feasible in manufacturing, but it is not that simple. Industries feed each other in terms of inputs and outputs and, therefore, cannot be compartmentalized. For example, business services are often a link between manufacturing industries. It is important to trace the effect of data reliabilities on model outcomes. The question here is how data reliabilities influence multipliers, that is, the elements of the Leontief inverse.

3.77. Ideally, industry reliabilities are calculated by taking variances of establishment data. As noted in section 2(a) above, this ambitious approach has been pursued recently by Mattey and ten Raa.[21] They accessed the census of manufactures tapes, which are confidential. In practice, one must deal with subjective reliability data. Barker, van der Ploeg and Weale[22] balanced the national accounts for the United Kingdom. The underlying reliabilities are published in ten Raa and van der Ploeg[23] and are reproduced in table III.3 below.

Table III.3. Reliability of industry data

Index	Industry	Accuracy (percentage)	Index	Industry	Accuracy (percentage)
1	Agriculture etc.	5	21	Textiles	5
2	Coal mining	5	22	Leather, clothing etc.	5
3	Mining	10	23	Bricks	5
4	Petroleum and natural gas	5	24	Timber and furniture	5
5	Food manufacturing	5	25	Paper and board	5
6	Drink	5	26	Printing and publishing	5
7	Tobacco	5	27	Other manufacturing	5
8	Coal products	5	28	Construction	15
9	Petroleum products	5	29	Gas	5
10	Chemicals	5	30	Electricity	5
11	Iron and steel	5	31	Water	15
12	Non-ferrous metals	5	32	Rail	5
13	Mechanical engineering	5	33	Road	40
14	Instrument engineering	5	34	Other transport	40
15	Electrical engineering	5	35	Communication	5
16	Ship building	5	36	Distribution	50
17	Motor vehicles	5	37	Business services	60
18	Aerospace equipment	5	38	Professional services	60
19	Other vehicles	5	39	Miscellaneous services	60
20	Metal goods	5			

3.78. Given the accuracy reflected by standard deviations in the table, it is easy to find the variances. The variance of the first input-output coefficient, a_{11} is σ^2_{11}=(5 per cent of a_{11})^2=0.0025 * a^2_{11}. The variance of a_{21} is similar, as the reliability of the data of the second industry is also 5 per cent. However, the third coefficient is more complex, since a_{31} is not confined to industry data with the same reliability. Its accuracy is neither 5 per cent nor 10 per cent, but some average. The reporting of errors as percentages suggests that mixed data have geometric mean accuracy. Hence, it is natural to set the variance of

a_{31} equal to $\sigma^2{}_{31}=(\surd(0.05\ *\ 0.10a_{31}))^2=0.0050*a^2{}_{31}$. The variances of the other coefficients can be determined in the same way.

3.79. Statistical effort will reduce the variances and the question arises how to target the effort. This raises the issue of the importance of coefficients. A simple, direct approach would be to declare a_{hk} important if the policy is to boost final demand for commodity k and the industry of interest is h, but this would neglect the indirect inter-industry effects. The total requirements imposed on industry h by a unit increase of final demand for commodity k is given by the (h,k)-th element of the Leontief inverse; hence, it is necessary to investigate the variance of the latter. The transmission of errors through the Leontief inverse is not easy, as the operation is non-linear. Fortunately, a useful formula for the variance of the elements of $B=(I-A)^{-1}$ is given by ten Raa:[24]

$$V(b_{hk})=\Sigma_{i,j}(b_{hi}\ b_{jk})^2\sigma^2{}_{ij.}$$

3.80. The variance of aij has a large influence on the variance of the Leontief inverse element b_{hk} if $b_{hi}b_{jk}$ is large. If the policy focuses on multiplier b_{hk}, more precision is obtained by sharpening the estimate of $a_{i,j}$, for which $b_{hi}b_{jk}$ is large. In other words, if the issue is the multiplier effect of k on h, then one must look for the industries that use h and produce k, in the sense of both high total multipliers b_{hi} and b_{jk} , and enhance the quality of the data at their interface (a_{ij}).

3.81. The above application of importance/sensitivity analysis to input-output multipliers is but one example. For a general analysis, reference is made to ten Raa and Kop Jansen.[25]

3.82. Measurement issues in particular affect the services. Services are intangible and, therefore, hard to measure in current as well as in constant prices. It is thus difficult to measure output of services and also their contribution to productivity.

3.83. The output of some service industries, such as retail and wholesale trade, as well as transport services, is measured by margins. Since margins are the difference between the values of two product flows (known here as gross output and inputs), measurement of the "net output" of trade and transport services differs from the measurement of (gross) output of goods. This in itself is no cause of concern, as there is a clear-cut translation from gross to net input-output coefficients. Thus, if gross output of these services is assumed to be of a single type, say $\widetilde{v}_{jj}$, and the inputs are $\widetilde{u}_{ij}$, as usual, then net output becomes $v_{jj}=\widetilde{v}_{jj}-\widetilde{u}_{jj}$ and the corresponding inputs remain $u_{ij}=\widetilde{u}_{ij}$ for $i\neq j$, while $u_{jj}=0$. In gross terms, input-output coefficients are $aij=\widetilde{u}_{ij}/\widetilde{v}_{jj}$, and in net terms $a_{ij}=u_{ij}/v_{jj}=\widetilde{u}_{ij}/(\widetilde{v}_{jj}-\widetilde{u}_{jj})$. Division of the numerator and denominator by $\widetilde{v}_{jj}$ yields $a_{ij}=\widetilde{a}_{ij}/(1-\widetilde{a}_{jj})$. This holds for $i\neq j$; a_{jj} is simply zero.

3.84. The use of margins, however, causes the additional problem of negative values for output, and this does not only apply to trade and transport services, but also to other services, such as banking and insurance services, for which services output is imputed also as the difference between, respectively, the values of interest and insurance-related flows (see 1993 SNA, paras. 6.120-6.141). In the case of trade and transport, the margins may become negative when prices are marked down, the output of banking services may become negative if interest payments exceed interest receipts under certain circumstances or during certain periods, and output of insurance services may be negative when claims exceed premiums plus interest on reserves during periods of extensive disasters. In the case of trade and transport margins, the occurrence of negative values reflects the inability to separate volume from price effects. Using gross output measurements would eliminate those negatives, but would not, however, solve the underlying measurement problem. Different solutions for the negatives would need to be found in the case of banking and insurance services, as imputations for these services are not based on calculating the difference between product flows in an i-o table.

3.85. Ultimately, services are rendered by labour or capital, or other factor inputs, and this observation suggests how they should be measured in the long run. In research and development, the bulk of expenses is on workers with particular skills. If it were fully accounted for, the rate of return to R and D would be the skill premium of these workers, at least in perfectly competitive markets. (For non-competitive markets, the shadow price of the skill would have to be calculated.) The implication for statistical work is to link types of labour and capital with activities, such as in R and D activities or in the distributional activities of trade.

3.86. The most difficult issue is the measurement of software services. These are important quantitatively, as computerization is a widespread phenomenon and accounts for a high share of expenditure. Here, too, the point is to measure the capital stock and to link it to activities. The Netherlands Central Bureau of Statistics shows that the approach is doable. Reference is made here to the study by Pomme and Baris.[26]

4. Theoretical and practical considerations for future i-o work

3.87. In the first section below, a number of theoretical conclusions with regard to i-o requirements are discussed. These hold under ideal circumstances, when there are no data constraints. In the second section, there is a discussion of the data constraints and institutional conditions that are encountered when coordinating the compilation and analysis of i-o tables in practice.

(a) Theoretical considerations

3.88. The main conclusion of the present section is that the use of supply and use tables can replace the use of square i-o tables in analysis. There is no analytical need to merge products and industries in a common classification. Moreover, the industry classification may vary across countries. Only tradable products must be classified in a harmonized way to pursue international productivity and trade studies. There is no need to identify competitive imports separately, as import coefficients cannot be used as stable coefficients in the type of analyses presented above.

3.89. Also, a more refined industry classification is preferable, ideally all the way down to the level of plants, as it would make it easier to estimate the confidence intervals of technical coefficients and their equivalents in social accounting matrices. When such data are not available from SNA compilation, it is useful to gather subject confidence percentages, as these can be used to determine variances of data and model coefficients, including multipliers.

3.90. In impact analysis, the largest gain in precision is obtained by enhancing the quality of the data of the industry that has the strongest links to policy instruments and the industry of concern. The influence of policy instrument k on industry of concern h is measured by the multiplier b_{hk}, which is an element of the Leontief inverse. The largest gain of precision of this multiplier is obtained by enhancing the quality of the data of industry j that have the strongest links to policy instrument k (a high value of b_{jk}) and industry of concern h (a high value of b_{hi}). Thus, efforts should be concentrated on input i of industry j, which corresponds to a high value of $b_{hi}b_{jk}$.

3.91. Even more important is the collection of labour force and capital stock data by industry, preferably by skill and type, respectively. Such data are highly desired in order to determine the productivity of not only the traditional factors, labour and capital, but also that of R and D and information and communication technology (ICT). Moreover, they are the key to the measurement of services output.

(b) Practical considerations

3.92. Input-output analysis is generally based on theoretical considerations, which do not take into account data deficiencies that limit the application of i-o techniques. One such limitation is that countries are rarely able to collect, through statistical surveys and other sources, detailed information on products produced by every establishment. Similar products are classified roughly into the same category and, not uncommonly, products produced by one establishment are lumped together in one single product identified by the characteristic of the establishment. If product detail is not available, it is useful for analysts to have production data that are at least classified by a standard industry classification. Furthermore, when carrying out cross-country productivity studies or other comparisons of production structures across countries, data need to be classified by a standard industrial classification based on ISIC.

3.93. Another consideration implicit in the analytical examples presented in this section is that it is theoretically advantageous that statisticians leave to economists the merger of separate supply and use tables into a square i-o table, while using assumptions they deem appropriate for the type of analysis pursued. This is theoretically correct. However, few economists may be capable or have the resources to do this type of work in practice, and statisticians often know more about the data to do the job more effectively. An intermediate strategy may be that statisticians provide the supply and use tables in addition to the merged square i-o table, thus providing analysts with information to experiment with alternative solutions.

3.94. In conclusion, for the purpose of using technical coefficients of i-o analysis, there is no need to make a distinction between imported and domestically produced products, as import coefficients of competitive imports cannot be assumed to be stable over time. In practice, however, the assumption of stable import coefficients is widely used as a simple analytical tool that is not too unreliable, particularly at an aggregate level. However, when more detail is used, this rough technique needs to be replaced by more sophisticated modelling techniques that are related to the analyses presented above.

C. Flow-of-funds accounts and macroeconomic policy

3.95. The present section, covering the flow-of-funds accounts, deals with the lower segment of diagram II.1, that is, the financial accounts and balance sheets of the SNA. The main features of the flow-of-funds accounts are discussed in section 1, the differences between these accounts and the SNA accounts are discussed in section 2, data sources are reviewed in section 3, and the policy analysis uses of the flow-of-funds accounts are presented in section 4. Section 4 also includes a discussion of the analytical techniques that have been used by flow-of-funds practitioners.

3.96. The flow-of-funds accounts were originally designed some 50 years ago as a comprehensive social accounting scheme to measure and observe "money flows" throughout the economy. As the scheme has evolved, however, it has come to focus on the operation of the financial system—on the flows of borrowing and lending and on the activities of banks and other financial institutions. In 1968, the flow-of-funds accounts were incorporated into the United Nations system of accounts in the sector breakdown of the capital finance account. At present, in the 1993 SNA, the flow-of-funds accounts have an even more central position as the capital account and the financial account in the main sequence of accounts.

1. The flow-of-funds matrix

3.97. An initial view of the flow-of-funds system can be obtained by a descriptive analysis of the flow-of-funds matrix. For this purpose, use is made of table III.4, which corresponds to the capital and financial accounts of the SNA of diagram II.1, discussed in the previous section. The data in the table are based on a recently derived matrix for Lithuania. (Although these data are preliminary rough estimates, they are treated here as if they accurately represent Lithuanian financial data).

3.98. Table III.4 divides the economy into the three main institutional sectors that are concerned with macroeconomic policy: the central government; the banking sector, which includes both the monetary authorities and the deposit money banks; and the rest of the world. The remaining sectors are aggregated into an omnibus "private sector", which includes provincial and local government, non-bank financial institutions, all enterprises (including state enterprises), non-profit institutions, and households.

3.99. The lines on table III.4 show the various types of transactions engaged in by the sectors. The first two lines connect the system to the non-financial economy. These show each sector's gross capital formation and its surplus from operations—its gross saving. The difference between these two lines for each sector estimates its "non-financial" surplus or deficit. A surplus is shown on line 3 as positive and represents net lending; a deficit is negative and represents net borrowing.

Table III.4. Flow-of-funds matrix for Lithuania, 1995
(millions of litas)

	Central Government		Banking sector		Private sector		Rest of the world		Total	
	U	S	U	S	U	S	U	S	U	S
1. Gross capital formation	925		—		4,464				5,389	
2. Gross saving		368		120		3,529		1,372		5,389
3. Net lending, surplus/deficit [a]	-557		120		-815		1,372		—	
Changes in:	Financial assets	Liabilities	Financial assets	Liabilities	Financial assets	Liabilities	Financial assets	Liabilities	Financial assets	Liabilities
4. Foreign claims, net			424					424	424	424
5 Central government debt		980	-75		279		776		980	980
6. Private credit	461		651			1,808	696		1,808	1,808
7 Money and quasi-money				1348	1,348				1,348	1,348
8. Miscellaneous and discrepancies		38		-468		754	3,24		324	324
9. Total	1,386	1,386	1,000	1,000	6,091	6,091	1,796	1.796	10,273	10,273

[a] On line 3, positive values show a surplus and represent net lending; negative values show a deficit and represent net borrowing.

3.100. The lines on the lower portion of the matrix (lines 4 through 8) contain data showing financial transactions, each line representing a particular financial instrument. The source of funds columns (S) in this section deal with issues of debt (increases in financial liabilities) and the use of funds columns (U) are acquisitions of credit instruments (increases in financial assets). The five categories (lines 4 through 8) cover all types of credit instruments. So the lower section of the matrix is the flow-of-funds representation of all the borrowing and lending in the economy.

3.101. A key feature of the flow-of-funds matrix is that it is an articulated system. That is, it has balancing cross totals and balancing down totals. Vertically, each sector has a balancing source and use of funds statement. Lines 4 through 8 for each sector provide a breakdown of the line 3 surpluses and deficits into the various types of lending and borrowing. If line 3 is omitted, the whole column of source of funds for each sector balances its use of funds, as shown by the totals in line 9. A similar feature is true crosswise as well. Line 1 equals line 2 when summed horizontally across all sectors. And each credit instrument line has total sources balancing total uses at the right of the matrix. It is this interlocking feature of the accounts, which provides its analytical power, that enables the flows to be traced from one sector to another.

3.102. Turning briefly to what the matrix reveals about the Lithuanian financial system in 1995, one should first consider the central government sector of table III.4. In this sector, there is a gross saving of 368. This is the Government's current revenue less its current expenditure. In the year shown, its gross saving was not sufficient to finance all 925 of its gross capital expenditures, with the result that net borrowing of –557 was necessary. The details of how this borrowing was carried out are found in the lower part of the matrix. The primary source of borrowing is the 980 issue of government debt on line 5. This borrowing is actually larger than the deficit of –557 in order to finance the extension of credit (government lending) of 461 recorded on line 6. The Government is, to this extent, acting as a financial intermediary, borrowing in order to relend.

3.103. It is of interest to see from whom the Government borrowed its 980. This can be observed by the horizontal analysis on line 5, the use of funds by each sector recording its absorption of government debt. Government borrowing is primarily from abroad (776), but this is supported by a substantial domestic amount (279) from the private sector. On the other hand, government debt held by the banking system was reduced by 75. (The increase in the cash balance of the government, which might be expected to be recorded as a use of funds on line 7, is by convention netted against the debt to the banking sector on line 5.) In Lithuania, as in many countries, the banking sector—especially the monetary authorities—tends to be a residual lender in this market.

3.104. In the rest of the world sector, the gross saving of 1,372 is Lithuania's balance-of-payments deficit on current account, which from the viewpoint of the rest of the world is a surplus. And, because the rest of the world does no capital formation for Lithuania, the entire rest of the world surplus, that is, its gross saving, becomes 1,372 of net lending to Lithuania. Once again, the lower part of the account details the net lending. It shows, under uses of funds, the lending of 776 because of government debt and 696 because of private credit. On the other hand, the rest of the world obtained credit from Lithuania (had financial sources of funds) of 424 resulting from foreign claims, net of the banking sector (line 4). That is, when Lithuania borrows more from the rest of the world than its current account deficit, it acquires claims on the rest of the world, in the form of foreign exchange deposits (net) of the banks and monetary authorities. This 424 increase in Lithuania's foreign exchange assets is often viewed as the net result of all the other entries in the rest of the world account, which is a key indicator of the overall balance-of-payments situation.

3.105. As to the banking sector, as a financial sector, its activities are primarily recorded in the lower part of table III.4. Also, its presentation is a consolidated one, which has the entire portfolio of the monetary authorities and deposit money banks as use of funds and the entire increase in the quantity of broad money (currency, demand and time deposit liabilities) as source of funds. The instruments in the portfolio breakdown indicate to whom the credit is being extended: 424 to the rest of the world (foreign claims, net), -75 to (actually from) the central Government (central government debt), and 651 to the private sector (private credit). The portfolio increase is primarily financed by the 1,348 money issue and its acquisition by the private sector. The banking sector intermediates some of this flow (651) back to the private sector. But it also intermediates a portion (424) to the rest of the world as it accumulates international reserves.

3.106. The private sector does the bulk of the country's capital formation (4,464) and the bulk of the gross saving (3,529) as well. It might seem that the sector's capital formation is largely financed internally with its saving. (Internal financing occurs when an enterprise finances its capital formation with its own operating surplus.) But the omnibus nature of this sector must be considered. It is likely that the saving of households goes into the acquisition of government debt (279) and the accumulation of money (1,348). On the other hand, the private sector borrowing of 1,808 is carried out mainly by enterprises for the purpose of capital formation. On this basis, some 1,902 of the sector saving is business saving that internally finances investment. The private sector deficit of –815 is a net figure made up of the sector's borrowing less its financial asset accumulation.

3.107. Line 3 in table III.4 is a summary of the operation of Lithuania's financial system in 1995. The sector deficits must be balanced by the sector surpluses. In this case, the rest of world surplus of 1,372 ultimately finances the central government deficit of –557 and the private sector deficit of –815. The contribution of the lower part of the matrix is to show how, that is, by what means, this takes place.

3.108. It has been shown that two aspects of the financing are straightforward. The rest of the world advances 776 to the central Government by way of government debt and 696 to the private sector through private credit. On the other hand, much of the private sector borrowing of 1,808 comes from the banking system and central government lending. These both involve forms of intermediation. The Government on-lends a share of its foreign borrowing, routing 461 to the private sector, and the banking system obtains funds by the monetary issue and routes 651 back to the private sector. It is the flow-of-funds account matrix that allows these financing patterns to be identified.

2. Relationship of the flow-of-funds matrix to the SNA

3.109. The simplified flow-of-funds matrix reviewed in table III.4 resembles the capital and financial accounts as they appear in the integrated economic accounts of the SNA of diagram II.1. Both include gross capital formation, saving and an array of financial instruments analysing net lending or borrowing. However, some differences, which may be taken into account when the SNA capital and financial accounts are extended for use in flow-of-funds analysis, are discussed below.

3.110. Sectoring is considered first. The central government sector and the banking sector are each only part of the SNA general government and financial corporations sectors. The reason for using only these main parts is simple enough. The data for the central Government and the banking sector are available long before those for the government and financial sectors as a whole. And, since these are the key policy-making sectors, it seems sensible to make the substitution. It does have the consequence of making the flow-of-funds private sector more heterogeneous than a corresponding SNA condensation. On the other hand, the use of the central Government and the banking sector greatly helps the matrix to identify key policy variables.

Classification of credit instruments used in the United States flow-of-funds accounts

Open market paper
Treasury securities
Federal agency securities
Municipal securities
Corporation and foreign bonds
Bank loans, n.e.c.
Other loans and advances
Mortgages
Consumer credit

3.111. With respect to the classification of instruments, however, there are more important differences. The SNA has no transaction type similar to foreign claims, net (line 4 in table III.4).[27] This category represents an attempt to move the currency and deposit assets and liabilities of the rest of the world into a separate transaction category on the grounds that these international deposits perform a separate function from domestic currency and deposits.

3.112. The SNA rejects such use of "functional" categories (see 1993 SNA, paras. 11.60 and 11.61). But one may ask why if such categories are useful for analysis. (The SNA also rejects "money" as a category on the same grounds. But most will find the SNA currency and deposits satisfactory for this concept.) The flow-of-funds accounts in the

United States support this position, with a separate "gold and official foreign exchange" category and with a separate "foreign deposits" category. In table III.4, money assets are confined to the domestic sectors, paralleling the treatment in the IMF's monetary survey.

3.113. As to the main SNA credit instrument categories—securities, loans, and shares, these were replaced in table III.4 by central government debt and private credit. The reason is to improve analytical usefulness, that is, to improve the ability to observe who is financing whom. If lines 5 and 6 of table III.4 were merged, for example, it would not be possible to analyse who was financing the Government and who was financing the private sector. As it stands, there is only one sector bearing the liability for each credit instrument, which enables the financing to be traced to that sector using the credit instrument line (5 or 6).

3.114. It must be admitted that the flow-of-funds matrix presented in table III.4 constitutes a highly simplified example as it is based on the data of Lithuania, which is an economy with a limited development of financial instruments. So, one should consider the complexities of the United States economy and the oldest set of flow-of-funds accounts that have been in continuous use for 30 years. These accounts use a list of credit market instruments that is different from the SNA, as indicated in the text box.

3.115. More than half of the categories have the sector orientation referred to that permits the tracing of financial flows from one sector to another. If, on the other hand, the illustrative data for securities, loans and shares in SNA table 2.8 are looked at, not much can be determined about who is financing whom. One important means of tracing intersectoral flows is not available in the SNA classification.

3.116. The conclusion of the above discussion of flow-of-funds accounts in relation to the SNA is a simple one. The SNA could be much more effective for analysis with an improved classification scheme for financial instruments. This seems to be an issue not between producers and users of data but between practitioners and the designers of the SNA.

3. Data requirements for the flow-of-funds matrix

3.117. The simplified flow-of-funds matrix in table III.4 is partly designed for effectiveness in macro policy analysis. But, in part, its design reflects the ease of compilation. It can be almost entirely estimated from the data regularly prepared by countries and submitted to and published by the International Monetary Fund in three of its publications on balance of payments, government finance and money and banking statistics. This simplified matrix can be elaborated further into a more detailed flow-of-funds system.

3.118. Of the four sector accounts in table III.4, three are directly estimated, that is, central Government, the banking sector and rest of the world. The private sector is entirely estimated residually. The upper portion of the matrix containing the estimates for gross capital formation, gross saving and net lending are obtained from the compilation of use of income and capital accounts, as explained in section A.1 above. With regard to saving, the above accounts have a rest of the world saving figure that is (minus) the surplus of the country on current account.

3.119. The derivation of the central government account can come directly from the format in the IMF Government Finance Statistics Yearbook.[28] Either consolidated central government or budgetary central government can define the sector, the former being preferred.

3.120. A convenient source for the rest of the world data is the IMF Balance of Payments Statistics Yearbook.[29] The analytic presentation contains sufficient detail. As a preliminary matter, the debits and credits will have to be reversed to shift to a rest of the world viewpoint and the United States dollar figures converted to local currency units, using the conversion rates in the table. The current account deficit figure—with appropriate sign change—becomes the rest of the world saving. The financial account items are grouped to obtain the capital inflows in the matrix. As is somewhat customary for flow-of-funds analysis, the foreign claims line is a combined international reserves total for both the monetary authorities and the deposit money banks.

3.121. The banking sector in table III.4 is a consolidation of the accounts for the monetary authorities and the deposit money banks. Balance sheets for these two sectors and the consolidated sector—referred to as the monetary survey—are presented in the IMF International Financial Statistics.[30] Increments in the monetary survey account provide the flows for the banking sector in the matrix in table III.4 (the banking sector can be divided into two sectors, one for the monetary authorities and one for the deposit money banks); the standard sector breakdowns shown are all appropriate to the flow-of-funds matrix.

3.122. Once preliminary sources and uses of funds accounts have been assembled for the three directly estimated sectors, the estimation of the private sector is simply a matter of calculating residuals to balance the cross totals. It is evident that errors in the direct estimates will be reflected in the residual estimates for the private sector.

3.123. The matrix at this stage is a fairly rough affair. Already, in the direct estimates various discrepancies will have been noticed, that is, situations in which there are two differing estimates for the same matrix cell. For example, the sector issue of government debt figures will not agree with the absorption figures in the rest of the world or banking sectors. In the estimates for table III.4, such discrepancies were repressed by selecting one estimate for the cell as the "true" figure. This procedure keeps the matrix clean but has the effect of hiding the errors by shifting them either to the miscellaneous and discrepancy line or to the residual estimates of the private sector. A better procedure is to insert two discrepancy columns into the matrix, retain both estimates for the issues and absorptions in their respective sectors, and record the inconsistency on the proper line in the discrepancy columns. The identification of such discrepancies is important because they are the key to the reconciliation and improvement of the estimates of the matrix.

3.124. The above simple compilation may be carried out not only annually, but also quarterly, as the IMF International Financial Statistics contains quarterly monetary data for all countries and quarterly balance-of-payments and government finance accounts for many countries. In addition, as these accounts are in general already used for policy analysis, their reporting lags are short. Thus, there is a real possibility for many countries to compile the simple matrix of table III.4 quarterly, with a lag of perhaps one quarter.

4. Macroeconomic policy

3.125. An essential ingredient for the successful formulation of macroeconomic policies is an effective current analysis of the economy. That is, policy makers need a well-organized picture of what is going on in the economy, one that is up to date and one that will help them to separate serious problems from minor difficulties. To this end, there will no doubt be specialists in the various government agencies whose task it is to have a grasp of the current facts—both statistical and otherwise—in some assigned area of expertise and to keep their senior officers informed of the current economic situation. It is against such a background that corrective macroeconomic policies can best be formulated.

3.126. Flow-of-funds data and analysis can make an important contribution to such analysis in the financial area. The flow-of-funds system provides a means of organizing much of the necessary financial data into a systematic, articulated format. This format provides the framework for a comprehensive analysis of the operation of the financial system. Policy impacts in the areas of public finance, balance of payments and the monetary system can be kept under continuous observation using the flow-of-funds system.

(a) Relationship of the flow-of-funds matrix to policy analysis

3.127. To visualize such matters more definitely, it may be assumed that policy makers have a flow-of-funds system like the one shown in table III.4, but one that is available on a quarterly basis with, say, a three-month reporting lag. As noted, such a system is quite feasible on the basis of existing data.

3.128. Table III.4 contains an array of financial variables that would be of policy interest. With respect to fiscal policy, for example, the table shows government saving (368), government deficit (-557) and total government borrowing (980). With respect to the balance-of-payments policy, the table shows the current account deficit (1372) and the overall deficit (424). As to monetary policy, there is an increase in the money stock, (1,348) and the flow of bank credit to the private sector (651). These variables can be seen as key summary observations in following the financial performance of the economy, variables that might well provide an early warning of developing financial problems.

3.129. More critical, however, are the advantages of observing these variables within the flow-of-funds framework. Then the power of its interlocking character can be brought into play. For example, an increase in the balance-of-payments current account deficit (rest of the world saving, 1,372) not only implies a balancing change in the rest of the world account, it also implies a decrease in the gross saving of some domestic sector, assuming real investment is unchanged. Also, that domestic sector must have a balanced account, either borrowing more or acquiring less in financial assets. Or, again, as has already been noted, increased government borrowing (980) would have to be placed with one or more of the other sectors, so the accounts of those other sectors must have added sources (or reduced other uses) of funds to remain in balance. As a final example, a change in private bank credit (651) may well correspond with a larger increment in the broad money stock. If so, this increment must be acquired by some non-bank sector, which must have an added source of funds to do so, and so on. Flow-of-funds analysis can often trace successive intersectoral impacts of this kind and thus illuminate the current operation of the financial system. The effects of financial policy actions can often be similarly traced. And it will be evident that the policy areas under consideration—fiscal policy, monetary policy and balance-of-payments policy—by their nature involve such interrelations.

3.130. There are three policy areas to consider each in relation to the flow-of-funds matrix; the first is fiscal policy. Perhaps the heart of fiscal policy is the creation of the central government budget. First, there are the necessaries of government current expenditure, usually under pressure to increase. Matching this are the tax policies controlling current revenue. A tax policy objective would be to provide some positive level of government saving. As noted, this key variable appears in the matrix (368). The capital account of the Government, which involves budgeting the Government's fixed investment expenditures and its deficit, also appears in outline form in the matrix. Financial planning for the deficit (-557) must consider government lending to local governments and public enterprises (461) to arrive at the total of government borrowing needed (980)—the so-called overall deficit. Here, proper planning should consider the placement of the debt issue, how much the various sectors will be able to acquire and, especially, how much the banking sector may have to absorb. The results of this whole process are outlined in a straightforward manner in the central government columns and the government debt row in the matrix.

3.131. The macroeconomic aspect of fiscal policy—the relation of the government account to the general level of economic activity—has become a rather conventional one. The view is now generally held that government deficit should not be greater than some 3 or 4 per cent of GDP. Just why is not clear. It relates presumably to the necessary control over aggregate demand. Another view is that "confidence" in the policy integrity of the Government is at issue. It must be remembered that some countries have bitter inflationary memories tied to large government deficits financed by central banks.

3.132. With regard to monetary policy, one may consider its aims as influencing interest rates, the quantity of money, and bank portfolios. Although the increases in the quantity of money and the banking system's portfolio appear directly on the banking sector account in the matrix, the mechanics of monetary policy are behind the scenes of this consolidated account. Normally, these involve central bank control of deposit money bank reserves, which take the form of deposit liabilities of the central bank. The central bank will have various devices—open market operations, auctions, reserve ratios — that enable it to influence the reserve position of the banks and hence their expansion or contraction. Interest rates are either manipulated administratively or as a by-product of reserve actions by the central bank. The upshot in terms of the banking system's portfolio and monetary issue is what is observed in the flow-of-funds matrix. It may be noted that the banking sector account can be deconsolidated into separate accounts for the monetary authorities and the deposit money banks to better trace the details of these mechanics.

3.133. There are two major approaches in monetary policy planning with respect to domestic macro objectives. One approach, which may be labelled the quantity theory approach, sets as an objective maintaining a stable ratio of the quantity of money to nominal GDP. This view is often concerned with the quantity of money as a cause of inflation. The second approach is more concerned with bank credit and especially the question of whether bank credit will be adequate to meet the financing needs of the private sector. This question can be usefully explored using the matrix format for an analysis of private sector finance. The two approaches referred to can, of course, be combined.

3.134. Balance-of-payments policy is a less well-focused policy area. But, for many developing countries, it can be of overwhelming importance. Its basic objective is to maintain an adequate stock of foreign exchange reserves, enough to purchase at least three or four months of imports. The matrix in table III.4 shows this increase in international reserves of 424 as net foreign claims, a banking sector use of funds and a rest-of-the-world source of funds. (In the usual flow-of-funds formats, deposit money bank claims are included with the net foreign claims of the monetary authorities.) This figure is generally regarded as a resultant of all the other balance-of-payments flows. Policy influence on international reserves, therefore, comes indirectly, by way of the other elements in the balance of payments.

3.135. In a sense, the most important ingredient in balance-of-payments policy is the price of foreign exchange. Changes in the exchange rate can be expected to influence all the parts of the balance of payments. But the exchange rate itself is not generally an instrument of economic policy. If the monetary authorities are administering a fixed exchange rate, their ability to do so comes back to their stock of international reserves.

On the other hand, if the exchange rate is set by an open market in foreign exchange, then it will have to be influenced indirectly.

3.136. Control of the balance-of-payments current account deficit (rest-of-the-world saving, 1,372) is decidedly difficult, and direct control of exports or imports is not usually attempted. However, imports are often presumed to vary directly with the level of economic activity. If so, monetary and fiscal policies may have some impact on the current deficit through their influence on imports. But, in general, the current account deficit is something that happens to policy makers.

3.137. Given a particular current account deficit, the fortunes of the country's reserves depend on having a capital inflow—776 plus 696 in table III.4—that is greater than the deficit. This, too, is a difficult policy front. Institutional arrangements such as the regulation of direct foreign investment or the use of government guarantees on borrowing can indirectly influence the trend of inflow. But the main policy instrument has come to be managing the level of domestic interest rates relative to those abroad. This international aspect of monetary policy may well take precedence over domestic needs.[31]

3.138. As recent events have shown, it is the volatility of capital movements that can make their management especially difficult. Large sudden reversals—often originating abroad—can result from “expectational” shifts combined with modern international financial markets. So far, standard monetary policy and its manipulation of interest rates is the primary policy instrument available to deal with such problems.[32]

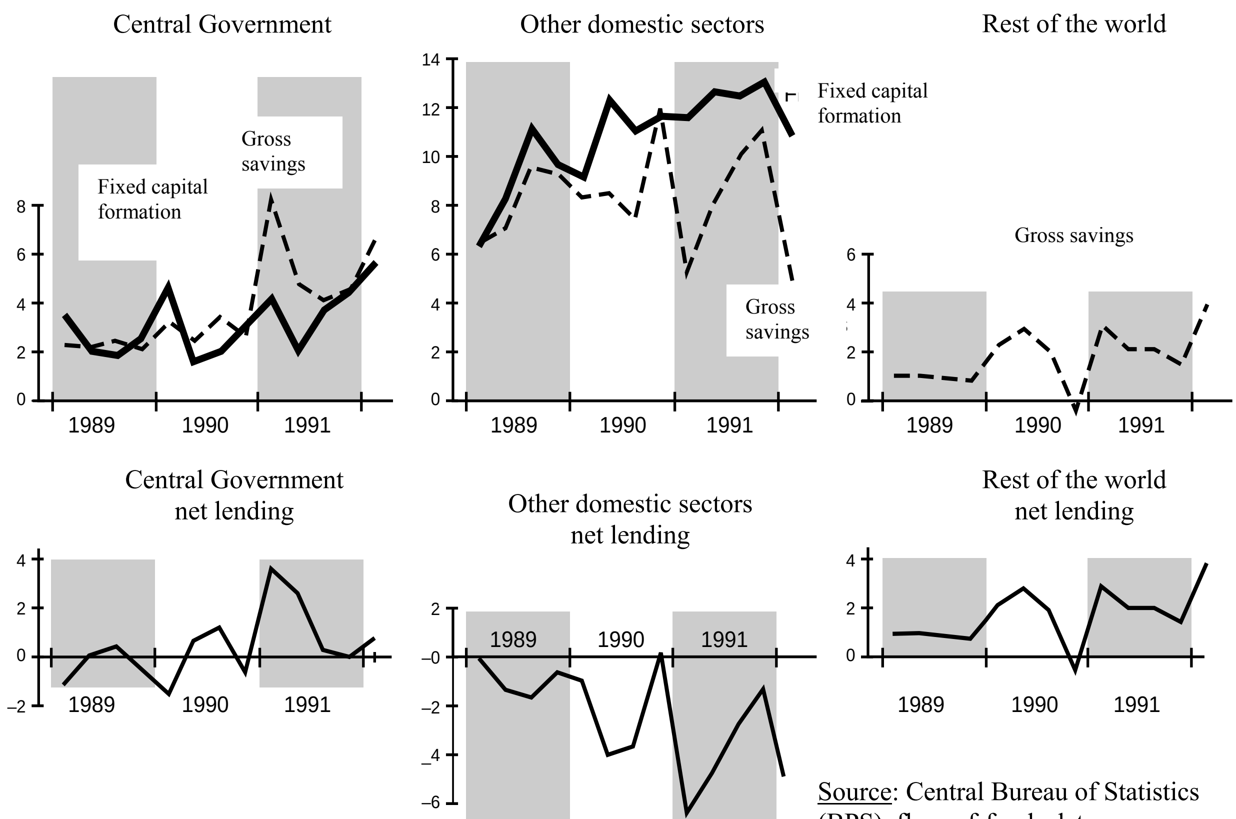
3.139. To summarize the discussion of the balance-of-payments policy, the variables in the flow-of-funds rest-of-the-world account are not those directly controlled in the balance-of-payments policy. But they are the key variables that such policies are indirectly trying to influence: the current account deficit, the capital inflow from abroad and, ultimately, the banking system's increase in international reserves.

(b) Current time series analysis of the financial system[33]

3.140. An effective current analysis of the financial system will take the form of a time series analysis, in which the data are as nearly as possible observing the concurrent economy. For example, in the following brief illustration for Indonesia, the analysis was done in July 1992 and made use of data through the first quarter of 1992. The analysis will also make maximum use of the structure of the social accounts.

3.141. One basic objective is to observe how capital formation is financed, that is, to observe how the acquiring sectors finance such expenditures and, in turn, how the sectors borrow from and lend to one another. To do so, the economy is first divided into sectors and the net borrowing or net lending for each sector is derived as the difference between the sector’s gross saving and real investment. This is done for Indonesia in diagram III.2.

Diagram III.2. Sector saving, fixed capital; formation and net lending (Billions of rupiah)



Source: Central Bureau of Statistics (BPS), flow-of-funds data.

3.142. The rest-of-the-world gross saving appears at the right of diagram III.2 in the rest-of-the-world column. This is the balance-of-payments current deficit looked at from the rest-of- the-world viewpoint. It reveals an up and down pattern in 1990 and a rising trend in 1991. Because the rest-of-the-world does not carry out any Indonesian capital formation, its entire gross saving is placed into the net lending curve at the lower right—that is, the rest-of-the-world gross saving (Indonesia's balance-of-payments current deficit) will equal the rest-of-the-world lending to Indonesia, minus any borrowing from Indonesia.

3.143. At the left of diagram III.2 is a similar column of curves for the central Government. Its fixed capital formation, apart from the seasonal pattern, is rather level in 1989 and 1990 but shows a marked increase moving across 1991. The Government's gross saving—roughly its current budget surplus—is also stable in the first two years but rises sharply to a peak in early 1991. This peak reflects the receipt of added oil revenues stemming from the Gulf war. The difference between these curves—the Government's surplus or deficit—is shown at the lower left. Considering the annual trend, it can be seen that in 1989 there is a modest deficit followed by a movement upward to a substantial surplus in 1991. Most of this surplus is in the first half of 1991; by year's end, the budget is nearly in balance.

3.144. Finally, in the centre of diagram III.2 are the other domestic sectors. This omnibus sector, which includes private and public enterprises, carries out the bulk of Indonesia's capital formation, and a rising trend in this curve is noted, reflecting the 1989-1991 boom. The trend of this sector's gross saving is much flatter, although it peaks sharply in late 1990, in reflection of the public enterprise profits from the Gulf war. The net lending curve of the other domestic sector is entirely negative, thus indicating net borrowing, and its trend is sharply downward.

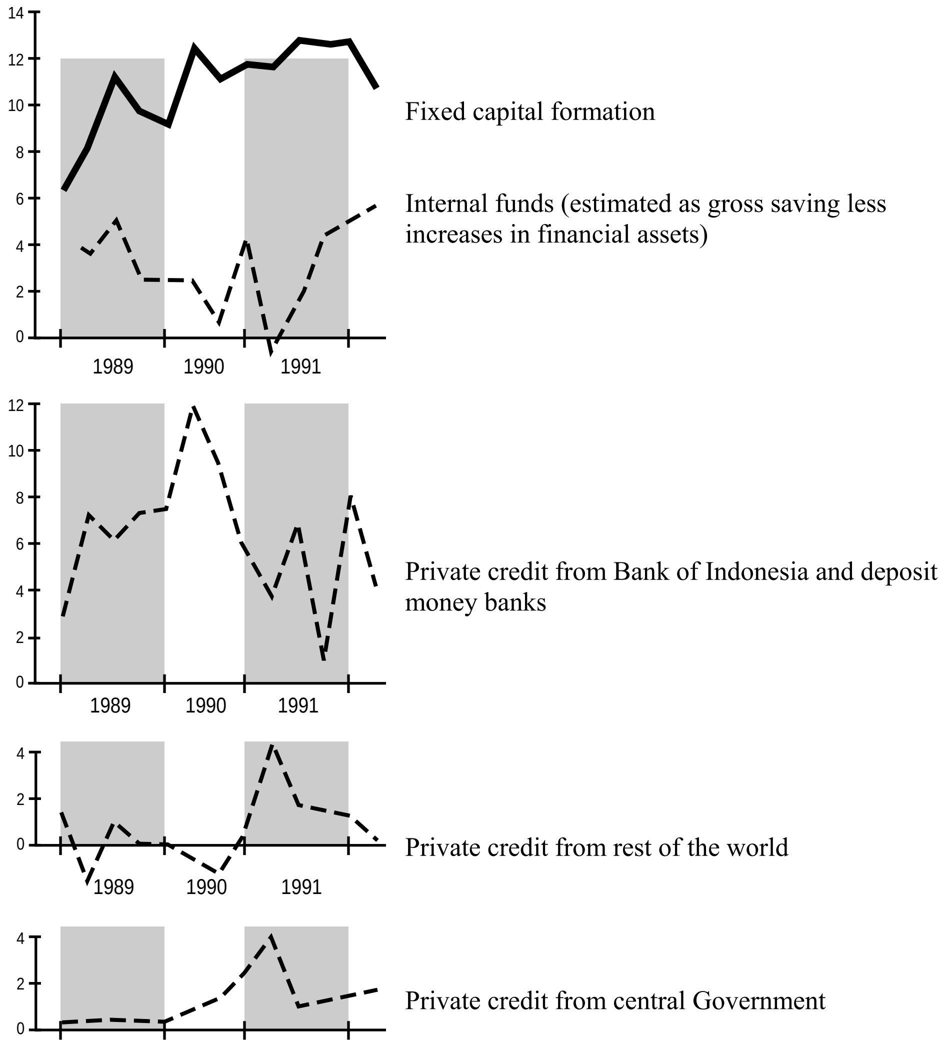
3.145. If one considers horizontally the three net lending/borrowing curves in diagram III.2, it is possible to characterize the operation of the financial system because the net borrowing on these curves must be financed by and is equal to the net lending. Thus, in 1990, with the government budget nearly balanced, the other domestic sector's net borrowing must have come from the net lending by the rest of the world. In 1991, the net lending of both the central Government and the rest of the world financed the growing net borrowing of the other domestic sector. These three net lending/borrowing curves thus give an initial sense of who is financing whom.

3.146. In order to investigate how the sectors financed one another, a full-fledged flow-of-funds analysis would break down each of these net lending/borrowing curves to reveal the particular borrowing and lending flows taking place. For example, an analysis of the central government deficit would reveal how much the Government borrowed by way of debt issue from the domestic sectors and the rest of the world.

3.147. And it would reveal the government lending flow to the private sector. Similarly, an analysis of the rest-of-the-world net lending would reveal its lending to the domestic sectors and the offsetting counterflow reflected in Indonesia's accumulation of foreign assets. In addition, the banking system, which does not appear in diagram III.2, would be analysed. Although the net lending of the banking system is small, it plays a major financial role as an intermediary, issuing currency and deposits to the domestic sectors and extending credit to the central Government, the private sector and the rest of the world (through international reserves and other foreign assets). By these methods, the flow-of-funds framework provides for current fiscal, monetary and balance-of-payments analyses.

3.148. There would remain the analysis of the private sector—the domestic sectors other than the central Government. Because this sector carries out the bulk of Indonesia's capital formation, an understanding of the finance of real investment must focus on this sector. An important advantage of the flow-of-funds framework is that it contains data needed to analyse the finance of this sector.

Diagram III.3. Other domestic sectors finance of investment (billions of rupiah)



Source: Central Bureau of Statistics (BPS), flow-of-funds data.

3.149. Figure III.3 presents this view of the financing of investment by the other domestic sector. The heavy capital formation curve at the top measures the financial objective. A key policy question here is whether th investment boom of 1989-1991 will continue into 1992. The finance for the investment is provided by the dashed curves: internal funds (crudely estimated as described above) and three types of borrowing (from the banking system, the rest of the world and the central Government).

3.150. For a rough analysis, the three years can be broken approximately in half. The rapid upward movement in capital formation up to mid-1990 can be seen to reflect

Indonesia's economic boom. The crude estimate of the internal funds declines during this period. The real investment growth is thus financed by borrowing, and as can be seen, the borrowing is from the banking system. The decision to acquire fixed capital is the origin of this demand for bank credit. What could not be financed internally was financed by borrowing from banks.

3.151. In the second half of 1990, internal financing turns upward (with the Gulf war) and bank borrowing declines. However, increased borrowing both from the Government and the rest of the world replace the bank borrowing. This is interpreted to mean that the domestic bank borrowing is here less necessary and the demand for bank credit declines. In 1991, the alternative sources of funds decline and the demand for bank credit trends upward again to fill the gap between capital formation and the rising internal finance curve. Policy makers need to judge whether the supply of credit in 1992 will be adequate to meet this need.

3.152. In conclusion, an interpretation of the net borrowing curve of the other domestic sector in the centre column of diagram III.2 is needed. The sector was in fact financing a major investment boom in 1989 through increased bank borrowing. But because the sector was equally advancing funds to the banking sector by acquiring currency and deposits, its net borrowing was small. This is the pattern of standard bank intermediation. In 1990 and 1991, this net borrowing became a larger trend. This growth reflects added sector borrowing from the central Government and the rest of the world, followed by a revival of internal finance and bank borrowing.

(c) <u>The saving-investment process scheme</u>

3.153. Probably the most pervasive flow-of-funds technique is the adoption of the saving-investment process view of the financial system. In this view, saving is seen to be placed within the financial system, to pass through the various financial markets and institutions, and then to flow into real investment. The flow-of-funds accounts provide the data by which these flows can be observed and traced.

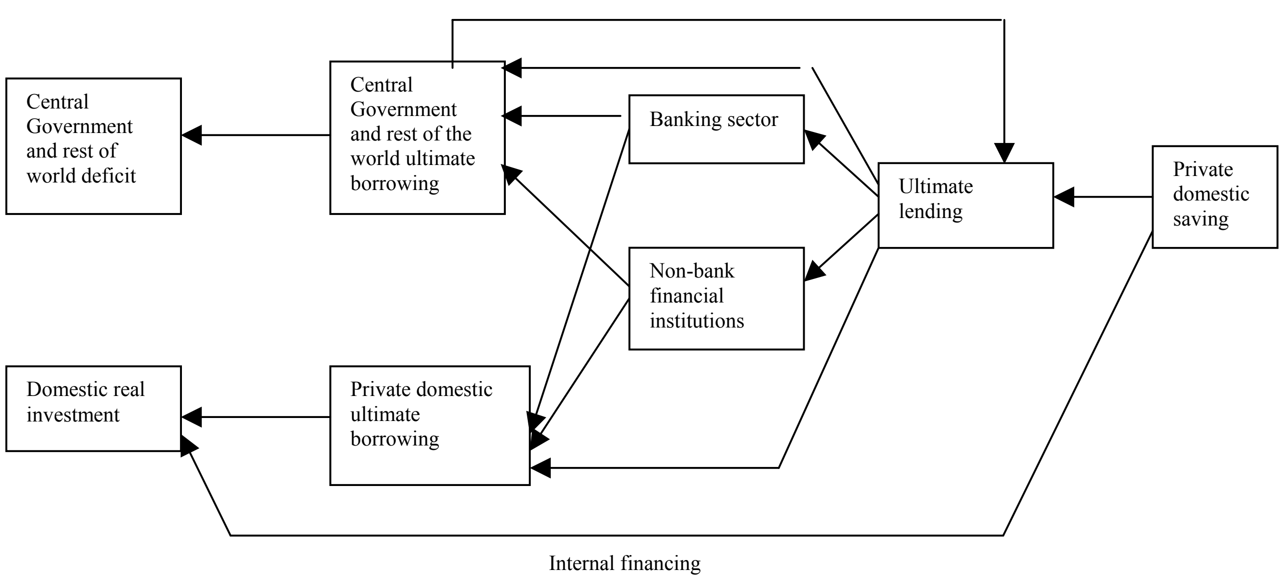
3.154. The scheme is illustrated in diagram III.4. Gross saving of all the private domestic sectors is presented at the right of the diagram. This saving either finances real investment internally, that is, within the enterprise, or is placed into ultimate lending—the acquisition of financial assets by the private domestic sectors. Ultimate lending is either placed with the banking system and other financial institutions or flows directly to the left of the diagram into private ultimate borrowing or central Government and rest-of-the- world ultimate borrowing. Funds also flow leftward from the two groups of financial intermediaries to ultimate borrowing. Gross capital formation at the far left of the diagram is financed by the total of the private ultimate borrowing plus the internally placed saving. The total ultimate borrowing of the central Government finances its deficit, which is assumed to be the objective of central Government finance. If the Government borrows beyond its deficit need, these funds form a kind of feedback into the system, returning to the ultimate lending at the right. The rest of the world is treated like the central Government, with the balance-of-payments deficit on current account treated as the objective at the left, financed by the rest-of-the-world borrowing and with the probability of a similar feedback flow.

3.155. In this scheme, the saving-investment account is split down the middle, its two halves are separated to the right and the left, and the financial system is inserted in between. The scheme presents three basic financial functions: the financing of investment (or the sector deficits), intermediation and the placement of saving. But the functions articulate that whatever saving is placed with the financial system necessarily provides external finance of investment (or the deficits). And the saving and investment at each end of the scheme provide links to the non-financial economy.

3.156. The variables in this saving-investment process scheme can, with one exception, be identified as the cells in a simple flow-of-funds matrix, as in table III.4, but with the addition of a non-bank financial institutions sector. The exception stems from the fact that financial institutions now issue credit instruments identical to those issued by the ultimate borrowers, with the result that the measurement of the financial flow through intermediaries has become somewhat arbitrary. Despite this ambiguity, most flow-of-funds analysts still retain the scheme as a basis for analysis.

3.157. It should be added that, in using this scheme, the arrows of the flow description should not be taken as directions of causation. Causation is more likely to run from borrower to lender, from left to right across the diagram. In particular it should not be concluded that saving decisions are the ultimate determinants of financial affairs.[34]

Diagram III.4. Saving-investment process



(d) Intersectoral tracing techniques

3.158. A central problem in flow-of-funds analysis is how to trace financial flows from one sector to another, that is, how to determine who is financing whom. The accounts show what financial instrument is being issued or acquired, but this knowledge often does not indicate who is being financed. If A acquires a government security and B liquidates one, B may or may not be being financed by A. There are no general principles by which to determine the question at issue, short of knowing that B sold its security to A, which is not known. So, the various methods of tracing who is financing whom are distinctly ad hoc, that is, depending on the circumstances.

3.159. If there are only two sectors involved—as in the case of foreign claims, net, in table III.4—it is inferred that the asset change finances the liability change, and vice versa, if both figures are negative. It is not being assumed here who is causing the flow; that will be dealt with subsequently. In the case of central government debt, where only one sector bears the liability, it can be inferred that the acquiring sectors finance the Government. This inference holds to the extent there is no secondary market in the instrument. On line 5 of table III.4, it is inferred that the central Government is financing the banking sector (-75). In the case of private credit in table III.4, it is inferred that the central Government, the banking sector and the rest of the world are all financing the private sector, again presuming that no secondary markets in the credit instruments are involved. This discussion underscores the point made in section C.2 above that sector-oriented transaction types—with only one sector incurring the liability or only one sector acquiring the asset (e.g., bank loans)—are a major aid in flow tracing.

3.160. The next question is the causation in the financial flows. This is often decided on the basis of behavioural patterns, which stem from one's knowledge of economic behaviour. With regard to the figures on foreign claims in table III.4, it is assumed that the overall balance of the rest of the world results from all other balance-of-payments developments. It is also assumed that the banking sector behaves passively and that the rest of the world causes financial flows from the banking sector to the rest of the world. There are many similar presumptions; the central government sector will determine its issue of debt. In most cases, borrowers take the initiative in setting up loans. Although this is generally true in regard to private sector borrowing from banks, there are times when bank credit policy is influential on the lending side. Other evidence may be called for. In these imputations, of course, the judgement of the analyst will come to bear.

3.161. A final consideration is the correlation between acquisition of financial assets and incurrence of liabilities. In a modern, complex financial market, with several sectors on each side of the market, a striking correlation in the flows between two sectors may be the only way to identify financing between the two. Correlations are also often used within a sector to identify or confirm, for example, which financial sources of funds are related to particular uses.

(e) Judgemental short-term policy projections

3.162. The work on short-term flow-of-funds projection began at the Federal Reserve Board in about 1960. The projections, extending some four to six quarters into the future, developed into a regular feature of staff policy presentations to the Board in the form of "chart shows" about once a year. The projections have continued up to the present time and are a key use of the flow-of-funds system as a whole.[35]

3.163. At the heart of these projections is a flow-of-funds matrix projected for some future period. The matrix is a full matrix, as published by the Federal Reserve Board, with perhaps a dozen sectors and some 15 types of transactions. The essence of the procedure is that the matrix as a whole—with its balancing sector and transaction accounts—is used to force such balances for the future period.

3.164. The projection often starts with a national income and product projection. (An alternative method is to extrapolate historical data to provide an extrapolated matrix for a future period.) Such a projection will usually provide saving and real investment estimates and, in turn, sector surplus and deficit projections. Available knowledge is then used to carry the projection into the financial accounts. For example, housing and durables projections provide a basis for projecting home mortgage and consumer credit borrowing and an initial estimate of consumer financial investment. Corresponding balanced statements are put together for business, governments and foreigners. The assembly of non-financial sector borrowing in the various instruments and financial intermediary receipts (mainly in deposits and insurance reserves) will provide the material for the financial institution estimates. Usually by this point some parts of the matrix will not appear to be reasonable. This situation sets off rounds of successive adjustment to the matrix until a final plausible projection is arrived at.

3.165. The process takes place within a framework of initial assumptions regarding monetary and fiscal policies. In the end, the projection will provide implications for interest rate movements and supply and demand stress in financial markets. These, in turn, may have implications for the initial policy assumptions.

(f) Long-term projections using the World Bank RMSM-X model

3.166. The revised minimum standard model extended (RMSM-X) is currently being used by country desks at the World Bank for 5- to 10-year policy projections. It evolved out of an earlier model that had become standard for foreign debt and balance-of-payments analysis. The RMSM-X, however, is extended to the economy as a whole and uses source and use accounts for the major sectors, arranged into two matrices, one for current and one for capital accounts. Each matrix is in to whom/from whom format. Details of the model and its use are discussed in section VII.C.

3.167. The purpose of the model is to allow the user to compare the implications of a variety of economic scenarios using differing policy premises and/or differing assumptions about the growth of the economy. Each projection is not a fully detailed view but rather a rough, general look, developed simply. A number of such projections can be produced quickly and compared. The most appropriate outlook can then be iterated to arrive at a more finely tuned view.

3.168. The model is not an econometric model in the sense of embodying fitted behavioural equations. Instead, the model begins with assumed growth rates for major economic variables such as real GDP, inflation and exports. These assumptions are in the nature of judgemental projections. An assumed marginal capital/output ratio is projected and used to obtain capital formation; similarly, a monetary velocity is projected and determines the size of the banking sector. Other variables such as government revenues and expenditures are simply tied to GDP growth. Simplicity is the keynote.

3.169. Historical data is fed into the model and an appropriate base year is selected. Making use of the scheme of assumptions, the model carries the base year matrices forward into each future year and generates a set of key economic and financial indicators with which the outcomes can be examined. The model uses the projections of the government budget, the balance of payments and the monetary accounts, together with the national income and product accounts, to derive the private sector and its finance. This, in turn, permits an examination of the consistency of patterns of saving, investment and finance over the term of the projection.[36]

(g) Empirical model analysis

3.170. The flow-of-funds matrix has had a considerable history in relation to the major macro models, starting with the Brookings model in the 1960s. At that time, many of the larger models wished to make use of the new financial data source to improve and elaborate their financial sub-models. In the process, various issues arose, two of which are discussed briefly.

3.171. One major issue raised forcefully by Brainard and Tobin in their famous "Pitfalls" article[37] was where the models stood on the question of balancing social accounts. The model builder must ensure by the design of the model that the social accounts balance, in both flow and level form, not only in equilibrium but also in every period of a dynamic adjustment. The requirement was convincing even though just how this would be achieved has remained a problem.

3.172. A second major front is that of liquidity preference theory and interest rate structure. The Brookings model essentially retained liquidity preference theory, using a bank reserves sub-model to determine the short-term interest rate and then deriving other rates by way of an interest rate structure. This position was vigorously opposed in the model work of Duesenberry, Friedman, and the Tobin group.[38] For them, the price of every financial instrument was to be determined by the supply and demand in its market. And, the interest rate structure needed to be free to change. Flow-of-funds lost this battle, so to speak. The major models have continued with the Brookings-style determination of the short rate and the use of a fixed-rate structure even though there were improvements in the financial modelling elsewhere such as in the mortgage market.

D. Meeting data needs for the Philippines macro policy analysis: beyond 2000

3.173. The Asian currency turmoil and structural reforms such as privatization, decentralization, globalization and liberalization have put more pressure on the statistical system, specifically on national accountants, in terms of supplying the required macroeconomic aggregates and indicators to support planning and policy-making. There are now more demands to expand, extend and articulate the Philippine System of National Accounts (PSNA). Furthermore, the current economic scenario calls for reliable short–term indicators to send early warning signals for planners and policy makers. At the sub–national level, the order is for more local-level indicators beyond the regional accounts, with the implementation of the local government code.

3.174. The National Statistical Coordination Board (NSCB), the agency assigned to compile the PSNA, continues to respond to the demands to improve the accounts and make them more responsive to the needs of current development planning. However, the development of new accounts is done on a selective or ad hoc basis because of resource constraints. Although the PSNA is considered one of the more advanced in the region, it still needs a lot of improvements, especially in the light of the recommendations in the 1993 SNA. The 1993 SNA, which provides a comprehensive framework for social, ecological and economic analysis, will answer the data needs of the new Philippine development plan. To maximize its use, however, users should be able to clearly point out the indicators that need to be developed on the basis of the PSNA. This will help attune the Philippine version of the 1993 SNA to the analytical requirements of the Philippine development plan. The Philippine framework should hinge on the applicability of the accounts.

3.175. An attempt is made here to identify indicators to analyse the medium-term Philippine development plan (MTPDP) and then to link them to the 1993 SNA framework. This will help to ensure the usefulness of the Philippine SNA framework. The sections below include (a) a summary of the macroeconomic policies of the MTPDP for the period from 1999 to 2004, the policy response to the 1997 Asian currency crisis, and decentralization strategies; (b) a listing of indicators based on the MTPDP and its link to the 1993 SNA framework; and (c) a plan of action to ensure the generation and utilization of these macro indicators.

1. Macroeconomic thrusts and strategies

3.176. The 1993 SNA is a theoretical construct to provide guidance in organizing socio-economic and ecological data for analysis. The development of the Philippine 1993 SNA framework should consider its applicability. Hence, the MTPDP was used as a basis for identifying indicators by which the Philippine framework would be designed.

(a) Thrust and strategies of the medium-term Philippine development plan, 1999-2004

3.177. The Philippines is currently implementing the MTPDP for the period from1999 to 2004. The new development plan will continue with the stabilization policies and financial reforms started in the previous plan (1993–1998). The policies on stabilization include a deficit-reduction programme and a shift in public sector investments. On structural reforms, market-oriented schemes, guided by a price system, will be adopted. These include privatization, deregulation and liberalization of imports and foreign investments. The overall thrust of the new macro policies is aimed at increasing private sector savings and raising investment efficiency, all within the context of a sustained, broad-based and non-inflationary growth. The capital market will be developed to mobilize savings. This is aimed at strengthening financial structures to make the country less vulnerable to external shock. The macroeconomic policies in the medium and long term will, accordingly, focus on the following:

- Development of a stable capital market that mobilizes an increasing pool of domestic savings and allocates these efficiently to productive sectors;
- Sustained/surplus fiscal balance through progressive taxation and effective and efficient public spending;
- Monetary prudence that allows for non-inflationary growth;
- Efficient operating of markets for the determination of quantities and prices of goods and services, including factors of production.

(i) Capital market development and financial resource mobilization

3.178. Capital markets, particularly those necessary to mobilize long-term savings, will be developed further. The Government, with the help of the private sector, will develop efficient pension and mutual funds markets to mobilize long-term savings. It will likewise adopt institutional reforms to encourage the mobilization of savings from small savers. Participation in the equities market will also be promoted by encouraging small investors to participate in initial public offerings. Development of the capital market will, to a large extent, hinge on improvements in the market infrastructure and regulatory framework of the banking and financial sector. The taxes on financial instruments will be re-examined and credit programme rationalized.

(ii) Fiscal policy

3.179. The public sector is expected to achieve fiscal surpluses. To this end, the Government will adopt measures to develop a more efficient and progressive tax system. It will strengthen the institutional framework to raise the tax effort and ensure stable budgetary surpluses. Expenditures of the national Government will be kept at a level consistent with growth and inflation objectives and public sector targets. Prudent cash management will be practised. Both the local government units and the government corporate sector will contribute increasingly to a healthy financial position.

(iii) Prices, monetary management and the external sector

3.180. Monetary policy will aim at maintaining price stability conducive to sustainable economic growth through targeting the base and reserve money levels. While this will affect stability in the value of savings and investments, it will at the same time allow sufficient liquidity to finance the expansion of economic activities. Interest and exchange rates will remain fundamentally market determined. The issuance of more long-term government bonds in the market delineated from budgetary and exchange rate considerations, along with a market-oriented interest rate policy, will be conducive to the development of a market for long-term securities. A sound balance of payments will be promoted and an adequate level of international reserves will be targeted.

(iv) Labour and employment

3.181. On the labour supply side, policies aimed at raising skills and human capital are useful; on the demand side, policies that expand investments and job opportunities will help. The generation of jobs for Filipinos in the labour force will be left largely to the private sector. In support of this policy, government intervention in wage setting will be minimized. In the long term, wages will be determined by the market. There will be greater opportunities and incentives for local employment through more jobs and better incomes from increasing labour productivity.

(b) <u>Policy response to the 1997 Asian currency market turmoil</u>

3.182. The currency and financial disturbances that hit East Asia in the second half of 1997 revealed weaknesses that made the Philippines vulnerable to external factors. As a result, the Government pursued stabilization measures to reduce speculation and uncertainty.

(c) <u>Decentralization</u>

3.183. With the implementation of the local government code, planning, policy and resources administration has been decentralized to the local government units. The concern is to provide equal opportunities for all local units to make productive use of their respective resources and comparative advantage. To this end, the following decentralization strategies will be pursued:

- National dispersion through regional concentration;
- Strengthening urban-rural linkages;
- Resource and area-based development;
- Effective regional development administration;
- Delivery of minimum desirable levels of welfare and facilitating economic growth;
- Furthermore, current development strategies will be pursued for globalization and financial reforms.

2. Indicators for macro policy analysis

3.184. Given the thrusts and strategies of the new MTPDP for the period from 1999 to 2004, the policy response to the Asian financial crisis and the decentralization strategy, indicators for macro policy analysis have been identified. These indicators are shown in table III.5, together with their definition, required frequency and level of disaggregation. The indicators were evaluated against the 1993 SNA framework as input in drawing up the Philippines 1993 SNA framework. The indicators selected will provide a link between macro analysis and the 1993 SNA and statistical development. If the 1993 SNA framework provides the information required by the indicators selected, the indicators are marked with an asterisk.

3. Institutional linkages

3.185. The task of statisticians is to respond to the demand of users. Most often, they provide more data than is actually needed. The result is more statistics, a bulk of which remains unused.

3.186. With the new challenges in statistics, the statistician should work efficiently and effectively. The statistician should link up with users to know their data needs and for purposes of prioritizing statistical activities. Moreover, dialogues between users and statisticians provide a venue for promoting statistical products of which users are sometimes not aware.

3.187. In the Philippines, such effort has been started in the use of Philippine economic environment and natural resources accounting (PEENRA). There is currently a joint activity with a government research group to use the results of PEENRA. The same activity will also be pursued for national accounts.

Table III.5. Selected indicators for macro analysis

MTPDP indicators	Frequency	Disaggregation	1993 SNA
A. Real sector	Q, A	N, R	*
GDP, real growth	Q, A	N, R	*
GNP, real growth	Q, A	N, R	*
GDP by industry, real growth and percentage share	Q, A	N, R	*
GDP by expenditure, real growth and percentage share	Q, A	N, R	*
Per capita GNP/GDP in US dollars (real)	A	N, R	*
Incremental output ratio	A	N	*
Investment (percentage of GDP)	A	N	*
Sources and uses of income	A	N	*
Net savings ratio to GNP	A	N	*
Marginal propensity to consume	A	N	*

B. Fiscal sector			
National government borrowings (ratio to GNP)	A	N	*
Total public sector borrowings (ratio to GNP)	A	N	*
Government borrowings from local and	A	N	*
government units (ratio to GNP)	A	N	*
Consolidated public sector financial	A	N	*
position (ratio to GNP)	A	N	*
Tax revenue (ratio to GNP)	A	N	*
Current operating expenditure (ratio to GNP)	A	N	*
Capital outlay (ratio to GNP)	A	N	*
Net lending (ratio to GNP)	A	N	*
Net external financing (ratio to GNP)	A	N	*
Tax effort (ratio to GNP)	A	N	*
Ratio of savings to GNP	A	N	*
M3 (ratio to GNP)	A	N	*
Investment multiplier	A	N	*
Interest rate	A	N	*
Saving-investment gap	A	N	*
C. Monetary sector			
Inflation rate (percentage)	Q, A	N, R	
Domestic savings rate (percentage)	A	N	*
Exchange rate (percentage)	Q, A	N, R	
Foreign currency deposits liabilities structure			
D. External sector			
Exports, real growth rate	Q, A	N	
Imports, real growth rate	Q, A	N	
Trade balance, percentage to GNP	Q, A	N	
Current account			
Overall balance-of-payments position			
Foreign investments	Q, A	N	
International reserves	Q, A	N	
Marginal propensity to import	Q, A	N	
Terms of trade (percentage)	Q, A	N	
Foreign capital			
E. Prices	Q,.A	N, R	
Price indices			
Asset price index			
F. Employment			
Employment			
Labour productivity			
Unemployment rate	Q, A	N	
Wage			

Notes:
Q – quarterly; R - regional; A – annual; N – national.
An asterisk (*) means the indicator can be compiled on the basis of 1993 SNA data.

Notes:

[1] Report of the Inter-Secretariat Working Group on SNA to the Statistical Commission in 1997 (E/CN3/1997/12).
[2] The data for period (t+1) were estimated based on extensive basic data, which is referred to in section VI.D as long-term accounts data. The estimation methods used to arrive at the (t+1) estimates are explained in section VI.D.1.
[3] UNDP and World Bank initiatives were preceded by much earlier developments in the 1960s of indicators and supporting methodology by the United Nations Research Institute for Social Development (UNRISD). A good summary of its activities is contained in Donald McGranahan, Eduardo Pizarro and Claude Richard, Measurement and Analysis of Socio-Economic Developments, Geneva, UNRISD, 1985'
[4] World Bank, World Development Report, 1993: Investing in Health, (Oxford, Oxford University Press, 1993); United Nations Development Programme, Human Development Report, 1996 (Oxford, Oxford University Press, 1996)
[5] See Report of the Secretary General entitled "Integrated and coordinated implementation and follow-up of major United Nations conferences and summits; a critical review of the development of indicators in the context of conferences follow-up", (E/1999/11)
[6] Handbook of Input-Output Table Compilation and Analysis, Handbook of National Accounting, United Nations, Series F, No. 74 (United Nations publication, sales no. E.99.XVII.9)
[7] Central Product Classification, Statistical Papers, Series M, 77, ver. 1.0 (United Nations publication, sales no. E.98.XVII.5).
[8] International Standard Industrial Classification of All Economic Activities, Statistical Papers, Series M, No. 4, Rev. 3 (United Nations publication, sales no. E.90.XVII,11)
[9] The SNA also allows for the use of producers' prices, if countries are not able to separate out all product taxes from the output flows (for more details see 1993 SNA, paras. 15.33 and 6.205-6.221)
[10] J. Mattey. and Th. ten Raa, "Primary versus secondary production techniques in U.S. manufacturing,' Review of Income and Wealth, vol. 43, no. 4, pp 449-464.
[11] See note 6, p. 250.
[12] Ibid., p. 161.
[13] Ibid.
[14] Ibid., p. 155.
[15] Ibid., pp. 252-253.
[16] Th. ten Raa, Linear Analysis of Competitive Economies (Hemel Hempstead, United kingdom, Prentice Hall-Harvester Wheatsheaf, 1995).
[17] See note 6, paras. 2.5 and 2.6.
[18] The Handbook assumes in the paragraphs quoted, that there is correspondence between ISIC and CPC categories
[19] See note 6, p. 43
[20] Ibid.
[21] See note 10.
[22] T.F. Barker, R. van der Ploeg and M. Weale, "A balanced system of national accounts for the United Kingdom", Review of Income and Wealth, series 30, no. 4 (1984), pp. 461-485
[23] Th. ten Raa, Th. and R. van der Ploeg, "A statistical approach to the problem of negatives in input-output analysis", Economic Modelling vol. 6, no. 1 (1989), pp. 2-20.
[24] See note 16, p. 178.
[25] Th. ten Raa and P. Kop Jansen, "Bias and sensitivity of multipliers", Economic Systems Research, vol. 10, no. 3 (1998), pp. 275-83
[26] M. Pomme and W. Baris, "Balance sheet valuation: produced intangible assets and non-produced assets," Links between Business Accounting and National Accounting, (United Nations publication, salkes no. E.00.XVII.13), chap. 9.
[27] Monetary gold and SDRs are a technical category usually of no importance at this aggregate level.
[28] International Monetary Fund, Government Finance Statistics Yearbook (Washington, D.C., annual).
[29] International Monetary Fund, Balance of Payments Statistics Yearbook (Washington, D.C., annual).
[30] International Monetary Fund, International Financial Statistics (Washington D.C., monthly). This publication also contains current (but abbreviated) government finance and balance-of-payments statistics.

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[31] Managing capital inflows requires long-term planning of the country's ability to service the debt that is acquired.
[32] It should be added that various controls on deposit money bank international transactions may become a helpful additional tool.
[33] The material in this section is taken from J.C. Dawson, eds., Flow-of-Funds Analysis: A Handbook for Practitioners (Armonk, New York, M.E. Sharpe, 1996), reading 41.
[34] For an exploration of the opposite hypothesis—that ultimate borrowing determines ultimate lending—see "Saving-investment process analysis for the 1950s" in Flow-of-Funds Analysis……. , reading 32; see also, "Measuring the saving-investment process" in Flow-of-Funds Analysis……. , reading 10.
[35] See Stephen P. Taylor, "Flow-of-funds projections" in Flow of Funds Analysis ….., reading 9, and Staff of the Board of Governors of the Federal Reserve System, "Policy projection with chart show briefing," in Flow-of-Funds Analysis…..., reading 38. A similar type of projection is presented in Henry Kaufman, James McKeon, and David Foster, "Financial market projection for private financial institutions" in Flow of Funds Analysis ….., reading 39.
[36] For an example of RMSM-X use, see John A. Holsen, "The medium-term outlook for Kazakhstan's economy" in Flow-of-Funds Analysis…….., reading 44.
[37] W.C. Brainard and J. Tobin, 'Pitfalls in financial model building", American Economic Review, 58, (May 1968)
[38] See Flow of funds Analysis …….., reading 25-30.

IV. POLICY ANALYSIS BEYOND THE ECONOMIC CORE

4.1. In chapter II, section B, it was recommended that the present focus in modelling and analysis be extended to incorporate social and environmental elements. This is what is being done in the present chapter. The extension is referred to as satellite accounting and analysis, as economic analysis is still considered the core of the 1993 SNA. There is more consensus on concepts and classifications of this economic core of the SNA than on those that define its satellite extensions. As there is much less consensus on extending the core to social and environmental elements, the sections below should be considered merely as examples of how economic analysis could be extended and how macro accounting could support this extension.

