NOVEMBER 1998

SPECIAL PAPER THIRTY-THREE

IMPROVING AFRICAN ECONOMIC STATISTICS

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OMIC RESEARCH CONSORTIUM

OUR LA RECHERCHE ECONOMIQUE EN AFRIQUE

IDRC - Lib. 113308

Improving African economic statistics

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ARCHIV
330(6)
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Improving African economic statistics

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AERC Special Paper 33
African Economic Research Consortium, Nairobi
November 1998

© 1998, African Economic Research Consortium.

Published by: The African Economic Research Consortium
P.O. Box 62882
Nairobi, Kenya

Printed by: The Regal Press Kenya, Ltd.
P.O. Box 46166
Nairobi, Kenya

ISBN 9966-900-82-9

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List of abbreviations

AERC	African Economic Research Consortium
CBN	Central Bank of Nigeria
CGE	Computable General Equilibrium
CIF	Costs, insurance and freight
FOB	Free on board
FOS	Federal Office of Statistics (Nigeria)
GDP	gross domestic product
GNP	gross national product
IMF	International Monetary Fund
I-O	input-output
MPS	system of material product balances
NMP	net material product
RPs	research papers
SAM	social accounting matrix
SNA	system of national accounts
UN	United Nations
USA	United States of America
WB	World Bank
UNECA	United Nations Economic Commission for Africa

Acknowledgements

I hereby acknowledge the contributions of Drs. Ajiferuke and Ogunkola to the production of this paper. Dr. Ogunkola produced extracts from the AERC research papers used for Section IV of the original report, the source of this paper, and Dr. Ajiferuke handled most of the computer analysis aspects for the original report. They also both took active part in preparing the report for publication. Support services were provided by Samuel Adamu & Associates, Ltd., and, in particular, its research assistants, Mr. Abel Jimoh and Mr. Abiodun Olabomi. VIC Computer & Business Centre produced the original final report.

I wish to thank Professor Ademola Oyejide for arousing my interest in the assignment and for giving valuable suggestions on the draft of the original report. I also want to thank the two referees for their valuable suggestions and comments, and the AERC editor for her comprehensive work. Finally, I am grateful to AERC for providing the financial support to carry out the project. I have no doubt that AERC will continue to provide the necessary support to ensure that sub-Saharan African country economic data are improved on a continuing basis. All the above notwithstanding, I take full responsibility, as the principal researcher, for the outcome of this work .

Professor Samuel O. Adamu
April 1998

Abstract

The main objectives of this study were to examine critically the availability and quality of economic statistics for sub-Saharan African countries relevant, in particular, for research; to assess the research reports by AERC researchers as examples of usage; and to develop a programme for ensuring improved data series on a continuing basis. Our findings show that on the producers' side, the official statistics offices of many sub-Saharan African countries are unable to produce complete, timely and accurate statistics that cover all areas of the economy. Also, data are published by these offices with considerable time lags. On the research users' side, as illustrated by AERC researchers, we find that many researchers misuse the available data; they fail to evaluate the quality of data and to make appropriate adjustments before use. All these are probably due to the researchers' lack of adequate knowledge of macroeconomic statistical systems. We also find that most researchers adopting modeling usually ignore the descriptive and analytical aspect of the research work, and concentrate totally on specification, estimation and simulation of models. The presentation of their results is usually not done in a manner that policy makers can easily understand.

In the light of these findings, apart from recommending the use of descriptive and analytical methods to diagonize and adjust for errors, a programme to improve the generation and use of data is recommended. The programme covers: workshops for current and potential AERC researchers on national accounts (as well as related accounts and tables), designed and conducted by AERC; based on the training workshops, projects to improve existing structured series and develop new ones; and the development of databases. All these, if adopted and implemented successfully, will go a long way to improve immensely the quality, quantity and use of sub-Saharan African economic statistics.

I. Introduction

The main objectives of this project are to examine the present state of economic statistics that are relevant for macroeconomic research and other uses in Africa, South of the Sahara; to examine the use of these statistics and problems mitigating against proper production and use, as these two go hand-in-hand; and to suggest ways of improving data availability, quality and appropriate utilization. In effect, to investigate and design ways of improving the quality of economic statistics, since research results can only be useful for economic analysis, policy making and decision taking if the data used in analysis/modeling/simulation are comprehensive, timely and accurate. Ultimately, the results of this exercise should enable African Economic Research Consortium (AERC) researchers and other users of sub-Saharan African economic statistics to ascertain, and to present to the public, important economic facts and their interpretation in a scientific and impartial manner.

Justification of the study

In macroeconomic research literature on developing countries, Africa in particular, there are lots of complaints about macroeconomic statistics and their uses. Some of these complaints involve: shortness of data in time series, highly aggregated series that are often insensitive to policy actions, gaps in series, and lack of timeliness in production and/or dissemination to users. Apart from these complaints about statistics in general, there are other complaints of specific nature such as: basic recording problems in administrative data, like trade statistics (Yeats, 1990); general agricultural data problems that are more or less specific to sub-Saharan African countries (Franchet, 1986); field work problems in the collection of crop production data in forest areas of Africa (Sarma, 1986); and inconsistencies about data produced by different statistics agencies (Ariyo, 1994). Most of these problems come from micro data that are used to compile macro data. Such problems do not cancel out in aggregation; the errors are additive and end up as macro data problems, and collectively as aggregation problems (Morgenstern, 1963). There are inappropriate applications of econometric research techniques, leading to serious estimation problems (Greene, 1993). These problems require proper investigation so that appropriate solutions can be proffered for them.

Our research activities on this project are mainly desk and library work. No primary data collection – sample survey/census – is carried out. Hence, most of the sources used may not be as current as they should be, but this is not likely to invalidate the conclusions reached. All the concerns raised are still with us today.

Organization of the study

Moving from this brief background statement, Section II of this study deals with economic statistics from the level of a system of national accounts (SNA) and by extension, to input-output tables, flow of funds, social accounting matrix (SAM) and satellite accounts. The section also deals with other economic statistics systems developed by other institutions such as balance of payments and financial and/or government statistics by International Monetary Fund (IMF), and their relations with SNA. Indications are also given of how all these are derived from basic data obtained in one way or the other from microeconomic units, and the quality of micro and macro data. The section concludes by making the link between macroeconomic statistics and macroeconomic modeling via macroeconomics.

Section III is about macro econometric modeling. This covers the various types of models, problems resulting from using SNA data in econometric models, data problems of regression analysis and the use of macroeconomic time series in modeling.

Sections II and III provide the background for what are presented in sections IV and V. Section IV deals with published AERC research papers. It appraises the papers in terms of the nature and uses of data, relates the AERC research project data to the macro statistics systems discussed in Section II and the econometric modeling approach of Section III, and discusses the research results as related to economic policies in the areas of interest to AERC. The econometric models are specifically appraised to cover diagnostic tests and procedures necessary to handle problems of macroeconomic time series.

Section V covers African country economic statistics in published form, and attempts to link this with the discussion in Section II. Attention is focused on availability and quality of data in each country and between countries. A further link is made with Section IV by relating availability and use of data by AERC researchers. Efforts by data producers and users to improve data quality over the years, especially by advanced countries like the United States, are discussed, and the role of international organizations is very much acknowledged. In concluding this section, and given the contents of Section IV, an attempt is made to focus on areas where improvement projects can be developed.

Section VI is about the design of a programme to improve the generation and use of data. Three projects are identified: a training programme for African economic graduates and researchers; coordination of data and research improvement projects as a follow-up to the training; and the development of an African economic data bank system. The concluding section (Section VII) summarizes the results of this exercise.

II. Economic statistics

An economy consists of many individual economic units (microeconomy units): households, establishments, enterprises (in either the public or the private sector). Their decisions determine the economy's total spending, total income, and total production of goods and services. The households effectively own factors of production while the establishments make decisions on what to produce. The enterprises, which may often be the same as the establishments or a group of establishments, make income, financial and overall decisions concerning their activities. The establishments use raw materials (intermediate consumption) and factors of production (labour, land, capital and entrepreneurs) to produce goods and services. These factors are rewarded in the form of wages, rent, interest and profit (income).

In a simplified economic system, interactions between the households and the enterprises can be viewed in the following ways: the households provide the factors of production and in return they are given income; the income is then used to purchase goods and services produced by the enterprises for consumption (current and capital). These transactions lead to three ways of measuring the amount of economic activities in the whole economy: the value of goods and services produced, the total factor earnings, and the total expenditure on goods and services. But the economy is not just households and enterprises, it comprises the government, non-government organizations and the rest of the world (because the economy is not closed). If we put all these into consideration, the compilation of the nation's total product (known as gross national or domestic product, depending on what is included), income or expenditure become very complicated and require systematic measurement and analysis of complex data series.

On the other hand, looking at all these, we can say that economic analysis is often carried out at two levels. One concerns the microeconomy (economic behaviour of the household, enterprise and so on) and is called microeconomics. The other is at the macroeconomic level (behaviour of the whole economy) and is called macroeconomics. Microeconomic analysis offers a detailed treatment of individual economic decisions, at the micro level, about particular commodities, while macroeconomics emphasizes the interactions in the economy as a whole. But there is a link between these two levels of analysis, called the "meso" (middle) link. It consists of: markets that link the macroeconomy and individual households and enterprises; economic infrastructures which are essentially public expenditures on physical infrastructure and support services; and social infrastructure, that includes education, health, nutrition support and other transfers. This link is particularly relevant in public policy making in a developing economy where the public sector is still very important.

If a policy design is to be meaningful and economic management successful, the microeconomic level, the macroeconomic level and the meso links among them must be measured accurately, comprehensively and in a timely way to produce economic aggregates and meso aggregates that can adequately reflect the economy. These are essentially the work of national accounting in its present form (UN, 1993a).

We take the unusual step of discussing economic statistics from the apex. This is intentional because of the emphasis given to the macro level of the economy and the related data in this exercise. We begin with national accounts and work through other macro level accounts.

System of national accounts

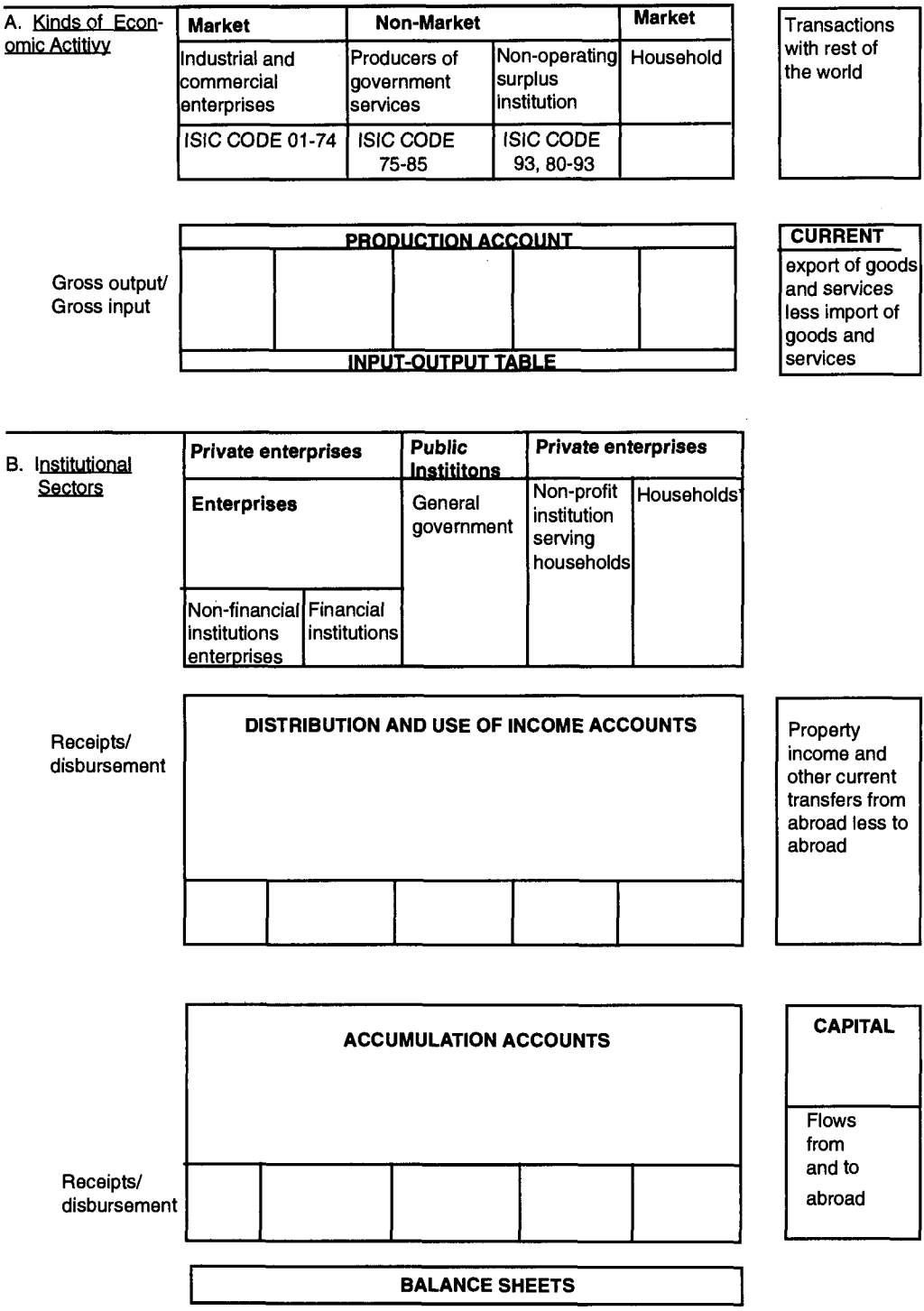
The concept of national accounts goes back to the work of Sir William Petty, who in 1665 produced the first national income estimate for England. He defined the income of the "people" as the sum of the annual value of the labour of the "people" and the annual proceeds of the stock or wealth of the "nation". On the other side of what can be regarded as a double-entry approach, he put annual expenses of the "people" or consumption outlays, both private and collective (produced by government), and the surplus remaining after current expenditure (Kendrick, 1972). Petty's approach was followed by the activities of individuals, institutions – both national and international – and government. In the process, various changes were made to his original work, in terms of concepts, measurement and uses.

A national accounting approach, in measuring the nation's income, product and expenditure, and deriving other aggregates and meso link values, has several advantages. It ensures that all economic units in the economy are covered and without double/multiple counting. National accounting involves:

- Defining, classifying and grouping transactions and transactors in an economy.
- Developing the transaction flows into a set of standard accounts for groups of transactors and the country as a whole.
- Providing additional tables and possibly satellite accounts that could not be part of the central system but are essential for the understanding of the economy.

The resulting framework is called a system of national accounts (SNA). Figure 1 presents a simple framework of the SNA structure. The columns of the diagram (excluding the first) represent the institutional sectors and establishments, while the rows (excluding the first also) cover the accounts and tables. The rows are also grouped into: kinds of economic activity, which are themselves groups of establishments (units of production process), and institutional sectors, which are also groups of institutional units. It is important that the reader goes through the figure and understands what it is all about. If the framework is properly presented, it reflects the inter-relatedness of all flows and stocks in the economy, and gives a complete description of the economic system.

Figure 1: National accounts framework



ISIC - International Standard Industrial Classifications, Rev 3

* The household includes unincorporated enterprises that are virtually unorganized (informal sector and these economic activities, in this respect, are found in all branches of the economy except the public sector and private non-operating surplus institutions servinc households.

National accounting, on the other hand, involves the design, construction and presentation of a comprehensive, articulate and integrated set of accounts, as in a business enterprise, covering all economic activities and economic units of a nation in a structured manner. SNA is a multi-purpose statistical system for economic analysis, policy analysis and decision making, whatever the structure and stage of a country's economy. In some literature, it is often referred to as economic accounting to differentiate if from the well known business accounting, but we shall continue to use "national" instead of "economic" for historical reasons.

The system commonly used by many countries is that designed by the United Nations (UN) or its predecessor, the League of Nations. This, began in 1947 when the League of Nations published *Measurement of National Income and the Construction of Social Accounts*. It was followed up with the 1968 System of National Accounts (UN, 1968) and its 1993 revised version (UN, 1993a). Over the years, national accounting has been based on standard accounting principles and development, developments in macroeconomics, since the appearance of Keynesian economics, and improvement and developments in data collection and analysis.

No national accounts compilation can be satisfactory without a proper and adequate classification and coding of concepts. These should be properly developed and followed. Therefore the SNA contains a number of standard classifications that in a sense constitute the skeleton of the system to be fleshed by the series of data collected and consequently manipulated to estimate the concepts (Adamu, 1997; UN, 1993a). If there is no proper classification and coding, data collection and development of these into accounts, the preparation of balance sheets and tables will be impossible, and comparison of the results over time and among countries will also be impossible.

There is also a hierarchical relationship between institutional units and establishments (Table 1). An institutional unit contains one or more establishments, while an establishment belongs to one and only one institutional unit. Establishments that have the same principal activity are grouped in industries according to the International Standard Industrial Classification of all economic activities (ISIC, Rev. 2 or Rev. 3). But institutional units are grouped together to form institutional sectors or subsectors on the basis of their principal functions, behaviour and objectives. Table 1, for each institutional sector, shows the type of institutional unit, kind of activity and economic objective.

There is no unique way of structuring the accounts compiled for an economy except that they have to satisfy some accounting rules and some specified objectives – derivation of certain aggregates like national income, analysis of production processes, financial analysis of the economy, distribution analysis and so on. But the best known accounting framework is the UN system as contained in UN (1968), which is now revised as the 1993 version (UN, 1993a). The 1968 version was built to reflect production, consumption expenditure, investment, financial transactions and external transactions. This consists of one account, the production account, for kind of activity and four accounts for each institutional sector or sub-sectors, and all external transactions (the rest-of-the-world accounts). The institutional sector and sub-sector accounts are: income and outlay account, capital accumulation account, financial transaction account, and balance sheet. Then, there are consolidated accounts (production, income and outlay, capital accumulation, and rest of the world) for the nation.

Table 1: Characteristics of institutional sector

	Non-financial corporate sector	Financial corporate sector	General government sector	Household sector
Type of institutional unit	1. Non-financial enterprise	1. Financial enterprise	1. Govt. units	1. Household
	2. Non-financial market non-operating surplus institutions	2. Financial market market non-operating surplus institutions	2. Non-operating surplus institutions financed and controlled by govt.	2. Non-operating surplus private institution households
Product	Goods and services	Financial claims services	Services and non-market-goods	Goods and services
ISIC (Rev. 3, Division)	All except 65 to 67 and 75 to 99	65 to 67	75, 80, 85, 90, 91, 92	All except 65 to 67 and 90 to 92
Economic objective	Making operating surplus	Making operating surplus	Providing final consumption (collective and individual)	Providing final consumption (individual)

A lot of changes were made in the 1993 edition of the SNA. This edition contains the following sets of accounts:

- The full sequence of accounts for institutional sectors and their balancing items
- The shortened sequence of accounts for industries
- The accounts for transactions
- Accounts of the rest of the world
- Simplified accounts for the nation

The details of all these accounts are presented in UN (1993a). The 1993 edition production account (account I) is designed to emphasize on value added as one of the main balancing items in the system. It shows only output as resources and intermediate consumption as uses. All institutional sectors now have a production account.

The process of distribution and redistribution of income is very important, hence the 1993 edition of SNA provides separate and different accounts. The distribution of income is decomposed into three main steps – primary distribution, secondary distribution and redistribution in kind. The first refers to the distribution of value added to factors of labour (compensation of employees) and capital (consumption of fixed capital) and to government (through taxes on production and imports net of subsidies), and the balancing

item as operating surplus (account II). It measures primary income. The second covers redistribution of income through essentially transfers in cash. It measures disposable income. The last one relates to further redistribution through transactions in kind. It measures adjusted disposable income.

There is a clear difference between production account under the 1968 SNA version and that of 1993, as the review shows. Also, the 1968 production account was only for kind of economic activity. The shortened sequence of accounts for industries is meant to fill this gap under the 1993 edition. The 1968 production account is equal to the first two sets of accounts (accounts I and II) discussed above.

The 1993 edition of SNA being fully integrated, accumulation accounts cover all changes in assets, liabilities and net worth (the difference between the assets and liabilities of any sector). Accumulation accounts are structured in a way that permits distinguishing various types of changes in assets, liabilities and net worth. The first group of accounts contains the capital account and the financial account. The capital account records transactions linked to investment in non-financial assets and capital transfers involving the redistribution of wealth. The right side includes saving, net and capital transfers receivable and capital transfers payable (with a minus sign) in order to arrive at that part of changes in net worth that is due to saving and net capital transfers. The second group of accumulation accounts is subdivided between an account for other changes in volume of assets and an account for revaluation.

A balance sheet is a statement, drawn up at a particular point in time, of the values of assets owned and of the financial claims – liabilities – against the owners of those assets. It may be drawn up for institutional units, sectors or the whole economy. Income and expenditure, and transactions in financial assets during the period of account, as contained in the other standard accounts presented above, can then be related to the levels of assets and liabilities. A balance sheet for the whole economy shows the stock of physical assets in the form of fixed assets and stock of goods, and holding of financial assets and liabilities in the form of claims on and liabilities to the rest of the world. For a sector, in addition it shows, its financial claims on and liabilities to the other sectors of the economy.

The opening and closing balance sheets display assets on the left side and liabilities and net worth on the right side. Assets and liabilities are valued at the prices of the date a balance sheet is established. Net worth, the difference between assets and liabilities, is the balancing item of the balance sheets. It is equivalent to the present value of the stock of economic claims a unit or a sector holds. Balance sheets show the level or stock of assets and liabilities at the beginning and end of a period of account.

A transaction account shows, for a given transaction or group of transactions, for example, interest, resources and uses for each sector (industry if relevant) engaged in this type of transaction, but not direct relations between transacting sectors. Thus relations of the type "what?/from whom?" and "what?/ to whom?" Totals of resources and totals of uses balance by definition and there are no balancing items. A transaction account is thus a way to recapitulate what may be found for a given transaction in the accounts of the various sectors/industries.

The most important transaction account is the goods and services account. It shows for the economy as a whole, or for groups of products, the total resources (output and

imports) and uses of goods and services (intermediate consumption, final consumption, changes in stocks, gross fixed capital formation and exports). Taxes on products net subsidies are also included on the resource side of the accounts. Uses are shown on the right side and resources on the left side in order to reflect transactions on the opposite side as compared with institutional accounts. Accounts for other transactions can be similarly produced.

The rest of the world accounts cover transactions and assets/liabilities between resident and non-resident institutional units. There is the need to interpret the rest of the world accounts carefully. The current transactions are recorded in only two accounts – the external account of goods and services and the external account of factor income and current transfers – but they are often merged. The balancing item of the first is the external balance of goods and services, and that of the second is the current external balance, which plays in the structure of the system a role equivalent to saving in income and outlay account.