4.2. Section A contains a discussion of a so-called human resources accounts (HRA) framework, in which social elements are linked to economic analysis through a satellite extension of the household sector accounts. The HRA framework applies the subsectoring of the household sector not only to economic data as suggested in the SNA, but also to social data, so that economic efforts and social impacts can be confronted in the same classification, and socio-economic assessments can be made. The HRA analysis for the Republic of Korea focuses on education and employment. The data of the accounting framework are, as in the previous chapter, supplemented by indicator ratios, on the basis of which analysis can be carried out. Section B is closely related to section A; it includes a review of the present work on human development indicators by UNDP, and ways in which they can be incorporated in the type of accounting framework for socio-economic analysis, as developed in the previous section. When extending the HRA framework to include human development indicators, it is suggested to redefine it as a framework for human development accounts. Section C shows a variety of policy uses of indicators by the World Bank. It highlights, in particular, why indicators are used instead of the underlying data and strongly recommends that data and indicators be defined within a conceptual framework that is consistent with theory and enables analysts to precast, forecast and backcast different data series using assumed correlates. Section D introduces, in a similar manner, satellite accounts, data and indicator ratios for integrated economic and environmental analysis. It is based on the orientation laid down in the System of Integrated Environmental and Economic Accounts (SEEA)[1].

A. Human resources accounts for the Republic of Korea

4.3. The present section proposes a set of indicators for long-term socio-economic analysis that are defined within the data constraints of so-called human resources accounts developed for the Republic of Korea. The National Statistical Office (NSO) of the Republic of Korea and the United Nations Statistics Division (UNSD) cooperated in this endeavour. The HRA study focuses on education and employment; future studies may deal with other socio-economic topics. The present section extends the indicator analysis discussed in section III.A, which is based solely on economic indicators, to socio-economic indicators.

4.4. The emphasis of the present section is on developing a methodology of analysis based on macro accounts; it does not pretend to present in detail an actual analysis of the impact of the Republic of Korea's educational and employment policies. Given this limited objective, only a subset of the data compiled have been used, not all available breakdowns have been reflected and data are restricted to 1990 and 1995, representing only the beginning and the end of the period of study for which data were available from all data sources. A further limitation is that the analysis is based on past data compiled by the National Statistical Office. As the data were not developed for the particular purpose of the present study, certain data detail and, in particular, cross-classifications of data linking individuals to the households to which they belong could not be obtained. Some of these limitations may be removed in a more comprehensive study that is planned at the end of the HRA programme, when all data have been analysed in detail.

1. Human resources accounts framework and data

4.5. The objective of the HRA study in the Republic of Korea is to develop a socio-economic data set within a framework of macro accounts, in support of assessing interrelated policies dealing with education, employment, productivity and household income. It does so by measuring the impact of such policies on the level of education of the population as a whole, and the working population in particular, the subsequent impact on productivity and value added growth in different industries and, through changes in the labour income per worker, on the income level of different household groups. The analysis is close to the one pursued by social accounting matrices, which generally focus on employment, labour income and its impact on the purchasing power of the household sector.

4.6. The data used in the analysis include economic and social data. One group of economic data refers to expenditures by households and Government on education, as well as data on income of households from which those expenditures are made. These are the data reflecting the economic responses of government policies and households, which have an impact on the educational quality of the population. The social impact is measured with the help of data reflecting the level of education of students, the population as a whole and the subset of the working population. Also measured are economic impacts based on value added and labour productivity data by industries and data on the share of labour income in total GDP and its share in the disposable income of households.

(a) HRA framework and economic data

4.7. The conceptual framework is presented in table IV.1. It is a schematic data presentation, which is designed as an adapted and extended version of the household sector accounts of the SNA. It consists of five separate data segments, each of which is based on separate data sources and supports the data requirements of the type of analyses described in the previous paragraphs. All data segments presented in the table, except the first one, include economic data based on concepts that are governed by 1993 SNA standards. The first data segment includes social data on education, which are based on international guidelines other than those of the SNA. This data segment is discussed in section (c) below.

4.8. The second data segment refers to production accounts data that are derived from annual establishment surveys (ES), including agricultural surveys. It includes data on output and value added, and two sub-items of value added, namely, compensation of employees and mixed income/operating surplus. Value added is presented in current and constant prices. The constant price data are needed in order to measure productivity and GDP growth. The data segment is divided into two parts. The first one refers to small-scale establishments with four or less employees, which are assumed to be those that are directly managed by the household sector, and another subsegment that refers to the production account items of the total economy, including the smaller ones. The two subsegments are included in order to explain, with the help of production data, the two main income sources of households -- compensation of employees and mixed income/operating surplus. Compensation of employees received by households is the result of employment corresponding to the total economy, while mixed income/operating surplus corresponds to the income items as presented in the data segment for the smaller production units.

4.9. The third data segment in the table includes information on employment from labour force surveys (LFS). These surveys are conducted frequently in the case of the Republic of Korea and use the same sampling frame as the household income and expenditure surveys.

4.10. The fourth segment is the core of the economic data set. Its main data sources are the household income and expenditure surveys (HS), which are carried out in a reduced format annually, and with more detail included every five years. The surveys cover data items that are included in three accounts of the household sector distinguished in the SNA, that is, the allocation of primary income, the secondary distribution of income account and the use of disposable income account. These accounts and the corresponding data segment cover four income sources of households distinguished in the SNA -- compensation of employees, mixed income/operating surplus, property income and current transfers. It also includes data on final consumption of households, including current expenditures on education. Two of the income items -- property income and current transfers -- are recorded as the difference between receipts and payments. Saving in this data segment is the difference between the four income items and final consumption.

Table IV.1 HRA Compilation framework

Household sector

Subsectors of households: urban/rural

ISCED-households	***Demographic surveys (DS)***	
	No. of households	
ISCED-individuals		
	No. of individuals in the total population, 6 years and older No. of students enrolled No. of working persons, 15 years or older	
Gender		

ISIC	ISIC
Establishment surveys (ES) : establishments with 4 or less employees	***Establishment surveys: all establishments***
Output	Output
GDP/value added, current prices	GDP/value added, current prices
GDP/value added, constant prices	GDP/value added, constant prices
Compensation of employees	**Compensation of employees**
Mixed income/operating surplus	Mixed income/operating surplus

Subsectors of households: urban/rural

ISIC **Gender** **ISCED-individuals**	***Labour force surveys (LFS)*** **Employment**	**ISCO** **Gender** **ISCED-individuals**

Subsectors of households: urban/rural x ISCED-households

	Household surveys (HS)	
	Compensation of employees	
	Mixed income/operating surplus	
Purpose classification of expenditures : education	Property income, receipts less payments	
	Current transfers, receipts less payments	
	Disposable income	
	Final consumption+E13 of which: educational expenses paid for by households	
	Saving	

	Education-related data sources (Bank of Korea-SNA)	
Purpose classification of expenditures: education		
	Final consumption on education paid for by households/ Government/ NPISHs Capital formation in schools and educational equipment by Government and NPISHs	

The last segment presented in the table refers to specialized data on current and capital formation expenses on education by Government and NPISHs. These data, which in the case of the Republic of Korea are obtained from the national accounts published by the Bank of Korea (SNA), are needed in order to supplement the data on final consumption by households on education. Final consumption by Government and NPISHs is an important supplement to educational expenses by households, and capital formation in education by Government and NPISHs is the only capital element on education, as households do not pay directly for buildings and other capital equipment used in education.

(b) Classifications and cross-classifications

4.11. The classifications that are used in the compilation and analysis of the data have been presented at the margins of each data block. If more than one classification is presented, it implies that data are available in cross-classifications. The classifications and cross-classifications are needed in order to show that indicator values differ between different groups of households and individuals and also between groups of establishments (industries) in which individuals are employed.

4.12. One of the concerns in drawing up the set of classifications is that an effective link be created between three types of units that are distinguished in the scheme of table IV.1, namely, establishments, individuals and households. The establishment units apply to the production data. The unit of individuals applies to data on employment, and to information on students and other parts of the population. The household unit is relevant to the grouping of data on income, expenditures and savings of households, as required in the SNA context, and also to some data regarding the heads of households. Linking data on the three types of units is essential for effective analysis of household sector information. As shown below in the case of the Republic of Korea, not all such links are yet available.

4.13. The scheme of table IV.1 identifies eight different classifications that are used in the HRA framework. Some are used separately, but many are used in cross-tabulations with other classifications.

4.14. The main classification is a subsectoring of households, which applies in principle to all economic and social data of the household sector. In the case of the Republic of Korea, however, owing to data limitations, only the distinction between urban and rural households has been applied to most, but not all, data sets. In particular, it was not possible to apply the distinction to the second data segment on production, as establishment data were not readily available separately for urban and rural areas. In the future, this distinction could be made on the basis of NSO regional GDP data. A further subsectoring of households has been made by distinguishing between the levels of education of the head of the household. This distinction, which is referred to in the table as ISCED-households, has been applied in the first data segment, where the number of households is cross-classified by urban and rural and by ISCED categories[2] corresponding to the heads of households. The same cross-classification is also applied to the HS data in the third segment of the table.

4.15. An industry (ISIC) breakdown is applied to all production data obtained from establishment surveys.

4.16. In the third segment of table IV.1 all working persons are cross-classified by ISIC categories of industries in which they are employed, by gender, occupational and employment status[3], and level of education (referred to in the table as ISCED-individuals). This multiple cross-classification of employment data is obtained mainly from the LFS data source. As the ISCED classification of working persons, however, was not available in this data source, the distinction was made on the basis of DS data, as working persons are also distinguished in the population census data. The ISCED structure of working persons of the DS data source – as reflected in the first segment of the table -- was applied to the information on working persons of the LFS data in the third segment. The ISCED (individuals) and gender classification is also applied in the first segment of the table to students and individuals in the population, six years and older.

4.17. Finally, a purpose classification of expenditures[4], in which educational expenses have been identified, has been applied to final consumption and capital formation on education in the last two data segments of table IV.1. In particular, the purpose classification has been applied to final consumption data obtained from the household survey and to the corresponding Bank of Korea data on final consumption and capital formation in the national accounts.

4.18. The full set of cross-classifications identified in the table has not been applied in practice to all data, as it would result in a proliferation of separate data categories; the basic data would not be sufficiently reliable to be presented in such detail. A more serious limitation for analysis, however, is that as yet no cross-classification between individuals (working persons and students) and households has been included; currently available data do not allow for such cross-classification. This data limitation implies, for instance, that it cannot be determined whether there are differences in the relation between expenditures on education, the impact of these on the levels of educational enrolment of students and the level of education of individuals, when the individuals belong to different classes of households. (This data limitation could be more easily removed in the future than any other data obstacles, as it was caused not by the collection of basic data, but by the manner in which data were processed and stored.) Also, no cross-classification link could be established between production data of small scale establishments and the household subsectors that manage these production activities.

4.19. Typical classifications and cross-classifications contained in social accounting matrices (see sect. II.C) are also included in the scheme of table IV.1 and in the data based thereon. SAMs traditionally include employment-related data in a cross-classification by ISCO categories and ISIC categories of industries of employment and an alternative breakdown of the same information by ISCO categories and household subsectors. These two detailed SAM breakdowns of employment-related data serve in SAM analysis to establish a link within I-O analysis between income generation of individuals in production and income use of households. The three classifications are contained as multidimensional cross-classifications in the first and third segments of table IV.1.

(c) Social data or indicators

4.20. The first data segment in table IV.1 refers to social data on individuals and households. The main data sources are annual demographic surveys and population censuses, which provide more detailed information every five years. They include data on the number of households and the number of working persons (15 years and older), as well as data on students enrolled.

Through appropriate classifications of these households and individuals, their educational characteristics are made explicit, and through an analysis of changes over time, the social impact of policies, measured through the data of the economic accounts, can be determined.

4.21. For the purposes of the present study, which focuses on education and employment, special indicators have been designed that measure the educational achievement of individuals in the total population, and of students and working persons. These indicators summarize, respectively, the ISCED breakdown of students, individuals in the total population, and working persons. This means that when classifying the indicators for the corresponding individuals, the

Table IV.1 – Supplement Social indicators on education and employment

	Subsectors of households: urban/rural	
	Demographic surveys	
	Educational achievement index of -households (heads of)	
	Educational achievement index of *individuals in the total population, 6 years and older *students enrolled	
Gender		

	Subsectors of households: urban/rural	
ISIC * Gender	*Labour force surveys* Educational achievement index of -working persons, 15 years or older	**ISCO * Gender**

ISCED breakdown referring to individuals is eliminated from the classification of data. Table IV.1-supplement (extracted from table IV.1) shows that the summary educational achievement indices have been applied to (heads of) households, individuals in the population, six years and older, students and working persons, and that the indices are available in several classifications and cross-classifications in the margins of the table.

4.22. Educational achievement indices of groups of individuals are weighted averages of the level of each individual. The weights are the number of individuals corresponding to each level of education. The individuals may refer to students, workers and other individuals in the population. The level of education is measured by ranking the ISCED levels of education: graduate school: rank 10; college or university: 9; junior college: 8; high school: 7; middle school: 6; primary school: 3; never attended school: 1. The logs of the ranks, instead of the ranks themselves, were used to arrive at a weighted average rank. This was done to avoid the level of education of the category with the highest rank being 10 times as high as the one with the lowest rank. When taking the log of the ranks, this factor is considerably reduced. This procedure is the same as calculating the weighted geometric means of the ranks, that is, $\sum_{i=1}^{m} n_i \log E_i = \prod_{i=1}^{m} E_i^{n_i}$, in which E refers to the rank of each educational level and n to the number of individuals that are ranked.

4.23. The indices are calculated in table IV.2. for heads of households, students, individuals in the total population, 6 years and older, and workers. This is done at the level of the country as a whole, in the left-hand side of the table, and separately for individuals in urban and rural areas and for males and females. The interpretation of the values of these indices may be illustrated with the following examples. The educational achievement index averaged for all students in the country had, in 1990, a value of 3.80; in 1995, the value was 4.15. This means that as explained above, the average level of students increased from close to primary school level (3.80) to a level that was closer to that of middle school (4.15); for some subgroups identified in the table these averages may be slightly higher, but in all instances, they are located between primary (3) and middle school (6). The way to link these educational achievement indices to other indicators in the table is explained below.

(d) Data consistency

4.24. For the time being, the data obtained from different data sources and used in the analysis below have not all been reconciled with each other; even though there are many overlaps between the data sources, the same data items estimated on the basis of different data sources are not consistent. The main reason is the time constraint. For instance, reconciliation of the data between the national accounts data of the Bank of Korea and the GDP and related data sets of the NSO would require detailed and extensive inter-agency discussions. Reconciliation of other data sources may be difficult. For instance, data on employment for 1990 and 1995 from demographic surveys and population censuses differ considerably from those of the labour force and establishment surveys; there are also large differences between the annual data on employment from the labour force and establishment surveys. It is generally recognized, however, that labour force surveys are the better source of information on employment.

4.25. On the other hand, full reconciliation of data is less urgent for the type of indicator analysis pursued in the present section. As explained below, data are not directly used in the analysis, but rather, indicators, defined as ratios, coefficients, growth rates and averages per worker are applied. As long as such indicators can be derived from the data of one data source, there is no immediate need to reconcile the levels between data sources, provided that the data structures of each data source are reliable, without internal distortions, and apply also to units not covered.

2. HRA indicator analysis

4.26. Two types of analysis that can be applied to the HRA data are discussed below, namely, indicator analysis of past developments and simple modelling for projections of future developments. The objectives of the two types of analysis are the same, that is, studying the interaction between education and employment. Both analyses are based on the measurement of indicator ratios defined below, and are of the same type as those discussed in section III.A. In that section, however, they were restricted to economic indicator ratios only, while the analysis below includes socio-economic indicator ratios.

(a) Indicator ratios and their use in assessing socio-economic developments

4.27. The socio-economic indicators used here are shown in table IV.2. They are derived from the HRA database for the Republic of Korea as defined in tables IV.1 and its supplement, covering 1990 and 1995 data only.

4.28. The table presents three groups of indicator ratios related to the analytical objective of the HRA for the Republic of Korea. They include indicators describing the level of education, expenditures on education and the supporting revenues of households, and indicators related to employment. In line with the analytical objective of the HRA for the Republic of Korea, they show how the level of education of individuals in the population is affected by their income and expenditures on education, and how this influence on the level of education is translated through the working portion of the population into improvements in productivity, GDP growth and labour income.

4.29. The indicators range from simple to complex indicator ratios and cover economic, social and mixed socio-economic indicators. The simple ones include percentage relations between aggregates and components (final consumption expenditure on education as a percentage of total final consumption expenditure of households, line 27), percentage distribution of working persons between industries (line 7) and of households between urban and rural areas (line 10), average of educational expenses per student (line 31), labour income per worker (line 5) and labour productivity averaged per worker (line 3) and, finally, growth rates, including the growth of the educational achievement indices of students (line 13), population of six years and over (line 15) and working persons (line 17), or the growth rate of the number of working persons (line 6). All growth rates were measured between 1990 and 1995 and, using a geometric average, were converted to average annual growth.

4.30. All indicators are recorded for the economy as a whole on the left-hand side of the table, and for selected indicators a further breakdown is presented in the data boxes on the right side of the table. The latter breakdown is an essential feature of this analysis, which assumes that indicator ratios differ among groups of households, individuals belonging to those households, and industries where they are employed. The breakdown is limited to urban-rural and male-female distinctions for most indicator ratios. In addition, an industry breakdown is applied to the indicator ratios that refer to the educational achievement index of workers, labour productivity, labour income and employment. More detail is available in the HRA database, but such detail will only be used when the final data are published in a joint NSO-UNSD publication.

4.31. A simple indicator analysis of past trends based on the indicator ratios in table IV.2 may include a series of interrelated conclusions. These may refer to changes in productivity and average labour income, changes in the educational achievement over time of heads of households, students, workers and individuals of the population as a whole, the relative importance of expenses on education to total consumption and income of households. In more detail they may include the following:

Table IV.2 Indicators on education and employment defined within the HRA framework for the Republic of Korea (1990 and 1995)

INDICATORS FOR POLICY ANALYSIS

Total economy

Indicator	No.	Data sources	1990	1995	Growth on annual basis (percentage)
PRODUCTIVITY, LABOUR INCOME AND EMPLOYMENT			1990	1995	
Value added/GDP	1	ES			14.7
Labour income as percentage of GDP/value added	2	ES	61.9%	60.6%	
Labour productivity, i.e.,value added in constant prices 1990, per working person, thousand won	3	ES/LFS	10,326	13,336	5.2
GDP/value added deflator (1990=100)	4	ES	100.0%	134.6%	6.1
Average labour income per worker, thousand won	5	ES/LFS	6,395	10,866	11.2
Employment, No. of working persons (in thousands)	6	LFS	18,085	20,377	2.4
Distribution of working persons, 1990	7	LFS			
LEVEL OF EDUCATION					
Households			1990	1995	
No. of households	8	DS	11,355	12,958	
Index of educational achievement (of heads of households)	9	DS	4.18	4.57	1.8
Distribution, 1990	10	DS			
Students enrolled					
No. of students enrolled (in thousands)	11	DS	11,020	10,550	
Nr. of students as percentage of total population	12	DS	25.4%	23.7%	
Index of educational achievement	13	DS	3.80	4.15	1.8
Distribution, 1990	14	DS			
Population (6 years and over)					
Index of educational achievement	15	DS	3.93	4.29	1.8
Distribution, 1990	16	DS			
Working persons, classification by sectors					
Index of educational achievement	17	LFS	4.41	4.90	2.1
No. of working persons as percentage of total population	18	DS	36.3%	40.4%	
Distribution, 1990	19	LFS			
Working persons, classification by industries					
Index of educational achievement	20	LFS			
Distribution 1990	21	LFS			
EXPENSES ON EDUCATION AND HOUSEHOLD INCOME AND CONSUMPTION					
			1990	1995	
Disposable income	22	HH			16.1
Disposable income per capita, thousand won	23	HH/DS	2,758	5,664	15.5
Disposable income as percentage of GDP	24	HH/ES	64.1%	69.0%	
Labour income (compensation of employees and mixed income as percentage of disposable income of households	25	HH	92.1%	93.0%	
Final consumption expenditure of households as percentage of household disposable income	26	HH	73.8%	70.2%	
Final consumption expenditure on education as percentage of final consumption expenditure of households	27	HH	8.1%	9.6%	
Distribution of households, 1990	28	DS			
			1990	1995	
Government and NPISH consumption on education expenditure as percentage of total consumption expenditures on education	29	NA	52.8%	52.3%	
Total capital formation on education as percentage of actual (=total) final consumption on education	30	NA	10.1%	10.0%	
			1990	1995	
Average expenditures on education per student, i.e., actual consumption on education / No. of students enrolled (million won per student per year, in 1990 prices, based on GDP deflator)	31	NA/HH/DS	0.990	2.446	

Table IV.2 (continued)

S u b s e c t o r s

	Industries, other than agriculture, fishing 1990	1995	Growth on annual basis (percentage)	Agriculture, forestry, fishing 1990	1995	Growth on annual basis (percentage)	
			9.3			15.1	1
	59.6%	58.7%		89.0%	87.8%		2
	11,562	14,258	4.3	4,657	6,867	8.1	3
	100.0%	134.6%	6.1	100.0%	134.6%	6.1	4
	6,886	11,258	10.3	4,146	8,113	14.4	5
	14,848	15,544	0.9	3,237	2,541	-4.7	6
	82.1%	87.5%		17.9%	12.5%		7

	Urban 1990	1995	Growth on annual basis (percentage)	Rural 1990	1995	Growth on annual basis (percentage)	Male 1990	1995	Growth on annual basis (percentage)	Female 1990	1995	Growth on annual basis (percentage)	
	8,462	10,032		2,892	2,926								8
	4.79	5.12	1.4	2.80	3.08	2.0							9
	74.5%			25.5%									10
	8,379	8,575		2,641	1,975		5,797	5,740		5,224	4,810		11
	25.9%	24.5%		23.8%	20.7%		26.6%	25.7%		24.2%	21.7%		12
	3.87	4.20	1.7	3.60	3.95	1.9	3.87	4.29	2.1	3.73	3.99	1.4	13
	76.0%			24.0%			52.6%			47.4%			14
	4.27	4.61	1.5	3.10	3.32	1.4	4.35	4.73	1.7	3.55	3.90	1.9	15
	73.1%			26.9%			48.8%			51.2%			16
	5.06	5.42	1.4	3.12	3.50	2.3	4.81	5.32	2.0	3.73	4.24	2.6	17
	34.2%	38.2%		42.4%	48.4%		48.0%	52.1%		24.5%	28.5%		18
Working persons, classification by sectors and industries	71.9%			28.1%			66.3%			33.7%			19

	Industries, other than agriculture, fishing 1990	1995	Growth on annual basis (percentage)	Agriculture, forestry, fishing 1990	1995	Growth on annual basis (percentage)	
	5.02	5.38	1.4	2.44	2.57	1.0	20
	82.1%	87.5%		17.9%	12.5%		21

	Urban 1990	1995	Growth on annual basis (percentage)	Rural 1990	1995	Growth on annual basis (percentage)	
			17.9			9.7	22
	2,788	5,867	16.0	2,673	4,922	13.0	23
	48.2%	56.1%		15.9%	12.9%		24
	93.3%	94.0%		88.2%	89.0%		25
	74.7%	69.6%		70.8%	72.5%		26
	7.9%	9.8%		8.8%	8.6%		27
	74.5%	77.4%		25.5%	22.6%		28

Notes:

DS = Demographic Surveys; ES = Establishment Surveys; HH = Household Surveys;
LFS = Labour Force Surveys; NA = National accounts of Bank of Korea

(a) The growth rate of labour productivity between 1990 and 1995 on an annual basis is 5.2 per cent for the total economy (line 3), while the growth of labour income per worker (line 5/line 4) in constant prices on an annual basis is 4.8 per cent (111.2/106.1), that is, lower than the productivity increase. As a consequence, labour income as a percentage of GDP has decreased between 1990 and 1995 from 61.9 to 60.6 per cent (line 2). During the same period, employment (line 6) has increased by 2.4 per cent on an annual basis. These relative growth trends for the total economy coincide with those of the main contributing activities to GDP: in agriculture (17.9 per cent of total employment in 1990 (line 7)), labour productivity increased by 8.1 per cent (line 3), labour income in constant prices by 7.8 per cent (line 5/line 4) or 114.4/106.1, but employment decreased by 4.7 per cent (line 6). For other industries (82.1 per cent of total employment in 1990) (line 7) the figures are 4.3, 4.0 (110.3/106.1) and 0.9 per cent;

(b) In 1990, the educational achievement index of students (line 13) is 3.8. This is lower than the educational achievement indices of all other groups for which the education of students should ultimately be reflected, that is, 3.93 for the population six years and over (line 15); 4.18 for the heads of households (line 9), and 4.41 for the working population (line 17). The 1.8 per cent annual growth of the educational achievement index of students is the same as that for heads of households and for the population six years and over (line 15). These growth rates are lower, however, than the growth of the educational achievement index of working persons (line 17), which is 2.1 per cent. The relatively low level of educational achievement of students as compared to other population groups, as well as its relatively low growth rate, imply that the educational effort in the Republic of Korea is not sustainable and may ultimately lead to a reduction in the growth of the educational achievement of all other groups;

(c) The figures for the total economy, however, are not representative for all groups in the population. In the case of the urban areas, the circumstances are more favourable with regard to the 1.7 per cent growth rate in the educational achievement index of students, which is higher than the 1.5 per cent of the population as a whole, and also higher than that of heads of households (1.4 per cent) and of the working population (1.4 per cent). For the rural areas, the 1.9 per cent growth for students is less favourable, as it is lower than the 2.0 per cent growth for heads of households, and the 2.3 per cent for the working population, but higher than the 1.4 per cent for the population six years and over. For males, the circumstances are favourable, as in the urban areas there is a 2.1 per cent growth for students, which is higher than the 1.7 per cent for the population six years and over, and 2.0 per cent for the working population. For females, however, the circumstances are less favourable, as the 1.4 per cent growth for students is lower than the 1.9 per cent for the population six years and over, and 2.6 per cent for the working population. It is also interesting to see how the level and growth of the educational achievement index differ between industries, where working persons are employed (line 20). They range from low levels in agriculture (2.44, and 1.0 per cent growth) to high levels in other industries (5.02, and 1.4 per cent growth;

(d) The fact that educational achievement of students is not growing as fast as that of the population as a whole may be due to higher expenditures per student (line 31), which increased from 0.990 million won in 1990 to 2.446 (in prices of 1990) in 1995. Some of this higher cost is because the level of educational achievement of students has increased between 1990 and 1995. The increase in expenditures per student has resulted in fewer students being educated (line 11); in 1990 the number was 11,020 million and in 1995 it was 10,550 million. There were fewer students in the total population (line 12) in 1995 (23.7 per cent) than in 1990 (25.4 per cent);

(e) Another reason for the decline in educational efforts may be the change in the relative importance of educational expenses in the total expenses of households and Government. The table shows that households spent relatively more on education (line 27) in 1995 (9.6 per cent) than in 1990 (8.1 per cent). For urban areas, the increase was even larger, from 7.9 per cent in 1990 to 9.8 per cent in 1995, while in the rural areas, there was a decrease, from 8.8 to 8.6 per cent. The supporting government and NPISH efforts, however, were reduced relatively (lines 29 and 30). In 1990, the Government and NPISHs contributed 52.8 and 10.1 per cent to the total of current and capital expenses on education; these figures reduced slightly in 1995 to 52.3 and 10.0 per cent.

(b) Use of indicator ratios in projections

4.32. This last part of the section shows how a selection of the socio-economic indicator ratios of the previous section can be used to serve as parameters in simple model projecting the HRA data to the future. In that way, indicator ratios and other indicators are used to the maximum extent to analyse not only the past but also how trends observed in the past can have consequences for the future. This use of indicators in projections is further discussed in section C.

4.33. The parameter relations that define the simple model are schematically presented in table IV.3. The variables of the model, which are the HRA data of the past and their projected values in the future, are presented in the rectangular blocks on the left-hand side of the table. They include final consumption by households, capital formation on education, and labour income received by households. Also included as variables are the educational achievement indices of students, the population as a whole and working persons, which are indicators derived from the basic data.

4.34. The parameters are presented on the right-hand side of the table in rounded rectangular blocks. They include a limited selection of indicator ratios that are either presented or derived from those included in table IV.2. Each of the rounded blocks of indicator ratios presented in table IV.3 includes a reference to the corresponding line number in table IV.2. This may help the reader to verify the link between the comprehensive set of indicator ratios in table IV.2 and the limited selection in table IV.3. The indicator ratios taken directly from table IV.2 include, among others, labour income as a percentage of GDP (line 2), average expenditures on education per student enrolled

(31), number of working persons as a percentage of total population (line 18) and so on. With regard to educational achievement indices, table IV.3 includes derived indicator ratios in the form of relative growth rates. Thus, the growth of the educational achievement index of the population is related to the number of students enrolled (line 15/line 11), the growth of the educational achievement index of working persons is divided by the growth of the index of educational achievement of the total population (line 17/line 15), and the growth of labour productivity is divided by the growth of the educational achievement index of working persons (line 3/line 17).

4.35. The model, schematically presented in table IV.3, is a dynamic one. It relates labour income and disposable income of households of one period to labour income of the next period through intermediate parameters, including growth rates of educational achievement and growth rates of labour productivity, average labour income per working person, growth of GDP and so forth. The projected values of the variables depend on the exogenous information on employment and also on the values of the parameters that are used in the projections. These could be changed as part of different scenarios linked to different impacts to policies. When fixing the alternative values of the parameters, account may be taken of the variations in the parameter values between the different groups of households, individuals and industries, as shown in table IV.2. Policies that affect the growth rates of educational achievement of selected groups, or the growth rates of labour productivity and average per capita labour cost of selected industries, influence the global values of parameters and may be taken into account in determining the impact of selected policy scenarios for the economy as a whole.

4.36. Table IV.3 presents not only the scheme of the analysis, but also includes data for 1990 and 1995 and projected data for 2000. The estimates and projections are made on an annual basis for the entire period from 1990 to 2000, but for the purpose of presentation only the data for 1990, 1995 and 2000 are shown. The starting point for the estimates is GDP in 1990. Thus, for instance, labour income in 1990 (115,656) is calculated on the basis of GDP (186,744) and, with the help of the value of the indicator on labour income as a percentage of GDP (61.9). As a next step, disposable income in 1990 (119,678) is estimated using labour income as a percentage of disposable income (92.1). Each subsequent variable is then estimated on the basis of the previous variable in the scheme of the table with the help of the next indicator ratio value. This estimation process is continued first for all variables in 1990 and then through the growth rates of educational achievement indices, annual figures for the period from 1991 to 1995 are calculated, using the 1990 values of the indicator ratios. In a similar manner, the projections to 2000 are made on an annual basis. Some adjustments were made to the indicator values, so that the estimated figures for 1995 were as close as possible to the actual data for that year.

Table IV.3 Schematic presentation of the use of indicator ratios in projecting future development of selected variables

Variables

	actual data 1990	*actual data* 1995	projection 2000
GDP/value added	***186,744***	***365,677***	665,180
Labour income (=compensation of employees and mixed income)	***115,656***	***221,424***	402,778
Disposable income households	***119,678***	***252,359***	432,878
Final consumption, households	***88,290***	***177,049***	303,698
Final consumption expenditure by households on education	***7,141***	***16,945***	29,067
Actual final consumption on education, incl. expenses by government and NPISH's	***15,119***	***35,514***	60,918
Capital formation in education	***1,522***	***3,560***	6,106
Number of students enrolled (11)	***11,020***	***10,550***	14,502
Index of educational achievement of the population(15)	***3.93***	***4.29***	4.69
Index of eductional achievement of working persons (17)	***4.41***	***4.90***	5.45
Labour productivity (3)	***10,326***	***13,336***	17,216
Employment (No. of working persons) (6)	***18,085***	***20,377***	***22,498***
GDP/value added deflator (4)	***100.0%***	***134.6%***	171.7%

Employment: assumed growth of employment: 2 per cent

GDP/value added deflator: assumed inflation: 5 per cent

Exogenous factors

Indicator ratios

	1990	1995
Labour income as percentage of GDP/value added (2)	61.9%	60.6%
Labour income (compensation of employees and mixed income) as percentage of disposable income of households (25)	92.1%	93.0%
Final consumption expenditure of households as percentage of household disposable income (26)	73.8%	70.2%
Final consumption expenditure on education as percentage of final consumption expenditure of households (27 adjusted)	9.5%	9.6%
Government and NPISH consumption on education as percentage of total consumption expenditures on education (29)	52.8%	52.3%
Capital formation on education as percentage actual (= total) final consumption on education (30)	10.1%	10.0%
Average cost (=actual consumption) of education per student enrolled (31 adjusted)	1.698	2.446
Percentage (adjusted) growth of index of educational achievement of population (15)/ 1,000,000 students enrolled (11)	1.8%	1.8%
Number of students as percentage of total population (12)	25.4%	23.7%
Index of educational achievement of students (13)	3.80	4.15
Growth of educational achievement of working persons (17) / growth of educational achievement of the population (15)	1.201	
Growth of labour productivity (3)/ growth of educational achievement of working persons (17)	2.464	
Number of working persons as percentage of total population (18)	36.3%	40.4%

4.37. The latter calibration of estimates of the data to 1995 required value adjustments of a limited number of indicator ratios, as compared with their values in table IV.2. Thus, the growth of the index of educational achievement of the population (line 15) per million students enrolled (line 11) was increased from 0.161 to 1.770 per cent. Average cost (i.e., actual consumption) of education per student enrolled (line 31) was increased from 0.990 million won per student to 1.689 million won per student in 1990 constant prices. And final consumption expenditure on education as a percentage of households' final consumption expenditure (line 27), was increased from 8.1 to 9.5. All three indicator values were increased in value for the years after 1990 as the 1990 values of the indicator ratios were not consistent with available 1995 data when the model was used to project the data from 1990 onward. The adjusted values of the indicator ratios were taken into account when making the projections for the later years until 2000. The adjustments illustrate how projections can be used to improve the values of indicator ratios for years for which no data are directly available.

4.38. The estimates and projections use two types of exogenous information. The first one concerns the increase in employment, for which an average growth of 2 per cent is assumed for the period from 1995 to 2000, and the second one is the GDP deflator, which is assumed to grow annually by 5 per cent. Of course, if other indicator ratio values and growth rates of the two exogenous factors are used, the projections will be different.

4.39. It should be pointed out that using only 1990 and 1995 data is a serious limitation of the simple projection model, which also suffers from lack of detail with regard to issues concerning education and employment. As this leads to simplifications in the parameter values, they should be removed in future studies. Thus, instead of using parameter/indicator values for 1990 and 1995 only, they may be developed for each year of the period. In addition, by having annual data, time lags can be built into the simple model, which would improve the accuracy of the projections. It would also make it possible to confront the values of the parameters with the actual data on an annual basis and thus make parameter adjustments that, at the present time, could only be made when confronting the parameter values with the 1990 and 1995 data.

4.40. Another limitation with regard to data detail is that the values of variables and indicator ratios used in the projections are those for the global economy. However, when reviewing the values in table IV.2 above, it was already indicated that the global values do not necessarily hold for the subsectors and other subgroups. The values for subsectors and subgroups, which table IV.2 identifies for urban and rural households, and for male and female individuals, may be higher or lower than the global values. This implies that the values of the global indicators would change if there were changes in the distribution of households or individuals between the groups. It is for this reason that in table IV.2 values of distributional indicators are identified. If these values change over time, the values of the global indicators may change, even if there is no change in the indicator values for each group. This will be elaborated in a future NSO-UNSD publication on HRA for the Republic of Korea, where an attempt will be made to incorporate the indicator values for subgroups in the orientation of the analysis developed in the present section.

B. *Incorporating human development indicators into macro accounting*

4.41. The human development indicators referred to in the present section extend the type of indicators shown in tables IV.1 and IV.1-supplement, which describe the educational qualities of individuals, to social indicators in support of other socio-economic policies.

4.42. The section takes into account the recent work of a number of United Nations institutions and other international organizations to identify a common minimum set of indicators for monitoring poverty and human development. These include the efforts of UNSD (to develop a minimum national social data set (MNSDS), the Joint Consultative Group on Policy (JCGP), OECD, the World Bank and the United Nations Development Assistance Framework (UNDAF). Fortunately, there is a great deal of convergence of views among these institutions on what would constitute a desirable and feasible set of indicators.

4.43. The objective of the present section is to help identify a compact set of human development indicators that can usefully be integrated with an international system of macro accounting. Since the recommendations issuing from the expert group meeting will no doubt influence data collection by national institutions, the number of indicators that are proposed should not be extensive nor should they require burdensome data collection efforts. But, most importantly, they should lend themselves to being clearly linked to other macro-accounting indicators, and in particular, they should directly reflect people's quality of life.

4.44. In view of the latter consideration, it is recommended that the satellite framework for such indicators be broadened to a human development accounts (HDA) framework, replacing the reference in the previous section to human resources accounts. This broader term, which is used throughout the present section, is needed in order to emphasize the backward and forward linkages between economic data and social indicators. Thus, in the previous section, attention is mainly focused on the relationships between income and expenditure flows and changes in the capital account of the standard SNA framework, on the one hand, and changes in people's basic capabilities, on the other hand. The present section deals with changes in capabilities—in terms of health, nutrition or literacy, for example— that can be linked back to changes in the economic indicators. In the previous section, human capabilities are evaluated primarily as inputs into production, that is, as a means to boost output. The primary interest of the present section is on charting the effects on human capabilities as valuable ends in themselves. The ultimate objective of such a broadened format of HDA is to serve as a barometer of human development and to clarify whether it is being advanced; this broader objective has implications for the kind of indicators that are selected.

4.45. It is important, both practically and theoretically, that in constructing the HDA, a clear distinction is made between input indicators and outcome indicators. Some indicators show the extent of inputs into human development—such as the population per number of hospital beds or the percentage of the population with access to health services. Other indicators can more directly reflect a human development outcome—such as mortality rates or incidences of certain diseases. It is recommended that the HDA be limited as much as possible to outcome indicators of human development or human poverty. This is not only more theoretically appealing, but also more practical in the sense of being more explicitly linked—and overlapping less—with the national economic accounts.

4.46. To illustrate the above and prepare the basis for a proposed set of indicators, section 1 contains a brief review of some of the indicators included in the human development index, the capability poverty measure and the two human poverty indices (one for developing countries and one for industrialized countries).[5] In section 2, an explicit set of human development indicators for a standard HDA is proposed.

4.47. When developing the proposed set of indicators, a provisional table of poverty indicators proposed for a parallel study on human resources accounts of Mozambique is taken as a point of departure. The table included in the Mozambique study is reproduced below as table IV.4.

1. Evolution of the human development index

4.48. Since its introduction in the Human Development Report, 1990, the human development index has undergone an evolution. In its current form, it includes four indicators: average income per person (in PPP dollars and discounted for income above average world per capita income), average life expectancy at birth, adult literacy and the combined gross enrolment ratio. Adult literacy and life expectancy are excellent examples of outcome indicators. Literacy denotes a basic level of educational achievement, while life expectancy denotes a basic level of health achievement. One difference worth noting at this point is that, while literacy is an individual attribute, life expectancy is a statistical construct only meaningfully applied to some sample of the population.

4.49. The combined gross enrolment ratio is an interesting case. It cannot be neatly categorized as either an input or an outcome indicator. In previous analysis associated with the formulation of sustainable human development indicators for UNDP, it was labelled as an intermediate output indicator. An enrolment ratio is an output, that is, an achievement in terms of the percentage of students at school, but it does not directly reflect the educational attainment of those students. Adult literacy, by contrast, does directly reflect educational achievement—and this is usually assumed to be the result of enrolment in primary school.

4.50. Asking why the indicator of average income per person is included in the HDI opens up an interesting discussion. Income has always been considered a means to human development, not an end in itself. If this is so, why is it included in the HDI along with other indicators more directly reflective of people's quality of life? The explanation given in the Human Development Report, 1996 is that it is a proxy for other human capabilities closely associated with one's material standard of living, such as being well nourished or having adequate shelter. Placing to one side the theoretical issue of confusing means with ends of human development, this poses a practical problem for devising a system of macro accounting because income is already included in the national economic accounts. Thus, including it in the satellite human development accounts would be a confusing duplication.

4.51. The HDI started out in 1990 as more of a poverty-focused index—including only life expectancy, adult literacy and income up to an international poverty line. Since 1990, it has evolved into an index that is more reflective of the average level of human development in a country, instead of being reflective of the level of human deprivation. It was therefore logical that a composite index would eventually emerge to gauge human poverty. The first such attempt was the capability poverty measure (CPM), introduced in the Human Development Report, 1996. The CPM clarified the basic concept of poverty as a capability failure, devised a way to identify thresholds for such failures that could be identified with individuals, and determined a way to use similar units (e.g., percentages of the population that are deprived) to construct a composite index.

4.52. The CPM is a simple additive composite index composed of three indicators: female adult illiteracy, child malnutrition and lack of access to trained birth attendants. Female adult illiteracy is merely the deprivation expression of the positively expressed female adult literacy. The percentage of children under five years of age who are underweight adds an important dimension of deprivation, namely, undernutrition, which had been missing from such previous composite indices of human development as the HDI. The third indicator, namely, the percentage of births unattended by trained health personnel, is a proxy for the lack of healthy reproduction. This is an example of an input indicator. Had data been available, it would have been preferable to use an outcome indicator, such as the percentage of low-birth-weight babies.

4.53. Both the capability poverty measure and the two human poverty indices are reviewed here. In the context of human development accounts, it is recommended to use a combination of human development indicators and human poverty indicators. One set of indicators will help register the average level of human development in a country, while a subset of such indicators will help register the extent of human deprivation.

4.54. The first human poverty index (HPI-1), introduced in the Human Development Report, 1997, represented an attempt to develop a poverty index that corresponded, dimension by dimension, with the HDI. The use of such dimensions, as well as a mathematical form that allows for trade-offs among dimensions, are its distinguishing features. In other respects, it basically builds on the concept and method introduced by the capability poverty measure.

4.55. The HPI-1 includes five indicators. It uses adult literacy instead of female adult literacy and drops the idea of trying to reflect the capability of healthy reproduction. It introduces a useful indicator related to life expectancy, that is, the percentage of the population not expected to live to age 40. Corresponding to average per capita income in the HDI, the HPI-1 uses three indicators to represent public and private economic provisioning: child malnutrition (as in the CPM), lack of access to safe water and lack of access to health services. Both of the latter indicators are input indicators, not outcome indicators, and an additional problem is that they can be considered input indicators into such outcomes as life expectancy and malnutrition. In practice, neither indicator is very informative, even as an indication of inputs into human development.

4.56. Following this brief review of composite indices used by the Human Development Report highlights, it is recommended that at least four sets of indicators for human development accounts be used: (a) indicators of basic educational attainment, such as adult literacy, (b) indicators of life expectancy, whether they reflect the average for the whole population or the probability of reaching a certain age, (c) indicators of malnutrition, such as the percentage of children under five years of age who are underweight, and (d) indicators of healthy reproduction, such as percentage of low-birth-weight babies. These are essential or foundational dimensions of human development. Moreover, these dimensions are separable, at least in principle. They are not supplying overlapping sets of information.

4.57. In the Human Development Report, 1998, a new human poverty index, HPI-2, was introduced for industrialized countries. It incorporates four indicators, representing deprivation in survival, deprivation in knowledge, deprivation in income and social exclusion. For deprivation in survival, it uses the probability of not reaching age 60. This indicator illustrates how variations on life expectancy (e.g., expectation of reaching age 40 or expectation of reaching age 60) can be used in human development accounts. For deprivation in knowledge, it uses functional literacy (which is defined as the knowledge and skills needed to understand and use information from printed texts as gauged by the OECD Adult Literacy Survey).[6] The use of functional literacy by the HPI-2 points out the importance of developing a definition of literacy for human development accounts that is more useful than that commonly used. Often, literacy is not tested, but is merely approximated by whether someone 15 years or older has finished at least four years of primary schooling.

4.58. More problematic are the HPI-2 indicators for deprivation in income and for social exclusion. For the former, the HPI-2 uses the indicator of the percentage of the population falling below 50 per cent of the median personal disposable income in a country. This is a relative measure of poverty—namely, one that varies by country. In principle, such a relative measure could be used in human development accounts although the results would not be comparable across countries. Preferable for international comparisons would be some kind of measure of absolute poverty—a fixed poverty line having the same value for all countries. But more fundamentally, it is questionable whether income poverty should be part of the human development accounts since it is measuring deprivation in the means to a decent quality of life rather than deprivation in the quality of life itself. A similar problem attends the use of per capita income in the HDI.

4.59. The indicator for social exclusion in the HPI-2 is the percentage of the total labour force that has been unemployed on a long-term basis, that is, for 12 months or more. One problem is that this indicator is bound to repeat the information contained in the percentage of the population that is income poor. A more fundamental problem is definitional. Social exclusion has not yet become a well-defined concept, and certainly not one that is easily operational. No usable indicator has yet been found, for example, for the HPI-1, the poverty index used for developing countries. Moreover, even with regard to the HPI-2, long-term unemployment is a perfectly clear and easily usable economic term. What is to be gained by also labelling it a dimension of social exclusion? These problems reinforce the argument that indicators of social exclusion are not likely candidates at present for human development accounts.

2. Human poverty indicators

4.60. Having reviewed the indicators in the HDI and the various indicators of human poverty, a concrete proposal for the indicators to be included in the human resources accounts for Mozambique (see table IV.4) is evaluated below. The focus is on the choice of the block of indicators for the population and the four blocks of indicators for the dimensions of poverty, namely, food intake and nutrition, education, health and quality of housing.

4.61. The proposal developed in the present section is based on building up a simple but coherent system of human development accounts on the foundation of essential population statistics. The most interesting indicators relate to the age and sex composition of the population; less interesting are the percentage of the population that is active and the percentage of the labour force that is unemployed. This is due to the emphasis in the present section on constructing human development accounts rather than human resources accounts, that is, focusing on human development outcomes rather than on economic activities.

4.62. Once the basic population structure is specified, the next building block is average life expectancy at birth, that is, the number of years that each person in the population can expect to live, given the existing age-specific mortality rates. This would give a simple matrix of population groups by life expectancies that is already rich in information in terms of basic human development.

4.63. Several other indicators would naturally recommend themselves as part of this matrix. Some standard measure of deprivation in survival, such as those used in the HPI-1 and the HPI-2, may be proposed, for instance. Thus, in addition to average life expectancy, there may be a basic poverty-related indicator, such as the percentage of the population not expected to reach age 40 (or some variation on this indicator defined in terms of deviations from median or mean life expectancy). In principle, it is possible to calculate the percentages of the population not expected to reach a series of age thresholds. Since such indicators are built up on the basis of mortality rates, it is a natural extension to use the same source of information to focus on particular rates. For example, the under-five mortality rate naturally suggests itself for this purpose. The

Table IV.4 Selected social indicators related to poverty, for Mozambique

	Unit(s) of measure
Food intake and nutrition	
Daily calorie intake per capita	Per capita (in physical units)
Alcohol consumption per capita	Per capita (in physical units)
Education	
Adult literacy rate	Percentage, individuals
Gross enrollement ratio: first/second/third level	Percentage, individuals, structure
Children not in primary school	Percentage, individuals
Adults with first/second/third level education	Percentage, individuals, structure
Tertiary students abroad, percentage of children	Percentage, individuals
Pupil/teacher ratios: primary/secondary	Average No. (individuals)
Health	
Under-five mortality	Percentage, individuals
Infant mortality rate	Percentage, individuals
Low-birth-weight infants	Percentage, individuals
One-year-olds fully immunized against tuberculosis/measles	Percentage, individuals
Underweight (malnourished) children under age five	Percentage, individuals
Births attended by trained health personnel	Percentage, individuals
Crude birth rate	Average No. (individuals)
Mothers breastfeeding at six months	Percentage, individuals
Pregnant women aged 15-49 with anaemia	Percentage, individuals
Maternal mortality rate	Percentage, individuals
Total fertility rate	Percentage, individuals
Women of child-bearing age as percentage of all women	Percentage, individuals
Contraceptive prevalence rate (married women of child bearing age using contraception	Percentage, individuals
Life expectancy at birth	Average No. (years)
HIV/Aids cases and related deaths	Per capita (No.)
Malaria cases	Per capita (No.)
Oral rehydration therapy use rate	Per capita (No.)
People with disabilities (percentage of total population)	Percentage, individuals
Crude death rate	Average No. (individuals)
Population (individuals) per nurse	Average No. (individuals)
Population (individuals) per physician	Average No. (individuals)
Households with access to health services	Percentage, households
Quality of housing	
Households with access to safe water, sanitation	Percentage, households
Households with access to electricity	Percentage, households
Households with housing based on different construction materials	Percentage, households, structure

maternal mortality rate is another alternative, although measuring such a rate is attended by problems.

4.64. There is already a rich source of information on human development, with the parsimonious use of relatively few indicators. With this simple set, it is possible to undertake some useful analysis of gender differences and inequalities.

4.65. With a combination of indicators of various dimensions of life expectancy and indicators of mortality rates, one can also gain information on both short-term changes in human development and more long-term changes. A mortality rate, such as that for children under five, can change relatively quickly, for instance. Life expectancy, since it is more of a stock variable, is likely to change more slowly. The desire to chart both short-term and long-term changes in human development is compatible with the use of human development accounts.

4.66. The long list of health indicators proposed for Mozambique may be too large. It includes input indicators, such as population per nurse, that are not necessarily useful because they are indirect reflections of human development—and in some cases, perhaps, not even very good as indirect indicators. Some would argue, for example, that the percentage of the population that lacks access to health services—given the minimal information that it conveys—is not a very useful health indicator. Mortality rates, however, are often considered to be among the more reliable indicators of a population's health status. If there is a desire to supplement this basic information with indicators of the incidences of certain diseases—such as malaria or HIV/AIDS—that would be feasible to do, although it would be more information-intensive.

4.67. Since life expectancy at birth is an indicator that registers the effects of so many different factors, it is an excellent summary statistic of the overall health status of a population. However, although the quality of one's life will determine how long one lives, longevity does not necessarily convey a great deal of information about how well people are living, especially during the later years of their lives. In fact, some quality indicators might not move in the same direction as life expectancy. Indicators of malnutrition are one example. Amartya Sen has pointed out, for instance, that although life expectancy is higher in India than it is in sub-Saharan Africa, undernourishment is much worse in India.[7]

4.68. Such important differences support the recommendation to explicitly include indicators of malnutrition in the HDA. The relevant proposed category for the Mozambique macro framework is entitled "food intake and nutrition" and includes indicators for daily calories and alcohol consumption. It would be preferable to use instead a set of three interrelated outcome indicators: the percentages of children under five years of age who are underweight, stunted and wasted (indicating weight for age, height for age and weight for height, respectively). In effect, the first is a composite of the other two. By including these three indicators, one could track both short-term and long-term changes in malnutrition. Stunting is more a reflection of long-term factors, for instance, whereas wasting is more a reflection of current states of malnutrition.

4.69. A third set of indicators for the HDA should be indicators of educational achievement. The proposal for the Mozambique framework tends to mix input and output indicators (e.g., pupil/teacher ratios and literacy rates). A small set of indicators that emphasize educational achievements is recommended. The adult literacy rate naturally recommends itself for this purpose, but its definition should incorporate some concern for functional literacy. Also, in order to capture more recent progress (or regress in educational achievements), an indicator of the literacy rate for young adults (i.e., 15-24 years of age) could also be included.

4.70. Illiteracy denotes a basic capability failure, and is thus most suitable as a poverty-focused indicator. Also, an indicator is needed that is more reflective of the average level of educational achievement of the entire population of a country. Included in some of the Human Development Reports before 1995 was one such indicator, namely, the mean years of schooling of the population aged 25 and older. There are several problems with such an indicator. It has to be derived ex post, for example, from computations based on enrolment ratios. In addition, it cannot capture the educational achievements of the age cohort that is younger than 25. A more recent variation on such an indicator is the expected years of education of the population, given current enrolment ratios. Such an indicator is an attractive alternative since it is constructed on a basis similar to that for life expectancy.

4.71. So far, then, a compact matrix of indicators recommends itself: population structure by age and sex; current life expectation of the population; current expectation of the years of education of the population; and current expectation of malnutrition by age five.

4.72. Indicators should also be included for the capability of healthy reproduction. The Mozambique framework does include some indicators for this capability, but they are not identified as such. Three candidate indicators are suggested here: infant mortality rate; percentage of low-birth-weight babies; and percentage of pregnant women aged 15 to 49 with anaemia. All three are outcome indicators. However, the indicator for low-birth-weight babies tends to be biased because it does not usually provide adequate coverage of births outside health facilities. In order to maintain a compact set of indicators, it might be advisable to focus on the infant mortality rate and the maternal mortality rate—and, perhaps, in addition, to combine the latter with the fertility rate in order to derive a probability of a woman dying owing to pregnancy-related causes.

4.73. The indicators for quality of housing in the Mozambique framework pose some problems. First, they are input indicators, and, in some cases, such as for construction materials, the type of inputs will vary across countries. There is no doubt that shelter is a basic human need, but in evaluating the satisfaction of this need, there is no identifiable corresponding human capability on which to focus. Instead, one may evaluate the provision of certain inputs, such as electricity, water and sanitation, or the size of the shelter, such as number of persons per room or per square metre. One problem is that the definitions of access, such as to water or sanitation, can vary significantly across countries. But, more critically, indicators for access to water or sanitation are providing information that will already be supplied, to some extent, by health indicators for life expectancy, mortality rates or incidences of diseases. This overlap is less evident for access to electricity. However, a more poverty-focused indicator, which could be derived from the same kind of survey question, would be the percentage of households that rely on traditional fuels (e.g., wood, charcoal, biomass). In many developing countries, this is more vital information since only a small minority of the population has access to electricity.

4.74. Given the above problems with regard to indicators for habitat, and until further discussion is held and expert opinion is consulted, judgement is reserved on whether they should be included in the minimum set of indicators for human development accounts.

C. Use of indicators in policy and analysis: World Bank experiences

4.75. The World Bank uses indicators as signals, signposts and scoreboards for decision makers and policy analysts. In practice, though often numerically precise, indicators help mostly to locate a variable in a specific context. Because they may be drawn from disparate sources, many indicators should be viewed more as ordinal rather than cardinal measures. Indicators from different sources, purporting to refer to the same phenomenon, for example, school enrolment, in general, are different. This has important implications for policy monitoring. In a number of respects, however, the role of indicators seems, superficially, little different from that of conventional statistical series.

1. Using indicators and data to measure

4.76. As a young philosophy don at Cambridge, Ludwig Wittgenstein posed the fundamental question: "What is the meaning of meaning?" Statisticians around the world are similarly faced with another frequently asked question: "What is the meaning of numbers?" What this question probes, however, is not usually concerned with the validity or robustness of a set of particular figures, but rather with the insight they might provide into some unknown reality. In other words, it has to do with their context and relevance. Overlaying such considerations, moreover, is clearly a time dimension, because situations and circumstances change and numbers have to adapt to the new conditions while providing some sort of bridge to link to a previous position. To have true meaning and value, numbers must thus be not only reliable measures of what they purport to measure but also constitute measures that are relevant to a given context. The following paragraphs deal, therefore, with the issue of using indicators to link across time and space to provide a better perspective of change and relative significance.

4.77. As mentioned elsewhere, it is important for the various available indicators to be placed in an appropriate wider socio-economic context and to have, therefore, a consistent integrated statistical framework to define their relevance as an information set. This then facilitates their use in both a time and a spatial context and allows, in particular, the measures to be disaggregated in their meaningful ways, for example, by location, demographic features or socio-economic grouping like class occupation and employment status, and related income (or consumption) level. Increasingly, this process of deriving more disaggregated measures is assuming growing importance as constitutional and political forces exert pressure for greater decentralization and local participation. The process is reinforced by calls for more performance assessments, regular policy monitoring, and so forth. At the same time, there is added pressure to focus policies more effectively on specific target groups such as poor or vulnerable households, women, female-headed households, children, the unemployed and so on. Indicators thus become essential to an understanding of people's access to, and the availability of, non-market goods and services. Knowing who benefits as well as who pays for different services of this nature is critical to assessing the effectiveness of policy. At present, however, such information is less than perfect.

4.78. From a government perspective, officials only know how many persons utilize a particular service and perhaps the basic demographic characteristics of those users. They also know from their budgets what it costs to deliver such social programmes in health, education, security, community welfare and the like. But they cannot tell from their administrative records (as currently set up) which socio-economic categories benefit most from the facilities and services provided and whether their delivery process is fair, democratic and effective. Partial knowledge about these features can be obtained from household surveys, where the general level of utilization by different income groups can be implied. But here again, there is little information about the relative value of the provision of public goods and services to specific households. It is usually only from individual supposition and the implication of scattered circumstantial evidence that analysts are able to draw tentative conclusions about the social effectiveness of the delivery of public non-market goods and services to the public at large. (Recent research conducted in the health sector in Latin America under the auspices of the Pan American Health Organization (PAHO) and the United Nations Children Fund (UNICEF) indicates that, predominantly, it is the richer households that are the primary beneficiaries of the bulk of expenditures on publicly provided goods and services.)

4.79. The availability of a recognized conventional framework that places data within given statistical constructs that are consistent with some underlying theory or set of conceptual relationships also enables analysts to precast, forecast and backcast different data series using assumed correlates. In the social sphere, backcasting or, more appropriately, backstrapping (since the data are rarely exact matches) is required to set the relevant historical context to social development. Social data have developed and expanded enormously over time as peoples consciousness and concerns have grown. In previous generations, such information as is currently available to follow the progress of different groups was not compiled in any extensive or comprehensive manner because issues now considered important were rarely contemplated then as worthy of policy attention.

4.80. There are several reasons for compiling specific indicators instead of data,[8] namely:

- Indicators often act as proxies rather than direct measures of socio-economic phenomena. They frequently serve, singly or in combination, as measures of things of interest, for example, malnutrition, education, standard of living, and quality of life, that are not directly identifiable or measurable in themselves;

- They can provide more timely and higher-frequency measures than sets of official numbers that are periodically generated from more conventional and regular annual (or longer) censuses and surveys;
- Indicators help to separate out the different elements of related but distinct socio-economic phenomena and concepts. They help distinguish such features as performance and productivity, efficiency and efficacy, enrolment and attendance, and treatment and cure;
- They illustrate explanatory relationships that help to clarify, for policy analysis, elements of pressure, state and response and, perhaps more tangibly, inputs, outputs and impact and their linkages;
- Since many are compiled in value-free units and represented as index numbers, they can be used in a standardized fashion for cross-country and inter-temporal comparisons. Also, most can be aggregated to different levels of policy interest;
- Indicators tend to be more qualitative than quantitative and provide patterns and shades of colour rather than exact observations.

Box IV.1 Social goals and indicators for the twenty-first Century

A recent OECD/United Nations/World Bank conference, held in Paris on 16-17 February 1998, identified the social goals and complementary indicators to be monitored by the development community as part of a new international development strategy:

Reduce poverty by half
- Headcount index
- Poverty gap index
- Income inequality; share of income accruing to poorest 20 per cent
- Child malnutrition

Provide universal primary education
- Net primary enrolment rate
- Progression to grade 5
- Literacy rate of 15-24 year olds

Improve gender equality in education
- Gender differences in education and literacy

Reduce infant and child mortality
- Infant mortality rate
- Under-five mortality rate

Reduce maternal mortality
- Maternal mortality ratio
- Births attended by health staff

Expand access to reproductive services
- Contraceptive prevalence rate
- Total fertility rate
- HIV prevalence in pregnant 15-24 year olds

Government and institutional commitment
- Countries with a national strategy for sustainable development

Water resources
- Population with access to safe water
- Intensity of freshwater use: percentage of annual available resources used

Biodiversity
- Nationally protected area as a percentage of total land

Energy use
- GDP per unit of energy use
- Total and per capita carbon dioxide emissions

THREE OTHER TOPICS WERE IDENTIFIED AS IMPORTANT FOR OBTAINING A MORE COMPLETE PICTURE OF THE STATE OF THE WORLD'S ENVIRONMENT—AIR QUALITY, LAND USE AND THE MARINE ENVIRONMENT.

Source: *World Bank, 1998 World Development Indicators*.

2. Indicators used by the World Bank

4.81. The World Bank uses, for its own operational purposes, a number of special measures, and it is prominent in the process of indicator development and dissemination in several important areas:

- World Development Indicators (WDI);
- Subscription to international development goals indicators. These have been agreed jointly with OECD and UNSD and donor Governments and are designed to monitor national progress towards achieving universal development goals defined by recent United Nations global summits (see box IV.1);
- The implementation of policy scoreboard indicators. These are designed to track progress along the separate tiers of corporate programme performance as related to the World Bank and its efficacy in delivering development services;
- Programme- and project-related operational activities;
- Leading indicators.

4.82. Each of these measures is discussed in the following sections. It should be noted, however, that the depth of indicator coverage and linkage to activities and policy is less extensive than that carried out by OECD. The measures used by the Bank are primarily descriptive rather than operational in character.

(a) Frontline measures: World Development Indicators (latest version,1998)

4.83. The WDI comprise a set of separate data products provided in different dissemination formats. The various statistical series published are taken from a consolidated database that draws on both Bank-generated statistics and information provided by specialized agencies and other outside data-producing organizations. The WDI bring together in a single location information previously provided annually on a separate country-by-country basis in World Tables, the Social Indicators of Development Report and Trends in Developing Countries.

4.84. As a multiple product, the WDI encompass (a) a hard-text report containing extensive tables of topically arranged indicators by subject area; (b) a CD-ROM package that extends the range of date coverage historically and presents time series going back to 1960 for certain indicators; and (c) the World Bank Atlas, which provides a selective overview of the world's progress in major areas of socio-economic development, in aggregate, and for regional geographical groupings as well as individually for 210 countries.

4.85. The WDI text also includes some analysis of trends and progress in the following sections:

- The introductions to each section focus on key development issues and trends. The first section, World view, reports on progress towards international development and the goals that are expected to be achieved early in the 21st century. This review will become a standard feature of future World Development Indicators. The introduction to the third section, Environment, reports on three big issues for integrated development: economic and environmental genuine saving, trade in goods from polluting industries, and demand for transport fuels;

- The provision of more timely data to strengthen trend analysis. Coverage of most indicators extends through 1996, and the introduction to the fourth section, Economy, includes preliminary estimates of macroeconomic indicators for 1997 for 37 developing countries, as well as projections of world economic growth through 2000. The sixth section, Global links, includes recent estimates of capital flows;

- New indicators. The World view section contains two tables on long-term growth. The People section has new tables on employment, unemployment and reproductive health. The Economy section includes the most recent data on relative prices from the International Comparison Programme (ICP). The States and markets section has added a table on military expenditures and trade in arms. The Global links section provides new coverage of interregional trade flows and tariff rates;

- Most tables show indicators for both the most recent year and an earlier year or period and cover 148 economies with populations of more than 1 million. Because the Bank is not a primary data collector, except in the areas of living standards measurement surveys and external debt, the production of the World Development Indicators involves partnerships with other international organizations, statistical offices, non-governmental organizations and private suppliers and users of data. The primary objective is to provide the most timely, comprehensive and internationally comparable data available in the main areas of social and economic research and inquiry.

4.86. In practice, while annual data are shown, much of the information is based on statistical reference points like censuses and surveys, which are held infrequently and irregularly and often only at decennial time periods.

(b) <u>Indicators to monitor development progress towards the twenty first century</u>

4.87. Development agencies are currently looking at impacts more than at inputs and they are implementing performance targets to establish their effectiveness and that of the development process itself in different countries. At a succession of global summit conferences sponsored by the United Nations, it was agreed to chart development strategies and goals for the next century covering children, education, the environment, population, women and social development. For this, sets of development indicators were required. The goals reflect commitments for the eradication of poverty, the sustainability of the environment, reductions in infant, child and maternal mortality, and the elimination of gender differences in access to education.

4.88. Following the publication in May 1996 of the OECD Development Assistance Committee's report, Shaping the 21st Century, which spotlighted the substantial achievements of the past 50 years in achieving development, attention was drawn to the need for a global partnership to pursue a new development strategy, focusing on the following key goals taken from the many goals set by the international conferences:

Economic well-being

- Reducing by half the proportion of people in extreme poverty by 2015, and
- [newly added by the Bank] Ensuring improvements in income distribution and reductions in malnutrition;

Social progress

- Achieving universal primary education in all countries by 2015;
- Demonstrating progress towards gender equality and the empowerment of women by eliminating gender disparities in primary and secondary education by 2005;
- Reducing by two thirds the mortality rates for infants and children under five and by three fourths the mortality rates for mothers by 2015;
- Providing access to reproductive health services for all individuals of appropriate age no later than 2015;

Environmental sustainability

- Implementing national strategies for sustainable development by 2005 to ensure that the current loss of environmental resources is reversed globally and nationally by 2015.

4.89. This metric monitoring approach also reflects a more pragmatic empiricist philosophy now underlying official donor resource allocations and the implementation of policy. It adopts actual performance and achievement levels as the best measures to demonstrate the success and effectiveness of broad-based development strategies. By this means, and using the measures of progress towards agreed targets, agencies seek ways to enhance the accountability and transparency of policy.

4.90. While all the goals are expressed in global terms, they are required to be pursued country by country through individual approaches that reflect local conditions and locally owned development strategies. Progress must also be made within the context of effective, democratic and accountable governance, the protection of human rights and property rights, and respect for the rule of law. The goals emphasize accountability, and by employing indicators culled from the WDI, the World Bank will systematically monitor the achievement of progress in the countries it assists.

4.91. As a means of monitoring and evaluating national-level progress in meeting those goals, a structured set of 22 core outcome indicators (to which many countries have now agreed) covering different aspects of development will be used. These indicators are being drawn from the WDI and overlap with, or are at least consistent with, the 15 indicators belonging to the recommended MNSDS, already endorsed by the United

Nations Statistical Commission, which relates to a broader range of objectives. The present development indicators will be supplemented by related metadata. They will eventually be complemented with additional statistical measures intended to provide further explanatory information relating to both process and the constituent nature of identified development problems. For example, the extended information will permit an indicator such as "prevalence of child malnutrition", currently defined by a specific anthropometric measure, to be reviewed also in terms of observed or implied per capita calorie consumption or changes in the prevalence of nutritionally related diseases such as yaws or rickets. Enrolment data may also be understood better in terms of student/teacher ratios and average classroom size. Indicators relating to other important progress markers of civil society such as participatory development and good governance have yet to be defined and identified.

4.92. Further work is needed on the progressive refinement of the existing core set of indicators. Basically, this means that within a country it will be necessary to create better primary data and an unambiguous and consistent reporting source. Household surveys, essential for measuring and understanding other issues critical to concerns of development like inequality, will need to be encouraged and supported. The relevance of the indicators and progress made in building up the necessary reporting profile for each developing country will need to be routinely scrutinized and reviewed on a regular basis. All this points to supporting programmes of well-directed data development and capacity strengthening in client member countries.

4.93. As to the indicators themselves, a clear distinction can be made between national, regional and international (i.e., comparable across countries) use. Nowhere is this more important than in the measurement of poverty. The need to supplement existing money-metric measures with more socially focused indicators that capture other often equally recognizable dimensions of poverty must be acknowledged. The role of regional goals is to provide more realistic scales and performance levels by which a relevant country's progress can be judged by comparison with its neighbours. National performance is also judged in a historical setting. In principle, across sectors of interest, it should be possible to aggregate microdata to macrodata and to compile consistent national, regional and global totals.

4.94. The broader acceptability of indicators and their use in development strategies and policy thinking can be strengthened by further efforts to ensure that measures are both specific and comprehensive and that they are relevant and analytically sound in relation to the concepts and situations being investigated. Because indicators are not necessarily precise measures, explanations of trends and greater transparency about what the numbers mean and how they are interrelated, may be required. Programmes to provide an expanded distribution and dissemination of the international sets of indicators contained in the WDI are expected, through user feedback, to help to improve the availability of the data in terms of country coverage and comparability of the selected indicators. The wide dissemination of the product is part of the Bank's goal to gain comprehensive acceptance of the indicators and to give greater outreach to the knowledge-sharing process.

4.95. While global agreement and endorsement is being sought on the core set of outcome indicators, there are still a number of evolving issues relating to the identification of supplementary processes and explanatory variables that the development forum needs to consider and review. The derivation of complementary indicators that correlate well with the thematic measures chosen and have the capacity to add a different dimension and perspective to development understanding must continue. Statistically and conceptually more refined measures that, from both a methodological and an operational standpoint, provide a more robust and coherent insight of behavioural interrelationships are also being sought. In pursuing such initiatives, it is desirable to link all the various numbers being produced into existing conventional statistical structures and anchor them into theoretically recognized systems such as the SNA, and balance-of-payments, population and demographic statistics. These are frameworks with which the professional community is already familiar and which have been internationally adopted. They provide a particular policy-focused emphasis to an existing menu of data. They also highlight where there are lacunae in the system and where new frontiers of research can be explored to increase the availability of indicators not at present in the global arena.

(c) The Bank’s corporate policy scoreboard indicators

4.96. The corporate scorecard is a tool to help align and fine-tune the Bank's own strategies with agreed global development objectives that, along with its partners, it is striving to achieve. The process is also designed to keep track of how well the Bank’s operational work meets these goals. The major objectives of the scorecard are to keep in focus overall goals to track movements in related indicators and to measure the effectiveness of the Bank's efforts towards achieving these ends through the setting and monitoring of appropriate country assistance strategy (CAS) benchmarks linked to sector assistance strategies (SAS).

4.97. The components of the scorecard consist of a summary set of synthetic measures, which provides a broad overview of movements in key composite indicators ranging from the global to the Bank level. The basic summary scorecard consists of 16 measures, focusing on three tiers of process, reflecting the *why*, *what* and *how* dimensions of the Bank's activities. Tier 1 relates to the measurement of progress towards the ultimate objectives of development and therefore focuses on key global objectives pertaining to poverty, income, human development and environmental sustainability as they pertain also to regions and countries. Tier 2 focuses on linking Bank strategies (CAS and SAS) to these global development objectives. Tier 3 is an internal measure of Bank performance that focuses on various aspects of the institution’s operational processes, including its capacity to deliver development results, the cost and financial effectiveness of its programme and its efficiency as a development organization.

4.98. The composite indicators in the scorecard are derived from corresponding sets of detailed indicators, which are intended to help explain movements in the defined composite measures. The Bank-level detailed indicators are based on corresponding unit-level data.

(d) Indicators of infrastructure operations

4.99. The Development Data Group of the World Bank is actively involved, through a small-scale research initiative, in the refinement of existing arrays of indicators produced by different sources to evaluate and monitor, over time, the performance of infrastructure capital as reflected in the level of service provided by public works.

4.100. These indicators are designed to measure real output effectiveness through the utilization of these collective services by different sectors of the population. While such measures are concerned primarily with the operational performance of installed capital and the efficacy with which these capital services are provided, the selected indicators are also designed to demonstrate how well the public provision of common user capital is actually supplied to households, that is, how a particular service, directly or indirectly provided, reaches out to the poorer sections of the community. Here, as in other applications of subnational and sectoral indicators, the intention is to determine the essential net beneficiary incidence of different aspects of socio-economic policy.

4.101. Assessing the value and effectiveness of large-scale infrastructure projects and the service flows obtained from each capital is difficult. An array of appropriate indicators is thus being developed that emphasize impact – in particular, on poor communities – of investment projects as a means of strengthening the efficacy and organization of infrastructure capital.

4.102. Policy analysts and decision makers involved with infrastructure management and investment decisions are confronted with choices among a variety of alternatives in allocating the scarce resources at their disposal. In both the annual budget process and capital investment programming, managers must ensure that their decisions to spend whatever balance of funds they have available reflect the best use of limited investment resources. In making alternative choices and decisions, account needs to be taken of scales of time preference, and the relative trade-offs between consumption and investment expenditures need to be weighed.

4.103. Currently, in a large number of cases, seen from a purely economic rather than an operationally pragmatic perspective, policy makers are clearly making suboptimal decisions concerning asset and resource management. Political priorities aside, one reason for this is that the current techniques and information that managers have available to make decisions about investment focus predominantly on resource supply. Policy makers not only need to choose which roads should be built (and which current roads should be better maintained), they also need to decide whether funds should be used for road building at all or be allocated to the development of a sewage system or a new reticulated water supply. Because existing approaches often do not give accurate feedback about the results of investment decisions or reveal the demand for infrastructure services, new measures of use and quality of service provided are required. The appraisal instruments currently at the disposal of managers give little indication about needs and their satisfaction through the services produced by infrastructural capital.

4.104. The performance indicator approach has proved operationally feasible in several different contexts for which particular indicators of service-level performance are identified. The evaluation method focuses on the demand for services provided by infrastructure capital. The indicators reflect direct use and utilization (rate of use) of the infrastructure as measures of the service flows provided. More importantly, the approach should be designed to allow, through the disaggregation of demanding groups by income status, an assessment of the degree of use of such facilities by poorer people and to meet the new Bank priorities of poverty reduction. The approach challenges, however, the more conventional cost-benefit appraisal methodology which tends to de-emphasize the critical importance of non-market and other (often subsidized) public infrastructure services delivered to lower-income communities and their locations.

4.105. The different matrices of performance indicators provide a new dimension of evaluation that looks at actual service delivery rather than simply applying a reported service provider cost of production and range of inputs measure. Often, the indicators identified to monitor this work need to be drawn from administratively unrelated and compartmentalized activities and other functions that use data from cloistered sources. These measures only assume more coherent meaning when drawn together into a well-defined, consistent and comprehensive framework that gives geographical (GIS) and socio-economic (e.g., household income status) coordinates to actual or projected service users. Such information is blended with existing Bank data relevant to the specific sector concerned and a consolidated matrix of performance measures is generated that serves as the basis for ex ante and ex post project evaluation. The process also provides a framework for aggregating information up from a project or facility level to the regional and country level and permits managers to transcend national boundaries and look at the transnational, cross-border implications of major projects. The ultimate aim is to provide an easy and transparent system for making better infrastructure project decisions and to monitor the effectiveness of the resulting investment in contributing to the development process in all its various socio-economic dimensions.

3. Leading indicators and early warning measures

4.106. In certain areas of analysis, the World Bank has been involved, along with other agencies, in creating collections of economic and monetary indicators to try to discern the directions in which economic and financial change is likely to occur. Quite separate from the global economic projections work, these techniques have come more to the fore in recent years when the main intention has been to help predict impending crises and to put in place policies to prevent financial and economic crises or to moderate their impact. In the Bank, this work is currently very selective and applied in only a few countries. It is not done extensively or in depth, as is the case for OECD, where the regular publication and review of main economic indicators and leading indicators for all member countries are routinely produced on a monthly basis.

4.107. Pressure within the Bank to produce more high-frequency statistical series, performance measures and indicators continue to increase as the Bank tries to refine its analysis and introduce new approaches to predict potential crises. Some vulnerability indicator matrices have been set up for individual countries (such as Thailand) covering long- and short-term measures related to economic, social, financial and environmental conditions, but, for the most part, little has been done to adopt a more standardized and structured approach.

4.108. By contrast, the OECD system of business cycle indicators, for example, covers 22 member countries and comprises leading, coincident (or reference) and lagging indicators that provide appropriate signals and timely recognition of economic turning points using a sequential probability approach. Although the primary focus is on the group of seven major industrialized countries (G-7) and other OECD countries, middle-income countries such as the Mexico, the Republic of Korea and Turkey are included. Official initiatives to incorporate major industrialized countries like China and India into the system are under discussion and, on their own account, countries like Singapore and Thailand adopt similar approaches. There is an emphasis on industry in its broader sense and financial viability and their interrelationships with business performance.

4.109. The prediction of turning points is based on pattern recognition linked to different collections of high-frequency indicators individually tailored to each country. Many of the composite indicators are formed using strongly intercorrelated unweighted or equally weighted series. Although methodologically sophisticated, the leading indicator (LI) approach represents a strategic retreat into greater statistical simplicity rather than conceptual frameworks using whatever current data are available to predict outcomes. There is an element of auto-regressive structure in the methodology and a *post hoc ergo propter hoc* type of approach. The alternative choice is to confront the more formidable problems of specifying a formal comprehensive model based on some underlying theory of economic behaviour that relies heavily on usually much more dated statistical series. An implicit assumption of the LI approach seems to be that, although cycles occur and can be identified, each is unique and represents a non-repeated, non-replicable economic process. The raison d'être of this pragmatic approach is that it works; according to OECD, correct predictions were made, for example, for the United Kingdom (a notoriously difficult economy to track) in 36 out of 40 cases. In all G-7 countries, over a 35-year period, 104 turning points were identified. This may all seem rather curious in the light of the agnosticism of rational expectations theorists and the widespread belief that economic fine-tuning to preserve short-term economic stability is a waste of time. Furthermore, in a case like the Republic of Korea, where a 6.5 per cent per year growth rate was historically identified by the system as an economic downturn (but only after a bevy of second order differentials are applied), the process of determining turning points, at least until recently, with the economic and financial crisis (which was not well predicted by the system, because it all happened too fast) has not been one of too great a concern.

4. Indicators and data standards as warning systems

4.110. The activities of OECD have institutional implications for the World Bank and for the International Monetary Fund's new data standards and for spotting problem areas as well as countries in economic and financial difficulty. Significantly, while the OECD leading indicator methodology claims to have correctly predicted the downturn of the Mexican economy at the end of 1994, it is an approach eschewed by the Fund's Department of Statistics. OECD has also consistently demonstrated that data relating to the performance of interest rates and the money supply, two series that figure prominently in the Fund's bag of key timely financial statistics (to which member countries wishing to participate in international markets are required to subscribe), are largely irrelevant in predicting changes in economic activity. In the case of developing countries, focusing national resources on developing an OECD leading indicator methodology to determine economic outcomes is probably largely irrelevant to policy analysis when so many more severe structural economic problems exist and where economies have large unorganized sectors. These features are not, in general, picked up in the LI approach.

4.111. The Fund's decision to establish standards to guide member countries in the provision of more reliable economic and financial data to the public came in the aftermath of the Mexican financial crisis. The proposed data standards are intended to pick up potential concerns by shedding greater light on economic performance and policy and thus enable users to better foresee emerging problems. In this context, however, the term "standards" is misleading because it does not translate automatically into "quality", nor do the standards guarantee data "reliability"; the standards simply define and document the sources and methodology underlying the statistics that countries are required to make public. The Fund's recognition of a country's efforts in this regard represents more a good housekeeping seal of approval of statistical organization; it is not an instrument designed to give some better predictability of impending crisis. That has to be determined by the market and external analysts. In other words, the main aim of the Fund's initiative is not to indicate crises, per se, but to encourage the greater transparency of official statistics and their more regular reporting. It seems evident, therefore, that there is some scope for a greater cross-fertilization of approaches, and the development of new indicators as well as sharing (and better use) of time-sensitive information between the two institutions.

4.112. The absence of any explicit theoretical or conceptual basis to the OECD work, however, remains a concern in establishing criteria of robustness in indicator predictions. The procedure requires the regular update, revision and reworking of the indicators – paralleling the recognized need to keep changing coefficients in a macro-model – that are used in the composite LI for each country. It might be possible to locate which indicators identify best those occasions where the disequilibria between aggregate demand and supply in an economy (as measured, say, by the differences between final goods inventories, shipments and unfilled orders) are most evident. The practical problem with this is the need to deal with comprehensive data of variable quality and have them available on a timely and regular basis. An alternative is to extend already available business survey information and related quantitative assessments on business outlooks to cover these areas. This, then, would impose some need to restrict the scope to a comparable grouping of companies in each successive time period. Such a selection could be based on a Standard and Poors 500 or Dow Industrials type of group covering the largest enterprises. Since the concern is to monitor changes and relative shifts in composition and not levels, such a measure for leading businesses probably adequately reflects trends in the respective industries and for the economy as a whole. Work is on hand on stock market price indices in emerging markets to try to develop this approach further. Given the new emphasis of development policy on encouraging the private sector to play a more dominant role in the development process and the relative decline in the importance of the State, a movement towards more private sector indicators such as these would seem desirable.

4.113. In general, however, in similar attempts to model disequilibrium, and hence predict outcomes, there is currently no theory of business-cycle activity, so it is necessary to search hard to identify procedures that have both sound theoretical roots and are also aligned with observed patterns of actual behaviour.

D. Greening the national accounts: approach and policy use[*]

4.114. There is general agreement that environment and economy interact, and that interaction requires integrative policies. Diagram IV.1 describes this interaction in terms of the well-known (re)source and sink (waste disposal) functions provided by the environment to the economy. Environment and economy also affect human welfare through the consumption of goods and services and a deteriorating life-support system. There is no general agreement, however, on how to assess this interaction and its policy consequences.

4.115. The phrase "sustainable development" was coined in the preparations for the Earth summit held in Rio de Janeiro as the integrative paradigm for environment and development. However, the definitions of such development as non-declining welfare[9] or the satisfaction of the needs of current and future generations are vague. They do not specify the ingredients of welfare or generational needs, nor do they indicate any particular role for the environment. It is not surprising that hardly comparable indices or indicators of true social progress have proliferated (see box IV.2 below). Nonetheless, sustainable development has shown a perhaps surprising staying power, insinuating itself even into the policy agenda of industrialized countries.[10]

1. Rationale: accounting for sustainability

4.116. The elusive concept of sustainability needed to be operationalized in a more systematic manner. The protagonists of the environment and development discussion, namely, environmental and economic scientists, thus looked into their respective analytical tool boxes so as to apply them to the other field. In doing so, they imposed their own particular values on the counterpart field. An unfortunate dichotomy between the environmentalist and economic world view of the environment-economy interface has been the result.[11]

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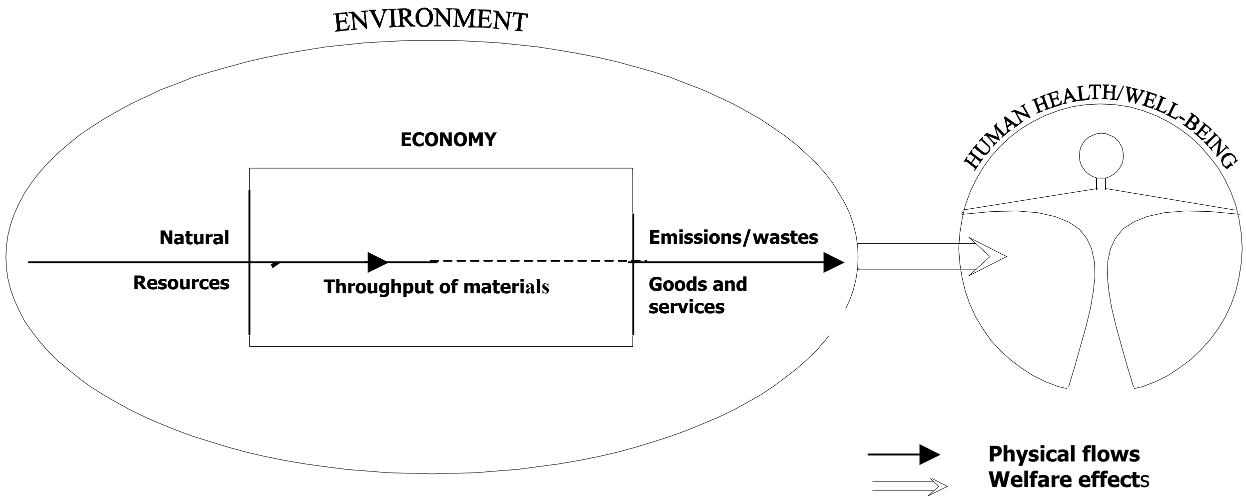
[*] Published in a modified form P.J.J. Welfens, ed., Internationalization of the Economy and Environmental Policy (Heidelberg and New York, Springer, 2001).

Diagram IV.1. Environment-economy interaction and effects



(a) Measuring sustainability – an emerging dichotomy

4.117. Environmental economists attempt to put a monetary value on the loss or impairment of environmental services as a first step towards internalizing these externalities into the budgets of enterprises and households. Environmentalists repudiate the commodification and pricing of the environment. In their view, the value of the environment cannot be expressed in money, and physical indicators of sustainable development, carrying capacity or material throughput are advanced. Calls for dematerializing economic activity[12] and/or compliance with social norms and standards are the policy responses of the environmentalist world view.

4.118. There are some advantages to the economic approach. For one, the use of a common numéraire permits direct comparison of conventional economic aggregates with environmentally adjusted ones through simple summation or deduction. Secondly, some key economic indicators, such as income, already have a built-in notion of sustainability. Thirdly, the worldwide-adopted 1993 System of National Accounts provides standard concepts and definitions for international comparison of these indicators. As shown below, the System of Integrated Environmental and Economic Accounts[13], advanced by the United Nations, makes use of these advantages.

4.119. In contrast, large indicator lists face difficult aggregation (weighting) problems. Moreover, their policy relevance is limited unless they can be linked to sustainability standards or other targets and thresholds, which are difficult to agree upon. As discussed in the concluding section, some indicators do have the capability of capturing social and welfare concerns, represented as the health/well-being circle in diagram IV.1. Also, one should not hide the fact that monetary valuation has its own limitations, especially when

Box IV.2. Indicators of social progress

A genuine progress indicator claims that America is "down" by 45 per cent since 1970, while GDP is "up" by 50% at the same time. [a)] Nature's annual services are given a value of $ 33 trillion by one team of scholars [b)], while a similar value ($35 trillion) is assigned to nature's capital stock by another.[c)] Total material flows of 45 to 85 tons per capita are considered to be "staggering" by a group of research institutes. [d)] The UNDP human development index for 1997 [e)] drives Switzerland from its fourth place in terms of per-capita GDP (real, in purchasing power parities) down to sixteenth, while a "pollution-adjusted GNP" [f)] lowers the country to number 31.

a/ C. Cobb, T. Halstead and J. Rowe, "If the GDP is up, why is America down", The Atlantic Monthly (October 1995).
b/ R. Costanza and others, "The value of the world's ecosystem services and natural capital", Nature, vol. 387 (1997), pp. 253-260.
c/ World Bank, Expanding the Measure of Wealth: Indicators of Environmentally Sustainable Development (Washington, D.C., 1997).
d/ World Resources Institute and others, Resource Flows: The Material Basis of Industrial Economics (Washington, D.C., 1997).
e/ United Nations Development Programme, Human Development Report, 1997 (New York and Oxford, Oxford University Press, 1997).
f/ E. Rodenburg, D. Tunstall and F. van Bolheiss, "Environmental indicators for global cooperation", Global Environment Facility working paper No. 1 (Washington, D.C., 1995).

it is extended beyond market transactions (see sect. 2(c)).

(b) Capital maintenance – the door to environmental accounting

4.120. Conventional national accounts measure capital consumption, that is, the "wear and tear" of fixed assets such as buildings or machinery, as a cost of production. The idea of reserving funds from revenue generated in production for the replacement of run-down capital can be seen as a sustainability criterion built into the economic concepts of production and income. The view of capital as the source of a continuous flow of output and income can be traced back to Adam Smith's "neat revenue" (quoted by El Serafy),[14] which was revived much later by Fisher,[15] among others, and Hicks.[16] Capital consumption is thus a useful starting point for operationalizing a broader concept of sustainability and incorporating it into an extended accounting system.

4.121. New scarcities in the formerly abundant natural resources of water, soil, mineral deposits and forests, and in nature's capacities of waste absorption, are the basic reason for introducing these natural assets into the realm of economics and economic accounting. Their incorporation, however, would change the conventional SNA accounting concepts of capital, capital formation and consumption of fixed capital. The reason is that non-produced assets are not an output of an economic production process and are therefore not considered as products in the 1993 SNA. Consequently, they are not reflected in the supply of products and thus can their use not be recorded as intermediate or final consumption. Also, their use cannot be dealt with as consumption of fixed capital, as the latter concept refers solely to the use of products over longer periods of time.

4.122. The costing of natural resource depletion and environmental degradation in production and income accounts and the deduction of these costs from output and value added (income generated) have to be justified by introducing an extrinsic objective, which is the desire of society to take care of the environment and account for its depletion and degradation as a social cost. This is radically different from the conventional accounting objective of measurement of economic performance, in which only the use of products is recorded as cost. In operational (accounting) terms, the caretaker objective of social cost accounting can be expressed as the need to maintain the non-produced natural asset base of production and income generation. In other words, sustainability criteria of natural capital and/or corresponding production/income generation have to be explicitly and additionally introduced in integrated environmental and economic accounting to justify the incorporation of environmental cost.

4.123. Hicks defines income as maximum consumption during a period of time, while making sure to be as well off at the end of the period as at the beginning.[17] The definition has been the model for the national accounts distinction between changes in net worth (changes in the state of being well off) and disposable income.[18] The changes in net worth concept supports the extension of wealth (or net worth) maintenance to scarce natural assets. Aggregating the microeconomic income definition to the national level calls for a measure that ensures that society is at least as well off at the end as at the beginning of the accounting period. This is achieved by making an allowance – as production cost – for using up national wealth, whether produced or non-produced. As a consequence, new indicators of net saving, net capital accumulation and "more" sustainable income are generated.

4.124. The term "more" refers to the fact that comprehensive assessments of sustainability would have to consider, beyond produced capital maintenance, further forms of human and institutional capital. The values of functioning or decaying institutions of law and order and of increasing or decreasing productivity of labour are difficult to assess. Only tentative attempts have been made to incorporate human capital in the national accounts.[19] Also, ex-ante analysis of sustainability would have to take into account further effects of technological progress, changes in consumption patterns (lifestyles), discovery and imports of natural resources, and substitution among production factors.[20] The roles of human and institutional capital, technological progress, substitution and change in lifestyle in sustaining growth and development is a rich field for further research – an issue that is beyond the present discussion on the measurement of environment-economy interaction.

4.125. The extension of Hicksian individual income sustainability to national income, in terms of produced and non-produced natural capital maintenance, avoids the fruitless discussion of sustainability as non-declining welfare. Economic welfare has been typically operationalized in terms of final consumption and, in the field of environment, of demand for natural amenities. The SEEA focuses on the easier-to-measure supply and maintenance of environmental services to the economy. Diagram IV.1 illustrates the demand for welfare-generating goods and services from the economy and the environment in the right-hand circle. The supply of environmental services is reflected in the source and sink functions at the immediate interface between the economy and the environment. This is a further advantage of environmental accounting, since environmental effects can be directly associated in this manner with causing economic activities - an important requirement for targeted policy responses.[21]

2. Approach: extending the system boundaries

4.126. The preceding section showed how sustainability criteria open up the self-contained, product -based accounting system for the incorporation of natural assets. The consequences of this for the scope of transaction in the SNA, the national accounts identities and the monetary valuation of the transactions are discussed below.

(a) Asset, production and consumption boundaries

4.127. Expanding the asset boundaries of national accounts for the sake of obtaining measures of *more* sustainable economic performance is a logical way of accounting for the environmental impacts of economic activity.

4.128. There are, however, other boundaries in national accounting whose extension was proposed for purposes of environmental accounting. The most important is the production boundary, which in turn determines the scope of consumption of households. The production boundary is based on the fundamental principle of accounting for market transactions. Reference is made to the use of labour and capital inputs in transforming goods and services into outputs, destined for markets, whether for sale or barter (see 1993 SNA, para. 1.20). Excluded from this definition are domestic services for own consumption by households, and natural processes, which are not under the managerial control of institutional units such as growth of fish in the ocean, precipitation, geological build-up of minerals and decomposition of pollutants.

4.129. However, it has been suggested that additional nature production account be introduced, which measures environmental damage as input into the production of environmental services.[22] Household production/consumption and its environmental cost, and nature's production of environmental services are also discussed in the SEEA for "opening a window on further analytical applications".[23] However, these extensions were never implemented in actual country studies of the SEEA. Another example of a partial extension of the production boundary is the United States study of integrated environmental and economic accounting.[24] The study treats the discovery of mineral deposits as capital formation and considers mineral resources as a produced asset.

4.130. The problem with modifying the concept of production is that it destroys the fundamental accounting identity between the value of income generated, value added and income used for purchases of capital and consumption goods and services. Measures of income and its distribution, (un)employment, inflation and market equilibrium, are blurred by changing the production boundary in national accounts (are 1993 SNA, paras. 1.21 and 1.22).

4.131. The pragmatic approach to SEEA implementation as reflected in its operational manual[25] is therefore to extend the asset boundary only. The production and consumption boundaries are maintained while allowing for the introduction of natural assets and asset changes in both the asset and production accounts. This is achieved through the following steps:

- The transfer of assets from the environment to the economy – accounted for as "other changes in volume" in the asset accounts. Production and income accounts are not affected;
- Costing permanent, that is, non-sustainable, depletion or degradation of economic assets (in the SNA sense, see box IV.3). The values of depletion and degradation are shifted from "other changes in volume" of the conventional asset accounts to the production and income accounts as natural capital consumption;
- Accounting for "non-economic" or "environmental" asset stocks in physical terms only, but applying a maintenance cost valuation to permanent, that is, non-sustainable, losses of environmental functions of waste absorption and other environmental services.

4.132. The distinction between economic and environmental assets is at the heart of environmental accounting. It determines the additional information on the environment to be incorporated in the extended accounts. Box IV.3 describes how environmental assets can be defined as non-economic natural assets, using the SNA definition of economic assets.

4.133. Diagram IV.2 shows in a simplified manner how the SEEA is developed as an expansion of conventional asset and flow (supply and use) accounts of the SNA. Environmental components are added by incorporating environmental assets and asset changes in the shaded vertical column of the asset accounts. At the same time, natural resource depletion and environmental quality degradation are reflected as additional environmental costs in the use accounts (as indicated in the shaded row of natural asset

Box IV.3. Asset definition

The economic asset definition of the SNA already includes all natural assets "over which ownership rights are enforced by institutional units, individually or collectively, and from which economic benefits may be derived" (1993 SNA, para. 10.2). These natural assets can be produced, such as agricultural products, or non-produced, such as land, mineral deposits or forests in the wilderness. Changes in the availability of economic, non-produced assets, resulting from depletion or degradation, are accounted for in the SNA as "other changes in volume". The SEEA shifts the value of depletion and degradation as "cost" into the production and income generation accounts.

Implicitly, environmental assets are all those non-produced natural assets that do not function as providers of natural resource inputs into production. They supply environmental services of waste absorption, ecological functions such as habitat or flood and climate control, and other amenities such as health or aesthetic values.

use). Environmental costs reflect the consumption of natural capital and are therefore recorded in both the asset and flow accounts. Expenditures for environmental protection are a social response to environmental impacts. They are shown as "thereof" elements of conventional aggregates.

(b) Accounting identities and environmentally adjusted aggregates

4.134. The inclusion of natural assets and asset changes in national accounts permits the compilation of environmentally modified aggregates. Summing up the rows and columns of diagram IV.2 one obtains most of these aggregates.

4.135. The aggregates can thus be presented as the sum totals and elements of the following accounting identities:

- Supply-use identity:

$$O + M = (IC + EC) + C + (CF - EC) + X ,$$

indicating that the supply of goods and services produced (O) and imported (M) equals their use in intermediate (IC) and final consumption (C), capital formation (CF) and exports (X). It should be noted that environmental costs (EC) are added to intermediate consumption (IC) as additional cost and deducted from environmentally adjusted capital formation, thus maintaining the supply-use identity;

- Value added (environmentally adjusted) identity for industry i:

$$EVAi = O_i - IC_i - CC_i - EC_i = VA_i - EC_i ,$$

describing value added generated by industry i (EVA_i) as the difference of output (O_i) and cost, including intermediate consumption (IC_i), consumption of fixed capital (CC_i), and environmental depletion and degradation (EC_i);

- Domestic product (environmentally adjusted) identity for the whole economy:

$$EDP = \Sigma EVA_i - \Sigma EC_h = NDP - EC = C + (CF - CC - EC) + (X - M) ,$$

defining environmentally adjusted net domestic product (EDP) as the sum of environmentally adjusted value added of industries, with a further deduction of environmental costs generated by households (EC_h). Alternatively, EDP can also be calculated as the sum of final uses of consumption (C), environmentally adjusted net capital formation (ECF = CF – CC - EC) and the balance of exports (X) and imports (M). Environmentally adjusted net capital formation (ECF) is an indicator that can be used for demonstrating the non-sustainability of economic performance (see sect. 3 (a) below).

Diagram IV.2 SEEA: flow and asset accounts

			Assets	
		Opening stocks	Economic assets	Environmental assets

+

	Industries (producers)	*Households/ Government (as consumers)*			*Rest of the world*
Supply of products	Output (O_i) thereof: environmental protection products				Imports (M) thereof: environmental protection products
Use of products	Intermediate consumption (IC_i)	Final consumption (C)	Gross capital formation (CF)		Exports (X)
	thereof: environmental protection products				*thereof*: environmental protection products
Use of fixed capital	Consumption of fixed capital (CC_i)		Consumption of fixed capital (-CC)		
Value added (VA), NDP	$VA_i = O_i - IC_i - CC_i$ $NDP = \Sigma VA_i$				
Use of natural assets (depletion and degradation)	Environmental cost of industries (EC_i)	Environmental cost of households (EC_h)	Natural capital consumption (-EC)		
Environmentally adjusted indicators	$EVA_i = VA_i - EC_i$ $EDP = \Sigma EVA_i - \Sigma EC_h$		$ECF = CF - CC - EC$		

+

Other changes of assets	Other changes of economic assets	Other changes of environmental assets

=

Closing stocks	Economic assets	Environmental assets

(c) Pricing the priceless: methods and limits of monetary valuation

4.136. Putting a monetary value on natural assets and changes therein, even if they are not traded in markets, is a prerequisite for establishing most of the above-described accounting identities and indicators. As discussed in section 2(c), physical accounts underlying the monetary ones are an important tool of environmental management but do not possess their aggregative power. Monetary valuation is, indeed, the only possibility to fully integrate environmental concerns into the economic accounting system while ensuring the consistency of "green" with conventional economic indicators. However, the imputation of monetary values, which were not necessarily observed in market transactions, has been criticized not only by environmentalists but also by more conservative national accountants. The following paragraphs, therefore, briefly review the three commonly proposed valuation techniques as to their capability of assessing environmental impacts and repercussions.[26]

Box IV.4. Sustainability and valuation

Different valuations applied in the SEEA reflect strong and weak sustainability to a differing degree. The commonly applied *net-present-value and net-price methods* assess depletion as the value change in a particular asset from loss in its income-generative capacity. This can be seen as a call for asset maintenance as far as possible within the production line of the particular enterprise – not necessarily a very strong sustainability notion, since diversification of the enterprise through reinvestment in other production processes remains a possibility. The so-called *user cost allowance*, on the other hand, focuses on income maintenance without restriction as far as investment of the user cost in (physical or financial) assets is concerned. It reflects weak sustainability in that it aims at overall income preservation, irrespective of where and how income may be generated. A more conservationist view, i.e. strong sustainability, of environmental waste absorption capacities, is taken by maintenance costing, albeit allowing for substitution if alternative production and consumption processes can be found.[a)]

a) See note 26.

4.137. Market valuation, as the name suggests, provides values that are closest to prices observed in the market. It is usually applied to economic assets of natural resources, though traded pollution permits could also generate a market value for environmental waste absorption capacities. In principle, the economic value of natural assets can be derived from the (discounted) sum of net returns obtained from their use in production. It is at this value that a natural asset such as a mineral deposit or a timber tract would be traded if a market existed for the asset. Market valuation techniques are also applied to changes in asset values, caused by depletion, that is, their non-sustainable use. These value changes represent losses in the income-spinning capacity of an economic asset. Depletion cost allowances thus reflect a weak sustainability concept, calling for their reinvestment in any income-generating activity. Box IV.4 indicates how different valuation techniques may reflect different degrees of sustainability of production and income generation.

4.138. Given the problems of projecting future net returns, several simplifying valuation techniques have been advanced, notably the net price valuation[27] and the user cost calculation.[28] The net price method makes use of the Hotelling assumption of compensating net price and discount rate increases to dispense with discounting future net returns. The user cost is calculated as a part of the net return from the exploitation of a finite resource, such as a mineral deposit, which through reinvestment would create a perpetual income stream. It can be shown that this allowance is a simplification of the net present value, assuming constant net returns over the lifetime of the resource.[29]

4.139. Maintenance valuation permits the costing of losses of environmental functions that are typically not traded in markets. Dealing only with economic assets, which conveniently supply marketed products, would drastically reduce economic analysis concerned with scarce goods and services, whether traded in markets or not. Notably, in industrialized countries, environmental externalities of pollution can be of far greater importance than natural resource depletion. The SEEA defines maintenance costs as those that "would have been incurred if the environment had been used in such a way as not to have affected its future use".[30]

4.140. Maintenance costs refer to the (missed) opportunity costs of avoiding the environmental impacts caused during the accounting period. Of course, these costs are hypothetical since environmental impacts did occur. They are used, however, to weight the environmental impacts in money terms for assessing the social environmental (expenditure) costs generated by different economic agents. Those agents did not "internalize" these costs into their budgets but should have done so from society's social costing point of view. Actual internalization, brought about, for instance, by means of fiscal disincentives, would, of course, change production and consumption patterns. The ultimate effects of internalization could be modelled for determining hypothetical aggregates such as an analytical green GDP[31] or an optimal net domestic product with regard to environmental targets.[32] Maintenance costs reflect a strong sustainability concept as they measure the outlays required for the long-term conservation of environmental assets, beyond natural regeneration or replenishment (see box IV.4).

4.141. Contingent valuation was proposed for green accounting[33] but is hardly applicable in practice. Together with other demand-side valuations, this technique refers to the ultimate welfare effects (damages) of environmental impacts, which are difficult to trace back to causing agents and the period of time when the impacts occurred. Contingent valuations are also inconsistent with market prices because of their inclusion of consumer surplus and face well-known problems of free-rider attitudes and consumer ignorance. Mixing these "cost-borne" valuations with "cost-caused" (maintenance cost) valuation creates aggregates that are neither performance or welfare measures and quite impossible to interpret.[34]

4.142. Conventional national accountants and economists, notably those in industrialized countries, have resisted implementing environmental satellite accounts in monetary terms. While some now favour the incorporation of natural resource depletion as cost into the conventional accounts,[35] many consider the costing of environmental externalities a matter of modelling (e.g., van Dieren[36] and Vanoli[37]). "Official" statisticians believe that they might put at risk some of their long-established concepts, such as GDP, if they let in controversial concepts and valuations, even through the back door of supplementary "satellite" systems.[38]

4.143. As a result, a number of relatively timid approaches of mixed physical and monetary accounting have now been adopted, mostly in Europe. The prototype Dutch National Accounting Matrix including Environmental Accounts (NAMEA)[39] refrains from monetary valuation of environmental impacts by simply allocating these impacts (mainly emissions) to causing economic sectors and juxtaposing them next to the conventional economic (supply and use) aggregates. While this approach facilitates the allocation of physical impacts to causing agents, it fails in aggregating environmental impacts as cost. Thus, environmental costs and benefits generated during the accounting period cannot be compared at the national or sectoral levels. To improve on this situation, that is, to enhance the policy relevance of the physical data, Keuning and de Haan combined different environmental impacts by means of "environmental policy theme equivalents".[40] However, even these aggregates suffer from limitations in selecting and defining the themes and their equivalent factors, which still do not permit inter-theme comparisons.

4.144. Other country projects, especially in developing countries, successfully addressed both natural resource depletion and environmental degradation.[41] These studies demonstrate the feasibility of environmental accounting for both natural resource depletion and environmental degradation. They might serve as an incentive for similar studies in industrialized countries where pollution is of much greater significance than resource depletion.

4.145. Monetary valuation of environmental impacts in a national accounting system can achieve a high degree of data integration. However, increasing distance of environmental effects from economic activity and output renders monetary valuation controversial, if not meaningless. Effects on human welfare such as health, inter- and intra-generational equity, loss of cultural patrimony, security or political stability are difficult to quantify in physical terms and impossible in monetary terms. The possible use of physical accounts and indicators in assessing the overall sustainability of a broad concept of development is briefly discussed in sections 3(c) and 4, below.

3. Policy uses of green accounting

4.146. The worry of national accountants about getting drawn into value/assumption-laden analysis is manifest in the not very concrete two-page (out of about 700 pages) discussion of the uses of the SNA (1993 SNA, paras.1.29 – 1.43). This may also reflect the difficulty of pinning down concrete policy uses for a multi-purpose statistical system serving a large variety of decision makers. Environmental accountants are no exception, and rare are the cases where data producers and users sit together to share their knowledge about policy needs and the new data concepts of green accounting.

4.147. Environmental accounts, just as conventional accounts, are to facilitate the diagnosis of past economic performance and the formulation of policies responding to diagnosis. In the light of the above-described rationale for environmental accounting, the following discussion of policy uses focuses on:

- The assessment of the sustainability of a country's past economic performance, taking account of environmental impacts and repercussions;
- The use of environmentally adjusted economic indicators in policy analysis and formulation;
- The use of physical accounts in environmental management and policy.

(a) Diagnosis: is growth sustainable?

4.148. Interaction between environment and economy was found to be the cause of non-sustainabilities in growth and development. Measuring the sustainability of economic performance is therefore the main objective of integrated environmental and economic accounting. To this end, the notion of sustainability was operationalized as produced and natural capital maintenance for continuing production and income generation. In principle, this allows the measurement of sustainable performance and growth, either as non-declining net output or as non-reduced capital input into production, that is, non-negative capital formation.

4.149. Net output (and corresponding income generation) and capital formation play key roles in conventional economic accounting and analysis. A similar significance can be assumed for their environmentally adjusted counterparts, EDP and ECF. However, the analytical road from capital maintenance to income preservation is not without obstacles, including the following:

- The possibility of substitution among production factors, giving rise to the distinction between strong (natural capital conserving) and weak (overall capital and income maintaining) sustainability;
- Technological progress in capital-saving production processes;
- Change in consumption patterns, which may bring about changes in production patterns and corresponding capital use.

4.150. Empirical studies mostly neglected possible "complementarities" in capital use. For instance, the Philippine environmental accounting project[42] made an allowance for natural capital depreciation, which assumes by and large weak sustainability in valuing depletion at net prices and strong sustainability in maintenance costing of degradation (see box IV.4). The project thus found that sustainability of economic growth could not be rejected for the country, at least for the period under consideration (1988-1994): EDP had grown, though moderately, and ECF was positive in each year. As mentioned above, positive ECF may hide complementarities that could make growth non-sustainable in the long run.

4.151. Bartelmus[43] shows confirmed non-sustainability in the sense of negative ECF only for Ghana, Indonesia and Mexico. Despite some attempt at harmonization, those results reflect the use of different concepts and methods; they also suffer from under coverage and underestimation.[44] Rough World Bank[45] estimates seem to indicate widespread non-sustainability for Africa. in terms of genuine savings which is similar to ECF. However, the validity of those estimates has already been questioned by more detailed studies of two developing countries (Chile and Jamaica).[46]

4.152. Multi-purpose national accounts, of course, facilitate much broader economic analysis than just the scrutiny of production and capital accumulation. Beyond production and income generation, the accounts provide detailed records of income distribution and use, financial transactions and asset (stock) accounts and balance sheets. It is beyond the scope of the present paper to describe in detail all the possible uses of the numerous stock and flow indicators covered in an extended national accounting system. Table IV.5 lists some of the monetary stock and flow indicators that are obvious candidates for environmental adjustment. The synoptic illustration of their uses in the assessment of economic and related environmental conditions leads, albeit eclectically, to further discussion of the role of "green" indicators in policy formulation.

(b) Policy formulation: steering by "eco-nomic" variables

4.153. National accounts facilitate policy-making either through the direct use and interpretation of accounting indicators (as described in table IV.5) or indirectly through modelling future developments and policy scenarios. Direct use has the advantage of avoiding the analytical straightjacket of assumptions and simplifications inherent in modelling, while fully reflecting the priorities, knowledge and experience of the decision maker. Modelling, on the other hand, makes use of the accounting indicators as variables and parameters in a more rigorous and transparent format than the intuitive data interpretation by policy makers.

4.154. For illustrative purposes, the following discussion focuses on the two salient features of green accounting, natural wealth and capital and environmental cost (see table IV.5). Natural capital (CAP_n) and changes in capital stock (ΔCAP_n) are important macro-policy variables. (Ignoring here difficult-to-assess microeconomic aspects of ownership and land tenure and their distribution.) On the other hand, depletion and degradation costs can be directly related to the microeconomic (production and consumption) behaviour of economic agents.

Table IV.5 Indicators for policy analysis, based on green accounting aggregates

Environmentally adjusted indicators		Policy analysis	
		Macro-analysis	*Micro/meso-analysis*
Stocks and change in stocks	CAPn = natural capital	Natural wealth categories; comparison with total economic capital and wealth; portfolio analysis of development finance; debt-servicing capacities of natural resource dependent countries	Distribution of natural wealth among economic sectors (property rights, equity, distribution policy)
	∈CAPn = changes in natural capital stock	Causes of stock changes: exploitation, growth, land use, natural disasters etc.; environmental-economic policy trade-offs	Changes in capital stock by causing agents (industries and households)
	EDP/CAP+CAPn = environmentally adjusted capital productivity	Comparison with conventional measures of (capital) productivity	Comparison of conventional and environmentally adjusted capital productivity; sectoral investment policy
	ED = env. debt (accumulated env. cost)	Liability of past to future generations (enhancing inter-generational equity)	
Flows	EDP = environmentally adjusted net domestic product	"More" sustainable indicator of economic performance and growth (per capita, constant prices); scorekeeping of policy success/failure; comparison of growth rates; ranking of countries	Environmentally adjusted value added: net (of environmental cost) indicator of economic performance and structure
	Ratios per EDP (budget deficit, trade and trade balance, debt, consumption, environmental protection expenditure etc.)	National and international comparative analysis and policy of trade, indebtedness, consumption, saving, investment etc.; modelling import and export of sustainability	
	EC = environmental depletion and degradation costs (total EC and as per cent of NDP)	Assessment of social cost that should be incurred to achieve sustainability in economic performance and growth; international comparison; rent capture for reinvestment	Costs to be internalized into the budgets of households and industries; initial level of fiscal (dis)incentives for changing production and consumption patterns
	ECF = environmentally adjusted net capital formation	Sustainability of economic growth	Sectoral breakdown of net capital formation for reform of investment policy
	Sg = genuine saving	Domestic saving available for capital formation after environmental costing (growth/investment policy)	
	EPE = environmental protection expenditure (current, capital expenditures, green taxes, etc.)	National environmental policy response (by environmental area); employment policy (generation of employment in protection industry	Environmental responses by economic sectors; green business opportunities; assessment of eco-efficiency of economic performance; competitiveness of industries

(i) Natural wealth maintenance: enhancing the sustainability of economic growth

4.155. The availability (stock) of productive wealth denotes the baseline for the long-term growth potential of an economy. A declining capital base would alert to limits of growth nationally, internationally and globally - a topic that has preoccupied environmentalists and environmental economists alike, at least since the Club of Rome study. [47]

4.156. Besides alerting to possible transgression of ultimate limits to growth, extended monetary asset accounts assess the relative significance of different economic assets, whether produced (fixed) or non-produced (natural). Long-term plans and policies of economic growth can make use of such assessment for setting priorities for capital formation and regimes of natural capital exploitation. The World Bank even considers comprehensive wealth assessment as a new model for "development as portfolio management".[48] Furthermore, productive and financial growth potentials are important indicators for steering technical assistance and public and private capital flows into the most promising channels of international cooperation.

4.157. For policy action, beyond priority setting, the asset accounts can be further broken down by industrial activity. This permits productivity analysis before and after incorporation of natural capital. At least one empirical study[49] showed large differences in conventional and green capital productivity, especially for primary production. Clearly, this would call for significant changes in sectoral investment policies. The use of fiscal incentives and disincentives for natural capital-saving or capital-wasting industries is discussed below as a micro-level policy instrument.

4.158. It is doubtful if the above-described uses of asset accounts warrant a paradigmatic shift from flow to (capital) stock analysis as advocated by the World Bank.[50] Static pictures of growth potentials have their uses but are probably less important than examining what a country has actually done with its wealth during a period of time. As this period happens to be one year in most national accounts, their use has been mostly for short- and medium-term analyses of market equilibrium. Some have argued that short- and medium-term stability is a prerequisite for environmental preservation,[51] implicitly relegating environment-economy interaction to long-term planning. Might this be a recipe of business as usual for short-lived administrations?

4.159. Green accounts should help to shed light on sweeping policy statements like the above on short- versus long-term action or inaction. Two scenarios can be conceived. The first is the case of confirmed non-sustainability, reflected in declining EDP and negative ECF; the second is the case of EDP growth and positive ECF.

4.160. In the first case, use can be made of the accounting capacity for systemic classification. The distinction of different categories of natural and produced capital and the allocation of their consumption to different economic sectors allows the blame of non-sustainability to be put on (a) the consumption of fixed or natural capital and its components and (b) different sectors that did not account for their capital use and/or were unwilling or unable to reinvest depreciation allowances for capital maintenance. In this manner, policy pressure points for the encouragement of capital maintenance through regulatory measures or market instruments can be identified (see below).

4.161. As discussed above, positive ECF does not ensure sustainability, if significant complementarities in non-produced and non-regenerative natural capital exist. The search for such complementarities can only be successful if, again, capital is broken down into different categories and the capital users/investors are identified. Once the use of non-substitutable natural capital has been identified and measured, regulatory action such as a logging ban or exploitation quotas could ensure its sustainable or socially desirable use. Such use would not exceed nature's self-restoring capacity (through natural growth or replenishment) unless the Government is willing to sacrifice the needs of future generations for those of the current one. Alternatively, market instruments could be used to achieve similar goals, possibly in a more efficient manner.

(ii) Accounting for accountability: prompting cost internalization

4.162. The above discussion of natural economic capital maintenance referred already to the allocation of depletion costs to the exploiters of natural resources. This cost allocation could be enforced either by direct regulation (command and control) or by using so-called market instruments of cost internalization. This applies even more so to non-economic, environmental capital maintenance.[52] Market instruments are deemed to be more efficient in dealing with external effects of production and consumption than top-down market intervention. The reason is that economic agents are given different options for dealing with environmental impacts, adapting production and consumption processes, paying environmental charges and depletion fees, or purchasing pollution permits. Drawbacks of market instruments are their time-lagged efficacy, high monitoring and enforcement costs, shortsightedness of individuals and general resistance to taxation.

4.163. Theoretically, internalized degradation costs should reflect the ultimate welfare losses generated by environmental damage (to health and well-being), that is, the costs *borne* by individuals. Once internalized, an optimal (maximum) and sustainable net national product would be obtained under perfect conditions.[53] As discussed above, such damage costing is not practicable in environmental accounting. Instead, maintenance costing is applied, which assesses the cost of hypothetically avoiding actual impacts on the environment. Such costing permits allocating the macroeconomic social (expenditure) costs generated by the degradation of a public good to those who *caused* the degradation. In other words, polluters can be made accountable for their environmental impacts, in line with the popular polluter-pays principle.

4.164. Environmental maintenance costs are thus those at which the market instruments should be set initially and pragmatically. They refer to the best available technical solution, which could have prevented environmental impacts or reduced them to acceptable environmental standards. The ultimate effects of possible cost internalization on the economy, that is, their final incidence onto other market partners, would have to be modelled with the usual assumptions about price elasticities and production and consumption functions. Further assumptions about environmental targets set, for instance, in dynamic input-output models, permit the consequences of internalization policies to be assessed for the whole economy at different target levels and with different market instruments.[54]

4.165. The polluter-pays principle is myopic, however, in that it assigns the responsibility exclusively to those who directly cause environmental impacts. This is an unambiguous approach for cost allocation in environmental accounts. It can be argued, however, that responsibilities on the supply side should be shared with the demand for goods whose production involves a joint supply of environmental "bads". A further analytical use of environmental accounts and input-output tables is therefore to make the connection between the environmentally harmful supply of goods and services and their final uses.

4.166. At the international level, exports and imports of natural resources and products made in polluting processes can provide an indication of imports and exports of sustainability by the national economy. Increasing globalization of economic activity, through trade liberalization, calls for full environmental cost pricing by everyone to avoid distortions in competitiveness. Comparable environmental cost assessments across countries in a standardized accounting framework are a means of identifying and addressing any such distortions.

(iii) Monitoring policy response: environmental protection expenditures

4.167. The implementation of environmental protection measures, prompted by regulations or market instruments, requires budgetary allocations and expenses by Government, non-governmental institutions, enterprises and households. These environmental expenditures are, in principle, already covered in the conventional accounts.[55] Proposals for deducting them from GDP as "defensive",[56] or as in the above-mentioned genuine progress indicator (see box IV.2), are to obtain a better measure of economic welfare. They are methodologically questionable.[57]

4.168. At first sight, the total of environmental expenses seems to be an indicator of the national environmental protection effort, which could be compared to either the total national economic effort, that is, GDP, or to other countries' environmental efforts. The mixture of current and capital expenditures, however, is not directly comparable to NDP or GDP, requiring the estimate of value added for a hypothetical protection industry.

International comparisons, on the other hand, are hampered by differences in environmental debt, that is, the accumulated environmental damage of countries.

4.169. Perhaps more useful are evaluations of the efficiency of environmental activities in different protection fields, comparing expenditures with changes in the state of the environment. This is not an easy task, given the time-lagged reactions of the environment and human health and welfare to particular protection measures. All in all, despite their popularity, the policy use of information on environmental protection expenditures is far from obvious.

(c) Physical accounting - a tool of environmental management

4.170. The above analysis focuses on the use of environmentally adjusted monetary aggregates to capture the role of nature in economic policy. Underlying the monetary aggregates are physical stocks and flows. As already mentioned, physical environment statistics were adopted by some national accountants to avoid the controversial valuation of non-market phenomena. Indeed, the organization of physical data in an accounting framework has its own uses, beyond this evasive argument.

4.171. Box IV.5 gives a brief overview of the commonly advanced physical accounting systems. They can be directly related to the simple real-world model of diagram IV.1, which depicts source and sink functions of, and material throughput through, the environment. Apart from these direct interactions between environment and economy, intra-environmental (nutrients, pollutants) flows and health effects of pollution are typically the subject of environmental statistics and indicators organized in their own frameworks.

4.172. Owing to their use of different units of measurement, physical accounts do not have the aggregative power of price-weighted monetary indicators. However, policy makers prefer highly aggregated indices to get the picture of the forest rather than being bogged down in looking at trees. Several methods of overcoming this deficiency and making physical indicators more policy relevant have been advanced. The use of equivalent factors (oil, greenhouse gas equivalents and so forth) permits aggregation of different, but still somewhat related, natural resources and pollutants. For a more comprehensive aggregation into compound indices, other types of weighting were suggested. Equal weighting is applied, for instance, in the popular human development index[58] and the sums and balances of material flows, pioneered by the Wuppertal Institute.[59] "Expertocratic" weights, reflecting the priorities of "those who represent the best environmental policy", were proposed for use in the European environmental pressure index project.[60]

Box IV.5. Physical environmental accounting

Three physical accounting approaches (and variations thereof) have been commonly advanced and applied. They can be categorized as natural resource accounting (NRA), environmental input-output tables (EIOT) and material flow accounts (MFA).

NRA describes the stocks and use of stocks of different natural resources during the accounting period in a fairly aggregate fashion. It was pioneered by Norway [a] and further developed by France.[b] NRA is typically measured in different units of weight, volume, energy equivalent and so on. It has been further developed by the SEEA as an integral part of its asset accounts.

It is still an open issue whether so-called land use accounts are a part of NRA, a separate accounting system or a part of environmental statistics (frameworks). The separate consideration of land use accounts is favoured by those who see them as an instrument of detailed assessments of land quality, biodiversity and land use intensity.[c]

MFA *is* a physical response to monetary measures of the sustainability of economic activity, focusing on material throughout put as a measure of environmental pressure from the economy. It describes the extraction, production, transformation, consumption and accumulation of chemical elements, raw materials or products [d] and may or may not include hidden "ecological rucksacks" of materials that are not incorporated in a particular economic output.[e] For aggregation purposes, the flows of materials (and energy) are usually expressed in one physical unit, weight.

Physical EIOT and mixed accounts like NAMEA[f] are variations of MFA in an input-output or make-use format. A physical input-output table prepared by German statisticians [g], for instance, provides greater sectoral detail (49 products and 11 residuals for 58 branches and final uses). Focusing on detailed production and consumption processes, beyond sectoral breakdowns of input-output matrices, material/energy balances were advanced by the United Nations [h] but were never implemented owing to considerable data requirements.

a) K.H. Alfsen, T. Bye and L. Lorentsen, Natural Resource Accounting and Analysis, the Norwegian Experience, 1978-1986 (Oslo, Central Bureau of Statistics, 1987).

b) J. Theys, "Environmental accounting in development policy: the French experience", in Environmental Accounting for Sustainable Development, Y.J. Ahmad, S. El Serafy and E. Lutz eds. (Washington, D.C., World Bank, 1989).

c) W. Radermacher, "Land use accounting – pressure indicators for economic activities", in Environmental Accounting in Theory and Practice …….; A. Scott and R. Haines-Young, "Linking land cover, intensity of use and botanical diversity in an accounting framework in the UK", in Environmental Accounting in Theory and Practice ….

d) A. Steurer, "Material flow accounting and analysis: where to go at the European level", in Material Flow Accounting – Experience of Statistical Institutes in Europe (Luxembourg, Eurostat, 1997).

e) J.H. Spangenberg and others, *Material Flow Based Indicators in Environmental Reporting – A Report for the EEA's Expert Corner* (Wuppertal, Germany. Wuppertal Institute, 1997).

f) S.J. Keuning and M. de Haan, "Netherlands: what's in a NAMEA? Recent results", in Environmental Accounting in Theory and Practice …

g) C. Stahmer, M. Kuhn and N. Braun, "Physical Input-Output Tables for Germany, 1990", Eurostat working paper No. 2/1998/B/1.

h) United Nations, Report of the Secretary-General, draft guidelines for statistics on materials/energy balances

4.173. Adding up material flows in tons seems to be less subjective, even if the relative importance of resource losses and different emissions of pollutants cannot be assessed in this manner. The result is a measure of material throughput, weighted by weight. Such throughput can be viewed as

- a measure of pressure from the economy on the environment, or
- a measure of "scale" of total resource flow and, by extension, economic activity.

4.174. Environmental pressure is the result of removing natural resources and accumulating wastes and pollutants. If notions of (non-) sustainability, that is, depletion and degradation, are applied, only permanent changes in natural assets should be accounted, as discussed above. At the optimal level, scale analysis supposedly takes over allocative economics, since critical (carrying capacity, sustainability) limits of natural resource capacities and waste absorption are about to be transgressed.[61]

4.175. In both cases of environmental pressure and scale measurement, the specification of critical limits is essential for the interpretation of total material flow as a signal for policy response. Such response could take the fairly radical form of "replacing quantitative expansion (growth) with qualitative improvement (development)".[62] More optimistic policies could attempt to supply "more with less", in other words, aim at "dematerializing" production and consumption as a "management rule for sustainability".[63] The questions are, of course, how much dematerialization and where. The "factor four" proposal for doubling wealth while halving material input, together with a list of promising examples,[64] is a first attempt at answering these questions.

4.176. Looking at the trees, that is, at the physical detail underlying monetary aggregates, has further uses. Monitoring the state of particular ecosystems and the availability of particular natural resources is necessary for managerial decisions on resource exploitation and pollution control. The presentation of these data in an accounting format permits linking specific environmental impacts to the causing economic activities or sectors. The purpose is to take direct action against the culprits, or to identify potential culprits of environmental damage in different environmental and economic scenarios.[65]

4. Outlook: beyond accounting - from valuation to evaluation

4.177. The preceding section referred to the limited capability of physical accounts and loosely organized indicator sets to capture the interaction between socio-economic, cultural and political issues for purposes of integrative policy-making. One way to improve the policy relevance of physical indicators is to relate them explicitly to social norms, made operational as standards or targets in all fields of interacting policy.

4.178. Introducing standards of living, limits in natural resource and carrying capacities, pollution standards, and distributional, cultural and political standards for economic activities turns the analysis of sustainability of growth into one of the "feasibility" of development.[66]. Feasibility in this connection means compliance of development programmes with an exogenously set normative framework of minimum and maximum standards and thresholds. Monetary valuation of costs and benefits from economic activities is replaced - at the borderline - by social evaluation of feasible development. Within the feasibility space, conventional micro- and macroeconomic strategies could be played out according to the rules of the invisible hand of the market. Outside this space, the invisible hand needs to be replaced by the visible one of the standard setter(s): non-economic values interfere in this case with conventional economic decision-making.[67]

4.179. The assessment of the limits themselves and the "distance" of the market economy to those limits, in other words, the size of the feasibility space, is still a hotly disputed matter. Widely differing proposals for indicators "of" and "for" sustainable development have been made, typically without any specification of the limits (see box IV.2).[68]

4.180. Consensus building through standardization of measurement and (e)valuation would improve the rational assessment of possible limits to growth and development. Such consensus might also overcome the above-described dichotomy between environmentalists and economists. The difficulty is to foster standardization while not discouraging pluralism in methodological research and experimentation. The current revision of the SEEA under the aegis of the United Nations Statistical Commission, in collaboration with the so-called "London Group" of national accountants, is a significant attempt at harmonizing environmental accounting methodologies.

Notes:

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[1] See Integrated Environmental and Economic Acc*ounting* (United Nations publication, Sales No. E.93.XVII.12).

[2] United Nations Educational, Scientific and Cultural Organization, International Standard Classification of Education (Paris, 1997).

[3] International Labour Office, International Standard Classification of Occupations - ISCO-88 (Geneva, 1988).

[4] The two purpose classifications used to identify expenses on education are COFOG (purpose classification of government expenses) and COICOP (purpose classification of household final consumption expenses). Both are in the final stages of revision by OECD. In principle, the CPC should be used to link HRA analysis to I-O analysis, in which products are used as units of classification. However, as the CPC only identifies educational services as a single category, with no further detail, it was not used in this analysis.

[5] See United Nations Development Programme, Human Development Reports 1996, 1997 and 1998 (New York and Oxford, Oxford University Press).

[6] Ibid., 1998, p. 24.

[7] Amartya Sen, "Economic policy and equity: an overview", paper prepared for the Conference on Economic Policy and Equity, Washington, D.C., 8-9 June 1998.

[8] Several investigators argue that there is no difference; see D. Roberts, Social Indicators and Social Statistics (Paris, OECD Development Centre, 1978).

[9] J. Pezzey, "Economic analysis of sustainable growth and sustainable development", Environmental working paper No. 15 (Washington, D.C., World Bank, 1989).

[10] For instance, in the constitution of the European Union, making the transition from the more restrictive sustainability of growth, stipulated in the Maastricht Treaty, to sustainable development in the 1997 Amsterdam treaties (for a discussion of the policy implications of these treaties, see F. Hinterberger and

others, Integration von Umwelt-, Wirtschafts- und Sozialpolitik, _IN/WI policy paper No. 1 (Wuppertal, Germany and Vienna, May 1998).

[11] This crude distinction between holistic views of human activities and their environment, and mainstream (neo-classical) economic approaches to the environment-economy interface is, of course, a simplification of existing schools of thought; it does, however, expose a major prevailing difference in approaching the issue. For a more detailed discussion of this polarization in tackling sustainable growth and development, see P. Bartelmus, "Whither economics? From optimality to sustainability?", Environment and Development Economics, vol. 2 (1997), pp. 323-345.

[12] F. Hinterberger, F. Luks and F. Schmidt-Bleek , "Material flows vs. 'natural capital' – what makes an economy sustainable?", Ecological Economics, vol. 23 (1997), pp. 1-14.

[13] See note 1.

[14] S. El Serafy, "The proper calculation of income from depletable natural resources", in Environmental Accounting for Sustainable Development, Y.J. Ahmad, S. El Serafy and E. Lutz, eds. (Washington, D.C., World Bank, 1989).

[15] I. Fisher, The Nature of Capital and Income (New York, Kelley, 1965).

[16] J. R. Hicks, Value and Capital, 2nd ed. (Oxford, Oxford University Press, 1946).

[17] Ibid., p. 172.

[18] There are important differences in the Hicksian and national accounts income concepts. They are founded on differences in the definition of "saving" and "changes in net worth". In the national accounts, the latter includes, in addition to saving, capital transfers, other changes in volume of assets and holding gains/losses. Those additional items would have to be deducted from Hicksian income, defined as the sum of consumption and change in net worth, to obtain the national accounts definition of disposable income as the sum of saving and (final) consumption (1993 SNA, para. 8.15). The reason for this difference is to avoid erratic fluctuation in income owing to large capital transfers, natural disasters and asset price changes in recurrent national accounting.

[19] J. van Tongeren and B. Becker, "Integrated satellite accounting, socio-economic concerns and modelling", DESIPA working paper series, No. 10 (New York, United Nations, 1995).

[20] P. Bartelmus, Environment, Growth and Development - The Concepts and Strategies of Sustainability (London and New York, Routledge, 1994), p. 70.

[21] Welfare/damage estimates are difficult to trace back to their causing production and consumption activities because of time-lagged and synergistic effects, e.g., in the complex pollution process of emission | ambient concentration | exposure | contamination | health effects.

[22] H.M. Peskin, "A proposed environmental accounts framework", in Environmental Accounting for Sustainable Development, Y.J. Ahmad, S. El Serafy and E. Lutz, eds. (Washington, D.C., World Bank, 1989).

[23] See note 1, para. 85.

[24] United States Bureau of Economic Analysis, "Accounting for mineral resources: issues and BEA's initial estimates," Survey of Current Business (Washington, D.C., 1994).

[25] Integrated Environmental and Economic Accounting – An Operational Manual (United Nations publication, Sales No. E.00.XVII.17).

[26] For a more elaborate discussion of the pros and cons of different valuations in environmental accounting see, e.g., P. Bartelmus, "The value of nature – valuation in environmental accounting", in Environmental Accounting in Theory and Practice, K. Uno and P. Bartelmus, eds. (Dordrecht, Netherlands, Kluwer, 1998).

[27] See R. Repetto and others, Wasting Assets: Natural Resources in the National Income Accounts (Washington, D.C., World Resources Institute, 1989).

[28] See note 14.

[29] J.M. Hartwick and A.P. Hageman , "Economic depreciation of mineral stocks and the contribution of El Serafy", report prepared for the World Bank, July 1991.

[30] See note 1, para. 50.

[31] V. Vu and J. van Tongeren, "An analytical approach to the calculation of 'green GDP' ", in Second Meeting of the London Group on Natural Resources and Environmental Accounting, Conference Papers (Washington, D.C., United States Bureau of Economic Analysis, 1995).

[32] B. Meyer and G. Ewerhart, "Modelling towards eco-domestic product" in Environmental Accounting in Theory and Practice ….

[33] See notes 23 and 1, paras. 320-321.

[34] See P. Bartelmus, "The value of nature-valuation in environmental accounting", in Environmental Accounting in Theory and Practice …., p. 295.

[35] P. Hill and A. Harrison, "Accounting for depletion in the 1993 SNA", in Second Meeting of the London Group on Natural Resources and Environmental Accounting, Conference Papers ….

[36] W. van Dieren, ed. Taking Nature into Account (New York, Springer, 1995).

[37] A. Vanoli, "Modelling and accounting work in national and environmental accounts", in Environmental Accounting in Theory and Practice ….

[38] Satellite accounts are explicitly introduced in the SNA to enhance its flexibility and analytical capacity without overburdening the central system. They may provide additional information, use alternative or complementary concepts and provide links to physical data sources (see 1993 SNA, para. 21.4).

[39] M. de Haan and S.J. Keuning, "Taking the Environment into Account: the Netherlands NAMEAs for 1989, 1990 and 1991", Occasional paper No. NA-074 (Voorburg: Statistics Netherlands, 1995).

[40] S.J. Keuning and M. de Haan, "Netherlands: what's in a NAMEA? Recent results", in Environmental Accounting in Theory and Practice ….

[41] See note 26.

[42] E.V. Domingo, "Philippines: adaptation of the United Nations system of environmental accounting", in Environmental Accounting in Theory and Practice ….

[43] P. Bartelmus, "Whither economics? From optimality to sustainability?", Environment and Development Economics, vol. 2 (1997), pp. 323-345.

[44] Ibid., pp. 331-332.

[45] World Bank, Expanding the Measure of Wealth: Indicators of Environmentally Sustainable Development (Washington, D.C., 1997).

[46] R.M. Auty, "Sustaining mineral-driven development: Chile and Jamaica", in Approaches to Sustainable Development, R.M. Auty and K. Brown, eds. (London and Washington, D.C., Pinter, 1997).

[47] Since the report by D.H. Meadows and others, (The Limits to Growth (New York, Universe Books, 1972))), the discussion on the limits to growth has continued, e.g., with H. E. Daly warning about the sinking of the overloaded planetary boat ("Steady-state and growth concepts for the next century", in Economy and Ecology: Towards Sustainable Development, F. Archibugi and P. Nijkamp, eds. (Dordrecht, Boston and London, Kluwer, 1989)), the Worldwatch Institute ("A new era unfolds", in State of the World 1993 – A Worldwatch Institute Report on Progress Toward a Sustainable Society, R. Brown and others, eds. (London and New York, Norton, 1993) predicting the economy's self-destruction as it undermines its environmental support system, or the (new) Club of Rome report (E.U. von Weizs≅cker, A.B. Lovins and L. Hunter Lovins, Factor Four – Doubling Wealth, Halving Resource Use (London, Earthscan Publications, 1995)), on a more positive note, regarding technological solutions.

[48] See note 45, p. 28.

[49] J. van Tongeren and others, "Integrated Environmental and Economic Accounting – A Case Study for Mexico", in Towards improved accounting for the environment, E. Lutz, ed. (Washington, D.C., World Bank, 1993).

[50] See note 45, p. 19.

[51] V.P. Gandhi and R.T. McMorran, "How macroeconomic policies affect the environment: what do we know?", in Macroeconomics and the Environment, V.P. Gandhi, ed. (Washington, D.C., IMF, 1996).

[52] It should be noted that individual corporations may already account for the depletion of the natural assets they own and exploit, costing them as capital depreciation. In this case, the conventional national accounts, which record depletion of natural resources as other volume change in asset accounts only, would overstate the net value added generated by those industries. Green accounts would correct this distortion of the

production level and structure of the economy by shifting depletion costs to the production/income generation accounts. In the case of environmental degradation (from pollution), it is less likely that these non-economic social costs are already accounted for, though not impossible, as the cases of some United States concerns have shown (Monsanto, du Pont, Cyanamid), costing potential environmental liabilities (see Wall Street Journal, 23 March 1992).

[53] P. Dasgupta, and K.G. Mäler, The Environment and Emerging Development Issues, Beijer reprint series, No. l (Stockholm, Beijer, 1991); K. Hamilton and G. Atkinson, "Valuing air pollution in the national accounts", in Second Meeting of the London Group on Natural Resources and Environmental Accounting, Conference Papers ...; R.M. Solow, "Intergenerational equity and exhaustible resources", Review of Economic Studies, Symposium 1974, pp. 29-46; J.M. Hartwick, "Intergenerational equity and the investing of rents from exhaustible resources", American Economic Review, vol. 67, No. 3 (1977), pp. 972-974.

[54] See note 32.

[55] The fact that environmental expenditures are conventional transactions seems to explain their popularity with national accountants. However, the segregation of environmental expenditures as "thereof" components of accounting aggregates still poses difficult classification problems (see, for example, Eurostat, SERIEE 1994 Version (Luxembourg, European Communities)).

[56] C. Leipert, "National income and economic growth: the conceptual side of defensive expenditures", Journal of Economic Issue, vol. 23 (1989), pp. 843-856; H.E. Daly, "Toward a measure of sustainable social net national product", in El Serafy, Environmental Accounting for Sustainable Development ….

[57] Defensive expenditures, sometimes called "regrettables", are difficult to distinguish from "desirables". Also, simple deduction would not account for the contributions of antecedent industries (e.g., steel or parts for environmental installations). Modelling these indirect contributions could be done by means of input-output analysis (see, for example, D. Schaefer and C. Stahmer, "Input-output model for the analysis of environmental protection activities", Economic Systems Research, vol. 1, No. 2 (1989), pp. 203-228.

[58] United Nations Development Programme, Human Development Report, 1997 (New York and Oxford, Oxford University Press, 1997).

[59] H. Schηtz, and S. Bringezu, "Major material flows in Germany", Fresenius Environmental Bulletin, No. 2 (1993), pp. 443-448; S. Bringezu, "Comparison of the material basis of industrial economies", in Analysis for Action: Support for Policy towards Sustainability by Regional and National Material Flow Accounting, S. Bringezu and others, eds. (proceedings of the ConAccount Conference, Wuppertal, Germany, 11-12 September 1997) (Wuppertal, Wuppertal Institute, 1998).

[60] J. Jesinghaus, "Tools for sustainable development: towards a system of societal performance indicators", paper presented at the Fourth International Workshop on Indicators for Sustainable Development, Prague, Charles University, 19-21 January 1998.

[61] H.E. Daly, "Steady-state and growth concepts for the next century", in Economy and Ecology: Towards Sustainable Development, F. Archibugi and P. Nijkamp, eds. (Dordrecht, Boston and London, Kluwer, 1989).

[62] H.E. Daly, Beyond Growth, the Economics of Sustainable Development (Boston, Beacon Press, 1996), p. 1.

[63] See note 12.

[64] E.U. von Weizs≅cker, A.B. Lovins and L. Hunter Lovins, Factor Four – Doubling Wealth, Halving Resource Use (London, Earthscan Publications, 1995).

[65] See, for example, S. Keuning, and Y. Timmerman, "An information system for economic, environmental, and social statistics: integrating environmental data into the SESAME", in Second Meeting of the London Group on Natural Resources and Environmental Accounting, Conference Papers ….

[66] P. Bartelmus, "Towards a framework for indicators of sustainable development", DESIPA Working Paper Series, No. 7 (New York, United Nations, 1994), p. 73.

[67] See note 13, pp. 337-340.

[68] See also note 34.

V. ADMINISTRATIVE AND OTHER POLICY USES OF NATIONAL ACCOUNTS BY INTERNATIONAL ORGANIZATIONS AND COUNTRIES

5.1. The present chapter deals mainly with the administrative uses of SNA data by international organizations and countries, that is, uses in which SNA data play an immediate role in the decision-making process of policy makers in countries and international organizations. These uses rely largely on the type of economic analyses described in chapter III, but also incorporate uses of some of the non-economic data included in satellite accounting described in chapter IV. The present chapter describes, in separate sections, such uses by international organizations, including Eurostat (sect B), OECD (sect. C), the United Nations (sect. D) and the World Bank (sect. E), and by countries, including Ghana (sect. F) and Hungary (sect. G). Administrative uses by other countries are dealt with in other chapters, including descriptions of the specialized uses of macro accounts for economic indicators (Philippines, sect. III.D) short-term accounts (United States, sect. VI.A; France, sect. VI.B; Guatemala and Costa Rica, sect. VI.C) and models (Norway, sect. VII.A; Netherlands Antilles, sect. VII.D).

A. Issues in international and national data uses of macro accounts

5.2. The increasing use of macro accounts data for administrative purposes raises a number of issues, which are relatively new and which may need to be addressed in the further development of macro accounts nationally and internationally. They were raised in some of the papers presented at the 1998 expert group meeting and were extensively discussed during the meeting. They are briefly reviewed below.

1. Scope of the macro accounts

5.3. The first issue is the scope and the direction in which macro accounts will be developed, in view of policy needs. The remaining sections of the present chapter contain a detailed review of the type of macro accounts data that international organizations are developing. This information is consolidated in table V.1, which shows the main macro accounts data that are used in analysis. It is based on an assessment of the data used by four international organizations in important analytical publications at the international level, namely, IMF,[1] the World Bank,[2] OECD[3] and the United Nations.[4]

5.4. The grouping of indicators in table V.1 by 11 categories is based on the categories used by three of the four organizations in presenting their data bank for analysis -- IMF, OECD and the World Bank. They are also close to the data segments identified in diagram II.1, which describes the scope of the 1993 SNA. Thus, categories I to V are indicators that refer to the total economy and counterpart external sector, and constitute the elements of the traditional aggregate SNA compilation for the national economy. Categories VI to IX

Table V.1. Selected socio-economic data and indicators used in international and regional analysis, classified by policy analysis objectives

I. Production, GDP, capital formation and saving
-GDP, current and constant prices, breakdown by- ISIC categories
-Indirect taxes, subsidies
-Gross fixed capital formation, current and constant prices: of which residential buildings
-Changes in inventories, current and constant prices
-Capital stock
-Saving, national
-GDP, real growth
-Gross capital formation, real growth
-GDP per capita
-Final consumption per capita
-Gross capital formation as percentage of GDP
-Gross national saving as percentage of GDP
-Output gap as percentage of potential output

II. Labour market
-Total employment, male, female
-Labour force participation rate
-Labour share of national income
-Labour productivity
-Unemployment rate

III. Prices, wage rates, exchange rates and interest rates
-Wage rates and unit labour cost in manufacturing
-Consumer prices
-Wholesale and retail trade price index
-Interest rates on short-term deposits, long-term bonds, policy related, mortgage rate, money market rate
-Exchange rates with regard to international trade, debt and balance of payments -Housing deflators
-Purchasing power parity
-World Bank Atlas conversion rate
-GDP deflator

IV. Foreign trade
-Value, volume price deflators of imports of goods, services, of which: oil and non-oil, food
-Value, volume and price deflators of exports of goods, services, of which: oil, manufacturing products and other non-oil, raw materials, energy, agricultural products, tropical beverages, non-factor services, capital goods
-Exports of goods and non-factor services, real growth
-Imports of goods and non-factor services, real growth
-Terms of trade

V. Balance of payments, current account
Current account: compensation of employees, investment income, current transfers
Current account balance as percentage of GDP

VI. Taxes, government budget and fiscal deficit
-Total revenue and grants, of which: production taxes, taxes on income and wealth, direct taxes, social security contributions, government transfers
-Total expenditures, of which: employment benefits, social security insurance, national defence, wages
-Final consumption expenditure public, current and constant prices
-Gross fixed capital formation
-Government gross financial liabilities/debt
-Government deficits as percentage of GDP

VII. Money supply, debits and credits, external and/or government debt, banks, official creditors (govt.), private creditors, balance of payments
-Broad and narrow money
-Long- and short-term debit outstanding and changes therein: arrears (interest and amortization), debt forgiveness and rescheduling; foreign currency reserves, direct investments, portfolio and other investments, errors and omissions; assets and liabilities
-Total debit service, of which: interest payments, amortization
-Effective rate of return on foreign assets

VIII. Business (corporate) income and investments
-Output
-Profits and other non-wage income
-Profits of the business sector
-Direct taxes paid
-Gross fixed business capital formation, current and constant prices
-Capital stock and rates of depreciation
-Capital share of the business sector
-Rate of return of the business sector

IX. Household income, consumption, saving and capital formation
-Revenues of households: compensation of employees, self-employment and property income, dividends, interest, rents, current transfers
-Final consumption expenditure, private, current and constant prices
-Expenditures by households: contributions to pension funds, social security contributions, interest on consumer debt, direct taxes
-Household saving
-Capital stock housing and scrapping rate
-Household savings ratio

X. Social conditions
-Population, of which: working age population, male and female
-Population growth
-Crude birth and death rate
-Infant mortality rate
-Life expectancy at birth
-Urban and rural population as percentage of total population
-Labour force in agriculture, manufacturing and services as percentage of total labour force
-Illiteracy rate
-Gross primary enrolment rate, male and female
-Number of inhabitants per hospital bed, physician
-Nutritional intake per person
-Population density
-Percentage of land owned by top and bottom 10 percent of landowners
-Poverty, head count index as percentage of population
-Income distribution
-Percentage access to water and electricity

XI. Environment

roughly refer to the four sectors of the SNA, that is, Government, financial corporations non-financial corporations and households. However, the exact scope of those sectors in international data series differs from that of the 1993 SNA: business (VIII) generally refers to financial and non-financial corporations, and when separate data are compiled with regard to financial corporations, they generally refer to banks (VII) only. The table includes two references to statistics that could be used in integrated satellite accounting: social conditions (X) and environment (XI). The latter category has been included only in order to be complete, but no specific references to international data series have been included in the table (for a discussion on environment, see sect. IV.D

5.5. Incorporation of the data in the table series does not necessarily mean that each organization has reconciled the data conceptually and/or quantitatively within an overall accounting framework. For instance, IMF uses three types of foreign trade data, one type is based on the national accounts, another on foreign trade statistics, and the third type is based on balance-of-payment statistics. Similarly, IMF uses three types of debt-related statistics, alternatively based on government finance statistics (GFS), balance-of-payments statistics and international financial statistics (IFS). Implicit in these uses of alternative data sources is the recognition that they are not reconciled. In the presentation of the data and indicators in the table, reference is made to one use only; this use is reflected in one heading only. It should be recognized that this lack of reconciliation of data describing the present, may also cause difficulties when data are being projected to the future. If the SNA identities between the data do not hold for the present, they will also not hold for the future, as identities cannot be represented in the projection model.