The external accumulation accounts are relevant, but not for all transactions naturally. The external assets and liabilities are equivalent with a reverse sign to the part of the consolidated balance sheet of the economy that relates to financial assets and liabilities. The external transaction accounts should be compared with balance of payments accounts.

In the 1968 edition of SNA, all accounts were consolidated to produce the nation's accounts made up of: gross domestic product and expenditure account, national disposable income and its appropriation account, capital accumulation account, financial transaction account, balance sheet, and external transaction account. But with the 1993 edition, the consolidated accounts of the nation are replaced by the simplified accounts of the nation.

Data contents of national accounts

National accounting is not like the business accounting of a firm under a single or coherent management that produces audited accounts based on day-to-day data generated from its activities; it is on a country with many independent firms, individuals and other institutions. Even though some of these firms produce final or audited accounts that can be used to build national accounts and fill the cells, we are dealing with statistics, and with a considerable degree of estimation. National accounting, more than any other branches of statistics, is an art, not a science. No two countries' circumstances will be identical, nor will the circumstances of any one country remain the same over time. In fact, estimating national accounts components is unique in many respects.

Conceptual development of the national accounting framework starts at a very aggregate level of the macroeconomy, before being made complex and true to life by a process of disaggregating both the transactions and the transactors. On the other hand, the work of compiling national accounts statistics (the realization of the national accounts framework for a given country in a given time period) normally starts with obtaining data on observational units (micro units such as establishments for kind of activity and enterprises for institutional sectors). These observed data are then aggregated in respect to both transactor units and transaction flows or stocks. But the process of aggregation is

not necessarily adding up a number of values. Some values may have to be netted in the process of aggregation, for example, to avoid double counting or when they are of no economic interest. These are flows of activities between units within the same group of transactors. The output of the exercise of compiling national accounts is called national accounts statistics. This exercise is normally performed by the central statistics agency of a country. In Section V, we shall discuss the published national accounts statistics of African countries, South of the Sahara.

The data content of a system of national accounts and the related compilation procedures are determined by the concepts, classifications and uses of SNA, and the relationships defined between the concepts or variables of the system and those available in basic statistical sources.

The economic data needed by users, including government, private enterprises and researchers, can be grouped into three categories:

- Aggregate and related forms, useful as a framework for analysing the many problems relating to the economic and social systems as a whole – the macro data set.
- Micro data essential for those designing and evaluating policies in such areas as taxation, government expenditure and other activities, modeling microeconomics, evaluating improvement in the quality of life, etc.
- The meso links between the micro and the macro data.
  The information about a nation, which forms the basic statistical data for these various needs, reflects the complexity of the nation itself. These pieces of information are:
- Demographic characteristics – size and composition, vital events such as births, deaths, marriages, etc.
- Characteristics of institutional units and establishment.
- Other characteristics – animate or inanimate objects.
- Resources.
- Activities that may be regarded as transactions among the various economic and social units.
- Activities that may be regarded as decision behaviours, affecting economic and social structure and mobility in the society.

All these pieces of information are connected with human beings as individuals or groups of individuals and are often observed through micro-units such as establishments, enterprises, households, etc. Some of these may not be quantifiable or observable at all. If collected they are classified and grouped, using appropriate standard classifications and codings; they are presented at varied levels of aggregation, and, depending on the statistical sophistication of the producers, a database is developed for each level of aggregation, starting with the micro level. The major means of collecting the information are by:

- Censuses of human population characteristics, housing, quality, production (agriculture, industry, distribution, etc.), etc., which are carried out at intervals of five or ten years.

- Sample surveys/censuses of establishments/enterprises or households, which are conducted annually, quarterly or even monthly.
- Data collected as by-products of administrative activities (administrative data) – tax administration, regulation and control of exports and imports, banking, and other financial transactions.
- Audited accounts (of government, public and private companies), budget books of government and organizations, and other relevant sources.

All these data are used to compile national accounts and other statistics systems mentioned later. A good compilation procedure for national accounts will need the various kinds of data mentioned above and proper techniques of manipulating them (Adamu, 1997; UN, 1993a).

Like all official statistics, national accounts statistics, in some standard forms, are published annually or quarterly in national official statistical publications or separately on their own. Country tables of national accounts statistics are published by the UN in its *National Accounts Yearbook*, in four parts, for all countries of the United Nations that respond to its request for national accounts data. Part one of the *Yearbook* contains summary information, at current and, where appropriate, constant prices. This includes final expenditures and cost components of gross domestic product (GDP); government receipts and disbursements; enterprise and household income and outlay; external transactions; capital transaction accounts; GDP by institutional sector of origin and kind of economic activity; and a table showing the relationships among the aggregate concepts used in the SNA that are common in national statistics systems.

Part two contains detailed breakdowns of the final expenditure components of GDP – consumption, capital formation, imports and exports – in current and constant prices, together with supporting tables giving additional information on government outlays and capital stock, and tables relating to stocks of reproducible tangible assets, at current and constant prices.

Part three shows detailed institutional sector accounts. For each sector or subsector, five accounts are presented – production account, income and outlay account, capital formation account, capital finance account, and balance sheet. In the case of corporate and quasi-corporate enterprises, an additional detailed account for financial transactions of financial institutions is provided. For external transactions, three accounts are compiled: current account, capital accumulation account and capital financial account.

Part four covers the kind of activity breakdowns, in some cases at one-digit or two-digit level, with a very small amount of further breakdown at three-digit level. Where appropriate, both current and constant prices are specified. The tables show the derivation of value added and its cost components, employment, supply of goods and services, and intermediate consumption. A reconciliation of SNA GDP with system of material product balances (MPS), and net material product (NMP) is provided.

This country data format provides a level to which every country, irrespective of its stage of development, should aspire to attain in compilating its national accounts. The level to which every country in Africa satisfies the obligation of making data available for the UN *National Accounts Yearbook* is a major subject of Section V later.

In this section we have discussed the UN SNA in some details. This is not the only framework for producing and presenting national accounts. Some advanced countries, like the United Kingdom and United States, have their own unique systems, but they normally will make returns to UN Statistical Office in the UN SNA format. Some international institutions, like the Commission of the European Communities, have theirs too.

Other production and income flow tables

To complete the picture of production and income flows in the economy, extensions can be made backward to produce an input-output table, or forward to produce flow of funds tables, or all of them can be combined with national accounts and rearranged to form a social accounting matrix. An input-output table adds an extra dimension to national accounts. The national accounts are concerned with the composition and value of goods and services purchased by final users, with rewards of the various factors of production and with value added but not with intermediate transactions among industries that form part of the production process. An input-output table, on the other hand, presents these intermediate transactions, together with the flow of goods and services to final demand and income generation. This is carried out within a framework that records all transactions among the industries and commodity groups distinguished in the table.

The flow of funds tables show the flows of financial claims that enable the surplus saving of some groups of financial units to provide the external funds needed by debtor units whose capital expenditure exceeds their savings. As a technique of analysis, flow of funds offers a valuable framework for explaining the mechanism by which surplus and deficit institutional sectors of the economy finance one another.

The flow of funds tables, usually produced for each institutional sector, consist of two accounts of national accounts – capital accumulation account and financial transaction account. In effect, flow of funds is a subgroup of national accounts, which is connected to the real part of the economy (production account and income and outlay account) through the capital accumulation account.

All of the national accounts, input-output tables and flow of funds tables can be put together like an inter-connected accounting statement for the whole economy, and presented in a matrix form, known as social accounting matrix (SAM). SAM has the features of a square matrix in which a row and the corresponding column constitute an account, because (1) for every row, there is a corresponding column and, in addition, each corresponding row and column are equal; and (2) every entry is a receipt (resource) when read in its row context but an expenditure (use) when read in the context of a column.

Satellite accounts and analysis

There is a limit to what may be accommodated in the central framework of the SNA. With the publication of the 1993 SNA edition (UN, 1993a), this was properly dealt with by developing what is known as satellite accounts.

The term "satellite account" was first used in 1967 by French statisticians and has since gained some popularity. A satellite account is an instrument for organizing all quantitative information relating to a particular field in order to provide a consistent system of knowledge of the most important features of the field, and to link its analysis to that of the entire economic and social system. It is, in effect, an extension of SNA used to measure meso links. Satellite accounts are ways of expanding the analytical capacity of national accounts for selected areas of social and/or economic concern in a flexible manner, without overburdening or disrupting the SNA. Clearly, satellite accounts have an important role in policy design and analysis in a developing country. The UN (1993a) gives satellite accounts a prominent position and, in addition, provides a good source of further reading.

There is also the extension to and relationship with the environment, resulting in the development of natural resources accounts. These accounts are designed to assess both quantitatively and qualitatively the state and development of natural resources, as well as the causes and effects of evaluating the environment. The accounts can be expressed in physical and/or monetary units, independent of the usual national accounts but connected by various links to them. The natural resources accounts should produce aggregates, with proper pricing, that can be used to modify the derived aggregates of SNA as appropriate. All these developments have brought in the concept of sustainable national income (Ahmad, et al., 1989).

Other economic statistics system and relation with SNA

The national accounts and the related tables discussed above are not the only macro economic statistics systems of interest. There are others developed independently, like the balance of payments accounts, which, conceptually, deal with the same areas of the economy but are not the same as the rest of the world accounts of the national accounts. There are others that can be regarded as expansions of some institutional sector accounts, for example, financial or government financial statistics, usually produced by financial or government agents, but which are not very much different from sectoral accounts of financial institutions and/or general government – distribution and use of income accounts, accumulation accounts and balance sheets (Figure 1). Compared with national accounts, the compilation of these other statistics systems is a lot easier because they are based on administrative data.

At the international level these statistical systems – balance of payments accounts and financial and/or government financial statistics – are developed by the IMF. On the other hand they can be looked upon as satellite accounts and analysis of these sectors, which summarize their detailed financial activities to produce more tables. There are also systems for employment and price statistics that are of interest to the International Labour Organization (ILO). With the production of UN (1993a), all these statistical systems are now harmonized with UN SNA, in such a way that a statistical series in one can be related closely with UN SNA series.

When basic economic statistics are available for all sectors of the economy, there is a high chance that the national accounts will be reasonably completed. This is because

every bit of not only economic, but all official, statistics has a place in or is an input of a cell in the system of macroeconomic statistics. But a country may have developed good economic statistics series, and yet not have the ability to produce any of the national accounts statistics tables. This is because there are additional needs for economic statistics of a nation, particularly by government, that may not require structuring the data.

All these pieces of information and the statistics derived from them, including statistics systems like national accounts, are *economic statistics*. At various levels, attention is required to ensure that the result of each statistical activity, the kind normally performed by national statistics offices, is close to expectation. As this is not often the case, there is need to improve the quality of whatever data are collected and estimates made at every stage up to the macro level.

Quality in economic statistics

At micro-data level

A major problem of economic statistics at the micro level, the starting level for derived statistics used by macro model builders, as in all social sciences, is that the observer of these micro data cannot experiment or control the respondents who give the basic data. The observer often must deal with circumstances that occurred long before, and over which there is no control. This is the main difference between data in the natural sciences and data in the social sciences, and is the source of the problems discussed in the remaining part of this section. These micro data and the corresponding derived ones must be handled with care, to ensure that they are close to the real life they measure. The development of a micro database, if it can be so called, consists of the following steps: (1) conception and choice of the kind of data collection method (sample survey/census, complete enumeration, or continuous recording of by-products of administrative activities) and actual collection; (2) treatment of the data to remove errors of observation and measurement; (3) analysis of data; and (4) decision or dissemination.

Treatment of data in the development of the database and derivation of aggregated statistics should be done to achieve consistency, reliability, validity, precision and accuracy, but these may not all be possible for a variety of reasons. There are as well the added qualities of completeness and timeliness; the former refers to total coverage of all items, and the latter to the time lag between the reference period and the availability of data to users. Whether it is possible to achieve these qualities is another issue; all are functions of cost and the priority of the decision maker

In a statistical sense, most of these qualities essentially refer to methods of obtaining the data or to the relationship between the sample collected and the reference population. A method of deriving a statistic (an estimator) is said to be consistent, in probability, if as the sample size increases, the estimator is close to the parameter. This is common in probability sample surveys and experimental designs. If any economic statistical system, such as SNA estimates, is based on this kind of survey then it can achieve consistency too. Hence consistency is a probability sampling quality, which estimates based on any other method cannot attain.

The term "reliability" is used in statistical analysis to refer to permanent systematic effects that persist from sample to sample, as distinct from error effects, which vary from one sample to the other. It seems inappropriate to use this concept to assess the quality of economic data because it may be difficult to estimate the systematic component of an economic value, as distinct from its error component, without some kind of experimental design or control approach.

Validation is a procedure that provides, by reference to an independent source, evidence that an inquiry is free from bias. It is usually applied to a sample investigation with the objective of showing that the sample is reasonably representative of the population and that the information collected is accurate. For example, if expenditures on GDP are independently compiled, they can provide sources for validating GDP by value added approach. Validity is not the same as consistency, which is about internal agreement of data or the procedure linking them.

Precision is also different from accuracy. Accuracy means closeness of an observation to the quantity intended to be observed, while precision is a quality associated with a class of measurements. Precision refers to the way in which repeated observations conform to themselves, in a narrow sense. It is a measure of dispersion of the observations and, in general, varies with the square root of the number of observations upon which it is based. On the other hand, accuracy, in the general statistical sense, denotes the closeness of compilations or estimates to the exact or true values. In a more specialized sense, it implies (a) an unbiased estimator, and (b) the reciprocal of the standard error of an estimator; or (c) the combination of (a) and (b). See Kendall and Buckland (1960) for more on definitions of these qualities.

Can micro economic statistics and their derivatives, used in various macro models, be assessed and tested for all these qualities? The qualities of data are to some extent related, but not all of them are applicable in our present situation. Consistency, reliability, precision and accuracy are internal properties of a scientific sample for data generated from a population and related to the concept of a parameter; hence they measure the closeness of an estimator to the corresponding parameter. Validity is different, and in the present situation, it could be the most useful because it is a within-record method.

The best ways to improve the quality of micro data from scientifically conducted sample surveys/censuses and the derived ones based on them, are through editing and imputations. Editing can be regarded as a validating or statistical procedure, but both procedures are meant to reduce errors, although each has its strengths and weaknesses. A validating procedure is a within-record action to detect and correct inconsistencies, impossibilities and suspicious situations. It is useful for both scientific and non-scientific data collecting procedures. For example, checking to see if the sum of the parts adds up to the total, checking that the number of harvested hectares is less than or equal to that of planted hectares, and so on. A statistical editing check is based on a statistical analysis of respondents' answers and it usually follows validation in an editing system. It may refer to a between-record checking of current survey responses or to a time series procedure using historical data of a statistical unit. As a result of this, the emphasis is on detecting outliers of either univariate or multivariate distributions.

At macro level

There is also macro editing, which is used to handle derived statistics. The aim is to find inconsistencies at the publishing level. It should be possible to trace the inconsistencies from the aggregate level to the individual records involved. Macro editing focuses on those records in which corrections will have an impact at the particular aggregate level. Some examples of bad macro editing in some sub-Saharan African countries are discussed later. No detailed discussion can be made about all these issues here, but standard textbooks abound everywhere that can be used.

Many statistics organizations are adopting computer-aided approaches to editing of standard sample surveys/censuses of relevance to economic statistics. A review of automated data editing and imputation in four major national statistics offices is contained in Pierzchala (1988).

From SNA to modeling through macroeconomics

The interrelatedness of SNA and macroeconomics is better seen in the chains of coherence of the SNA's consolidated accounts of the nation, based on the fundamental economic identities or definitions. These fundamental identities are:

(a) production = intermediate consumption + value added
(b) production = intermediate consumption + final consumption + capital formation + exports - imports
(c) value added = sum of primary income items
(d) primary income + net transfers received = disposable income
(e) disposable income = final consumption + saving
(f) saving = capital formation + net acquisition of financial assets - net incurrence of debts
(g) exports-imports + net primary income received abroad + net transfers received from abroad = net acquisition of financial assets from abroad - net incurrence of debts owed abroad
(h) sum of acquisitions of financial assets = sum of net incurrences of debts
(i) closing balance = opening balance + capital formation + net acquisition of financial assets - net incurrence of debts + revaluations
(j) total population = inactive population + active population.

These definitional equations, according to Vanoli (1985), form the basis for the construction of macroeconomic models. They are valid for the economy as a whole, and identities (a), (c) to (f) and (i) are also valid for any particular complete economic unit (economic agent or institutional sector). But since these are based on aggregates, they provide a poor understanding of the economic life of the people. If we are to understand that economic life, we must break down the major categories of actors of economic life, economic operations, economic activities and products, and assets and liabilities.

For example, identities (a) and (c) can provide an analysis of production by kind of activity, while identity (b) assumes analysis according to type of product; the three identities taken together constitute the input-output table. When combined with identities (i) and (j), they can form a model of the productive process. Other analyses dealing with the rest of the world and/or financial activities can be similarly developed from combinations of some of the identities to deal with the various problems of poverty, debt and other balance of payment issues, especially those facing most of sub-Saharan Africa today.

This also provides other ways of looking at standard classifications. If we are to have a proper understanding of economic life, the elements of the identities must be disaggregated in appropriate ways using appropriate standard classifications. In addition to identities for a proper model, we need equations of technical and/or behavioural nature, and we have to classify the variables (the aggregates, often in disaggregated form) of the model to reflect our objectives.

III. Macro econometric modeling

Macro econometric modeling, as dealt with here, is a mathematical and statistical exercise to measure macroeconomic relations using actual data that are set out to make numerical estimates of the economic relationships, and to make forecasts as appropriate. The definition here includes the situation where at least one data point is used. Apart from these, econometric modeling is a continuous refinement of data, re-estimation of structural parameters, investigation of forecasts and revision of equations over time. In an estimation of an econometric model, we are interested in describing actions or behaviours of particular set of human beings in each relationship of the system, hence the nature of the data as discussed above.

The development of macro econometric modeling has come a long way since the work of Tinbergen (1939). This evolution was helped by the revolution in macroeconomics started by Keynes (1936), increasing improvement in the compilation of national accounts, development of input-output analysis and corresponding development in computer technology. As a result of all these, it is appropriate to look at various types of macro econometric models available and how data have been structured to estimate the parameters.

Types of econometric models

Econometric modeling provides a vast area for the use of economic statistics or generally what are known as official data. Since our interest is in macro econometric modeling, we shall exclude discussion of sector models, specific industry models (e.g., iron and steel, electricity, etc.), submodels (for plant and equipment investment, for example), and micro models (household or firm behaviour). There are many ways of classifying models, but here we are only concerned with macroeconomic models, and so adopt the following classification (Uno, 1988):

1. *Short-term projection models* - These are econometric models used for the purpose of making short-term, often quarterly, macroeconomic projections. These models are often used for practical purposes rather than for academic exercise. The models focus on macroeconomic variables obtained from the national accounts and/or related statistical systems.

2. *Multi-sector industry models* - These models, used for medium- to long-term analysis, attempt to disaggregate the economy to the industry level in order to address specific industrial problems: environmental, energy, trade, shift in demand, changes in competitive edge, etc. The multi-sector analysis is based on the following three different approaches:

- Input-output framework - This approach uses the econometric method in specifying the model but has input-output table(s) within the framework. The model, therefore, can be considered to be based on a general equilibrium system. Often referred to as computable general equilibrium (CGE) model, this kind can also integrate data from input-output tables, national accounts and flow of funds to obtain a SAM as the base data.
- Keynesian macro framework - The models in this class are based on the Keynesian macro framework with the production sector disaggregated into individual industrial units. This disaggregation is often attempted in order to capture the shift in industrial structure concomitant with the changes in the structure of demand. Unlike the models based on input-output frameworks, market clearing is not assumed.
- Turnpike model - This is a long-term optimization model dealing with some target values concerning economic welfare, subject to various constraints imposed on the economic system. A turnpike model can be developed as part of a long-term development plan in the following steps: Step one reveals the economy's whole envelope frontier that can be reached, if only a suitable policy is developed . In step two, after proper evaluation based on some criteria, the best alternative is chosen as a target to be traced to the plan. Step three deals with how to obtain targets by means of the policy variables available to the government. At each step, there are many factors that are intertwined with each other. A turnpike model calculates the optimum growth path under a set of assumptions on population, technological innovation, possible changes in institutional factors and long-term trends in the international environment. Thus, the model can solve, for example, for an optimum path that maximizes consumption. It is a dynamic input-output analysis.

3. ***Multi-regional models*** - Regional modeling includes national models with regional disaggregation, and models that focus on a particular region. The multi-regional models are distinguished from macro aggregate models in that they describe the inter-regional relationships such as population, migration and transportation. The distances between regions are often defined in terms of geographical distance, time distance and economic distance. In models where the economic effects of transportation systems are analysed, distance is measured in terms of transportation cost, taking into consideration both pecuniary cost and time cost.

Many regional models also attempt to measure the effect of social overhead capital, which is intended to benefit the local residents directly, on production; for this purpose, public capital formation is categorized into several groups according to the intended policy goals.

4. *Multi-country models* - One of the major difficulties in economic forecasting is that the model explains the endogenous variables while leaving the exogenous variables unexplained. A model that successfully constructs the domestic economy is of no practical value unless the largest of all exogenous variables, the trends in the world economy, is somehow taken into account. Multi-country models solve this problem by dividing the world economy into several blocks and quantifying the interdependence among them through the international flows of goods, services and capital. Interdependence among countries and regions is expressed by the trade matrix as follows :

$$E = A \times M$$

where E = export vector of countries
M = import vector of countries
A = n x n trade matrix (n = number of countries).

Matrix A represents the shares of each country in total imports of a particular country.

Thus, once a country's imports are known, and given shares of individual countries in total imports of a country, which are represented in the trade matrix, imports can be distributed among trading partners. The exports of a country, in turn, can then be calculated as the sum of all imports by its trading partners.

Problems of framework on econometric models

We hope that we have not given the impression that every stage developed above leads to a good result, like the Creation story. Far from it. There are problems at every stage. Here, we discuss briefly the problem that is the main subject of this exercise before we deal with it in the context of African countries. This problem concerns errors of observation and measurement, which were studied in a unique manner by Morgenstern (1963). The need to overcome this problem has prompted many econometricians to develop techniques to handle estimating parameters in the presence of these errors (Klein, 1974: 383 – 426, and related references).

Here, our interest is in those errors that relate to macro econometrics. The main source of this kind of error is in the concepts of national accounts statistics (Section II). The main identity or definitional equation in national accounts, as shown above, is about the equality of total product, total income and total expenditure. There are also the rules of accounting – principles of double – and quadruple-entry – that are applicable in national accounting and other economic definitions. These can introduce error of measurement as they may not be satisfied in practice.