5.6. The data items have been included at the level of detail in which they are included in the data banks for international analysis of each organization. Some organizations deal in much more detail with the selected flows than do others. For instance, OECD uses data on household sector revenues and expenditures in much more detail than does IMF, which summarizes the information by only including household saving. The same applies to the business sector, which has been incorporated in the OECD data bank in more detail, showing profits and other non-wage income, and also taxes, while IMF only includes gross fixed capital formation of business. On the other hand, IMF and the World Bank include much more detail than does OECD in the area of financial flows and stocks, distinguishing between long- and short-term assets and liabilities, and including a detailed articulation of the flows and stocks by counterpart sectors. There are also differences in scope: in its World Economic Outlook, IMF does not include any social data, except for employment. OECD includes data on employment and the population and also distinguishes between male and female in both cases. The World Bank includes a much larger set of social data in its analytical data bank, including data on population growth, illiteracy rates, life expectancy at birth, nutritional intake, and so forth. The type of analyses carried out by each organization, of course, explains the differences in detail and scope.

5.7. When comparing the data with the comprehensive SNA scope of diagram II.1, it can be shown that several segments, and particularly new data features of the 1993 SNA, are not represented in the international databases. In particular, the following segments are omitted:

- The separate analysis of the production accounts of households and corporations is a new feature of the 1993 SNA that has not been incorporated in international analyses. A separate examination of production structures between households and corporations could, however, provide considerable information about the differences in productivity in large- and small-scale production. As the latter includes informal sector production, it also has a link to welfare analysis;
- The output and intermediate consumption data blocks have been seldom used in international and regional analysis, even though they are an important element of national i-o analysis;
- The CCIS of data is a new feature of the 1993 SNA, which was not present in its earlier version. This feature has not been used in international analyses, while data are often available. The CCIS can be used to show how production is institutionally organized, for example, between private and public corporations, or between the corporate sector and the household sector. Also, by analysing such data over time, changes in the institutional dimension of production can be observed;
- Not only are production accounts not used, but also most of the other accounts of the non-financial corporate sector (known as the business sector by OECD and IMF). This is due to the limited use in national accounts of financial statements of corporations. In future compilation practices, this sector may need more emphasis, because of its large impact on production and investments and through direct investments on financial flows and stocks reflecting financial relations between countries;
- Production accounts of banks and Government are also not utilized in analysis, even though this information is readily available. The emphasis of national accounting on the production measures of these sectors — FISIM and government output — has not had much impact on analysing the sectors, as the production of those sectors is largely ignored in the analyses examined;
- Household sector data have been generally underutilized as well. Most of the data sets examined include data on saving and consumption, but do not examine in any detail how those savings are arrived at. The only exception is the OECD data set. The financial accounts and balance sheet data of the household sector have not been utilized at all. There are, of course, considerable difficulties in compiling such data. Further development of household sector data may be important, however, because comprehensive economic data on this sector may be a useful input into socio-economic analysis (see sect. IV.A);
- The separate sector accounts for NPISHs are also not used in the analysis by any of the organizations examined for the purpose of the present paper. Those data have been little developed, but may become more important in the future owing to the increasing role of non-government organizations and/or the recognition thereof. The United Nations Statistics Division is cooperating in a joint study with Johns Hopkins University to set statistical standards in support of data development for this sector.

Table V.2. Data and indicators for short-term analysis	
World Bank	**United Nations**
-GDP, real growth -Gross capital formation, real growth -GDP per capita, growth -Final consumption per capita, growth -Exports of goods and non-factor services, real growth -Imports of goods and non-factor services, real growth -Gross capital formation as percentage of GDP -Gross national saving as percentage of GDP -Government saving /overall budget as percentage of GDP -Current account balance as percentage of GDP	Economic growth, saving and investment -GDP, current prices -GDP, constant prices -Gross fixed capital formation -Unemployment rate -Consumer price index -Short-term interest rate Public sector transactions -Government expenditure -Government budget balance International transactions -Exports -Imports -Current account balance -External debt -Unit value of exports -Unit value of imports -Exchange rate -Purchasing power parities

5.8. The comprehensive data set presented in table V.1 is generally used in annual analyses or in analyses over longer periods. Short-term analyses immediately after the year has passed, of course, cannot deal with the amount of detail of the data presented in the table. It is in this context that reference is made to table V.2, which presents summary indicators that are currently being used by the World Bank[5] and the United Nations to report on developments for periods recently completed. The two examples reflect a considerable emphasis on short-term GDP-related data and indicators (category I in table V.1.), with a more limited emphasis on categories of foreign trade (IV), balance of payments, current account (V), price and exchange rate data (III), government sector data (VI) and external debt data (VII). The information for short-term analysis may not be able to assess all policy issues, such as monetary or fiscal issues. The IMF Special and General Dissemination Standards are another set of key indicators, which do address the latter issues.

2. Policy uses

5.9. Official data may be submitted by countries for general public dissemination and use in the analytical publications of the organizations collecting those data (National Accounts Statistics, Main Aggregates and Detailed Tables; IMF, World Economic Outlook; OECD, OECD Economic Outlook; World Bank, World Development Report; United Nations, World Economic and Social Survey). They may be used by international agencies, as well as by government agencies, and academic and other private users to assess socio-economic conditions and developments over time. There are other administrative uses of national accounts data that are closer to policy decisions and they concern, in particular, the administrative uses described below in the sections on the European Union, IMF, the World Bank and the United Nations.

5.10. The European Union (see sect. B) uses national accounts data extensively for administrative purposes, and has created a legal framework to standardize concepts and compilation methods, so that data are optimally comparable among member countries, associated members and future members. It uses national accounts data to assess the eligibility criteria for entry into the European Monetary Union and into the European Union itself. GNP is also used to determine the contribution of each member State to the budget and, in the future, it will be used to distribute the VAT among member States.

5.11. Revisions of data up to four years after the accounting period has passed are taken into account. To ensure that the underlying national accounts data of countries are robust enough to support administrative uses, Eurostat has made extensive studies of the data approaches used in the compilation of national accounts of each country. Recently, it has carried out a study of the hidden economy, and will use the findings to make adjustments to the GNP data of each member State. It has also examined the different approaches followed by countries when compiling GDP in constant prices, where, for example, different data sources and assumptions about technological change are used. This results in different estimates of economic growth.

5.12. No legal framework for the use of statistical concepts and methods is available in other international organizations. For instance, the World Bank (see sect. E) uses national accounts and related data to take policy decisions with regard to lending conditions. It uses three types of data for these purposes, namely, GNP per capita, debt as a percentage of exports and debt as a percentage of GNP. IMF makes use of national accounts and related data for surveillance purposes (debt data, balance of payments, data on fiscal deficits, subsidies and the like), and also uses the data to determine countries' access to SDRs and other special IMF financial facilities. The United Nations and other organizations of the United Nations family use GNP and per capita GNP data to assess the contributions of each member State to the budget of the organizations.

5.13. Administrative data uses in countries include the use of population census data to distribute government financial resources over regions of the country, the use of CPI in salary negotiations and the use of other price indices to adjust balance sheets of companies in periods of high inflation. There have been some suggestions about using national accounts and related statistics more extensively for administrative purposes, as this would provide a more rational basis for policy decisions. Furthermore, as economic data may be used jointly with social data (population, labour force) in policy decisions, there may be a "healthy" pressure to make economic data compatible with social data, and this could be done within satellite accounts frameworks. On the other hand, the increased use of national accounts data for administrative purposes might result in political pressures that would affect the data quality.

3. Data checks and adjustments of official data

5.14. Data submitted by countries for use by international organizations are generally termed "*official data*", as distinct from other data that may be estimated or based on other less official data sources. Official data are generally submitted by statistical offices in countries or by other government agencies recognized as statistical compilers, such as central banks.

5.15. As a consequence of this administrative use of national accounts data, international organizations concerned carry out detailed checks of each country's data, and some may even decide which data sources should be "legitimized" and which conflicting data sources should be discarded. There are several consequences of data being "legitimized". There may be political pressure to lower the data in order to increase the benefits that countries may receive from or contribute to the organization. On the other hand, as data are in the public domain, there may be "healthy" reviews of data sources and compilation approaches by countries of other countries' data. The resources needed to maintain the database for administrative uses may be considerable and generally much larger than the resources needed for other analytical uses of data.

5.16. IMF and the World Bank adjust data submitted by countries, based on assessments by country economists. OECD, when publishing national accounts data for its member States, makes adjustments to the national accounts of some member countries. For instance, following an agreement between OECD and the United States, the national accounts published by OECD include a number of adjustments, which are not incorporated by the United States Bureau of Economic Analysis when it publishes the national accounts for the United States. In addition, adjustments are made to introduce alternative concepts. For instance, the United Nations, when using GNP data for assessment purposes, adjusts them to take into account alternative rates of converting the data to United States dollars. Similarly, in the World Bank Atlas, the World Bank publishes data based on a special conversion methodology and, in some of its other publications, uses PPP conversion rates instead of exchange rates. Another type of conceptual adjustment is the use by the United Nations of assessable income instead of GNP, from which allowances are deducted for low per capita income and debt. Also, in other United Nations uses, concepts such as transfers of resources are defined, which are not based on the concepts of the SNA.

5.17. The above adjustments, when applied to country data, generally change the level of the data; they have less impact on growth rates, but will considerably influence the distribution of aggregates among countries and also among economic activities in the country. As a consequence of the above, there may be differences between the national accounts data published by the countries themselves and those published and/or used by international organizations.

4. Institutional mechanisms coordinating development and use of macro accounts

5.18. There are different mechanisms in international organizations with regard to the links between data developments and the requirements of data analysis. In the case of OECD, there is a "contract" between the Statistics Department and the Analysis Department concerning which data are being developed on request and in which country provisional data plays a role. On the other hand, in the World Bank, the Statistics Department has a programme to educate the economists in the Bank on how the conceptual framework of the 1993 SNA could be used by them in analysis.

5.19. Also, institutional mechanisms of interactions between national accountants and users differ among countries. In some countries, national accounts requirements are demand driven, while in other countries they are supply driven, that is, the national accounts agency or department takes the initiative to promote the use of national accounts data with users; in most instances, however, the forces are in both directions. In the case of Ghana, there is a committee of producers and users of statistics, which, among other things, decides about the development of national accounts. The case of Hungary is a rather complex one. In Hungary, the Central Statistical Office compiles the national accounts. From the early 1970s, the macroeconomic aggregates were calculated according to the System of National Accounts and the Material Product System. The transition caused difficulties in the compilation and use of data, which was further complicated by the introduction of the revised concepts of the 1993 SNA. Users faced difficulties using the long-term time series, as the national accounts were subject to methodological changes. As there is an extensive use of the aggregates of the Hungarian national accounts for forecasting purposes (with special emphasis on the quarterly estimates), this caused considerable difficulties. In the Philippines, there is a National Statistical Coordination Board, which is in charge of national accounts compilation and which, to a large extent, takes initiatives to educate users on the availability of data and the development of new data, which is promoted with the users. In Norway and France, national accounts and modelling are in the same institutions, which allows for considerable coordination between national accountants and users.

B. Use of national accounts data in European Union policy

5.20. The history of the development of the European Union is a remarkable - and probably unique - process in the annals of world history, characterized by the progressive integration and pooled sovereignty of a large number of countries. It is, of course, first and foremost a political process, but one that relies on statistics as neutral background information about the actual economic and social situations, the possibilities and the needs of the countries participating.

5.21. The European Economic Community (EEC), founded in 1959, was primarily a customs union, with a common external tariff. The European Commission[6], on behalf of the member States, negotiates any changes to the tariff, for example in the General Agreement on Tariffs and Trade, and so from the start the European Commission needed reliable foreign trade statistics. EEC was also a common market for agricultural products, whose centralized management required good data on agricultural output, prices and costs. The 1960s and 1970s were a period of fairly active industrial policy, which led to a growing body of industrial statistics. These three areas are still the mainstays of statistics in Europe today. Throughout this period, a need was felt for a broader macroeconomic overview of the kind given by national accounts. However, it was immediately apparent that the national accounting systems of the member States (then six) were quite different, so work began in the early 1960s to develop a common system that became the European System of Accounts (ESA). ESA was developed in parallel with the revision of the SNA that began at about the same time: ESA was consistent with the 1968 SNA but differed from it in various ways.

1. Macroeconomic analysis

5.22. The national accounts are the backbone of all general macroeconomic analysis inside the Commission, which is carried out by the macroeconomic departments and also by sectoral departments. It is impossible to give a complete list of the types of analysis, but prominent examples over the years have included:

- Impact of oil price rises (using input-output tables);
- Harmonization of tax rates (using government accounts);
- Financing and incidence of social security (using sector accounts);
- Economic assessment of other policies (such as transport or environment);
- Purchasing power parities;
- Sustainable development (more recently);
- Economic forecasts, which are discussed in biannual meetings with forecasters from the member States’ economics ministries to compare their vision of the future and to coordinate policy responses, since EU economies are closely linked by trade and other flows.

5.23. For this last use, the Commission found it more convenient to use the same data as those being used by the representatives of member States – that is, the national rather than harmonized data.

5.24. The political process of integration needed a neutral, objective and fair way of determining contributions to the budget and of allocating certain expenditures. Rather than renegotiate these quotas each year among the countries, it was decided to agree to adopt certain criteria. Thus, for example, contributions to the budget are partially based on GNP and payments from the regional fund on regional GDP.[7] The EU budget receives as "own resources" all customs duties on imports from outside EU and some direct levies on coal and steel undertakings; together, these represented 19 per cent of the budget in 1997. The rest is made up of a share of national receipts from VAT, which is essentially calculated from macroeconomic data (45 per cent and declining) and a supplementary (so-called fourth) resource proportional to GNP, which is now 35 per cent of the budget and rapidly growing in importance. Overall, countries currently pay into the EU budget about 1 per cent of their GNP, amounting in total to nearly $100 billion per year.

5.25. To ensure fairness in the assessment of countries' contributions, the national accounts figures used have to be reliable and comparable – and have to be shown to be so. The first step in 1989 was to create a GNP committee of representatives to oversee the process. The next step was to require the countries' national accountants to compile a detailed inventory of the sources and methods they were using to compile the national accounts aggregates at least to the extent that they impacted on the level of GNP. This exercise produced a rich source of documentation, ranging from about 250 to 900 pages per country, producing some 3,500 pages in total. On the basis of that information, visits by Eurostat staff to the member States identified points on which the ESA was not being applied correctly. These were usually easily corrected, but did not generally change the level of GNP very much. Where there was doubt about the interpretation of the ESA, the GNP committee was asked to give an opinion.

5.26. Respect of methodology alone is not sufficient to ensure genuine comparability of the results. The basic statistical sources available in the member States vary considerably, so it was not appropriate to seek to impose a unique compilation method, but rather to verify that national statisticians made the best use of the data that was available and that the differing approaches were actually comparable in their effect. To achieve comparability of the levels of GNP, it was necessary to address the thorny issue of what is popularly known as the hidden or underground economy. In fact, this could better be described in a national accounts context as ensuring that all economic activity that, in principle, falls within the production boundary defined in the SNA is actually included in the national accounts. This exercise came to be known as exhaustivity of GNP. All member States have conducted a series of exercises to verify the exhaustivity of their national accounts. This has already produced some sizeable upward revisions of GNP (sometimes of 15 per cent or more), and complete, systematic results for all member States were due to be submitted to Eurostat in October 1998.

5.27. The calculation of eligibility for grants for the regional fund is less critical because most regions are clearly either eligible or not; methods of regional allocation of GDP are only crucial for those regions close to the threshold of 75 per cent of the EU average GDP per capita. However, it is worth noting that there are no international guidelines on regional national accounts outside the EU. Some services in particular are notoriously difficult to regionalize, such as banking, insurance and telecommunications.

2. Assessing convergence for economic and monetary union

5.28. By the early 1990s, the EU had achieved a customs union and a single internal market for goods and services, labour and capital. The next step was the creation and adoption of a single currency. In order to ensure that a single currency could be maintained without imposing intolerable strain on the countries that participated, it was necessary that they be sufficiently similar in their economic and, in particular, in their monetary structure and behaviour. In the Treaty on European Union (often referred to as the Maastricht treaty), certain criteria were adopted:

- Price stability, measured by a harmonized consumer price index;
- Sustainable government financial position, with government debt less than 60 per cent of GDP and annual deficit less than 3 per cent;
- Normal fluctuation margins on exchange rates;
- Durability of convergence as reflected in long-term interest rates.

5.29. The protocol on the excessive deficit procedure annexed to the Treaty stipulates that the data to be used are to be based on ESA definitions: "government" means ESA general government; "deficit" means ESA net lending/borrowing and so on. In accordance with the Treaty on European Union (Maastricht), the European Commission (and, for statistical issues, the office in charge is Eurostat) monitors the development of the budgetary situation and government deficit and debt in member States and compliance with the corresponding convergence criteria. The deficit calculations require even closer inspection by Eurostat than do the GNP budget contributions, since while total GNP is defined in a fairly functional way, the accounts of an institutional sector, in this case general government, are susceptible to institutional differences between countries. What might appear as minor changes to the definition of a sector or to the recording of transactions can produce significant differences in the resulting figures; 3.0 per cent was politically crucial.

5.30. Since statistics required to measure the convergence indicators must be strictly comparable, Eurostat collaborated closely with the national statistical institutes of member States and statisticians of central banks to devise the European System of Economic Accounts (ESA 79). This provides the reference for calculating debt and deficit. In specific cases, in connection with the assessment of debt and deficit, where accounting procedures have not been clearly outlined or where cases are not covered by ESA 79, there is a clearly defined procedure for reaching a decision. This consultation on methodology involves the best specialists of national and financial accounts of the European Union and the decisions of Eurostat are taken solely on the basis of statistical principles that comply with the harmonized rules. The principles established for accounting treatment apply not only to the member State in question but automatically and identically to similar operations in every member State.

5.31. Several decisions on the harmonized treatment of specific problems have been taken:

- Interest rates: capitalized interest, zero coupon bonds, deep discounted bonds, linear bonds, indexed bonds and fungible bonds;
- Interest rate and currency swaps;
- Sale of gold by central banks;
- Export insurance guaranteed by the Government;
- Financing and exploitation of public infrastructure by private sector enterprises;
- Financial leasing;

- Pension funds;
- Classification of units acting on behalf of the European Union;
- Recording of financial advances;
- Payments from central banks to the central Government from the revaluation or sales of financial assets;
- Cash/accrual basis in national accounts.

5.32. The outcome is a high degree of reliability and comparability in calculating member States' debt and deficit. Verification of each case that arose was carried out by means of a careful analysis by Eurostat staff, in close consultation with experts from the member State concerned and experts of other member States in a special task force. Once all views had been heard, Eurostat issued a press release announcing the agreed treatment so that all decisions were clear, open and widely known. Press statements about how national accounts are compiled are not at all common, but Eurostat quickly realized after one unfortunate and infamous case (France Telecom) that such transparency was necessary for such highly politically sensitive numbers.

5.33. Some people, particularly those not directly involved, have expressed concern at the close attention to these numbers by politicians and that there might be political distortion of national accounts figures. Eurostat and the statistical offices of member States are, of course, conscious of this danger and resist it, within countries and through joint consultation procedures. At the same time, some national accountants may regret that there is less flexibility and scope for their imagination and innovation in implementing the international SNA/ESA standards in their countries. Certainly, the need for common interpretations to achieve the high level of comparability required does necessarily entail discussion and agreement. While this may be a burdensome approach, the broader discussion with experts of other countries often leads to a better solution for the countries' own needs. Subsequent Eurostat controls of the data and methods used would query any practice found to be incompatible with the agreed norms or otherwise not comparable.

5.34. Thus, there is a new situation for national accounts in the European Union, with some constraints; however, it is believed that the benefits outweigh the problems. The benefits are:

- A truly unprecedented degree of checking of the reliability and comparability of the figures, leading to improved data from which all users benefit;
- National compilers are protected from political interference by the existence of common rules and verification by Eurostat;
- The high profile this gives national accounts data reminds policy makers and politicians of the importance of national accounts and statistics generally.

3. Managing the Economic and Monetary Union

5.35. On 1 January 1999, the new European Central Bank (ECB) took over responsibility for formulating and managing a common monetary policy for the 11 countries that met the "Maastricht convergence criteria" and agreed to take part in the Euro zone. ECB will therefore make the kind of decisions made by any central bank and needs the kind of macroeconomic indicators a central bank would have: consumer price indices, industrial production, unemployment, exports and imports, balance of payments, and so on, as well as data on financial and monetary markets.

5.36. The centrepiece and the overall consistent presentation of these short-term statistics are the quarterly national accounts. The figures presented need to be both *comparable* (for this purpose, probably more in growth rates than in actual levels) and *fast*. Previous uses of national accounts for EU policy-making were largely *structural,* for example, annual GNP levels, which could be revised up to four years afterwards. Eurostat has responded in various ways to improve the data flow, including through the production of a manual on quarterly national accounts. The manual aims to settle some conceptual points that were not fixed in the SNA or in the 1995 ESA, for instance, related to the timing of transactions and their allocation to quarters and seasonal adjustment. More importantly, the manual is designed to promote enhanced reliability and comparability of the quarterly data through practical recommendations designed to foster the adoption by all countries of the best available methods.

5.37. Having achieved the convergence criteria, it is necessary to maintain them or an intolerable strain would be put on the common currency and on economic conditions within the Economic and Monetary Union (EMU). Constant monitoring of the criteria continues and, in the event that a country does, in the future, develop, for example, an excessive deficit, it will be liable to a fine unless certain extenuating circumstances can be adduced, *inter alia*, it is in a recession, which is defined as a decline of real GDP worse than –0.75 per cent. The member States' national accountants immediately expressed concern that the existing measures of national accounts at constant prices were not sufficiently harmonized to support such fine analysis reliably. Thus, since the middle of 1997, ways have been examined to make the constant price measures more comparable, starting with areas known to be problematic such as non-market government services and computers.

5.38. The management of monetary policy needs to be based on a set of short-term indicators produced by each country, using the same definitions at very precise and regular intervals. Examples include indicators for supply and demand, production and consumption, the labour market and money supply. Responsibility for producing these indicators will lie with the European Central Bank, on the one hand and Eurostat on the other. For several months, Eurostat has been engaged in wide-ranging consultations with users and producers of statistics concerning the information requirements associated with the management of EMU. The consultations resulted in the opening of a "Euro-indicators"

Internet site, comprising, as at the beginning of September 1998, some 80 statistical indicators for EUR-11 (the 11 countries of the Euro zone) and EU-15.

5.39. The Euro-indicators are obtained by aggregating the latest data produced by member States. Eurostat sometimes makes estimates as soon as available national statistics cover a significant portion of the activity being measured. The methodologies underlying Euro-indicators are generally harmonized so as to produce consistent and reliable series aggregated at EUR-11 and EU-15 levels. Euro-indicators are updated continuously on agreed dates. Eurostat has set an exact publication date for most Euro-indicators.

5.40. The Euro-indicators cover the following areas of the European economy:

- National accounts;
- Monetary and financial indicators;
- Consumer prices;
- Producer prices;
- Distributive trade;
- Industrial indicators;
- Labour market (employment-unemployment);
- External trade;
- Balance of payments;
- Short-term qualitative surveys.

4. Towards a common VAT system

5.41. The VAT systems of the member States are still not completely harmonized: the collection of goods and services covered is not the same or there are small differences in the rates of VAT levied. Although levied progressively at each stage when value added is produced, the rules of deduction of VAT on inputs mean that VAT bears mainly on final consumers. A new system that is more appropriate for a true single internal market is being studied. In this system, sellers of goods or services would make one declaration in respect of all their sales, regardless of the member State of destination (consumption) of the products.

5.42. The member States' tax authorities and particularly enterprises welcome this simplification but Governments wish to ensure that it will be neutral in its effect on the distribution of tax revenues between countries as compared with the present system, in which VAT is effectively paid by consumers and therefore received by the country where consumption takes place. Rather than a complicated microeconomic form-filling system to follow products from their producer to the consumer, it has been proposed to implement a macro-economic clearing procedure based on macroeconomic statistics of national accounts, production, consumption and trade. Such a system would require precise statistics. At the same time, the administrative sources that statisticians have often used in the past will disappear. The amounts involved are enormous (total VAT receipts of the 15 member States are currently about 7 per cent of total GDP). Producing statistics that will command the respect and confidence of politicians and policy-makers for this kind of use represents a major challenge for statisticians. Some face the prospect with reluctance, while others recognize that if they do not do it someone else will. A similar challenge is being successfully faced by Statistics Canada to redistribute the proceeds of a new VAT-type tax between the provinces.

5.43. National accounts have recently been at the forefront of political attention. However, it is clear that other uses continue and in fact are increasingly strong in amount and importance in formulating, managing and analysing the common monetary and economic policies needed for the Economic and Monetary Union. It has been shown that the development and use of national accounts has gone in parallel with the integration of the European Union and is intimately bound up with it. It is a complex process with many potential pitfalls but it has thus far been successfully steered thanks to the dedication and integrity of the national accountants of member States.

5.44. Statistics entered a crucial period in Europe. The strengths and weaknesses, pitfalls and opportunities of European statistics have been systematically analysed during recent congresses and meetings organized by various institutions, particularly at the 1994 Voorburg conference on the long-term perspectives of international statistics. The creation of EMU, for all its intrinsic risks in terms of institutional relations between member States, is a golden opportunity to advance statistical knowledge, produce quality data and make statistics and notably national accounts an even more reliable decision-making instrument for political authorities and economic and social operators alike.

C. Data requirements for OECD country studies

5.45. At approximately annual intervals, the Economics Department of the OECD secretariat prepares studies on the economies of each of its member countries. These studies are reviewed by the Economic and Development Review Committee (EDRC), which is composed of officials from OECD member countries. After revisions in the light of discussions during the review, the studies are published in the series of *OECD Economic Surveys.* Traditionally, these studies have had a largely macroeconomic focus. They aim to critically review each member Government's economic policies during the past year and to forecast the likely out-turn of the economy during the coming 18 months or so. Growth, inflation, unemployment and the current account balance have traditionally been the aspects of macroeconomic management and performance of particular interest. Over the past decade or so, however, the scope of these studies has progressively broadened to deal with a growing range of issues. The studies now aim at monitoring overall progress with "structural adjustment" and to assess the need for further macroeconomic reforms. As used by OECD, the term "structural adjustment" refers to changes in a country's economic institutions, which may enhance "supply-side" efficiency and flexibility. Examples of such changes include privatization of state-owned firms, deregulation, tax reform, reduction of subsidies, removal of barriers to trade and competition and – of special relevance in recent years - improving the functioning of labour markets, particularly their flexibility.

5.46. The Economics Department also monitors on a regular basis the macroeconomic developments in OECD member countries' economies, using a wide range of short-term indicators. The most important data source is the quarterly national accounts, although several member countries still do not produce these statistics. In addition, the Economics Department produces the *OECD Economic Outlook* twice a year (in June and December) to provide a periodic assessment of economic trends, prospects and policies in member countries. It includes a large number of tables, which present the statistics underlying these analyses. It also presents data and analyses for some non-member countries in those cases where it is necessary to provide a broader context for the analysis of economic trends in OECD.

5.47. Section 1 below describes the kinds of economic statistics that are required for the regular OECD reviews of macroeconomic performance and for the half-yearly updates of the economic situation in OECD; it does not deal with the more varied – usually country-specific – statistics that are used for evaluating policies for structural adjustment. Section 2 briefly describes the working relations between the Statistics Directorate and the Economics Department.

1. Data used by OECD for review of macroeconomic performance

5.48. Table V.3 lists the economic statistics that are presented in the *OECD Economic Outlook.* National accounts data feature prominently in the list, demonstrating the importance of quarterly national accounts for short-term economic analysis. As would be expected, balance-of-payments and labour market data are also well represented in the table. Not surprisingly, the national accounts also dominate the statistics used in the *OECD Economic Surveys*, which focus on individual country's prospects in more detail and take a longer-term perspective than the *Economic Outlook.*

5.49. Statistics of final expenditures on the GDP are central to the Economics Department's review and forecasting process. In OECD Member countries, short-term economic policy measures are mostly designed to act on the expenditure components of GDP – consumption, investment and the trade balance. Data on final expenditure on the GDP are required at both current and constant prices because, although current price data are of little interest in themselves, there is considerable interest in the behaviour of the implicit price deflators obtained as ratios of current to constant price data.

5.50. Imports and exports need to be broken down by broad commodity groups as the determinants of trade flows in these different groups differ. For example, at the present time, countries whose exports are oriented towards agricultural commodities and minerals are suffering from a slump in demand for most of these products, which is impacting significantly on their balance of payments. Also, the structure of trade flows by partner country is needed for the OECD "Interlink" model. In addition, this structure is used in determining potential market growth for each country. This information is available for all

Table V.3. Statistical indicators included in the OECD Economic Outlook

Demand and output

1. Real GDP
2 Nominal GDP
3 Real private consumption expenditure
4 Real public consumption expenditure
5 Real total gross fixed capital formation
6 Real gross private non-residential fixed capital formation
7 Real gross private residential fixed capital formation
8 Real total domestic demand
9 Real exports of goods and services
10 Real imports of goods and services
11 Output gaps

Wages, costs and inflation

12 Compensation per employee in the business sector
13 Unit labour costs in the business sector
14 GDP deflators
15 Private consumption deflators
16 Consumer prices
17 Oil and other primary commodity markets

Labour force, employment and unemployment

18 Labour force
19 Labour force participation rates
20 Employment
21 Unemployment rates: commonly used definitions
22 Standardized unemployment rates
23 Labour force, employment and unemployment

Business sector

24 Capital income shares in the business sector
25 Rates of return on capital in the business sector

Saving

26 Household saving rates
27 Gross national saving

Fiscal balances and public indebtedness

28 General government total outlays
29 General government current receipts
30 General government financial balances
31 General government structural balances
32 General government primary balances
33 General government net debt interest payments
34 General government gross financial liabilities
35 General government net financial liabilities

Interest rates and exchange rates

36 Short-term interest rates
37 Long-term interest rates
38 Nominal exchange rates (*vis-à-vis* the United States dollar)
39 Effective exchange rates

External trade and payments

40 Export volumes
41 Import volumes
42 Export prices (average unit values)
43 Import prices (average unit values)
44 Competitive positions: relative unit labour costs
45 Competitive positions: relative export prices
46 Export performance for total goods
47 Shares in world exports and imports
48 Trade balances
49 Non-factor services, net
50 Investment income, net
51 Current account balances
52 Current account balances as a percentage of GDP
53 Structure of current account balances of major world regions

Other background data

54 Semi-annual demand and output projections
54 Semi-annual demand and output projections (continued)
55 Semi-annual price, cost and unemployment projections
56 Contributions to changes in real GDP in major OECD countries
57 Contributions to changes in real GDP in other OECD countries
58 Household saving, net wealth and indebtedness
59 Productivity in the business sector
60 Central government financial balances
61 Maastricht definition of general government gross public debt
62 Monetary and credit aggregates: recent trends and targets
63 Export market growth and performance in manufactured goods
64 Geographical structure of OECD trade

OECD member countries. Gross fixed capital formation should be broken down at least between the public and private sectors and, preferably, further subdivided by type of asset - dwellings, other construction, machinery and so forth. In practice, some countries are not able to provide data separately identifying public and private capital formation, and some can only classify capital formation according to industry of ownership.

5.51. The income and outlay account for Governments is available for almost all OECD member countries. This account shows the sources of government revenue (basically, taxes and social security contributions) and the ways this revenue is spent – mainly on consumption, subsidies to industries and transfers to households. This account has a priority as high as that for final expenditure on GDP.

5.52. The income and outlay account for households provides information on two important variables – disposable income and saving. Several OECD member countries are still not able to compile these accounts.

5.53. GDP by kind of activity is available annually for all countries. Most *OECD Economic Surveys* show GDP decomposed into primary, secondary and tertiary sectors. Although shifts in the industrial composition of GDP are certainly of interest over a long period, they are of little interest for short-term analysis of economic developments in OECD member countries and therefore have low priority. It might be noted, however, that these data are of key significance for transition economies, where changes in the structure of production are taking place very rapidly.

5.54. The balance of payments are relatively high-priority statistics and are available for all OECD member countries. They are compiled according to the definitions and classifications of the IMF Balance-of-Payments Manual and distinguish between merchandise, factor services, non-factor services and transfers in the current account balance, and between long- and short-term transactions in the capital account. It might be noted that, with the near complete liberalization of capital transactions by OECD member countries and the globalization of financial markets, capital account data are increasingly unreliable. However, as the current financial crises around the world show, information from the capital account is still critically important for some policy analyses.

5.55. Price indexes are also high-priority statistics and are available, in some form, for all OECD member countries. Consumer and producer price indexes (CPIs and PPIs, respectively) are usually published for several subcomponents – for example, “fuel and energy” and “food products”, in the case of CPIs, and “intermediate”, “consumer” and “capital” goods, in the case of PPIs. Price indexes for exports and imports are often “unit value” indexes (i.e., obtained simply by dividing the total value for a commodity grouping by the number of items involved). These are inferior to price indexes in that the goods included in unit value indexes are defined in very broad terms, so that the price changes recorded from one period to another may be due to differences in quality. Unit value indexes are also affected by changes in the composition of the goods included in each commodity grouping. For these reasons, some OECD member countries have now replaced their unit value indexes for imports and exports by directly collected price indexes.

5.56. OECD member countries attach great importance to the proper measurement of price changes, although they recognize the difficulties involved and are modest in claiming to have solved them all. Chief among these is the problem of adjusting for changes in quality. In particular, when a new "quality", "version" or "model" of an existing product is introduced at a higher price, efforts are made to quantify the quality change. Very often this means that the introduction of the new product results in an increase in the price index because the true value of the improvement in the quality of the new product is judged to be less than the increase in its price. The importance of this issue has increased in recent years as inflation in most OECD member countries has been reduced to low levels and, in many cases, monetary authorities are pursing an objective of "price stability". The target to be aimed at is clearly very sensitive to the biases in measured inflation if deflationary policies are to be avoided. The so-called "Boskin report", which was released in the United States of America in late 1996, highlighted the difficulties faced by price statisticians in ensuring that changes in both quality and consumer tastes are taken into account adequately.

5.57. The simplest kind of wage statistic is average compensation per employee, which is obtained by dividing the national accounts aggregate "compensation of employees" by the average number of employees. A narrower measure of the cost of labour is provided by statistics on hourly wage rates, but several countries compile these data only for manufacturing industries. Unit labour costs are calculated by the OECD secretariat as ratios of compensation of employees (at current prices) to value added (at constant prices)

5.58. Labour force statistics are available for all countries, although there are important quality differences between them. There is a general consensus among labour force statisticians that statistics on employment and, especially, unemployment, should be based on household surveys. Employment statistics from surveys of establishments and unemployment statistics from administrative sources are inferior because they are necessarily less comprehensive. In addition, the unemployment definitions used for administrative purposes can vary significantly between countries and can also change over time, which even makes it difficult to assess what is happening within a country. At the present time, about three quarters of OECD member countries compile labour force statistics from household surveys.

5.59. Statistics on money and interest rates are available for all OECD member countries. The preferred measure of money supply is the broad "M4" definition, which includes time deposits as well as currency and checking accounts. Interest rates (and exchange rates) are currently the key indicators for monetary conditions. Growing instability in the money-income relationship has meant that the significance of monetary aggregates for analysis and forecasting has diminished. All OECD member countries publish a typical short-term (e.g., three months) and a long-term (e.g., 10 years) interest rate. Of course, high-frequency data on a range of financial variables are available for most OECD member countries from market sources.

5.60. Most of the other economic statistics are high-priority series. Industrial output indexes are widely available in OECD member countries. Their main interest for OECD analysts is that they provide up-to-date indicators of changes in economic activities, although, with the declining share of industrial production in GDP, movements in industrial production are less of an indicator of GDP trends.

5.61. Capacity utilization is one of the most important statistics collected through "business surveys". Business surveys are directed at owners or managers of enterprises and ask for their assessment of the current business climate and prospects for the future. Such data are valuable for short-term forecasting. Oil prices and effective exchange rates are both calculated by the OECD secretariat. The former data are supplied by the International Energy Agency. The latter series is an index that takes a country's base year exchange rate against the currencies of its trading partners as 100 and measures the trade-weighted appreciation/depreciation of that country's currency since the base year. Labour productivity should be measured by comparing the change in the volume of value added to the change in labour inputs. Most countries have some measure of this kind though often it only covers manufacturing activities. The value added volumes are often based on inferior methods such as using output indexes to extrapolate base year value added. In a similar way, data on numbers employed are often used as a proxy for labour inputs, rather than the preferred measure of hours worked.

5.62. Two general points should be made in conclusion. First, although the *OECD Economic Surveys* give only annual statistics, the analysts who prepare the reports work with monthly or quarterly data whenever possible. These annual reports are, in effect, the outcome of a continuous, year-round monitoring process. Monthly or quarterly statistics on labour force, prices, output and, preferably, national accounts are thus essential for preparing an effective annual review.

5.63. Secondly, OECD economic analysts are mainly interested in the demand side of national accounts –consumption, investment and the trade balance. This reflects the fact that, in most cases, the "supply structure" of OECD economics is sufficiently flexible that it can be counted on to respond more or less automatically to changes in the level or composition of demand. Only in the case of very severe shocks – for example, a drastic rise in oil prices – does it become necessary to focus directly on the detailed structure of supply. It may be, however, that if "globalization" accelerates, larger and more abrupt changes in the structure of production will take place in response to increased competitive pressures. The issue of how wage dispersions and employment patterns are changing in response to globalization is one that is assuming macroeconomic significance. Its analysis will require not only detailed production numbers, but also linked data on employment, wages and trade.

2. Working arrangements between statisticians and economists

5.64. After many years of trial and error, the economists and statisticians of OECD have devised working arrangements, which both sides currently regard as optimal. These are supported by two pillars – the analytic data base (ADB) and the "contract". The ADB is maintained by the Economics Department. It contains, for each member country, a standard set of economic variables of the kind discussed above. The Statistics Directorate is the basic source for the data and provides the historical series, the data revisions and the regular updates for the ADB. However, the staff of the Economics Department add the very latest information from press releases, newspapers or contacts in national capitals and – more importantly – they can extend the key ADB series over the 18-month forecast period. The "contract" is a formal, written agreement between the Statistics Directorate and the Economics Department, which divides the series for each member country into different priority groups and specifies acceptable time limits for updating them. The contract is a compromise between what the Economics Department would like in the best of all possible worlds and the service the Statistics Directorate can realistically be expected to provide within the constraints of communications technology and data availability in OECD member countries.

5.65. Another critical issue for economists in carrying out their analysis is the comparability of data from one country to another. International frameworks such as the *System of National Accounts 1993,* the *Balance-of-Payments Manual* and the International Labour Office's guidelines on labour force statistics are designed to ensure data comparability between countries. However, it is an unfortunate fact that almost all countries deviate from these frameworks to some extent to take account of local conditions and data availability. The Statistics Directorate tries to keep track of the major deviations from these international guidelines so that it can assist the Economics Department in its analysis. The SNA was introduced into most OECD member countries' national accounts in 1999. The Statistics Directorate will obtain as much detail as possible on each country's deviations from the SNA guidelines to assist economists in their analysis.

D. Use of macroeconomic accounts in intergovernmental forums: United Nations experiences

5.66. The experiences with two specific uses of macro accounts data in intergovernmental forums at the United Nations are presented below. The first group of experiences relates to the use of such data in forums discussing the explicit and implicit transfers of resources between developed and developing countries. The second group refers to the use of GNP, GNP per capita and related data when discussing the so-called United Nations scale of assessments, that is, the relative contributions of Member States to the United Nations budget. Both discussions have in common the fact that the SNA is used as a point of departure, but that several adjustments are made; the SNA concepts do not fully adhere to the policy requirements of these discussions.

1. Resource transfers between developed and developing countries

5.67. The Development Policy Analysis Division of the Department of Economic and Social Affairs makes intensive use of data sets of national accounts, external trade, balance of payments and external debt, some of which the Statistics Division has a lead role in providing. Since 1947, the Development Policy Analysis Division and its predecessors have been responsible for producing the United Nations annual economic report, the *World*

Economic and Social Survey. It also provides substantive servicing to the General Assembly and the Economic and Social Council, and it assists the Office of the Secretary-General in regard to international macroeconomic and financial policy questions with which the United Nations becomes engaged. Given the highly political nature of the United Nations and its calling as an international forum on economic and social development, this means that the Division is asked to work on policy questions with a high political saliency. Of course, the United Nations in New York and Geneva and the regional offices have not been the exclusive forums for international negotiation on development questions. Thus, some of the controversies that have raised the temperature of United Nations intergovernmental meetings have also raised temperatures in the forums of the Bretton Woods institutions and the World Trade Organization.

5.68. At the heart of the intergovernmental discussions of economic and social questions at the United Nations is a grouping of developing countries ("the South") confronting or being confronted by a grouping of developed countries ("the North"). A central theme of the discussion—and often the most difficult to resolve in a consensus context— is how the benefits of whatever is under discussion are split between these two groups of countries. Whenever the discussion allows, the question of the explicit and implicit financial relations between the two groups of countries is put on the table. Developing countries might ask if the developed countries take out more than they put in? Do they take out resources directly through "financial transfers" or indirectly through falling "terms of trade"? Should not developed country Governments compensate for the rapacious extraction of the natural wealth of the developing world? Or, the other side might counter, do developing countries appropriately appreciate the resources that developed countries place at their disposal? Do developing countries really expect private investors to place funds with them and not repatriate profits from their investments? When oil prices boomed, who was responsible for the losses of the oil-importing developing countries and who was asked to compensate for them? Do not many developing countries also benefit when international commodity prices plummet? Are there not many developing country exporters of manufactures and developed country exporters of commodities?

5.69. Variants on the questions above have been raised over the past 50 years and may continue to be raised. At various points in that period, the Secretariat has been asked to help resolve the dispute by providing the facts; thus, it was asked to estimate the "net financial transfer" and measure the change in the "terms of trade". Neither was a simple task.

(a) <u>What is the net transfer of resources?</u>

5.70. The net transfer issue became especially sensitive in the early 1980s, after the debt crisis caused Latin America to make "net transfers" in the order of 3.5 per cent of its GDP to its foreign partners (before the crisis, it had enjoyed inward transfers of some 1 per cent of GDP). This degree of swing in resource availability was said by the developing countries to be exacting a horrendous economic price. The developed countries said the concept of "net transfer" was incorrectly labelled and measured and, while not denying that the countries in debt crisis were suffering, argued that the net flow of lending was still positive.

5.71. Of course, the concept made sense and still makes sense. Today, the debate about the relevance of the concept hardly exists at all. The net transfer of resources has become a commonly reported concept, one that the General Assembly routinely asks the Department to continue monitoring. The numbers are carried in the annual *World Economic and Social Survey* and in the biannual reports to the General Assembly on the subject. Indeed, as in the Latin American debt case in the 1980s, there was considerable interest in the impact of the recent Asian crisis on net transfers, as reported by the Secretary-General:

> *"The net transfer to the five countries most affected by the [current] financial crisis (Indonesia, Republic of Korea, Malaysia, Philippines and Thailand) was equivalent to an annual average of about 2 per cent of GDP in the 1990-1996 period. With the onset of the crisis, the net transfer to these countries has become a negative 2.5 per cent of GDP for 1997-1998, for a total net transfer shock of about 4.5 per cent of GDP."*[8]

5.72. But what, exactly, is the "net transfer"? It can be derived in a straightforward way from the national accounts. The concept ultimately requires one to think about a related concept, known as "gross domestic saving", which does not exist in the SNA (the SNA concept is "gross national saving", where the focus is on saving by different institutional units, e.g., household saving out of disposable income, government saving and business saving).

5.73. The national accounts define exports and imports in terms of goods and services (referred to as non-factor services in the previous version of the SNA). If the balance of trade so defined (formally referred to as the "external balance of goods and services") is positive, it means the country earns more foreign exchange from exporting than it pays for importing. The foreign exchange surplus finds its way into some combination of greater domestic holdings of foreign assets, or reduced foreign claims on the country, or greater payments of interest or investment income to foreign holders of claims on the country, or smaller receipts of interest or investment income on foreign assets, or maybe there is some unrequited transfer abroad. When all those financial flows are lumped together, they have to add up to an amount that is the same size as the surplus on trade in goods and services, but with an opposite sign. This is the "net financial transfer". When, as in this case, it is a net financial outflow, the convention is to show it as a negative number. In short, the net transfer of resources is the financial counterpart to the net trade balance, as defined in the national accounts. If the trade balance is in surplus, the net financial transfer is said to be a "negative transfer" or a transfer "away from the country". Developing countries typically are expected to have trade deficits and the net transfer that can be said to finance the trade deficit is positive. However, countries with strong export performance or that are enjoying a boom in the international prices of commodity exports may also have a "negative transfer"; thus, care must be taken in assessing whether a "negative transfer" is a positive or a negative development.

5.74. The negative net transfer shows the portion of GDP that is sent out of the country on a net basis, rather than being used for domestic expenditure. By the same token, when the net transfer is positive, as it was before the debt crisis and as it became again in the 1990s, domestic expenditure exceeds the value of production. These can be stated in terms of simple identities and used to bring out the concept of "gross domestic saving". Thus, using the conventional definition of variables and letting NT stand for net transfer, the definition of the net transfer may be stated as

$$NT = -(X - M)$$

and from the traditional expenditure equation,

$$GDP = C + I + X - M$$

(where C and I include government and private expenditure), the result is

$$GDP + NT = C + I.$$

That is, the net transfer allows domestic expenditure to be more or less than the value of domestic production. The next step gets more interesting: defining "gross domestic saving" as that part of GDP that is not consumed, i.e.,

$$S = GDP – C$$

substituting this into the previous equation gives

$$S + NT = I$$

That is, gross domestic investment is financed out of gross domestic saving and the net transfer (or, if negative, investment is penalized by having to make a net transfer abroad). Equation ($S = GDP – C$) is not standard SNA, which defines saving out of gross national product (GNP), a concept that has an intuitively attractive meaning for countries that are usually creditor countries. That is, GNP asks one to focus on the behaviour of the nationals of a country (rather than the activity taking place physically within the country). GNP differs from GDP mainly in that it includes the nationals' net "primary" income (what used to be called "factor income") from abroad. The standard presentation then says that the investment taking place physically in the country is "paid for" by the nationals out of their saving, out of their domestic and foreign income and out of the net capital flow.

5.75. The net transfer approach says something close to this, but still a little different: it says that a certain total value is produced physically in the economy in a year and the amount of that which is not consumed is available potentially to finance investment. However, there is also a net cash flow *vis-à-vis* foreigners and that either adds to or subtracts from available gross domestic savings and determines the actual level of investment. Not surprisingly, this concept of saving gained popularity in Latin American debtor countries, where net interest and profit payments were seen not as a cost of producing the domestic product, but as an appropriation by outsiders of some of the value produced domestically. It certainly must have felt to Latin Americans like there was an appropriation of domestic income when international interest rates on dollar debt shot up from negative levels after correction for inflation in the late 1970s to inflation-adjusted rates on the order of about 10 per cent a year by 1981.

5.76. One point that should be added to this discussion pertains to the actual measurement of the net transfer, as it embodies a further departure from the standard SNA categories. The distinction was made above between net primary (factor) income earned or paid abroad and the export or import of goods and services. In fact, one type of primary income is treated as if it were a service export. That is, like the World Bank in its presentations of trade and payments data of developing countries, the Department decided to treat labour income as part of services. Lumping factor income from labour and capital together is not analytically useful. Similarly, workers' remittances are treated as part of the labour services earnings, since it is usually not analytically meaningful to distinguish whether or not workers first accumulate their earnings in foreign bank accounts before sending them home. According to the accounts, workers' remittances are unrequited transfers. In some countries, such as Bangladesh, the Philippines and some countries in Central America and the Caribbean, these are major and regular sources of foreign exchange. Thus, when one looks at data on, say, the debt-servicing ratio of Bangladesh in World Bank publications, one should be assured that the denominator includes "earnings" in the form of workers' remittances.

5.77. Thus, while the SNA is the starting point for macroeconomic data definition and presentation in the work of the Department, there are cases in which the Department, the World Bank and probably several other users find it useful to depart from SNA definitions and substitute their own ones. The motivations may in some sense be driven by political concerns, but one can be assured that the politicians are engaged because there are real economic phenomena at work here.

(b) How well do we measure the terms of trade?

5.78. In the above discussion of the net transfer, it was measured in terms of nominal dollars (or local currency). But international price changes can make the real burden or benefit of a net transfer different from the nominal measure. Concern about the real net transfer and how international prices are affected by changes in trade flows goes back at least to the question of the real cost of German war reparations after the First World War. However, not only is the theory ambiguous about what happens to the terms of trade during a change in net transfer, but it would usually be hard in a practical sense to associate terms-of-trade developments of the developing countries with particular swings in their net transfers. Rather, it is typical to think of developing countries as price takers in international markets. This notwithstanding, a generalized debt crisis forcing a generalized swing in net transfers might change the global demand and supply for tradable goods and services sufficiently and thereby change the terms of trade of the affected countries. In the light of the global dimensions of the financial crisis of 1997-1998, posing the question this way does not seem absurd.

5.79. Measuring such an effect, however, is another matter. In fact, most efforts to measure the direct change in developing country real income owing to terms-of-trade changes are not linked to net-transfer considerations.[9] Such exercises have enough difficulty asking what is the change in the value of GDP (given the trade balance) brought about by a change in international prices of traded goods and services. The answer to this question depends in the first instance on how well the change in the terms of trade has been measured. Indeed, there are controversies about this going back to the early literature about development, for example, regarding whether there is a long-run tendency of the terms of trade of developing countries to decline.

5.80. A recent exercise in the Department to try to discern whether there was a trend in the terms of trade of the developing countries illustrated these difficulties. In this case, the analysts began with a decision to estimate the change in the terms of trade from the deflators for exports and imports in the national accounts. One attraction of this approach was that the trade variables in the accounts included trade in services as well as merchandise. Also, it was thought that having the terms-of-trade estimate on the same statistical basis as GDP would make for a more systematic calculation of the real cost or real benefit of the changes in the terms of trade (i.e., the change in the volume of imports that could be purchased from a given volume of exports, expressed as a percentage of GDP).

5.81. The first difficulty encountered was an aggregation problem, not a data problem. If one were to add together, say, the current dollar value of exports of all the developing countries for a series of years and divide the data of each year by the total value of that year's exports in the prices of a fixed year, one would have an estimated series of the unit value of exports for this group of countries. Doing the same exercise on the import side would give a unit value measure for imports, and dividing the export unit-value index by the import unit-value index would give an index of the terms of trade.

5.82. But what does this index mean? Developing countries are a heterogeneous group and one would not want to adjust the aggregated GDP of the group by the GDP value of the change in the terms of trade of the group as though it had been one country. At that level of aggregation, too many changes in prices would offset one another and the total effect of changes in terms of trade would be underestimated. For example, in the years in which petroleum prices soared, one would want to calculate the terms-of-trade gain of the oil exporters and add it to their GDP and calculate the terms-of-trade loss of the oil importers and subtract it from their GDP. Moreover, since the gainers were not expected to compensate the losers, after 1973 it became the standard practice in the reports of international organizations to show terms-of-trade estimates separately for oil exporters and oil importers.

5.83. Now, the same argument carries the inquiring analyst down through finer and finer groupings of countries until arriving at the data of individual countries. That is, the terms-of-trade losses, say, of Africa in a given year should be defined as the sum of the losses experienced by each of the African countries. The losses of losers should not be netted against the gains of the countries that gained, especially if the exercise were undertaken to estimate needs for compensatory financing arrangements for the countries suffering terms-of-trade losses. Thus, one has to conclude that the analysis should be carried out at the country level.

5.84. A second concern was the quality of the national data that were used. Data are published on unit values of exports and imports in the national accounts of far more countries than publish comparable data on unit values of trade on a customs or payments basis. In other words, many countries are estimating unit values of trade in their national accounts from very partial data. That does not mean that the estimates are bad. But the data sources should be investigated and a conclusion as to reliability drawn, especially when there are significant differences between the national accounts and the international trade data or when there are no trade data.

5.85. By looking just at the data in the files or in the books of the Statistics Division, one can hardly tell their quality. Indeed, it is known, for example, that a World Bank mission might arrive in a country, check the national accounts data and decide to disregard them. The team would then re-estimate the national accounts themselves. Those accounts would appear in the Bank's report, but the lower reliability official data would probably continue to be produced and be incorporated into the national accounts files of the Statistics Division.

5.86. In the Department's exercise, data frustrations kept rising until the exercise was suspended. However, often studies cannot be postponed and it is incumbent on the analyst to present estimates, however uncertain, of the subject at hand. Sometimes the difficulties are obvious and analysts do not need a Michelin guide to warn them that the data may be weak. But on many occasions, policy analysts can be led to inappropriate conclusions if they are insufficiently sensitive to the possible weaknesses in the data with which they are working and a Michelin guide could be very useful.

2. United Nations scale of assessment

5.87. An example of the use of GNP data by the United Nations to calculate the relative contributions of Member States to the United Nations budget is given below. Similar uses of such statistics are made by other international organizations, some of which are also described below.

5.88. The United Nations scale of assessments is the basis on which the expenses of the United Nations are apportioned among Member States. The Committee on Contributions, an expert group appointed by the General Assembly, advises the Assembly concerning the apportionment, under Article 17, paragraph 2, of the Charter of the United Nations, of the expenses of the Organization among its Members.

5.89. The original guidelines embodying the apportionment of United Nations expenses are contained in the Committee's terms of reference, which maintain that the scale of assessments should be broadly appropriated according to the principle of "capacity to pay". It is recognized, however, that such capacity is difficult to measure accurately by statistical means alone since other factors not easily quantified need to be considered. Comparative estimates of national income were deemed to be the best measure of capacity to pay, with attention being given to economic realities prevailing at the time of the Organization's inception, including: a) comparative income per head of population; (b) temporary dislocation of national economies arising out of the Second World War; and (c) ability of Members to secure foreign currency.

(a) Income measure of capacity to pay

5.90. At the outset, aggregate product and income concepts were considered, conceptually, to be the best summary measures of the capacity to pay of countries. The relative percentage level of those aggregates for each country to the total for all countries determines the percentage contribution of each Member State to the budget of the United Nations. The four main product and income concepts of the SNA have been considered by the Committee in the course of time, that is, GDP, national income (NI), GNP (or what is referred to as GNI in the 1993 SNA) and national disposable income (NDI).

5.91. Some discussions have taken place in the Committee on the merits of conceptual correctness and availability and comparability of data for a maximum number of countries. Data comparability, reliability and availability were generally considered the more important criteria. For most countries, the relative divergence in the magnitude of the levels of these income and product aggregates is not large and their trends are highly correlated so that the use of one or another should normally not result in marked differences.

5.92. Conceptually, the more superior aggregate in the determination of capacity to pay would be NDI because it represents the total income available to residents of a country, including factor income and current transfers received from less paid to abroad. NDI suffers, however, from the lack of availability and timeliness of information. GDP is more readily available in terms of data for a maximum number of countries and is generally more reliable than any of the other concepts, as many countries have emphasized this concept in their national accounts practices. However, a product concept such as GDP is less relevant conceptually than either national income or national disposable income, as, in the case of many developing countries, among others, it does not account for labour income received by migrant workers from abroad, service payments on external debt and dividends remitted out of the country by foreign investors, all of which are covered in NI. In terms of reliability, gross concepts are generally considered more reliable than the net counterparts, principally because of the difficulty faced by many countries in measuring consumption of fixed capital (depreciation) and the practice by some countries of deriving it merely as a theoretical adjustment.

5.93. In the course of its work, the Committee on Contributions has used three of the concepts mentioned above, that is, GDP, NI and GNP. NDI has never been used in the Committee's work. In the section that follows, the generic terms "income" or "national income" are used, to cover either one of the three concepts that have been used in the Committee's work until now.

5.94. The national income data used in the calculation of the assessments scale are obtained directly from Member States through the national accounts questionnaire sent by the Statistics Division, which is based on the SNA. Incomplete or missing data are supplemented by estimates prepared by UNSD based on other national economic indicators or on secondary indicators compiled and published by other international bodies, for example, the World Bank, IMF, the African Development Bank and the Caribbean Community. Results of economic surveys prepared by the regional commissions and reports of statistical experts provided under the programme of technical assistance are the other sources of information used.

(b) Adjustments made to the income concept

5.95. The income concepts as defined in the SNA have been adjusted by the Committee to take into account a number of considerations, which are not reflected in the definitions of the SNA. The resulting income, known as "assessable income", replaces national income as a measure of capacity to pay. A few of these adjustments and the considerations behind them are considered below. Included among them is the conversion to United States dollars, which influences the level of assessable income relative to that of other countries to a much larger extent than do the other adjustments.

(i) Low per capita income allowance

5.96. In order to prevent anomalous assessments resulting from the use of national income (or any other aggregate income or product concept) that might possibly distort the capacity to pay of countries, per capita income is used as a means of giving attention to countries with large populations that suppress per capita income levels. The application of the so-called low per capita income allowance formula reduces national income as the basis of assessment.

5.97. The percentage of the low per capita income deduction is calculated as the percentage difference between per capita income of the country (Y/C) and an income threshold, known as the "low per capita income limit" (L), multiplied with a percentage (g), referred to as the gradient. In symbols, the low per capita income deduction is $\frac{L - Y/P}{L} * g$. The gradient determines the maximum allowable percentage reduction from national income. Thus, the lower the per capita income, the closer the percentage deduction approaches the full magnitude of the gradient. The deduction may be considered as a transfer of income from countries above the income threshold to those below, which would allow the latter to generate extra income needed to advance to a higher level of socio-economic development. The gradient regulates the pace of the development objective, that is, the higher the gradient, the more income is allocated to support extra development efforts for countries to advance.

5.98. Thus, a country with a per capita income of $500 would, under the low per capita income formula, with an income limit of $1,000 and a gradient of 40 per cent, have a percentage deduction from its national income of 20 per cent ($\frac{1000-500}{1000} * 0.4 = 0.2$). This country's assessable income would be 1 minus 20 per cent, or 80 per cent of its national income. Instead of being assessed on the basis of its total national income, the country would be paying only on the basis of 80 per cent of its national income. The further per capita income moves below the per capita income limit, the greater the percentage deduction from its national income and therefore the less its assessable income. On the other hand, a country with a per capita income of $1,000 and above would not be entitled to receive an income reduction, and its assessable income would be equal to the national income plus the ratio of total relief granted to the total of the national income of countries absorbing the low per capita income relief. Thus, the assessable income of countries with a per capita income above the threshold is increased with a fixed percentage, which is somewhere between 10 and 20 per cent.

5.99. The per capita income threshold, expressed in United States dollars, represents a minimum basket of goods and services on which an acceptable standard of living can be based. It is calculated as the average per capita income in the world, using the population of each country as a weight and after conversion to United States dollars, using market exchange rates (see sect. 2(b)(iv)). Countries with a per capita income above this average could be considered relatively more capable of paying a bigger share of the assessment burden. On the other hand, those members with per capita incomes lower than the threshold are considered relatively less developed, with inadequate resources to meet financial obligations, and are therefore entitled to a reduction in the level of their national income in the determination of capacity to pay. The criteria used to institute changes in the low per capita income threshold include the movement over time of average per capita incomes of the total membership of the Organization, which reflects changes in real growth, inflation and exchange rates.

5.100. Over the years, as concerns mounted for the plight of countries at the lowest rung of the per capita income scale, especially those economies reeling from the debilitating effects of inflation, the methodology has been adjusted by changing some elements of the low per capita income deduction in order to better adapt it to continuously changing world economic conditions. Accordingly, both parameters of the formula, that is, the income threshold and gradient, have been modified a number of times – from $1,000 and 40 per cent, respectively, since the beginning of the formulation of assessments, to $4,318 and 80 per cent, as applied in the present scale.

(ii) External debt relief

5.101. The external debt factor arose in the context of addressing Members' ability, or lack thereof, to secure foreign currency. Beginning in 1969, servicing and amortization of external debt was recognized as expenditure affecting capacity to pay - as a cost of a country's development efforts that otherwise could be used to pay its assessed contribution. Particular attention was devoted to those countries that had to channel a large portion of their foreign earnings to the servicing of external debt.

5.102. The burden attributed to inordinate levels of external debt is often the result of contracting obligations during years of more favourable economic conditions, with expectations of continuous prosperity in the years ahead. However, affluence came to a rapid halt as diminished trade opportunities and reductions in prices of mineral and agricultural products, on which the primary exports of some countries fully depended, became the rule rather than the exception. As a result, repayment of debt and interest payments represented enormous burdens on the economies of these countries and seriously impaired their economic growth.

5.103. NI, GNP and NDI did take into account the payment of interest on foreign debt, but excluded the repayment of the debt, which the SNA treated as a reduction of liabilities to abroad, that is, as a financial flow not affecting income. Given the burden that the repayment of debt places on countries, the Committee felt that an adaptation of the SNA definition of national income would be needed. A formula was devised that permitted a reduction from national income of a 12.5 per cent ratio of debt service repayment of the principal due to total external debt accumulated, assuming that on the average, total debt accumulations are fully amortized within eight years. The formula has been applied only to developing countries, assuming that only those countries incur external debt in support of their development process; developed countries, on the other hand, often incur foreign debt as participants in international financial markets. Data on total external debt for most developing countries are extracted from the data bank of the World Bank and published in Global Development Finance. Although the scheme described here is still being applied in the methodology as the basis of easing debt burden, the concept of debt stock, which only assumes repayment of debt, is being proposed for replacement by actual repayment of principal (debt flows). Proponents for the change argue that non-repayment of principal actually enhances a country's capacity to pay its obligations since its income remains intact.

(iii) Adjustments for other socio-economic concerns

5.104. There were also efforts to improve the measurement of capacity to pay by using socio-economic indicators as alternatives or supplements to income concepts. There was a sense that socio-economic indicators determined the real, as opposed to absolute, capacity to pay that income aggregates actually measured. A country with limited infrastructure, for example, is relatively disadvantaged when compared to another at the same stage of development since it would need to allocate a portion of its income for productive support. One study that dealt with the concept of sustainable income essentially called for the deduction from national income of actual expenditures made towards the enhancement of development policies by setting aside a part of the national income to ensure continued generation of future income. In this view, countries dependent on a single, non-renewable resource needed to set aside portions of their income in order to invest in alternative production processes that would reduce dependence on primary products.

5.105. Another alternative measure considered was the concept of monetary income, defined as income less imputed value added, where value added in agriculture was used to approximate the deduction of non-monetary income. It was thought that the resulting concept better reflected the pace and level of development, in particular for countries with a large non-market sector.

5.106. The main drawbacks with the use of these alternative measures centred on the inherent data limitations in terms of availability, comparability and timeliness, the absence of standardized concepts and less sensitivity to changes over time, as many of the socio-economic indicators measured long-term changes and not the annual changes the Committee was looking for.

(iv) Conversion to United States dollars

5.107. The Committee uses national income concepts in United States dollar terms in order to make them comparable among countries. The conversion rates used are, in principle, average annual market rates available from IMF for its members. These rates are averages based on the market rates communicated to IMF by the monetary authority of its members or an average of daily or end-of-the-month quotations in the market of the country or in New York. The preference is always market rates; only when a free market rate is not available is use made of the official rate. For non-IMF members, the United Nations operational rates of exchange, primarily established for administrative and financial purposes, are generally used. In a few cases, so-called price-adjusted rates of exchange (PARE) are applied as a conversion factor in lieu of market exchange rates.

5.108. PARE is an alternative conversion rate developed by UNSD that is derived by extrapolating the exchange rate of a base period to future years, with the help of price indices –generally CPIs—available for each country. The market exchange rate from which PARE is extrapolated is the average exchange rate of the entire period for which national income data are available to the Committee. The assumption here is that, over a long period of time, market exchange rates are close to price relatives between countries. Only for shorter periods do market exchange rates deviate from those price relatives, and that is why the PARE conversion has been established and applied to countries with temporary distortions in their exchange rates as compared to the price relatives. PARE thus smooths out temporary distortions in per capita income expressed in United States dollars resulting from uneven exchange rate movements caused by inflation, flight of capital, currency speculations, differences in interest rates among countries and other distorting impacts of the international financial capital markets.

(v) Other adjustments

5.109. A number of other adjustments to national income data are less conceptual but still worth mentioning. One places a limit on the changes over time of each country's assessment and thus implicitly limits the relative growth of national income that is taken into account in the assessment of Member States. The other adjustment, known as mitigation, is also applied to the assessment, and takes into account catastrophic and natural disasters such as wars, floods and earthquakes, as well as anomalies in available statistical information. Thus, in mitigation, national income is implicitly adjusted for ad hoc events that only apply to selected countries.

(c) Alternative methods used by other international organizations

5.110. There are basically two principal methods used by international organizations in formulating scales of assessment. One is the continuous approach, as applied in the United Nations methodology described above. It assesses each Member State according to its individual capacity to pay in relation to the capacity to pay of the other Members. The rate adjudged to each is a function of relative capacity to pay. An increase in assessment implies that a country's economic growth during a given period is relatively higher than that of other States or, conversely, if all countries register negative growth, that the country's decline is relatively smaller than that of most of the other Members.

5.111. Apart from the United Nations, the above system is used by most of the specialized agencies, including the International Labour Organisation (ILO), the Food and Agriculture Organization of the United Nations (FAO), the United Nations Educational, Scientific and Cultural Organization (UNESCO), the International Civil Aviation Organization (ICAO), the World Health Organization (WHO) and the World Meteorological Organization (WMO). The same system is also used by the International Atomic Energy Agency (IAEA). While the United Nations scale is used by some of these agencies as their own scale of assessments, some form of modification is instituted by others in order to take into account the specific characteristics of membership.

5.112. The other approach, which could be termed the discrete option of allocating membership contributions, classifies member States into groups. This is currently practised by the African, Caribbean and Pacific Group of States (ACP) and the World Tourism Organization. The International Telecommunication Union (ITU), the World Intellectual Property Organization (WIPO), the Inter-Parliamentary Union (IPU) and the Universal Postal Union (UPU) use similar systems of assessment. It is a comparatively uncomplicated and transparent methodology where members are divided into groups and assessed on the basis of a range or combination of factors, including economic, social, political and institutional ones.

5.113. Normally, this type of approach classifies countries by dividing them into groups while maintaining economic, social and political homogeneity within each group, for example, OECD countries, transition economies and the rest of the membership, which includes most developing States. Each group is then assessed a percentage according to relative capacity to pay. In this specific example, the ranges of assessment may vary from 70 to 75 per cent for OECD members, 15 to 20 per cent for transition countries and 10 to 15 per cent for the rest. It is possible that these rates were arrived at according to established economic criteria, for example, representing the relative weight of each group to the total, but they could likewise have been a political decision that measures the capacity to pay of one group as compared with that of the others. Thus, if capacity to pay truly changes (or is politically deemed to have changed) among groups, the ascribed rates for the groups will also change.

5.114. According to this methodology, members are classified into groups on the basis of economic factors that define the concept of capacity to pay: total per capita income levels.

Group assessment rates are derived according to group shares of the total, which are then uniformly distributed among members of the group. Countries are classified solely on the basis of their national income, without regard to standard-of-living measures such as per capita income. A result of this methodology is that diversely heterogeneous countries are lumped together in groups where there is not a high degree of comparability or compatibility in the socio-economic structure and stages of development of the group members.

5.115. Other international organizations, when assessing member States, use different systems, in which SNA income and related concepts play a role. Some use equal shares for member States, such as the Association of South-East Asian Nations (ASEAN), the Organization of the Petroleum Exporting Countries (OPEC) and the Colombo Plan. Others charge for services provided; this applies, for instance, to the International Fund for Agricultural Development (IFAD), the Bank for International Settlements (BIS) and the Inter-American Development Bank (IDB), in which financial burden is financed largely from commissions, interests from loans and investment of funds. A third group uses production or capacity measures that are characteristic of the operations of the organizations; for instance, the International Maritime Organization (IMO) uses tonnage in maritime transport or navigation in determining contributions and the International Tin Council (ITC), a non-United Nations organization, assesses members on the basis of the production or consumption of tin.

E. Use of economic statistics in the operational guidelines of the World Bank

5.116. The World Bank classifies borrowing member countries according to two main criteria: (a) how poor or well off the countries are, and (b) what is their creditworthiness, in other words, how likely is it that the countries will be able to repay the loans made. The measure used as a proxy to measure the poverty or otherwise of countries is GNP per capita. This is converted into terms of United States dollars, and this level is used to classify the country according to operational category. Table V.4 sets out the thresholds for 1998/99.

Table V.4. Classification of countries by poverty thresholds

Category	Title	Low threshold	High threshold
		US dollars	
I	Civil works preference	0	785
II	IDA eligibility and 20-year IBRD terms	786	1,505
III	17-year IBRD terms	1,506	3,125
IV	15-year IBRD terms	3,126	-
V	IBRD graduation	5,446	-

5.117. The second criterion is creditworthiness, which, of course, is a complex issue. In order to assist the World Bank in the assessment, a classification of countries is drawn up that reflects the ability of the countries to repay debt measured in present value terms, by considering this debt compared to GNP and exports. The classification scheme is represented in diagram V.1.

Diagram V.1. Classification of countries by creditworthiness

Present value of external debt as percentage of GNP	0 -100	100-200	200 and over
80-100	Severely indebted		Severely indebted
50-80	Moderately indebted		
0-50	Less indebted	Moderately indebted	Severely indebted

Present value of external debt as percentage of exports

5.118. The vertical axis measures the ratio in percentage terms of the present value of external debt to GNP. The horizontal axis measures the ratio as a percentage of the present value of external debt to exports, where exports is defined as exports of goods and services, plus net income receipts, plus workers' remittances from abroad.

5.119. Both of these measures are designed to give an indication of the country's ability to service the debt. The first takes account of the size of income flows available to residents of the country, both through domestic production and net income receipts coming from abroad. The second takes an expanded definition of exports to indicate the current foreign currency generation capacity of the economy, through direct exports of goods and services, as well as net income receipts and workers' remittances from abroad. These workers' remittances represent money returned to the country from workers who are resident in another country by the SNA and balance-of-payments conventions, but who still retain a strong family, cultural and economic connection with the country. This results in a stable flow of foreign currency earnings coming into the country.

1. Operational guidelines – GNP per capita

5.120. The compilation of GNP per capita is measured in the first instance in national currencies. The national currency estimates must then be denominated in a common currency for inter-country comparability, which raises the issue of choice between exchange rates and purchasing power adjusted conversion factors. Also, it is generally recognized that no single indicator can be an adequate basis for comparing countries. Per capita income, for instance, only relates to one aspect of the development process, which requires a broader comparison of many indicators for a comprehensive assessment. In considering these numerous and complex issues, the Bank's main priority has been to find a simple, transparent and readily available basis to compare economies for such operational purposes as determination of country eligibility for preferential categories of lending. It has at the same time been recognized that for most analytical purposes, per capita income measures must be supplemented by broader socio-economic indicators for a "fairer" comparison of countries' economic well-being.

5.121. GNP, as the aggregate of domestic and net foreign incomes of a country's residents, is the generally preferred conceptual basis for country income comparisons. The results, however, are in fact little affected if the domestic measure of income is used, namely, GDP, which excludes net income receipts from abroad. GNP comparisons on a per capita basis adjust for differences in population size, but not for other demographic factors such as differences in age–sex compositions of the national populations. Also, GNP per capita does not reflect the distribution of the end products between different uses such as domestic consumption and exports. Supplementary indicators thus have to be considered to assess relative levels of national welfare.

5.122. Coverage and quality differences, as well as variations in institutional practices and capabilities implicit in the various national accounts statistics, substantially affect the GNP per capita comparison. The disparate coverage is especially pronounced for many of the lower-income countries with a weak national capability for gathering even the most basic economic statistics. Data gathering in some countries is frequently limited to the formal monetary economy even though informal and subsistence activities account for a relatively high proportion of national income. The non-monetary subsistence sector, which produces from own consumption rather than marketing, is generally incorporated in the GNP estimates of most countries, but by differing procedures. Coverage is more different for the monetary but unrecorded activities that are referred to as the informal sector of the economy. This sector comprises a wide variety of occupations that are mostly carried out by the self-employed, including those working in the underground economy, at the margin of the law by evading taxes and regulatory frameworks.

5.123. For lower-income countries, one study carried out in the 1980s of a selection of countries placed the relative share of unrecorded activities at well above 25 per cent of GNP for most of Africa. The seriousness of the gaps in coverage is illustrated in the periodic efforts to improve national accounts that have led to major revisions of the national currency estimate of GNP. Even simply ranking country incomes is difficult to do with confidence when the available data are subject to drastic changes such as upwards revisions to the GNP series for Madagascar and Argentina of more than 25 per cent in the early 1990s. While the problem is likely to persist in view of the generally weak national statistical capabilities of many lower-income countries, there has been an increasing effort for developing countries to extend their coverage to include the informal economy and related household activities such as cottage industry and craftwork.

5.124. The long-standing problem of international comparability because of differences between the Material Product System (MPS) and the SNA has eased with the transition of the States of the former Soviet Union and other planned economies towards more market-oriented systems. However, the pace of transition has varied and the GNP data have been derived from MPS estimates through rather mechanical means in some cases. The economies in transition are therefore still affected by systemic differences in data collection and economic structure, which continue to limit international comparability. However, it should be noted that a desire to become a member of the European Union has had a salutary effect on the statistical systems, and every effort is made in candidate countries to align themselves fully with the statistical systems of the EU countries. However, it is also true that with transition, traditional data reporting systems have been breaking down, while the new procedures depending on comprehensive registers and efficient sampling are not yet fully in place. Comparability of economic aggregates has thus been reduced to persistent discontinuities in definitions, classifications and methods for collecting basic data and compiling statistical indicators. As output becomes more diverse and better suited to consumer preferences during the transition process, the changes typically fail to be adequately reflected in the aggregated production data owing to insufficiently developed national statistical capabilities. The problems of GNP coverage are substantial also because the informal sector is believed to be extensive and growing in most historically planned economies as a result of persistent price controls as well as a legal framework for private business that is still at an early stage of development.

2. Expressing GNP estimates in a common currency

5.125. The denomination of national currency GNP estimates in a common currency such as the United States dollar for international comparison raises intractable index number issues analogous to those in comparisons of prices and quantity aggregates for a single economy over time. Meanwhile, exchange rates and the ICP approach to purchasing power adjusted comparisons of income offer the only workable alternatives for denominating national currency estimates of GNP in a common unit such as the United States dollar. While ICP-based comparisons are extensively used in various analytical studies, exchange rates being readily available for most countries in a timely manner have remained the only practical basis for comparing countries for operational purposes.

(a) Exchange rates

5.126. The exchange rate is often used as a basis for conversion factors since it is observable in the market and available universally. If free trade, competitive domestic markets and stable exchange rates prevail, and transport costs are relatively small, then international comparisons of GNPs converted at prevailing exchange rates would be conceptually equivalent to GNP comparisons between regions within a country. Under such conditions, national currency data converted at exchange rates would be comparable across countries, as a United States dollar's worth of United States products would be equivalent to what a United States dollar converted at the exchange rate of any other country would fetch in the products of that country. International comparability would only suffer to the extent that the actual country situation departs from the above free market conditions.

5.127. Since market imperfections are extensive, it is generally recognized that conversions at exchange rates can be misleading in practice. Moreover, fluctuations in exchange rates are affected by capital flows across national boundaries, speculation and currency market interventions of monetary authorities that are unrelated to actual changes in the relationship between the domestic and foreign prices of goods and services. Also, exchange rates reflect, at best, the relative prices of tradables, and difficulties arise owing to taxes, subsidies, quantitative controls and other restrictive practices impeding free trade. Thus, the volume of goods and services that a United States dollar buys in the United States may lack any close correspondence to what a United States dollar converted to another country's currency at the official exchange rate would buy in that country. In the former Soviet Union countries, for instance, trade and service transactions often took place by administrative fiat, with no reference to either domestic prices or official exchange rates, so that the relation of purchasing power to exchange rates was especially remote.

(b) Purchasing power parities

5.128. The alternative approach is to convert national currency estimates of GNP to a common currency using conversion factors that reflect the ICP-based purchasing power parities rather than exchange rates. The basic ICP approach is to subdivide GDP into a large number of basic item headings for which detailed price and expenditure data are collected. The implicit real quantities obtained from these price and expenditure data are then revalued at a uniform set of average international prices, which are denominated in a standard currency. These values are deemed to provide an improved basis for international comparison of national accounting aggregates at various levels of aggregation up to the level of GDP and GNP. Similar estimates can be obtained by converting local currency values to the numeraire currency by PPPs, which are computed by obtaining price ratios of matched items and aggregating them by GDP expenditure weights. PPPs as conversion factors provide estimates of GNP aggregates and their various components on a purchasing power adjusted basis for income levels to be compared according to their relative command over goods and services. PPP-based estimates are, in theory, more stable over time as rankings are affected by the relative performance of the economies free from the effects of exchange rate fluctuations. In general, developing country GNPs converted by PPPs are higher than the corresponding values using exchange rates, the difference being larger for lower-income countries. ICP-based GNP levels and rankings can therefore differ from those based on exchange rate conversions. The operational use of the PPP approach has been limited owing to serious concerns about quality, timeliness and geographical coverage of the available survey data.

3. The World Bank operational rates

5.129. The practice of the World Bank has been to use per capita GNP numbers in United States dollars as a transparent readily available single indicator for operational purposes such as the determination of country eligibility for preferential credit. The Bank also generates a wide range of country-level economic and social indicators to supplement per capita GNP in international comparisons for broader analytical purposes. These various economic, demographic, educational and other indicators are regularly included in reports to the Executive Board of the World Bank, and disseminated to the general public through various Bank publications. An essential part of the briefing material for the annual general meetings of the World Bank with its blending and borrowing members are the "At a glance" tables. Besides a regular core of basic socio-economic indicators, the selection focuses on areas of bank policy priority such as poverty alleviation and environmentally sustainable development. Since 1991, the bank has also published ICP-based purchasing power adjusted estimates of GNP in its main statistical publication, World Development Indicators, and its companion publication, the World Bank Atlas.

5.130. The World Bank Atlas methodology enables conversion factors to be calculated based on exchange rates but avoiding some of the worst fluctuations in exchange rates by a smoothing process. The Atlas conversion factor is the simple arithmetic average of the exchange rates for the current year, and two estimates for the current year derived from the previous two-year exchange rates, adjusted by the country's inflation rate relative to international inflation. These are used in the calculation of the official GNP per capita estimates used to determine country eligibility for preferential lending rates. They are also used by other international institutions as a basis for the allocation of technical assistance funds, and to help determine budget contributions by member countries. The figures are compiled once a year and disseminated internally within the Bank as part of the Bank's operational guidelines.

4. Using statistics in administrative and regulatory procedures

5.131. When statistics are used not as inputs into economic models or general economic policy advice, but rather quoted in administrative procedures, contracts or laws, then certain issues arise that require resolution. An example of this is the role of GNP per capita in the administration of the World Bank operational guidelines to determine the lending terms of loans to developing countries. Of course, there are many other examples, which face the same challenges, such as the use of the consumer price index in price contracts and wage rate agreements, and the increasing use of economic statistics in the regulatory framework of the European Union.

(a) Revisions

5.132. How are revisions handled? In the World Bank, the estimate of GNP per capita for year (t-1) is used in year t to determine the classification of a country in terms of lending status. Even if the figure for that year is significantly revised upward or downward, no change is made to the lending terms set for loans beginning in this time period. Is this right? If one can revise the statistics, cannot the loan terms be revised? The short answer is that this would be impossibly complicated – what would be done about the excess money already paid in interest? What if it was revised again next year or in 10 years? It is simply not practical to allow revisions to affect the regulations in this manner. In the United Kingdom, no revisions are allowed to the official retail price index in order to avoid the attendant complications. But this then poses an insurmountable problem for statisticians when attempting to make a correction to the level of the index after an error has been made. The effect of the error is frozen into the index, and the necessary adjustment must be introduced gradually in succeeding time periods so as not to affect any given time period growth estimate.

(b) Political pressure

5.133. Statistics that affect the events of countries in a very direct manner will always come under scrutiny by those affected. If the GNP per capita rises so as to increase the interest terms of World Bank loans, it is understandable for the affected country representatives to ask "are you sure?" and to take steps to examine whether the rise is justified and there is no scope for error. But, of course, there is always scope for error in statistical estimates, and so the compiling statistician becomes vulnerable to charges of mismeasurement. Even worse, statisticians may be asked, in the light of the general uncertainty of the figures, whether in fact they should not reconsider the first estimate and avoid the crossing of thresholds. What can be done? The obvious response is to ensure that statisticians are protected from this kind of pressure, but this is not easily achieved in practice. Countries can influence powerful groups within institutions, and it is essential that the statistical compilers be enshrined behind a clear statistical mandate, answerable only to the very top of the institution. The head of the statistics compiling section should be recognized professionally on the international stage; this would give a certain status to the post.

5.134. A quote from the Washington Post (Sunday, 4 October 1998) reveals the difficulties in allowing politics to influence statistics:

> *"The census dispute between the Clinton administration and House Republicans centers on whether a federal law permits the government to use statistical sampling to estimate portions of the population rather than count every resident. The administration says that minorities and poor people are traditionally among those missed and that statistical sampling actually makes a census more accurate because it accounts for lapses in the traditional head count method. (The Census Bureau estimated that in 1990 it missed 4 million of 250 million people.) But congressional Republicans contend that not only is sampling forbidden under census law, it can also be manipulated for political ends. The stakes in the case "U.S. Commerce Department v. U.S. House of Representatives" are high because population figures from the 2000 Census will be used to determine how much states get in federal money, as well as the size of congressional districts and political representation.*
>
> *Without sampling, President Clinton himself has insisted, the accuracy of the census "especially with regard to minorities and groups that are traditionally undercounted, decreases substantially".*

(c) Simplicity versus best practice

5.135. When statistics are used in administrative procedures, it is strongly recommended that the statistics be simple in concept and the compilation method be transparent and well described. However, such statistics may not theoretically be the most appropriate measure, given the aim of the administrative procedure. The use of GNP per capita is a good example of a case in which the World Bank has chosen smoothed exchange rates to convert GNP in local currency to United States dollars. This is despite the fact that using purchasing power parity conversion factors is generally accepted to be a superior method, in theory, for comparison purposes. But the PPP factors are conceptually complex, not timely and have still to reach a high enough level of quality to justify their use. Thus, a simple and transparent second-best procedure is used.

(d) Resources

5.136. One effect of using statistics in this way is the increased ability of collectors and compilers to bid for resources. When those affected by the regulations wish assurances that they will not be short-changed, the answer often is that more resources are necessary in order to increase confidence in the results and improve the ability of compilers to defend their figures.

(e) Competition

5.137. When a country moves above a threshold for lending in the World Bank, but another similar country does not, often the disadvantaged country, after assuring itself that its own move is justified, will examine whether the other country should also have moved. This is a very healthy environment as it helps ensure that methods are transparent, and guarantees a continuing skeptical examination of the figures for all countries.

(f) Changes in the statistics

5.138. It is interesting to note how a change in accounting conventions and definitions can directly affect a measure used in an administrative procedure. The Balance of Payments Manual, revision 5, recommends that goods sent to a country for processing and then re-exported be recorded in gross terms in imports and exports of goods. The treatment, according to the fourth revision of the Manual, was to simply show the net position as "processing and repair" in exports of services, and to show nothing in the imports of goods. This change in convention results in the definition of exports, as used in the credit-worthiness analysis, to be increased. In the case of Mexico, for example, the change can have a significant effect on the ratio of debt to exports, potentially enough to change its debt classification. The question is which definition of exports is appropriate for this purpose. Does the gross exports position genuinely reflect an increased ability to service debt by increasing the flow of foreign money into the country, or is the net position a more accurate representation of the money actually available to the economy? Given that the import is needed in order to generate the export in a very direct manner, it seems logical to use the net measure. The interesting point is that without a change in the administrative rule, the change in the statistics could cause a change in the effect of the rule. Does this then make changes to statistical concepts the legitimate interest of lawmakers?

5.139. When there is more than one way to estimate a number for a variety of statistical sources, it is essential that interested parties know what is going on and work together to agree on a common solution. An example might be the use of different sources for some categories of debt statistics – the choice must be clear and described, and the countries affected must commit to the methodology.

5.140. It is natural for statisticians to strive to improve their concepts and methodology, and when a more appropriate treatment of a modern phenomenon becomes agreed upon, such as has recently been the case with financial derivatives, then the SNA and balance of payments will be updated. But what about the effect this may have on the measures incorporated in the rules and regulations? These rules were drawn up with a certain understanding of what was meant, say, by lending and borrowing. To find that the terms have been effectively extended may cause a difference in the measure of external debt of a country, and thereby its creditworthiness. Should lawmakers be consulted before statistical manuals are updated? Does it make sense to say "as measured according to the SNA in practice" when framing legislation? Or should reference always be made to a specific document, with a date of publication attached?

5.141. No definitive conclusions can be reached at this stage in this very difficult area. The use of economic statistics in administrative procedures, contracts, regulations and laws seems to be on the increase, and experience will be the teacher – but one can be afraid that the lessons may be hard ones. In the meantime, it is important that the issue be debated not only among statisticians, but also as part of a healthy debate among administrators, politicians and statisticians.

F. Review of data requirements of policy analysis and planning agencies: the case of Ghana

5.142. The problems that precipitated the need for economic recovery and structural adjustment in Ghana, and in most sub-Saharan African economies, are now well known. Policy failures and unsuccessful planning efforts, among others, have been identified as fundamental to the crisis experienced. The failure of policies, arguably, resulted from neglect of the institutional requirements for policy formulation, implementation and monitoring. However, planners and analysts have downplayed data inadequacy, paucity and inconsistency as contributing, along with other factors, to the inability to provide realistic policy analysis, forecasting and planning. There have been wide divergences between the targets of certain crucial macroeconomic variables such as the rate of growth in money supply, the inflation rate and the budget deficit, and their actual consequences. The high forecast errors usually put in question the basis and method of arriving at the targets. The role of adequate and reliable data in enhancing the quality of policy decisions cannot be overemphasized. Undeniably, there is widespread recognition of the importance of economic and social statistics as major inputs into policy research and development planning. Policy analysis and planning require well-structured and reliable data to fully understand the working of an economy. Since the real economy is complex, data requirements are complex and extensive. The quality of any data set would have effects on empirical findings and consequently on policy decisions.[10]

5.143. The current state and the development of economic statistics in sub-Saharan Africa have not supported a good understanding of the working of these economies: where they do, they come after long delays. Without a loss of generality, the data on these economies have been structured, and rightly so, on the United Nations framework. In most cases, data generation has become a ritual of satisfying such international obligations. Indeed, they fail to mirror effectively the pace and level of economic activities internally. Confidence in the data has been dubious, with the result that policy makers are in a dilemma as to what is credible from the policy analyst. Most often, they perceive the policy analyst's recommendations as being not fully informed and do not feel comfortable with them. There is a recognizable gap between policy analysts and planners on the one hand, and policy decision makers on the other. In the light of this, it is imperative that ways be found to improve data quality in terms of consistency, validity, reliability, precision and accuracy, as well as completeness and timeliness. Once this is achieved, the level of confidence in the data will be enhanced and attention will therefore be solicited of those at the apex of policy-making, leading to improved policy effectiveness. As long as there are mixed feelings about the data and, therefore, the results from policy analysis, research, modelling and planning endeavours, based on an incredible set of data, such activities will be futile or will at best be regarded as mere theoretical exercises with no hard data application.

5.144. Policy analysis and planning are not new concepts in Ghana. The country's history is replete with many drawn up development plans and policy analysis efforts, while the success of these undertakings is another issue. The unavailability of reliable data can not solely explain these failures; nonetheless, it may have been a potent variable. The request for empirical analysis, monitoring and evaluation of economic development in the era of economic recovery programmes and democratization has led to the resurgence in policy analysis and planning agencies to live up to the expectation of utilizing high-quality and timely data.

1. Functions of policy analysis and planning agencies

5.145. Historically, policy analysis and planning in Ghana have been undertaken at the sector level at government ministries. The Ministry of Finance and Economic Planning – now the Ministry of Finance (MOF) – coordinated the research departments of other ministries. In addition to the national budget preparation and other financial functions, the Ministry was given the joint responsibility of coordinating policy and development planning activities with the input of other sector ministries. The unstable political environment that characterized the greater part of the post-independence era of Ghana was not conducive to the establishment of definite and organized channels for policy analysis and planning. Even where those channels did exist, they were not clearly defined in terms of function and linkages. With the current wave of economic liberalization, coupled with political democratization, more definite and concrete channels and institutions are emerging. At the apex of the public sector planning agencies is the National Development Planning Commission (NDPC), which obtains inputs from the policy planning, monitoring and evaluation divisions (PPMEDs) of the sector ministries, as well as the statistics, research and information departments (SRIDs) and agencies within the public service. The Ghana Institute of Management and Public Administration (GIMPA), which reports to the Office of the President, is another public institution in the government machinery. Other public sector institutions include the relevant departments and institutes in the universities. Among private sector agencies and institutions are the Centre for Economic Policy Analysis (CEPA) and the Institute of Economic Affairs. These institutions provide independent policy analysis and guidelines to policy makers for policy planning.

5.146. The NDPC was established to coordinate the new national planning efforts and to advise the President on development planning policies and strategies. Thus, the functions of the commission include the following responsibilities:

- To study and make strategic analyses of macroeconomic and structural reform options;
- To make proposals for the development of multi-year continuous plans, taking into consideration the resource potential and comparative advantage of the different districts of Ghana;
- To make proposals for the protection of the natural and physical environment, with a view to ensuring that development strategies and programmes are in conformity with sound environmental principles;
- To make proposals for ensuring the even development of the districts of Ghana by the effective utilization of available resources;
- To monitor, evaluate and coordinate development policies, programmes and projects;
- To undertake studies and make recommendations on development and socio-economic issues;
- To formulate comprehensive national development planning strategies and ensure that the strategies, including the consequential policies and programmes, are effectively carried out;
- To coordinate and harmonize district and sectoral development plans in the preparation of a national development plan;
- To keep under constant review national development in the light of prevailing domestic and international economic, social and political conditions and to make recommendations for the revision of existing policies and programmes where necessary;
- To perform such other functions relating to development planning as the President may direct.

5.147. The functions of the NDPC as outlined above are supposed to be linked with those of the PPMEDs and SRIDs of the sector ministries and regional coordinating councils, as well as the district assemblies that are to provide inputs into the Commission's work. The main functions of the PPMEDs are to initiate and develop policies and plans and provide technical direction in their planning and programming to ensure that the policies and plans are consistent with the national policy framework of the Government. In addition, they are to undertake monitoring and evaluation of the implementation of the policies and plans. As to the SRIDs, they are to initiate, stimulate, coordinate and undertake research work in the sector, provide guidelines for research methodology, procedures and reporting, ensure effective management of information, and maintain a central database on the sector.

5.148. In GIMPA, a separate division was established to add to the Institute's activities programmes tailored to meet the organizational needs of capacity-building in policy analysis and strategic planning and management. The main functions of the division include:

- Mounting of training programmes in policy-making and analysis, and strategic planning and management;
- Undertaking policy and strategic studies and research as they affect the national economy;
- Organizing forums on topical national issues.

5.149. The GIMPA achieves these aims through training in the three broad areas of public policy, business policy and strategic studies. The undertaking of policy reviews of critical national importance is also one way the division performs its functions. The end result of these research activities is the publication of a biannual journal, the Ghana Economic Outlook. The GIMPA forum, established between GIMPA and other agencies involved in development, provides yet another avenue for policy critique and discussion. At these forums, national, sectoral and corporate policy issues, which are researched with the tools of systematic enquiry, are critically examined. Objective recommendations are made to advance the level of awareness and improve the quality of public or corporate policy. Other institutions, such as the Institute of Statistical, Social and Economic Research of the University of Ghana, the Centre for Development Studies of the University of Cape Coast and the Planning Department of the University of Science and Technology, are teaching, doing research and consulting in the area of policy analysis and planning.

5.150. Established as an independent "think tank", CEPA has the following roles:

- Conducting independent analysis and research on economic policies of relevance to Ghana;
- Disseminating understanding of economic issues among decision makers in the public and private domain;
- Contributing to informed public participation and discussion of economic matters to publish or assist in the publication of literature on economic issues.

5.151. In pursuance of these functions, CEPA seeks to promote an interest in and studies of major issues affecting Ghana, and an in-depth understanding of the fundamentals of public policies. In addition, the Centre provides a forum for the exchange of ideas on issues of importance to Ghana, and serves as a bridge between the Government, the private sector, academia and the general public. The Institute of Economic Affairs is another non-partisan, non-profit research institute with donor sponsorship and support. Its main functions include research and dissemination of results as they affect the social, political and economic lives of the citizenry. The Institute holds public forums from time to time on topical national issues. It is noteworthy that the Institute has more bias towards political issues, for example governance, than economic policy analysis.

2. Institutional arrangements for linking statistical data and policy analysis

5.152. The Ghana Statistical Service (GSS) is the legally mandated institution to collect, analyse and disseminate official statistics or data (Fourth Republican Constitution of Ghana, adopted on 7 January 1993). The ministry departments on monitoring and evaluation and the research department of the Bank of Ghana are the liaisons with the GSS in the provision of data and checking for consistency. All the ministries, departments and agencies, central management agencies and the Office of the President generate data, which are submitted to the GSS. Much of the data collected has been based on the traditional way of reporting and conform to the recommendations of the SNA. The Quarterly Digest of Statistics, published by the GSS, provides data for macro analyses. Based on the availability of funding, other panel data are collected and processed on key socio-economic indicators. For example, the Ghana Living Standards Survey (GLSS) has recently been conducted. The GLSS databases provide information on key indicators that do not form part of the regular data reporting of the GSS.

5.153. While data are supplied by an identifiable source, there could be criticism that much of the data collected are of no immediate use or of no use at all to policy makers and planners. That data is supply driven rather than demand driven. A mechanism is necessary to bring together data users and producers to identify real data needs; then, one can expect that the data collection, analysis and dissemination will be demand driven. For a long time in the data-collecting history of Ghana, no such arrangement was made. This has caused the GSS to sometimes fail in its duties to ensure the timely availability of data. Many of its publications have been delayed or not published at all, especially in the early 1980s. Although institutional linkages are desirable among data users and producers, they have not had much success. A recent attempt did not go far; the process terminated when the contract of the project came to an end. Cognizant of the need for the institutionalization of a dialogue between the agencies involved in the supply and use of data, a national committee of producers and users of statistics (NACPUS) was formed in the 1980s. This committee, which comprised sectoral statistics working groups (SSWG), had the following functions:

- To identify the data needs of users;
- To coordinate the statistical activities of the various producers;
- To formulate appropriate policy recommendations for the Statistical Service Board.

5.154. SSWGs were formed to facilitate the work of the NACPUS. The main objective for their formation was to provide a forum for discussions on the status of sectoral statistics and to make specific recommendations for their improvement, both in qualitative and in quantitative terms. The specific functions of the SSWGs included:

- Identification of user needs within the sector;
- Determination of available sources of data;
- Evaluation of methodology for data collection;
- Allocation of responsibilities within the working group.

5.155. The weakness or non-existence of institutional linkages has led to discrepancies in data on the same variable from institution to institution. For example, data from the Ministry of Trade and Industry (MOTI) and the Ministry of Food and Agriculture and other sources are different from those of the GSS. This situation is very serious since, in the case of MOTI and GSS, both supposedly draw their data from the same source, that is, from the Customs, Excise and Preventive Service. In a recent attempt to foster a linkage among user institutions of statistics, the Department for International Development supported a joint GIMPA/GSS/MOF/University of Oxford workshop of CGE modelling for policy analysts. At the time of the compilation of the 1993 SAM, in 1996, it was felt that if users were not trained, they might not take full advantage of it in policy analysis. A workshop, which brought together participants at the policy level in their various organizations, was organized to introduce them to policy analysis using CGE modelling. This activity has kindled interest in the area and plans are under way to institutionalize it. This is one of the recent attempts at institutionalizing or putting in place arrangements for statistical data (SAM, in this case) to be used in CGE modelling for policy analysis. A parallel arrangement is under way at GIMPA and NDPC for time series modelling.

3. The need for future improvements of data and institutional arrangements

5.156. The evidence strongly suggests that data are still a problem for effective policy analysis and planning in Ghana. In fact, data may be:

- Unavailable in some cases;
- Inaccessible owing to bureaucracy or other motives or sheer arrogance on the part of those who provide it;
- Lagging behind the need for it;
- Inconsistent and irreproducible among institutions reporting on the same variables;
- Collected but of no use to users since little dialogue exists between data producers and users.

5.157. In addition, there have not been enough attempts in the direction of sustainable institutional arrangements to link statistics to policy analysis and planning. Simply put, issues regarding statistics are not given priority and peripheral attention is accorded to data. There is a need for some re-engineering on the data front in order to enhance policy analysis and planning.

5.158. For the effective provision of data, there is a need for continuous dialogue between producers and users of official statistics so that available data reflects the optimum societal data requirements. Linkages should be fostered among the producers of official data by way of equipping them with modern communications technology. Information sharing among the producer and user agencies could be enhanced by powerful computer systems. Often, when data are requested from some organizations, one is met with considerable frustration and impediments. While some may be genuine, others are ways of covering up the non-existence of the data, the collection of which should have been the responsibility of the institution concerned.

5.159. To a large extent, data production should be demand driven. There should be periodic consultations and review of the data needs of user organizations and agencies. In this regard, data collection, collation, analysis and dissemination should go beyond the traditional norms to explore emerging relevant variables that tend to explain changing social, economic and political circumstances. Adequate institutional arrangements should be in place for linking statistical data with policy analysis. In this connection, there is a need for national and international donor and governmental financial support for any project that has the possibility of achieving that goal.

G. Experiences with use of Hungarian national accounts data in analysis

5.160. The national accounting system as a tool for the study of macroeconomics offers information on changes in the volume of economic activity over time. Information obtained from the national accounts is suitable for analytical purposes as the accounting framework is providing a coherent system, and the concepts (production, income, accumulation) accounting rules correspond to economic theory.

5.161. Since the early 1990s, the estimates of the Hungarian national acounts (HNA) have been influenced both by the new concepts of the 1993 SNA and by the country's transition from a centrally planned economy to a market economy. During this period, real growth was low and the changes in the accounting system rendered the valuation more difficult. The methodology applied for compiling the HNA has gradually been improved, and, when using long time series, one should be careful to take into account changes in concepts between data of subsequent years.

5.162. The uniqueness of the Hungarian statistical system is that, since the early 1970s, both the SNA and the MPS influenced the economic statistics and the macro-aggregates that were compiled. Although the concepts, classifications and accounting rules have not strictly followed any international guidelines, the existing double data sets facilitated the Hungarian participation in international comparisons. During the period of the centrally planned economy, value added of non-material service activities was significantly underestimated, while the share of the non-material sphere was increasing continuously. In the 1990s, the annual accounts were considerably revised. The revision affected the data sources of the accounts, the classifications and the compilation methodology. The Hungarian Statistical Office started to use the preliminary version of the 1993 SNA before its finalization. In the transition process that started in 1989, many institutional changes took place, which forced the Office not only to change the methodology, but to build up completely new data sources as well. The main data source of the accounts was the tax declarations of enterprises. The Statistics Act allowed the Hungarian Central Statistical Office (HCSO) access to the micro tax data. After introducing the 1993 SNA, the most important changes were made in the valuation of other services.

1. Analytical aspects of the data in the Hungarian national accounts (HNA)

5.163. The data in the national accounts were subject to methodological changes from time to time. Modifications were made because of the following factors:

- Taking into consideration the new concept;
- Making corrections or changes in the existing categories with the aim of corresponding them with international recommendations;
- Introducing new classifications by industries, sectors, legal forms or ownership;
- Changing the base year for the constant price aggregates.

Table V.5. Volume indices of output and value added of industries in the Hungarian economy, 1991-1993
(previous year = 100)

Industry	1991		1992		1993	
	Before modification	After modification	Before modification	After modification	Before modification	After modification
Output						
Agriculture	86.1	86.1	89.0	89.0	90.1	89.4
Manufacturing	81.1	81.1	87.1	87.1	102.1	100.5
Construction	82.9	82.9	103.1	103.1	95.7	95.8
Trade	95.8	95.8	98.2	98.2	93.2	92.5
Transport	86.2	86.2	104.0	104.0	97.7	95.9
Other services	96.2	96.2	102.6	102.5	106.3	109.7
Total	85.9	85.9	94.6	94.6	99.7	99.6
Value added						
Agriculture	91.9	91.9	83.4	83.5	93.3	92.1
Manufacturing	82.2	82.2	93.3	93.3	104.4	103.0
Construction	85.0	85.0	101.9	101.9	93.6	94.5
Trade	91.7	91.7	83.9	83.9	94.8	96.2
Transport	88.6	88.6	95.7	95.7	94.9	94.6
Other services	97.6	97.6	103.6	103.3	103.1	104.6
Total	88.1	88.1	97.0	96.9	99.2	99.4

5.164. The HNA data published in different time periods can only be compared if the consequence of methodological changes are taken into account. It is not rare to find, when comparing publications in different years, that data for the same concept or statistical aggregate are different. Such differences may cause confusion and lead to mistakes in the analyses and valuation. In order to avoid such mistakes, one should be aware of the changes and methodological corrections that were introduced by the Statistical Office in different years. The HNA are now close to the recommendations of the 1993 SNA. The revisions of the formerly published data cover the period back to 1991. The revised data for 1991 onward can therefore not be compared directly with the data published for the years before 1991, namely, with the time series of the period between 1960 and 1991. Comparison of the two types of times series is facilitated by publishing the 1991 data, compiled according to both the 1968 and the 1993 SNA methodology.

5.165. For the period from 1991 to 1993, the revised HNA were published by the Hungarian Central Statistical Office in the summer of 1995, and a year later they were revised, when the final estimates for 1994 were prepared. Comparisons of volume indices of output and gross value added for the period from 1991 to 1993 in table V.5 show that the deviations between preliminary and final data for 1993 have become significant. The effects of the methodological changes are larger in the case of the growth rates of gross value added than of output. The methodological changes affected the elements of intermediate consumption as well. The preliminary data published for 1995 reflected the methodological changes. These modifications affect the supply as well as the use of products in the Hungarian national accounts, as is shown in table V.6. The volume indices of both supply and use decrease by one percentage point as a consequence of these revisions. The growth rates are higher for some of the components of supply and use.

Table V.6. Supply and use of products in the Hungarian national accounts in 1995, before and after modification

	Current prices (billion FT) Before modification	After modification	Volume indices (previous year=100 per cent) Before modification	After modification
Supply				
Output at basic prices	10 707.9	1 0681.1	103.4	102.2
Taxes less subsidies on production	828.0	900.4	104.0	101.1
Imports	2 036.6	2 163.1	99.3	99.3
Total supply	13 572.5	13 744.6	102.7	101.7
Use				
Intermediate consumption	6 042.1	5 967.5	105.0	102.7
Actual final consumption	4 363.4	4 341.6	93.9	93.4
Gross capital formation	1 252.2	1 343.7	106.3	108.2
Export	1 914.8	2 091.8	113.4	113.4
Total use	13 572.5	13 744.6	102.7	101.7

2. Effects of revisions on data

5.166. Data changes are a consequence of the combined effect of several types of changes. Some are changes in national accounts concepts and classifications, and others are the result of changes in the base year. Each of the effects is briefly reviewed below.[11]

(a) Effects of methodological changes

5.167. Effects of the methodological changes in the narrow sense were determined after publishing the time series back to 1991, the year for which two estimates were made according to the “old” and the “new” methodology. The main changes are described below and their quantitative impact on output, intermediate consumption and value added of economic activities is presented in table V.7.

5.168. In the new methodology, agricultural output and value added at basic prices include subsidies on export. This change increases the value of the output of this industry at basic prices and at the same time reduces the adjustment for net taxes on products, leaving value added at market prices unaltered.

5.169. In the new HNA, the changes in housing services with regard to government-owned housing and owner-occupied dwellings were significant, while the estimation of output of rented private housing remained unchanged. The value of consumption of fixed capital of government-owned dwellings was revised, and the stock of dwellings was revalued to current replacement cost. The annual stock of local government-owned dwellings was valued at the average market price (price is determined by square metres), which would have been obtained if the dwellings were sold unoccupied. The market prices are not the prices actually paid by the tenant households when purchasing the dwelling under the privatization scheme of dwellings. The revaluation of local government-owned dwellings and the increased rate of depreciation (from 1 per cent to 1.5 per cent) increased the output of local government housing services (approximately double). The output of housing services of owner-occupied dwellings is measured by an adjusted rent. The new estimates of intermediate consumption of fixed capital for owner-occupied dwellings is calculated by using the annual average construction price per square meter as replacement cost.

Table V.7. Effect of methodological changes on the main categories of the Hungarian national accounts, 1991 (billion FT)

	Output	Intermediate consumption	Value added
	Absolute change		
Agriculture, forestry	-113.2	-76.2	-37.0
Government-owned dwellings			
Non-financial corporation sector	-2.2	-	-2.2
Government sector	+13.2	-	+13.2
Owner-occupied dwellings	+83.3	-5.1	+88.4
Own-account construction of dwellings	+7.8	+4.7	+3.1
Financial intermediation	+62.2	+3.5	+58.7
NPIs serving enterprises	+1.0	+0.5	+0.5
NPIs serving households	+23.6	+15.2	+8.4
Government			
Market	+57.5	-30.0	+87.5
Non-market	+90.1	+90.1	0.0
Private health services	+3.0	0.0	+3.3
Total at basic prices	+226.3	+2.7	+223.6
Taxes-subsidies on products	+37.9	0.0	+37.9
Total at market prices	+264.2	+2.7	+261.5
	Percentage change		
Total at market prices	+4.7	+0.1	+10.5
Agriculture	-	-	-19.0
Other services	-	-	+13.0

5.170. In the revised estimates, the output of the own-account construction of dwellings includes the non-market production of capital repairs, while in the past it was not taken into consideration. The value of intermediate consumption is estimated by applying the intermediate consumption/output ratio to small entrepreneurs that are allocated to construction.

5.171. Financial intermediation services indirectly measured (FISIM) are treated as market services in the new system. Their output is calculated as the difference between interest received and interest paid, without correction for interest received on own capital or other property income received. The imputed output is not allocated to the users of the services, but is accounted for as intermediate consumption of a nominal sector.

5.172. The imputed insurance service charge is estimated as the difference between insurance premium received, plus interest on technical reserves and claims paid, plus charges in technical reserves. It is allocated to users.

5.173. For 1991, NPIs serving enterprises were included in the sector NPIs serving households. In the new methodology, such enterprises are included in the non-financial corporate sector. The NPIs serving households form a separate sector, and include NPIs that are mainly financed from membership fees paid by households; their output is estimated as the sum of costs: intermediate consumption, compensation of employees, consumption of fixed capital and other taxes on production less subsidies.

5.174. The output of government services in the revised national accounts is estimated as the sum of cost and is based on the annual reports of the government institutions. The sales and costs of entrepreneurial activities in the sector are allocated to the type of activity of the reporting unit. Information is also available to derive an operating surplus or loss for both sales of principal and entrepreneurial activities of the Government. Estimates of consumption of fixed capital were revised to cover assets with a long service life (e.g., roads and bridges). Assets of central and local government are estimated at current and constant replacement costs, instead of estimates at historic costs. Depreciation rates were increased from 1 to 2.5 per cent for buildings; this change led to triple the sum for the total consumption of the fixed capital of this sector.

5.175. Honoraria paid for certain government health services were included in the output and value added of the private health services.

5.176. The definition of net taxes on products was changed. Taxes on exports are now recorded as taxes on products. Value added tax includes non-deductible VAT on gross fixed capital formation. Profits of fiscal monopolies are treated as other taxes on products. Reimbursements of medicine by social security and subsidies by the government to public transport companies on students' and pensioners' monthly passes are treated as social transfers in kind and not as subsidies on products.

5.177. The most significant change was made to exports and imports of goods and services after 1990. Data on external trade for the period from 1985 to 1990 were derived from data supplied by enterprises. Since 1991, external trade is estimated on the basis of custom declarations, and the recording of imports and exports are based on a special trade system. The two scopes are entirely different.

5.178. From 1991 onward, data of external trade comprise not only the fee of processing goods but also the raw materials imported (or exported) for processing purposes, according to international standards.

5.179. A chain index is calculated on the basis of 1990-adjusted data in accordance with the contents of 1991 data, which can be used if comparison is to be made. Beginning in 1997, the coverage changed, and now includes the industrial free zones as well. For the sake of comparability, 1996 data have been changed according to the new methodology of 1997. This change increased the trade volume, as the industrial free zones accounted for about 30 per cent of exports and about 26 per cent of imports.

(b) Effects of changes in classifications

5.180. Two types of classification are used in classifying economic units by industries. The Hungarian industrial classification, corresponding to ISIC, revision 3/NACE, revision 1 at the level of 60 divisions, was used from 1992 to 1997. At the beginning of 1998, a new industrial classification was introduced, in line with international standards at the four-digit level. The industrial classification introduced in 1992 constituted a significant change in the distribution of activities of the national economy between industries. A large number of agricultural firms were reclassified to manufacturing: also, many of the enterprises earlier classified into manufacturing were reclassified to services. It should be emphasized that enterprises and not establishments are classified according to their main activities. The generation, distribution and use of income accounts are presented in a sectoral breakdown. Furthermore, the generation of income account is presented in an industrial-sectoral cross-classification.

(c) Effects of changes in the constant price base year

5.181. The base year for producing constant price aggregates is maintained for a period of between 5 and 10 years. In the case of the long time series of national accounts aggregates going back to 1960, the base years have been changed six times. For example, for the period between 1991 and 1995, 1991 was used as the base year for the constant price aggregates; after that period, 1995 was used as the base year.

5.182. Modification of constant prices may cause significant changes in the level of the aggregates, which may cause problems with the users in understanding the data, particularly in periods of high inflation rates. At the level of industries, the base year changes either decrease or increase the share of some industries or branches in the constant price aggregate total. For example, the share of agriculture and construction became smaller at the 1991 constant price aggregates, and the share of some other industries was also reduced. When comparing the constant price estimates based on 1991 and 1988 base years, the industries whose share reduced included agriculture, industry and transport, and the industries whose share increased included construction, trade and other services. From 1980 onward, a continuous increase in the proportion of other services is observred. This process was strengthened with the revision of the data from 1991 onward.

3. Analysing and forecasting short-term growth

5.183. There is an increasing demand for forecasting Hungarian macroeconomic data, mainly GDP macro-aggregates. The Institute of Economic Analysis and Information Technology (ECOSTAT), in the Hungarian Central Statistical Office, is one of the leading institutions in the Hungarian market to provide these forecasts.

5.184. Two methods are used at EcoStat for producing the forecasts of macroeconomic changes:

- Experts' opinions of their economic expectations;
- Forecasts based on econometric models.[12]

5.185. The econometric model is a dynamic quarterly model, composed of four blocks (demand block, supply block, price-wage block and income-distribution block) developed for forecasting short-term growth. The estimates provided by the expert could extend the information used in the econometric model. EcoStat has applied both methods in its forecasting activities and has learned the following: the two methods can be used jointly as well, such as introducing experts' expectations as exogenous information in the econometric model. But when the econometric model and the expert's opinion are used in parallel, the results should be monitored carefully, as the methods could provide erroneous results. In a period of changing trends, the econometric models could lead to under- or overestimation. Therefore, it should be kept in mind that the period of transition from a centrally planned to a market economy is accompanied by large-scale structural changes and many changes in trends. This applies in particular to the macroeconomic aggregates of Hungary, as the trend of macro-aggregates has changed in the past 10 years. As a result, at the beginning of the 1990s, there were serious problems with finding a correct or appropriate forecasting process/model of the national economy.

5.186. Not long after the HCSO started publishing the Hungarian national accounts according to the 1993 SNA, efforts were made to produce the quarterly national accounts estimates as well. The first results of this work were released in mid-1996. The publication helped to analyse changes in the national economy in the short term. There was considerable pressure from users to publish selected aggregates of the national accounts quarterly, including real growth rates of total GDP, household consumption expenditure, gross fixed capital formation, and exports and imports of goods and services. These aggregates were estimated by HCSO in two or three months after the end of the given quarter and the preliminary estimates were generally modified during the year as more accurate data became available for the national accounts. The data sources, as well as the methods used in the quarterly estimates, are different to some extent from those used for the annual accounts.

5.187. Parallel with the GDP estimates compiled by the HCSO, EcoStat has begun to process data on value added tax declarations. In this research, the Institute calculates quarterly GDP, with the help of net sales and intermediate consumption. Comparisons of the results of the calculations for the past four years with the aggregates of the quarterly national accounts show that the two methods result in estimates that are almost the same. The first results of the EcoStat calculation were published in February 1998. According to this source, volume indices of the value added for 1997 increased between +3.7 per cent and +4.2 per cent, while the first estimate of the real growth of value added by the HCSO was +4.4 per cent.

Notes:

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[1] IMF, World Economic Outlook, 1998 (Washington, D.C.).
[2] World Bank, World Development Report, 1997, (Washington, D.C.). The database of the World Bank is reflected in another report, LDB (Live Data Base) Glossary of Terms and Indicators, Development Economics, World Bank, July 1997.

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[3] OECD, OECD Economic Outlook, (Paris, June 1998). Basic data used in macroeconomic assessments are included in the OECD databank, which is described in Economic Outlook Database Inventory (EO63) (June 1998).

[4] World Economic and Social Survey, 1998,Trends and Policies in the World Economy (United Nations publication, Sales No. E.98.II.C.1).

[5] World Bank, SAVEM tables (Selected Analytical Variables for Economists and Managers) (Washington, D.C., March 1998); see, also, section III.C.

[6] The European Commission is one of the four main institutions created by the Treaty of Rome (1957). The three others are the European Council, the European Parliament and the Court of Justice. The Treaty of Maastricht (1992) created a new institution: the European Central Bank.

[7] The use of GNP for one and GDP for the other is probably best seen as an accident of history. For all but the smallest countries, the numerical difference is extremely small.

[8] Report of the Secretary-General on the financing of development, including net transfer of resources between developing and developed countries (A/53/228), para. 9.

[9] In some analyses, the net transfer and terms-of-trade factors are estimated independently and then added together and the result is sometimes referred to as the "real net transfer"; however, it is not the "real cost" of the transfer at all, but the combined effect of developments in the net transfer and changes in international prices.

[10] Olawale E. Ogunkola, "The state of macroeconomic data in Africa". Paper prepared for the Project Link autumn conference, held at the University of Lausanne, Switzerland, from 30 September to 4 October 1996.

[11] National Accounts for Hungary, Revised Sources, Methods and Estimates, 1996 edition, (Paris, OECD-Hungarian Central Statistical Office, 1997), pp.6-17 and 18-30.

[12] Description of the ECO-LINE Model and Its Use for Analysing and Forecasting Economic Growth (Budapest, Hungarian Central Statistical Office, Institute of Economic Analysis and Information Technology, November 1998), pp. 6-13.

VI. SHORT-TERM ACCOUNTING AND ANALYSIS

6.1. Chapter III dealt with the links between the scope of macro accounting and medium- and long-term economic analysis. The present chapter focuses mainly on short-term economic accounting and analysis. More than medium- and long-term analysis, short-term analysis has to confront the scarcity of available data. Various techniques have been developed to identify proxies and/or measure short-term economic developments and conditions indirectly. The present chapter provides a discussion of the compilation approaches used for this purpose. Some of these approaches are far removed from accounting, while more recently developed techniques have focused on the use of short-term accounting as a means of measuring recent conditions and developments or forecasting them for the immediate future.

6.2. Two representative approaches to short-term analysis are discussed in the first two sections of the chapter. Section A deals with the measurement of cyclical indicators designed to predict upturns and downturns in business cycles. The selection of appropriate indicators for past periods is the essential element of this approach. The selection is based on correlations between the selected indicators of past and future developments. Section B deals with recent developments in national economic accounting, in which the accounting framework is used as a means of estimating recent economic conditions and developments and arriving at consistent estimates; this approach is not used to forecast. Generally, it only focuses on an aggregate format of the SUT framework of the SNA, but in the approach described in the section, and based on French experiences, limited institutional sector accounts are compiled for recent periods. A similar approach is taken in section C, which describes indicators used by central banks in two Central American countries (Costa Rica and Guatemala) in a short-term model and the reduced format accounts framework underlying it. Because of the application of the indicators by central banks, the model and the underlying accounts emphasize the integration of production and fiscal, monetary and financial analysis. As a consequence, there is much more emphasis on institutional sector accounts data than on the short-term accounts format developed and used by INSEE in France, as presented in the previous section. Section D describes how a formalization of the compilation methods used in present practices of national accounting could be used to improve those methods and the resulting estimates. The section supplements the approaches presented in the previous sections by focusing in particular on short-term accounting when less basic data are available. The presentation is based on the discussion of aggregate national economic accounts in section III.A.

A. Cyclical indicators and national accounts

6.3. The present section deals with the use of national economic accounts and other data in the context of indicators describing short-term and intermediate trends and fluctuations. The indicators are applied to the analysis and prediction of business cycles and growth cycles. As such, they refer to the movements of the economy and are basically of a macroeconomic nature. Most correspond well to the framework of national accounts, for example, the series relating to capital formation, changes in inventories, and business and consumer credit. Some have more in common with social indicators, for example, the average work week, initial claims for unemployment compensation, and job vacancies (see table VI.1).

1. Indicators, business cycles and growth cycles: concepts and definitions

6.4. As a general category, economic indicators are descriptive and anticipatory time series used as tools of (predominantly macro) analysis and forecasting. They target trends and shorter changes in domestic and foreign economic and financial conditions. The indicators may be published data or measures derived from the data, and they may refer to countries, regions, sectors or industries. These time series may be measured in current or constant prices, physical units, or index numbers; they may be quantitative, for example, national retail sales, or qualitative, for example, a diffusion index based on a survey of department stores. Some indicators represent production, employment and income; others sales, inflation and a host of other variables. There are as many subjects of indicators in this sense as there are different targets at which they can be directed. Thus, one important way in which such series are used is as explanatory (often lagged) variables in econometric models and regression equations.

6.5. An important subdivision of the general category of economic indicators consists of cyclical indicators. These are time series selected for being both comprehensive and systematically related to business cycles. The "indicator approach", which they serve, combines data and procedures designed to monitor, signal and confirm cyclical changes and, particularly, turning points in a country's or a region's aggregate economic activity. Cyclical indicators can help analyse and predict not only expansions and contractions in the economy at large but also substantial speedups and slowdowns, that is, not only business cycles but also growth cycles.

6.6. Business cycles are recurrent sequences of alternating phases of expansion and contraction that involve a great number of diverse economic processes. These movements show up as distinct fluctuations in seasonally adjusted, comprehensive series that measure all major aspects of overall economic activity: production, employment, income and sales. This implies that the cyclical fluctuations in these variables are highly diffused across the economy, yet also sufficiently synchronized to dominate the national aggregates. The same applies to a great many other economic and financial variables that participate in business cycles: money and credit; interest rates, yields and prices of assets; profit totals, rates, and margins; business fixed and inventory investment; household expenditures, particularly on housing and durable goods; rate of inflation and sensitive commodity prices; unemployment and government budget balance; and imports and trade balance. Some of these series tend to move early, others late, but their leads or lags are sufficiently small relative to the duration of business cycle phases for the indicators to show a high degree of cyclical conformity (a high correlation with the best measures of total economic activity).

6.7. During the long reconstruction period in Western Europe and the Far East after the Second World War, there was a revival of interest in cycles defined in terms of deviations from trends rather than levels of economic aggregates. For example, in Germany, no business contraction occurred for almost two decades, and in Japan for almost three, while strong growth trends were interrupted by recurrent "retardations". For lack of a better term, these alternations of above-trend and below-trend phases came to be called growth cycles (which, however, should not be confused with any fluctuations in the long-term growth rates themselves, the best known of which are labelled "long waves"). The growth cycles are defined by the consensus of detrended indicators just as business cycles are defined by the same time series, with no allowance for their longer-term trends.

6.8. Most but not all of the United States business cycle contractions (recessions) of the past 50 years were preceded by growth cycle contractions (slowdowns). That is, the latter begin with much reduced but positive growth rates and then develop into actual declines. Thus, the high (above-trend) growth phase typically coincides with business cycle recovery and middle expansion, and the low (below-trend) growth phase with late expansion and contraction. However, some slowdowns of cyclical proportions never turn into recessions but stay in the realm of positive growth and issue in renewed, stronger expansions. Thus, growth cycles are more numerous than business cycles and more symmetrical, being measured from rising trends.

6.9. Comprehensive series on production, employment, income and trade, which tend to move together, represent the principal coincident indicators. These are all measures of different aspects of present economic activity. The end of each business cycle expansion is marked by a cluster of "specific cycle" peaks in such series; the end of each contraction, by a cluster of troughs. Analysts at the National Bureau of Economic Research (NBER) base the dating of business cycle peaks and troughs on the identification and analysis of such clusters, that is, the consensus of the corresponding turning points in the main coincident indicators. There are four major arguments in favour of this procedure. First, the co-movement of the indicators itself is an essential characteristic of the business cycle. Secondly, business cycles are short-term, averaging about four or five years, with some contractions lasting less than a year, so that annual time series are of limited use for their identification, dating and analysis; quarterly, monthly and even shorter unit periods are necessary. Thirdly, no single adequate measure of aggregate economic activity is available in a consistent form for a long historical period. Fourthly, economic statistics generally are subject to error, so that the evidence from a number of independently compiled indicators tends to be more reliable than the evidence from any individual series.

6.10. Across a wide spectrum of variables, the specific cycles differ greatly and in part systematically. What matters particularly in the present context is the typical variation of cyclical indicators with respect to their relative timing. Thus, many economic time series, known as leading indicators, tend to reach their turning points before the corresponding business cycle turns. They represent to a large extent flow and price variables that are highly sensitive to overall cyclical influences (e.g., the average work week, new orders and contracts for capital goods, business profits, changes in money and credit, stock prices and commodity prices). However, because they are also sensitive to shorter fluctuations and random disturbances, leading indicators show not only large cyclical rises and declines but high short-term volatility as well. The coincident indicators are generally much smoother than the leading ones, and they come closer to one-to-one correspondence with business cycle phases. The heightened sensitivity of the leading series makes them often better predictors of growth cycles than of business cycles.

6.11. There are also many series whose turning points tend to occur after the peaks and troughs in the business cycle, and they are the lagging indicators. These include some massive stock variables that are very smooth and move cyclically less than the coincident indicators and much less than the leading indicators (e.g., total inventories, and loans outstanding and non-residential structures). Many lagging series measure or reflect the costs of doing business: not only debt and inventories but also, in particular, unit labour cost and interest rates. Hence, when treated on an inverted basis (divided into one), the principal lagging indicators become long leaders. An increase (decrease) in costs of inputs of labour, materials and capital relative to the levels of actual and expected prices deters (promotes) economic activity. For instance, bond prices lead and bond yields lag. In fact, turning points in the lagging series occur before the opposite turning points in the leading series on average and with great regularity.

2. Indicator selection, measurement and reliability: United States experience

6.12. A long series of comprehensive and detailed studies of United States business cycle indicators resulted in their cross-classification by types of economic process and characteristic timing in recessions and recoveries.[1] Table VI.1 shows how the principal indicators are divided by seven process categories (listed in column 1) and three timing categories (columns 2, 3 and 4). Read horizontally, the table shows the within-process sequences. For example, in the employment-related group, average weekly hours in manufacturing led, employment coincided, and average duration of unemployment lagged. Read vertically, the table shows which variables in different economic process groups had similar cyclical timing. Thus, among the leading series, one finds job vacancies, capacity utilization, consumer expectations, new orders for non-defence capital goods, change in inventories, corporate profits, and yield spread, representing the seven economic process groups from employment to money and credit, respectively. The tabulation is based on the average timing at all post-Second World War business cycle turns and ignores the differences in timing classifications between peaks and troughs, which are interesting though infrequent. (For example, the capacity utilization coincided rather than led at some troughs, reflecting the recent patterns of flat downturns and sharp upturns.)

6.13. Six criteria were used to assess the performance of cyclical indicators by the National Bureau of Economic Research and the United States Bureau of Economic Analysis in studies carried out during the 1960s and the 1970s:

- Role of measurement (economic significance);
- Quality of measurement (statistical adequacy);
- Consistency of leads or coincidences or lags (timing at recessions and revivals);
- Correlation of specific and reference cycles (historical conformity or coherence);
- Prompt identifiability of cyclical turns (smoothness—inverse of noise);
- Promptness and frequency of statistical reporting (currency or timeliness).

6.14. More than 100 cyclical indicator series were systematically scored on the 0-100 scale for each of these six criteria and their many relevant components, and the weighted averages of the results were combined into total scores. The purpose was to help select the most significant, reliable and consistently cyclical series for inclusion in the composite indexes of United States leading, coincident and lagging indicators and for presentation in the Government's statistical reports. Since the best series were selected in each of the economic process and timing categories, the average scores obtained tended to be relatively high and clustered (mostly around 70 per cent and higher).

6.15. The evaluation of economic significance is difficult and to some extent inevitably judgemental; hence, much of it was handled by the pre-selection of clearly high-scoring indicators like total output and employment among the coincident indicators, and new investment commitments (capital appropriations, new orders and contracts) among the leading indicators. For the other criteria, objective statistical measures are generally available, and they were used in various forms: measures of coverage, sampling and reporting errors for statistical adequacy, means and standard deviations of leads and lags for cyclical timing, and so forth. In addition, more recent studies considered the relative size and frequency of data revisions as estimates of measurement errors in preliminary figures on the indicators. Series that are heavily and frequently revised present difficult problems when used as predictors; series that are less or not revised are easier to use as indicators, although they are not necessarily better measured.

Table VI.1. Cross-classification of United States indicators by economic process and timing

Economic process	Cyclical timing: Leading indicators	Cyclical timing: Roughly coincident indicators	Cyclical timing: Lagging indicators
Employment and unemployment	Average work week, manufacturing* Initial claims for unemployment insurance, inverted Job vacancies	Non-farm employment* Unemployment, inverted	Long-term unemployment* Average duration of unemployment*
Production and income	Capacity utilization rate	Gross domestic or national product (GDP or GNP) (Q)* Industrial production	
Consumption and trade	New orders for consumer goods and materials* Consumer expectations index* Vendor performance (slower deliveries diffusion index)*	Manufacturing and trade sales*	Unfilled orders, manufacturing
Fixed capital investment	Formation of business enterprises Contracts and orders for plant and equipment* Building starts, building permits, housing Gross private residential investment (Q) Manufacturing, new orders, non-defence capital goods*	Gross private non-residential investment (Q) Producers' durable equipment (Q)	Structures (Q) Manufacturers' machinery and equipment sales and business construction expenditures
Inventories and inventory investments	Change in business inventories (Q) Change in manufacturing and trade inventories Materials and supplies on hand and order		Manufacturing and trade inventories Ratio of manufacturing and trade inventories to sales*
Prices, cost and profits	Industrial materials price index Stock price index (500 common stocks)* Corporate profits after tax (Q) Ratio of corporate profits to corporate domestic income Ratio of price to unit labour cost, non-farm		Unit labour cost, percentage change Consumer price index for services, percentage change*
Money and credit	Changes in money and liquid assets Net changes in business loans and consumer instalment credit Money supply M2 in constant dollars* Interest rate spread (long less short)*	Velocity of money	Commercial and industrial loans outstanding* Ratio of consumer instalment credit outstanding to personal income, percentage* Average interest rate charged by banks*

Notes: The series are generally in physical terms (like the industrial production index) or in constant dollars (like real GDP and its selected income and expenditure components representing profits; also money and credit aggregates). Only prices of stocks and commodities and interest rates are expressed in nominal terms. All series are monthly, except those marked (Q), which are quarterly. The series marked with an asterisk (*) are components of leading, coincident or lagging indexes of the United States Department of Commerce, Bureau of Economic Analysis; the Conference Board; Columbia University's Center for International Business Cycle Research (CIBCR) and the Foundation for International Business and Economic Research (FIBER). Series that tend to move counter-cyclically (down in expansions and up in contractions) are used in inverted form (divided by one). Structures include residential and non-residential buildings and facilities such as roads and bridges, produced by the construction industries.

6.16. Established procedures and technologies help to determine some of the cyclical timing sequences and explain why they should, and indeed do, persist. Thus, before funds for new projects are disclosed, they must be appropriated; before plants are built, contracts are placed; before equipment is paid for and installed, it must be ordered. New investment commitments are associated with planning capital projects on the demand side; production and expenditures, are associated more with their realizations on the supply side. The distinction is important where long gestation lags intervene. This is consistent with the theory of desired stock-flow adjustments and the flexible accelerator. Similarly, theories of inventory cycles in general agree with the observed sequence of leading inventory investment and lagging inventory/sales ratio.

6.17. Changes in prices of sensitive materials tend to move early, changes in producer prices later; those in consumer prices, and particularly services, lag. Changes in labour productivity lead, those in unit labour cost lag. These tendencies are due to cyclical movements in sales and rates of capacity utilization. Profit margins depend positively on economic growth, productivity and price/cost ratios; negatively on inflation and interest rates and risk (particularly of investment, which interacts strongly with profits). As a result, profit margins and then totals show very early and large fluctuations. This has a strong effect on stock prices, real business investment and, ultimately, general economic activity. Theories that stress the role in economic cycles of business profits and investment, fluctuations of financial asset markets, and expectational errors and self-validations should be consistent with these behavioural tendencies.

6.18. Changes in interest rates, which are considerably influenced by the actual and expected changes in money, credit and prices, also strongly influence the markets' and the economy's course. The fact that the rates often lag at turning points, particularly troughs, does not at all contradict the above statement. Money and credit aggregates in nominal terms are smooth and lagging, their flows (or rates of change) are volatile and leading. Before peaks (troughs), money often rose less (more) than prices, hence, real money balances, broadly defined, tended to lead. Various monetary theories seek to explain and exploit these sequences, but some succeed in doing so and others fail. Thus, monetary and financial arrangements also explain some of the cyclical behaviour and sequential timing of the indicators.

6.19. The above remarks are suggestive but they merely illustrate the significance of indicators in the theories and observations of business cycles. The role of these factors has been further worked out below, where some actual experiences in a selected group of countries are presented.

Table VI.2. Cyclical indicators used in 14 countries or areas	North America			Europe				Asia and the Pacific						
	USA	Canada	Mexico	Germany	UK	France	Italy	Japan	Republic of Korea	Aus-tralia	Taiwan Province of China	Thai-land	New Zea-land	Malay-sia
Coincident indicators														
GNP or GDP	1	1	1	1	1	1	1	1	1	1	1		1	
Personal income, disposable income or wages and salaries	1	1		1	1			1		1	1		1	1
Manufacturing and/or trade sales	1	1	1	2	1	1	1	1	1	1	2	1	1	1
Industrial production	1	1	1	1			1	1	1	1	1			1
Employment, non-farm, manufacturing or production industries	1	1	1	1	1	1	1	1	1	1	1		1	1
Employment, rate or number	1	1	1	1	1	1	1	1	1	1	1		1	
Other											2	8		1
Leading indicators														
Average work week or overtime	1	1	1	1	1	1	1	1	1	1	1		1	
Unemployment insurance claims	1	1		1		1								
New orders, consumer goods	1	1												
New orders and contracts, capital goods	1	1	1	1	1			1	1		1			
New non-residential construction	1	1	1		1					1	1	1	1	
New housing starts or permits	1	1		1	1	1		1		1			1	
Inventories, change or balance or ratio to sales	1	1	1	1	1	1	1	1	1				1	
Corporate profits, profit margins	2	2	1	2	2	1	1	2		2			1	1
Bond yield inverted, or bond prices	1			1	1	1		1		1				
Yield spread	1			1	1	1		1		1			1	
Labour productivity, growth rate	1			1		1		1		1				
Stock prices	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Money supply, deflated	1			1	1	1		1		1	1	1	1	1
Consumer credit growth	1	1		1				1						
Materials, prices, growth rate	1	1			1	1	1	1		1			1	1
Consumer prices services, growth rates	1			1	1	1		1		1				1
Other			2	2	3	1	1	1	2	1	1		1	

Sources: National Bureau of Economic Research (NBER); Center for International Business Cycle Research (CIBCR), Columbia University; Foundation for International Business and Economic Research (FIBER).

3. Use of indicators in measuring business and growth cycles: practices in 14 countries or areas

6.20. Table VI.2 lists coincident and leading indicators used in the selected 14 countries or areas in North America, Europe and the Asia-Pacific region, as compiled and monitored by the Foundation for International Business and Economic Research (FIBER). The coincident indicators are presented in the upper part of the table and the leading indicators in the lower part. As explained below, not all countries use all the indicators included in the table, and in the case of some indicators, more than one type is used.

(a) Coincident indicators

6.21. Most of the coincident indexes considered here include quarterly estimates of real GDP or GNP in linearly interpolated monthly form. Estimates from the expenditure side are used in some cases (Japan), gross non-farm product in others (Australia). GDP series are employed in most cases but GNP series serve in the Republic of Korea and Taiwan Province of China. An exception is Thailand, which has only annual NIPA data that are not used.

6.22. The only other class of coincident indicator series from quarterly national accounts consists of household income (Australia), personal income (Canada), and disposable income (United Kingdom and New Zealand), all in real (deflated) terms. The United States index contains the monthly personal income in constant prices.

6.23. The bulk of the monthly coincident indicator series consists of four groups. First, industrial production is represented by either an index in physical units or a deflated value aggregate (as exemplified, respectively, by the series for the United States and Malaysia). Secondly, employment varies from total civilian or non-farm (Australia, Canada and the United States) or even more comprehensive full and part time, including proprietors (New Zealand) to production and construction (United Kingdom) and manufacturing (Taiwan Province of China). Thirdly, unemployment numbers (Germany and France) or rates (elsewhere) are used in inverted form. Fourthly, sales in constant prices refer to manufacturing (Taiwan Province), wholesale and retail trade (Republic of Korea), both industry and trade (United States), retail stores only (United Kingdom), or department stores (Taiwan Province and Thailand).

6.24. For one country only, Thailand, a combination of monthly output series for individual products, such as commercial vehicles, motorcycles, cement and beer, had to be used, since the index of industrial production was not satisfactory and real GDP was available only in annual form. (However, an improved production series is being constructed.) Other components of the coincident index for Thailand are series in real terms on business and value added taxes and import duties. For Taiwan Province of China, deflated bank clearings were found useful.

(b) Leading indicators

6.25. The variety of leading indicators is much greater than that of coincident indicators, and they differ much more in quality and other characteristics, across both countries and economic processes. By far, most of these series are monthly.

6.26. Monthly composite indexes of leading indicators are now available for each of the G-7 countries, Mexico, the Republic of Korea, Taiwan Province of China, Thailand, Malaysia, Australia and New Zealand. Indexes for Argentina and Poland are in advanced stages of preparation but need more testing. It is the intention to extend the coverage of the coincident and leading indicators and indexes to at least 12 more countries in the course of the next two years, in cooperation with the Conference Board. The lower part of table VI.2 presents the leading indicators for the 14 countries whose indexes have by now a well-established history of sampling over periods ranging from one to five decades and post-sample estimation, monitoring and interpreting on a regular monthly basis.

6.27. Like the United States indexes, which served as a model here, the international leading composites cover the following categories:

- Labour market indicators: average work week and/or overtime hours, which are correlated with lagging employment, and claims for unemployment insurance, which are correlated with lagging unemployment. The hours of work refer generally to manufacturing, with data available for most countries. The unemployment claims, like unemployment itself, are inverted (rising in contractions); unfortunately, these statistics do not exist in many countries that lack a developed social safety net;
- New orders for consumer goods, generally durables for which advance orders are taken (United States and Canada only) and new orders and contracts for machinery and equipment and non-residential or plant construction (most countries). These indicators lead production and shipments for the consumer and capital goods in question, respectively. The gestation periods for plant and equipment can be long: indeed, the output and expenditure series for this class of goods are often lagging rather than coincident. Investment spending is staggered over time but much of it is timed in the late stages of the lengthy production periods involved;

- New housing starts and building permits lead residential construction, that is, output and sales of new family housing units and apartment buildings, and related expenditures. Here, the construction periods are relatively short, measured in weeks and months, not quarters and years. But housing starts and permits tend to be long leaders because even the completions (output and sales) of residential complexes and units generally occur much earlier than the turning points of the economy at large. The main reason for this is presumably the high interest sensitivity of demand for housing. Buying of furniture and household appliances is closely related to residential construction;

- Inventories of goods for sale reflect business firms' expectations of demand for their products, which tend to be pro-cyclical. However, unintended inventory accumulation is counter-cyclical, occurring in slowdowns and recessions when sales fall below expectations. In reaction, firms liquidate inventories, which makes sense microeconomically but has adverse short-term macroeconomic consequences. All this has been particularly important in relatively short and mild cycles (during which fixed investment played a lesser role). Inventory balances from surveys substitute for quantitative data in some countries, inverted inventory sales ratios are used in others;

- Corporate profit margins and the ratios of prices to unit labour costs, which proxy for the margins, are long leaders; so are the bond prices (and inverted bond yields) and the yield spread (long minus short). Interest rates usually coincide or lag at business cycle peaks and have often long lags at troughs, but they lead when inverted, and have strong negative effects on profit margins. Profit totals also lead but by shorter intervals on average. Profits are also inversely related to growth of labour productivity and to inflation;

- Stock price indexes are multiples of corporate profits, and they rise and fall strongly with market expectations of net company incomes – the source of investors' future incomes from dividends and capital gains. The two streams of income are very different, of relatively stable institutional origin for dividends, and highly unstable expectational origin for capital gains and losses. Interest rates represent the major negative factor influencing stock prices. Despite high volatility, which makes market movements largely random and unpredictable in the short run, stock prices are among the better leading indicators of business cycles and growth cycles. These indexes are available for all countries covered;

- Comprehensive money supply series expressed in constant prices tend to lead by relatively long intervals. Nominal money growth rates are very irregular leaders, even after much smoothing. Growth of credit aggregates is often rather less erratic, and applications to consumer and housing credit produce some useful leading indicators;

- Consumer price inflation is most of the time in most places pro-cyclical but lagging. However, the growth rate of consumer prices for services, when inverted, has the average cyclical timing of a long leading series. The growth rates of sensitive prices of industrial materials tend to be leading by shorter intervals;

- A miscellaneous residual group of leading indicators includes (a) some business and consumer confidence indexes (a category that may need strengthening); (b) changes in business population (new incorporations, business failures); (c) exchange rates, real exports; (d) major relative prices (oil); and others.

(c) Dating business and growth cycles

6.28. Real GDP, although the most comprehensive, systematic and widely used measure of domestic output or real income, is not well suited to determine alone the dates of an economy's cyclical expansions and contractions. Popular writing found it convenient to adopt the notion that a two-quarter decline in GNP or GDP in constant prices constitutes an "official" recession. But it is clear that this ad hoc definition does not correspond well to the NBER chronology of United States business cycles, which has been successfully used in a great many various studies and is widely accepted.[2] In the recession of 1980, real GDP and GNP decreased for a single quarter only, for example, while several monthly indicators had longer declines. In 1969/70, the same series fell in two quarters, one before the downturn and another before the upturn, and rose in between during the recession. These aggregates are simply not smooth enough - or they have too large random error components – to provide sufficient guidance for the task of constructing a reliable business cycle chronology (quite apart from their limitation to quarterly data). Nor can any single monthly series do the job. The NBER researchers (since the late 1980s, organized into a business cycle dating committee) have always relied primarily on the evidence from the main monthly and quarterly indicators of general economic activity in the United States. This set has changed over time, depending on the direction and availability of national statistics. In recent years, it was approximated best by monthly component series of the commerce index and by the index itself, supported by other broad measures of gross and net output and inputs for the United States economy.

6.29. Growth cycles are defined as major fluctuations in detrended coincident indexes. A non-linear phase-average trend is calculated for each index by combining 75 month-centred moving averages with interpolations between mean values of the series in its successive business cycle phases. The result is a flexible, smooth trend that separates the long-term from the cyclical and shorter movements in the data, while preserving good fits throughout as far as possible.[3] The dates of the major peaks and troughs in the deviations from these trends of the composite coincident indexes provide the most comprehensive of the cyclical chronologies for each country. They include both those cyclical slowdowns that merely alternate with speedups during long expansions and those that become recessions, that is, absolute declines in total economic activity.

Table VI.3 Timing of composite leading indexes at business cycle and growth cycle turns, 14 countries or areas, 1951-1998

Countries or areas	Business cycle turns								Growth cycle turns							
	Number of business cycle turning points		Number of extra-specific cycle turning points	Percent-age of leads	Business cycle peaks		Business cycle troughs		Number of business cycle turning points		Number of extra-specific cycle turning points	Percent-age of leads	Growth cycle peaks		Growth cycle troughs	
	Covered	Missed			Mean (median)	Standard deviation	Mean (median)	Standard deviation	Covered	Missed			Mean (median)	Standard deviation	Mean (median)	Standard deviation
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
United States	16	0	6	100.0	-12.3 (-10.5)	6.1	-3.8 (-2.0)	2.9	22	4	0	100.0	-6.5 (-5.0)	4.7	-8.9 (-6.0)	8.3
Canada	12	0	13	83.3	-7.0 (-6.0)	9.0	-4.5 (-3.5)	2.6	24	4	1	62.5	-3.3 (1.5)	7.3	-4.8 (-6.0)	4.4
Mexico	8	0	2	87.5	-4.0 (-4.0)	1.6	-3.5 (-3.0)	4.1	10	0	0	80.0	-0.6 (-3.0)	6.0	-4.4 (-4.0)	3.8
Germany	10	0	11	100.0	-11.0 (-12.0)	6.6	-7.4 (-4.0)	6.1	19	5	2	84.2	-3.9 (-4.0)	6.0	-6.9 (-5.5)	7.0
United Kingdom	10	2	7	80.0	-10.8 (-13.0)	8.3	-13.4 (-10.0)	13.1	14	8	3	92.9	-12.0 (-14.0)	7.1	-14.0 (-11.0)	8.5
France	12	2	6	66.7	-8.5 (-10.0)	7.3	-1.5 (-2.5)	6.2	18	2	0	72.2	-5.9 (-7.0)	4.6	-4.7 (-5.0)	9.9
Italy	11	3	7	72.7	-7.8 (-4.0)	14.4	-4.7 (-3.0)	9.5	18	6	0	66.7	-6.3 (-4.0)	12.9	-7.1 (-7.0)	7.8
Japan	5	0	18	60.0	-10.3 (-1.0)	19.7	-2.0 (-2.0)	2.3	21	0	2	66.7	-2.6 (0.0)	7.7	-6.5 (-6.0)	5.5
Republic of Korea	5	0	10	100.0	-4.7 (-6.5)	4.0	-5.5 (-5.5)	3.5	11	8	2	81.8	-2.3 (-4.5)	8.0	-6.8 (-8.0)	3.6
Taiwan Province of China	8	0	4	62.5	-9.0 (-2.0)	15.4	-2.0 (-1.5)	3.9	12	2	0	58.3	+2.2 (+4.0)	5.3	-8.2 (-5.0)	9.3
Thailand	4	7	0	100.0	-4.5 (-4.5)	0.7	-6.5 (-6.5)	6.4	4	9	0	100.0	-1.0 (-1.0)	0.0	-6.5 (-6.5)	6.4
Malaysia	4	1	4	75.0	-10.0 (-10.0)	4.2	0.5 (0.5)	2.1	8	11	0	75.0	-4.8 (-3.0)	5.7	-6.2 (-6.0)	8.1
Australia	11	3	10	100	-11.2 (-9.0)	5.0	-6.5 (-4.0)	7.3	19	3	2	100.0	-9.6 (-8.0)	5.4	-13.7 (-11.0)	10.9
New Zealand	13	1	4	84.6	-4.7 (-6.0)	3.8	-6.3 (-6.0)	5.2	17	2	0	76.5	-5.2 (-6.0)	5.1	-6.2 (-4.0)	6.3

Sources: National Bureau of Economic Research (NBER); Center for International Business Cycle Research (CIBCR), Columbia University; Foundation for International Business and Economic Research (FIBER).

Notes: Entries in columns 1 and 2 are numbers of business cycle peaks and troughs covered and missed, respectively; those in column 3 are numbers of specific cycle peaks and troughs that do not match business cycle (growth cycle) turning points. Entries in column 4 are percentages of the reported timing observations that are leads. Entries in columns 5 and 7 are mean leads and (in parenthesis) median leads, in months, at peaks and troughs, respectively; entries in columns 6 and 8 are the corresponding standard deviations. Each timing observation included in the averages is given a minus sign when a lead, a plus sign when a lag of an index relative to the business cycle (growth cycle) turn covered.