In business accounting, the principle of double entry implies that each flow in the account has to be recorded twice, first as a receipt in one account, and second as a disbursement in another, and the total of each side must be equal. Considering the national accounts as a whole, with all units and all sectors involved, one can see that, in principle, national accounts are, for most transactions, concerned with two economic agents/ institutional units based on a principle of quadruple entry. This means that each transaction is normally recorded twice by each of the transactors involved as in the case of double entry. These two principles are the conceptual basis of national accounts consistency, although in practice, national accounting does not take full advantage of these principles because the accounts of a nation are not kept like those of a business unit by actually recording all flows incurring in a given period. As stated before, the accounts of the nation rely on accounts of various units that are not always consistent or even available, and on statistics of various kinds and degrees of reliability and completeness.

Even though these principles guarantee the equality of the two sides of an account, and by implication, the various ways of measuring the GDP and the chains of coherence

of the SNA, based on the fundamental economic identities, it does not mean that this equality exists in actual fact. For example, solving identities (a) to (b) of Section II) to remove production, intermediate consumption and value added will lead to :

sum of primary income items = final consumption + capital formation + exports - imports

The items on both sides, if estimated independently, will not be equal statistically. The difference (error of observation and measurement) is usually referred to as statistical discrepancy and normally should be random. Klein (1974) discussed this issue and its implication in estimation, including how to handle this important problem of econometric modeling.

Data problems of regression analysis

Most of the econometrics of estimating economic relationships are based on regression analysis, using the time honoured method of least squares and others based on it. In the early stages, when most of the calculations were done on desk calculators and scatter diagrams were constructed to examine the pattern of the data, a lot of attention was given to problems of data. Unusual data points and some obvious forms of collinearity could often be detected in this process of data handling. But today, with the increase in quantity of data and more sophisticated computation, little attention is given to data-related problems in econometric work by many researchers. Some often cite diagnostic measures without verification. This is far from ideal, particularly in developing countries, where the quantity of data available is still very small, the time series are short and number of data series in disaggregated form is few – compared with the advanced countries.

It is necessary to look critically into the data in use to discern unusual magnitudes and patterns in the data we are using. There is the possibility of the presence of influential subsets of data points (outliers) or that of collinearity or ill-conditioning among regression variates. Collinearity exists when one of a set of two or more series of data can be expressed (not necessarily exactly) as a linear combination of the other(s). There is the need to identify the presence of these unusual figures, assess the potential damage their respective conditions may cause to the final results of the econometric exercise, and use appropriate techniques to reduce or remove their effects. It is usually desirable to assess the condition of the data and take any possible remedial action prior to subsequent estimation and further diagnosis for influential data and/or collinearity.

Subsets of data with a disproportionate influence on the estimated model are often due to:

- Inevitable occurrence of improperly recorded data, either at source or in their transcription to computer-readable form.
- Observational errors, which are often inherent in the data.
- Outlying data points, which may legitimately occur as extreme observations (outliers).

Such data often contain valuable information that improves estimation efficiency by its presence. Even as beneficial as they are, however, it is constructive to isolate extreme points and determine the extent to which the parameter estimated depends on these desirable data.

- Data that could have been generated by some data collection model(s) other than that specified but for which diagnostic tests may reveal patterns that suggest alternatives.

Any one of these sources might create suspicion about the accuracy or appropriateness of the data. Belsely et al. (1980) provide a detailed analysis of these data problems and diagnostic solutions to them.

Macro econometric models and macroeconomic data

The problems dealt with in the last subsection are related to regression analysis generally, but most macroeconomic data systems for macro econometric modeling are time series. A time series is a single occurrence of random event, e.g., the yearly series GDP of a country, say, from 1990 to 1994, a single realization of a process GDPt.

A process that features prominently in recent works involving macroeconomic data is the random walk (an important concept of stochastic process or probability theory):

$$y\,(t) = m + y\,(t\text{-}1) + e\,(t)$$

By direct substitution for y on the right hand side of above, we have

$$y\,(t) = \Sigma\,\{u + e\,(t\text{-}i)\}, i = 1,2,3.....$$

which means that $y\,(t)$ is the simple sum of what will eventually be an infinite number of random variables, probably with non-zero mean. If the $e(t)$ (innovations) are being generated by the same non-zero mean, constant variance distribution, the variance of $y\,(t)$ would obviously be a non-stationary process, even if m is zero. On the other hand, the first difference of $y\,(t)$,

$$z\,(t) = y\,(t) - y\,(t\text{-}1) = m + e\,(t)$$

is simply the innovation plus the mean, and it can easily be shown that it is stationary. The series, $y(t)$, is therefore said to be integrated of order one, $I(1)$, because taking a first difference produces a stationary process. A series is integrated of order d, $I(d)$, if the series becomes stationary after being differenced d times.

An $I(1)$ series in its raw (undifferenced) form is constantly growing. Macroeconomic data are derived, as shown earlier, from flows and stocks that can easily be detected as variables that relate to population size, such as output or employment, hence they grow constantly. As a result of this, the residuals obtained from conventional regression models,

using these data, are highly autocorrelated. One implication of this is that the standard significance tests will be misleading. The conventional t and F tests would tend to establish a relationship when, in fact, there might be none.

The general result is that regression of one random walk on another is virtually certain to produce a significant relationship, even if the two are, in fact, independent (Granger and Newbold, 1977). This idea is easily extendable, say, to the general regression model

$$y(i,t) = b(i,j).X(j,t) + e(i,t) \quad i = 1,2, .. m; j = 1, 2, ...p; \text{ and } t = 1,2,...n$$

where $e(i,t)$ are white noises

But if $y(i,j)$ and $x(i,j)$ are integrated by different orders, this will not lead to stationarity by differencing, as $y(i,j)$ and $x(i,j)$ will be drifting apart. Generally, if two series are integrated to different orders, their linear combinations will be integrated to the higher of the two orders. Two series that satisfy the requirement of the same order in integration are said to be cointegrated. The ultimate is a model, integrated of order one, that has one as its characteristic root. Hence, the need to test economic data for unit root.

There are other situations that will arise when the assumption of homoskedasticity of the variance of the error term does not hold. All of these normally lead to other problems, which must be diagnosed and procedures for correction developed (see Greene, 1993, and its cited references for details).

All said and done, there is still the need to appraise a model for its features – the results of analysis of its economic meaning and the individual relationships of which they consist – and to draw some conclusions on the direction of research, especially from the point of view of economic policy. All of these, in addition to other inputs to building the model, help to assess the quality of data used for the model.

In conclusion, it is reasonable to say that econometric research is as good as the economic analysis and economic statistics that form the basis of the work. The quality of macroeconomic modeling specifically will be very much decided by macroeconomic analysis, and national accounts and related statistics. It is also important to note that macro econometric modeling is more problematic than other econometric modelings from the point of view of data.

IV. AERC reseach papers

The principal objective of the African Economic Research Consortium (AERC), which was established in August 1988, is "to strengthen local capacity for conducting independent, rigorous inquiry into problems pertinent to the management of economies in sub-Saharan Africa". To assure the most appropriate design of projects to improve African economic statistics, it is necessary to appraise the nature and uses of data as well as the results of AERC research. This appraisal was undertaken for that purpose – to assess the quality and availability of data. At the time the grant was made for this exercise, 34 research papers (RPs) had been published; ultimately we reviewed and analysed 41. These research papers form the main input for this section. Additional material was solicited from the researchers through a user questionnaire, but no tangible one was obtained.

Annex A contains a kind of content summary of each of the research papers (RPs); it covers nature of data, use of data, appraisal of research content of the papers with special attention to macroeconomic models, and some other information. A summary of Annex A is presented in Table 2. For each RP, the table shows key words of the title; whether the RP is a model, if so what type; data used, whether time series or survey; expected nature of data; and name of country and researcher(s).

Of the 41 RPs in this analysis, 14 used Nigerian data and 8 were on Ghana. There were three each for Tanzania, Ethiopia, Malawi and Kenya, two for Uganda, and one for Côte d'Ivoire; four used multi-country data. A careful look at column two (keywords of title) and column five (expected data structure) shows clearly how the AERC topics of interest are related to the economic statistics discussed in Section II. But actual data used may not be so structured, or as large in quantity and completeness; in fact, only four papers used macroeconomic data that are so structured.

In this section, we attempt to extract the salient points from the content of the RPs and discuss the results and their implications for the objectives of this exercise.

The nature of data

As should be expected, most of the researches are based on time series from official sources: national statistics offices, central banks, and international agencies such as the IMF and World Bank. The time series are annual except a few such as RP 5, which combined annual and quarterly data; RP 14, which used monthly data (1985 – 1991), and RP 41, which used weekly and monthly data. Most time series used are within 1960 and 1992, while some are as short as 1986 – 1991. Only RPs 25, 26, 33 and 34 structured their data into the appropriate economic statistical system (ESS) or used aggregates derived from ESS.

Table 2: AERC Research Papers

RP	Keywords in title	Model	Data	Expected data	Country structure	Researchers
1	SAP and coffee sector	Descriptive	Time series	Rest of the world A/C	Uganda	Ssemogerere
2	Interest rates, private savings	Single	Time series	Flow of funds	Kenya	Mwega et al.
3	Capital formation, informal finance	Descriptive	Both	Flow of funds	Ghana	Aryeetey et al.
4	Informal finance, macro adjustment	Descriptive	Time series	National accounts	Malawi	Chipeta et al.
5	Non-bank finance, demand for money	Single	Time series	Financial accounts	Kenya	Ndele
6	Exchange rate, macro performance	Single	Time series	National accounts	Ghana	Jebuni et al.
7	Macroeconomic-demographic model	Multi	Time series	National accounts extended*	Ethiopia	Kidane
8	Macroeconomic and external debt	Combined	Time series	National accounts	Nigeria	Ajayi
9	Exchange rate, agric. exports	Combined	Time series	Rest of the world A/C	Ghana	Fosu
10	Formal and informal finance	Descriptive	Both	Flow of funds	Ghana	Aryeetey
11	Financial system, savings	Sector	Time series	Flow of funds	Nigeria	Soyibo et al.
12	Savings - investment	Descriptive	Survey-A	Flow of funds	Nigeria	Soyibo
13	Foreign debt	Descriptive	Time series	Rest of the world A/C	Ethiopia	Degefe
14	Informal, semi-formal and formal finance	Descriptive	Survey-A	Flow of funds	Malawi	Chipeta et al.
15	Fiscal deficit and adjustment	Single	Time series	Government sector accounts	Cote d'Ivoire	Kouassy et al.
16	Small and medium enterprises	Descriptive	Survey-A	Industrial sector accounts	Nigeria	Ekpeyong et al.
17	Banking system	Descriptive	Time series	Financial accounts	Nigeria	Soyibo et al.
18	Informal financial markets	Descriptive	Survey-A	Financial accounts	Tanzania	Hyuha et al.
19	Economic integration	Descriptive	Time series	Rest of the world A/C	Multi-country	M'bet et al.
20	Tax revenue, productivity	Single	Time series	Government sector accounts	Tanzania	Osoro
21	Informal and formal finance	Descriptive	Survey-A	Financial accounts	Ethiopia	Aredo
22	Inflation and control	Single	Time series	National accounts	Ghana	Sowa

cont. next page

Table 2 cont.

RP	Keywords in title	Model	Data	Expected data	Country structure	Researchers
23	Macroeconomics	Combined	Time series	National accounts	Kenya	Nwega
24	Foreign exchange market, Dutch auction	Descriptive	Time series	Rest of the world A/C	Ghana	Dordunoo
25	Exchange rate, sector prices	CGE	Input-output	Input-output table	Nigeria	Ajakaiye et al.
26	Exchange rate, deficit, inflation	Multi	Time series	National accounts	Nigeria	Egwaikhide et al.
27	Trade, payment and economic performance	Descriptive	Time series	National accounts	Ghana	Jebuni et al.
28	Production and external trade	Descriptive	Both	Rest of the world A/C	Uganda	Ssemogerere
29	Effective exchange rates	Descriptive	Time series	Rest of the world A/C	Multi-country	Kidane
30	Monetary harmonization	Descriptive	Time series	Financial accounts	Multi-country	Chipeta et al.
31	Trade relations	Descriptive	Time series	Rest of the World A/C	Multi-country	Musonda
32	Macroeconomics	Multi	Time series	National accounts	Nigeria	Soludo
33	Debt service and SAP	Descriptive	Time series	Rest of the world A/C	Ghana	Osei
34	Macroeconomics	CGE	SAM	SAM	Nigeria	Ajakaiye
35	Capital flight, external debt	Descriptive	Time series	Rest of the world A/C	Nigeria	Ajayi
36	Exchange rate policy	Descriptive	Time series	Rest of the world A/C	Nigeria	Odubogun
37	Exchange rate, monetary policy	Sector	Time series	Rest of the world A/C	Malawi	Silumbi
38	Tax reforms	Single	Time series	Govemment sector accounts	Tanzania	Osoro
39	Money supply	Combined	Time series	Financial accounts	Nigeria	Ogun et al.
40	Balance of payments	Combined	Time series	Rest of the world A/C	Nigeria	Umo et al.
41	Foreign exchange, parallel market	Single	Time series	Rest of the world A/C	Nigeria	Ayogu

* to include satellite accounts related to demographic data.
"Both" means "survey and time series".

Survey data are used in some papers, either alone or in combination with time series. RPs 14, 16, 18, 21 and 24 used survey data carried out by the authors, but most of them gave no details about how the data were collected, problems of measurement, observation or non-response encountered, or any assessment of the quality of the data. For example, survey data obtained by the authors could be properly structured to obtain standard institutional accounts or a kind of activity production account, e.g., for the informal financial sector, but this was not done. Had this been done, the data could have indicated better links between the informal and formal/semiformal financial sectors, if there is any, as RP 14 investigated, and be related properly with the economy as a whole. Most authors' surveys were analysed like ordinary social surveys, not like economic statistical surveys, which require the use of relevant standard classifications for, e.g., industries, occupations, financial instruments, financial transactors, etc. At the end of reading such reports, one is likely to say, "And so what ?" or "What is next ?"

Not much is said about the quality of time series data either. Only a few papers have something to say about the quality of their data and what to do. RP 31 has a data appendix of about 14 pages but without any comments about the quality of the data and adjustments made. RP 33 has this to say about the quality of debt statistics in Ghana: "A major practical problem is inadequacy of data. This problem extends to inconsistencies in published debt figures. Time series from official Ghanaian sources are not consistent. Publications of the World Bank and the International Monetary Fund (IMF) also often have the same defect, as the figures on debt sometimes depend on which World Bank or IMF publication is used...; but World Bank publications are used because of availability and easy and meaningful international comparisons".

On the other hand, in an appendix to RP 32 titled, "Data Sources and Limitations", specific sources used for different kinds of data are stated in order to ensure consistency. But this may not be achievable because sources within the same organization may produce conflicting data series, as even RP 33 noted in its appendix, and as also expressed in RP 32. Even though this problem is recognized by many, no one stated that it is often caused by revisions of published data, which are due to improved data inputs, as the discussion in Section V will reveal. RP 32 further remarked that "macroeconomists in developing countries can play a critical role in ensuring the evolution, in the long term, of better quality databases by interacting actively with the data collection agencies, pointing out which data are needed and in which form. Basic errors and inconsistencies in data series should continually be brought to the attention of the agencies, and this positive interaction may result in greater efficiencies over time". The trend of this discussion is elaborated in Section V, but researchers need to be more actively involved than expressed here, as early macroeconomic researchers in the West were.

Since all the data used are time series, except the five authors' surveys and the single data point, input-output and SAM (one each), problems resulting from the characteristics of macroeconomic time series demand attention, whether the research is descriptive, analytical or econometric modeling. Diagnostic procedures as simple as ordinary graphing and as complex as handling generalized autocorrelation or conditional heteroskedasticity should be undertaken. Very few studies did this properly. For those that did not, it is easy to see the inadequacy of their results. For example, in modeling, the results of the conventional t or F tests, which are always reported, are not likely to be adequate.

The uses of data

1. Descriptive approach

There are various ways of using economic data in research. The simplest and probably the oldest technique is a descriptive approach (using descriptive statistics such as: average, mean, proportion, and ratio; growth rates; and dispersion measures – standard deviation; graphs and charts; etc.). The purpose of this approach is to separate "the wood from the trees" so as to study the systematic patterns in the data series or to sterilize it. Another approach is econometric modeling, as discussed in Section III. There is also the possibility of combining the two approaches, where the descriptive aspect serves as an introductory or exploratory analysis of the topic of interest in the research. For a time series, computing descriptive statistics such as growth rates and/or percentage shares and presenting them in graphs may lead to justification for sterilization or segmentation of the series to identify the major factors of each segment or subperiod. This then provides ways of incorporating such factors into the econometric model or helps to provide a better explanation of the model. Not much of this approach is adopted in the AERC research papers we looked at.

Of the 41 RPs analysed, 21 used a descriptive approach, three combined the two approaches, and the remaining 17 adopted econometric modeling in one form or the other: single equation, sector model and macro models – multi and general equilibrium. RPs on Nigeria are made up of five descriptive and nine econometric models. Ghana, which is next to Nigeria in number of RPs, has five descriptive and three econometric models. Of the others, Kenya and Tanzania have two single equation models each; Ethiopia, Côte d'Ivoire, Malawi and multi-country each have an econometric modeling study, while the others are either descriptive or combined. These patterns of the use of data among the country researchers demand special attention. Some of those using single equation models can also be regarded as combining econometric modeling with a descriptive approach. Apart from mathematical presentation, the AERC researchers who combined the two approaches seemed to produce more rigorous work than those who used stand-alone models. Those engaged in econometric modeling should do more to develop their works descriptively and analytically, as well as to present their results in a simple format to aid the usefulness of the models and their understanding by policy and decision makers.

The mathematical presentation of equations and heavy computations with statistical results that are often larger than, or as large as, actual data used is not necessarily a sign of good economic statistics or econometric work. A statistical approach to research implies data reduction, not increase; data reduction means extracting all the relevant information in the given data in the form of the smallest number of data possible. Certainly, the relevant information cannot be larger than the given data.

There are broadly two types of descriptive approaches of interest here: those based on surveys and those based on time series. For those based on surveys alone, since the data are not properly structured as economic statistical systems, the exercises are of limited economic content. In fact, there is a case where some hypotheses were stated at

the beginning of the work, and tables of categorical data were presented, but no test was carried out.

For the purpose of the descriptive approach, the use of time series can be done in two ways: (1) deriving descriptive statistics like growth rates and/or percentage shares of the data of the sample period for analysis, and/or making graphs and charts, or (2) dividing the sample period into segments, if need be, before or after deriving the descriptive statistics to improve the analysis. Where time series are segmented, descriptive indicators for each segment become more fruitful. RP 17, on its page 3, listed four segments of the Nigerian banking history, but the data series was not structured to reflect these periods. Data used were only for 1970 to 1988, which cut across the last two segments of the period, but this shortened period was segmented into five subperiods (Table 8 in the paper), for the purpose of the analysis carried out. RP 8 partitions 1970 – 1987 into four segments (its Table 3). There are other segmentations and uses of various statistical indicators before a model in a reduced form was estimated. This is a good example of combined use of descriptive and econometric modeling approaches. The contribution would have been greater if the model had been developed for the whole economy, with particular attention to external debt. Some researchers ignored the obvious segments appearing in their plotted data. For RP 33, although no segments were indicated, the plotting of the series for 1970 to 1990 in its figures 1 to 6 suggested the need to use subsample periods: 1970 – 1980 and 1981 – 1990. If this had been done, the analysis would have been richer.

There are four RPs, all essentially on foreign debt, that basically use a descriptive approach. They follow essentially the same procedures: a set of debt data time series that rarely goes beyond 1970 with ratios, graphs and charts constructed; and a set of definitional equations, followed by descriptive and analytical discussion. Even though some had "macroeconomic" in their titles, only ratios such as debt-exports, debt-GNP, debt-investment and reserves-imports were computed and used.

But these ratios are based on aggregates from different parts of SNA and balance of payments accounts:

- balance of payments - current account (exports, imports)
- rest of the world accounts - balance sheet (debt)
- national accounts - income and outlay account (GNP)
- national accounts - capital finance account (investment)

or some alternative ones such as flow of funds. In effect, all these show that a macro econometric or a CGE model, directed at debt management, can be developed in four or more blocks and in as many equations as data series can allow. Such exercises will be more rewarding (see RPs 32 and 34 for the kind of macro econometric model).

2. Use of data in macro econometric models

The data situation with a macro econometric model is different. There is usually a flow chart showing the major linkages among the blocks of the model. Very often, each block

requires an economic statistical system or subsystem in time series or a data point (for all or some parts of it). In the case of RP 34, five blocks are specified and, in each case, the corresponding ESS can be stated as follows:

Block	Economic statistical system
1. Price	Price statistical system for all sectors of the economy
2. Demand	Expenditures on the GDP
3. Production	Input-output table and corresponding employment statistics
4. Income determination	Institutional income and outlay account
5. Government fiscal operations	Flow of funds for government sector

A similar tabulation can be presented for any of the macro econometric models. Since time periods are used in descriptive analysis to reveal some systematic patterns or breaks in trends in a series, there must be some means of handling such effects in econometric modeling too. This is done by defining dummy variables based on known segments or those discovered by breaking the series into periods. Each of such variables takes only zero or one as values. If many dummy variables are defined, care must be taken to avoid collinearity (Klein, 1974). Only a very few RPs used this technique.

Appraisal of research

Our appraisal of the macroeconomic models used in AERC research papers is based purely on data issues. The appraisal focuses on models presented by the authors, the required data, the availability of data and their uses, the effect of data availability and characteristics of the data series on the validation of the models (i.e., various tests), and the relevance of the conventional t and F tests, just to mention a few. As in Section III, the models are arranged according to some classifications: sectoral-, single- and multi-equation models, and CGE, as long as at least one data point is used. We appraise all the models, but give special attention to macro econometric models. The selection method involved examination of all research papers published as of the start of the exercise; ultimately this amounted to 41.

Multi-equation (system) models

These are the models where many equations are estimated and the system of equations is solved, thereby creating interactions among the equations. Three papers belong to this group, RPs 7, 26 and 32. One of the features of macro econometric models relevant to our study is the extensive use of time-series data. As there are no upper limits on the availability of data, it is noted that too short a period of data may not reveal all the necessary information and may make the use of available standard tests impossible. Thus meaningful estimation and evaluation of equations may not be feasible.

Single sector multi-equation model

The RPs in this category are 37, 39 and 40. RPs 37 and 39 are based on monetary statistics and RP 40 is based on balance of payments. All three RPs did some diagnostic tests using graphs and applying dummy variables to sterilize the data series, and applying first difference. For RP 40, the values of F-statistic are very high, an indication that the diagnostic work done might not be enough.

Single-equation models

These are models that do not require solution of all the equations estimated as is the case with multi-equation models. Although many equations may be involved, these are ignored and no effort is made to examine the effects of non-inclusion equation(s) on the equation of interest. Ten RPs fall into this category, which includes a multi-equation model reduced to a single-equation model that was then estimated. In many cases, the variables are transformed by taking first difference and/or logarithm of the variables. The conventional t- or F-tests used are still inappropriate, probably because of cointegration or some other problems.

General equilibrium models

There are two papers in this category; one uses an input - output framework and the other constructs a social accounting matrix for a computable general equilibrium model. The common feature in terms of data issues is that they do not require many time series data when compared with macro econometric models reviewed above. The two papers in this category are RP 25, based on input-output, and RP 34 based on SAM. The only addition to the standard input-output table in RP 25 to make the SAM in RP 34 is the inclusion of rows 37 to 41 with the same number of columns as the use-matrix (input-output table). It is not clear either how the rows came in or how the SAM is related to the set of equations specified and used. In both papers, discussion of data, in general, and their quality, in particular, is scanty.

Concluding remarks

In this subsection, we bring out, as a reminder, the salient points of this important section as follows.

Informal sector

Among the RPs, there are six on informal financial sectors; of these, there are two each for Ghana and Malawi, with a follow-up to the initial one in each country. The remaining two are on Ethiopia and Tanzania each. All are based on authors' surveys, which provide the authors some degree of freedom to develop data structures for informal financial activities like those for formal financial ones.

The informal sector, whether in tangible production or in financial intermediation, is an important aspect of the economy in the sub-Saharan Africa. But the way data on it are collected and analysed leaves much to be desired. In most cases, data collection is done as for any social study, and as a stand-alone work without the results being integrated with data for the rest of the economy. Such integration requires that concepts, definitions and standard classifications applicable to the corresponding formal sector be adopted. Unless this approach is adopted, the impact of this kind of research on policies and assessment of change will not be fully appreciated.

For example, RP 21 presents a diagram of the financial institutions in the country as they are related to the informal financial sector. From this, the transactors and the transactions (the financial instruments that the transactors deal in) in the informal financial sector can be identified and presented in standard formats. Such a presentation can easily lead to flow of funds tables for informal financial transactions, side by side, and interaction with those of formal financial transactions. This approach is lacking in all the relevant RPs. A level of professionalism that relates the informal to the formal in an appropriate way is required. This may be a reflection of how much structuring of financial data, in the form of flow of funds, the authors are interested in or familiar with. A lot can come out of survey data if properly carried out and if all data collected are given a place in the study.

2. Macroeconomic models

Policy research is not just an academic exercise, but a practical activity for the use of policy analysts and policy makers – who are diverse in their ability to understand the results of the research. Even though the work can be rigorous, the presentation must be done stage by stage without leaving out key steps in the development of the work done.

Probably in anticipation of such problems with understanding, econometric models in AERC RPs used data series in first difference or logarithm form, as well as conventional t- or F-tests, which are still inappropriate as shown by the extremely large values of the test statistics (see some in RP 40). Only very few RPs, in particular RPs 26 and 41, took the problems related to the characteristics of macroeconomic time series seriously. The approach adopted in RP 26 is more appropriate to the kind of macro econometric models of interest in this exercise. It is not enough to simply mention what others have done; our data must be tested, if only to add positively to the literature providing solutions relevant to our situation where the data are of relatively low quality. Some brief comments about some of the RPs will serve to illustrate this point.

Many RPs – descriptive or econometric – computed rates, percentages, graphs, charts, etc., of the data series, but these were not properly interpreted to bring out the core issues of the data to help in economic interpretation of the exercise. For example, the graph of a series can reveal a lot – a break in a series requires the use of a dummy variable; integration requires first differencing, as many times as necessary; tests for unit characteristic root; etc. Even though the problems are present in the data used, only a few RPs noted and did something about them.

In this respect, we consider in depth three studies that are of great relevance to this

exercise. RP 7 raised a lot of questions. We find it difficult to understand the estimated econometric model, and we are puzzled. Here is an RP with a very relevant title, features such as economic-demography model, and distinctions between traditional and modern sectors of the economy. It also recognizes blocks of equations such as production, consumption; foreign sector for an economic equilibrium model and two demographic blocks of equations – fertility and mortality, and immigration. Moreover, it makes the link between economic and demographic blocks of equations. From this point, we became more confused or illiterate!

As examples: estimations are made using OLS/2SLS, according to the author, without anywhere to locate the data, except that the author said they were from statistical publications of the Central Statistical Authority and the Central Bank. Statements are made without justification, e.g., "the table shows that the data seem to be within acceptable limits". What this means is neither obvious nor explained, and the link between economic and demographic sectors was made without adequate information about the procedure. A proper appraisal of this RP is not possible because there is not enough information to do one.

In order to justify the approach adopted, RP 32 cited various sources and terms for diagnostic tests and procedures, such as theory of cointegration, non-stationary series, spurious and inconsistent regression, and sensibly congruent model, and accepted them as present in the literature without any verification. Ideally, we should verify the claims of various sources on the kind of data we are using, if only to assess the degree of such problems with our own data. There is also the claim in RP 32 that the approach adopted allows the model to describe "the short-run and long-run characteristics of the data in a statistically robust manner" (page 45). One would have expected that this would be demonstrated with the results of the estimation, to show to what extent this has been achieved. This is very important for policy analysis. In all, RP 32 should be compared with RP 26.

RP 34 is probably the best on public economic policy, and if much is said about it, it is because of the interest it generates. As valuable as this research work could be for policy making, however, not much is revealed to the reader about the data and their uses. As far as the uses of data are concerned, a lot is missing between Section III of the RP, which contains the model specification, and its Section IV, which is on the analysis of model simulation results. These missing gaps include:

- The structure of the SAM in Appendix 1 of the RP, which is not stated in the conventional form; similarly, some briefs about base run, the development, solution and calibration of the model, and the simulation procedure are not presented.
- Most of the variables defined in the model do not have corresponding data in the appendix, and no justification is presented, while some variables in the SAM, in and outside the input-output table, have virtually zero cells.
- The treatment of producers of government services in the input-output table probably led to the following statement (page 18): "A feature of the Nigerian economy that must be incorporated into an analysis of the macroeconomic impact of the bank lending rates is the direct and indirect dependence of the activity sectors on imported intermediate inputs. For instance, a quick look at Appendix 1 of the RP will show

that two-thirds of the activity sectors depend directly on imported intermediate inputs. With the exception of the producers of government services sector, therefore, all other sectors depend indirectly on imported intermediate inputs".

It is probable that "imported inputs" for producers of government services are not included because all the cells relating to the producers of government services in the input-output table and "imported input" are zero. This should not be, and available data do not support it; producers of government services have intermediate consumption.

This work used 1985 as the base of the data and has simulated results for 1987 to 1991. We believe the work must have started, or much of it was done, sometime after 1991. If this is correct, we could regard the simulation results as ex post with known actual series. Hence, the simulation results could have been tested against the actual, which were available by the end of or during this work. Such a test would be very useful.

All the above notwithstanding, the approach used in RP 34 is recommended to many researchers who have the capability to adapt it to other policy issues of macro nature in many countries. Sub-Saharan African countries, as noted earlier, have short sample periods for econometric work, which requires long series to be valid. The CGE approach does not have such a restriction, hence we should be able to do better using it.

In addition, the results may be used for multi-country studies of the same set of macro policies for comparative analysis. Such exercises must take into consideration the undestandability factor noted above and be written so that policy makers can find them very readable.

Compared with the needs sketched in Section III, AERC researchers still have a long way to go in terms of the macro models they cover. As we can see from the examples above, only a very few models can be called macro econometric models, based on economy-wide data and analysis with proper understanding of the nature of the data used. The single equation and sectoral multi-equation models all have the potentials of economy-wide structural forms with special attention to area(s) of interest. This approach is rewarding and should be encouraged. There are multi-country studies not developed as macro models. There is only one research paper (RP 7) with long-term characteristics specified, but these are inadequately presented and are in no way near what is expected.

In concluding this section, some questions that demand urgent answers are necessary if sub-Saharan Africa is to benefit from all these research activities. As shown by Harris (1985) and cited in RP 32, "there were about 184 macro-models on various African economies, 33 of which were on Nigeria". Today, for Nigeria, as an example, the number is on the increase, judging from AERC research and other sources such as Olofin (1995). But the impact of all these is not felt by the ordinary people as in other countries in the West and Asia. Why? Are models and policy and decision makers biased? Or can a given model be implemented successfully under any system of governance? Given the stage of development of most sub-Saharan African economies, are stability and growth models the priority, or even relevant? And given the role of government in collective and individual consumption, whatever the stage of the economy, are we giving the government the attention it deserves in our data structures, e.g., input-output table, and in macro econometric modeling? We need a model that will capture all the correct answers to these questions. Or are they the correct questions, anyway?

V. African country economic statistics

In Section II, we discussed the way the national economy is structured as national accounts framework called SNA. The framework is fleshed with various basic data series, obtained from the economy, to compile what is called national accounts statistics or simply national accounts. This structured statistics or statistical system is made up of the traditional national accounts, other related production and income flows developed or structured into tables (input-output tables, flow of funds and social accounting matrix). An extension of the structure combines both quantity and monetary units, satellite accounts, and other related statistics systems such as balance of payment, government statistics, price statistics, etc. The role of other international institutions with special interest was also mentioned. All these are developed from basic underlying statistics collected, in one way or the other, from microeconomic units (microeconomic data). The passage from microeconomic data to these statistical systems, as demonstrated in Section II, is not a simple direct aggregation. There is also the link between these macroeconomic statistical systems (i.e. SNA) and macroeconomics, which partly forms the basis of macro econometric modeling.

In Section IV, we dealt with AERC research papers, paying attention to the nature of data and their uses, and appraising the research as far as data contents are concerned. It is found that data are used, but not often in the structured form discussed in Section II. Partly because of this, very few macroeconomy-wide models are built and estimated. Could this be because data are not available in this form?

In this section we want, as far as sub-Saharan African countries are concerned, to investigate the availability of these statistical systems, and concerns about and assessment of the data quality. We consider data improvement efforts by individuals and institutions, especially international and/or national organizations, over the years. We also compare data availability and usage, with AERC research reports as illustration, and suggest possible improvement projects of relevance to AERC objectives.

The work reported here is based on various sources, including published official statistics by African countries and/or UN organizations, publications containing African statistical publications, and other sources. In addition, we attempted to use a producer questionnaire to fill gaps in the data reported by the international agencies. But sub-Saharan Africa is not a set of homogenous countries. The countries are varied in many respects – geographical and physical setting, culture, level and stage of development, perceptions about life. All these influence each country, hence some level of detail is necessary. Since we do not have unlimited resources, our discussion will be limited.

As the last paragraph shows, development of economic statistics in Africa relied very much on the efforts of the UN organizations. In part, this is because, as members of the

UN, African countries, like other countries of the world, are under the obligation of the UN charter to make available information needed by these agencies for decision making. Therefore, these agencies are major data users, and are in the forefront in developing appropriate statistics by providing necessary resources to create in the African environment the capacity to produce improved official statistics. They provide technical assistance to improve data collection, as well as the compilation and processing of basic data, using standard questionnaires and standard classifications. They also strengthen, on a continuous basis, national statistical bases and the publication and dissemination of statistical information. Annex B contains some information on such statistical publications as available in 1989 (IDE, 1990).

In November 1995, *IMF Survey* reported an initiative by the International Monetary Fund (IMF) to improve country economic statistics in areas relevant to IMF activities. The areas to be covered include "exchange rates, international reserves, the balance sheet of the central bank, and reserve or base money; other areas include interest rates, the consumer price index, exports/imports, external current account balance; overall fiscal balance; external debt and debt service, and GDP". The objective is to enlighten countries about standards for data publication in terms of coverage and frequency, access by the public, and data integrity and quality. This initiative illustrates the important role of international organizations in increasing and improving data quality generally.

Data availability, timeliness and accuracy

It should be clear from Section IV that sources of African economic data suitable for macro econometric modeling are of two types. The first type includes statistical publications by country's central statistical organizations. In a given country, this role may be the responsibility of one or more agencies – one dealing with general statistics while the others deal with some important specific subject-matter such as finance, agriculture, mineral resources, etc.

The other type of source is the UN agencies' statistical publications. Like country publications, some are general, but most specialized agencies publish data pertaining to their activities only (IDE, 1990). The basic underlying data inputs for all these sources are collected from country official statistics organizations or data collected in collaboration with these country organizations, like surveys and statistics of *Social Dimensions of Adjustment in sub-Saharan Africa (SDA)*, which are jointly sponsored by about three international agencies and the country concerned. The international agencies collect statistics by using standard questionnaires administered at regular intervals, with country agencies as respondents (UN, 1989).

The major difference between country statistical publications and those of the UN is that a country statistical publication on a given subject is likely to incorporate more features than one published by an international agency. In addition to using international standard classifications, a country will have to reflect in its publications some national standard classifications based on administrative, geographical or other features, which in effect is more disaggregated. By contrast, the publications of international agencies

are likely to be more aggregative. The implication of this difference is that country statistics in international publications are more suitable for multi-country modeling than are statistical series put together from individual country publications for such study. This is because the international agencies are likely to have done some cleaning to make the country statistics comparable. But international statistical publications have a very important defect in terms of gaps in data series through no fault of these international institutions. The gaps may not be due to non-collection of such data by the affected country statistics agencies, but to the inability of the country statistcs agencies to respond to the international statistics agency's questionnaires. Therefore, there is need to supplement international statistical series with what is available at country level if a multi-country model is done.

The statistical publications, summarized in Annex B, are presented according to producer (each African country, UN, the World Bank, IMF and the UN Economic Commission for Africa – UNECA) , and by group of subject-matter areas. The subject-matters are:

0. General
1. Population, labour and housing
2. Agriculture (ISIC 1)
3. Mining, manufacturing, electricity, gas, water supply and construction (ISIC 2 – 5)
4. Transport, communication, commerce and services (ISIC 6 – 8)
5. External trade and balance of payments
6. Wages, prices, and family income and expenditure (WPAC)
7. Enterprises and establishments
8. Banking and public finance
9. Social statistics and others
10. National accounts

Most of the groups are self-explanatory, but those under group 7 – enterprises and establishments – are essentially basic data in the form of survey/census reports other than population surveys or censuses. Often, they form inputs for producing more aggregated series such as those of groups 2 to 4. Most basic data for groups 5, 8 and 9 come from administrative by-products. All these groups except 9, to some extent, are used for group 10 – national accounts compilation. The more data we have in groups 0 – 8, the easier it is to have better national accounts statistics of a country, in quantity and quality.

According to Annex B, the total number of statistical publications by sub-Saharan African countries is 1,459, of which 283 are on population, labour and housing; 241 are of a general nature; and 164 and 155 fall into groups 2 and 5, respectively. UNECA has 55 publications that are mainly on Africa. The UN has 251 publications, and the World Bank and IMF have 26 publications between them that contain data on African countries. IMF publications are all on external trade, balance of payments, external debt, and financial statistics of both private and public sectors. On the basis of this source, the country with the largest number of publications is South Africa (134), followed by Kenya (100) and

Zambia (75). The countries with the fewest are Comoros (1) and Namibia (1). We also note that only Ethiopia, Kenya, Malawi, Tanzania, Zambia, Zimbabwe and South Africa produced at least one publication under each group listed above.

Annex C presents the frequencies of the publications summarized in Annex B. In doing this, groups 1 to 9 are merged into two major groups – non-economic (groups 1 and 9) and economic (groups 2 to 8). Hence, Annex C has four major columns. Each major column is then divided, four for the frequencies – annual, quarterly, monthly, irregular – and one column for maximum period covered in the publications.

Most of the general statistical publications were annual or irregular. Since the publications were collected at the end of 1989, we should expect that data covered should be close to 1989 but published in 1990. The latest edition (1995) of this publication by the Institute of Developing Economies (IDE) of Japan, the only known source of such publication, is not significantly different from the 1990 edition – an indication that not much improvement in publication availability had been achieved since the previous collection exercise (in 1989) was carried out. Even then only 13 countries have data series close to 1989. Angola, Benin, Congo, Ethiopia, Gambia, Sierra Leone and Namibia had lags longer than seven years. Publications under non-economic statistics were mostly irregular or probably more than five years in interval. Only very few were annual. Those with series close to 1989 were very few. Like those publications under general, a large number of statistical publications classified as economic were either irregular or annual. Those published quarterly or monthly were very few but significant.

The national accounts publications were all either irregular or annual. No series was available at an interval of less than a year, and the lags were quite long. Only Mauritius had national accounts figures up to 1988. In all cases, countries had statistical series starting from the 1960s, and Kenya, Zambia and Zimbabwe went back to 1947, 1945 and 1954, respectively. National accounts provide the best indicators for assessing availability and quality of data. This is because most of the various categories of data discussed above have a place in national accounts, balance sheets and other tables – hence the need to look into national accounts in more details.

Annex D is a summary of statistical information extracted from the UN's *Yearbook of National Accounts* 1991. The publication provides detailed national accounts estimates for 178 countries and areas, which include 47 sub-Saharan African countries. The information for the countries and areas shown in the publication reflects what was available to the producer as of 30 September 1993. The standard presentation of the *Yearbook*, as noted in Section II, groups the estimates into four parts, each part made up of a number of tables. No sub-Saharan African country has any data in part three, which consists of institutional sector accounts. No data exist for Comoros, Namibia or Guinea.

Generally, no country has a complete set of tables for the three categories of data. This may not be evidence of inability to produce the tables, but more of evidence of non-response on the part of country statistics agencies. For example, more tables are produced for part one than any of the others. A country that produces a set of summary tables (part one) should have details of these summaries, from which the summaries in part one are derived. The assessment discussed here is based on the number of tables published, the degree of timeliness measured by number of up-to-date tables and the average lag.

Concerning part one – summary information, which has 12 tables – every country has non-zero cells for some tables, except Comoros, Guinea and Namibia; only Cameroon has complete number of tables, but these show an average lag of 5 years. The countries with fewer than 12 but still a fairly high number of such tables are Botswana (11), Mauritius (10), South Africa (10), Guinea Bissau (10), Zimbabwe (9) and Lesotho (9). South Africa (10) has the largest number of tables with up-to-date data, followed by Kenya (7), Mauritius (7) and Nigeria (7). Most of the other countries have fewer than 7. The latest figures contained in the tables should be for 1991, and only South Africa, Kenya and Nigeria attained this in their respective up-to-date tables. Average lags in years for the other countries range from 0.3 for Mauritius to 7.8 for Côte d'Ivoire and Togo. As noted above, many countries produced more tables in the summary information part than the other parts involving detailed information. A previous study (Adamu, 1997) found similar results, except that some tables in part three were not empty as we have now – a poor trend.

Not many of the tables of part two (final expenditure) are produced. In fact, a large number of countries produced nothing. Of those that produced something, South Africa has the best results: seven tables contained at least one non-zero cell, and the seven tables were up-to-date without lag. South Africa is followed by Mauritius with six tables of the same quality, and Kenya has three tables with the same quality. Zimbabwe has eight tables, none up-to-date, and with an average lag of three years.

Regarding part four (production by kind of activity), only Nigeria had two tables completed properly, followed by Kenya and Equatorial Guinea with one table each. On the other hand, there are others like Seychelles with three tables, none up-to-date, and an average lag of one year; and Botswana with three tables but none up-to-date, and an average lag of five years. Others have one or two tables.

As a kind of control, we compared sub-Saharan Africa with some other developing (Malaysia, India, Brazil and Chile) and developed (Netherlands and Canada) countries. As the bottom section of Annex D shows, the sub-Saharan African countries are close to what obtains in the other developing countries but far below those of the developed ones. What this implies is that the developing countries are very disadvantaged and a lot needs to be done to raise the quantity and quality of economic statistics.

So far in this section, we have considered data availability and the quality of national accounts as they are usually known. No mention has been made of the other tables such as input-output tables, flow of funds, social accounting matrix, etc. According to IDE (1990), from which Annex B was developed, only six countries – Ghana (1968), Kenya (1961, 1967, 1976), South Africa (1967, 1971, 1975), Tanzania (1969), Zambia (1965, 1967, 1969, 1973) and Zimbabwe (1980) – reported that they constructed input-output tables. According to the analysis carried out in Section IV, we know that some other countries, such as Nigeria, constructed and used input-output tables (see RPs 25 and 34).

Nigeria is the only country that reported compilation of flow of funds tables, while financial balance sheets and flow of funds for 1985 were compiled for Zimbabwe (Edmunds, 1989). Kenya (probably with some other countries) compiled some regional accounts in 1947 to 1949 and a social accounting matrix for 1976 (IDE, 1990). South Africa is the only country with quarterly national accounts (IDE, 1990).

A very important means of aiding the assessment and use of economic statistics is published documentation of the methods and sources of the underlying data used as inputs. The documentation, in addition, assesses the completeness and reliability of the sources. In IDE (1990), used for annexes B and C, only Gambia, Ghana, Kenya, Liberia and Malawi had such published documents. It is a desirable publication.

All the above notwithstanding, there is, in addition, the possibility of some cases of missing data due to non-response by some countries' statistics agencies. This may affect the quantity of data available for such countries, but it is not likely to significantly affect the quality and pattern discussed, assuming no change in production techniques.

Data availability versus usage

The data used in the papers discussed in Section IV and those available in the publications considered in Section V are brought together here for comparison and assessment. Of the 41 RPs discussed in Section IV, 37 directly deal with specific country data of eight countries (out of a total number of 47 countries) – Côte d'Ivoire, Ethiopia, Ghana, Kenya, Malawi, Nigeria, Tanzania and Uganda. Country coverage is inadequate. For each country, the RPs, the year published, the data used and the length of sample period are shown in Table 3a. The corresponding available data, as presented in Annex C are presented in Table 3b(i), and those available as presented in Annex D are in Table 3b(ii).

A careful study of Table 3a shows that the difference between the last observation of a RP data series and the year of publication of the RP, now referred to as publication lag, gives an indication that the researchers are not using up-to-date data. Average of this lag for each year of publication was computed from the table. Publications for 1990 to 1993 have an average of 4 years each, but 1994 and 1995 have 5 and 6 years respectively – a sign that recent publications used older data series than the early ones. This is a reflection that the series lack updating. On the other hand, this lag is composed of lag in data series, length of research work and publication. With more information on these items, a lot can be said about updating of data series – a sign of good research activity.

As Table 3 shows, Côte d'Ivoire has long sample periods of macroeconomic time series and the series used is quite long, 1965 – 1989, for the topic treated, fiscal deficit. The variables used are all national accounts aggregates. There is no reason why a macro econometric model could not be developed. For Ethiopia, the macroeconomic model is poor in terms of both data and presentation. What is available on national accounts in Table 3b is not encouraging; there is clearly a case of non-response to international requests for data. The Ethiopian debt RP has no problem about data, as these are usually from international sources in virtually all sub-Saharan African countries; and the other RP for Ethiopia used survey data.