6.30. The United States experiences in detecting business cycles and growth cycles have been tested for all 14 countries or areas with the aid of compiled leading indexes. The results are presented in table VI.3. The left-hand side of the table shows the main features of the timing of the indexes at turning points of business cycles; the right-hand side refers to their timing at turning points of growth cycles.

(i) Leading indicators and business cycle timing

6.31. The longest and best performance records of the composite indexes of leading indicators, those for the G-7 countries and Australia, conform well to hopeful but reasonable expectations. Leads predominated heavily for each of these countries, accounting for more than 70 per cent of all recorded timing observations (column 4). The average leads at business cycle peaks were mostly long, from 7 to upward of 10 months, except for the low medians of Italy and Japan (column 5). The averages at business cycle troughs were generally much shorter, one to five months, except for the outlier United Kingdom (column 7). This reflects the basic asymmetry of contractions being much shorter than expansions, and often ending more abruptly.

6.32. Similar observations apply to the smaller countries as well, but here a small number of business cycle turning points impairs these measurements in a few cases (notably Malaysia). Yet, this problem also exists in the case of Japan, a large economy with historically infrequent recessions, hence, few available timing comparisons.

6.33. The variability of individual leads is very high for Canada, the United Kingdom, Italy, Japan and Taiwan Province of China. The standard deviations of these measures are 7.7 for peaks and 5.5 for troughs (columns 6 and 8). The variability of the average leads across them is much less, about 3.0 for both peaks and troughs (columns 5 and 7).

6.34. As for conformity of the leading indexes to business cycles, it can be measured inversely by the numbers of (2) the business cycle turning points missed and (3) the extra-specific cycle turning points in the indexes. The missed recessions and recoveries are few and far between (compare columns 1 and 2). In contrast, the numbers of extra movements and turns in the indexes are too high for comfort (column 3). However, most of these episodes that are not related to business cycles have been associated with growth cycle slowdowns and speedups, as can be seen from the low frequencies of extra turns in table VI.3, column 3.

(ii) Leading indicators and growth cycle timing

6.35. Growth cycle slowdowns tend to be longer than business cycle contractions; growth cycle speedups tend to be shorter than business cycle expansions. Furthermore, all business cycles have their growth cycle counterparts, but the converse is not true, as not all cyclical slowdowns become recessions. The relative timing measures are generally consistent with the implications of the distinction between fluctuations in upward trending time series (business cycles) and fluctuations in trend-adjusted, hence, stationary, series (growth cycles).

6.36. Thus, for most countries, the leading indexes tend to anticipate growth cycle peaks by shorter intervals than they do business cycle peaks; conversely, they tend to anticipate growth cycle troughs by longer intervals than they do business cycle troughs (see table VI.3, columns 5 and 7, and their counterparts in the same table). In approximate rounded terms, the leads at business recessions and recoveries averaged seven to eight and four to five months, the leads at growth slowdowns and speedups averaged four and six to seven months, respectively. The corresponding standard deviations did not vary systematically, averaging six to eight months (columns 6 and 8).

6.37. Measures of cyclical conformity provide another interesting contrast. The leading indexes missed three times as many growth cycle turns as business cycle turns (64 vs. 19, see columns 2 and 10). On the other hand, they had nine times as many extra turns in the context of business cycles than in the context of growth cycles (102 vs. 12, see columns 3 and 11). The more pronounced the economy's turning points, the less likely they are to be missed by the leading indicators; but most of those turns in the leaders that are "extra" relative to the major downswings are found to be related to the additional cyclical slowdowns in general business activity.

4. National accounts and cyclical indicator development: past, present and future

6.38. The use of national accounts data as cyclical indicators is limited for a number of reasons. As the national income and product accounts deal with the current (or, more exactly, recent) state of an economy, they are related primarily to the coincident rather than the leading indicators. The only subsets of quarterly data from NIPA that are assumed to be predominantly leading are residential construction and change in business inventories, but monthly data are available and preferable in both categories. Housing starts and the smoother permits provide earlier and more frequent information and have longer leads than the quarterly series and the value of residential construction put in place. A similar statement applies to inventory investment, which, however, is particularly difficult to handle in any form because of its volatility and blend of the hard-to-distinguish planned and unintended components.

6.39. Including GDP or GNP and related data has the advantage that the most comprehensive measure of national output or real income is directly represented in the indexes, which would be particularly important for countries with relatively weak monthly aggregative statistics. But there is the disadvantage that the coincident index is no longer an independent monthly estimate of a country's overall economic activity, which complements the quarterly GDP (or GNP) series. It is for that reason that the basic NBER list of United States coincident indicators included non-farm employment, real personal income, real manufacturing and trade sales, and industrial production (i.e., output of manufacturing, mining and public utilities). The coincident index of the United States Department of Commerce was also of this type, and so is its present successor, the index of the Conference Board. The advantage of this approach is that all the series are monthly; also, the composite index based on them is independent of NIPA and can be compared with the quarterly GDP or GNP aggregates.

6.40. Another disadvantage of using GDP or GNP as (coincident) indicators is that the accounts are at best quarterly, not monthly, and they are subject to lengthy lags of release and several, often large, revisions. Thus, the quarterly components of the index must be converted into monthly estimates on a timely basis. Linear interpolation is an always available, direct and simple procedure but it is primitive and a source of possibly serious errors, and corresponding extrapolations are riskier still. Using related monthly series to interpolate real GDP is, in principle, preferable but the best options (the broadest available production and employment series) are already used in the monthly composite indexes, and one would not wish to give them excessive weight. Nonetheless, it is clear that the availability of some monthly accounts series, such as those for personal income and consumption in the United States, would be a much better option. So, it would seem desirable to examine what, if any, further steps in this direction could be practically taken. Streamlining the extensive revision processes would also be a recommended topic for inquiry.

6.41. Another aspect of the link between cyclical indicators that could be further developed is related to the use of national accounts data in modelling. Modern macro-models developed to a large extent from the idea of interdependence among the major components of total income and output. Correspondingly, econometric models of the United States economy drew heavily on the NIPA data, first annually and later quarterly. Their initial business-cycle orientation[4] (Tinbergen 1938/39) changed to a preoccupation with the determinants of levels of the output and employment aggregates in the short run, following the impact of Keynes' theory. In contrast, the development of the indicators was motivated from the outset by the need for timely recognition and, more ambitiously, prediction of business cycle turning points and inflection points. The indicators generally are endogenous—influencing the economy and influenced by it—not exogenous "prime movers". The NBER indicator approach favours an endogenous, non-linear view of business cycles, with asymmetrical phase durations and rates of change and configurations around peaks and troughs. On the other hand, most macro-models are not fundamentally non-linear in specification and estimation of the relationships covered, and they rely largely on outside forces and shocks to account for the existence of business cycles. Leading and other cyclical indicators are used in econometric models but in ways quite different from those of the indicator approach. Yet, the two methodologies are complementary, as is argued below, and some model builders report making intensive use of monthly indicator data.[5]

6.42. The single most important recommendation offered here is that getting better and richer monthly indicator data for as large a number of countries as possible should be of great benefit to Governments, markets and research internationally (not necessarily in that order). The information deserves as much public and private support as the national income and product accounts have received in the past, but substantial prior attention must be given in detail to how the work should be structured.

B. Data requirements, compilation techniques and scope of short-term accounting: French experience

6.43. The French Institute of Statistics and Economic Studies (INSEE), periodically publishes a note (note de conjoncture) on short-term economic forecasting. In that presentation, quarterly national accounts are central, in particular the input-output table. The analysis is carried out at the same time as the publication of quarterly national accounts. Table VI.4 reflects the schedule of quarterly accounts compilation and their revision. In the first and third quarters, economic forecasting performed during the preceding quarter has been revised. The longest period of forecasts covers three quarters.

Table VI.4. Quarterly national accounts and economic forecasting published in each quarter

	Q1	Q2	Q3	Q4
Quarterly national accounts	Q4	Q1	Q2	Q3
Forecast	Q1, Q2	Q2 , Q3 , Q4	Q3, Q4	Q4, Q1, Q2

6.44. The forecasting of quarterly accounts is based on a set of indicators derived mainly from INSEE business surveys. These surveys request information from firms and households on their activity over the past few months and in the months to come, from a qualitative point of view. The data are quickly available and constitute the first information on short-term changes.

6.45. Quarterly national accounts are constructed from quantitative indicators, excluding data from business surveys. However, even if quarterly accounts and forecasting use different short-term indicators, the procedure to compile the input-output table is similar in both cases.

6.46. The aim of the present section is to explain how forecasts are made, from the use of business surveys until compilation. Since the method is partly explained by the one used in quarterly national accounts, the construction of quarterly national accounts is presented first. The second part covers business surveys and economic forecasting.

1. French quarterly national accounts

6.47. French quarterly national accounts provide comprehensive macroeconomic information on the current period. The conceptual framework is similar to that used for annual national accounts and the data are consistent with the annual data available. The series in value (nominal terms), volume (real terms) and price cover the period from 1970 and are seasonally adjusted.

6.48. The information introduced in accounts is often insufficient to cover the complete field of accounts. The quality of indicators can be established by comparing accounts and indicators at the annual level. The observation of the annual series indicates the link between accounts and indicators and the correction that must be applied to construct accounts from indicators. This correction is then applied to obtain quarterly accounts from quarterly indicators.

(a) Relations between indicators, quarterly accounts and annual accounts

6.49. Basically, it is assumed that the following relation links quarterly accounts in nominal or real terms to indicators:

$$C_q = a\, I_q + E_q\,,$$

where C_q denotes the item in the accounts, I_q the indicator and E_q an error. Under this specification, the annual accounts must satisfy the relation:

$$C_a = a\, I_a + E_a\,,$$

where C_a represents the annual accounts data, I_a and E_a the annual sum of the indicator values and the error terms, and the coefficient (a) can be estimated on the basis of the annual series.

6.50. When observing the series annually, the quarterly accounts predicted by the model are of the form:

$$C_q = \hat{a}\, I_q + \hat{E}_a /4,$$

where $\hat{E}_a = C_a - \hat{a}\;\; I_a$ is the error observed and

$$C_q = \hat{a}\, I_q$$

refers to the last period, when no annual accounts are compiled and the annual error term is zero. At the present time, the prediction of the model is not respected. To reduce the contribution of the error term on the account variation, one should rather take:

$C_q = \hat{a}\, I_q + \hat{E}_q,$

where the error terms $\hat{E}_q$ are such that the annual sums are still equal to the annual observed error terms $\hat{E}_a$ and the sum of the squares of the first differences is minimal.

(b) Classification of branches and products in the quarterly national accounts

6.51. The quarterly national accounts comply with the framework defined for the national accounts and use classifications based on the ones used in the annual series. However, according to the areas covered by the short-term indicators, the input-output table is compiled at rather aggregate levels. The classification used for the quarterly national accounts is presented below:

Agricultural, forestry, and fishery products
Agricultural and food industries
Energy products
Intermediate goods
Producer durables
Consumer durables
Automotive vehicle and other land transport
Consumer non-durables
Products of building and construction, civil and rural engineering
Wholesale and retail trade
Transport and telecommunications services
Market services; real-estate rental
Insurance services and services of financial institutions
Non-market services
Travel (tourism)

(c) Data sources for the quarterly accounts

6.52. The compilation of quarterly accounts is organized according to the indicator sources. In particular, aggregates - output, gross capital foreign trade, and consumption - are computed independently. The construction of each aggregate and of the input-output is presented below. The presentation is restricted to the quarterly accounts in volume since forecasting is concerned only with these accounts.

6.53. Foreign trade is calculated using the same sources in quarterly and annual national accounts. Here, accounts and indicators are equal. The values are obtained from the customs for goods and for services from the balance of payments published by the Banque de France. The statistics are all monthly and are revised in the short term. The customs revisions are relatively regular contrary to what happens with the balance-of-payments statistics. The final values of foreign trade are therefore easier to predict for goods than for services. Hence, foreign trade contains a large uncertainty at the time of the first publication of quarterly national accounts, concerning services. It is first computed in nominal terms and then in real terms. The main price indicators are the unit value indexes given on a monthly basis by the INSEE Foreign Trade Division.

6.54. To estimate quarterly household consumption, a large set of indicators is available. The sources used are not household surveys. Instead, indicators are derived mainly from the panel surveys of retailers established by the Banque de France and from government statistics for services. Progressively, the set of sources encompasses private institutions; this is currently the case for new products. To obtain the volume series, the corresponding retail price index is used.

6.55. Only manufacturing, energy, agriculture and food outputs are derived from indicators. For other branches, output is computed from commodity flows when preparing the input-output table: its valuation, therefore, depends on the valuation of uses. The main output indicator is the industrial output index (indice de production industrielle). Most of these indicators are monthly but some of them are quarterly. The quarterly indicators are available too late to be taken into account in the first publication of the quarterly accounts. They are therefore first estimated: this estimation is based on information of the INSEE business survey (enquête de conjoncture).

6.56. In the quarterly national accounts, gross fixed capital formation (GFCF) by product is estimated on the basis of short-term indicators for only a few products. This is the case for building and public works. For new dwellings, output is assessed first with the help of an indicator of dwelling equivalents obtained by applying a suitable time lag grid to housing starts; these figures are supplied by the Ministry of Urban Planning and Housing. An indicator of changes in stocks is based on data on changes in stocks derived from the Ministry of Urban Planning and Housing survey of new dwelling sales. GFCF is evaluated as the difference between output and changes in inventories. For the rest of building and public works, output is equal to GFCF and based on indicators by activities.

6.57. Automotive vehicles is the other product for which GFCF is derived from indicators: registrations of commercial and company vehicles. The remaining part of investment in intermediate goods and producer durables is calculated with the help of availability indicators as output plus imports, minus exports, minus intermediate consumption and the respective part of investment and changes in stocks is estimated on the basis of the annual series. Since no short-term indicators are available for these products, these accounts are confronted with INSEE business surveys in wholesale and might be adjusted accordingly.

6.58. When compiling the input-output table, final uses (except changes in inventories) for all products have been calculated independently. Intermediate consumption of products for any given branch are calibrated on the output of the corresponding branch. For services, intermediate consumption is based on an initial estimate of output (derived from activity indicators).

6.59. Trade margins on final consumption, gross fixed capital formation and exports are estimated on the basis of the corresponding uses and use trade margin coefficients computed annually. The value added tax is estimated according to a similar procedure.

6.60. Output in wholesale is equal to trade margins. Other outputs per product are calculated in a very simple manner by subtracting transfers from branch output; in services, for which, by definition, there are no inventories, the output of each product is reckoned to be the difference between its uses and resources. Changes in inventories are calculated as total resources minus total uses, excluding inventories.

2. INSEE business surveys and economic forecasting

6.61. Business surveys consist in asking firms a series of questions on their activity, typically on the trend of their production over the past few months and in the coming months. They answer from a qualitative point of view (improvement, degradation, same level). The different answers are aggregated, taking into account the size of firms. The results concerning each question are presented as balanced opinions: the percentage of firms that answer positively less the percentage of firms that answer negatively. The periodicity and the economic activities for which the business surveys are conducted, are indicated in the table below.

INSEE business surveys

Survey	Frequency
Economic activity in industry	Monthly (except August)
Investment in industry	January, April and October
Financial situation in industry	Half-yearly (December and June)
Production factors	Half-yearly (January and July)
Foreign competition in industry	Half-yearly (December and May)
Economic activity in retailing	Monthly
Economic activity in wholesale	Bimonthly
Economic activity in building	Monthly (except August)
Economic activity in construction	Quarterly (January, April, July and October)
Economic activity in public works	Quarterly
Economic activity in services	Quarterly

(a) Forecasts based on business surveys

6.62. Business surveys are not used as the main source for the quarterly accounts in the sense that they do not help to quantify aggregates. However, they are often referred to when working out the quarterly accounts. For instance, the survey statistics on prices and output are confronted with the series on quarterly accounts and may lead to adjustments. Also, the quarterly surveys help to forecast when quantitative indicators are not available (this is currently the case for the quarterly part of the industrial production index).

6.63. Even though the business surveys are not directly used in the construction of quarterly accounts, the economic forecasts presented largely reflect the qualitative data and the subjective responses. This raises a number of conceptual and practical problems. One may wonder what sort of economic changes the surveys are able to detect, and how to make use of them to evaluate quantitative variables. The procedure, which consists in forecasting quarterly accounts from surveys, is often discussed.

6.64. To illustrate the use, an example is given of how the monthly survey on activity in industry is used to forecast output in quarterly accounts.[6] The survey on activity in industry contains several questions concerning activity itself. Firms are asked to evaluate trends of their production, order books, and stocks in the past months and in the coming months. They also give their opinion on the activity in industry on the whole.

6.65. The statistics relating to these questions are used to forecast quarterly industrial output seasonally adjusted. They are first seasonally adjusted and transformed into quarterly variables. The quarterly variables correspond to the average of monthly variables moved one month back in order to take into account the fact that manufacturers often answer at the beginning of the month. Furthermore, statistics from surveys are less sensitive to the number of working days than production in accounts. In order to ease the link between qualitative and quantitative data, quantitative output from accounts is adjusted for working days.

6.66. The links between qualitative and quantitative variables may be complex. It has been decided to represent them in a rather general way, modelling the global dynamics in the framework of an autoregressive vector model. Precisely, all the variables (opinions and production) are linked with all the variables lagged. The estimates and a causal analysis provide some conclusions. First, the expected trend of personal production in the survey is a predictor of future output in the quarterly accounts as well as a predictor of all opinion variables. It also shows that, given this information, other qualitative variables in the survey do not provide additional information relevant to the forecast activity. Secondly, the observed trend of personal production plays a similar role in the forecasting of the present value of output.

6.67. In practice, the model is used to forecast the present value of output in quarterly accounts given the information available in the survey. It shows that the percentage change of output at a given quarter is mainly linked to the observed trend of production at this quarter and the expected trend of production at the two preceding quarters. This relation expresses how qualitative output has to be transformed to get a quantitative output. The model also helps to give expectations for output and opinion variables for the next quarter. The procedure amounts to forecasting output in quarterly accounts applying the same relation as the one used for the current quarter, with either available variables such as opinions on expected activity or forecasted variables such as opinions on observed activity.

(b) Compilation of i-o tables with the help of economic forecasts

6.68. As INSEE business surveys can be viewed as a source of short-term indicators for national accounts, they are also being used to forecast the aggregates of the input-output table. This is done in a way that is similar to the compilation of i-o tables as a part of the quarterly national accounts.

Classification of branches and products for prediction
Foods
Energy products
Manufactured goods
Products of building and construction, civil and rural engineering
Wholesale and retail trade
Market services
Non-market services
Travel (tourism)

6.69. The surveys include statistics for different sectors, for instance industry, and building/construction and public works. The various indicators lead to a classification of products and branches presented below. This classification is less detailed than the one used in the quarterly national accounts but it still distinguishes some products such as wholesale and services in order to apply the same construction as in the quarterly accounts.

6.70. Household consumption is forecasted using household surveys. The opinion variables used are partly concerned with the expectation of standard of living and the purchasing capacity. A relation between consumption and opinion variables is estimated for the manufactured goods, and applied to forecast consumption of other products. A final adjustment is made so that total consumption follows total consumption given by a behaviour model. This model is consistent with the permanent income hypothesis.

6.71. As in the quarterly national accounts, only manufacturing, energy and food outputs are directly fixed; the output in other branches are computed from uses and resources balances. The main information used to forecast output comes from the business survey on activity in industry. The procedure used to forecast manufacturing goods and the opinion variables involved are presented above.

6.72. The forecasting of GFCF is based on several business surveys. In manufactured goods, investment is computed from the survey on activity in wholesale, taking into account opinions on observed and expected activity. The forecasts are compared with the annual investment trend expected by firms in the survey on investment in industry. In building and public works, investment results from the business surveys. In particular, new dwellings, housing starts and changes in stocks are forecasted from surveys and investment is computed applying the same procedure as in accounts. For the rest of building and public works, opinion variables on activity are used to quantify investment.

6.73. Information in business surveys is limited concerning foreign trade. In particular, opinions on foreign order books in industry provide information on exports. The final forecasts of imports and exports need to respect econometric relations with domestic and world demand (the latter is an expected demand from statistics on foreign imports).

6.74. To integrate the data into the input-output table, the same procedures are used as for the quarterly national accounts. First, intermediate consumption is deducted from output. It should be noted that in order to limit the contribution of the weighting coefficients on the change of intermediate consumption, these coefficients are assumed to be stable. Then, trade margin and VAT on different uses are computed from the corresponding uses. The margin rate and the tax rate are maintained stable over the forecasting period. Finally, output in services and changes in stocks are computed from the resources and uses balance.

C. Data needs of financial programming of central banks: short-term analytical framework for Central America

1. Economic policy objectives

6.75. Price stability and a low rate of inflation is a major objective of central bank policies in general and in Central America in particular. The liberalization of trade and financial flows, the internationalization of financial markets, the financial crises in Asia and other regions of the world, including the most recent Brazilian crisis and similar crises that may occur in the future, are all events that may have important economic influences on small developing countries like those of Central America. Those changes suggest greater monitoring on the part of central banks, which have expressed concern about such outcomes, to prevent similar crises or to moderate their impact.

6.76. While price stability is a main objective, there are several sub-objectives of monetary and financial policy, including the following:

- Price stability and inflation;
- Structural adjustment (sustainable development), which, in the case of Central America, is represented by growth and employment;
- Balance of payments;
- Sectoral behaviour (government borrowing, private sector credit, and so on);
- Efficiency of financial markets.

6.77. Some of the above objectives and other criteria are used to define the elements of financial and monetary integration in the Central American region, which is based on a convergence of macroeconomic policies between countries.[7]

6.78. The above objectives are frequently pursued by central banks within a framework of so-called “financial programming”, which is based on IMF guidelines[8]. The latter focus in particular on the first objective of price stability, and require the support of the other objectives. Thus, price stabilization promotes growth and employment, while the efficiency of the financial system can have economy-wide repercussions, either by providing an environment conducive to economic growth or by constraining the economy. The objective of financial markets is a more general objective that concerns not only central banks, which are moneylenders of the last resort, but also other financial institutions that control and supervise the financial system. The overall objective pursued by the central banks of Costa Rica, El Salvador, Guatemala, Honduras and Nicaragua is to surpass the stage of trade union integration initiated in the early 1960s and to advance towards a more comprehensive financial and monetary integration.

6.79. Financial programming has traditionally been based on balance-of-payments data, monetary statistics and public finance statistics as the main sources of information to evaluate the performance and degree of adjustment that is required to correct fundamental macroeconomic imbalances. The main objective is to identify the sectors in which current and capital expenses exceed their current incomes. The difference must be financed by savings of other sectors, and at the level of the country as a whole by foreign financing. Financial programming has generally focused on short-term analysis (one year or less). Use is made of quarterly or monthly indicators that provide timely current year data that can be used as a means to study the dynamics of the economy and thus better predict impending changes in the future.

6.80. The need for more periodical, timely and reliable data is increasing. It is for this reason that Central American countries have a special interest in subscribing to the Special Data Dissemination Standards (SDDS) of IMF. El Salvador has already taken steps to fulfil the requirements. The system encourages member countries to improve (a) data coverage, periodicity and timeliness (speed of dissemination); (b) the quality of the disseminated data; (c) the integrity of the disseminated data, and (d) access by the public.

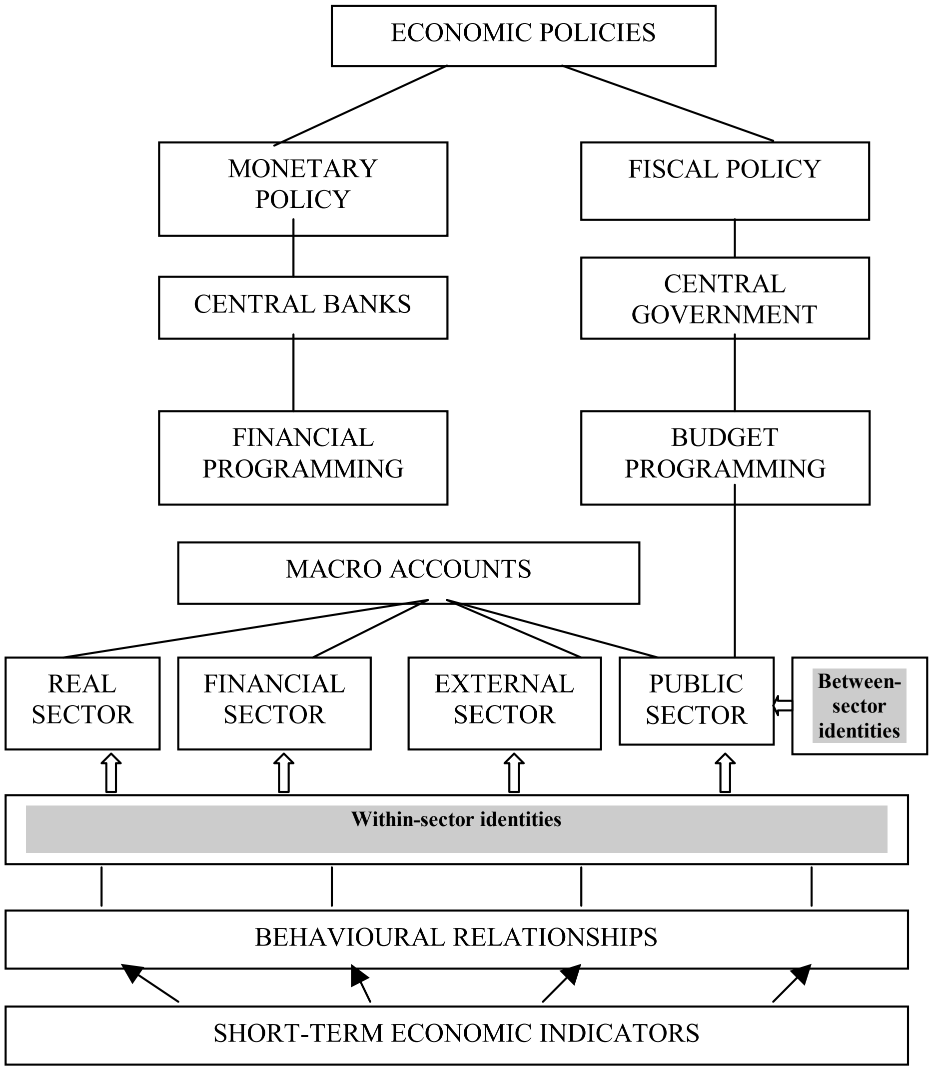
6.81. While the approaches to financial programming in support of policy decisions are generally considered useful, it is recognized that it would be convenient to extend the analytical framework in such a way as to include sectoral behavioural economic relations in order to asses the effects of policy actions. Policy makers would find it particularly useful to integrate analysis of the real sector of the economy into the analysis pursued by financial programming, as this would improve the study of inflation and its determinants. This could be done on the basis of the 1993 SNA, which is a comprehensive analytical tool that has traditionally been used for medium- and long-term analysis based on low-frequency data in studies of structural economic behaviour (coefficients, averages, relations, propensities and so forth). Short-term analysis pursued by financial programming uses the basic identities of the national accounts to study disequilibrium situations and monitor the path of the economy towards an equilibrium state in the short run. In view of this, the 1993 SNA may be used in adapted format to support short-term analysis by integrating high-frequency short-term economic indicators used in financial programming with the low-frequency data of the national accounts.

6.82. Rather than using the entire SNA, a reduced format of it could be used for short-term analysis purposes. The data included in such a reduced format would be early indicators of economic developments. Thus, monthly economic indicators could be used, for example, as leading indicators of quarterly and annual GDP. Monthly data from central government would give signals of less frequent general government data. Broad money survey data should be used as a preliminary estimate of the evolution of the financial sector, and data on international monetary reserves and trade may be used as early indicators to monitor developments in the balance of payments.

2. Elements of policy analysis used by central banks in financial programming

6.83. Figure VI.1 shows how indicators, macro accounts and economic policy objectives relate to each other. Better coordination between them would improve policy analysis objectives pursued by financial programming. It follows from the presentation that the format of the macro accounts is determined, on the one hand, by the policies identified in the upper part of the diagram and, in the lower part, by the short-term indicators that are used to evaluate the impact of those policies. The diagram further shows that within- and between-sector identities used in national accounting and behavioural relations for selected sectors assumed in financial programming are important links between the two (see sects. 2 (b) and 2 (c) below).

Figure VI.1 Economic policies, short-term economic indicators, macro accounts and sectoral identities



6.84. It was suggested above that the macro accounts supporting short-term analysis be a reduced format of the 1993 SNA. The precise scope of such a format would be determined by the scope of the indicators and the identities and behavioural relations that are used in projections based on the short-term analysis. The three elements are discussed in the sections below, and conclusions with regard to the reduced format of the accounts are presented in section 3.

(a) Short-term economic indicators

6.85. Table VI.5 presents a list of short-term indicators that are or may be used in the future by central banks in Central America to monitor the implementation of the policy objectives mentioned above. They are grouped together in the table by the policy objectives that are pursued in the region by the central banks. For each indicator, a brief description is given of how it is defined and, in some instances, how it is measured. Also, its frequency is indicated, that is, whether the indicator information is available quarterly, monthly or even daily. Indicators with an asterisk (*) are not yet implemented.

6.86. Some of the indicators of table VI.5 are used as instruments of financial and monetary integration in the region, in both the public and the private sector. In order to implement such a policy, the Central American Monetary Council has set target values for those selected indicators, and periodically compares the actual values of those indicators with their target values in order to check for convergence of the macroeconomic policies between countries in the region.

6.87. The target values of the indicators, which are determined on the basis of an established regional benchmark base period, that is, 1995-1997, are the following:

- Rate of growth of annual GDP > 4.5 per cent;
- Rate of annual inflation (CPI) < 14.0 per cent;
- Real interest rate, between 0 and 10 per cent;
- Real exchange rate index, between 90 and 110 percentage points;
- Central bank net foreign assets/monetary base > 80 per cent;
- Current account deficit/GDP < 4.0 per cent;
- Public sector deficit/GDP < 2.5 per cent;
- Public total debt/GDP < 50.0 per cent.

Table VI.5 Indicators used by central banks in Central America grouped by policy objectives

Name and symbol of indicator		Periodicity	Description of indicator
Price stability and inflation			
Consumer price index	CPI	Monthly	The most common measure of inflation π). It covers the metropolitan area in each of the five countries and includes medium- and low-income classes of the population. For certain analyses, the implicit index of the domestic demand is sometimes used, which in turn, is approximated through other related indicators, such as the construction price index, the import price of raw material and capital assets.
Core inflation index	CI*	Monthly	An alternative measure of inflation, which excludes from CPI price changes that tend to be volatile. Ignoring changes in food and energy prices, which often are quickly reversed, is due to the fact that they do not require and are not affected by a monetary policy response. This is a key indicator, especially for countries following an inflation targeting policy.
Asset price index	API*	Quarterly	The indicator measures the inflationary pressures, which are channelled to fixed assets and financial instruments (inflationary bubbles). In some circumstances, the API might lead the CPI, according to some other countries' evidences. With still less coverage, an index of monetary conditions (IMC)* might be suggested, based on short-term weighted average interest rate and exchange rate. At present, it is being evaluated by the central banks of the region.
Excess of bank net domestic assets	ENDA*	Quarterly	The indicator is used to evaluate the consistency between monetary and exchange rate policy. It is based on an estimation of the difference between real money demand and money supply. This difference is double-checked with the variation in exchange rate. When the variation of the ENDA does not exceed the variation in exchange rate, it is said that coherence between these two policies exists.
Government borrowing	GB/GDP		At present, credit to the Government is very limited in Central America, which is one of the main conditions in stabilization (stand-by) programmes with IMF.
Monetary base, M1 and M2	Mo, Mi/GDP	Daily/ monthly, resp.	Money, as defined, is a classical intermediate goal of monetary authorities. Mi/GDP is an index of total liquidity of the economy, meanwhile, money multipliers are obtained straightforward from Mo and are defined as the inverse of the liquidity index.
Non-financial fiscal déficit	NFFD/ GDP	Quarterly	The indicator refers to the most important non-financial institutions of the public sector (reduced sector), for which such information is readily available.
Current external account deficit	CEAD/GDP	Quarterly	The quantification of external deficit sustainability and its relationship with national saving is of special interest. An increase in the external account deficit and higher external debt service means that less domestic saving is available for investment.
Exchange rate	ER	Monthly	Nominal exchange rate (NER) and real exchange rate (RER), as well as the rate of nominal and real devaluation (RND and RRD), are all important indicators to evaluate the consistency of monetary and exchange rate policy.
Average rate of short-term interest rate	IR	Monthly	The indicator is estimated as a weighted average of selected (commonly used) financial instruments in the market, in both nominal and real terms.

Table VI.5 continued

Name and symbol of indicator		Perio-dicity	Description of indicator
Effectiveness of the exchange rate policy	EERP*	Monthly	The indicator is occasionally estimated on a monthly basis, as an ex post elasticity, which measures the accumulated percentage of variation of the real exchange rate (RER).
Structural adjustment (sustainable development)			
Economic activity indicator and quarterly GDP	EAI & QGDP	Monthly/ quarterly, resp.	EAI is used to estimate economic growth cycles. QGDP, along with potential GDP (PGDP),* is mainly used to anticipate overheating situations and possible inflationary pressures, when production exceeds capacity constraints. Also, these indicators are very useful in predicting money demand functions and other behavioural relations, which are further commented on in section C.3 (b).
Total exports	X/GDP	Monthly	The indicator for outward-looking strategies. At present, exports are considered to be the engine of growth in Central American economies.
Exports to third countries	XTC/X	Monthly	The indicator of diversification and integration with other trade regions, like NAFTA and MERCOSUR (South America).
Investment fixed capital formation ratio	K/GDP	Quarterly	The indicator of capital marginal productivity (ICOR).
Saving rate	S/GDP*.	Quarterly	The indicator should progressively increase along with structural change and reduction of foreign saving dependency. In the short run, this ratio would be indirectly estimated from financial accounts and evidences of fixed capital formation. That is, the estimation would come from "below the line". This is further discussed in section C.3 (b).
Value added of primary activity	VAPA/PIB	Quarterly	The indicator tends to decrease with structural change, mainly in developing economies.
Terms of trade index	TTI*	Monthly	The indicator is expected to improve with export diversification. At present, this indicator is available on an annual basis; monthly measures are highly recommended, however.
Balance of payments			
Trade deficit	X-M/ GDP	Monthly	The indicator is used to detect situations that can be untenable for the economy in the long term. It reflects episodes of chronic fiscal deficit, according to the balance-of-payments monetary approach.
Current external account deficit	CEAD/ GDP	Monthly	For those countries that receive an outstanding amount of transfers in the form of household remittances, like El Salvador, this indicator is crucial to understand the imbalances produced in trade deficit. Similarly, in countries with external debt problems, like Nicaragua and Costa Rica, interest payments would make the difference between trade and current deficit.
Direct foreign investment	DFI/X	Quarterly	The key indicator in Central America; very related to economic development. In fact, these economies are opening their markets and some are receiving considerable amounts of capital (direct investment) from multinational corporations.
Net foreign assets	NFA/Mo	Monthly	In a narrow definition, it includes central bank and money depositary corporations. It can either be a basic objective or a result of the financial programme. In Central America, a common criterion is that NFA must be enough to purchase at least three months of imports.
Foreign debt	FD/X & FD/GDP	Monthly	Foreign debt can seriously restrain the possibilities of growth in the future, as it reduces national saving.

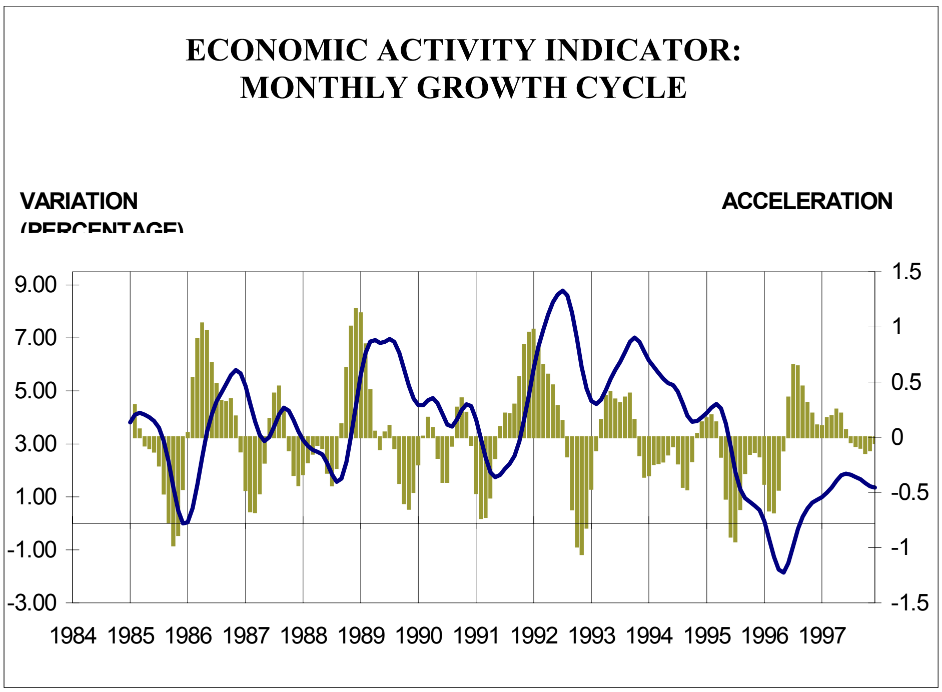
Table VI.5 continued

Name and symbol of indicator		Perio-dicity	Description of indicator
Sectoral behaviour			
Government borrowing from banks and government debt	GB/L, GB/TAX, GD/GDP	Monthly	L = total lending; TAX = total taxes. As a result of stabilization and adjustment programmes, the government borrowing from state-owned banks to total lending ratio has been drastically reduced in Central America.
Public sector borrowing	PSB/L	Quarterly	The indicator value may decrease with privatization.
Private sector borrowing, private sector debt	PRSB/L, PRSD/ GDP	Quarterly	An alternative indicator of economic activity that, at constant prices, can be compared to the EAI, owing to the high correlation between private credit and economic activity in countries with incipient stock exchange development.
Per capita value added by sector	PVAS/ GDP*	Quarterly	The indicator of sector performance in a globalization environment, with open markets and increased productivity.
Efficiency of the financial markets (financial reform)			
Interest rate differential (spread)	IRD	Monthly	The indicator is a measure of efficiency of financial intermediation. It is defined as the difference between the rate of interest on lending and the rate of interest on deposits.
Net worth/assets, liquid assets /total liabilities, money deposits abroad/ total money deposits	NW/A, LA/TLB, MDA/TD		Risk of loss indicators* to measure solvency, liquidity and exchange rate risk, respectively.
Monetary aggregates	M2/GDP, M3/GDP	Monthly	Broad money (financial deepening).
			Other quantitative and qualitative indicators: stock exchange registers; newspaper information on economic issues such as runs on banks and bankruptcies.
Financial and monetary integration in Central America (Regional benchmark base period, 1995-1997)			
Rate of growth	ΔGDP	Annually a/	No less than 4.5 per cent
Rate of inflation	π (ΔPCI)	Annually	No more than 14 per cent
Real interest rate	I	Annually	Between zero and 10 per cent
Real exchange rate index	RER	Annually	Between 90 and 110 percentage points
Central bank net foreign assets	CBNFA/Mo	Annually	Greater than 80 per cent
Current account deficit	CEAD/GDP	Annually	Less than 4.0 per cent
Non-financial fiscal deficit	NFFD/GDP	Annually	Less than 2.5 per cent
Public total debt	PTD/GDP	Annually	Less than 50 per cent

Notes: An asterisk (*) indicates “not yet implemented”.
a/ Targets are annually fixed, although there is a monthly or quarterly follow-up of the indicators.

6.88. An important example of an economic indicator used in dynamic analysis is the monthly economic activity indicator (EAI). Central American experiences show that it tracks closely the movements of the economy and the divergence to long-term pattern growth. This tracking gives some advantage to the authorities in taking actions that avoid or lessen the pressures on prices and inflation, when effective demand exceeds domestic supply. The signalling of growth cycles through the EAI is considered to be the beginning of short-term analysis. Other economic indicators, mainly of the monetary sector, would be compared to the EAI to decide whether the aggregates are pro-cycle or anti-cycle; this would be a part of the study of the transmission mechanisms of economic policies, and, in particular, monetary policies. The graph below shows the growth cycle of the Costa Rican economy during the period from 1985 to 1997.

Figure VI.2. Economic activity indicator: Monthly growth



6.89. At present, the main characteristic of the short-term economic indicators is that they are based on high-frequency and timely statistics. They lack, however, an underlying conceptual framework and therefore may be inconsistent conceptually and quantitatively. As they have been criticized for that reason, the need arises to reframe short-term economic indicators under an accounting system such as the 1993 SNA. To do so would enhance the utility of macro accounts data based on systems such as those developed by the United Nations and IMF, which have traditionally been used to provide the larger part of the low-frequency data needed for economic analysis and policy-making.

6.90. Table VI.6 shows how to relate the short-term indicators to accounts. The indicators are summarized in the last column, the policies to which they relate are included in the first column and the segments of the macro accounts, including SNA and related accounting systems, are presented in the middle column. What immediately becomes clear is the scope of the SNA and related accounts that support the indicators. This scope is used in section 3 to define a reduced format macro accounts framework.

Table VI.6. Short-term indicators related to macroeconomic accounts and economic policy objectives

Economic policy objectives	Macroeconomic accounts, matrices and vectors	Short-term macroeconomic indicators
Price stability and inflation	Broad money survey, external transactions, price vectors	CPI, π, API, CI, ENDA, GB/GDP, Mi/GDP, NFFD/GDP, CEAD/GDP, ER, RER, RND, RRD, IR, EERP
Structural adjustment	Supply and use table (SUT), income account	EAI, QGDP, X/GDP, XTC/X, K/GDP, S/GDP, VAPA/GDP, TTI
Balance of payments	External account of goods and services, financial account	(X-M)/GDP, CEAD/GDP, DFI/X, NFA/Mo, FD/X, FD/GDP
Sectoral behaviour	Broad money survey, capital account SUT and integrated economic accounts (IEA)	GB/L, GB/TAX, GD/GDP, PSB/L, PRSB/L, PRSD/GDP, PVAS/GDP
Financial market efficiency	Broad money survey, financial accounts, stock exchange financial statements	IRD, NW/A, LA/TLB, MDA/TD, M2/GDP, M3/GDP
Economic integration	Rest of the world account, price vector	Macroeconomic convergence indicators

(b) Identities and disequilibria of financial programming

6.91. Within-sector identities constitute the main basis of short-run analysis. Without them, the nature of sectoral imbalances is unknown, and it is not possible to properly assess the state of the economy. The main identities are presented in table VI.7.

6.92. The real sector identity, which is the macroeconomic identity of the goods and services market (supply and use), is also the main identity used in the national accounts. Central banks use quarterly GDP or even indicators like EAI to approximate this identity. This will allow the monitoring of supply and demand in the short run, as all countries have monthly data of imports and exports and quarterly (direct or indirect) indicators of final consumption, government expenditures and expenses on imported and domestic gross fixed capital formation. However, hardly any country has short-term data on changes in inventories, which is a very volatile indicator, as it is the one that is generally estimated on the basis of the difference between supply and aggregate demand. Opinion surveys would be a better means of estimating changes in inventories in short-term accounting.

Table VI.7. Identities used in short-term analysis

Real sector identity	GDP = C + G + GKF + Δ I + (X-M)	GDP= gross domestic product M, X = imports and exports of goods and services C = private final consumption expenditures G = general government consumption expenditures GKF =gross fixed capital formation ΔI = changes in inventories
Financial (monetary) sector identity	NDA + (NFA$)* ER = MLB	NDA = net domestic assets NFA = net foreign assets in dollars ER= exchange rate MLB =monetary liabilities (Mo, M1 or M2, depending on how narrow or broad the definition of the sector is)
External sector or balance-of-payments identity	X – M + FS = NFA + Δ GD + Δ PD	FS = factor services Δ GD = change in government debt Δ PD = change in private sector debt
Budgetary constraint of the public sector	NFPSD = I - E = ΔDD + ΔFD	NFPSD = non-financial public sector deficit I = incomes G = expenditures ΔDD = change in domestic debt ΔFD = change in external debt

6.93. The identity with regard to the monetary sector is the so-called broad money survey identity, which covers the financial assets and liabilities of central banks, monetary authorities, depositary institutions and deposit money banks. NFA is supposed to be a control variable under fixed exchange rates, since net foreign assets are endogenous. This identity can be estimated on a monthly basis.

6.94. A third identity is the external sector or balance-of-payments identity. Central banks are currently working to obtain quarterly estimates on an accrual basis, as opposed to a cash basis, a common practice when custom statistics are delayed.

6.95. Another identity used in short-term analysis is the budgetary constraint of the public sector. The budgetary constraint identity might be compiled monthly on a cash basis for the central Government. Because quarterly data are not available in time for all government institutions, countries have chosen to estimate the non-financial public sector deficit (NFPSD) through data “below the line”, that is, through data on financial flows for a reduced non-financial public sector (RNFPS), which includes the most important public institutions.

Table VI.8. Behavioural relationships used in short-term analysis

Money demand, quarterly (to study the existence of a domestic asset excess in the short run, real demand money is proposed, as a function of quarterly GDP)	M^d/P = f (GDP, i, ...)	M^d/P = money nominal demand deflated by CPI GDP = gross domestic product (EAI could be used for monthly estimations) i= nominal average interest rate
Production function, quarterly (used to approximate potential output, when the use of resources is on a level compatible to a low rate of inflation)	GDP = f (E , K, U,…)	E = employment K = use of installed capacity U = total factor productivity
Consumption function, quarterly (this function can be estimated through short-term indirect indicators, for example a composite index built out of a combination of consumption imported goods, sales index and data on value added tax)	C = f (NDIt-1, i, W, …)	NDIt-1 = national disposable income (or GDP), previous period W = real financial wealth
Investment function, quarterly (used to prove the validity of the accelerator principle)	I = f (GDPt-1, i …)	i = real average interest rate
Import function, quarterly or monthly	M = f (GDP, ER, …) or M= f (EAI, ER,...)	ER= exchange rate
Export function, quarterly or monthly (used to track outward-looking strategy for development)	X= f (GDPpc, ER, ...)	GDPpc = gross domestic product of trade partner countries.
Liquidity effect and interest rate effect on domestic demand, quarterly (used to prove the validity of the Keynesian transmission mechanism)	i = f (Mo, M1, Cr,) DD = f (I, ...)	Mo = monetary base Cr = total credit i = short-term interest rate
Predictive power of real and monetary variables over inflation, monthly	π = f (EAI, i, ER, M1,...)	EAI = economic activity indicator ER= exchange rate i= nominal average interest rate

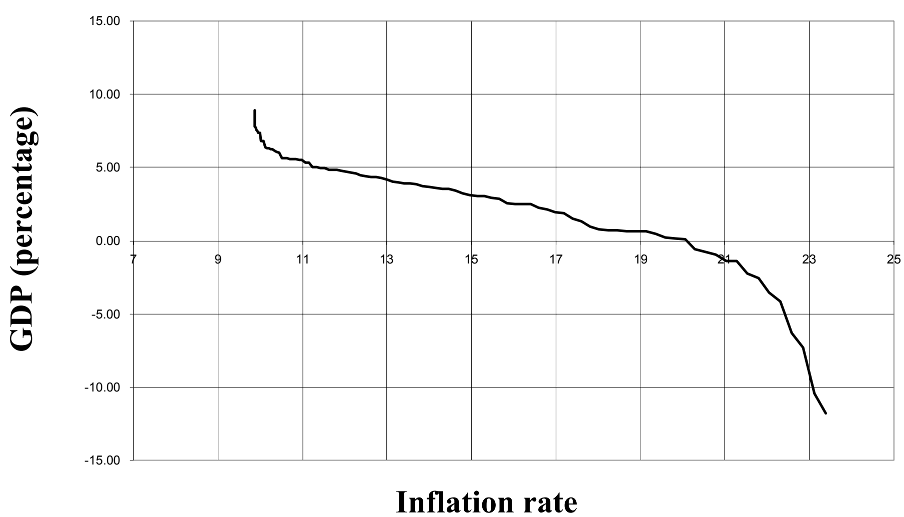
6.96. The within-sectoral balances are estimated in a separate analysis. In order to achieve consistency between these analyses, there is a need to reconcile the data between the four sectors, in order to satisfy between-sector identities such as those that are implicit in money demand functions and other relationships that involve variables from different sectors. This has not yet been done in the analyses by the central banks in Central America, as the sectoral data have not been developed in an accounting framework. This has caused many problems in the past. The task will be greatly facilitated with the implementation of the 1993 SNA and the new IMF manuals. Data consistency will also be improved through relational databases, which are currently being implemented in the countries in Central America, and through models like RMSM-X of the World Bank.

(c) Behavioural relationships

6.97. In addition to the sectoral equilibrium identities, behavioural relationships among variables and indicators are highly recommended for short-term analysis. Behavioural equations can be estimated to relate indicators within a particular sector or between different sectors. Of special interest to the central banks are those that define relationships between instruments or intermediate objectives and final goals; table VI.8 above presents some examples.

6.98. Inflation is a central issue in financial programming strategy that basically relies on production-price relationships. For Central American countries as a group, the Executive Secretariat of the Monetary Council of Central America estimated an econometric model to quantify the impact of inflation on economic growth. The graph below shows that the greater the rate of inflation, the lower is economic growth. When the rate of inflation hits 22 per cent, economic growth turns to a negative rate (breakpoint). There is a non-linear relationship between inflation and economic growth. When the level of inflation is between 10 and 20 per cent the relation is almost linear, with an inflection point around 15 per cent or so. When the inflation rate is above 22 per cent the relation seems to be non-linear and the impact of inflation on economic activity is stronger. An econometric study showed that economic activity growth is more affected by the acceleration of inflation (uncertainty) than by the level itself. This is reflected in figure VI.3.

Figure VI.3 GDP growth versus inflation



3. Reduced format macro accounts framework

6.99. Based on the considerations developed in the previous sections, a reduced format of quarterly accounts, which is linked to the annual framework of comprehensive accounts based on the 1993 SNA is proposed for Central American countries. Such a format is currently being implemented in Costa Rica and Guatemala. These are the first two Central American countries to initiate, in 1997, a programme under the guidance of the United Nations Statistics Division and the Executive Secretariat of the Monetary Council of Central America. It started with a pilot compilation for a reference year: 1995 in Guatemala and 1996 in Costa Rica. Working with available data allowed these countries to properly focus attention on the compilation methodology. During the second phase of the programme, which was to be initiated probably in late 1999, a base year would be selected and surveys would be implemented to fill the data gaps that remained in the first phase. Complete national accounts series may be estimated for, say, at least every five years. The rest of the countries are following the steps taken by Guatemala and Costa Rica and are currently compiling similar SNA data sets.

6.100. The reduced format of quarterly accounts would make use of a set of short-term indicators, supplemented with identities and behavioural relations that would be used to estimate the rest of the accounts and also make projections to the future. For example, the EAI would be an indicator for quarterly GDP; central government data would provide information of less frequent data on general government or public sector deficit; central bank data are available well in advance of the whole monetary sector and can be used as a leading indicator of the financial sector; and international monetary reserves and trade statistics highlight the balance-of-payments position. In other cases, the relation with the accounts would be more indirect: for example, credit data would be the leading indicators (see sect. A) for consumption and some capital formation expenditures, while net lending in the financial account and some items of the capital and financial accounts can be used to approximate saving.

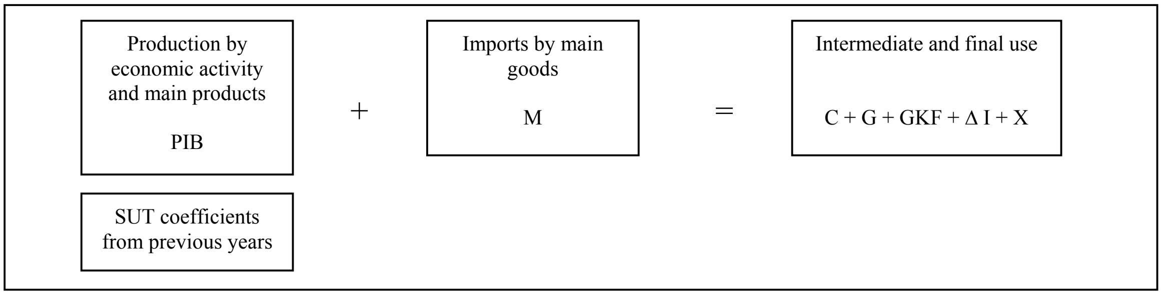
6.101. The reduced format, which is closely related to the general 1993 SNA system, should be able to satisfy at least three needs: (a) analysis of current macroeconomic events; (b) support of financial programming; and (c) monitoring of the impact of policies on real variables. The reduced format should be used during the current year and not beyond that; that is, annual comparisons and historical analyses should be made with the help of the comprehensive accounts. The reduced format framework -- as well as the annual accounts – should, furthermore, make the data on prices of goods and services, average wages, exchange rates, interest rates, the terms of trade index, the asset price index and employment and volume indexes explicit. Making those price data explicit is essential as national accountants use such data in their compilation and they play an important role in analysis.

6.102. Certain elements of the reduced framework, namely, the format of the supply and use table and the integrated economic accounts and the relationships between the real and the financial sectors of the system, are further discussed in the following sections.

(a) Quarterly supply and use table and integrated economic accounts

6.103. The quarterly SUT may include an estimate of GDP, using a value added approach by broad economic activity categories or products, and a balance (equilibrium identity) between GDP and its uses, based on the use of short-term economic indicators. Indirect indicators, coefficients and relations of previous years may be used to estimate value added and some of its components, if needed. For example, fixed coefficients could be used to estimate value added from production indexes. Or, by the same token, compensation of employees may be estimated with the help of employment indexes. As mentioned above, the table should also make price data explicit, including data on prices of goods and services, average wage rates, exchange rates, interest rates, the terms of trade index and the asset price index. Figure VI.4 summarizes the elements of a quarterly SUT.

Figure VI.4. Quarterly supply and use table



6.104. Based on the experience in Central America, particularly in Costa Rica and Guatemala, the quarterly IEA may include data on the following institutional sectors:

- Financial intermediaries, including central bank and depositary corporations (banking institutions), which are equivalent to the broad money survey; insurance companies and other financial institutions, such as pension and investment funds and stock exchanges;
- Public sector, including central government, social security and the most important public service institutions and enterprises, which would constitute the RNFPS;
- Rest of the world, that is, data on the main aggregates and balancing items of the balance of payments, including, for example, imports and exports of goods and services, trade balance, income and transfers, current account balance, reserves and other financial transactions, and overall balance, with detailed components as relevant.

6.105. In particular, an indicator of net lending/borrowing for the private sector would be obtained from the three sectors mentioned. Net borrowing of the reduced non-financial public sector should be used as an estimate of the fiscal deficit, which would be contrasted with the domestic and foreign bank financing to the Government. To some extent, net lending/borrowing of the private sector could partially be estimated through bonds selling on the part of the Government. Banks' liabilities and foreign exchange deposits should explain the other part. The data requirements of a quarterly IEA are summarized in figure VI.5.

(b) <u>Relationships between the real and the financial sector</u>

6.106. With few exceptions, transactions in the real sector generate transactions in the financial sector. Transactions in the financial accounts are the counterpart of transactions registered in the current and capital accounts. In general, data on financial transactions are more timely and more frequently available than are non-financial data. Financial statements are easily found because they are required by government institutions. Thus, the SNA link between financial and non-financial data could be used to estimate the latter on the basis of the former. Several examples of this are presented below.

Figure VI.5. Quarterly integrated economic accounts

Central bank	**Depositary corporations, insurance companies and other financial intermediaries**	**Reduced non financial public sector**	**Rest of the world**
Production, generation of income, allocation of primary income, secondary distribution of income, capital and financial accounts	Production, generation of income, allocation of primary income, secondary distribution of income, capital and financial accounts	Production, generation of income, allocation of primary income, secondary distribution of income, capital and financial accounts	Goods and services, primary income and current transfers, capital and financial accounts

6.107. Variables with potential predictive contents - interest rates, interest rate spreads, stock price indexes and monetary aggregates - are commonly associated with expectations of future economic events. In particular, asset prices are strongly influenced by expectations of future returns, which are related to expectations of future economic activity, inflation and monetary policy. Even if their impact on aggregate demand is limited, they may contain useful information about current and future economic conditions. This information may be used to improve the inflation forecast on which monetary policy is based.

6.108. SNA annual accounts, with implicit data on prices and volume, are not enough to take advantage of the richness of information. All shocks operating on the economy induce adjustments in portfolios and impose changes in relative asset prices. This process transmits asset market responses to the output market, reinforcing or moderating any direct effect of the shocks to the output market. In particular, monetary impulses are transmitted to the output market through the general substitution process and resulting relative changes.

6.109. In fact, a variety of movements and changes in portfolio can occur in financial accounts throughout the year, which may be followed sooner or later by changes in economic activity. For example, certain movements in the financial accounts from liquid assets to less liquid assets, like non-transferable deposits or equities, could reflect uncertainties of economic agents related to changes in the exchange rate and interest rates, which, in turn, are a response to the worldwide financial crisis.

6.110. A financial crisis may affect household wealth and reduce consumption expenses and, consequently, GDP. The prices of goods and services, as well as the rate of inflation, would probably increase. And, as is well known, financial crises can occur in no time at all, and, indeed, are happening too fast. In a world of globalization and openness, the financial sector facilitates the transmission of international disturbances to the domestic market, therefore, developing countries must be prepared for such an event and improve their knowledge through a better analytical accounting framework.

6.111. In these situations, financial variables probably impact on real variables. The financial variables with predictive potential include, among others, nominal exchange rates, which reflect inflation expectations, yield curves, share and other equity prices and broad monetary aggregates like M2 and M3. These indicators when incorporated in quarterly accounts could thus be used as leading indicators of the real sector. All of this information can be utilized to predict better inflation, which is the basic issue of financial programming.

4. Conclusions

6.112. Policy makers and analysts make predictions based on subjective judgements and not necessarily based on strict statistical analysis. However, decisions rely more heavily on judgements when data are not timely or reliable. Short-term indicators are available early and may be used to double-check both judgemental and econometric predictions. In turn, macro accounts provide the adequate underlying framework to analyse the indicators.

6.113. Basic statistics, short-term indicators, identities and accounts are all elements available to economists to analyse and track the economy. In practice, putting all these elements together in a comprehensive and coherent framework is not an easy task. The link between short-term indicators and annual accounts, or between indicators and policies, is not at all clear and not much has been written about it.

6.114. From a central bank standpoint, basic data, often from different sources, do not always address the needs of policy analysis, because priorities of statistical agencies may be different from those of central banks. As the basic data are not consistent, indicators derived from them might give misleading or contradictory signals to analysts and policy makers. The need emerges, then, for developing short-term indicators integrated in an accounting framework based on the 1993 SNA, and using the indicators and accounts in the current year to assess the impact of monetary, fiscal and related financial policies in the future.

6.115. It is suggested to use a reduced format of national accounts, based on the recent experiences of two Central American countries, Costa Rica and Guatemala. Such a framework should take into account the economic policies being implemented in these countries and the present increasing demands for short-term indicators by international organizations.

6.116. An additional issue considered here is how to link financial and real variables so that the former can approximate and possibly predict the latter. This would require the use of financial indicators, behavioural relationships between real and financial variables, coefficients and relations from previous years and, of course, the support of an underlying macro accounting framework for short-term analysis.

6.117. In support of the above, quarterly estimates of the indicators used should be improved, in particular those of the real sector. This would include more accurate and periodic measurements of gross fixed capital formation, changes in inventories (through opinion surveys) and consumption expenditures, together with indirect data on population growth and purchasing power. Also, there is a need to conduct quarterly surveys to improve estimates of services and direct foreign investment for balance-of-payments purposes. In addition, estimates of non-financial public sector deficits should be improved by having more accurate and timely measures of income and expenditures of Government. Finally, the link between financial and real sector analysis could be improved by more accurately estimating a money demand function that would monitor, on a monthly or quarterly basis, the velocity of money, that is, the ratio of the quantity of money to nominal GDP.

D. Assessing and optimizing the impact of national accounts compilation methods on indicator analysis

6.118. The present section assesses the compilation methods used in present national accounting practices. By focusing in particular on short-term accounting, it makes explicit the compilation methods underlying the short-term national accounts estimates presented in section VI.B, and shows how these methods can be improved. Through an illustrative example based on the accounting framework, data and indicator ratios discussed in section III.A, it explains in section 1 below how a subset of the analytical indicator ratios is used as assumptions in present compilation practices, and thus limits their use in indicator analysis. The use of indicator ratios in the compilation particularly affects the reliability of short-term estimates of national accounts variables and the indicator ratios based thereon, when fewer direct estimates of national accounts data are available and a larger subset of indicator ratios is used in the compilation, as compared to their use in long-term accounts. Section 2 contains a discussion of an alternative compilation method, using interval instead of point estimates of data and indicator ratios in order to mitigate the impact of assumptions on indicator analysis. It also shows how the use of interval estimates would improve the national accounts estimates, and bring closer short-term and long-term estimates, as a much larger number of prior information items in the form of indicator ratios can be included in both compilations than when point estimates are used.

6.119. As in section III.A, the present section refers to a special type of indicators, namely, indicator ratios, which may be used in both compilation and analysis. To avoid terminological confusion between the disciplines of national accounts and analysis, the term indicator ratio will be used exclusively in this section. For the same reason, some other terminological conventions are adopted here. The term variables is used to refer to transaction items in the macro accounts, such as household and government consumption, exports and capital formation. Indicator ratios are defined as ratios between macro accounts variables. The term data is only used when referring to basic data obtained from surveys and other administrative data sources. The term estimates is used when referring to the values resulting from macro accounts compilation, and thus made within the constraints of a framework of macro accounts. They may include revisions of the values of macro accounts variables that are initially (and directly) based on basic data, estimates of other macro accounts variables (made indirectly) using available basic data, national accounts identities and values of indicator ratios, and also estimates of indicator ratios. The estimates may be intermediate or final, depending on whether they are made at an intermediate stage of the compilation of macro accounts or at the end when the values of variables are reconciled within the framework of the accounts. Both (basic) data and estimates may refer to macro accounts variables and indicator ratios based thereon. Alternatively, the terms prior and posterior values are used to refer to the values of basic data and estimates, respectively.

1. Formal presentation of present compilation practices

6.120. There are several recent attempts to formalize compilation practices as a means of computerizing the compilation of national accounts. Several softwares are now available, which include elements of such formalization, but as there is no comprehensive consensus about the details of national accounts compilation, each software unavoidably includes the national accounts compilation orientation or procedures of its author. The United Nations Statistics Division, in its recent Handbook of National Accounting, entitled A System Approach to National Accounts Compilation[9], has taken a different approach and has emphasized the design of worksheets and tables used to enter, adjust and reconcile data, without stipulating the assumptions and reconciliation procedures that define the orientation of national accounts compilation. Defining the latter is the topic of this section, which does not enter into any details regarding worksheet and table design.

(a) Two-stage compilation

6.121. Present compilation procedures are based on the combined use of data and indicator ratios in the compilation. They can be described as a two-stage estimation process in which all estimates are made within a pre-designed national accounts framework. In the first stage, variables for which no data are available are estimated indirectly either through the use of national accounts identities or by using assumed indicator ratio values. As at this stage there are more indicator ratios and identities than are needed to estimate the remaining variables, they may be partly conflicting with each other and statistical discrepancies between the values of the variables remain. In the second stage of reconciliation of variable values, these statistical discrepancies are removed by eliminating obvious errors in the values of the data and estimates and otherwise changing those that are considered to be less reliable. As a consequence, some of the values of the indicator ratios are changed as well.

6.122. The starting point of the first stage is the basic data derived from existing data sources. They may include SUT data on output and/or value added of industries, imports and exports, government consumption and capital formation, as well as comprehensive IEA data of sectors, including central Government, banks and insurance companies, and schemes, balance-of-payments data and integrated data sets related to public non-financial corporations. The remaining national accounts variables are estimated with the help of identity restrictions inherent in the SUT and the IEA of the national accounts framework and indicator ratios.

6.123. The identity restrictions of the SUT used in the compilation may include supply and use identities for separate products used in the commodity flow method, and also the identity between the total of intermediate consumption by products and by industries that is applied in conjunction with the use of the commodity flow method. Similarly, if the IEA is compiled, identities between resources and uses of different sectors may be applied to income, expenditure, capital and financial data, or an identity may be incorporated between net lending estimates alternatively based on income and expenditure items and financial flow items. Furthermore, identities may be used with regard to production data obtained from industry and sector data sources. To the extent that the number of identities is not sufficient to estimate the national accounts variables for which no basic data are available, assumptions are made about indicator ratios that may hold approximately between national accounts variables. Thus, technical coefficients are used to estimate value added if output data are available and vice versa if value added data are available. Similarly, product detail of final consumption is obtained by assuming indicator ratios between total consumption and selected outlays. Assumptions may furthermore be made with regard to the distribution of production activities of industries and corresponding production data between the non-financial corporate sector and the household sector. Alternatively, tax ratios are used to estimate product taxes, when the information on product flows is available, or to estimate income tax paid by households, when income data are available from basic data sources.

6.124. The number of indicator ratios used in the first stage of the compilation is larger when fewer basic data are available, and smaller when more information can be obtained from basic data sources. The first applies when short-term accounts are compiled and the second to long-term accounts, particularly for benchmark years. As national accountants want to use as much information as possible in their compilation, the number of identities and indicator ratios used as assumptions is generally larger than what is strictly needed to make estimates of all variables of the accounts. As a consequence of this, the first stage estimation does not arrive at consistent estimates, and statistical discrepancies remain.

6.125. The statistical discrepancies are eliminated in the second stage of the compilation by adjusting the estimates. When making such adjustments, it cannot be avoided that limited changes are applied to some of the first-stage estimates of macro accounts variables for which basic data are available, or to the values of indicator ratios that were used in the first stage to estimate other variables. Implicit in the latter procedure are qualitative reliability criteria regarding basic data on national accounts variables and indicator ratios, which the national accountants take into account.

(b) Example

6.126. Tables VI.9 and VI.10 illustrate, with the help of fictitious data, the details of this two-stage process and how it affects the values of variables and indicator ratios in long-term and short-term accounting. The format of both tables is identical to that of tables III. 1 and III.2. The two tables include for each item four types of estimates for period (t+1), arranged by two lines and columns. The estimates in column t+1, short-term refer to early accounts compiled on the basis of a limited basic data set, and the estimates in column t+1, long-term refer to later estimates, which are based on a more extensive basic data set. Line (1) of each item refers to the first-stage estimates for short- and long-term accounts, respectively, and line (2) to the second-stage estimates.[10] The variables and indicator ratios that were based on basic data sources or assumptions (assumed indicator ratios) in the first stage of the compilation are printed in **bold and underlined** in line (1); all others were estimated indirectly following the two-stage estimation method described below.

6.127. The two-stage compilation approach may be explained with the help of the estimates presented in the first column of the two tables, corresponding to the first- and second- stage estimates of short-term accounts. In the first stage (line (1)), a limited set of basic data are directly estimated, supplemented by assumed values of selected indicator ratios, which are generally based on the previous year's values; both are printed in tables VI.9 and VI.10 in **bold and underlined**. Thus, in the first stage, early basic data are available on employment (item [7]), exports ([11]), and all expenditure categories of the Government, that is, final consumption ([17]), gross capital formation ([18]), and other outlays ([20]). Also, early data are available for the population at the beginning of the year ([32]). The remaining bold figures in the external account ([13], [14] and [15]) are not directly available data, but rather values that are assumed to be unchanged between year (t) and year (t+1). (See the data values presented in table III.1.) The same applies to capital transfers received by households ([37]); they are also assumed to remain unchanged between periods (t) and (t+1). The basic data available for an early estimate of other income of corporations ([24]) is based on profit and loss accounts data of large corporations that may be available from early financial statements.

6.128. As the number of data items thus available for short-term accounts at the beginning of stage 1 is only 11 out of a total number of 38 data items in table VI.9, the remaining ones need to be estimated with the help of national accounts identities and assumptions based on the type of indicator ratios presented in table VI.10. In the present example, 14 of such indicator ratios have been used; they are indicated with the help of figures printed in **bold and underlined**. The 11 basic data and the 14 indicator ratios for which values were assumed are further supplemented by national accounts identities that are traditionally used by national accountants to derive values of national accounts items in an indirect manner.

Table VI.9. National economic accounts estimates for period (t+1): short-term and long-term accounts, first (1) and second (2) stage estimates

TOTAL ECONOMY

(units: million US dollars, thousand m/years, thousand inhabitants, 100= price index in base year)

INDUSTRIES (column 1)

		t+1, short-term	t+1, long-term
[1] Output, incl. product taxes less subsidies	(1)	3,771	**4,034**
	(2)	3,771	4,034
[2] Intermediate consumption	(1)	1,900	2,033
	(2)	1,870	2,033
[3] Gross capital formation, total economy	(1)	418	**449**
	(2)	412	490
[4] GDP, market prices, current prices	(1)	1,871	2,001
	(2)	1,901	2,001
[5] GDP, market prices, constant prices	(1)	1,171	1,228
	(2)	1,171	1,228
[6] Compensation of employees paid and mixed income, gross	(1)	1,252	1,252
	(2)	1,252	1,252
[7] Employment, thousand m/years worked	(1)	**34**	**34**
	(2)	34	34
[8] Taxes on production and imports, less subsidies	(1)	193	206
	(2)	193	206
[9] Operating surplus, gross (excl. mixed income)	(1)	427	544
	(2)	457	544

REST OF THE WORLD (column 2)

		t+1, short-term	t+1, long-term
[10] Imports	(1)	504	**543**
	(2)	504	543
[11] Exports	(1)	**567**	**567**
	(2)	567	567
[12]=[11]-[10] External balance of goods and services	(1)	63	24
	(2)	63	24
[13] Compensation of employees, received by residents less paid to non-residents	(1)	**4**	**3**
	(2)	4	3
[14] Taxes on production less subsidies plus taxes on income and wealth, received by resident Government less paid to non-resident Government	(1)	**1**	**0**
	(2)	1	0
[15] Other incomes, receipts by residents less payments to non-residents	(1)	**-8**	**-10**
	(2)	-8	-10
[16]=[12]+[13]+[14]+[15] Net lending, rest of the world	(1)	60	17
	(2)	60	17

GOVERNMENT (column 3)

		t+1, short-term	t+1, long-term
[17] Final consumption, Government	(1)	**385**	**385**
	(2)	385	385
[18] Gross capital formation, Government	(1)	**41**	**41**
	(2)	41	41
[19] Taxes on production less subsidies plus taxes on income and wealth, received by Government	(1)	415	**366**
	(2)	415	366
[20] Other outlays, payments less receipts by Government	(1)	**48**	**48**
	(2)	48	48
[21]=[19]-[17]-[18]-[20] Net lending, Government	(1)	-58	-107
	(2)	-58	-107

Notes

Production taxes less subsidies have not been allocated to sectors, but only recorded for the total economy ([8]).

Gross capital formation includes the value of improvements to land and the cost of ownership transfers of non-produced assets ([3], [18], [2], [27])

Disposable income of households ([28]) includes adjustment for the change in net equity of households on pension funds, and is after deduction of taxes on income and wealth. In the case of disposable income before taxes ([29]), no tax deductions have been made.

Other incomes, receipts less payments ([15], [20], [24], [26]) include operating surplus gross, property income and non-tax current and capital transfers. Capital transfers received less paid include acquisition less disposal of non-produced non-financial assets. In the case of households ([26]), operating surplus excludes mixed income and capital transfers, which are presented separately. In the case of the Government ([20]), other incomes have been replaced by other outlays, which are equal to payments less receipts of property income and non-tax current and capital transfers, less operating surplus gross.

Table VI.9. (continued)

<<OF WHICH>>

NON-FINANCIAL AND FINANCIAL CORPORATIONS (column 4)

	Item		t+1, short-term	t+1, long-term
[22]	Gross capital formation, corporations	(1)	307	**316**
		(2)	294	316
[23]	Taxes on income and wealth, paid by corporations	(1)	36	**29**
		(2)	36	29
[24]	Other incomes, receipts less payments by corporations	(1)	**275**	**275**
		(2)	260	259
[25]=[24] [23]-[22]	Net lending, corporations	(1)	-68	-71
		(2)	-70	-87

HOUSEHOLDS, incl. NPISHs (column 5)

	Item		t+1, short-term	t+1, long-term
[26]	Final consumption, households	(1)	1,072	**1,070**
		(2)	1,042	1,102
[27]	Gross capital formation, households	(1)	90	133
		(2)	77	133
[31]	Compensation of employees and mixed income, received	(1)	1,256	1,255
		(2)	1,256	1,255
[35]	Taxes on income and wealth, paid by households	(1)	185	131
		(2)	185	131
[36]	Other incomes, receipts less payments by households	(1)	238	296
		(2)	226	312
[37]	Capital transfers households, receipts less payments	(1)	**11**	**11**
		(2)	11	11
[29]= [31] +[36]	Disposable income before taxes, gross	(1)	1,494	1,551
		(2)	1,482	1,567
[28]= [29] - [35]	Disposable income, gross	(1)	1,309	1,419
		(2)	1,297	1,435
[30]= [28] - [26]	Saving, gross	(1)	237	349
		(2)	255	333
[38]=[30] +[37]-[27]	Net lending, households	(1)	158	227
		(2)	189	211
[34]	Increase of the population, thousand inhabitants	(1)	1.319	1.200
		(2)	1.319	1.200
[32]	Size of population, thousand inhabitants, beginning of year	(1)	**90.000**	**90.000**
		(2)	90.000	90.000
[33]	Size of population, thousand inhabitants, end of year	(1)	91.319	**91.200**
		(2)	91.319	91.200

STATISTICAL DISCREPANCIES

Item		t+1, short-term	t+1, long-term	
Supply less use	(1)	-66	73	row (1)
	(2)	0	0	
				row (2)
Gross capital formation	(1)	-20	-41	row (3)
	(2)	0	0	
GDP-expenditures	(1)	-66	73	row (4)
	(2)	0	0	
				row (5)
Compensation of employees and mixed income	(1)	0	0	row (6)
	(2)	0	0	
				row (7)
Taxes on production less subsidies, income and wealth	(1)	0	0	row (8)
	(2)	0	0	
Operating surplus gross, property income and other current and capital transfers	(1)	57	0	row (9)
	(2)	0	0	
				row (10)
				row (11)
				row (12)
				row (13)
Net lending	(1)	-29	32	row (14)
	(2)	0	0	
				row (15)
				row (16)
				row (17)

Table VI.10. Indicator values for period (t+1), alternatively based on short and long-term national accounts estimates (of table VI)

Aggregates per capita and per worker

			t+1, short-term	t+1, long-term
[28]/[33]	@1 Household disposable income/capita (thousand US dollars)	(1)	14.329	15.564
		(2)	14.198	15.739
[26]/[33]	@2 Per capita GDP (thousand US dollars)	(1)	11.734	11.732
		(2)	11.406	12.083
[4]/[33]	@3 Value added (= GDP) constant prices per worker, labour productivity (thousand US dollars per m/year)	(1)	20.488	21.944
		(2)	20.817	21.944
[4]/[7]	@4 Value added (= GDP) per worker (thousand US dollars)	(1)	55.589	59.461
		(2)	56.480	59.461
[5]/[7]	@5 Value added (= GDP) constant prices per worker, labour productivity (thousand US dollars per m/year)	(1)	**34.782**	36.476
		(2)	34.782	36.476
[6]/[7]	@6 Average labour remuneration per worker (thousand US dollars per m/year)	(1)	**37.184**	**37.184**
		(2)	37.184	37.184

Prices

(percentage)

[4]/[5]	@7 GDP price deflator	(1)	**159.8**	**163.0**
		(2)	162.4	163.0
([4]/[5])/([4] -1/[5]-1)-1	@8 Inflation rate	(1)	0.0	2.0
		(2)	1.6	2.0

Balance of Payments

(percentage)

[10]/([1]+[10])	@9 Import/supply-use	(1)	**11.8**	11.9
		(2)	11.8	11.9
[12]/[4]	@10 Export- import gap as percentage of GDP	(1)	3.4	1.2
		(2)	3.3	1.2
[16]/[4]	@11 Net lending to abroad/GDP	(1)	3.2	0.9
		(2)	3.2	0.9

Production

(percentage)

			t+1, short-term	t+1, long-term
[4]/[1]	@12 Value added /output coefficient, total	(1)	**49.6**	**49.6**
		(2)	50.4	49.6
[6]/[4]	@13 Labour share in value added (= GDP)	(1)	66.9	62.5
		(2)	65.8	62.5
[3]/[4]	@14 Investment share in value added (= GDP)	(1)	**22.3**	22.4
		(2)	22.3	24.5
[3]/([4]-[4]-1)	@15 Incremental capital - output ratio[b)]	(1)	24.5	3.0
		(2)	8.8	3.3
([5]/[7]/ ([5]-1/[7]-1) -1	@16 Value added (= GDP) constant prices per worker, labour productivity increase	(1)	0.0	4.9
		(2)	0.0	4.9
([5]-[5]-1)/[5]-1	@17 GDP real growth	(1)	0.9	5.8
		(2)	0.9	5.8
[16]/[3]	@18 Net lending to abroad/capital formation, total economy	(1)	14.5	3.9
		(2)	14.7	3.6

Behaviour and participation of corporations in the economy

(percentage)

([24]-[23])/[22]	@19 Earnings (after taxes)/gross capital formation, corporations	(1)	**77.7**	77.6
		(2)	77.7	72.6
-I25]/ ([16]+ [38])	@20 Corporate net borrowing/total net lending of the economy	(1)	31.4	28.9
		(2)	28.3	37.9

Population, employment and labour income

(percentage)

[31]/[29]	@21 Labour income as share of disposable income of households, before taxes	(1)	**84.1**	80.9
		(2)	84.1	80.1
[28]/[4]	@22 Household disposable income/ GDP	(1)	69.9	70.9
		(2)	68.2	71.7
[7]/[33]	@23 No. of employees/population	(1)	36.9	36.9
		(2)	36.9	36.9
([7]-[7] -) / ([7]-1)	@24 Employment growth	(1)	0.9	0.9
		(2)	0.9	0.9
[34]/[32]	@25 Population growth	(1)	**1.5**	1.3
		(2)	1.5	1.3

Table VI.10 (continued)

Behaviour and participation of government in the economy

(percentage)

				t+1, short-term	t+1, long-term
[17]/([17]+[18]+[27])	@26	Government consumption/ total expenditures of Government	(1)	81.2	81.2
			(2)	81.2	81.2
[18]/([17]+[18]+[27])	@27	Government capital formation / total expenditures of Government	(1)	8.6	8.6
			(2)	8.6	8.6
[27]/([17] +[18]+[27])	@28	Other expenditures of Government/ total outlays	(1)	10.2	10.2
			(2)	10.2	10.2
[21] / ([17]+[18]+[27])	@29	Net borrowing/total expenditures of government	(1)	12.3	22.6
			(2)	12.3	22.6
-[21] / ([16] +[38])	@30	Government net borrowing/total net lending of the economy	(1)	26.7	43.8
			(2)	23.4	46.8
-[21]/[4]	@31	Government net borrowing/GDP	(1)	3.1	5.3
			(2)	3.1	5.3

Taxes

(percentage)

[23]/[24]	@32	Taxes/revenues of corporations	(1)	**13.2**	10.5
			(2)	14.0	11.2
[35]/[29]	@33	Income tax ratio of household disposable income before taxes	(1)	**12.4**	8.5
			(2)	12.5	8.4
[8]/[4]	@34	Production taxes less subsidies/value added (=GDP)	(1)	**10.3**	**10.3**
			(2)	10.1	10.3
[19]/[4]	@35	Total taxes/GDP	(1)	22.2	18.3
			(2)	21.8	18.3

Behaviour and participation of households in the economy

(percentage)

[26]/[28]	@36	Propensity of households to consume	(1)	**81.9**	75.4
			(2)	80.3	76.8
[27]/[30]	@37	Capital formation/saving, households	(1)	**38.2**	**38.2**
			(2)	30.4	40.0
[17]/[26]	@38	Government/household consumption ratio	(1)	35.9	35.9
			(2)	36.9	34.9
[26]/[4]	@39	Household consumption/GDP	(1)	57.3	53.5
			(2)	54.8	55.1
-I38]/([16] +[38])	@40	Net lending of households/total net lending	(1)	72.3	92.9
			(2)	75.7	92.4

6.129. The values of the indicator ratios of table VI.10 used in the present compilation of short-term accounts are mostly based on the values that were observed in year (t). (See the values of indicator ratios presented in table III.2.) Some of them are indicator ratios that are traditionally used by national accountants when compiling production accounts. They include a productivity indicator or value added per worker in constant prices (@5), average labour remuneration per worker (@6), a value added/output coefficient (@12), and production taxes less subsidies as a percentage of value added (@34). Less often used product and production coefficients are the investment share in value added (@14) and the import to total supply coefficient (@9). As the present accounts also include institutional sector data, several coefficients are based on the previous year's (t) values in these accounts, that is, labour income as a share of disposable income of households (@21), earnings as a percentage of gross capital formation of corporations (@19), tax rate of corporations (@32) and households (@ 33), propensity of households to consume (@36) and capital formation of households as a percentage of their savings (@37). Two early direct estimates of indicator ratios were used. The first one is the GDP deflator (@7), which may have been based on early price surveys; the other one is population growth (@25), which may have been estimated earlier with the help of population projection methods.

6.130. The values of variables and indicator ratios that are not based on basic data sources or assumptions are presented as first-stage (non-bold) estimates in the first line corresponding to each item of tables VI.9 and VI.10. The estimates of national accounts variables are not balanced at the end of the first stage and this is reflected in a number of statistical discrepancies in the first line of each item at the end of table VI.9. It shows that there are statistical discrepancies between supply and use (-66) and between the estimates of capital formation for industries in the first column of the table and alternative estimates made for each sector (-20). This results in corresponding statistical discrepancies for operating surplus (57) and net lending (-29). The two sets of statistical discrepancies are related to each other, because of national accounts identities holding within and between sectors (57+ 29= 66+ 20).

6.131. The reconciliation of the estimates, that is, the elimination of the discrepancies, is done in the second stage. At this stage, estimated values of variables are adjusted and indicator ratios, if necessary, are changed as well. Generally, the changes are applied to the values of the variables and indicator ratios that, in the first stage, were estimated indirectly, but sometimes the values of variables are also changed based on basic data or assumed indicator ratio values, if those are considered to be less reliable. By comparing the values of variables and indicator ratios in line (1) with those in line (2), an assessment can be made of the extent to which first-stage estimates are adjusted in the second stage of the compilation.

6.132. A similar two-stage process of compilation applies to the long-term estimates in the column t+1, long-term. The main difference with the short-term accounts is that in this case there are many more variables for which basic data are available (19 data items in bold in table VI.9) and therefore less assumed indicator ratios are needed (5 indicator ratios printed in bold in table VI.10) to estimate the remaining variables. The statistical discrepancies measured at the end of stage one of the compilation of long-term accounts are larger than in the case of short-term accounts, because more direct information is available and this direct information may be inconsistent.

6.133. One feature of the present compilation needs to be further examined on the basis of the figures presented in tables VI.9 and VI.10, in preparation for the presentation of the revised Bayesian approach in the following section. That is the extent to which estimates of variables based on basic data and assumed values of indicator ratios used in the first stage of the compilation are altered in the second stage in order to arrive at reconciled national accounts estimates. In general, one would assume that most changes would be applied to the estimates for which no basic data are available. The latter intuitive assumption, however, is not fully justified on the basis of the information presented in the two tables. Thus, one may observe that gross capital formation [3] in table VI.9 was changed from 418 to 412, when compiling short-term accounts between the first and the second stage of the compilation and for the long-term accounts, from 449 to 490. In the case of the short-term accounts, the first figure (418) was indirectly estimated and it was therefore justified to change it to 412. However, in the case of long-term accounts, there was a direct estimate of gross capital formation of industries, which was estimated at 449 and which was changed to 490 in order to arrive at reconciled data. There is only one other data item that was estimated directly and changed between the first and the second stage of the compilation, namely, final consumption of households [26]; in the case of the long-term accounts, it was changed from 1,070 in stage one to 1,102 in stage two of the compilation. No such changes were applied in the second stage of the compilation to other direct estimates of short- and long-term accounts, such as employment [7], exports [11] or the estimates of expenditures by the Government ([17], [18], [20]) or to population figures ([32], [33]). All of these were apparently considered to be robust and/or did not justify any amendment in the light of statistical discrepancies that needed to be resolved. With regard to the indicator ratios in table VI.10, there was only one case in which a ratio was changed, namely, the value added/output ratio (@12); in the case of short-term accounts, it was increased from 49.6 to 50.4 per cent and in the case of long-term accounts, the coefficient was not changed. The above leads to the conclusion that national accountants in their compilation process have in mind implicit reliabilities of the data with which they work and will not change them, even if they consider the estimates based on basic data –and also those indirectly estimated—reliable enough not to warrant a change.

2. Improving present compilation methods, using a Bayesian approach[11]

6.134. While the above formalized description of present national accounts compilation procedures is, of course, highly simplified, it is believed to be sufficiently accurate to serve as a starting point for the development of alternative procedures for national accounts compilation, which may address some of the weaknesses of the present approaches. Such an improved method is described below. It overcomes a number of the weak points of the present compilation methods. First, it makes explicit the reliabilities of basic data and assumptions (indicator ratios), which are implicit in the present method. Furthermore, it allows expanding without limit the number of information items that can be incorporated in the compilation procedure. In the present compilation methods, the number of basic data, assumptions expressed in terms of indicator ratios and national accounts identities cannot be much higher than the number of national accounts variables that are estimated. Already in the first stage of the compilation described above, too much information is used and this leads to initial statistical discrepancies. Another weakness of the present method is that indicator ratios used as assumptions in the compilation cannot be used to any further extent in the type of indicator analysis described in section III.A. If value added-output coefficients are used in the compilation as assumptions, they cannot be further used in the analyses of the estimates thereafter. A last issue addressed by the method below is that estimates of the present methodology are highly dependent on which assumptions (indicator ratios) are used in the compilation. If other indicator ratios are used as assumptions, different national accounts estimates may result.

6.135. The alternative to the present compilation procedures is a Bayesian approach to compilation that has been developed by Jan R. Magnus, Jan W. van Tongeren and Aart de Vos.[12] It avoids many of the above limitations of present national accounts practices and opens enhanced possibilities of better integrating the accounting estimation procedures with those used in indicator analysis and econometrics. Without entering into the technical (mathematical) details of this technique, which are fully described by Magnus, van Tongeren and de Vos, a brief description of this method is given below, followed by a presentation of the accounts estimates for the short and long term, and an assessment of how those estimates differ in quantity and quality from the ones based on present compilation practices discussed above.

6.136. The Bayesian method uses interval estimates for a subset of the variables and indicator ratios instead of the point estimates used in the present practices of national accounts compilation. It thus attaches to each basic data item and assumed value of an indicator ratio a reliability interval that is determined by the national accountant carrying out the compilation.

6.137. Some of the features of the Bayesian estimates are obvious from the following brief description. Instead of confronting within the identities of the accounting framework point estimates of variables and indicator ratios, as is being done in the present methods, the Bayesian approach confronts the values of basic data obtained through surveys and other data sources and assumed values of indicator ratios, together with their reliability indications. Intuitively, it may be clear that when values of variables and indicator ratios are confronted with each other within probability intervals, it is not possible for them to conflict with each other, as is the case when statistical discrepancies result from the present approaches that are based on point estimates. This implies that in the Bayesian method, as much information on variables and indicator ratios as is available can be used as long as reliability intervals can be assigned to each. Furthermore, in the Bayesian approach, the final estimates of the variables and indicator ratios will, in general, be different from the initial data or assumptions. This contrasts sharply with current compilation practices, where estimates of variables that are based on basic data remain generally untouched, as was explained in the previous section. Finally, as the number of information items with regard to variables and indicator ratios that can be accommodated in the Bayesian method is, in principle, unlimited, the estimates after national accounts reconciliation are not dependent on the selection of information that is used, which is an obvious advantage over the present methods of compilation.

(a) <u>A simple example</u>

6.138. This intuitive description may be clarified with the help of a simple example that includes the main national accounts aggregates: GDP (y), final consumption (c), gross capital formation (i) and exports minus imports (x). So-called prior and posterior values are presented in the first and third columns of table VI.11, together with the corresponding 5 per cent standard errors that hold with 95 per cent probability. The prior values in the first column refer to basic data in the case of GDP (y) and exports minus imports (x), to assumed values of final consumption (c) and the consumption/investment ratio (c/i) based on the previous year's data. The posterior values in the third column refer to the final estimates after national accounts reconciliation. They are estimated with the help of a statistical technique that takes into account the prior information on variables and indicator ratios and also the identities that should hold. As a result of using this so-called Bayesian estimation technique, the estimated (posterior) values of the national accounts variables are located within acceptable ranges (reliability intervals) that are consistent with those that were fixed at the outset for prior (basic) data and indicator ratios used in the estimation. Posterior values presented in the third column satisfy the national accounts identity between GDP and expenditures (211.6+69.9-44.3=237.2).

Table VI.11. Simple example of the Bayesian approach

National accounts aggregates and indicator ratios	Prior values (standard error)		Posterior values (standard error)	
National accounts variables				
GDP (y)	230	(11.5)	237.2	(9.2)
Final consumption (c)	220.5	(11.025)	211.6	(7.0)
Gross capital formation (i)			69.9	(3.7)
Exports less imports (x)	-44	(2.2)	-44.3	(2.2)
Indicator ratios				
Consumption-investment ratio (c/i)	3.0	0.15	3.03	0.11

6.139. What is interesting in the Bayesian approach is that it starts with 5 per cent reliability intervals corresponding to the prior value of each national accounts variable (column 2) and ends up with reliability intervals for posterior values (column 4) that are much less than 5 per cent, except for the last aggregate of exports minus imports (x).

6.140. The example includes one indicator ratio, namely, the consumption/investment ratio (c/i), which has been given a prior value of 3.0 (based on past data), together with a 5 per cent standard error (0.15) that is assumed to be satisfied with 95 per cent probability. The posterior value of this ratio is consistent with the posterior values of the national accounts variables (211.6/69.9=3.03). The standard error of the posterior value is less than the 5 per cent interval that was assumed for the prior value of the indicator ratio. The latter reflects an important advantage of the Bayesian approach, as compared with the present national accounts compilation approaches. While the indicator ratio has been given a prior value -- comparable to the first-stage estimate in the present compilation approaches -- it ends up with a posterior value and reliability interval that is different from the corresponding prior values. This means that the indicator ratio, for which a prior value has been used in the compilation, can still be used as an indicator ratio in the analysis of the data. This is not the case in the present methods, where point estimates of indicator ratios are used as assumptions in the compilation.

(b) Prior and posterior values in a more comprehensive example

6.141. The Bayesian technique is applied to the values of short- and long-term accounts variables and indicator ratios of tables VI.9 and VI.10, to which the present compilation method was applied. The starting point of the Bayesian approach is the selection of prior values of national accounts variables and indicator ratios that are based, respectively, on basic data sources and assumptions, as used in the first stage of the present compilation described in section D.1.

6.142. The prior values of variables and indicator ratios and their reliability intervals are presented in table VI.12 and compared with those that are used in the present compilation approach. Prior values of variables are presented in “normal” letters and those that refer to indicator ratios are presented in *italics*. The variables and indicator ratios carry the same codes as those that are used in tables VI.9 and VI.10. They are grouped together by the sectors that were identified in the columns of table VI.9. The values presented in table VI.12 correspond for short- and long-term accounts to the first line of each item in tables VI.9 and VI.10. For the present compilation approach, in columns (b) and (d), the prior values that were presented in **bold** in tables VI.9 and VI.10, are indicated. The prior values used in the Bayesian approach are indicated in columns (a) and (c). The reliability indications of prior values used in the Bayesian approach are presented in column (e). A distinction has been made there between high (H), medium high (MH), medium low (ML) and low (L) reliability. They correspond to reliability intervals of ±0.5.per cent, ±2.5 percent, ±5 percent and ±10 percent, respectively. These are the intervals within which the prior values are located with 95 per cent probability.

VI.12. Prior values of variables and indicators used in the Bayesian and present approaches to compilation

		Variables and indicator ratios	short-term accounts		long-term accounts		reliability of *prior* values in the Bayesian approach
			prior values		*prior* values		
			Bayesian compilation (a)	Present compilation approach (b)	Bayesian compilation (c)	Present compilation approach (d)	(e)
Total economy	[1]	Output, incl. product taxes less subsidies			4034	4034	ML
	[3]	Gross capital formation, total economy			449	449	L
	[6]	Compensation of employees paid & mixed income , gross	1252		1252		MH
	[7]	Employment, thousand m/years worked	33.657	33.657	33.657	33.657	MH
	@23	*Nr. of employee/population*	*37.1%*		*37.1%*		*MH*
	@12	*Value added /Output coefficient, TOTAL*	*49.6%*	*49.6%*	*49.6%*		*H*
	@14	*Investment share in Value added (= GDP)*	*22.3%*	*22.3%*	*22.3%*		*MH*
	@7	*GDP Price deflator*	159.8%	*159.8%*	*163.0%*	*163.0%*	*H*
	@5	*Value added (= GDP) constant prices per worker, labour productivity (1000 US dollar per m/year)*	*34.782*	*34.782*	*34.782*		*MH*
	@13	*Labour share in Value added (= GDP)*	*64.9%*		*64.9%*		*H*
	@34	*Production taxes less subsidies/ Value added (=GDP)*	*10.3%*	*10.3%*	*10.3%*	*10.3%*	*MH*
Rest of the world	[10]	Imports			543	543	MH
	[11]	Exports	567	567	567	567	MH
	[13]	Compensation of employees, received by residents less paid to nonresidents	4	4	4	3	*
	[14]	Taxes on production less subsidies plus taxes on income and wealth, received by resident government less paid to non-resident government	1	1	1	0	*
	[15]	Other incomes, receipts by residents less payments to nonresidents	-8	-8	-8	-10	ML
		Import / supply-use	*11.8%*		*11.8%*		*MH*
Corporations	[22]	Gross capital formation, corporations			316	316	ML
	[23]	Taxes on income and wealth, paid by corporations			29	29	ML
	[24]	Other incomes, receipts less payments by corporations	275	275	275	275	ML
	@32	*Taxes / revenues of corporations*	*13.2%*	*13.2%*	*13.2%*		*MH*
	@19	*Earnings (after taxes) / gross capital formation, corporations*	*77.7%*	*77.7%*	*77.7%*		*MH*
Government	[17]	Final consumption, government	385	385	385	385	MH
	[18]	Gross capital formation, government	41	41	41	41	MH
	[19]	Taxes on production less subsidies plus taxes on income and wealth, received by government			366	366	MH
	[20]	Other outlays, payments less receipts by government	48	48	48	48	MH
		Government / household consumption ratio	*35.7%*		*35.7%*		*MH*
Households	[26]	Final consumption, households			1070	1070	L
	[37]	Capital transfers households, receipts less payments	11	11	11	11	L
	[32]	Size of population, thousand inhabitants, beginning of year			90.000	90.000	MH
	[33]	Size of population, thousand inhabitants, end of year			91.200	91.200	MH
	@36	*Propensity to consume of households*	*81.9%*	*81.9%*	*81.9%*		*MH*
	@37	*Capital formation / saving, households*	*38.2%*	*38.2%*	*38.2%*		*MH*
	@21	*Labour income as share of disposable income of households, before taxes*	*84.1%*	*84.1%*	*84.1%*		*MH*
	@33	*Tax ratio of household disposable income before taxes*	*12.4%*	*12.4%*	*12.4%*		*MH*
	@25	*Population growth*	*1.5%*	*1.5%*	*1.5%*		*ML*

*) When the prior value is less than 10, the rel1iability is assumed to be MH

6.143. The table shows that the Bayesian approach can accommodate much more prior information than the present approaches to national accounts compilation. This becomes particularly apparent in the compilation of long-term accounts, when more basic data are available, and less prior information can be accommodated in the present approaches. Thus, column (d) shows that the number of national accounts variables (normal characters) estimated with the help of basic data and thus also available to the present compilation approach is 19 out of a total number of data items of 38. As a consequence, the present approach can only accommodate prior values for two indicator ratios (printed in *italics*). In the Bayesian approach, one additional national accounts variable is used as a prior value in column (c), that is, compensation of employees paid and mixed income, gross [6] and, furthermore, prior values of 16 indicator ratios are used. The latter number could be increased in the Bayesian approach, if necessary. When compiling short-term accounts, the number of national accounts variables for which basic data are available to both approaches is much less, that is, 10 items in columns (a) and (b). In the present compilation approach, therefore, more indicator ratios are needed to estimate all other national accounts data items, that is, 12 in column (b). In the Bayesian approach, the same number of indicator ratios is accommodated as in the compilation of long-term accounts, that is, 16 in column (a).

6.144. Table VI.13 presents the posterior values of selected national accounts variables and indicator ratios based on the present and Bayesian approaches. They are referred to as “key variables and indicators” as they are often used in analysis. The posterior values resulting from the present approach are presented for short-term accounts in column (a) and for long-term accounts in column (d). They are the same values as presented in the second line of the corresponding items in tables VI.9 and VI.10. For easy reference, table VI.9 includes the codes of each item. The posterior values of the Bayesian approach are presented in column (b) for short-term accounts and in column (e) for long-term accounts. Each posterior value resulting from the Bayesian approach also has a reliability interval, which is indicated for short-term accounts in column (c) and for long-term accounts in column (f). As in table VI.12, the national accounts variables and indicators are grouped by the sectors that were distinguished in the accounting framework of table VI.9.

6.145. A number of interesting conclusions can be drawn from a comparison of the posterior values of the present and Bayesian approaches.

6.146. In most instances presented in table VI.13, the Bayesian approach generates estimates for short–term accounts that are much closer to those of long-term accounts than when the present compilation approach is used. This applies to the estimates of national accounts variables, as well as to the estimates of indicator ratios. Thus, the absolute value of the difference in the Bayesian approach between short- and long-term estimates (columns (b) and (e)) of gross capital formation for the total economy [3] is 10 (434-424), GDP, market prices, current prices [4] is 48 (1,938-1,890), final consumption of households [26] is 8 (1,076-1,058) and net lending of households [38] is 4 (162-158);

Table VI.13. Posterior values and reliability intervals of key variables and indicators, compared between the present and Bayesian compilation approaches

		Key variables and *indicator ratios*	short-term accounts			long-term accounts		
			present compilation approach	Bayesian compilation approach		present compilation approach	Bayesian compilation approach	
			Posterior value		Reliability interval of *posterior* values	*Posterior* value		Reliability interval of *posterior* values
			(a)	(b)	(c)	(d)	(e)	(f)
Total economy	[3]	Gross capital formation, total economy	412	434	11.2	490	424	8.8
	[4]	GDP, market prices, current prices	1901	1938	30.8	2001	1890	22.9
	@14	*Investment share in Value added (= GDP)*	22.3%	22.4%	0.5%	24.5%	22.4%	0.4%
	@3	*Per capita GDP (1000 US dollars)*	20.817	21.246	0.544	21.944	20.760	0.388
	@17	*GDP real growth*	0.9%	1.5%	3.1%	5.8%	0.0%	1.3%
Rest of the world	[12]	External balance of goods and services	63	43	15.0	24	29	13.1
	[16]	Net lending, rest of the world	60	40	15.0	17	24	13.1
	@10	*Export- Import gap as %of GDP*	3.3%	2.2%	0.8%	1.2%	1.5%	0.7%
Corpo-rations	[25]	Net lending, corporations	-70	-67	6.6	-87	-67	5.6
Government	[17]	Final consumption, government	385	384	8.0	385	380	7.2
	[21]	Net lending, government	-58	-51	9.4	-107	-71	8.2
	@35	*Total taxes/ GDP*	21.8%	21.8%	0.3%	18.3%	21.0%	0.3%
	@38	*Government / household consumption ratio*	36.9%	35.7%	0.7%	34.9%	35.9%	0.7%
	@31	*Government net borrowing / GDP*	3.1%	2.6%	0.5%	5.3%	3.8%	0.4%
Households	[26]	Final consumption, households	1042	1076	24.4	1102	1058	19.6
	[29]	Disposable income, gross	1297	1313	24.2	1435	1302	20.4
	[30]	Saving, gross	255	237	17.6	333	244	16
	[38]	Net lending, households	189	158	11.1	211	162	10.1
	@36	*Propensity to consume of households*	80.3%	82.0%	2.3%	76.8%	81.2%	0.1%
	@1	*Household disposable income/capita (1000 US dollars)*	14.198	14.399	0.392	15.739	14.305	0.300
	@39	*Household consumption / GDP*	54.8%	55.5%	0.8%	55.1%	56.0%	0.7%
	@40	*Net lending of households/ total net lending*	75.7%	79.7%	5.3%	92.4%	87.2%	5.7%

in all instances mentioned, the difference is less than 3 per cent. In the case of the estimates based on the present compilation approach (columns (a) and (d)), the absolute values of the differences are, respectively, 78, 100, 60 and 23; the percentage difference for gross capital formation is 19 per cent; for all other variables selected the difference is more than 4 per cent.

6.147. The same applies to the estimates of the indicator ratios between the short-term and long-term approaches: GDP real growth (@17) changes in the present compilation approach from 0.9 to 5.8 per cent between short- and long-term accounts, and in the Bayesian approach the real growth reduces from 1.5 to 0.0 per cent. Per capita GDP (@3) increases from 20.817 to 21.944 thousand United States dollars between short- and long-term accounts (a change of 5.4 per cent), while in the Bayesian approach, it decreases from 21.246 to 20.760 thousand (a change of 2.3 per cent). A last example is taxes as a percentage of GDP (@35), which decreases from 21.8 to 18.3 percent between the short- and long-term compilation, while in the Bayesian approach it decreases from 21.8 to 21.0 per cent.

6.148. In the long-tem approach, when more information is available, one expects that the posterior values of the two approaches should come close to each other. This is the case for some, but not for others. GDP [4], final consumption of Government [17] and final consumption of households [26] differ less than 5 per cent between the present and the Bayesian approaches in the case of long-term accounts. On the other hand, there are large differences with regard to gross capital formation for the total economy [3] (13.5 per cent), external balance [12] (18.6 per cent) and four other balancing items, namely, net

Table VI.14. Reliability intervals of prior and posterior values

National accounts aggregates and indicator ratios	Reliability intervals of Prior values		Posterior values
National accounts variables			
			(Percentage)
Gross capital formation, total economy	L	10	2.1
Final consumption, Government	MH	2.5	1.9
Final consumption, households	L	10	1.9
Indicator ratios			
Investment share in value added (= GDP)	MH	2.5	1.8
Government/household consumption ratio	MH	2.5	1.9
Propensity to consume of households	MH	2.5	0.1

lending, rest of the world [16] (37.5 per cent), net lending, Government [21] (33.7 per cent), net lending, corporations [25] (22.7 per cent) and net lending, households [38] (23.3 per cent). The percentage difference between the two approaches is considerable for some and less for other indicator ratios: GDP real growth (@17) is 5.8 per cent in the present approach and 0.0 per cent in the Bayesian approach; the export-import gap (@10) as a percentage of GDP is 1.2 per cent in the present approach and 1.5 per cent in the Bayesian approach; government net borrowing as a percentage of GDP (@31) is 5.3 per cent in the present approach and 3.8 per cent in the Bayesian approach; and the propensity to consume of households (@36) is 76.8 per cent in the present approach and 81.2 per cent in the Bayesian approach.

6.149. Finally, it may be interesting to compare the reliability intervals of prior and posterior values, which are available for some of the national accounts variables and indicator ratios. Taken from tables VI.12 and VI.13, they have been reproduced in table VI.14. The percentage reliability intervals of the prior values correspond to those presented as H, MH, ML and L in column (e) of table VI.12, and the reliability intervals of the posterior values are calculated by relating the absolute values of reliability intervals presented for long-term accounts in column (f) of table VI.13 to the posterior values presented in column (e). Table VI.14 shows that in all instances the percentage reliability intervals of posterior values are reduced as compared to those of the prior values. In particular, the reductions in the percentage interval of gross capital formation of the total economy and the propensity to consume of households should be noted.

(c) Potential of the Bayesian technique

6.150. The estimation technique explained in the present section was developed for a simple accounting framework as presented in tables III.1 and VI.9. However, in principle, the technique could be used in a data set that is integrated -- that is, made consistent -- through an accounting approach to data development. Thus, it could be used to estimate the variables and indicator ratios of a socio-accounting framework as presented in section IV.A, the financial and monetary variables and indicator ratios of section III.C and/or the environmental indicator ratios and supporting data of section IV.D.

6.151. The technique that was elaborated on the basis of Gauss software can be applied to a small data set as presented here, or to a much larger data set. Thus, the technique could also be used by countries as an integral part of a national accounts compilation in which the number of intermediate data items is very large. The feasibility of this will be tested in an operational follow-up to the theoretical development of this technique.

6.152. The indicator ratios estimated above are limited to coefficients that hold within one period. However, this is not necessarily a limitation of the technique, as indicator ratios could also be defined between basic data of different periods. Growth rates are obvious examples, but also capital output ratios are inter-period indicator ratios, and lagged relations between causes in one period and effects in another may be another example of indicator ratios that are defined between variables in different periods. The technique could thus be applied to national economic and other macro accounts variables covering several accounting periods.

6.153. The latter would be a step towards extending the technique from estimating simple indicator ratios to estimating parameters in more complex models, such as the ones presented in chapter VII, the estimation of which are based on time series analysis. Once that is achieved, the simple projections in the present section and in section IV.A, based on indicator ratios, may then be based on more complex and comprehensive models involving the estimation of parameters based on time series analysis. Then, a more effective link will be established between the compilation approaches of macro accounting and projections based on those accounts and made through comprehensive modelling.

6.154. In the paper by Magnus, van Tongeren and de Vos [13]reference was made to another use of the technique in sensitivity analysis. It was shown that different configurations of basic data availability led to differences in the reliability of the final estimates of data and indicator ratios. This could be used to determine which data sources would have priority in the development of national accounts, as each data source would have its own influence on the reliability of the posterior values. To some extent, this was also made explicit in the present section, where the reliability of (final) estimates within short-term accounts based on a limited basic data set were compared with the posterior values of long-term accounts when more basic data are available.

Notes:

[1] See V. Zarnowitz, Business Cycles, Theory, History, Indicators, and Forecasting (Chicago, University of Chicago Press, 1992), chap. 10.
[2] See, for example, S.K. McNees, “Forecasting cyclical turning points: the record in the past three recessions”, in Leading Economic Indicators: New Approaches and Forecasting Results, K. Lahiri and G.H. Moore, eds. (New York, Cambridge University Press, 1991).
[3] See C. Boschan and W.W. Ebanks, “The phase-average trend: a new way of measuring economic growth”, in 1978 Proceedings of the Business and Economic Statistics Section (Washington, D.C., American Statistical Association, 1978); see, also, R.J. Hodrick and E.C. Prescott, “Post-war U.S. business cycles: an empirical investigation”, discussion paper no. 451 (Pittsburgh, Carnegie-Mellon University, 1980).
[4] J. Tinbergen, Statistical Testing of Business-Cycle Theories, two volumes (Geneva, League of Nations, Economic Intelligence Service, 1938/39).
[5] L.R. Klein, “Cyclical indicators in econometric models”, in Analyzing Modern Business Cycles: Essays Honoring Goeffrey H. Moore, P.A. Klein, ed. (Armonk, New York, M. E. Sharpe, 1990).
[6] For further details, see Marie Raynaud and Sylvie Scherrer, “Utilisation de l’enquête mensuelle auprès des chefs d’entreprise dans le diagnostic conjoncturel ”, note de conjoncture (INSEE, December 1997), p. 24.
[7] More recently, countries of the region have committed themselves to a broader set of objectives for integration, which aims at a sustained and sustainable socio-economic development for the region (based on decisions of the presidential summits of the five Central American countries). Sustained development in this context means a steady GDP growth rate in balance with the environment, and in terms of a suitable rate of national saving that progressively reduces dependency on external financing. The environmental dimension of integration, which until now has only been pursued by Costa Rica, has not been dealt with in this section.
[8] See Marcelo Caiola, A Manual for Country Economists, Training Series No. 1, vol. 1 (Washington, D.C., IMF Institute and IMF Research Department, 1995).
[9] United Nations publication, Sales No. E.99.XVII.10.
[10] The long-term (t+1) second-stage estimates were used in section III.A, where economic development was explained with the help of indicators.
[11] The present section is based on Jan R. Magnus, Jan W. van Tongeren and Aart de Vos, “National accounts estimation using indicator ratios”, Review of Income and Wealth, series 4b, No. 3 (2000).
[12] See note 11.
[13] Ibid.

VII. Specification of Models and the Design of Macro Accounts

7.1. This last chapter is about the relationship between modelling and macro accounting. It is in many ways the logical extension of what has been presented in previous chapters, which dealt mainly with what was earlier termed "indicator analysis". In some of the sections of chapters III, IV and VI, indicator ratios were presented as a means of analysing the data in economic and satellite accounts. It was also argued there that analysis with the help of indicators could be carried out more effectively if they were defined and measured within an accounting framework, as the use of the latter would contribute to the conceptual and quantitative coherence of the indicators. The indicator analysis in those chapters focused, however, on assessing developments in the past or, as in chapter VI, in the immediate past.

7.2. Modelling extends this analysis, by using relations between developments and corresponding data in the past as a means of projecting the developments and data to the future. This link between past and future developments has already been pursued in previous chapters – in chapter III for economic indicators and in section IV.A for socio-economic indicators, where indicator ratios were used as a basis for projecting past developments to the future.

7.3. These simple projection models can be considered as a first step towards establishing a link between simple indicator ratios and parameters in more complex models that are measured through econometric techniques. The ratios were based on values of the data of one year. When using the data of past periods in more complex projection models, the parameters of functional relations are estimated through regression techniques and their values can be considered as averages across periods. Each functional relation is generally more complex than the ones in a simple model. Thus, while in a simple model, GDP or value added is related to and explained with the help of a ratio between investments and GDP, a more complex functional relationship may explain investments not only on the basis of GDP/value added, but also use prices, interest rates and other explanatory variables. Furthermore, in more complex models, time lags and other features may be built in, which facilitate projections of developments over time.

7.4. The chapter should be read within the above context. The first section presents the Norwegian experience in integrating modelling and accounting, which is particularly advanced, as macro accounting and modelling have been the responsibility of Statistics Norway since the late 1930s. The next two sections deal with international models. Section B presents the experience of the United Nations Project LINK model, in which projected developments based on national models interact globally with one another through sub-modules of external data of macro accounts on imports and exports, migration and financial flows. LINK includes 79 individual models, representing 72 countries and seven regional groupings, that together constitute a set of 30,000 variables, in which the models are prepared with the cooperation of national and international agencies and researchers. Section C presents the World Bank experiences with the RMSM-X model, which is a flow-of-funds version of the revised minimum standard model (RMSM). The model is to be used by economists in a country to provide analysis of policy packages. In addition, the model generates all the projections required when IMF or the World Bank assists those countries in the formulation of policy goals and the implementation of programmes to pursue them. The model deals with the impact on economic growth of financial and monetary policies that are either supported or not supported by foreign loans and other aid. The last two sections deal with models whose format and scope are very close to those of the national accounts. Section D presents a comprehensive model developed in the Netherlands Antilles, which has frequently been used to project short- and long-term impacts of government policies. The section not only includes a comparison of the scope of the national accounts and the model with regard to the Netherlands Antilles, but also compares the methods used in the model to project data with the compilation methods used in the national accounts. The conclusion of the section is that national accountants estimating data indirectly when no direct information is available may use the projection methods used by modellers.

A. Integration of modelling and national accounting: experience of Norway

7.5. A special feature of Statistics Norway is that it has a large in-house Research Department. The Research Department was, from the start, responsible for the development of economic models and, until 1991, for the national accounts as well.

7.6. The close coordination between accounting and modelling is based on a number of basic considerations, which are well summarized by Odd Aukrust,[1] who was at the time Director of the Research Department of Statistics Norway and responsible for both national accounts and model building in Norway, in a paper he presented at a meeting of the International Economic Association, in Italy in 1976:

> *"One lesson to be learned is that the location of the model building work within the national statistical agency has much to recommend it. The important point is that this allows model construction work to be intimately connected with national accounting work. Indeed, in Norway, the national accounting unit and the model construction unit are parts of the same Research Department and are located literally on the same floor. Obviously, this favours the establishment of close links, conceptually and otherwise, between the planning model and its database, with beneficial effects to all parties concerned. For the model builder it means that the data problems connected with model construction are immensely simplified, and that the annual updating of the model can be made a simple routine job. To the national accountant it means feedback effects, helping him to choose his definitions and classifications in such a way as to make the national accounts data maximally useful for analytical purposes. To the planner or model*

> *user, finally, it means that model results can be brought easily together with historical series and studies against the background of data for the past."*

7.7. This is still the view of Statistics Norway and has been confirmed by reviewers of the Ministry of Finance, who wrote in a description of the Norwegian planning models originating in the Ministry of Finance:

> *"But there has been a two-way channel of adaptation. The administration has had ample opportunity to influence the model development, and the successive model versions have been more and more dedicated to the policy-making framework."*[2]

7.8. Behind the quotations above is the notion that one would not be able to observe the functioning of the economy from the data of the national accounts alone. Also needed are inputs from economic theory, econometrics and, possibly, other data sets in order to construct an empirical model. In the models discussed here, the national accounts play a dominant role as a data source. The models and the national accounts share a common interest of displaying the workings of the economic system.

7.9. Macro models are at times evaluated according to their ability to predict GDP and other national account indicators. While this is relevant, there is certainly more to the models. For a model to be useful for policy analysis, it is important that it be able to address a wide range of policy questions.

7.10. When using the term "national accounts" in the present section, it refers not only to the comprehensive data sets produced as a result of the accounting activities, but also to the definitions of concepts and classifications, which are useful for macroeconomic analysis. As a result of the cooperation between accountants and modellers, one may expect, at the present time, to find these concepts both in the accounts and in the models, as well as in the design of data collection.

1. The close integration of accounting and modelling

7.11. The close coordination of modelling and accounting has evolved over a long period of time, starting in the years prior to the Second World War. In the pre-war years, the initiative was clearly that of the University of Oslo, where, in 1928/29, Ragnar Frisch held his first lectures on "the economic circulation system". By the mid-1930s, his system looked very much like modern national accounts.[3] This conceptual system was fully developed in the early War years. Even though some tests of the system were made for particular industries, the empirical work was never finished.

7.12. During the War (1940 to 1945), the initiative for national accounting shifted to Statistics Norway, where it has stayed, although contacts with the universities are still close, especially on questions of modelling and econometrics. A separate division for national accounts within Statistics Norway was established in 1946, headed by Odd

Aukrust. In 1947, the national budget was introduced in the Norwegian political system[4]. At the start, the budget had an emphasis on planning and managing extensive and rigorous direct controls, for example, of building materials. Such planning needed the national accounts system, so that the plan could be considered within a consistent data framework. The first national accounts publication of Statistics Norway was issued in 1952. In 1950, the Research Department was formed, headed by Odd Aukrust. The Research Department consisted of the National Accounts Division, the Tax Research Unit and the Unit for Business Cycles Analyses. Until 1991, the Director of the Research Department was responsible for both model building and the national accounts.

7.13. The first input-output model of Statistics Norway, MODIS, which was developed for use in the government planning system, was finished in time to be used in the preparation of the national budget for 1961.[5] That event may have signalled the end of the pioneering period. During that time, a system of economic planning was introduced and the tools in terms of a computerized national accounts system and macroeconomic models were developed. The present division of labour between model users and model builders was established at that time.

7.14. In 1991, Statistics Norway was reorganized. The National Accounts Division was transferred from the Research Department to the Department of Economic Statistics. This resulted in more emphasis on the role of the national accounts for coordinating and integrating economic statistics. The National Accounts Division still has close relations with the Research Department, in particular with the monitoring of short-term economic development and economic surveys. Statistics Norway has become an important user of its own models and a producer of forecasts and model-based analyses. The models and the accounts have changed since the pioneering period, but the main features of the organization of model building and accounting remain as they were at the end of the early period.

7.15. During the 1980s, the responsibilities of Statistics Norway as a model developer were confirmed, and a specific agreement, together with a somewhat enlarged budget for modelling maintenance and development, was established. An important formal channel for interaction in Norway is the Modelling Committee, established by the Ministry of Finance soon after 1960 to discuss and coordinate modelling issues between the Ministry, the Institute of Economics at Oslo University and the Research Department of Statistics Norway. The Central Bank was allowed one representative on the Committee after it started model building of its own, and later the Norwegian School of Business Administration was also invited to join. The interaction between model builders and policy makers in the Norwegian tradition is described by Olav Bjerkholt.[6]

7.16. In a review of models and data in the Norwegian system of economic planning, Terry Barker concluded that "the Norwegian system has considerable advantages", but there is a possibility "that fewer resources are put into them [model building and research] than if they [the Ministry of Finance] were directly responsible for research and development. Associated with this is a slower response by the model-builders to new policy pressures ".[7] At the time, models were appearing within the Ministry of Finance and the Central Bank of Norway. Barker's conclusion was: "It is important that as soon as the Bureau [Statistics Norway] has developed a satisfactory alternative, the outside model should be closed down".

7.17. The contacts between accountants and model builders seem less intense today than in 1976, when Aukrust made his speech (see above). This is, however, not only a consequence of the increased organizational and physical distance between the national accounts and modelling departments, which still is small. As the systems have been running for some time, the work is shifting towards maintenance of the existing set of models, and the close administrative contacts between model builders and accountants may be of diminishing importance. The exception is in the field of quarterly accounts and business cycle monitoring, where contacts have intensified. In trying to reap the benefits referred to by Aukrust, the essential coordination between national accountants and modellers, it may be that the emphasis should be shifted from solely data support of modelling by national accountants to the formulation of joint projects. It is possible that the satellite account format may allow for manageable projects involving both model builders and national accountants. At present, there are two new satellite accounting projects that could result in a more active cooperation. These are in the fields of environmental accounts and labour accounts. The shared interest in labour accounts has so far focused mainly on the qualification structure of employed persons.

7.18. Another factor that needs to be taken into account is funding. While it is relatively easy to finance the first implementation of new satellite accounts, it is much more difficult to obtain long-term funding for maintenance and updating. As the series of successful satellite accounts is growing, particular attention may be paid to the question of maintenance and updating within the limitation of scarce resources.

2. Applications of models in policy analysis

7.19. There are two main models -- MODAG and MSG -- and some other models that are present maintained by Statistics Norway. They are described in section (a) below, their uses are reviewed in section (b), and the role of the national accounts therein is examined in section (c). The use of quarterly models and national accounts is dealt with in section 3.

(a) Models

7.20. MODAG is the main model for policy analysis used by the Norwegian Ministry of Finance. It is used for short- and medium-term projections. The MODAG models are demand-oriented models that are based on the original input-output models of the early 1980s. The model has 29 industries and 45 products. The model incorporates the supply and use tables of the national accounts at this level of aggregation. The parameters for the supply and use tables are re-estimated every year as new data from the national accounts are made available. Likewise, all the econometric equations are re-estimated each year, adding a new year of information to the previous time series. Almost all the data used for the model come from the national accounts. Some exceptions cover labour supply and population by age groups, and data for export market developments. There is a close integration of national accounts and the formulation and estimation of this model. The main features of the model are described in an extract from the latest long-term programme,[8] and more details can be found in the article by Adne Cappelen.[9].

Box VII.1. Main features of MODAG

MODAG is a demand-oriented model, in which changes in the activity level and employment, to a great extent, is explained by changes in demand components such as private consumption, private investments and government expenditure for consumption and investments.

Private consumption in the model depends partly on the development of household disposable real incomes and partly on the development of household wealth. Investment in the companies of mainland Norway is largely assumed to be a consequence of the growth in production (acceleration principle), but to some extent also of profitability considerations in the industries. Among the determinants of investments in dwellings, one finds developments of household incomes and prices of used dwellings. Exports of traditional products depend partly on market developments and partly on export prices relative to the prices that Norwegian exporters are facing in competition with foreign producers. Imports of traditional products in MODAG, to a large extent, follow from the demand, but relative prices are of importance as well.

Employment is largely determined by production, but also depends on wage costs relative to unit costs of intermediate consumption. Increased growth in unit wage costs implies a substitution of intermediate consumption for employment in the factor demands of the establishments.

Wage formation is the most important supply-side mechanism of the model. Changes of unemployment as a consequence of demand shocks imply changes in the real wage level and in prices of Norwegian products relative to world market prices. With the passing of time, this will contribute to dampen the total effects of demand shocks on activity levels and employment. However, the strength of this mechanism depends on the level of unemployment and on how fast unemployment is reduced. There is uncertainty related to the way changes of unemployment would influence the growth of wages. On the basis of the present level of unemployment, the impacts of changes in unemployment on wage rates development are smaller in the MODAG model than in the macroeconomic model RIMINI of the Central Bank of Norway.

7.21. MSG is a second group of models, which originated from the work of Leif Johansen in the late 1950s.[10] The responsibility for maintaining and developing the model was transferred to Statistics Norway in the 1970s. MSG models are computable equilibrium models in which consumers and producers use all available resources. This implies that all labour that is supplied is used by means of adjustments of the wage rates. The growth in the economy is mainly determined from the supply side by technological change, growth in capital stocks and the development of supply of labour, and by the supply of certain natural resources. The description of production activities of the society is a central part of the model. Forty industries are specified, of which seven belong to the general government sector. Production factors include intermediate consumption, labour, three types of capital equipment, two types of energy and various types of transport. These factors are, to a varying degree, substitutable. The model also gives a relatively detailed description of the supply and use of energy. In a post model, emissions of various pollutants related to the use of fossil energy and industrial processes are projected. The model may be used to assess the interrelationships of the development in economic activity, energy use and selected environmental problems.[11] Other features of the MSG models are described in box VII.2.

Box VII.2. Other features of MSG models [a)]

- The market structure of many industries (including manufacturing industries) is characterized by a number of producers of relatively equal, but not identical products (monopolistic competition on the home market).
- ·Norwegian exporters of manufacturing products face set prices on the world market, and can sell all their profitable products at these prices.
- ·In every industry, gross fixed capital investment is determined so that the expected rate of return to capital equals a predetermined amount. This amount is supposed to be set by the rate of return on financial investments abroad, as a consequence of free mobility of financial capital between Norway and other countries. Special attention is paid to the modelling of the electric power market.
- ·The model does not pay attention to delays in adjustments.
- The central assumptions to be made by the model user are: demographic developments, number of hours worked, tax rules, production taxes and subsidies, development of production, prices and investments of petroleum extraction, world market prices by product, requirements for the rate of return on capital.
- ·Required development of the current external balance and net financial investments of households and general government.

a) See note 8, box 3.5.

7.22. The newest version of the MSG model, MSG6, is used for the long-term programme for the period from1998 to 2001. An earlier version, MSG-EE (multi-sectoral growth - energy and environment),[12] was used to analyse the green tax reforms. This earlier model had a somewhat simpler description of production behaviour. The production part of MSG6 is described by Holmøy and Hægeland,[13] and household behaviour is described by Bye and Holmøy.[14].

7.23. Adhering to the traditions of Statistics Norway, the MSG models integrate the supply and use tables of the national accounts. Data from the national accounts are used for calibrating the model to the base year. In the earlier MSG-EE version, producer and consumer behaviour was estimated econometrically using time series from the national accounts. In the new version of MSG6, a serious attempt is made to integrate parameters estimated by econometric analyses of microdata. This implies less use of the time series of national accounts for econometric analyses.

7.24. The sub-model of energy products (in physical units) and emissions can be combined with the MSG models and with the MODAG model. The data are taken from the energy accounts and the emission accounts. These accounts have not been part of the national accounts, and there are some consistency problems that are apparent when comparing the values of the use of energy products for intermediate consumption and household consumption (the national accounts figures), to the corresponding figures in physical units from the energy accounts.

7.25. The large models of Statistics Norway are also available for other than government use, and are often used as a starting point for further model analyses, for instance, transportation models and regional models. These models often combine national accounts data with specific data related to the project at hand.

7.26. The quarterly model of Statistics Norway, KVARTS, is described in section 3. The model for tax analyses, LOTTE, is a static microsimulation model based on a population model that is the sample used for income statistics. The model is calibrated to totals from the income statistics. Data from the national accounts are used for wage income and dividends shares. Some of the results are used for the household sector accounts in the national accounts. Statistics Norway also has a dynamic microsimulation model, MOSART. It is used for labour supply analyses and projections of the social security system. There is no formal use of national accounts data in this model.

7.27. The regional models are of the input-output type. They are to a large extent estimated from the regional accounts. These accounts give a distribution of each cell of the national supply and use table by county. For the regional models, these data must be supplemented by data on trade patterns.

7.28. The RIMINI model of the Central Bank of Norway is a quarterly econometric model. It is a much smaller model than MODAG or MSG, without input-output relations. The model is estimated from the time series of the quarterly national accounts. The models of the Central Bank of Norway have an emphasis on financial flows and financial balance sheets for institutional sectors.

7.29. The Norwegian School of Business Administration has provided smaller models of the computable equilibrium type for use in specific projects. These models are calibrated to national accounts totals, but with modest use of national accounts data for other purposes. In the past, this institution had built larger econometric models, but these models have not been updated for some years.

(b) Uses of models in policy analysis

7.30. The models have been applied in various policy analyses. The main ones include the preparation of annual national budgets, the development of a long-term programme for the period from 1998 to 2001 by the Ministry of Finance, and analysis of taxes and environmental policies (e.g., green tax reforms). These and other uses are described below.

(i) National budgets

7.31. Since 1947, the Government's proposed state budget, which is presented to the Parliament in the autumn, has been accompanied by a national budget. A revised national budget is presented the following spring.

7.32. To assess economic perspectives, the Ministry of Finance uses the MODAG model. Assessments from other institutions, such as OECD, Statistics Norway, the Central Bank of Norway and some of the larger banks are also referred to. It should be noted that the Ministry of Finance uses the MODAG model not only for a passive projection for the near future, but for other projections as well. For instance, when reviewing the "uncertainty of wage development" in the revised national budget for 1998, the MODAG results for wage growth were contrasted with the corresponding results of the RIMINI model of the Central Bank of Norway, as well as with results obtained from using alternative specifications of the wage relations of the model and assuming lower growth of the labour force.[15]

(ii) The long-term programme for the period from 1998 to 2001

7.33. Since the first four-year plan (1949-1952), long-term programmes have developed into a broad analysis of recent developments in the country. Recent developments are presented together with the political goals of the present Government and a longer-term analysis of consequences and background information. The latest programme covers the period from1998 to 2001.[16] In a separate volume of "facts and analyses", published by the Ministry of Finance, there is a description of the economic perspectives and the models and assumptions that are applied.[17] The relevant models are MODAG for short- and medium-term analyses and MSG for longer-term analyses. In addition to these macroeconometric models, there are other models used for analysis, such as demographic models and microsimulation models for analyses of taxes and income distribution and for education, labour force participation and social security systems.

(iii) Tax analyses and environmental policies

7.34. Most of the analyses of taxes and income distribution are done by using microsimulation-type tax models of Statistics Norway. Statistics Norway offers tax analysis to all political parties in Norway, thus allowing the political opposition to prepare for the discussions in Parliament.

7.35. As a result of the integration of the detailed supply and use tables of the national accounts, the MODAG model is used to give macro projections of all kinds of product taxes, social benefits and other income components.

7.36. The models of Statistics Norway have also been used to assess the impact of the green tax reform. The objective of the tax reform is to tax CO^2 emissions harder, relaxing the tax on the use of labour (employers' contributions to the social security system). The paper submitted to Parliament on the Kyoto agreement[18] gives projections of the CO^2 emissions linked to the MODAG model. (See note 12 for a description of the MSG model (MSG-EE) and its use for this purpose.)

7.37. A related use of the models is for surveillance of the energy market. An example is the recent report on perspectives for energy balance towards 2020.[19] That report draws up a number of scenarios of energy use and supply, utilizing the MSG model (MSG6), as well as physical models of electricity supply and models of Nordic and international energy markets.

7.38. In 1998, there was a study of the Norwegian social security system, using the MSG6 model to project economic development and the development in pension requirements to 2050.[20] The economic assumptions used are close to the ones used in the long-term programme, with some updates concerning the oil industry and the social security system.

(iv) Other model uses

7.39. The models also have policy applications that are not directly related to government policies or government controls. For example, the Technical Calculation Committee for Income Settlements prepares a report prior to the central negotiations, containing statistics on wages and income development, the development of average competitiveness relative to other countries and short-run prospects for the development of consumer prices for the following year.[21] The members of the budgeting committee represent the parties to the income negotiations and the Ministry of Finance. From its start in 1966, a senior economist from Statistics Norway has always headed the Committee. The quarterly model KVARTS is used in the preparation of the short-run economic prospects of the Norwegian economy.

7.40. Another use is in monitoring economic development and business cycles. In addition to the work of the Ministry of Finance, which is reported in the national budgets, independent monitoring of short-term economic developments is done by Statistics Norway and the Central Bank of Norway, as well as by some of the larger banks and industries. Statistics Norway uses the quarterly model KVARTS for this purpose (see section 3 below). The Central Bank of Norway uses its quarterly model RIMINI for the same purpose.

7.41. Regional analyses are also done with the help of transportation models and regional models. Single region models have been developed for the counties, for use in regional reports and analyses of the consequences of larger projects. The regional models mainly cover demographic developments, labour supply and housing demands, as well as economic development. Multiregion models that may be linked to the central planning models and produce a regional distribution of their main results are available.

(c) Role of national accounts

7.42. From the first national accounts compiled by Statistics Norway, the national accounts have included supply and use tables. These data are the very core of Norwegian national accounts. The supply and use tables specify trade margins and product taxes and subsidies related to the various products by both different users and different suppliers. Thus, all relevant valuations are calculated in the same tables, and the balancing of supply and use in common valuation terms is possible. These tables provide all the information that is needed for balancing the national accounts, and also generate the database for a detailed coverage of product taxes and subsidies in the macro models.

7.43. A particular feature of the Norwegian econometric models is that they integrate the supply and use tables into the model structure. To some extent, the tradition of the detailed input-output models is still carried on in the present models. To some degree, the supply and use data also have an integrative function in the models as they have in the national accounts. This feature is particularly useful because the models are very detailed. It enables the integration of analyses of production at the industry level, demand analyses of products and analyses of consumption by purpose, and also has a role in the price determination part of the models. The integration of the supply and use tables has also proved to be useful for environmental modelling, making it possible to combine such aggregates as energy and materials in the implicit production functions and still have details on the use of energy products available for emission projections.

7.44. In 1997, a project was initiated by Statistics Norway to integrate environmental satellite accounting with the national accounts. This work has thus far generated estimates of the value of the most important natural assets, including oil, forests and fish stocks. Furthermore, the supply and use tables of the Norwegian Economic and Environment Accounts Project have been extended with emissions data, as was done in the Dutch NAMEA approach.[22] Thus far, the accounts contain only an aggregate measure of energy use by industry. For future development, the satellite approach may be used to address consistency problems, which are currently encountered in the modelling of energy use.

7.45. Each year, once the final annual accounts are finished, the base year of the models is shifted, and all econometric equations are re-estimated, adding one more year of observation to the database. Also, the quarterly accounts are adjusted to the final annual accounts, and the base year and econometric equations of the quarterly model are updated.

3. Use of quarterly accounts and models in early and short-term projections

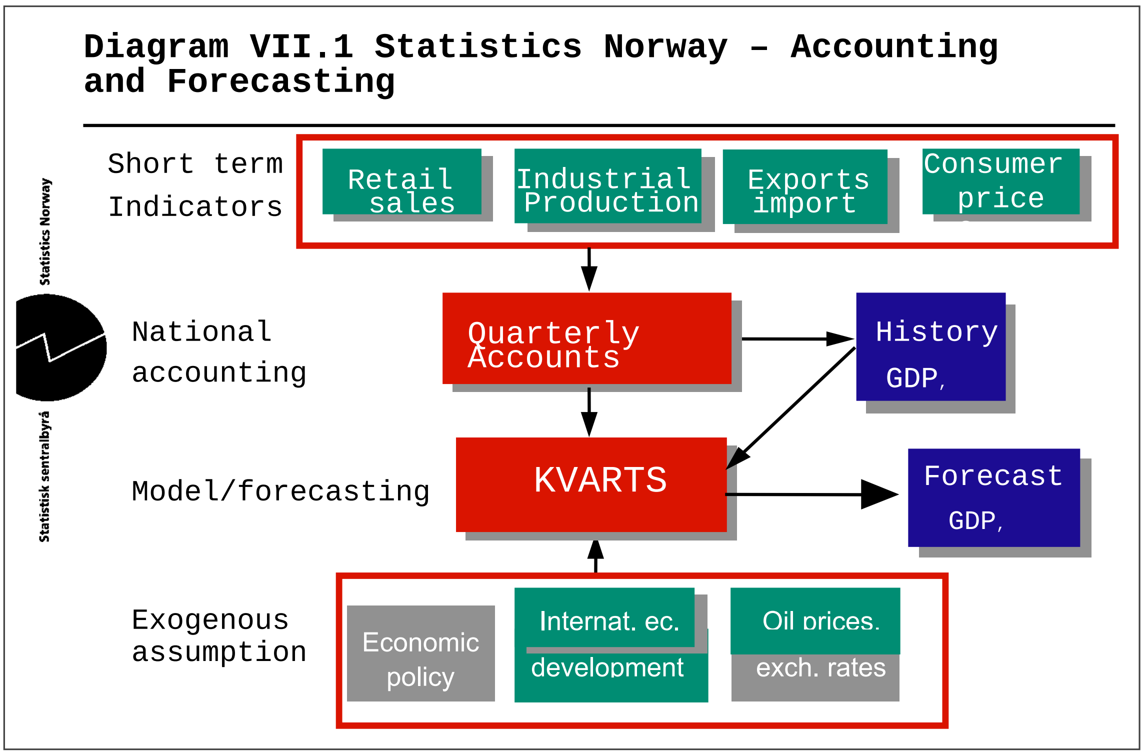
7.46. Since 1922, Statistics Norway has prepared economic surveys to collect data on the preceding year shortly after the year ends. The presentation of these first national accounts estimates is done in the first week of February. The accounts of the preceding year are presented together with a projection of economic development for the current year. The economic prospects are then analysed and discussed with the help of the accounts and projections made and on the basis of the short-term statistics that are available.

7.47. The early accounts based on the economic surveys involve, to a large extent, simple projections of the data series for the first three quarters of the year. The first regular quarterly accounts, covering the full year, are not available until mid-March. The forecasts for the following year are made with the help of the quarterly model KVARTS. The model estimates make full use of the quarterly accounts for the previous year. The coordinated early presentation is made possible by the close integration of the quarterly accounts and the quarterly model.

7.48. In the development of the quarterly accounts by Statistics Norway, three different phases may be distinguished. The first phase was between 1953 and 1956, and covered data for 1951 and later years. Those quarterly accounts were rather aggregated. Each component of GDP (final uses, export surplus and increase in stocks) was assessed separately and added together to arrive at GDP. No breakdown by industry or by object of consumption was included. The next phase was started in 1959 and was discontinued in 1971. During that period, the quarterly figures had the same classification by industry and consumption items as the annual accounts. Much of the work was computerized, but the final balancing of each quarterly account had to be done manually. The generation of those accounts was discontinued in 1971 because resources were needed for the main revision of the national accounts related to the 1968 SNA. A further difficulty contributing to that decision was that an administrative register of employment that was kept by the social security system was closed down. The employment figures of that register had served as short-term indicators for several service industries.

7.49. The present production of quarterly national accounts started in the 1980s, producing quarterly figures for the periods from 1966 to1977 in 1983, and from 1978 to1983 in 1984. As shown in diagram VII.1 below, this compilation was, from the beginning, closely integrated with the quarterly econometric model KVARTS.

7.50. The accounts and the KVARTS model have the same classification of industries and products. These classifications are more aggregated than the annual accounts, having 56 industries as opposed to 175 in the annual accounts, 85 products (approximately 1,000 in the annual accounts) and 35 consumption items (as opposed to 249 in the annual accounts). The model and the accounts do not give full information for institutional sector accounts, but concentrate on supply and uses, employment, wages and other components of gross value added (including depreciation). The production of the accounts uses a model that is formulated in the same model language as the econometric models (TROLL). The KVARTS model and the quarterly accounts literally use the same equations describing the supply and use tables. The entries in the quarterly accounts are usually estimated from indicators of short-term economic statistics. In case an indicator has not been entered in the indicator data bank in time to be used in the accounts, the level of the indicator is automatically projected by a simple trend projection.



7.51. The quarterly model (KVARTS) is estimated from the data of the quarterly accounts. The econometric equations are checked each quarter against the new set of observations from the quarterly accounts. The newly estimated residuals are examined, and in case there are large residuals, the economic indicators and the data transmissions are checked. In this way, the model results also contribute to the quality check of the accounts data. The newly revised quarterly estimates are discussed at a series of meetings, in which national accountants, model builders and producers of short-term statistics participate. When the data are presented to the public, they are accompanied by a revised short-term economic projection, and an analysis of economic developments and trends that are reflected in the accounts. When the final annual estimates are made, the equations are re-estimated.

7.52. The quarterly accounts have short, but hectic, compilation periods. It is not possible to start too early, as the short-term indicators need some time for preparation. On the other hand, there is pressure not to use too much time in the compilation. The time schedule is linked to other uses of the data. For instance, the second quarter is needed for the national budgets prepared by the Ministry of Finance, the third quarter for the preparation of the economic survey by Statistics Norway, and the fourth quarter is used for the revised national budget. The time schedule usually allows a production time of four weeks to finish the quarterly accounts, including some days for publishing the accounts and presenting the revised economic projection. As resources are limited, Statistics Norway has, over the years, developed an efficient compilation system, which also is efficient in terms of dissemination and organization of the data. The quarterly accounts are currently the area in which contacts between national accountants and model builders are the closest.

B. Data development in support of Project Link

7.53. Project LINK is a large, cooperative, non-governmental, international research consortium, based on a worldwide network of participants in more than 60 countries, which provides regular projections of the world economy. The activities of Project LINK are coordinated jointly by the Department of Economic and Social Affairs of the United Nations Secretariat and the Institute for Policy Analysis at the University of Toronto. The national centres of the project include universities, for example, Osaka University in Japan and the University of Ibadan in Nigeria; private research organizations, for example, Heptagon Grupo Financiero, Venezuela, and Global Economics sdn, Bhd, Malaysia; government agencies, for example, the Institute for Applied Economic Research, Brazil and the Korean Development Institute, Republic of Korea; and central banks, including the Bank of Finland and the Bank of Russia. Project LINK's principal achievement has been to integrate independently developed national models into a world model (LINK). Initiated in 1968 under the auspices of the United States Social Science Research Council and with the leadership of Nobel Laureate, Professor Lawrence Klein, the project has expanded from a core of 11 researchers and seven country models to encompass 79 models at the present time, thus providing comprehensive coverage of the global economy. The operational centre of the project is at United Nations Headquarters in New York and is responsible for maintaining and updating computerized files and the LINK databases, model equations and computer programs for countries and global modu. It prepares medium-term baseline forecasts, as well as alternative scenarios, at least four times a year. These forecasts are provided to the national modelling centres and are discussed at the biannual LINK meetings.

7.54. The most important feature of Project LINK is its reliance on the modelling and economic analysis expertise of resident economists from all of the OECD countries, more than 40 individual developing countries and 10 economies in transition. Most of the country groups operate national econometric models that are part of the LINK system. In addition to its ongoing concern with issues relating to short- and medium-term prospects of the international economy, Project LINK is a unique focal point for applied international economic research in general. Its meetings and research projects draw on an extensive network of international economic experts, from both inside and outside the modelling community. The economic analyses prepared by Project LINK are used on a regular basis by the United Nations Secretariat, international economic agencies and national research organizations.

7.55. The objectives of the project are the following:

- To provide a consistent framework for undertaking quantitative studies of international economic transmission mechanisms, as well as of the effects of international disturbances, and national and international policies on the outlook for the world economy;
- To improve the understanding of global economic interdependence, and the determinants of the economic performance of individual countries;
- To assist project participants, international agencies and international economic research centres in improving macroeconomic policy formulation, implementation and evaluation through the use of quantitative techniques that take into account global economic interdependence;
- To evaluate the global and regional economic implications of national and international economic policy initiatives, within a globally consistent framework;
- To advance academic research in international economics, development economics and related areas. In addition, econometric methods and large-scale model solution techniques are being investigated by member teams.

7.56. There are two LINK meetings each year, one held in March and another in September, to discuss the outlook for the world economy, as well as policy issues, and to evaluate the project work in progress.

1. The LINK model system

7.57. The LINK model resides on computers at United Nations Headquarters and at the University of Toronto. The modelling system consists of 79 models, representing 72 individual economies and seven regional groupings (most of them consist of small developing economies and more resources are required to develop individual models for these small economies). The models are linked together through international transmissions between national and regional economies in various sub-modules, dealing with merchandise trade flows, trade prices, services, exchange rates and international commodity markets. In total, the LINK system consists of 30,000 variables.

(a) National models in the LINK system

7.58. Most national models in the LINK system can be described as traditional open-economy macroeconomic models. While economic activity is generally demand driven, supply-side constraints are incorporated in some of the models. The representation of factor demands and prices follows economic theory, with proper allowance for special features of each of the national economies. As most of the models are built and maintained by resident national experts, structural country-specific details, such as the transmission of monetary and fiscal policies and institutional details pertaining to both the public and the private sectors, are well captured. These models are extremely diverse in scale and scope, ranging from small-scale models consisting of a few dozen equations to national systems of several thousand equations.

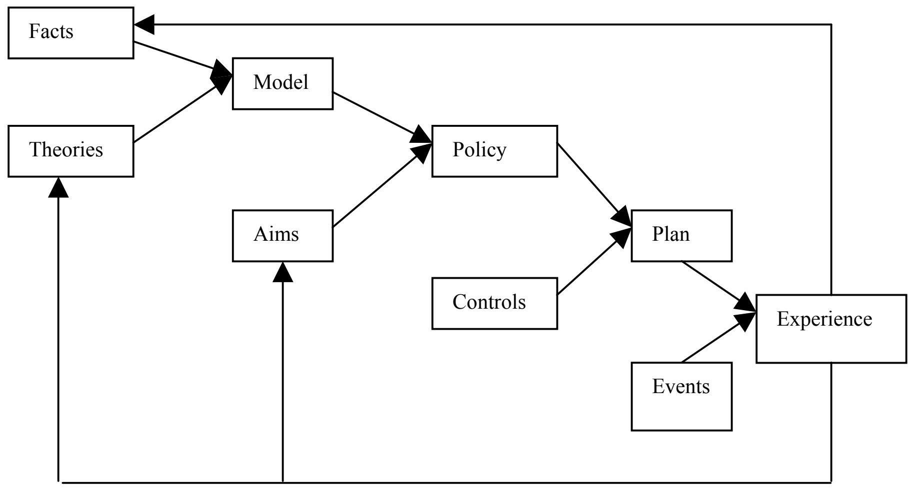
7.59. A national model in the LINK system can be viewed as an approximation of the true - but almost impossible to fully identify - structure of an economy. The degree of approximation depends on three factors: the objectives of the modelling exercise, the statistical data availability, and the economic theories embedded in the model. Most national models in the LINK system serve two objectives: to make short- and medium-term forecasts of an economy and to be used as a tool for economic policy analysis. The relationship between modelling, statistical data, theories, and policies can be illustrated by diagram VII.2, cited by Richard Stone.[23]

7.60. As shown in the diagram, a model, either an econometric one or another type of economic model, should be built based on facts, that is, statistical data, guided by economic theory. Meanwhile, the diagram also shows that a model is a tool to enable policy makers to use statistical data in their decision-making. The most important message from the diagram is that all components - including statistical data, economic theories, modelling, policy making and planning - are part of a process: economists, statisticians and policy makers learn from the experience while improving the statistical system (for example, by creating new indicators) and the models. As Lawrence Klein has stated with reference to modelling: "The whole process of model building is a state of flux because at any time when one generational system is being used, another, better approximation to reality, is being prepared."[24]

7.61. From a certain angle, any national model in the LINK system can be viewed as a set of two kinds of equations: identities and stochastic equations. Identities are defined according to various accounting frameworks within an economy - such as the GDP identity, or the balance of payments. Stochastic equations represent theories regarding technical and behavioural relationships among economic variables. From this perspective, a well-established macro accounting system for an economy not only provides a data foundation, but the accounting framework itself is an important part of the model. Since countries differ as regards both their economic structure and the availability of statistical data, it is important not to be dogmatic in modelling each national economy. As a matter of fact, this feature distinguishes the LINK system from many other global modelling systems in which a standard framework is usually imposed on many or all country models.