The eight RPs based on Ghana data are in the areas of investment, exchange rate, finance, inflation, trade and debt. The data used often covered the period 1965 – 1988 for annual series, while one RP used weekly data covering the period 1986 – 1991. All these topics put together would form a start for a good macro econometric model with particular emphasis on any of the topics, but none was carried out. In terms of availability of relevant national accounts aggregates, what is available may not be bad at all, as reflected in

Table 3: Use and availability of data

(a) Country data used in AERC research papers

Country	RP No.	RP YP	Type of data	Data series
Côte d' Ivoire	15	1992	Government financial statistics	1965-89
Ethiopia	7	1991	Macroeconomic-demographic	not stated
	13	1992	Balance of payments	1964-86
	21	1993	Financial accounts	1978-90
Ghana	3	1991	Flow-of-funds	1960-86
	6	1991	National accounts	1970-88
	9	1992	Balance of payments	1960-87
	10	1992	Flow of funds	1978-88
	22	1993	National accounts	1960-88
	24	1994	Balance of payments	Weekly: 1986-91, annual: 1956-90
	27	1994	National accounts	1960-88
	33	1995	Balance of payments	1970-90
Kenya	5	1991	Flow of funds	Quarterly and annual: 1973-87
	23	1994	National accounts	1969-90
Malawi	4	1991	National accounts	Annual: 1966-89 weekly: 1985-91
	14	1992	Flow of funds	Monthly: 1985 91, survey: 1989
	37	1995	Balance of payments	1965-90
Multi-country studies	2	1990	Flow of funds	1967-85
	19	1993	Balance of payments	1966-87
	29	1994	Balance of payments	1970-88
	30	1994	Flow of funds/balance of payments	1978-90
	31	1995	Balance of payments	1961-89
Nigeria	8	1992	National accounts	1969-89
	11	1992	Flow of funds	1969-89
	12	1994	Flow of funds	1980-89
	16	1992	Industrial sector accounts	Survey
	17	1992	Flow of funds	1970-89
	25	1994	Input-output table	1985, 1986 - 89
	26	1994	National accounts	1973-89
	32	1995	National accounts	1970-92
	34	1995	SAM	1985, 1986-91
	35	1995	Balance of payments	1970-89
	36	1995	Balance of payments	Monthly:1987-90 annual: 1959-86
	39	1995	Flow of funds	1970-89
	40	1995	Balance of payments	1950-88
	41	1995	Balance of payments	Daily, wkly,and mthly.: 1990-93
Tanzania	18	1993	Flow of funds	Survey
	20	1993	Government financial statistics	1976-90
	38	1995	Government financial statistics	1967-90
Uganda	1	1990	Balance of payments	1981-87
	28	1994	Balance of payments	1981-90

Source: Based on Annex A.
YP = Year published

b) Data available for countries studied in AERC research papers

i. According to Annex C

Country	General data		Economic dta		National accounts	
	No. of tables	maximum period covered	No. of tables	maximum period covered	No. of tables	maximum period covered
Cote d'Ivoire	10	1947-1984	15	1956-1988	3	1958-1980
Ethiopia	5	1963-1980	19	1953-1988	1	1961-1966
Ghana	3	1955-1988	28	1935-1985	2	1968
Kenya	3	1955-1988	56	1945-1989	6	1947-1979
Malawi	7	1964-1989	27	1962-1988	2	1968-1985
Nigeria	6	1971-1984	20	1960-1988	2	1970-1981
Tanzania	5	1938-1984	50	1950-1988	4	1960-1986
Uganda	4	1954-1974	31	1938-1974	3	1950-1965

II. According to Annex D

	Summary information (12tables)			Final expenditure (17 tables)			Production by kind of activity (13 tables)		
Country	Number of tables	Number up-to-date	Average lag (Years)	Number of tables	Number up-to-date	Average lag (Years)	Number of tables	Number up-to-date	Average lag (Years)
Cote d'Ivoire	5(41.7)	0	7.8	-	-	-	-	-	-
Ethiopia	3(25.0)	1(8.3)	1.3	-	-	-	-	-	-
Ghana	7(58.3)	0	3.9	1(5.9)	0	5.0	2(15.4)	0	5.0
Kenya	7(58.3)	7(58.3)	0.0	3(17.6)	3(17.6)	0.0	1(7.7)	1(7.7)	0.0
Malawi	7(58.3)	0	1.6	1(5.9)	0	5.0	-	-	-
Nigeria	7(58.3)	7(58.3)	0.0	-	-	-	2(15.4)	2(15.4)	0.0
Tanzania	7(58.3)	7(58.3)	0.0	2(11.8)	2(22.8)	0.0	-	-	-
Uganda	7(58.3)	0	3.7	-	-	-	-	-	-

Note: Figures in parenthesis are percentages of total number of tables as indicated at top of the column.

Table 3b(ii). But that only a year is recorded in Table 3b(i) for national accounts publication is a gross case of nonresponse to international requests for data or lack of publication on national accounts separately. Ghana, for example, produces data in three parts out of the four into which national accounts statistics in the UN *Yearbook* are categorized, although with lags of up to five years as reported in Table 6. The lag length may not, in fact, be so, given the information from our 1990 source (IDE, 1990) that publications on general data are up to 1988.

Two RPs used Kenya data: one on finance used quarterly data for 1969 to 1987 and annual data for 1969 to 1989; the other, on growth, which is more analytical (parametric analysis) than econometric, used annual data, 1967 – 1990. Variables covered are savings, balance of payments aggregates, investment, capital utilization, GDP and private sector credit. Not much econometric work was done. Available data show that a full-fledged macro econometric model is feasible for Kenya, with minimum data problems. This conclusion stems from the discussion above, which rates Kenya very high in terms of data availability. Kenya has a relatively good set of macroeconomic time series.

Malawi has three RPs, two on exchange rate and one on links between informal and formal/semi-formal financial sectors. The reports on exchange rate are based on annual series, 1965 – 1990, and that on financial sector on a survey and monthly series, 1985 – 1991, for savings and credit associations. Data available for Malawi have not been fully utilized.

Nigeria, with 14 RPs, has the largest number of studies and these cover a large area of the economy. Four papers can be regarded as macroeconomic models; two are macro econometric and the other two are computable general equilibrium (CGE) models. The sample periods of the econometric models, using annual data, are 1973 – 1989 and 1970 – 1991, even for those published in 1995. One CGE uses a 1985 input-output table, and the other uses a 1985 SAM. They were published in 1994 and 1995, respectively. One of the others used daily, weekly and monthly price/rate series for 1990 – 1993. The remaining ones used annual series ranging from 1950 – 1988 and 1970 – 1991. In terms of availability of data, Nigeria's situation is not really good, although data presented in Annexes C and D may not reflect the situation on the ground. At the present level of work, Nigerian macro econometric efforts need more disaggregated series, especially for capital accumulation classified by kind of activity and type of product, and the related price indexes and employment data. The researchers should be interested in the data they use and their improvement. At present they seem to believe in division of labour so much that they do not directly make adjustments themselves where necessary (see the comments of RP 32 on data), and Nigerian researchers comment least on data quality. Engaging in improvement of data is part of good macro econometric modeling.

Tanzania has three RPs covering finance (survey data) and tax revenue, with one covering the sample period, 1976 to 1990 and the other 1969 to 1990, even though, one was published in 1993 and the other in 1995. In terms of data availability, proper macro econometric models can be constructed. The two RPs for Uganda are on research related to export of agricultural products, but these are adversely affected by lack of data series with minimum gaps. The lack of data is also reflected in Table 3.

Since the researches discussed in Section IV are mostly on external trade, balance of payments and capital movements, including debts and finance, there is need to note seriously the discussion on data use. It can be said that the use of data in most sub-Saharan African countries has not adequately matched the availability of data. Macroeconomic data are produced on the assumption that they will be used. Likely improvement in quality can only come if there is increase in use and feedback from the users to the producers. Macro econometric modeling provides a very important source of feedback. Researchers should have the habit of updating their data series as research progresses, while producers should respond adequately to users and those engaged in further compilation for larger audience, as international agencies often do.

Concerns about and assessment of data quality

How accurate are national accounts statistics series and the related ones used as often in the research papers studied above? Not much answer to this question is provided in Section IV, because many AERC researchers failed to comment on the data they used, or to report in detail any adjustment they made. By not commenting on data quality, researchers give the impression that everything is o.k. – or that they think it is. Yet, given the situation of African economic statistics, which are incomplete in various ways – in number and quality of accounts and tables produced, not to mention institutional sector accounts and sectoral and national balance sheets that are not produced at all – it would be the height of deceit to give pass marks to sub-Saharan African countries in official data production.

Concerns about African economic data have several causes, mostly the gaps, lags and inaccuracies in underlying data and final products, whether published by country or international agencies. These defects are noted by various other users, as shown later. It is reasonable, then, to deal with concerns about underlying data and some higher level aggregation. The greatest concern about economic statistics in African countries is about external trade and agricultural statistics (Yeats, 1990a, and 1990b; Franchet, 1986). This does not mean that the other series are free of concern, it is probably because these series are the most used. But external trade and balance of payments statistics are the oldest series because of African countries' trade relations with their colonial masters. As a result of this, the sector has the largest quantity of data and longest series by category in each country, and probably it was the start of statistical activity for most statistics agencies.

The concern about external trade statistics is not so much about quantity as about quality. Basing a study on UN trade statistics, including the UN Series D Commodity Trade Tapes, Yeats (1990a) applied trade reconciliation and evaluation techniques to reported data on trade among sub-Saharan African countries, and between them and developed countries. He showed that sub-Saharan African trade data as of mid 1989 generally extended back to 1962. But there were important gaps in the historical records, and the African countries' records show much greater reporting lag: only six of the 39 countries' records extend beyond 1983. Also, the level of product details in official trade statistics is very low compared with what obtained in developed countries, while many

African countries' trade statistics lacked detailed levels and often incompletely covered total trade, even at the three- and four-digit levels.

The quality of African trade statistics is another issue. Since external trade statistics are virtually by-products of administrative activities, most of the problems of data quality come from (Yeats, 1990a):

- Administrative errors due to shipping costs, diversion en route, re-export of goods, differential time lags or delay in reporting, multiple exchange rates, and differences between countries in commodity classification and valuation procedures.
- Illicit activities of operators in the sector of the economy, resulting in over-invoicing or under-reporting of exports or imports (reported exports exceed matched imports from a country or the partner country), and/or smuggling.
- Normal statistical errors of measurement and observation.

There are reporting discrepancies for transshipments in which goods are routed through countries bordering the exporter or importer countries; therefore a country of origin may inaccurately list a routing country as the importer, or a country of final destination may report the routing country as the exporter. Defects in procedures can also cause discrepancies and lead to underestimation or reproduction of records of trade for some years. Frequent changes of rules at ports may also cause statistical defects.

There are important gaps in the historical records for a variety of reasons – political changes, in particular. In addition, there is the possibility that trade reported in components of three- and four-digit SITC groups is sometimes different from the total reported at a higher level. Also, delay in clearing goods due to confusion about laws and tariff regulations may create errors due to backlogs of records, causing delay in processing them and leading to distortion in time series.

In order to assess the quality of African trade statistics by comparing African export data with corresponding partner import data, Yeats (1990b) defines a statistic:

$$P = ((I_{kj} - E_{jk}) / E_{jk}) * 100$$

where E_{jk} is the reported FOB export value of African country j to partner country k, and I_{kj} is the reported CIF imports of partner country k from country j.

The ideal is that P should be positive and of a size not greater than a percentage that should cover transport and insurance between the two countries. When P is negative and sizable, there is the possibility of under-invoicing by importers or smuggling on a fairly massive scale. In fact, for African countries, the measured discrepancies (P) are often large, far exceeding the average 3% – 6% differences observed for trade between developed countries. Because the discrepancies in data on intra-African trade were generally found to be considerably larger than those of trade with developed countries, more detailed African partner country statistics were compiled. These were analysed with reference to exports to all of sub-Saharan Africa, and for each sub-Saharan African country to its largest African trading partner and the partner's reported imports.

Finally, Yeats (1990b) concluded that:

- The average discrepancy between matched export and import values was more than 60% for 35 of the countries and more than 100% when Gambia was included.
- The data are probably useless for assessing the direction of intra-African trade because countries listed by the exporters as the largest markets for exports often failed to report any corresponding imports.
- The data appear to be equally deficient for determining the composition of trade because major discrepancies are revealed between partner country statistics at greater levels of detail.
- There are larger and persistent differences in the trends in both the magnitude and direction of intra-African trade, as reflected in reported exports and matched imports.
- The fact that reported FOB exports frequently exceeded matched reported CIF imports suggests that smuggling is widespread in trade among African countries, or that importers are intentionally under-invoicing to avoid high tariffs or quotas.

Yeats ignored the other direction of trade by not examining partner country exports with corresponding African country imports. Another problem with Yeats (1990b) is that the concern is shown without providing procedures with possible adjustment of the data. This is discussed more in the next subsection.

According to the results obtained by Yeats (1990b), the percentage discrepancies for a country like Nigeria were not high for the partner countries, except within Africa. For example, in the case of Nigeria, the percentage discrepancy with respective to all developed countries was 4.1, 0.0 for Canada, 7.4 for European Economic Community, 0.1 for European Free Trade Areas, 0.0 for Japan, 0.0 for United States, and -13.7 for sub-Saharan Africa (Yeats, 1990b, Table 3). On the other hand, between Nigeria and Ghana the level for manufactured goods is -74.4% (Yeats, 1990b, Table 5). This is not necessarily a reflection of the accuracy of Nigerian trade statistics with non-African partner countries, and it does not mean that all is well for external trade statistics in the other direction. As Table 4 shows, when, Nigerian imports are compared with corresponding partner countries' exports the situation can be very serious. Overall discrepancies for 1988 and 1989 were -18.3% and -34.9%, respectively, but there were discrepancies as high as -82.4% for Africa and -76.1% for Eastern Europe – all these after an allowance of 10.7% for CIF, as the footnote of the table shows. Those for major partners are very low, with some being positive. The situation between Nigeria and Canada produced a curious result in 1988 when Nigeria recorded US$16.6 million as imports but the corresponding Canadian export was zero! In the same year, the United States and Germany recorded 3.8% and 4.2%, respectively. All these are possible cases of capital flight and such computation for other countries will be educative.

There is another kind of concern when the same series, produced by more than one agency in the country, are not consistent (Ariyo, 1994). Ariyo tried to look for means of selecting the "best" series out of a collection of series either from the same source or from various sources assumed independent, for research purposes.

Table 4: Partner country exports compared with corresponding Nigeria imports

Partner	1989 merchandise imports CIF ('million)				1988 merchandise imports CIF ('million)			
	FOS (naira)	FOS (US$)	DOT (US$)	P	FOS (naira)	FOS (US$)	DOT (US$)	P
America	4055.7	550.7	753.4	-26.9	2671.5	588.8	583.6	0.9
USA	3093.9	420.1	544.4	-22.8	1852.5	408.3	393.2	3.8
Canada	131.7	17.9	31.0	-42.3	75.3	16.6	0	**
Brazil	787.6	106.9	139.0	-23.1	686.6	151.3	156.2	-3.1
Others	42.5	5.8	39.0	-85.1	57.1	12.6	34.2	-63.2
Western Europe	15852.6	2152.5	2818.9	-23.6	10743.9	2368.1	3085.9	-23.3
Germany	4356.1	591.5	590.6	0.2	2698.2	594.7	570.8	4.2
UK	4097.6	556.4	704.6	-21.0	2793.5	615.7	771.5	-20.2
Netherlands	979.4	133	242.1	-45.1	691.2	152.3	199.6	-23.7
Italy	1362.7	185	285.5	-35.2	802.5	176.9	339.7	-47.9
France	2000.2	271.6	450.9	-39.8	1599.5	352.5	529.1	-33.5
Spain	328.5	44.6	91.3	-51.2	214.1	47.2	125.6	-62.4
Others	2728.1	370.4	453.9	-18.4	1944.9	428.7	549.5	-22.0
Eastern Europe	574.8	78	326.8	-76.1	767.8	169.2	293.4	-42.3
Asia	4386.1	595.6	1118.6	-46.8	3144.8	693.1	1116.7	-37.9
Japan	1707.8	231.9	293.6	-21.0	1314.4	289.7	341.6	-15.2
Others	2678.3	363.7	825	-55.9	1830.4	403.4	775.1	-48.0
Africa	230.1	31.2	176.9	-82.4	235.7	52	148.4	-65.0
Other continents	70.3	10.6	54.4	-80.5	81.4	17.9	41.4	-56.8
Total	25177.6	3418.7	5249.0	-34.9	17645.1	3889.2	4760.1	-18.3

Source: Federal Office of Statistics, Nigeria; DOT data, from IMF & Direction of Trade database. These data are the partner country exports to Nigeria at FOB plus 10.7% CIF charges.
1. Eastern Europe includes Cyprus, Gibraltar, Malta and Turkey for DOT data.
2. "Other countries" are mainly Middle East.
3. US$ = US dollars.
4. DOT = Department of Trade.
5. ** = division by zero.

To do this, in short, he listed data series in trade (exports and imports), debts (external and internal), and savings, which are very important for AERC research projects. He ended testing only for the degree of closeness of the group of series but not for consistency. The results are mixed (Table 5) and a choice is not easy. The test can only give some degree of closeness but will not say which is "best". In a situation like this, we need to go

back to the source of the series one by one, have details about how the data are compiled, reconcile the data series possibly in terms of their relative age, and take the latest or the one based on the best procedure and improved underlying data.

Table 5: Quality of macroeconomic data: Comparison of Nigerian series from various sources

	Source, sample period and comparison				Test
Data	Source	Period	Comparison	Ariyo's	Multiple sample test
(1)	(2)	(3)	(4)	(5)	(6)
1. Export data (₦'m)	UN : ITS	1970-1985	IFS v ITS	w = 36.5	
	IMF : IFS	1970-1989	IFS v RET	u = 130	
	FOS : RET	1970-1988	ITS v RET	u = 135.5	0.52
	CBN : ARA	1970-1988	CBN v IFS	u = 178.5	
			ITS v CBN	w = 28*	
			CBN v RET	w = 36*	
2. Export data (US$'m)	IMF : DTS	1970-1985			
	ECA : FTSA	1973-1985	DOTS v FTSA	w = 20*	0.38
3. Import data (₦'m)	UN : ITS	1970-1985	IFS v ITS	w = 23.5*	
	IMF :IFS	1970-1988	IFS v RET	u = 148	
	FOS : RET	1970-1988	ITS v RET	u = 132	2.40
	CBN : ARA	1970-1988	IFS v CBN	u = 181.5	
			ITS v CBN	W = 1*	
			CBN v RET	w = 10*	
4. Import data (US$'m)	IMF : DOTS	1973-1985			
	ECA : FTSA	1973-1985	DOTS v FTSA	w = 33	3.87
5. External debt data	IMF : IFS	1973-1982	IFS v PEI	w = 17.5	
	CBN : ARA	1973-1989	WDT v ARA	w = 6*	
	CBN : PEI	1973-1989	ARA v PEI	W = 1*	0.999
	WB : WDT	1973-1990			
6. Domestic debt data	IMF : IFS	1973-1982			4.13
	CBN : ARA	1973-1989			
	CBN : PEI	1973-1989			
7. Gross domestic saving	CBN : SB	1975-1991	SB v WT	u = 26*	1.12
	WB : WT	1975-1991			

Source: Ariyo (1994).

1. The results of the paired comparisons by Ariyo (1994) are contained in column 5. Note that * = Test is significant at a = 0.05, u = unequal samples, and w = equal sample.
2. The Kruskal-Wallis H tests for many samples compared simultaneously are in column 6. The issue here may be, which comes first? If the simultaneous comparison shows lack of significant difference, is paired comparison necessary?
3. Data for gross national saving has a typical problem that a researcher must guard against. Ariyo noted it, but did not do much to discover that what CBN, *Statistical Bulletin* contains is not "gross national saving" but "national saving" (FOS, *Annual Abstract of Statistics,* 1993 or *National Accounts of Nigeria,* 1981 to 1990). For example, correct figure for 1986 gross national saving = {-1,494.7 (national saving) +4,736.49 (consumption of fixed capital)} = 3,241.80.
4. The abbreviations are as in Ariyo(1994).

As an illustration, in Nigeria, there can be serious discrepancies between what the Central Bank (CBN) and FOS produced for imports (Adamu, 1997, Chapter 8). Such discrepancies are very common with agricultural statistics in most African countries (Franchet, 1986).

Agricultural data present another serious source of concern. This becomes more so when it is realized that agriculture accounts for a sizable percentage of the GDP. But virtually all agricultural products, especially food crops, are produced by traditional farming, part of what is often referred to as the informal sector. In a Eurostat workshop in 1986 (Franchet, 1986), a variety of problems of food statistics was discussed and emphasis was laid on improving the food statistics database.

Anybody who is familiar with African data knows that it will not be possible to achieve this for Africa in the near future because there are a lot of problems. Sarma (1986) listed the problems as:

- Basic data on area and production of food crops are not available for some countries.
- Where the data are available, but are incomplete; they cover commercial or marketed production, output of large farms but not of small farms or subsistence production – and they cover cereals only, and not all food crops.
- Where the data are available but not reliable: (1) they are based on subjective estimates of agricultural extension workers, etc., and not on sample surveys of scientific nature and *a priori* knowledge of the situation, for example, root crops and localized crops in the forest areas; (2) they are based on benchmark agricultural censuses or surveys with adjustments for increase in population, etc.; (3) they are based on sample surveys but sampling errors are large; and (4) sample surveys are conducted but field work is not reliable, and non-sampling errors are not adequately dealt with.
- Different sets of crop estimates are available, originating from different state/national agencies.
- National crop data differ from FAO data, partly because a consumption approach is often used by FAO when completed questionnaire from a country is doubted.
- The data are not comparable over time in some countries.

The discussion above is a reflection of what is contained in RPs 1 and 28, where no meaningful results are obtained for gaps in the production data series. The problems apply to virtually all agricultural statistics, and identification of the specific nature of deficiency, possibly for each crop, will assist in the formulation of measures for improvement of data.

Even though trade and agricultural statistics are dealt with specifically here, the other series are in no way better. In fact, they are often likely to be worse because not much attention is focused on them. Financial statistics should be better, but considering the role banks play in external trade in some countries and the state of external trade statistics as discussed above, the situation is not likely to be all that good. The experiences in a country such as Nigeria, where banks that were said to be very profitable are suddenly found to be distressed, do not say much on the positive side for the accounting practice

in the country. Therefore, the quality of the statistical by-products is likely to be doubtful. Our earlier observation about sample surveys/censuses or administrative by-products applies to the derived series in varying degrees and may be very serious because these errors do not cancel out when aggregated to obtain the derived statistics.

How independent are sources of macroeconomic data?