7.62. The 79 country and regional models in the LINK system can be classified into two groups, full-scale or simplified, according to whether or not a well-defined macro accounting framework underlies the model. Models for most developed economies, as well as for about 30 large developing economies, are full-scale models; the rest are simplified models.

Diagram VII.2. Relationship between modelling, statistical data, theories and policies



7.63. A full-scale national model in the LINK system usually contains the following segments:

- Aggregate demand for goods and services, including private consumption, public consumption, investment, inventory and so forth;
- Production, of goods and services;
- Price formation;
- Labour supply and demand;
- Wage and income formation;
- Government sector, including government spending and tax receipts;
- Monetary and financial sectors;
- External sector, including trade flows of goods and services, and capital flows.

7.64. However, the degree of detail in these segments varies substantially across countries. For example, in many large models, the structure of demand and supply is defined in very disaggregated categories, and some models even incorporate an input-output framework.

7.65. A full-scale national model in the LINK system usually also defines a set of economic policy instruments, such as:

- Fiscal policy, including government spending and tax policies;

- Monetary policy, including money supply, discount rate, reserves, or some pre-defined central bank monetary rules;
- Trade policy, including tariffs and exchange rate policies;
- Other country-specific policies.

7.66. The specification of behavioural equations also varies across the models, depending on the various economic theories and different econometric techniques they incorporate. However, the present section is not concerned with this issue. In contrast to a full-scale model, a simplified country model in the LINK system usually does not have a well-defined structure, although it does contain some useful information for the country. Ideally, to model an international economic transmission, the LINK modelling system should incorporate as many individual country models as possible. Technically, the United Nations trade statistical data can fairly define a 200x200 bilateral international trade matrix. But many developing countries do not have enough structural statistical data for building a full-scale model. In this case, Project LINK has tried to build simplified models for these countries, either as an individual model or as a regional model for a number of small countries that are similar. In those simplified models, some macro accounting framework may not hold, while the relationships among macro variables are defined with some ad hoc rules. These models may not be sufficient enough to be used in country-specific policy analysis, but they do play certain roles in forecasting and they are needed in order to close the LINK system as a global model.

(b) International linkages

7.67. To model the world economy, independently developed country models are tied together through international linkages among the economies of the world. Such linkages can be defined by the following categories:

- Flows of goods and formation of international prices;
- Flows of services;
- Flows of capital (which, in recent years, have increased tremendously);
- Migration of labour;
- Exchange rate formation;
- Other bilateral or multilateral international linkages (for example, between the Canadian and United States auto industry, United States bond yields and Japanese income, or United States interest rates and the debt service of many developing economies).

7.68. The most important international linkage operates through the modelling of trade flows and international prices. LINK applies the concept of a trade matrix, that is, the bilateral trade shares, disaggregated by a number of commodities. In this framework, a country's exports are the weighted average of partner countries' imports, with the weights given by the appropriate trade shares. Similarly, a country's import prices are derived from partner countries' export prices. As trade shares sum to unity, this approach imposes consistency on international trade flows. A similar approach is currently being developed for international service flows. Similarly, import prices are a product of export prices, given the trade shares and domestic prices of exporting countries. International monetary linkages are primarily provided through an exchange rate module. Major currency exchange rates are modelled endogenously as functions of interest and inflation differentials and cumulative wealth. The scarcity of international financial data prevents a consistent modelling of bilateral capital flows at the present time.

7.69. Important worldwide commodity markets, such as oil, or raw materials, are being analysed in separate sub-modules, and these sub-modules will provide price forecasts that can be fed into producer and consumer countries.

(c) Forecasting and policy analysis

7.70. The LINK model system has been used for world economic forecasts and for simulation of international policies. Before each LINK meeting, national LINK participants send their country forecasts, including their major policy and exogenous assumptions, to the LINK centre. The centre is then responsible for ensuring international consistency in a number of areas. In particular, major currency exchange rates should be consistent as regards monetary policy assumptions in the major countries; commodity prices must comply with their implied export and import deflators for the corresponding trade categories across countries; and there should be international trade equilibrium as imposed by the transmission mechanisms.

7.71. After several iterations of computer simulation and, if necessary, interaction with country participants, a pre-meeting LINK forecast for the world economy is generated, including world, regional and country outlooks. The pre-meeting forecast is presented to the LINK expert group meeting as a baseline. Since the requirement of international consistency means that forecasts for some countries may differ from their original single country forecasts, comments and feedback from national experts are collected at the LINK meeting and a post-meeting LINK forecast is generated after the meeting. To some extent, therefore, LINK forecasting is a process involving permanent interaction among the economists involved in the project. Since the LINK system is an approximation of the world economy, with emphasis on both national economic features and the international transmission mechanism, it has been used for a number of studies of international policies and simulation of the international transmission of economic shocks. Examples include the following:

- Studies on trade policy, including the impact of multilateral trade liberalization, such as the Uruguay Round on multilateral trade negotiations and the impact of regional trade blocs, such as the European Union;

- Studies on the impact of economic shocks, or policy changes in one country, or one region, on the world economy and on other regions and countries, such as the global impact of the Asian financial crisis;
- Simulation of international economic policy coordination, such as the coordinated interest rate cut in the major industrialized countries;
- Studies of the effects of international transfers;
- Other policy studies, such as the identification of the peace dividend for the world economy.

2. Future development of the LINK system and data requirements

7.72. Since the establishment of Project LINK some 30 years ago, many advances have been made in modelling techniques, in economic theory and, most of all, in computational technology. But the principle of the project remains the same, namely, the integration of independently developed national models through international linkages into a global system. Following this principle, there are two dimensions for improvement of the LINK modelling system in the future: first and foremost, to include more national models in the system; to add new international linkages by taking into account new developments in globalization; and to enhance the existing models in the system.

7.73. One priority is to add more national models, especially models for developing countries. The developing economies that are now included in the LINK global model in one of the seven regional models are listed below. These countries are natural candidates for new individual models:

- Africa. Angola, Benin, Burkina Faso, Burundi, Cape Verde, Central African Republic, Chad, Comoros, Democratic Republic of the Congo, Djibouti, Equatorial Guinea, Eritrea, Gambia, Guinea, Guinea-Bissau, Lesotho, Liberia, Madagascar, Malawi, Mali, Mauritania, Mozambique, Niger, Rwanda, Sao Tome and Principe, Sierra Leone, Somalia, Togo, Uganda, United Republic of Tanzania and Zambia.

- Asia. Afghanistan, Bahrain, Bangladesh, Brunei Darussalem, Democratic People's Republic of Korea, Fiji, Jordan, Laos, Lebanon, Macao, Mongolia, Myanmar, Nepal, Oman, Papua New Guinea, Qatar, Samoa, Sri Lanka, Syrian Arab Republic, United Arab Emirates, Vietnam, and Yemen.

- Latin America and the Caribbean. Antigua and Barbuda, Bahamas, Barbados, Belize, Bermuda, Costa Rica, Cuba, Dominican Republic, El Salvador, Guadeloupe, Guatemala, Guyana, Honduras, Jamaica, Martinique, Netherlands Antilles, Nicaragua, Panama, Suriname and Trinidad and Tobago.

7.74. Another priority is modelling new international linkages, such as international capital flows, which have become more and more important in intercountry relations and in international policy analysis. Modelling work could begin with relatively stable foreign direct investment.

7.75. Equally significant is the aim to improve the model structure of the simplified national models in the LINK system by adding more detailed macro accounting frameworks and by adding more variables, such as price, money and finance, which are usually weak in some developing country models. Another improvement concerns the models for economies in transition, some of which are still based on a mixed system of net material product and SNA concepts and data.

7.76. All of these improvements will require, in particular, improved statistical data. Thus, closer cooperation among Project LINK, the United Nations Statistics Division and the Development Policy Analysis Division and national economists and statisticians is important in carrying out the work described above.

3. Two examples of country models

7.77. To illustrate the diversity in size and structure of the country models in the LINK system, the main features of two country models that were recently to presented to Project LINK by the national modelling centres are summarized below.

(a) Brazilian model

7.78. The new Brazilian model is an annual model developed by the Research Directorate of the Institute of Applied Economic Research.[25] The model, which is built upon the main identities of the national accounts, the balance-of-payments accounts, and the public sector budget accounts, contains about 200 equations. The structure of the model is based on Keynesian theory, with GDP being determined by aggregate demand and no restrictions being put on the supply side, partly because of the lack of sufficiently long time series for estimating equations for the labour force and employment. Equations in the model can be grouped into three blocks: aggregate demand determination, public sector accounts and balance-of-payments accounts. In the block of aggregate demand, real private consumption is specified as a function of real disposable income and nominal interest rates. As shown below, the equation is estimated in first differences, with an error-correction mechanism, which incorporates the existence of a unity income elasticity in the long-run relationship between consumption (CFTPP) and income (RDOPP). The nominal interest rate (TJCDBN) is included in the equation to account for the negative impact of both inflation and real interest rate on private consumption:

CFTPP DEL (1:LOG(CFTPP)) = A22.1 DEL(1: LOG(RDOPP)) +
A22.2 (LOG(CFTPP(-1)) - LOG(RDOPP(-1))) + 22.3*DEL(1:LOG(TJCDBN)).

7.79. In modelling private investment, investment in construction projects is defined as a function of GDP and real interest rate. Again, an error correction mechanism is specified for the equation, with a unity long-run relationship between construction investment and GDP. Meanwhile, domestic equipment investment demand, modelled in terms of investment ratio to GDP, is defined as a function of real interest rate, real exchange rate, and government investment. There seems to be a trade-off between the demand for domestic equipment and the demand for foreign equipment, as indicated by the negative coefficient for the real exchange rate in the equation.

7.80. In the public sector block, government revenue and expenditure, broken down by several categories, are modelled in real terms and defined as functions of real GDP and inflation. Inflation has an impact on real government revenue and expenditure in three main ways: taxes and expenditures are eroded because of imperfect indexation; there is a time lag in tax collection; and the behaviour of government taxation and spending is affected by inflation. Given the historically high inflation in Brazil, coefficients corresponding to inflation in the government sector are allowed to vary from period to period, estimated by the Kalman Filter method.

7.81. In the balance-of-payments block, import demand is specified following a standard new classical function, that is, depending on domestic activity (GDP) and the relative prices between foreign and domestic goods. The import demand functions are originally defined separately for capital goods, intermediate and consumer goods, but then converted into the SITC categories according to the LINK system. Although the export equations are overridden in the LINK system by the linkage mechanism, they are specified in the original country model as a function of world total import, relative prices and domestic capacity utilization. While the long-run income elasticities of import demand in three categories are estimated to be about one, the price elasticities are about two. Equations for trade in services are defined according to the standard classification of non-factor and factor services, disaggregated into several items. Foreign investment (both direct and portfolio) and change in international reserves are assumed exogenous in the model, so the current account balance determines the variation in external debt, with other factors included in the debt demand equation, such as the exchange rates between the United States dollar and other major currencies.

(b) Model of Finland (BOF5)

7.82. The macroeconomic model of Finland, developed by the Bank of Finland,[26] is a medium-sized quarterly model, containing about 450 variables, with 60 key behaviour equations and 300 identities, input-output equations and definitional equations. For the past 25 years or so, the BOF model has been modified to follow the development in economic theory and econometric techniques. The main improvements of the latest version of the model, BOF5 (1998) over BOF4(1990) - a synthesis of Keynesian and neo-classical include a specification of model consistent expectation, and the wealth effects for the household sector. The model contains 16 blocks: production functions;

consumption; investment; exports; imports; production; employment; wages; prices and costs; income; corporate sector incomes and outlays; household incomes and outlays; public sector incomes and outlays; balance of payments; financial markets; policy rules.

7.83. In the goods and factors (production) markets, the model contains three domestic behavioural sectors: household, corporate and government. The corporate sector is disaggregated into two production sectors: the manufacturing sector, assumed to be in competition with foreign firms, and the rest, assumed to be in non-(international) tradables. The government sector is disaggregated into central government, local government, and social security funds. While the local government sector is modelled as a single, independent decision-making unit to maximize the utility of local residents under tight budget constraints, the central government guides the local government mainly through transfer payment.

7.84. A fixed exchange rate regime is modelled, but a floating regime can also be simulated, determined by uncovered interest parity with an assumption of perfect capital mobility. In modelling wage formation, labour unions and centralized bargaining play an important role. Wage has been decomposed into "negotiated" wage rate increases and "wage drift" occurring outside the contractual wage formation. While inflation expectations, tax wedges and unemployment are the main determinants of negotiated wages, the wage drift component is determined by disequilibrium factors in the labour market, that is, the unemployment rate and the real-wage gap.

7.85. The behaviour of the household sector is modelled by assuming an intertemporal maximization of utility under a flow budget constraint, with wealth composed of housing wealth, money balances and debt. It is also assumed that there is the possibility of an imperfect foresight of future flows of income. As a result, private consumption (C) depends on current-period real disposable income (YD/PCP), real wealth (WEALTH) and present value of the expected stream of future real income (the second composite term in the equation below). Meanwhile, the demand for real money balances is dependent on the weighted averages of past and future consumption streams and on nominal interest rates:

$$C = 0.3 * YD *100/PCP + (1-0.3)* \{0.85 *CEX/(1+RLBN/400-INFPCPEX)+ 0.047 *100 * (0.25*WEALTH(-1) +YD)/PCP\}$$

where C is consumption, CEX is expected consumption in the next period, that is, CEX=C(+1), PCP is the consumption deflator, INFPCP is the inflation rate, INFPCPEX is the expected inflation rate in the next period, YD is disposable income, WEALTH is net wealth, and RLBN is the deposit interest rate.

7.86. The behaviour of the firm is modelled based on profit maximization, with a two-stage optimization, that is, desired levels are first determined and then adjustment costs are minimized. In the first stage, firms are assumed to maximize the value of their expected future profit streams subject to their respective production functions, product demand functions and adjustment costs associated with investment. The manufacturing sector will meet two demand functions: foreign demand, that is, export, and domestic demand. As a result of profit maximization, an investment function will depend on both past and the expected future differences between the marginal product and the rental price of capital. The investment equation for manufacturing is shown below:

DLKF1 = -0.11 * DLKF1E2 +0.61 * DLKF1EX + 0.4931 *DLKF1 (-1)
+0.01*{PGDP1*FK1/PIF1-(CCR1+RS/400-INFPIF1EX)/(1+RS/400 - INFPIF1EX)}

where DLKF1 is the growth of net stock of private fixed capital, DLKF1E2 is DLKF1EX(+1), DLKF1EX is DLKF1(+1), PGDP1 is the deflator for manufacturing, FK1 is the marginal product of capital for manufacturing, PIF1 is the fixed investment prices, RS is the money market rate, INFPIF1 is the inflation rate for PIF1, and INFPIF1EX is the expected inflation rate for PIF1.

7.87. The demand for labour input is solved by inverting the production function. The input-output identity for production with an assumption of fixed share is used in solving value-added deflators. Likewise, prices for demand components are obtained as weighted averages of sectoral producer prices, import prices and indirect taxes.

7.88. In modelling policies, two monetary policy rules are defined. As a default rule, the targeted interest rate of the central bank will react to changes in inflation as follows:

RS = max {((RFOR + DMP*400*(INFSTAR)), 0.5}.

As an alternative rule, the interest rate will react to changes in expected inflation:

RS = max{(RFOR + DMP*400*(INFPCPE2 - INFSTAR)), 0.5},

where INFSTAR is the target rate of inflation, RFOR is the foreign interest rate (three-month commercial ECU), DMP is a dummy of 0, or 1, INFPCP is the inflation rate, and INFCPE2 is INFPCP(+2).

7.89. Several different rules are defined for fiscal policy. For example, the tax rate can be endogenized by tying income taxes to government net interest outlay to guarantee the sustainability of public finance. But in medium-term forecasting, tax rates are exogenous.

C. Extended RMSM-X model: uses within the World Bank and data support structure

7.90. For more than 30 years, the World Bank has used macroeconomic models to project the growth path of developing countries. During the 1970s and 1980s the revised minimum standard model (RMSM) was used for this purpose. RMSM calculates the need for additional foreign savings to close the so-called savings gap and the model is used to calculate the need for extra foreign exchange in order to be able to purchase those imports that are critical in the production process. The popularity of RMSM is undoubtedly attributable to its simplicity, but that simplicity also limits its usefulness. Introducing multiple economic agents in a consistent flow-of-funds framework allows more policy options to be explored while preserving the useful features of RMSM. This flow-of-funds version of RMSM is known as the revised minimum standard model extended (RMSM-X). Although conceived as a working tool for country economists to facilitate their analysis of policy packages, even the basic version of RMSM-X generates all of the projections required for the country assistance strategy (CAS) document, the country creditworthiness analysis or portfolio review and its structural adjustment operations.

1. RMSM-X: the World Bank's main vehicle for macroeconomic projections

7.91. The basic version of RMSM-X contains four economic agents or "sectors": public, private, financial and foreign. The public sector is defined as the central government and the financial sector is defined as the monetary system, consisting of the central bank and deposit money banks. This means that the "private" sector[27] contains non-central government agencies, parastatal enterprises and non-monetary financial institutions. The foreign sector is simply the balance of payments viewed from outside the country, which means that credits and debits are reversed. The sectors and variables of the model, as well as important assumptions, are specified in table VII.1 below.

7.92. RMSM-X, like RMSM, relies on the fundamental accounting identity of standard national income accounts,

$$Y = C + I + X - M,$$

where Y is gross domestic product at market prices, C is total consumption, I is total investment, X is export of goods and services and M is import of goods and services.

7.93. Gross domestic product (at market prices) must be equal, ex post facto, to expenditures on consumption, investment, exports and imports. The basic model requires a bit more detail, dividing consumption and investment into public and private components:

$$Y = Cg + Cp + Ig + Ip + X - M,$$

where g and p denote government and private, respectively.

7.94. In addition to the GDP identity, RMSM-X incorporates budget constraints for each of the four sectors which require not only that the total sources (revenues) for each sector equal its total uses (expenditures), but also that a use in one sector must be a source in another sector. These relationships ensure consistency with the flow-of-funds accounting methodology. Behavioural constraints on the model are embodied in four financial asset market-clearing relationships for money demand, foreign assets, government borrowing from the private sector and domestic monetary credit. These relationships yield a system of nine equations, of which eight are independent and one is determined by Walras' law. Therefore, the model can be solved for eight unknown values – the endogenous or residually estimated variables of the model.

7.95. Many solution procedures or "closures" exist for the model. Three solution methods are incorporated in the basic RMSM-X. If a user specifies values, directly and indirectly, for all variables except those of government spending and borrowing, letting those be determined by the model, that is referred to as public sector closure. If one specifies the government accounts and lets the "private" sector values be determined, that is private sector closure.

Table VII.1. Sectors, variables and assumptions of the RMSM-X model

CLOSURE	PUBLIC	PRIVATE	POLICY
Endogenous/residual variables			
<u>Sectors</u>			
Budget	None	Private sector credit	Private sector credit
Monetary:			
Current	Profits and losses	Profits and losses	Profits and losses
Capital	Domestic credit	Domestic credit	Domestic credit
Foreign	Foreign credit	Foreign credit	Imports
Private	Private sector credit	None	None
<u>Goods markets</u>			
National accounts	Government consumption	Private consumption	Private investments
<u>Asset markets</u>			
Money	Money supply	Money supply	Money demand
Money sector credit	Credit to government	Credit to government	Credit to private sector
Private sector credit	Government demand	Private supply	Private supply
Foreign	Government foreign credit	Private foreign credit	Specified by user
Important assumptions			
GDP growth	Specified	Specified	Computed
Inflation	Specified	Specified	Computed
Nominal exchange rate	Specified/computed	Specified/computed	Specified/computed
Foreign reserves	Computed	Computed	Computed
Incremental capital output ratio	Specified/computed	Specified/computed	Specified
Velocity of money	Specified	Specified	Specified

7.96. In both these closures, borrowing from abroad is determined by the country's balance-of-payments requirement. The user specifies in the debt module the amounts likely to be disbursed by foreign lenders, from existing loans as well as from expected loan commitments, and the model calculates the balance of payments. If additional foreign capital is required, the so-called gap-fill loan, a designated "marginal foreign creditor" provides it. In the public sector closure, the "marginal borrower" is the central government; in the private sector closure, it is the private sector. In the basic RMSM-X, the marginal foreign creditor in both closures is foreign commercial banks. If the gap-fill loan's net disbursement amounts are negative, that is, the country gets more inflow of foreign credit than it requires, or substantially positive, the user should respecify and rerun the projection.

7.97. The third closure in the basic model is the policy closure. The user specifies the path of government policies and the behaviour of some private sector variables and the model generates the paths of nominal and real GDP and the remaining private sector variables. In this closure, all foreign borrowing is identified in advance and imports adjust up or down to close the balance of payments. This is known as an "availabilities" mode, because net imports are limited to the identified amounts of external financing and there cannot be any additional borrowing. Many other closures are feasible, but these three have been identified as especially useful to Bank staff.

7.98. In addition to distinguishing between public and private sectors, RMSM-X makes use of several price indices and generates output in both current and constant prices. The price indices of a country's exports and imports are specified exogenously. The country's overall rate of inflation, measured by the average GDP deflator, is also specified by the user in the public and private sector closures. The domestic price index of investment goods is also specified, as a weighted average of the import price level of investment goods and the average GDP deflator, and the model determines the price index of consumption goods as an implicit deflator.

7.99. The user can dictate the path of the nominal exchange rate explicitly by specifying the devaluation rate and, hence, the model calculates the path of the real exchange rate by linking the nominal exchange rate with the GDP deflator and the MUV deflator. Or the user can specify a constant real exchange rate, and the nominal exchange rate will be an outcome of the model. It is, of course, possible to specify combinations of the different exchange rate options. For example, the user might want to see a real devaluation in the beginning of the projection period that will eventually end with a constant real exchange rate. Both rate indices are bilateral with respect to the United States dollar, and do not represent trade-weighted multilateral indices.

7.100. In all three closures, the user must specify the incremental capital output ratio (ICOR). It is up to the user to take note of the changing composition of output and reflect it in the ICOR. If a capital-intensive sector such as modern manufacturing is projected to grow more rapidly than agriculture, services and other sectors, one would expect a rising ICOR – other things being equal.

7.101. With real GDP specified exogenously and total investment determined by means of a lagged ICOR (even in the policy closure, where the ICOR and prior investment determine GDP), and with real exports and imports identified, the model can determine total consumption as a residual value:

$$C = Y - I - X + M.$$

7.102. It is then a simple matter to subtract either government or private consumption from total consumption, and government or private investment from total investment, to obtain the other component as a difference. The double entry of saving, once in the current account as a use of funds and again in the capital account as a source of funds, is a convenience. In a simplified government budget equation, for instance, one might show only one current income variable, taxes, and one current expenditure variable, consumption. In the capital account, there might be only investment expenditure and one borrowing item – foreign credit. Thus, one could write:

	taxes - consumption = bond sales - investment
or	taxes = consumption + saving
and	saving + foreign credit = investment.

7.103. So long as the standard accounting identities are respected and one is able to specify meaningful functional relationships, many alternative closures are feasible. In theory, each can be couched in a requirements mode – as in the public and private closures – or in an availabilities mode as in the policy closure. If the model is used properly, however, all closures will converge in terms of results. Iteration is the key. One can run the model in the public or private closures to see how much additional foreign borrowing would be required to sustain the scenario, adjusting items until the amount is insignificant. At that point, the identified amount of net foreign borrowing requirement is the identified availability. Similarly, one can test a variety of output growth rates and patterns within the public or private closures, obviating the need for a policy closure. It is strictly a matter of choice as to where one wishes to begin.

7.104. The importance of iteration cannot be overemphasized. Numerous "runs" are the norm, as users observe the consequences of their assumptions and adjust them in a pragmatic fashion. If any part of the projected system of accounts sticks out as unreasonable or implausible, based on historical experience and expectations for the country, one should re-examine the initial assumptions and the specification of functional parameters and make adjustments.

2. Institutional need for projections

7.105. The World Bank produces country projections for its country assistance strategy document in order to underpin its lending and non-lending programme for the country for which the CAS is being prepared. If the country team prepares a structural adjustment loan,[28] the team is expected to show the impact of the structural adjustment loan on the country's development path. Henceforth, the team prepares a set of macroeconomic projections. Another institutional need for projections is the World Bank's annual portfolio review. The World Bank's financial policy and risk department undertakes this particular exercise.

7.106. During the CAS process, the country team is asked to prepare detailed projections for the national accounts, balance of payments, trade, fiscal accounts, external debt and the monetary survey. The detailed CAS annexes show the base-case scenario. However, the document is also used to explore the low-case scenario and the high-case scenario. The base-case scenario is the scenario in which the full lending and non-lending programme, as set forth in the CAS document, is being implemented, given, of course, the expectations of what will happen to the global external environment. In the low-case scenario, those risks that can negatively affect the outlook of the country are explored. Most of the time a domestic slippage in policy is investigated and/or an external risk such as a deterioration in the country's terms of trade is explored. The low-case scenario is used to identify in which case the World Bank should decrease or increase its lending. The high-case scenario is the outlook in which the policy and/or the external environment develop more favourably for the country than could reasonably be expected during the preparation of the base-case scenario. Again, the country team identifies in which situations the World Bank should for see increased lending and in which situations it should reduce its lending allocation to the country.

7.107. The structural adjustment lending operation identifies the structural shortcomings of the borrowing country. It designs an agenda for reform through incorporating in its lending conditions those reforms that would generate a positive impact on the country's development path. The World Bank staff are asked to show this impact on the country's economy through a set of macroeconomic projections. The main vehicle to collect the projections used for the creditworthiness or portfolio review is the Unified Survey. The Unified Survey is carried out each year within the World Bank and has been its principal mechanism for gathering quantitative macroeconomic information from its country teams on member countries. Country teams are asked for historic macroeconomic data,[29] and country teams working on countries that are borrowing on IBRD terms or that have a major impact on the world economy are asked to formulate and quantify a "most likely" scenario for a set of macroeconomic variables.[30] Apart from the fact that the projections are used to evaluate the creditworthiness of these IBRD countries, they are also used to compare regional and global aggregates compiled from the Unified Survey with the global economic prospects as projected by the development prospect group of the World Bank.

7.108. The Unified Survey country teams are requested to base their projections on a "most likely" scenario, given all the relevant information available on the external environment and on the country team's assessment of likely policies and performance.

The 1997 Unified Survey Instructions guide describes a "most likely" scenario as follows:

- The most likely scenario is usually not the same as the base case often used in the CAS. Traditionally, the CAS has contrasted a low-performance base case with a more favourable high case associated with greater policy reform and higher Bank lending programmes; more recently, some CAS reports have identified the higher-performing scenario as the appropriate base for this purpose. The scenarios are often chosen to illustrate in quantitative terms the impact of proposed reforms, or the potential cost of changes in domestic or international economic conditions. For the Unified Survey, we ask you to make judgements and to distil the uncertainty down to a single set of projections that can be used by the Unified Survey team.

- The PAC [Planning Assumptions Committee] assumptions on the international economic environment should be used to the maximum extent possible. One strength of the Unified Survey process is that it obtains simultaneous results for a large number of countries sharing the same exogenous assumptions. For most economies, there should be no reason to modify the projected PAC trends; if it is necessary to do so in specific areas (e.g., because of long-term export contract arrangements), the reasons should be well documented in the memorandum that will accompany the submission.

- Realism is preferable to over-optimism. While it is appealing to imagine that all economies can achieve 5 to 7 per cent real GDP growth and double-digit export growth in just a year or two if only the right policies are followed, for many countries this is not likely to happen. Useful analysis of risk and creditworthiness requires the most realistic assessment of economic prospects that you can provide, rather than a rosy outlook in which unrealistically high growth obscures all risks.

7.109. Evaluation of the impact of the structural adjustment programme, quantified by the macroeconomic projections, can best be done by evaluating the economic trends in the economy. Two concepts of critical importance are feasibility and sustainability. Feasibility of the reform agenda is the notion that one can expect certain economic trends to change, but only within a certain margin, and the notion of consistency among the to-be-implemented reforms and their expected impact. Sustainability is the combined notion of a country's solvency and creditworthiness.

3. Data requirements and data sources

7.110. The RMSM-X module data requirements are identified by sector (see table VII.2). The minimum data requirements for assembling the consistency framework are one year of historical data for flow variables and two years of data for stock variables.

Table VII.2. Potential data sources

ACCOUNT or SECTOR	SOURCE
Balance of payments	IMF recent economic development paper Central bank publication State planning publication IMF International Financial Statistics
National accounts	IMF recent economic development paper National accounts (DECDG-MAC team) State planning publications United Nations survey
Government	IMF recent economic development paper Government publication Central bank publication IMF Government Financial Statistics
Monetary sector	IMF recent economic development paper IMF International Financial Statistics Central bank publication

7.111. Data requirements depend on the number of sectors to be included in the model; the basic model consists of four sectors: government, private (rest of the economy), monetary and foreign (external). The rest of the economy sector is sometimes divided into private sector and non-financial public enterprises, and the monetary sector is divided into central bank and deposit money banks. The behaviour of the deposit money banks may be distinct from the central bank, necessitating the creation of two sectors in order to model their different roles and links with other sectors. The final disaggregation of the sectors depends on the characteristics of the economy being modelled and the availability of data.

4. Accounting concepts and data conflicts

7.112. The two accounting approaches generally used to record transaction flows are the cash basis and the accrual basis. Balance of payments, national accounts and monetary statistics (stocks) are normally recorded on an accrual basis, where transactions are recorded when an obligation or a liability arises, not when it is actually paid. For the monetary sector, the difference between cash and accrual is not significant because most bank transactions are conducted in cash. On the other hand, government finance statistics are often presented on a cash basis and the underlying budgetary accounts may record cash flows with a time lag. It is assumed here that all macroeconomic statistics are recorded on an accrual basis even if they are actually recorded on a cash basis.

7.113. Another important accounting principle to take into consideration is the difference between due and cash with respect to debt service payments, especially foreign debt service payments. The balance of payments and the government accounts are often shown on a cash payment basis with respect to foreign and domestic debt service payments. If this is the case, then this will lead to an underestimation of the balance-of-payments current account balance and of the government savings and deficit. The data entered in the model has to be on a due payment basis and adjustments to the data may be necessary.

7.114. Another typical data problem is source inconsistency, where separate sources provide different numbers for the same item. For example, the value of public consumption in the national accounts may differ from the value listed in the government accounts. Unfortunately, there is no firm rule for ranking sources since the reliability of data varies across countries. Furthermore, the preferred sources may vary with the purpose of the modelling exercise. For example, simulations of fiscal policies would favour government data over any other source. Ultimately, the country team is best informed to make the final decision on which sources are most reliable and most relevant to the exercise.

5. Connection with macroeconomic data

7.115. The connection with the macroeconomic data is basically made in two ways. First one examines the trends in the economy for which projections are being prepared and secondly one examines the data trends of those countries that have gone through a similar structural adjustment process. A variety of tools are available to the economists at the World Bank for this type of exercise. The main vehicle for storing and analysing historical data is the Live Data Base (LDB) system. The LDB system was initially developed by the Development Data Group in the Development Economics Vice Presidency (DEC) of the World Bank, in partnership with the African region. The LDB system is composed of local (country) databases and a regional database, which gets its data inputs regularly from the local (country) databases for producing the regional aggregate analytical briefings. The country LDB consists of a set of topical data sheets in which the economist or the research analyst stores the macro and social economic data on the country in question. The country LDB is not only a tool to store data but also comes with a powerful table generator. It allows the economist to generate any standard report that the World Bank requires, such as the country at a glance table (AAG) or CAS, and also to generate any customized or ad-hoc reports. This ad hoc reporting feature allows the country economist to generate analytical tables to study specific macroeconomic trends. But, what may be even more important, a time series table can be generated through which one can analyse the trends in the assumptions needed for the projection model, the RMSM-X. The country LDB not only allows for storage of historical data, it also is seamlessly linked with the RMSM-X and can feed the RMSM-X with historical data and receive its projection data.

7.116. To analyse trends in other countries that have gone through a similar structural adjustment exercise, the economist can use the regional database that is generated by storing the individual country LDBs. However, this limits the team to analyse only the economic trends of those countries in its own region, which may not be the most relevant. Hence, the World Bank has developed a tool, SIMA, that allows economists to access not only the other regional databases, but also the global database, which is administered by the Development Economics Data Group (DECDG), and a variety of other external databases (see table VII.3). In addition, the country team has access to the Bank's externally available CD-ROM databases, such as World Development Indicators (WDI) and Global Development Finance (GDF). SIMA allows researchers to specify any query for any indicator across any set of countries. This tool facilitates cross-country comparison, not only for the same time period but more importantly for cross-country comparison of similar macroeconomic situations during different time periods. A prime example is the recently published Country Economic Memorandum on Indonesia, which compared how major exchange devaluation had affected macroeconomic aggregates for a sample of 15 countries five years before the crisis occurred and five years after the crisis.

Table VII.3. Databases available under SIMA

FAO databases
- Agricultural production
- Fishery
- Forestry
- Land and utilization
- Production and trade indexes
- Trade

IEA databases
- Energy balances
- Energy statistics

ILO database
- Economically active population

IMF databases
- Government financial statistics
- Balance of payments
- Direction of trade
- International financial statistics

ITU database
- International telecommunications

United Nations database
- National accounts

UNESCO database
- Education statistics

UNIDO database
- industrial statistics

WHO databases
- Causes of death and live birth statistics
- Health for All global indicators

World Bank databases
- Development data
- Regional databases
- Unified Survey

7.117. In the last decade, the World Bank has developed a system that allows the country team to analyse the data of its own country in order to help determine the assumptions underlying its projections. The main vehicle for country analysis is the LDB system, which seamlessly integrates the modelling exercise with the analytic information contained in the historical data. Its researchers also have a user-friendly access mechanism to a variety of databases, enabling them to conduct research across countries and across economic events. This access tool, SIMA, allows researchers to compare what other countries have done during similar events and to use this information for underpinning the projections made for the country in question.

D. Integration of accounting and modelling in the Caribbean: the 'Antillyse' model and the national accounts of the Netherlands Antilles

7.118. The "Antillyse" model used in the Netherlands Antilles[31] is an example of a model that is closely related to the national accounts in terms of the variables that are within its scope. The model is mainly used to project and assess impacts of government policies. It derives at least one third of its data from the national accounts and thus incorporates many of the data-consistency features of a national accounts system. It should be mentioned that "Antillyse" is based on a format of the national accounts of the Netherlands Antilles, which differs in sectoring and other features from the 1993 SNA. Currently, there are plans to adapt the national accounts of the Netherlands Antilles to the 1993 SNA and this opportunity may be used to also adapt the format of the model.

7.119. As a consequence of its close relation to the national accounts, the model has also been used by the Department of Economic Affairs to make provisional national accounts estimates for recent years for which the Central Bureau of Statistics has not yet made them. More recently, it was decided that, as of 1999, the Bureau would present an annual update of all "Antillyse" primary variables, and if some of this information was not available, it would use the model as a means of deriving preliminary estimates.

7.120. The aim of the present section is twofold. First, there is a discussion of the similarities and differences between the national accounts (section 1) and the model (section 2) in terms of the scope of the variables in both, and the relations used in the model to project and in the accounts to compile data. Section 3 contains an explanation of how accounts and model approaches can be further integrated. It is suggested that such integration be accomplished by adopting in the compilation of the accounts the relations used in the model to project, and by further refining the scope of the accounts and the model through the introduction of concepts and classifications of the 1993 SNA. The improvements applied to the model and the accounts would lead to more refined projections, and would permit the model to be used for advance estimation of the national accounts.

7.121. The remaining parts of the section should be considered as a national accountant's assessment of the model. They deal not only deal with data needs, but also with identities and other relations assumed in the model and evaluate how close they are to the relations that are assumed in the compilation of national accounts. This assessment, from a non-traditional angle, may be useful as a means of bringing closer together the accounting and modelling approaches to compilation and analysis.

1. Structure, scope and compilation of the national accounts

7.122. The national accounts of the Netherlands Antilles are based on a previous format of the national accounts of the Netherlands. It includes a distinction between industry and institutional sector data, but to a more limited extent than is required in the 1993 SNA.

7.123. The industry data are limited to a breakdown by industries of value added components, including compensation of employees, employers' social security contributions, indirect taxes minus subsidies, depreciation and operating surplus. The industry data do not include any information on output and intermediate consumption, but those data are included in the sector accounts. More recently, a detailed supply and use table was developed for the Netherlands Antilles, but it has not been fully integrated with the national accounts.

7.124. The accounts distinguish between five sectors and subsectors, that is, enterprises, government, with a breakdown by social security and other government, insurance schemes and pension funds, households and the rest of the world. As compared with the 1993 SNA, the accounts of the Netherlands Antilles do not separately identify non-financial corporations within the enterprise sector. Financial corporations cover only pension funds and insurance schemes; banks are not separately identified and therefore remain included as part of the enterprise sector.

7.125. For each of the sectors, data are compiled on selected accounts of the 1993 SNA, including production accounts, primary and secondary distribution of income accounts and capital accounts. The production accounts include data on output, intermediate consumption and value added. The capital accounts include data on capital formation and capital transfers.[32] All data on the sector accounts are cross-classified by sectors of resource and use. The latter detail is additional to what is explicitly included in the 1993 SNA. However, in other respects the accounts of the Netherlands Antilles have less transaction detail or scope than is required in the 1993 SNA. They do not distinguish between production accounts of enterprises and households; all production data are included in the enterprise sector. Furthermore, the accounts do not include any data on financial flows or stocks.

7.126. The main sources used to compile the national accounts include production information obtained from economic surveys of establishments, which also include enterprise information for large enterprises. Other sources include government administrative records, data on social security, pension funds and insurance schemes, foreign trade and balance of payments. Household surveys are only available every five or six years. Estimates for household sector transactions are therefore generally based on counterpart sector information (mainly government) or derived residually. The compilation of data for the enterprise sector is based on a mix of industry data covering large and small establishments, and sector data covering large enterprises. All production data are included in the enterprise sector. The savings of the enterprise sector are estimated on the basis of data on retained earnings from large enterprises. The difference between operating surplus and saving, after allowance for specific expenditures, including compensation of employees, direct taxes and property income paid by large enterprises, is treated as property income paid by enterprises to households.

2. Model structure and scope compared to the national accounts

7.127. The "Antillyse" model has been used to assess the impacts of various government policies on export promotion, reduction of government budgets and employment, and so forth. The model is primarily used to derive impacts of government policies based on growth, stabilization and other strategies recommended by IMF and IDB. The IMF strategies focus on financial, fiscal and monetary objectives, including control of inflation, government deficits, external and government debt, interest rates, exchange rates and prices, and the IDB strategies deal with growth, employment, saving and investment. Impact assessments have also been made of joint IMF-IDB and other government strategies.

(a) Operation, overall structure and scope of the model

7.128. The core Antillyse model consists of separate macro models for each of the islands (Curaçao, Bonaire and St. Maarten, including Saba and Statia). They include the main macroeconomic relations describing each of these economies, covering, for instance, consumption and investments. The "Antillyse" model integrates the separate island models by adding up these relations (sometimes with weighted coefficients) to the level of the Netherlands Antilles as a whole. This is realistic as the Netherlands Antilles has a federal structure, which includes the three island territories as separate local units. The "Antillyse" model and the separate models of the islands each include behaviouristic relations, identities and other relations between a large set of variables. The variables are divided into primary and secondary ones.

7.129. The primary variables include endogenous and exogenous variables, which are close to the basic data. The number of primary variables is less than 100 and, of those, approximately one third is extracted from the national accounts of the Netherlands Antilles. The remaining primary variables include monetary survey data, labour market data, some specialized data on United States interest rates and selected data on exports and imports of main products.

7.130. The secondary variables, which are derived from the primary variables, include coefficients, growth rates and price indices, as well as alternative or derived concepts that are closer to those used in analysis than are the national accounts concepts. The identities are similar to the national accounts identities and therefore are only defined between the primary variables. The behaviouristic relations are mainly defined between the primary variables.

7.131. The model includes relations between variables in the same period as well as across periods. It is structured in such a manner that when data are entered for primary variables of past and present years, the primary and secondary values of the following years are automatically determined. This function of the model, which is called the "reference path", is fully determined, because all primary variables, and also secondary variables, are defined in terms of functional relationships and identities, in which other variables of the present or past periods play a role. Impact analysis is carried out with the help of the model by (a) adding impact quantities or values to the entries of the (exogenous) variables in the model and/or (b) changing the values of the parameters of the model. The impact quantities, values or changes in the parameters are based on the presumed direct impacts of policies or external effects, and they result in indirect changes that are calculated through the model. The direct and indirect changes are the total impact of policies and/or external effects; they are recorded as changes from the reference path.

7.132. The model closely follows the sectoring and specification of transactions of the national accounts of the Netherlands Antilles. However, it has changed the scope of the government sector by including in it the sector insurance schemes and pension funds and the social security subsector. As in the national accounts, the model does not have a separate financial corporate sector covering banks; they are included with the enterprise sector.

7.133. Given the close link between the structure of the model and the national accounts, the latter are the main source of information for data used in the model. However, they are not the only data source. Other data sources include the monetary survey of the central bank, price data, labour force data and also some specialized economic and social data such as interest rates in the Netherlands Antilles and in the United States, foreign currency reserves, money supply and value of invested wealth. The extent to which national accounts and non-national accounts variables are used in the model can be seen in table VII.4. The non-national accounts data are not necessarily conceptually consistent with those of the national accounts, and they may also be inconsistent, in this sense, among themselves.

TABLE VII.4. Primary variables used in "Antillyse" [a)]

NATIONAL ACCOUNTS

ENTERPRISES
12. Gross domestic product of business (enterprises)
13. Gross investments of enterprises
14. Total wages of enterprises
15. Depreciation of enterprises

EXTERNAL SECTOR
<u>Current income</u>
18. Export of goods and services by companies (enterprises)
19. Wages from abroad
20. Rest income from abroad to enterprises
21. Transfers from abroad to households
22. Transfers n.e.c.
<u>Current expenditures</u>
24. Import of goods and services by enterprises
25. Import of goods and services by government
26. Imports of goods and services by households
27. Wage bill to abroad
28. Rest income to abroad
29. Transfers to abroad from households
30. Transfers n.e.c.

GOVERNMENT SECTOR
<u>Current revenues</u>
33. Goods and services by government to enterprises
34. Goods and services by government to households
35. Rest income to government from enterprises
36. Indirect taxes by enterprises
37. From which revenues from import duties
38. Direct taxes from enterprises
39. Direct taxes from households
40. Transfers from households
41. Transfers from abroad
43. Capital transfers from households
44. Capital transfers from abroad
<u>Expenditures</u>
46. Goods and services from enterprises to government
47. Gross investments of government
48. From which imports (see above)
49. Wage bill government
50. Interest from government to enterprises
51. Interest from government to abroad
52. Subsidies on prices
53. Transfers to households
54. Transfers to abroad
55. Depreciation

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EXTERNAL SECTOR
59. Balance of capital account
60. Appreciation of gold stock etc.
61. Capital transfers n.e.c. (see above)

GOVERNMENT SECTOR
63. Current surplus (+) (transaction basis)
64. Net government capital inflow from abroad
65. Net private loans (to government)
66. Capital from enterprises to government
67. Monetary financing central govt. + island govt. of Curaçao
69. Change in primary and secondary liquid money

CHANGES IN PRICES IN PERCENTAGE
71. Consumer price (change)
72. Export price (change)
73. Import price (change) (=consumer price USA)
74. Investment price (change)

LABOUR MARKET
76. Employment of enterprises *1,000
77. Employment of government *1,000
78. Unemployment rate, percentage
79. Labour productivity trend
80. Population *1,000
81. Population 15-64 years *1,000
82. Natural population growth 16-64
83. Migration balance *1,000

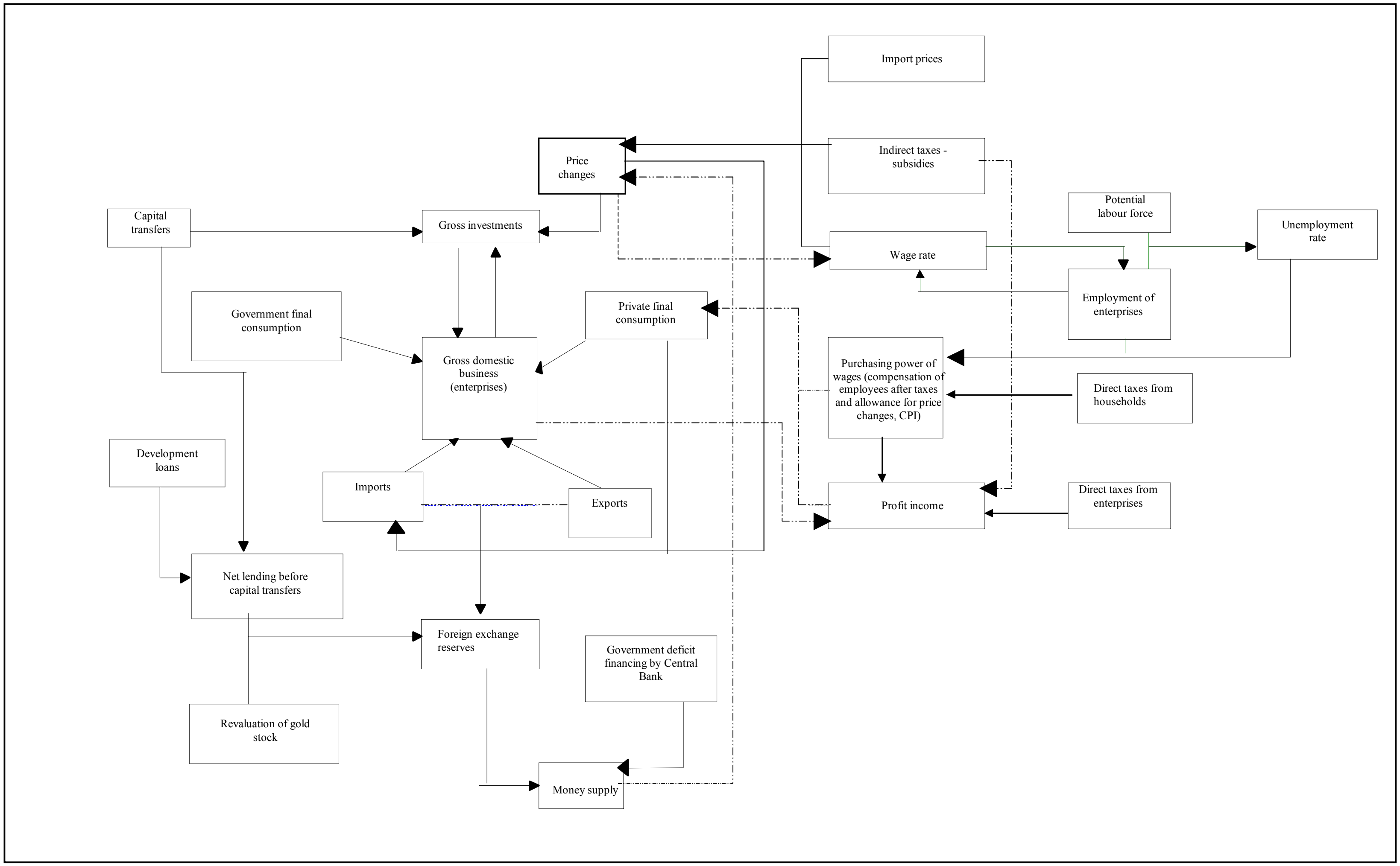
OTHER
86. Interest USA
87. Prime rate

PERCENTAGE CHANGE
90. Value of exports main products
91. Investments in export sector
92. World trade volume of goods and services
93. Employment Isla *1,000

95. Foreign reserve stock
96. Money
97. Domestic debt
98. Foreign debt
99. Value of invested wealth (of enterprises)
100. Accumulated migration balance since 1979

[a)] The primary variables based on the national accounts cover all transactions of four sectors: enterprises, government, households and the rest of the world. For the household sector, private final consumption, disposable income and savings are dealt with as secondary variables. Transactions of the two (sub-) sectors of social security and pension funds and insurance schemes are consolidated with those of government.

Diagram VII.3. Schematic presentation of the structure of the "Antillyse" model



7.134. The structure of the model is reflected in diagram VII.3 below. It shows the main primary variables and the behavioural, identity and other relations that are defined between them, which are discussed in sections (b) and (c) below. It also shows the importance of the national accounts in structuring the model, as the majority of primary variables presented in the diagram are variables from the national accounts (private and government final consumption, gross investments, gross domestic product of business (enterprises), imports and exports, capital transfers, indirect taxes less subsidies, direct taxes from households and enterprises). Only a minority of the variables, in the diagram are based on other data sources, including financial and monetary variables (foreign exchange reserves, money supply, monetary financing, development loans), data in volume terms (employment of enterprises, unemployment, potential labour force) and price data (wage rate, import prices, price changes).

(b) Functional relations used in model projections and national accounts compilation

7.135. The model includes a large number of functional relationships that are or may be used to project data to future and past years. They are comparable to relations used in national accounts to compile data for most recent years. The projection and compilation of data can refer to the same accounting period, if the model is used to estimate data for recent periods, for which only a limited data set is available. In order to compare the model relations with similar ones used in national accounts compilation, they may be grouped together in a number of categories that can be understood in terms of relations used as assumptions in national accounts compilation.

7.136. The following groups of relations may be distinguished:

- Relations used to “extrapolate” the values of the variables to future years;
  - Assumption of no or constant change over time;
  - Extrapolations with simple price adjustments;
  - Extrapolations including lagged and/or composite price and other factors;
- Relations between variables used to “estimate” data, once other data are known:
  - Estimations with the help of simple coefficients, ratios and so on applied to variables or aggregates of variables within the same or across accounting periods;
  - Estimations based on multiple relations within the same or across accounting periods.

(c) “Identities” or balances that hold between the variables of the model

7.137. The variables extrapolated on the basis of “no change” assumptions refer mainly to transactions with the rest of the world: wages and rest of income from abroad to enterprises (see box below),[33], transfers and capital transfers to and from abroad. Furthermore, appreciation of the gold stock is assumed to be the same each year. Constant changes over time are assumed for depreciation, labour productivity (see box), growth of employment and population. These “no change” or “constant change” assumptions determine the “reference path” of the economy over time. When using the model, some of the elements may be changed exogenously in order to arrive at changes over time that are different from the “reference path”.

19. Wages <u>from</u> abroad	O19 = N19
20. Rest income <u>from</u> abroad to enterprises	O20 = N20
55. Depreciation	O55 = N55+10
79. Labor productivity trend	O79 = N79*1.02

7.138. Similar assumptions are made when data are extrapolated with the help of price adjustments, generally based on the consumer price index. This extrapolation technique has been applied to changes over time of goods and services provided by government to households and enterprises (see box below), subsidies, imports by government (see box) and transfers from abroad to households, migrants’ transfers (see box). Also, in these instances, exogenous changes can be incorporated to arrive at changes over time that are different from the “reference path”.

21. Transfers <u>from</u> abroad <u>to</u> households	
	O21 =N21*(1+O71/100)
25. Import of goods and services by government	
	O25 =N25*(1+O71/100)
33. Goods and services by government <u>to</u> enterprises	
	O33 =N33*(1+N71/100)

7.139. The above relations are known as “semi-behavioural”; they are based on trends observed in the past. Very few of them are used by national accountants, who generally prefer to base themselves on direct estimates and not on assumptions about trends over time.

7.140. They should be distinguished from more complex “behavioural relations”, which are applied, for instance, to project the total wage bill of enterprises, exports of goods and service by enterprises, and transfers to households by government. The latter are based on economic theory and/or based on relations found in regression analysis of past data. The wage bill of enterprises is, for instance, extrapolated from an earlier year with the help of data on the consumer price index and unemployment of the present and previous year (see box below). Similarly, exports of goods and services are extrapolated with the help of price indices of exports and imports of the present year and the world volume of trade of the previous year. Furthermore, transfers to households by government, which mainly refer to social transfers, are extrapolated on the basis of employment data.

14. Total wages of enterprises
O14 = N14*(1+O145/100)*(O79/N79-1)+
(1*(N71+O71)/2-0.5*(O78-N78))/100 -0.1*(N78-5)/100)

in which:
145. Employment businesses %

7.141. Simple coefficients are used to estimate depreciation of enterprises on the basis of the total stock of accumulated capital, and imports of goods and services by households on the basis of their disposable income (see boxes below). Similarly, direct taxes of households are linked through simple coefficients to disposable income of the household sector. And private final consumption is linked to disposable income with the help of two types of coefficients, namely, one type representing the propensity to consume of household wage income and another one representing the propensity to consume of profit income received by households. Simple coefficients are also used to estimate indirect taxes, which are linked to value added of enterprises. Finally, simple coefficient links are used to estimate the active population between ages 15 and 64 to the total population and the migration balance is linked through a simple coefficient to the unemployment rate.

15. Depreciation of enterprises	O15 = 0.1*N99
26. Imports of goods and services by households	O26 = 0.12*O133
in which: 133. Disposable (income of households based on) wages and (social) benefits	

7.142. More complex multiple relations are used to estimate gross investments of enterprises and interest paid by government to enterprises; multiple relations are also used to make estimates of the consumer and export price indices. Gross investments are estimated on the basis of a mix between an investment accelerator or capital output ratio and a link to United States interest rates and the consumer price index in the Netherlands Antilles (see box below). The prime rate and the value of domestic debt determine interest paid by government to enterprises, and interest paid to abroad is determined by the value of foreign debt and the United States interest rate. The consumer price index is related to the import price index and the trend in labour productivity and wage rates, and a similar relation determines the export price index.

13. Gross investments of enterprises
O13 = 400*O12/$H12+0.33*N99*((O144+N144+M144)/300-(N86-N71)/100)+N13/100

in which:
144. Return (on invested wealth of enterprises)

7.143. In general, national accountants use simple coefficients, rather than the complex behavioural relations used in models that are based on economic theory.

(d) Role of identities in the model and national accounts

7.144. Identities play an important role in national accounting. They determine the consistency of concepts and data based thereon. Ideally, they should be used to check the conceptual consistency of data that are independently obtained, but in actual country practices they are often used to derive data of selected sectors of transactions indirectly or residually. The number of identities and therefore internal consistencies of concepts and data depend on the scope of the national accounts, but are generally very large. Conceptual consistency, as emphasized in the national accounts, is not the only type of consistency between data. In the model there is emphasis on another type of consistency, that is, the consistency defined by the functional relationships between the data, as reviewed in the previous section. When the model is used for projections, all projected data satisfy the functional relationships of the model and only those identities, or conceptual relationships defined by the national accounts, are included in the model.

7.145. The identities included in the national accounts of the Netherlands Antilles are those between supply and use of goods and services between the sectors, the intersectoral balances between payments and receipts that refer to transactions of the primary and secondary distribution and capital accounts and the identities that are defined within each sector. The number of identities is further enlarged, because of the cross-classifications of transactions of the sector accounts, which reflect "from whom to whom" links between the sector data. The product flow identities that hold within the SUT compiled more recently for the Netherlands Antilles are not yet integrated with the other identities of the national accounts. As the scope of the national accounts is limited to the capital accounts of the 1993 SNA, flow-of-funds identities are not covered in the accounts.

7.146. Most of the identities in the national accounts hold automatically, because final consumption and other variables of the household sector are derived residually, or are estimated as counterpart information of other sectors (government, enterprises and rest of the world). Thus, identities are used to a very limited extent in the national accounts of the Netherlands Antilles as checks.

12. Gross domestic product of business (enterprises)
O12 = O13+O104+O105+O47+O18-O24-O25-O26
46. Goods and services from enterprises to government
O46 = O33+O34+O47+O104-O25-O55
59. Balance of capital account
O59 = O44+O64+O65-O66 +(N59 -N44-N64-N65+N66)+N59*0.01

in which:

104	Material public consumption
105	Value of consumption of households

7.147. The model includes three types of identities, which are illustrated by examples presented in the box above. They are all across-sector identities. The first one is the across-sector identity between GDP and GDP obtained as the sum of expenditure components. The second one defines the identity with regard to goods and services between the government and enterprise sector and the third one is the across sector identity with regard to capital flows. The latter represents a group of identity relations between flows and stocks of financial assets and liabilities, covering foreign reserves, money, domestic and foreign debt and the value of accumulated wealth of enterprises. As the data used in these identities are not based on national accounts data, they are not integrated with the national accounts identities.

7.148. No other across-sector identities are included in the model, because one sector – the household sector—is entirely obtained on the basis of counterpart information. Thus, current and capital transfers to households from government and vice versa are determined as part of the estimates of the government sector. Similarly, there are variables in the model that identify payments to and receipts from households by business and the rest of the world. Thus, the household sector is not directly included, but indirectly it is measured residually on the basis of other sectors' data and estimates.

7.149. The model faithfully follows the national accounts, in that it uses the identities to derive estimates of items that cannot be obtained through direct measurements and/or exogenously. Thus, the first identity defined in the above box is generally used to estimate either the value of consumption of households (item 105) or GDP (item 12). The selection of the residual items depends on whether direct information is available on GDP in the case of short-term projections, or on final consumption in the case of long-term projections. The model does not include a formal procedure to use the identities for checking the consistency of alternative estimates.[34] However, when making provisional estimates for recent years for GDP and its breakdown by expenditures, plausibility checks are carried out with the help of price and volume indices of consumption and other GDP expenditure categories and this may result in the revision of some of the model projections.

3. Further integration of national accounts and the model

7.150. In principle, the same type of relations as presented above for the model are used in the compilation of national accounts. However, the emphasis of national accounts compilation, when using such relations, is different. There is more emphasis on identities than in the model, but national accounts use less refined methods to extrapolate and only simple coefficients are used to derive the values of some variables from those of others. On the other hand, the national accounts, and in particular the 1993 SNA, are much more refined than the model when defining concepts and using sectorization as a means of classifying the data. A number of suggestions are presented below on how a "cross-fertilization" between the accounts and the model could improve the scope and compilation/projection methods used in both and how the introduction of the 1993 SNA features could make a contribution to this effort.

(a) Use of functional relations of the model in national accounts compilation

7.151. The first suggestion is that the national accounts, when compiling data for future years, may adopt the more refined extrapolation methods of the model. In particular, national accounts may make use of the behaviouristic relations defined in the model for wages and gross investments of enterprises, and may also utilize them in the estimation process of model relations between the variables across periods. The estimates derived in this manner would most probably be more precise than the cruder types of assumptions used in the national accounts compilation. Also, it would in general be advantageous to use the model relations in those instances where national accounts would normally not make estimates when limited data are available. This holds in particular for institutional sector accounts, which are generally not compiled until comprehensive data are available. In these instances, the model approach may be used as a first approximation of transactions estimates that would otherwise not have been made.

(b) Extending the use of identities in the model and the national accounts

7.152. Both the accuracy of the national accounts and the precision of projections through the model would be considerably improved if they both dealt with identities in a different manner. At present, they are used to derive data indirectly and not as a means of checking data and estimates that are derived in alternative ways. Thus, in national accounts the SUT compilation should be used to confront direct estimates of household final consumption with indirect estimates obtained as a result of the commodity flow method. This would be achieved if the present SUT compilation were integrated with the compilation of institutional accounts. With regard to the model, a similar use of identities may be introduced. At present, the model derives the value of consumption of households (item 105) or GDP (item 12) as a residual from the first national accounts identity referred to above. If GDP is fixed in simple scenarios and investments are increased, final consumption of households is correspondingly reduced, which is not a very useful outcome of a model. Instead, the model may include separate functional relations for investment, final consumption of households and GDP. As the separate estimates may not be consistent with the overall GDP identity, another procedure may be introduced into the model to change the first estimates of several variables, which would achieve the GDP equilibrium, for instance, through prices and other adjustments.

7.153. Expanding the scope of the accounts through the inclusion of flow-of-funds data for selected sectors may further enhance the use of identities in the national accounts. As flow-of-funds data are currently not included in the national accounts, the model obtains such data from data sources other than the national accounts. They are therefore not consistent with the national accounts data of the past, and consistency requirements are also not satisfied when the model projects such data to the future. Extension of the present national accounts to the financial accounts and financial balance sheets is feasible, as at least for some sectors data are readily available. This applies in particular to the non-financial corporate (NFC) sector and the financial corporate (FC) sector (banks, pension funds and insurance schemes), for which financial accounts and balance sheet data can be based respectively on financial statements of non-financial enterprises and banking and related financial data prepared by the Central Bank. NFC data would be particularly important as they would provide a significant part of the analytical link between production and financial analysis and would supplement financial analysis carried out by the Central Bank, which may omit data on direct private investment flows. The same extension is also feasible for the two sectors of social security, insurance schemes and pensions funds, which are currently included with government in the model (see section 2(a)). By making these sectors explicit and in particular including information on their financial flows and stocks, the model knowledge of the financial flows and stocks may be improved, as both sectors are important focal points of the financial system of the Netherlands Antilles. Similarly, the accounts can be extended for the government and rest of the world sectors to include financial flow and stock data, so that government and external debt are included in a consistent framework of national accounts. The extension of the accounts to financial accounts and balance sheet data should be done in close cooperation with the Central Bank.

(c) Refining the sectorization of the national accounts and the model

7.154. The model and also the national accounts of the Netherlands Antilles would be considerably refined if a clearer distinction were incorporated between three SNA sectors, - non-financial corporations, financial corporations and households. At present, the model as well as the accounts distinguish between "enterprises" and "households". Financial corporations are only partly identified in the accounts, which include a sector for insurance schemes and pension funds, while aggregating banks with the NFC sector. There is no separate financial sector in the model; insurance schemes and pension funds are included with the government sector and banks are included with the NFC sector, as in the national accounts.

7.155. The difficulty of the present approach becomes particularly clear when bringing together data of "enterprises" in table VII.5. The functional relations implicit in the model between the data presented in that table are distorted because of incompatibilities between the scope of different items in the table. For instance, gross domestic product of business (enterprises), total wages of enterprises, goods and services by government to enterprises and employment of enterprises refer to all production units, including large non-financial corporations, banks, insurance schemes, pension funds and also small household enterprises. However, data on investments of enterprises, interest from government to enterprises or net private loans may refer only to large non-financial and financial corporations, including banks, while data on exports of goods and services by companies (enterprises) cover only non-financial corporations.

7.156. By distinguishing corporate production units from small household production units, productivity measures could distinguish between the two, and also other elements of the production analysis could be separately identified. In general, by using the same sector scope for all variables that refer to enterprises (business) and households, the model would include behaviouristic relations specified by sector, which would be more reliable when projecting sector data to the future.[35]

7.157. The non-inclusion in the accounts and the model of a separate financial corporate sector as defined in the SNA presents a clear difficulty in the analysis of the data. Banks are not therefore identified in the accounts and model and this presents an obstacle to the proper analysis of the role of offshore banking in the economy of the Netherlands Antilles. This may be less problematic in the accounts as, at the present time, they do not yet include financial accounts. On the other hand, the model has introduced these accounts through the incorporation of data on financial flows and stocks, including those presented in table VII.4 under the heading Monetary Review. By not having in the model a clearly identified financial sector that includes banks, the links between the financial flow and stock data and the real economy of goods and services cannot be well reflected. Therefore, both the national accounts and the model should incorporate a financial corporate sector, for which data should be available in the national accounts with regard to all flow accounts as well as balance sheets. This is not unfeasible, as, in general, financial corporate sector accounts can be based on consolidated presentations by central banks.

TABLE VII.5. "ENTERPRISE" VARIABLES IN *ANTILLYSE*

PRIMARY VARIABLES

NATIONAL ACCOUNTS

ENTERPRISES
12. Gross domestic product of business (enterprises)
13. Gross investments of enterprises
14. Total wages of enterprises
15. Depreciation of enterprises

EXTERNAL SECTOR
Current income
18. Export of goods and services by companies (enterprises)
20. Rest income from abroad to enterprises
Current expenditures
24. Import of goods and services by enterprises

GOVERNMENT SECTOR
Current revenues
33. Goods and services by government to enterprises
35. Rest income to government from enterprises
36. Indirect taxes by enterprises
37. From which revenues from import duties
38. Direct taxes from enterprises
Expenditures
46. Goods and services from enterprises to government
50. Interest from government to enterprises

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Government sector
65. Net private loans (to government)
66. Capital from enterprises to government

LABOUR MARKET

76. Employment of enterprises *1,000

OTHER

99. Value of invested wealth (of enterprises)

SECONDARY VARIABLES

134. Disposable profit income =
O12-O36+O52+O20-O28-O35-O38+O50+O51-O14

a) The numbers refer to the codes used in the model.

7.158. More detailed approaches to sectoring and other breakdowns, as suggested above, are particularly relevant to national accounts and also to the model when it is used to make national accounts estimates for the recent past. However, for forecasting purposes, model users may be less interested in a detailed model for two reasons. First, it is difficult to make good forecasts at a detailed level, and secondly, the model may become too difficult to understand and lose its use as a communication instrument. Whatever level of detail is chosen for the national accounts and the model, the two types of detail should be closely coordinated, so that the lesser detail can be derived from the more detailed presentation.

(d) Use of I-O structures in the model

7.159. The present model does not incorporate any industry breakdown of the supply and use table. Based on the national accounts of the Netherlands Antilles, it includes instead an institutional I-O structure. The latter is based on the goods and services or product flows recorded in the accounts between institutional sectors, as reflected in table VII.6. The column numbers in the table are the same as those in the rows and correspond to the same sectors as shown in the rows. The goods and services transactions presented in the table are thus as deliveries from sectors in the columns to sectors in the rows. The enterprises and insurance and pension fund sectors are included as one sector in the table, as the accounts do not distinguish between the product flows to and from the two sectors.

7.160. It should be noted that an SUT has been elaborated in the Netherlands Antilles during the past few years, but as it has not been integrated conceptually and quantitatively with the national accounts, the model cannot make full use of the data detail by industries.

Much could be gained from integrating the industry data of the SUT with the rest of the national accounts and including the SUT industry relations into the model. I-O relations based on industries are much more stable than the type of institutional I-O relations that are currently included in the model. The 1993 SNA includes, at present, two types of I-O relations. The first one is the supply and use table, with a breakdown of production and product data by industries and products, and the second one is a cross-classification of production data by industries and sectors, which was newly introduced in the 1993 SNA. The CCIS is a matrix, linking SUT with institutional sector data. It shows, in particular, how production structures differ between large NFC and small household (HH) sector production units. As the national accounts in the Netherlands Antilles currently include an SUT, the model could be restructured on the basis of national accounts data that are available.

Table VII.6. Goods and services transactions between sectors, I-O relations in the national accounts of the Netherlands Antilles

		(1)	(2)	(3)	(4)	(5)
Enterprises and insurance schemes and pension funds	(1)		X	X		X
Government, other than social security	(2)	X		X		X
Social security	(3)					
Households	(4)	X	X			X
Rest of the world	(5)	X				

7.161. On the other hand, the national accounts of the Netherlands Antilles do not distinguish between NFC and HH production units, which implies that the CCIS matrix can only be introduced in the model when the national accounts have been adapted to the 1993 SNA. The latter point is closely related to the previous issue of sectorization and the scope of enterprises in the present national accounts of the Netherlands Antilles. Incorporation of the two I-O features in the model allows one to distinguish between production structures and productivity measures of different industries and also between large and small production units.

(e) Making “price” data explicit in the national accounts

7.162. Another feature that may be incorporated into the national accounts is to make data on price indices, wage rates, interest rates and exchange rates explicit in their presentation. All of these elements, except interest rates, are currently being used in compiling national accounts data for of the Netherlands Antilles, which is in line with the practices of other countries. On the other hand, they are also used extensively in the model, for example, when extrapolating data with the help of price adjustments, or when estimating employment on the basis of wage rates, imports, using a comparison between import prices (reflecting exchange rates) and consumer prices, or investments, using, among other things, interest rates. At present, price elements in the model include a consumer price index, an export price index, an import price index (= United States consumer price index), an investment price index, an implicit wage rate for government and enterprises, and the prime rate and interest rate in the United States. As the model acquires “price” data from data sources that are different from the national accounts, there is no guarantee that they are compatible with the ones used in the compilation of the national accounts. By specifying them explicitly in the national accounts, the modeller may either use them directly or use them as a point of reference. Using these "prices" in the model would also introduce the national accounts consistency between volume, value and price data.

(f) Benefits from further integration of accounts and the model

7.163. Once the above features have been incorporated into the national accounts and/or the model, there is further compatibility between the scope and projection/compilation methods used in both. The corollary of this is that if the model were used to project data to a recent period, national accounts compilation and model projection would result in data that are close to each other. Such close integration would be particularly advantageous for the compilation of short-term accounts, when few data are available. When compiling such accounts, much more use than at present could be made of the behaviouristic and other functional relations in the model.

7.164. By integrating the accounts with the model to a larger extent, use can be made of the modular structure of the model to integrate other specialized models and supporting data sets. For instance, the Central Bank or the Ministry of Finance may be interested in developing specialized monetary and fiscal models, which may include some elements of the real economy, such as GDP, exports and imports. They may be operated separately with real economy data inserted as exogenous information, or they may be operated as modules of the present "Antillyse" model. Also, environmental modules may be developed to show the impact of production and final consumption on environmental quality and may focus, in particular, on the environmental impacts of the tourist industry. The present "Antillyse" model already includes an energy module, which can be used to show the impact of production and final consumption on energy consumption.

7.165. A further advantage of the close alignment between accounts and the model is that close links can be established between statistical development and the policy uses of statistics. This is clearly illustrated by the past uses of the "Antillyse" model, in assessing the impact of IDB, IMF and other government policies on the economy of the Netherlands Antilles.

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[22] Julie Hass and Knut Ø.Sørensen, Norwegian Economic and Environment Accounts Project (NOREEA), Final report to Eurostat, Statistics Norway (1998).
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[25] See Alexandre Samy de Castro and Marco Antonio F.H. Cavalcanti, "Annual econometric model for the Brazilian economy", paper presented at the Project LINK meeting, March 1998.
[26] See Alpo Willman and others, "The BOF5 macroeconomic model of Finland: structure and equations", Bank of Finland discussion papers (1998).
[27] The so-called "private sector" should be interpreted as a residual sector, i.e., whatever sector the user does not specify separately will be in this "private sector".
[28] If a country is eligible to receive IDA lending, the structural adjustment loan becomes a structural adjustment credit.
[29] Historical data are used to update the World Bank's macroeconomic databases from which it draws the data published in the World Development Indicators and Global Development Finance publications.
[30] Until the Unified Survey of 1998, the indicator coverage of the projection part of the survey was the same as the C-annexes of the country assistance strategy document.

[31] The economic affairs agencies of Curaçao, Bonaire and St. Maarten developed "Antillyse", in close cooperation with Marijn van Schaaijk, who is heading the Netherlands consultancy firm Micro-Macro Consultants. The model can be downloaded, free of charge, from the home page on the Web site: www.rsl.net/Runy.

[32] The accounting framework of the Netherlands Antilles distinguishes between capital and financial transactions, but this distinction is not the same as that in the 1993 SNA. The capital accounts include only capital formation, and financial transactions refer only to capital transfers. The SNA financial accounts are not included. Consequently, net lending is estimated before capital transfers.

[33] The codes of the variables used in this and later boxes are those used in the model. As most are primary variables, their references can be found in table VII.4 above; if secondary variables are referred to, they are explained in the corresponding boxes. When variables are preceded by an "O", they refer to the current year and when preceded by an "N", they refer to a previous year. Any other letter (e.g., "H") used refers to values of variables in earlier years, which may be benchmark or base years.

[34] Formal checking procedures using identities do exist. See, for instance, F.J.H. Don, "Restrictions on variables", Journal of Econometrics, vol. 18 (1982), pp 369-393. They are, however, too complex to use in a very small country.

[35] While a more detailed approach could help to make more accurate estimates for the past, model users may not want a detailed model, as it is difficult to make good forecasts at a detailed level, and also because the model would become too difficult to understand and would lose its use as a communication instrument. Instead, only the Central Bureau of Statistics may compile national accounts at a more detailed level and compare the results with the model projections at the aggregate level.

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