In this situation of concerns over data quality, and what Ariyo (1994) set out to deal with, it seems appropriate to inquire into the degree of independence of sources of data. As mentioned above, all data about a country originate, at least theoretically, from the country through the designated statistics office, usually the central statistics office charged with coordinating and disseminating statistical information for external use. But as the economy becomes more complex, other institutions are created to regulate certain broad areas of homogeneous activities and such institutions are then charged with data collection for those activities. In several countries, especially those under a federal system of government, data collection agencies may be many, as statistics may be on concurrent lists. In such countries, even though the central agency is still generally in charge of external dissemination, some kind of independence is created. This is why, for example, in the directory of sources of statistical materials listed in IDE (1990), many countries have more than one statistics agency sending out statistical publications. We illustrate the kind of problem generated with the situation in Nigeria. Originally, FOS collected financial statistics and all data on external trade and balance of payments. But with the creation of the CBN, all financial statistics, except for exports and imports of goods and services, became the responsibility of the CBN.

Today, FOS compiles external trade statistics – exports of merchandise (FOB) and imports of merchandise (CIF) – but no data on several of the related services. CBN collects and analyses external services statistics related to external trade. Since FOS is in charge of compiling the national accounts, data on balance of payments and services relating to external transaction accounts are collected from CBN. CBN, for its part, collects data on exports and imports of merchandise from FOS. Over the years, this arrangement has not always been all that smooth for various reasons, most important of which is frequent changes in laws or decrees relating to tariffs on external economic activities, and delay in clearing of goods.

There is also the problem of the standard classifications used by each of these agencies. FOS follows SNA concepts and classifications, while CBN follows the IMF manual on balance of payments, which is not identical with that of SNA. The differences between the two systems have caused a lot of statistical discrepancies between CBN and FOS data (Adamu, 1997). The problem is now not only between FOS and CBN, but among many other agencies in charge of agriculture, trade, industry, labour, etc., which feel that they should be independent in collecting data on the subject they control, just as at the international level (UN, 1989). But this is not easy because of the inadequate resources available to these agencies in developing countries. There is need for proper coordination, cooperation and collaboration in every statistical programme (Adamu, 1990).

Coordination, cooperation and collaboration are necessary not only at the national, but also at the international level. Part of the objectives of UN (1993a) is to encourage these in all official statistical systems and harmonize them. On the other hand, while the international organizations collect basic data for their various compilations from the countries, most of them do extra work to ensure that what they have reflects the situation on the ground, by investigating their findings and collecting more data through their field staff. All these efforts are used to "massage" the country data to obtain the final figures, as normally published, with appropriate footnotes. This probably is the beginning of their development of databases, as we have them today. Apart from this, when figures from various sources are being compared, knowledge of the underlying facts, often obtained from published documentation of sources and methods, is necessary; otherwise our conclusion may be defective. African researchers and other users of official statistics need to adopt the approach of these international organizations, if research results are to reflect the real-life situation.

Improvement efforts

Unlike international institutions, such as the IMF, which make serious efforts to improve country statistics, most countries in Africa do nothing even after serious concerns are raised about the statistics they publish. In fact, some government statistics agencies regard production of statistics as a ritual just to satisfy part of government activities; hence no change or initiative must be made. Some even regard their production procedure as a secret, not to be discussed with users. But this should not be so, as demonstrated by Carson and Jaszi (1986) for the United States, where in 1973 the Advisory Committee on GNP Data Improvement was established "to evaluate the quality and timeliness of the underlying data used in preparing the national economic accounts, and to recommend specific improvements to the data." (U.S. Department of Commerce, 1977: 1). The committee was set up in response to the concern of economic policy makers in the early 1970s about "successive revisions of provisional (preliminary) figures released on the quarterly movement of the GNP... that caused uncertainty with the measures of the state of the economy". As a result of the uncertainty, the Statistical Policy Division of the U.S. Office of Management and Budget had cause "to question the content, accuracy and timeliness of the underlying data used in constructing the economic accounts". The report of the committee was published in 1977, and a six-year programme of data improvement (covering 1978 – 1983) was put in place. The report included a priority ranked schedule for implementing the recommendations to serve as a guideline for all agencies involved in the implementation.

Activities along this line continued in the United States, and in 1989 the President of the United States established a working group on "improving economic statistics". The impetus for the formation of the working group was the widespread "concern expressed in recent years about economic statistics – their quality, timeliness, methodological soundness comparability, and usefulness" (U.S. Bureau of Economic Analysis, 1990: 2). The working group developed a set of 25 recommendations for short- and long-term

improvements. In doing so, it concentrated on setting priorities to resolve the inevitable conflicts among various improvement goals, such as those between accuracy and timeliness. In effect, the U.S. experience shows that the improvement of economic statistics is a continuing exercise for a country that values information. The developing countries should take a similar approach.

Unfortunately, there is no known sub-Saharan African country that has done something close to what countries like the United States are doing. There are various reasons for this. In most of the sub-Saharan African countries, governments lack a correct perception of quality of data or of the importance of data. There is also the inadequacy of all types of resources – money, material and human. But a lot can be done by all – individuals, institutions within and outside a country, whether as producers or users. The U.S. actions, for example, were the result of users raising concerns, and the attentive producers reacting swiftly. Apart from this, production or use of economic statistics is not a once-and-for-all activity, but part of an ongoing exercise in data collection, and the revision of estimates based on new or additional data, or reaction from users. There are countries like Nigeria, whose central statistics offices conduct producer-user workshops, often regularly, where papers are presented by selected producers and users, and discussed by participants. But it is doubtful if there are follow-ups between workshops to deal with specific issues. There are also cases of consultants – often paid through foreign assistance – who are brought in to solve specific problems, but activities often fall back as soon as the consultants leave the scene. Performance is usually not sustainable. Notwithstanding all these, much collaboration between users and producers is needed.

The work of Klein and his colleagues in the United States is a good example. Starting with the first comprehensive model of the United States economy (Tinbergen, 1939), and following the work of Klein and his colleagues as contained in Klein and Goldberger (1955), a lot of revision, updating and extension have been done. None of these efforts have been made alone by the researchers or as a once-for-all activity, but through interaction with producers and to supplement the work of producers (see various studies cited in Klein and Goldberger, 1955). During the early work on the model, revised data were used as they were made available, and adjustments in data were made to ensure that the real-life situation was explained as closely as possible. Also, studies relevant to the model were carried out in collaboration with data collection experts. For example, about 26 pages of Klein and Goldberger (1955), a book of 159 pages, were devoted to data and data preparation.

Such comments on data are very rare in AERC researchers' works. The few who complained did not follow up with serious efforts to do something; no RP gave any indication of any adjustment made, nor did anyone report the use of revised data from producers when the project was progressing. There is no reason why the kind of effort made by early model builders in the United States cannot be adopted by African researchers and data collection experts. We have to go back to basics if we are to make a success of macro econometric modeling.

The practice in the United States, discussed above, provides two important ways of improving official statistics generally – by government and by users. But available information about the African situation is that cooperation between the government and

the individual users is insignificant. On the other hand, international institutions are very active in various ways. The IMF, for example, takes deliberate steps during country visits to interact with government officials in charge of core statistics. During such interactions, methods used in producing statistics are discussed, and where necessary, adjustments are made.

One of the problem areas, as noted earlier, is external trade data. When the principal researcher of this study was in charge of FOS (1989 – 1991), import statistics were always part of the main problems discussed with the IMF field officials as a result of the kind of figures presented in Table 3. Locally collected figures were usually low and in need of adjustment, by using either partner countries' exports or some other alternative. For example, a case is demonstrated in Table 6 where a procedure to correct import figures is derived step by step, through various sources and statistics. This may lead to a kind of iterative approach to ensure closeness with partner country exports, assuming that the partner country exports data are better.

Since it may not be advisable to dump all existing data that suffer from serious inaccuracy, some ways of improving the quality must be found. The most available means is adjustment based on some *a priori* knowledge of the statistical item involved and its environment. Sarma (1986) gave some steps to follow in collecting statistically good data and making good adjustments. This was actually done to adjust some Nigerian agricultural statistics series (Adamu, 1986, 1989), and to develop time series or benchmarks for most of the informal economic activities for production accounts (Adamu, 1997, Chapter 3). Not all defects can be handled in this way and appropriate attention should be given to every stage of future programmes of surveys/censuses.

Areas for improvement

So far, we have identified some of the problem areas of African country economic statistics. Our findings include researchers' use or misuse of available data, failure of many researchers to evaluate the quality of data, and problems of macroeconomic time series before usage, while structured data were not used by many. The problems also include inability of official statisticians to produce complete, timely and accurate statistics covering all areas of the economy, as well as inability on the part of the producers to make the data available with minimum time lag and without hindrance. Then there is the stage of the economy with a very large informal sector, where records are not kept, and data collection is bound to be difficult.

As a result of all these, particularly from the producers' end, there are gaps in the available data, often with too long time lags and inadequate frequencies. There are several missing cells in standard tables, while many accounts, balance sheets, and other tables of SNA relevant to research and management of the economy are never produced. The main reason for this is not just non-availability and inaccuracy of base data, but also inadequate human resources and funds to produce the underlying data and the accounts, balance sheets and other tables.

Table 6: Derivation of imports (US$'million)

	1988	1989
Sources of foreign exchange for imports:		
From commercial and merchant banks:		
a. FEM from CBN via banks	2790.8	2200.4
Non-oil exports	431	292.4
Invisible	218.3	154.4
Other	403	409.4
b. Made available by CBN directly		
Public sector drawing on LCs	283	206.2
Total	4126.1	3262.8
Minus: increase in NFA of commercial and merchant banks	504	-34
Used for profit remittances and private sector debt service	112	62
	3510.1	3234.8
Net available for financing of imports and NFS	269	169
Imports of NFS (from CBN)	3241.1	3065.8
Available for imports valid for exchange	1179.7	978.6
Imports not valid for exchange	4420.8	4044.4
Total non-oil imports (including project related), of which		
imports FOB	3993.5	3653.6
CIF margin	427.3	390.9
Unrecorded imports' (20%)	798.7	730.7
Total non-oil imports FOB	4792.2	4384.2
Total oil imports FOB	942	1251
Total imports FOB	5734.2	5635.2

Source: IMF field staff communication with FOS, 1990.
CBN = Central Bank of Nigeria
CIF = cost, insurance and freight
FEM = foreign exchange market
FOB = free-on-board
NFA = net foreign assets
NFS = non-factor services
LCs = letters of credit

In the light of these problems, areas for improvement can be categorized as follows:

(a) Monitoring, standardizing and documenting the data content of AERC researches.
(b) Collecting data by sample survey/census on the informal sector in the sense of SNA.
(c) Improving the completeness, timeliness and accuracy of the underlying data used to produce the accounts, balance sheets and other tables.
(d) Improving some existing accounts and tables that at present are not properly done – input-output table, rest of the world accounts, and flow of funds.
(e) Developing some areas that are at present missing in the systems: quarterly and regional GDP series, sectoral and national balance sheets, and satellite accounts for natural resources and other areas of national priority, e.g., poverty alleviation.
(f) Improving researchers' knowledge of structured macroeconomic data.

As far as (a), (b) and (f) are concerned, AERC needs to do something. For (c), national governments, through their central statistics offices and the major subject-matter agencies, can do a lot, just as their counterparts in the United States are doing. In addition, international organizations, which have always helped, will have to continue to do so with a more focused approach that can yield tangible results. They should stop using financial performance as the yardstick for their success and pay more attention to the statistics produced. Local users will have to show sufficient concern to influence government to act. It is of no use complaining without making the problem known in the right quarters or taking initiatives. Users must get involved in the data they use, so as to be able to do appropriate adjustments on their own. Side by side with official efforts, there should now be private initiatives.

With regard to (d) and (e), many agencies, including those of governments and international and national institutions, can do much, depending on the objectives or activities of the agency. The IMF example cited above is important. AERC has a role to play here, judging by the activities of its researchers, as discussed in Section IV.

AERC research projects are concentrated on "external balance and macroeconomic management, external and internal debt management, and financial management and domestic resource mobilization" (Ariyo, 1994). All these, using the categorization in Section II, are covered in rest of the world accounts, flow of funds, sectoral and national balance sheets, and input-output tables. Attention will, therefore, have to be concentrated on these accounts, balance sheets and tables. But these cannot be understood without the central system, the national accounts. To this end, AERC needs to support projects in:

- Improvement/development of rest of the world accounts
- Improvement/development of flow of funds
- Development of sectoral and national balance sheets
- Improvement/development of input-output tables
- Development of a database for national accounts compilation
- Development of a database for AERC researchers
- Development of quarterly GDP series
- Development of satellite accounts and analysis of government consumption
- Development of informal sector in the sense of SNA
- Training in national accounts and other related accounts and tables

VI. A programme to improve African economic data

In this exercise we have attempted to ascertain what data are actually used by AERC macro econometric researchers, how the data are used, and the actual state of availability and quality of economic statistics in sub-Saharan African countries. This foundation is a necessary condition for knowing what improvement should be undertaken. We have found that the availability and quality of data in these countries are not the same from one country to another. Moreover, the economic statistics in most of these countries can be regarded as most unsatisfactory. (The situations in other developing countries are not better). The users, AERC researchers in particular, are not helping, as only very few commented on the availability and quality of the data they used. And most of those who did only raised concern without making any efforts to improve the data. The few who did extrapolation or adjustments failed to document them as part of the research. Where own surveys were used, the analysis was done with little input of the knowledge of economic statistics. Attempts to collect more data through questionnaires from users and producers did not yield anything significant.

Towards the end of the last section, we briefly discussed what should be done to effect necessary changes. The objective of this section is to expand that discussion and develop a programe to improve African economic data.

The programme

Addressing the problems identified in sections IV and V and improving the quality of African economic policy research will require a concerted, systematic approach. We propose here to implement such an approach through a formal programme of at least three years duration, though this could be extended if necessary. The three main components of the programme would be the organization of a training programme for African economic graduates and researchers, the coordination of data improvement projects, and the development of an African economic data bank system. Details on each of the three components are presented below.

Training programme in national accounts and other macroeconomic statistical systems

Adequate knowledge of the concepts, measurement and compilation of macroeconomic statistical systems is very important for macroeconomic modeling and other research

activities. Such knowledge aids researchers in assessing the quality of data and in determining the necessary adjustment required before using the data. As noted in Section IV, however, a large number of researchers seem not to be familiar with these frameworks. Hence, the need for a training programme in national accounts and other macroeconomic statistical systems. The two groups that would be targeted for the training programme are AERC researchers and the students in AERC's collaborative MA programme.

Training workshops

The main objectives of the training workshops are :

- To up-date researchers' knowledge of national accounts and related systems (NARS), in particular those aspects relevant to AERC research interests – structured statistics of real, fiscal, financial and external sectors to cover basic concepts and definitions, measurements, accounts and tables with their compilations.
- To aid the researchers in carrying out: (a) preliminary assessment of coverage, possible time periods, accuracy and timeliness; (b) assessment of the characteristics of macroeconomic data that often make straightforward econometric research work difficult; and (c) the necessary remedies to correct the defects.
- Above all, to strengthen the capacity of researchers in relating NARS with macroeconomics, so that they are able to use NARS statistical series effectively in research.

The contents of the workshops would be as follows:

1. National accounts
   - Basic concepts - production, flows and stocks, transactors and transactions, and standard classification
   - Measurement - concept of gross domestic product (GDP) and related aggregates, development over the years, sustainable income and environmental influence on GDP
   - Accounting framework - rule of accounting and valuation, the standard accounts, sectoral and national balance sheets, satellite accounts and analysis
   - Data presentation.
   - Population and production
   - Compilation - sources of basic data, derivation of the accounts and the statistics (aggregates), often as sums of balancing items
   - Consolidated accounts of the nation
   - From SNA through macroeconomics to macro econometric modeling
   - Developments in UN system of national accounts
   - Uses of national accounts
   - Practical work using country data or relevant data for a proposed research work

2. Input-output tables - backward extension of national accounts to analyse intermediate consumption:
   - Conceptual framework
   - Evolution of input-output table
   - Structure and methodology of input-output table
   - Compilation
   - Uses of input-output table
   - Practical work based on country data or relevant data for a proposed research work

3. Social accounting matrix (SAM) - a rearrangement of national accounts as a matrix for some specific analysis:
   - Rationale for SAM
   - Structure of and methodology SAM
   - Compilation
   - Applications of SAM
   - Practical work based on country data or relevant data for a research proposal

4. Flow of funds tables - a more detailed analysis of capital accumulation and financial transaction accounts:
   - Monetary systems and other financial institutions
   - Rationale for flow of funds tables
   - Evolution, structure and methodology of flow of funds
   - Compilation
   - Uses of flow of funds tables
   - Practical work based on country data or relevant data for a research proposal

5. Government accounts and tables - more detailed accounts and tables of general government sector accounts of national accounts, and government financial statistics:
   - General government sector and subsectors
   - Methodology, accounts and other tables
   - Surplus/deficit
   - Annual budget statements
   - Government financial statistics
   - Uses of government statistics
   - Practical work using country data or relevant data for research proposal

6. Balance of payments accounts and tables - essentially the same as the rest of the world accounts and tables:
   - Conceptual framework
   - Methodology, accounts and tables
   - Surplus/deficit and external debts
   - Balance of payment statements
   - Uses of balance of payments

- Practical work based on country data or relevant data for a proposed research work

7. Satellite accounts and analysis: This is a very recent aspect of SNA. Interest here is about the basic concepts of a framework for functionally oriented satellite accounts. Such framework is about a given field that can be taken as an extension of SNA, and not for the economy as a whole. The conceptual framework of a functional satellite account includes, at the same time, many features from the central framework and a number of additional ones that are necessary to give a more suitable picture of the field in question. The course will encompass a relevant area of concern, e.g., satellite framework of poverty alleviation to cover the following topics:

- Provision of additional information on the particular social concerns of a functional nature
- Use of complementary concepts where necessary
- Extended coverage of costs and benefits of human activities
- Further analysis of data by means of relevant indicators and aggregates
- Linkage of physical data sources and analysis to the monetary accounting system
- Linkage of specialized information system in specific economic, social or natural fields to each other and to national accounts
- Production and products
- Income - primary incomes, transfers and disposable income
- Use of goods and services
- Assets and liabilities
- Purposes
- Aggregates - changes in the main aggregates shown in the central framework, and introduction of aggregate by purpose
- From analysis to accounts

8. Natural resources accounts and tables - an extension of national accounts based on satellite accounting:

- Scope of natural resource accounting
- Setting up natural resource accounts - physical and monetary accounts
- Valuation principles in natural resources accounting
- Integrating natural resources into the national accounts
- Uses of natural resource accounts
- Practical work based on country data or relevant data for research proposal

9. Price systems: This should cover all prices collected as part of official statistics and the construction of their index numbers. On the other hand, every group of items presented above (1 – 8) generates its group of values per unit, which can be called a price system. In particular, workshops will discuss the following:

- Producer, international, wholesale or retail, and consumer prices; price indexes and compilation, and constant valuation; and changing the base, and updating the basket of items used in price indexes

- Other prices - wages, interest, exchange rates, etc.
- Practical work based on country data or relevant data for a research proposal

Each topic should, in addition, include: assessment of coverage, time periods, accuracy and timeliness, plus diagnostic tests for defects in macroeconomic data and remedies. More time should be devoted to (1) because the others are its extensions

A course of instruction at graduate level:

The main objective of the course is to provide economics graduates with the basic knowledge of national accounts concepts, compilation and statistics, to enable them to characterize an economy appropriately.
The contents of the course are as follows

- Basic concepts - production, flows and stocks, transactors, and standard classification
- Measurement - concept of gross domestic product (GDP) and related aggregates, development over the years, sustainable income, and environmental influence on GDP
- Accounting framework - rules of accounting and valuation, the standard accounts, sectoral and national balance sheets, satellite accounts and analysis
- Data presentation
- Population and production
- Compilation - sources of basic data; derivation of the accounts and statistics (aggregates), often as sums of balancing items
- Consolidated accounts of the nation
- From SNA through macroeconomics to macro econometric modeling
- Developments in UN system of national accounts
- Uses of national accounts
- Country practice

The prerequisite or concurrent requirement is a first degree course in macroeconomics.

Data improvement projects

The work of AERC researchers covered a variety of topics that should use data based on national accounts, flow of funds, rest of the world accounts, input-output tables and SAM. However, most of the available data from various sources are unstructured and have known and unknown levels of completeness and reliability (Table 2). Even in cases where researchers use their own surveys, little or no attempt is made to structure these data as economic ones where standard concepts, definitions and classifications are adopted. Hence, there is the need to improve the quality and availability of African economic data.

The proposed topics for study

The suggested topics, essentially based on the findings presented above, are improvement or development of:

- Informal sector in the sense of SNA
- Database for national accounts, and compilation of institutional sector accounts
- Rest of the world accounts
- Flow of funds
- National and sector balance sheets
- Input-output table
- Quarterly national accounts
- Satellite accounts and analysis of government expenditure

The general objective is to improve or develop areas covered by each topic in a given country. The specific objectives for each of the topics are given below:

- Informal sector in the sense of SNA - The main objective is to estimate the true picture of informal sector activity so as to carry out proper monitoring, develop informal units into standard modern small businesses and provide information for better management of the economy. It is also to improve data collection and the use of these data in SNA, which would minimize the data problem normally created in national accounts compilation.

- Database for national accounts, at current and constant prices, and compilation of institutional sector accounts - The objective of this project is to obtain disaggregated information on aggregates such as income (to different types of earners), savings (of various groups of workers and self-employed people), taxes and transfers, etc., that AERC researchers require in their work for the provision of results that are sensitive to macro policies of interest.

- Rest of the world accounts - The objective is to disaggregate the rest-of-the world accounts into several trade blocks and quantify the interdependence among blocks through the international flows of goods, services and capital.

- Flow of funds - The objective here is to properly compile flow of funds accounts for countries that are not yet doing so. Such a compilation will provide the empirical base for exploring such issues as the: sensitivity of borrowing to interest rates; effects of cost and supply of credit on physical investment demand; role of money holdings in the public's structure of assets and liabilities; and effects of financial position – levels of assets and liabilities – on the demand of goods and services for credit and investment in financial claims.

- National and sector balance sheets - According to Adamu et al. (1996), no sub-Saharan African country reported production of complete sector accounts, and neither did any report balance sheets for the nation or the sectors. Hence, the main objective of this project is to compile complete national and sector balance sheets for each country. The integration of such a set of balance sheets with the flow of accounts aids the analysis of net worth, changes in net worth and wealth of the nation.

- Input-output table - Many countries do not produce this important table and those producing it do not do so in the appropriate way. The major problem in the compilation of the input-output table is lack of adequate information to show the inter-relatedness of industries. Also, the government, with its important role in the economy of developing countries, is never included in the use of matrix. The main objective of this improvement project is to correct these two major defects.

- Quarterly national accounts - Most African countries compile national accounts on an annual basis, yet annual series are inadequate for the short-term analysis required to closely follow short-term movements. Hence, the objective of this project is to develop quarterly national accounts relevant to short-term economic analysis and policy.

- Satellite accounts and analysis of government expenditure - Poverty and uncontrollable external debt are two of the major problems facing virtually all sub-Saharan African countries. These two problems are closely related to government expenditure. In most countries, however, there are no comprehensive, detailed data on actual programme expenditures by the central, state/provincial and local governments. But these data are very important to assess poverty, to develop policies and programmes for poverty alleviation, and to study anti-poverty spending of these governments and the impact of government policy generally on the poor. Hence, the main objectives of this project are to compile satellite accounts and analyse government consumption in order to provide information additional to that given by the national accounts, especially across social and economic activities, with extension to costs and benefits of institutional sector activities. In addition, the activities covered may have to be related to adjustments expected in the input-output table project, and may extend and relate to the household sector, the ultimate beneficiary of government expenditure.

Project activities

The activities under each of the eight proposed projects will cover the following broad tasks as appropriate:

- Initiating a plan for the project, including the project's prospects.
- Reviewing existing situation, and documenting what is available in terms of organization, data series, data sources, data compilation (where appropriate) and publications.

- Solving the issues relating to definitions and concepts, and selecting appropriate standard classifications, national or international, to use with necessary adjustments.
- Examining all the possible institutional units likely to be involved and making decisions about their categorization.
- Identifying all statistical series to use, their sources and instruments of data collection, and assessing quality.
- Identifying computational needs and developing statistical and computational procedures to use.
- Choosing and procuring appropriate software and accessories for computer processing.
- Developing and compiling prototype tables and/or accounts.
- Producing an outline of research output.
- Producing a document to cover all the above.

In each case, output will include documentation of procedures, data series and sources, with prototype accounts and tables as appropriate. This documentation will be different from similar publications, often referred to as *Handbooks* (see cited examples in UN, 1993) or *Sources and Methods* by some countries (see, for example, CSO, 1985), including some African countries, as contained in IDE (1990), that produce them for their national accounts compilation. The proposed reports will document sources, data series available, and procedures for adjusting inadequacies and compiling the derived statistics, among others.

African economic data bank system

We noted earlier that the availability of useful data to AERC researchers is very low while the quality of available data is very poor. Moreover, we also saw that AERC researchers hardly make use of multi-regional models, possibly because of inaccessibility of data on other countries. It is also not uncommon for two researchers from the same country to use two different sets of data for the same variable in their studies.

One way to improve the quantity and quality of data, and to ensure that comparable data are used by all AERC researchers, is to set up a data bank for AERC researchers. This data bank would bring together the scattered series from varied sources to one place where they could be compared and reconciled within each country.

The proposed data bank could be numeric in nature, and hence can be referred to as a statistical data bank encompassing systems for searching, retrieving and reporting the stored data. A data bank system is a functioning combination of one or more numeric database files with a search system that can retrieve the numeric data (comprising numeric values, their accompanying attribute(s) and the association between them) from the numeric database and present it to the user. Additionally, a data bank system may also possess some computational routines by which the retrieved numeric data can be analysed, or "massaged". Some of these routines are:

- Aggregating or consolidating data
- Creating new variables from old variables

- Sorting on specified fields
- Importing or exporting data from/to other software packages
- Generating reports in a specified format, e.g., tabular form

Hence, this project intends to develop a system along with the data bank. This approach would make it easier for the stored socioeconomic data to be readily updated, accessed and shared among researchers in appropriate electronic data formats.

Support for this project would be solicited from UN agencies relevant to African countries, the World Bank, IMF and others. And African data from these agencies should be included in the proposed data bank for comparablilty. For example, not many African countries accept the World Bank debt data as more reliable than what they have in their files.

Organization

AERC's normal procedure for training and research projects should be followed, possibly under an assistant coordinator, for the implementation of this overall data improvement programme.

VII. Conclusions and recommendations

The main objectives of this study were to examine critically the availability and quality of sub-Saharan African country economic statistics for research purposes, to assess research reports by AERC researchers as examples of the uses of data, and to develop an improvement programme to ensure improved data series on a continuing basis. Our findings show that on the producers' side, the official statistics offices of many sub-Saharan African countries are unable to produce complete, timely and accurate statistics that cover all areas of the economy. We have also found that data are published by these offices with considerable time lags. On the research users' side, as illustrated by AERC researchers, our findings include the following:

- The research papers, as shown in Table 2, cover a variety of topics that should use data based on any of the following: national accounts, flow of funds, rest of the world accounts or balance of payments accounts, input-output tables, and SAM. Some researchers used their own surveys, but made no attempt to structure their data as economic data with standard concepts, definitions and classifications. They should be encouraged to do so in order to integrate the data generated into the mainstream of macroeconomic data and models.
- The varied forms of data, mostly unstructured, from various sources, with known and unknown levels of completeness and reliability, should draw the attention of AERC to encourage some minimum standard for the quality of data used for AERC research.
- Most researchers adopting econometric modeling ignore the descriptive and analytical aspects of their research work and concentrate totally on specification of models, estimation and simulation. Further, their presentations are not done in a way that enables policy and decision makers to understand the results with minimum effort. The mark of distinction of an expert is the ability to communicate with people outside the area of speciality in a way that they can understand.
- Too much attention is paid to simulation, and not enough to the quality of data inputs and other procedures leading to model specification and simulations. To reduce this, it may be necessary to encourage more joint projects where different researchers pool their expertise to execute the project.
- Attention to short-, medium- and long-term models has been inadequate. Ideally, short-term models should use data points of less than yearly intervals, say quarterly or monthly, or even less. One or two cases are reported with less than a yearly interval, but there are models based on annual data that are supposed to be dealing

with short-term problems. This is less than appropriate. On the other hand, some models with long-term characteristics failed to demonstrate this with the estimates and their implications. If the present stage of underdevelopment of many sub-Saharan African countries is to change for the better, more attention will have to be directed at long-term models and their short- and medium-term policy implications.

- Although only a few research reports contain input-output tables or their extended form, SAM, the few that do are not adequate for communicating rigorous research to policy makers. More research work using this type of data in improved form must be encouraged, at least to reduce the use of short time series for econometric work involving estimation of many parameters at a time.
- There is a lack of adequate knowledge of macroeconomic statistical systems by a large number of the researchers, and this has adverse effects on the research results. In the light of these findings, areas for improvement can be categorized as follows:
- Monitoring, standardizing and documenting the data content of AERC research.
- Collecting data on the informal sector in the sense of SNA.
- Improving the completeness, timeliness and accuracy of the underlying data used to produce the accounts, balance sheets and other tables.
- Improving some existing accounts and tables not at present properly done: e.g., input-output table, rest of the world accounts and flow of funds.
- Developing some areas that are at present missing in the systems: quarterly and regional GDP series, sectoral and national balance sheets, and satellite accounts for natural resources and other areas of national priority, e.g. poverty alleviation.
- Providing training in national accounts and other related accounts and tables.

In order to address some of the data problems and to improve the quality of African economic policy research, a programme to develop and improve the quality of African economic data would have to be put in place. As proposed, the programme would be made up of a training programme for African economic graduates and researchers, coordination of data and research improvement projects, as a follow-up to the training, and the development of an African economic data bank within AERC. It may be adopted for a period of three years in the first instance, but this may be extended if necessary.

Annex A: A summary of AERC research projects

	RP1	RP2	RP3
1. Nature of data			
(a) Primary/secondary	Secondary	Secondary	Combined
(b) Time series/surveys	Time series	Time series	Combined
(c) Source	Official and survey	Official	Official & survey
(d) SNA?	No	Yes	No
(e) Type and length of time series	Annual: 1981-1987	Annual: 1967-1983	Annual: 1960-1986
(f) Economic statistical system	R of W account	Flow-of-funds	F of F account
2. Use of data			
(a) Approach	Descriptive	Model (single)	Descriptive
(b) If descriptive:			
- Any periodization?	No	Yes	No
- No. of periods		3	-
- Indicators used?	Yes	No	Yes
- What type?	Rates and percentage	-	Prop., rates & %
(c) If model	Not model		-
- Macro type		Single	-
- Estimating method		OLS/2SLS	-
(d) Any graph?	No	No	No
(e) Any other figures?	No	No	No
(f) Number of tables in text	14	5	9
(g) Number of tables in appendixes	8	4	1
(h) Comments on quality of data	Yes	No	No
(i) Relation with a previous RP	No	No	No
3. Appraisal of model (macro only)			
(a) Equations:			-
- Number of structural equations		Single	
- Number of definitions		-	
(b) Variables			-
- Number of endogenous			
- Number of exogenous			
(c) Blocks and number of equations			
(d) Diagnostic test done		-	-
(e) Simulation or forecast goodness of fit:			
- Ex post		-	-
- Ex post beyond sample period			
- Ex ante (long-term) forecast			
(f) Test statistic(s) for:			
- Estimates		t-test	-
- Simulation		-	-
(g) Areas of economic policy	Trade	Saving mobilizaton	Domestic resource mobilization
4. Other information			
(a) Country covered	Uganda	Kenya	Ghana
(b) Name(s) of researcher(s)	E. Ssemogerere	Mwega, F.M. et al.	E. Aryeetey et al.
(c) Keyword in title	SAP and coffee sector	Int. rates & savings	Informal financing

Annex A continued

	RP4	RP5	RP6
1. Nature of data			
(a) Primary/secondary	Combined	Secondary	Secondary
(b) Time series/surveys	Time series/survey	Time series	Time series
(c) Source	Official and survey	Central Bank of Kenya, IMF	IMF, World Bank
(d) SNA?	Not applicable	Yes	Yes
(e) Type and length of time series	Annual: 1966-1989, monthly 1985-1991	Quarterly and yearly 1973-1987	Annual: 1970-1988
(f) Economic statistical system	F of F account	F of F account	R of W account
2. Use of data			
(a) Approach	Descriptive	Model (single)	Combined/single
(b) If descriptive:			
- Any periodization?	No	No	No
- No. of periods	-	-	-
- Indicators used?	Yes	Yes	Yes
- What type?	%	Proportions, rates & %	Rates & %
(c) If model	-	Sector single equation	Macro
- Macro type	-	Short- and long- run	Single
- Estimating method	-	OLS	OLS
(d) Any graph?	No	No	Yes: 1
(e) Any other figures?	No	No	No
(f) Number of tables in text	11	7	8
(g) Number of tables in appendixes	-	2	2
(h) Comments on quality of data	No	No	No
(i) Relation with a previous RP	No	Yes/2	No
3. Appraisal of model (macro only)			
(a) Equations:	-	Single	Block triangular
- Number of structural equations			8
- Number of definitions	-		
(b) Variables			7
- Number of endogenous		2	
- Number of exogenous			
(c) Blocks and number of equations		3,7	
(d) Diagnostic test done	-	Chow test	-
(e) Simulation or forecast goodness of fit:			
- Ex post			
- Ex post beyond sample period		-	
- Ex ante (long-term) forecast			-
(f) Test statistic(s) for:			
- Estimates	-	t-test	F
- Simulation	-	-	-
(g) Areas of economic policy	Financial	Monetary	Exchange rate
4. Other information			
(a) Country covered	Malawi	Kenya	Ghana
(b) Name(s) of researcher(s)	C. Chipeta et al.	Ndele	C.D. Jebuni et al.
(c) Keyword in title	Informal fin. sector	Demand for money	Exchange rate

Annex A continued

	RP7	RP8	RP9
1. Nature of data			
(a) Primary/secondary	Secondary	Secondary	Secondary
(b) Time series/surveys	Time series	Time series	Time series
(c) Source	Official and survey	CBN, World Bank & IMF	Official
(d) SNA?	No	No	No
(e) Type and length of time series	Annual, no period given	Annual: 1970-1988; 1969-1988	Annual: 1960-1987
(f) Economic statistical system	National accounts	R of W account	R of W account
2. Use of data			
(a) Approach	Model (multi)	Combined	Combined
(b) If descriptive:			
- Any periodization?		Yes	Yes
- No. of periods		2 or 3	5
- Indicators used?		Yes	Yes
- What type?		Rates coefficient	Rates & %
(c) If model	Macro	Macro	Sector
- Macro type	Multi	Single	-
- Estimating method	OLS/2SL	OLS	OLS
(d) Any graph?	No	No	Yes; 7
(e) Any other figures?	Yes; 1	Yes/20 app.	No
(f) Number of tables in text	4	-	18
(g) Number of tables in appendixes	-	32	1
(h) Comments on quality of data	Yes	No	No
(i) Relation with a previous RP	No	No	No
3. Appraisal of model (macro only)			
(a) Equations:			
- Number of structural equations		Single	Recursive
- Number of definitions	36	-	
(b) Variables	6	-	44
- Number of endogenous			
- Number of exogenous	42		
(c) Blocks and number of equations	?	-	
(d) Diagnostic test done	5,42	-	
(e) Simulation or forceast goodness of fit:	-	-	-
- Ex post			
- Ex post beyond sample period			
- Ex ante (long-term) forecast	-	-	
(f) Test statistic(s) for:	Yes; 2000; 2010	-	
- Estimates	F-test	t-test	F test
- Simulation			
(g) Areas of economic policy	Economic-demographic	Debt management	Trade
4. Other information			
(a) Country covered	Ethiopia	Nigeria	Ghana
(b) Name(s) of researcher(s)	A. Kidane	S.I. Ajayi	K. Yerfi Fosu
(c) Keyword in title	Macroeconomic	External debt	Agric. exports

Annex A continued

	RP10	RP11	RP12
1. Nature of data			
(a) Priary/secondary	Secondary/primary	Secondary	Combined
(b) Time series/surveys	Time series/survey	Time series	Combined
(c) Source	IMF, IFS	CBN, FOS, NDIC, IMF, FMBN, NIDB	Private survey
(d) SNA?	No	Yes	Yes
(e) Type and length of time series	Annual: 1978-1988	Annual; 1969-19891	Annual; 1980-1989
(f) Economic statistical system	F of F account	F of F account	F of F account
2. Use of data			
(a) Approach	Descriptive	Model (sector)	Descriptive
(b) If descriptive:			
- Any periodization?	No	No	Yes
- No. of periods	-	-	4 but 2 used
- Indicators used?	Yes	-	Yes
- What type?	Rates and %	Sector multi-equation model	Count and %
(c) If model			-
- Macro type			-
- Estimating method	OLS	OLS using MLM, MFM, MYPM	-
(d) Any graph?	Yes; 2	No	No
(e) Any other figures?	2	-	No
(f) Number of tables in text	1	5	7
(g) Number of tables in appendixes	-	7	5
(h) Coments on quality of data	No	Yes	No
(i) Relation with a previous RP	Yes/3	No	Yes/2; 11; 17
3. Appraisal of model (macro only)			
(a) Equations:			
- Number of structural equations		Single	-
- Number of definitions	-	-	
(b) Variables			-
- Number of endogenous	-		
- Number of exogenous		-	-
(c) Blocks and number of equations			-
(d) Diagnostic test done			
(e) Simulation or forecast goodness of fit:			
- Ex post			
- Ex post beyond sample period	-		
- Ex ante (long-term) forecast		-	-
(f) Test statistic(s) for:	-		
- Estimates	-	t-test	-
- Simulation		-	-
(g) Areas of economic policy	Financial	Financial	Financial
4. Other information			
(a) Country covered	Ghana	Nigeria	Nigeria
(b) Name(s) of researcher(s)	E. Aryeety	A. Soyibo et al.	A. Soyibo et al.
(c) Keyword in title	Financial markets	Fin. sys. & savings	Savings-invest.

Annex A continued

	RP13	RP14	RP15
1. Nature of data			
(a) Priary/secondary	Secondary	Primary	Secondary
(b) Time series/surveys	Times series	Survey/records	Time series
(c) Source	Govt/international	Authors' survey	Govt/World Bank, IMF
(d) SNA?	Yes	No	No
(e) Type and length of time series	Annual: 1964-1986	Monthly: 1985-1991	Annual: 1965-1989
(f) Economic statistical system	R of W account	F of F account	Govt sector account
2. Use of data			
(a) Approach	Descriptive	Descriptive	Model (single)
(b) If descriptive:			
- Any periodization?	No	No	No
- No. of periods	-		
- Indicators used?	Yes	Yes	No
- What type?		Average	Single/reduced
(c) If model			
- Macro type			
- Estimating method	Calculation		OLS
(d) Any graph?	Yes; 1	No	No
(e) Any other figures?	No	No	No
(f) Number of tables in text	9	8	8
(g) Number of tables in appendixes	-	2	
(h) Comments on quality of data	Yes	No	No
(i) Relation with a previous RP	-	Yes/4; 10	Yes/19
3. Appraisal of model (macro only)			
(a) Equations:			
- Number of structural equations	-		Single
- Number of definitions			
(b) Variables	-		
- Number of endogenous			
- Number of exogenous			
(c) Blocks and number of equations	-		
(d) Diagnostic test done			
(e) Simulation or forecast goodness of fit:			
- Ex post			
- Ex post beyond sample period			
- Ex ante (long-term) forecast	-		
(f) Test statistic(s) for:			
- Estimates			t-test, DW.
- Simulation			
(g) Areas of economic policy	Debt	Financial	Fiscal deficit
4. Other information			
(a) Country covered	Ethiopia	Malawi	Côte d'Ivoire
(b) Name(s) of researcher(s)	B. Degefe	C. Chipeta et al.	Kouassy et al.
(c) Keyword in title	Growth & foreign debt	Financial sectors	Fiscal deficit & ADJ.

Annex A continued

	RP16	RP17	RP18
1. Nature of data			
(a) Primary/secondary	Primary	Secondary	Primary
(b) Time series/surveys	Survey	Time series	Survey
(c) Source	Authors' survey	NDIC and CBN, FOS, IFS	Authors' survey
(d) SNA?	No	Yes	No
(e) Type and length of time series	Survey	Annual: 1970-1989	Suvey
(f) Economic statistical system	Industrial sect. A/C	F of F account	F of F account
2. Use of data			
(a) Approach	Descriptive	Descriptive	Descriptive
(b) If descriptive:			
- Any periodization?	No	Yes	No
- No. of periods		4 but 5 used	
- Indicators used?	Counts & %	Yes	Yes
- What type?		Ratios & growth rt.	
(c) If model			
- Macro type			
- Estimating method	OLS		
(d) Any graph?	No	Yes, 2	No
(e) Any other figures?		Yes, 1	2
(f) Number of tables in text	11	9	14
(g) Number of tables in appendixes			
(h) Coments on quality of data	No	No	Yes
(i) Relation with a previous RP	No	Yes/11	Yes/3; 4
3. Appraisal of model (macro only)			
(a) Equations:			
- Number of structural equations			
- Number of definitions			
(b) Variables			
- Number of endogenous			
- Number of exogenous			
(c) Blocks and number of equations			
(d) Diagnostic test done			
(e) Simulation or forecast goodness of fit:			
- Ex post			
- Ex post beyond sample period			
- Ex ante (long-term) forecast			
(f) Test statistic(s) for:			
- Estimates			
- Simulation			
(g) Areas of economic policy	Industrial	Financial	Financial
4. Other information			
(a) Country covered	Nigeria	Nigeria	Tanzania
(b) Name(s) of researcher(s)	D.B.E. Ekpeyong	A. Soyibo et al.	M. Hyuha et al.
(c) Keyword in title	Small and medium ent	Banking system	Informal fin. market

Annex A continued

	RP19	RP20	RP21
1. Nature of data			
(a) Primary/secondary	Secondary	Secondary	Combined
(b) Time series/surveys	Time series	Time series	Combined
(c) Source	IFS and BCEAO	Government	SACCDO and author
(d) SNA?	No	No	No
(e) Type and length of time series	Annual: 1966-1987	Annual: 1976-1990	Annual: 1978-1990
(f) Economic statistical system	R of W account	Govt. sector A/C	F of F account
2. Use of data			
(a) Approach	Descriptive	Model (single)	Descriptive
(b) If descriptive:			
- Any periodization?	No	No	No
- No. of periods			
- Indicators used?	No	Yes	
- What type?			
(c) If model		Single	
- Macro type			
- Estimating method		OLS	
(d) Any graph?	No	No	No
(e) Any other figures?	No	No	2
(f) Number of tables in text	36	4	14
(g) Number of tables in appendixes	No	4	1
(h) Comments on quality of data	Yes	No	No
(i) Relation with a previous RP	No	No	
3. Appraisal of model (macro only)			
(a) Equations:			
- Number of structural equations		Single	
- Number of definitions			
(b) Variables			
- Number of endogenous			
- Number of exogenous			
(c) Blocks and number of equations			
(d) Diagnostic test done			
(e) Simulation or forecast goodness of fit:			
- Ex post			
- Ex post beyond sample period			
- Ex ante (long-term) forecast			
(f) Test statistic(s) for:			
- Estimates			
- Simulation			
(g) Areas of economic policy	Trade	Taxation	Financial
4. Other information			
(a) Country covered	CFA countries	Tanzania	Ethiopia
(b) Name(s) of researcher(s)	A. M'bet et al.	N.E. Osoro	D. Aredo
(c) Keyword in title	Economic integration	Tax reform	Financial sectors

Annex A continued

	RP22	RP23	RP24
1. Nature of data			
(a) Primary/secondary	Secondary	Secondary	Secondary
(b) Time series/surveys	Time series	Time series	Time series
(c) Source	Govt. international	Govt. international	Officials
(d) SNA?	Yes	Yes	No
(e) Type and length of time series	Annual: 1960-1988	Annual: 1969-1990	Weekly: 1966-1987 Annual: 1956-1990
(f) Economic statistical system	Pieces & wages system	National accounts	R of W account
2. Use of data			
(a) Approach	Model (single)	Combined	Descriptive
(b) If descriptive:			
- Any periodization?	No	Yes	Yes
- No. of periods		5	2
- Indicators used?			Yes
- What type?			Ratios & growth rate
(c) If model	Single equation	Single equation	
- Macro type	Short-term		
- Estimating method	OLS	OLS	
(d) Any graph?	Yes; 2	No	Yes; 7
(e) Any other figures?		3	2
(f) Number of tables in text	7	2	6
(g) Number of tables in appendixes	4		3
(h) Comments on quality of data	No	No	No
(i) Relation with a previous RP	Yes/6	Yes/13	No
3. Appraisal of model (macro only)			
(a) Equations:			
- Number of structural equations	Single	Three	
- Number of definitions			
(b) Variables			
- Number of endogenous			
- Number of exogenous			
(c) Blocks and number of equations			
(d) Diagnostic test done			
(e) Simulation or forceast goodness of fit:			
- Ex post			
- Ex post beyond sample period			
- Ex ante (long-term) forecast			
(f) Test statistic(s) for:			
- Estimates	t-test		
- Simulation			
(g) Areas of economic policy	Inflation	Growth	Financial
4. Other information			
(a) Country covered	Ghana	Kenya	Ghana
(b) Name(s) of researcher(s)	Sowe et al.	F.M. Mwega et al.	C.K. Dordunoo
(c) Keyword in title	Infl. trend & control	Macroeconomics	Foreign exchange mkt

Annex A continued

	RP25	RP26	RP27
1. Nature of data			
(a) Primary/secondary	Secondary	Secondary	Secondary
(b) Time series/surveys	Time series	Time series	Time series
(c) Source	FOS, CBN, NISER	IMF, CBN	Govt/international
(d) SNA?	Yes	No	Yes
(e) Type and length of time series	1985, Annual: 1986-1989	Annual: 1970-1989	Annual: 1960-1988
(f) Economic statistical system	Input - output table	SNA	R of W account
2. Use of data			
(a) Approach	Model (CGE)	Model (multi)	Descriptive
(b) If descriptive:			
- Any periodization?	No	No	Yes
- No. of periods			9
- Indicators used?			Yes
- What type?			Ratios, rates & %
(c) If model			
- Macro type	CGE	Dynamic system	
- Estimating method	Calibration	OLS/Gauss-Seidel	
(d) Any graph?	Yes; 4	No	Yes; 3
(e) Any other figures?	No	Yes; 5	1
(f) Number of tables in text	13	5	30
(g) Number of tables in appendixes	2	1	
(h) Comments on quality of data	No	Yes	No
(i) Relation with a previous RP	No		Yes/6
3. Appraisal of model (macro only)			
(a) Equations:			
- Number of structural equations	Input-output, 18x18	5	
- Number of definitions		3	
(b) Variables			
- Number of endogenous		8	
- Number of exogenous		6	
(c) Blocks and number of equations		4, 8	
(d) Diagnostic test done		Dickey-Fuller tests	
(e) Simulation or forecast goodness of fit:			
- Ex post			
- Ex post beyond sample period			
- Ex ante (long-term) forecast			
(f) Test statistic(s) for:			
- Estimates		t-test	
- Simulation		Theil's inequality coeficient	
(g) Areas of economic policy	Exchange rate	Inflation	Trade
4. Other information			
(a) Country covered	Nigeria	Nigeria	Ghana
(b) Name(s) of researcher(s)	O. Ajakaiye	F.O. Egwaikhide et al.	C.D. Jebuni et al.
(c) Keyword in title	Exch. rate & prices	Exch, rate deficit	Trade & payments

Annex A continued

	RP28	RP29	RP30
1. Nature of data			
(a) Primary/secondary	Combined	Secondary	Secondary
(b) Time series/surveys	Combined	Time series	Time series
(c) Source	Govt/intern./author	Govt/intern./author	Official
(d) SNA?	Yes	Yes	No
(e) Type and length of time series	Annual: 1981-1990	Annual: 1970-1988	Annual: 1978-1986
(f) Economic statistical system	R of W account	R of W account	F of F account
2. Use of data			
(a) Approach	Descriptive	Descriptive	Descriptive
(b) If descriptive:			
- Any periodization?	No	No	No
- No. of periods			
- Indicators used?	Yes	Yes	Yes
- What type?		Index	Rates & %
(c) If model			
- Macro type		Trend - fitting	
- Estimating method		OLS?	
(d) Any graph?	No	Yes;9	No
(e) Any other figures?	No	No	No
(f) Number of tables in text	26	18	11
(g) Number of tables in appendixes		3	5
(h) Comments on quality of data	Yes	No	No
(i) Relation with a previous RP	Yes/1	No	No
3. Appraisal of model (macro only)			
(a) Equations:			
- Number of structural equations			
- Number of definitions			
(b) Variables			
- Number of endogenous			
- Number of exogenous			
(c) Blocks and number of equations			
(d) Diagnostic test done			
(e) Simulation or forecast goodness of fit:			
- Ex post			
- Ex post beyond sample period			
- Ex ante (long-term) forecast			
(f) Test statistic(s) for:			
- Estimates			
- Simulation			
(g) Areas of economic policy	Trade	Exchange rate	Monetray
4. Other information			
(a) Country covered	Uganda	Ethiopia, Kenya & Sudan	Southern Africa
(b) Name(s) of researcher(s)	Ssemogerere et al.	A. Kidane et al.	Chipeta et al.
(c) Keyword in title	Non-tradit exports	Effective exch. rate	Monetary harmonization

Annex A continued

	RP31	RP32	RP33
1. Nature of data			
(a) Primary/secondary	Secondary	Secondary	Secondary
(b) Time series/surveys	Time series/survey	Time series/survey	Times series
(c) Source	Official/private survey	CBN, FOS, IMF, World Bank	Bank of Ghana,WB.
(d) SNA?	Yes	Yes	Yes
(e) Type and length of time series	Annual: 1961-1992	Annual: 1970-1992	Annual: 1970-1990
(f) Economic statistical system	R of W account	SNA	SNA
2. Use of data			
(a) Approach	Descriptive	Model (multi)	Descriptive
(b) If descriptive:			
- Any periodization?	Yes	No	No
- No. of periods	3		
- Indicators used?	Yes		Yes
- What type?	Rates & %		Rates & %
(c) If model			
- Macro type		Macro	
- Estimating method		OLS	
(d) Any graph?	Yes;5	Yes; 7	Yes; 6
(e) Any other figures?		1	
(f) Number of tables in text	5	4	12
(g) Number of tables in appendixes	19		
(h) Comments on quality of data	No	Yes	Yes
(i) Relation with a previous RP		No	Yes/ 8
3. Appraisal of model (macro only)			
(a) Equations:			
- Number of structural equations		18	
- Number of definitions		14	
(b) Variables			
- Number of endogenous		62	
- Number of exogenous		23	
(c) Blocks and number of equations		5, 62	
(d) Diagnostic test done			
(e) Simulation or forecast goodness of fit:			
- Ex post			
- Ex post beyond sample period			
- Ex ante (long-term) forecast			
(f) Test statistic(s) for:			
- Estimates		t-test	
- Simulation			
(g) Areas of economic policy	Trade	Macroeconomic	Debt
4. Other information			
(a) Country covered	Tanzania	Nigeria	Ghana
(b) Name(s) of researcher(s)	F.M. Musonda	C.C. Soludo	B. Osei
(c) Keyword in title	Trade with PTA count	Macroeconomic	Debt service & SAP

Annex A continued

	RP34	RP35	RP36
1. Nature of data			
(a) Primary/secondary	Secondary	Secondary	Primary/secondary
(b) Time series/surveys	Time series	Time series	Time series
(c) Source	CBN	INternational/others	Govt/others
(d) SNA?	Yes	Yes	Yes
(e) Type and length of time series	1985, Annual: 1980-1991	Annual: 1970-1988	Monthly: 1987-1990 Annual: 1959-1986
(f) Economic statistical system	SAM	R of W accounts	R of W accounts
2. Use of data			
(a) Approach	Model (CGE)	Descriptive	Descriptive
(b) If descriptive:			
- Any periodization?	No	Yes	Yes
- No. of periods		3	
- Indicators used?			Yes
- What type?			Rates
(c) If model			
- Macro type	CGE		
- Estimating method	Calibration		
(d) Any graph?	Yes; 7	No	2
(e) Any other figures?		No	1
(f) Number of tables in text	6	9	10
(g) Number of tables in appendixes	5	Yes/8	-
(h) Comments on quality of data	Yes	No	No
(i) Relation with a previous RP	Yes/11, 17, 25	No	No
3. Appraisal of model (macro only)			
(a) Equations:			
- Number of structural equations	SAM with input-output (30x30)		
- Number of definitions			
(b) Variables			
- Number of endogenous			
- Number of exogenous			
(c) Blocks and number of equations	5, 26		
(d) Diagnostic test done			
(e) Simulation or forecast goodness of fit:			
- Ex post			
- Ex post beyond sample period			
- Ex ante (long-term) forecast			
(f) Test statistic(s) for:			
- Estimates			
- Simulation			
(g) Areas of economic policy	Financial	Debt	Exchange rate
4. Other information			
(a) Country covered	Nigeria	Nigeria	Nigeria
(b) Name(s) of researcher(s)	D. Ajakaiye	S. Ibi Ajayi	K. Odubogun
(c) Keyword in title	Macroeconomics	Capital Flight	Exch. rate policy

Annex A continued

	RP37	RP38	RP39
1. Nature of data			
(a) Primary/secondary	Secondary	Secondary	Secondary
(b) Time series/surveys	Time series	Time series	Time series
(c) Source	IFS, Res. Bank of Malawi	Government accounts	Govt/international
(d) SNA?	Yes	Yes	Yes
(e) Type and length of time series	Annual & quarterly: 1965-1990	Annual: 1969-1990	Annual: 1970-1989
(f) Economic statistical system	R of W account	R of W accounts	Financial accounts
2. Use of data			
(a) Approach	Model (sector)	Model	Combined
(b) If descriptive:			
- Any periodization?	No	Yes	Yes
- No. of periods		2	4
- Indicators used?		Yes	
- What type?	Sector	Rates & %	Sector
(c) If model		Single	
- Macro type			
- Estimating method	2SLS		
(d) Any graph?	Yes; 7		Yes; 4
(e) Any other figures?			
(f) Number of tables in text	6		7
(g) Number of tables in appendixes		7	10
(h) Comments on quality of data	Yes		No
(i) Relation with a previous RP	No	Yes/20	No
3. Appraisal of model (macro only)			
(a) Equations:			
- Number of structural equations	2	1	4
- Number of definitions			
(b) Variables			
- Number of endogenous			
- Number of exogenous			
(c) Blocks and number of equations			
(d) Diagnostic test done	Granter		Akaike critria log likelihood
(e) Simulation or forecast goodness of fit:			
- Ex post			
- Ex post beyond sample period			
- Ex ante (long-term) forecast			
(f) Test statistic(s) for:			
- Estimates	F-test		t & F tests
- Simulation			
(g) Areas of economic policy	Exchange rate	Taxation	Monetary
4. Other information			
(a) Country covered	Malawi	Tanzania	Nigeria
(b) Name(s) of researcher(s)	E.B.D. Silumbu	N.E. Osoro	O. Ogun et al.
(c) Keyword in title	Exch. rate & monetary	Tax reforms	Money supply

Annex A continued

	RP40	RP41
1. Nature of data		
(a) Primary/secondary	Secondary	Secondary
(b) Time series/surveys	Time series	Time series
(c) Source	Govt/international	Others, CBN
(d) SNA?	Yes	Yes
(e) Type and length of time series	Annual: 1950-1988	Daily, wkly & mthly: 1990-1994
(f) Economic statistical system	R of W account	R of W account
2. Use of data		
(a) Approach	Combined	Combined
(b) If descriptive:		
- Any periodization?	Yes	
- No. of periods	4	
- Indicators used?		
- What type?		
(c) If model	Sectoral	Multiple
- Macro type		
- Estimating method	OLS	Calculation
(d) Any graph?	14	14
(e) Any other figures?		
(f) Number of tables in text		11
(g) Number of tables in appendixes	6	2
(h) Comments on quality of data	No	Yes
(i) Relation with a previous RP	No	No
3. Appraisal of model (macro only)		
(a) Equations:		
- Number of structural equations	Many, not structures properly	Single
- Number of definitions		
(b) Variables		
- Number of endogenous		
- Number of exogenous		
(c) Blocks and number of equations		
(d) Diagnostic test done	Test for stability	Dickey Fuller test
(e) Simulation or forecast goodness of fit:		
- Ex post		
- Ex post beyond sample period		
- Ex ante (long-term) forecast		
(f) Test statistic(s) for:		
- Estimates	F-test	t and F tests
- Simulation		
(g) Areas of economic policy		Exchange rate
4. Other information		
(a) Country covered	Nigeria	Nigeria
(b) Name(s) of researcher(s)	J.U. Umo et al.	M.D. Ayogu
(c) Keyword in title	Balance of payments	Foreign exchange

Source: Compiled from AERC research papers.

Annex B: Sub-Saharan African country statistical publications: Number by category of subject-matter areas and country

Country by Geographical area	General	Populat./ labour/ housing	ISIC 1	ISIC 2-5	ISIC 6-8	External trade	WPFIE	Enter-prises	Bank/Pub. finance	Social stat.	National accounts	All publica-tion
East Africa												
Burundi	5	1	1	0	1	0	2	3	3	0	1	17
Comoros	0	1	0	0	0	0	0	0	0	0	0	1
Djibouti	5	0	0	0	0	1	0	0	2	0	1	9
Ethiopia	5	10	2	3	1	2	7	0	4	2	1	37
Kenya	3	24	26	13	5	3	3	1	5	11	6	100
Madagascar	6	10	3	1	3	2	2	0	1	2	0	30
Malawi	7	11	3	1	4	3	5	1	10	6	2	53
Mauritius	6	13	6	1	1	4	1	0	2	8	1	43
Mozambique	3	3	1	1	2	2	0	0	1	2	0	15
Reunion	19	15	1	0	6	7	12	0	3	6	3	72
Rwanda	4	2	0	0	0	0	1	0	0	0	1	8
Seychelles	5	10	3	1	0	2	3	0	4	3	2	33
Somalia	8	2	0	2	0	4	1	1	3	0	1	22
Tanzania	5	10	18	4	5	4	8	1	10	5	4	74
Uganda	4	12	15	8	0	2	3	2	1	5	3	55
Zambia	2	21	10	3	7	4	9	1	6	6	6	75
Zimbabwe	9	13	16	1	3	7	5	2	5	2	5	68
Subtotal	96	158	105	39	38	47	62	12	60	58	37	712
Central Africa:												
Angola	5	1	0	5	3	6	0	0	6	1	0	27
Cameroon	11	7	0	1	1	13	2	1	1	0	1	38
Central Afr.Rep.	7	3	1	0	0	1	2	5	0	0	2	21
Chad	5	2	1	0	1	11	0	3	1	0	4	28
Congo	3	8	0	1	2	4	2	2	0	3	3	25
Gabon	6	3	0	1	0	0	0	1	0	0	3	14
Sao Tome & Princ	0	2	1	0	0	1	0	0	0	1	0	5
Zaire	7	4	0	0	1	3	4	3	6	0	0	28
Subtotal	44	30	3	8	8	39	10	15	14	2	13	186
Southern Africa:												
Botswana	8	10	6	0	1	1	2	0	1	5	2	36
Lesotho	2	5	8	2	0	2	2	0	0	4	1	26
Namibia	1	0	0	0	0	0	0	0	0	0	0	1
South Africa	16	21	17	23	11	5	4	5	12	14	6	134
Swaziland	5	6	7	8	1	1	1	0	3	3	2	37
Subtotal	32	42	38	33	13	9	9	5	16	26	11	234

Annex B continuted...

West Africa:												
Benin	9	4	0	0	0	5	2	3	0	0	2	25
Burkina Faso	7	6	0	0	1	2	1	3	0	1	5	26
Cape Verde	3	0	0	0	0	2	0	0	0	0	0	5
Cote D'Ivoire	10	9	2	2	1	2	2	0	6	3	3	40
Gambia	1	3	2	0	1	4	3	1	1	2	1	19
Ghana	4	8	1	5	4	6	5	2	5	2	2	44
Guinea Bissau	1	0	0	0	0	0	0	0	0	0	0	1
Liberia	4	5	2	1	0	9	0	0	3	2	2	28
Mali	4	5	3	1	1	2	3	1	0	1	2	23
Mauritania	4	2	0	0	0	2	0	0	0	0	3	11
Niger	4	3	1	0	0	10	0	0	0	0	1	19
Nigeria	6	1	4	4	1	2	4	0	5	0	2	29
Senegal	5	3	1	3	0	6	1	0	1	0	2	22
Siera Leone	2	1	0	0	0	3	1	0	5	1	1	14
Togo	5	3	2	0	0	5	2	2	0	0	1	20
Subtotal	69	53	18	16	9	60	24	12	26	12	27	326
Sub-SaharanAfrica	241	283	164	96	68	155	105	44	116	98	88	1458
UNSO	4	92	0	21	8	20	9	6	6	66	19	25
UNECA	15	16	1	2	1	3	5	0	3	8	1	55
World Bank	8	-	-	-	-	1	-	-	2	-	1	12
IMF	-	-	-	-	-	7	-	-	7	-	-	14

Source: Compiled from IDE (1990).
Note: ISIC = International Standard Industrial Classification, Rev. 2.
WPFIE = wages, prices, family income and expenditure.

Annex C: Sub-Saharan African country statistical publications: Frequency and period covered

Country by geographical area	General					Noneconomic statistics				
	Frequency				Maximum period covered	Frequency				Maximum period covered
	I	A	SA/Q	BM/M		I	A	SA/Q	BM/M	
East Africa										
Burundi	1	1	1	2	1962-86	1	-	-	-	1979
Comoros	-	-	-	-	-	1	-	-	-	1966
Djibouti	3	1	1	-	1971-87	-	-	-	-	-
Ethiopia	2	2	-	1	1963-80	11	1	-	-	1961-82
Kenya	-	2	1	-	1955-88	26	9	-	-	1944-85
Madagascar	4	1	-	1	1960-88	10	2	-	-	1959-75
Malawi	-	4	1	2	1964-89	11	5	1	-	1966-87
Mauritius	-	4	2	-	1959-87	6	13	2	-	1952-87
Mozambique	1	2	-	-	1964-87	4	1	-	-	1963-83
Reunion	6	6	4	3	1965-89	16	4	-	1	1951-88
Rwanda	-	3	1	-	1964-87	2	-	-	-	1978-81
Seychelles	-	4	1	-	1967-86	8	5	-	-	1960-87
Somalia	2	2	1	3	1961-87	2	-	-	-	1975-81
Tanzania	1	2	1	1	1938-84	10	5	-	-	1952-81
Uganda	1	1	2	-	1954-74	9	8	-	-	1948-75
Zambia	-	1	-	1	1965-87	18	7	1	1	1960-86
Zimbabwe	-	4	3	2	1968-88	13	1	-	1	1953-84
Subtotal	21	40	19	16	-	148	61	4	3	-
Central Africa:										
Angola	1	2	-	2	1962-81	1	1	-	-	1960-72
Cameroon	2	3	4	2	1957-87	7	-	-	-	1962-76
Central Afr, Rep.	2	1	3	1	1965-87	3	-	-	-	1959-63
Chad	-	2	2	1	1966-83	2	-	-	-	1962-64
Congo	-	2	-	1	1958-82	8	-	-	-	1958-84
Gabon	1	3	-	2	1963-84	3	-	-	-	1960-64
Sao Tome & prnciple	-	-	-	-	-	4	-	-	-	1967-84
Zaire	2	1	4	-	1955-88	4	-	-	-	1967-84
Subtotal	8	14	13	9	-	29	3	0	0	-
Southern Africa:										
Botswana	3	4	1	-	1967-88	9	6	-	-	1967-87
Lesotho	-	1	1	-	1963-83	7	2	-	-	1966-84
Namibia	1	-	-	-	1967		-	-	-	- -
South africa	-	13	1	2	1964-89	14	21	-	-	1904-86
Swaziland	2	2	1	-	1966-87	6	3	-	-	1966-85
Subtotal	6	20	4	2	-	36	32	0	0	-
West Africa:										
Benin	-	3	4	2	1964-82	4	-	-	-	1961-82
Burkina Faso	2	2	1	2	1965-87	6	1	-	-	1960-85
Cape verde	-	2	1	-	1951-87	-	-	-	-	-
Cote D'Ivoire	3	3	2	2	1947-84	12	-	-	-	1955-68
Gambia	-	1	-	-	1964-68	2	2	1	-	1963-80
Ghana	-	3	1	-	1955-88	6	3	1	-	1948-84
Guinea Bissau	-	-	1	-	1980-84	-	-	-	-	-
Liberia	2	1	1	-	1967-87	5	2	-	-	1962-84
Mali	1	1	1	1	1965-88	6	-	-	-	1956-87
Mauritania	1	1	1	1	1963-88	2	-	-	-	1965-77
Niger	1	1	1	1	1963-87	3	-	-	-	1977
Nigeria	1	3	2	-	1971-84	1	-	-	-	1963
Senegal	2	1	-	2	1957-87	3	-	-	-	1955-76
Siera Leone	1	1	-	-	1969-79	1	-	-	-	1985
Togo	-	2	2	1	1959-86	3	-	-	-	1958-70
Subtotal	14	25	18	12	-	54	8	2	0	-
Sub-Saharan Africa	49	99	54	39	-	267	104	6	3	-
United Nation	-	3	-	1	1948-89	152	4	2	-	1945-89
ECA	6	8	-	1	1961-87	24	-	-	-	1950-90

Annex C cont.

Country by geographical area	General					Noneconomic statistics				
	Frequency				Maximum period covered	Frequency				Maximum period covered
	I	A	SA/Q	BM/M		I	A	SA/Q	BM/M	
East Africa:										
Burundi	7	1	1	1	1964-86	-	1	-	-	1975-84
Comoros	-	-	-	-	-		-	-	-	- -
Djibouti	-	3	-	-	1973-85	-	1	-	-	1987
Ethiopia	13	2	2	2	1953-88	1	-	-	-	1961-66
Kenya	35	17	2	2	1945-89	5	1	-	-	1947-79
Madagascar	8	4	-	-	1949-886	-	-	-	-	-
Malawi	12	13	1	1	1962-88	1	1	-	-	1968-85
Mauritius	4	9	2	-	1945-88	-	1	-	-	1976-88
Mozambique	1	6	-	-	1954-73	-	-	-	-	-
Reunion	22	6	1	-	1946-78	2	1	-	-	1967-85
Rwanda	1	-	-	-	1982-83	-	1	-	-	1975-86
Seychelles	6	6	1	-	1964-88	1	1	-	-	1981-86
Somalia	5	5	-	1	1960-86	1	-	-	-	1977-86
Tanzania	24	24	2	-	1950-88	4	-	-	-	1960-86
Uganda	17	13	-	1	1938-74	3	-	-	-	1950-65
Zambia	19	14	6	1	1960-87	3	3	-	-	1945-73
Zimbabwe	23	10	3	3	1957-87	3	2	-	-	1954-80
Subtotal	197	133	21	12	-	24	13	-	0	0 -
Central Africa:										
Angola	2	12	1	5	1960-79	-	-	-	-	-
Cameroon	6	8	4	1	1946-79	-	1	-	-	1959-84
Central Afr. Rep.	4	5	-	-	1960-87	1	1	-	-	1961-73
Chad	7	3	4	3	1960-83	4	-	-	-	1961-88
Congo	5	5	1	-	1962-83	1	2	-	-	1958-85
Gabon	2	-	-	-	1964-66	1	2			1960-82
Sao Tome &Principle	1	1	-	-	1961-78	-	-	-	-	
Zaire	6	4	4	3	1962-89	-	-	-	-	-
Subtotal	33	38	14	12	-	7	6	0	0	-
Southern Africa:										
Botswana	7	4	-	-	1966-87	1	1	-	-	1964-85
Lesotho	7	6	-	1	1960-83	-	1	-	-	1964-75
Namibia	-	-	-	-	-	-	-	-	-	-
South Africa	36	36	3	3	1946-89	5	-	-	-	1911-80
Swaziland	5	13	3	-	1967-88	1	1	-	-	1965-84
Subtotal	55	59	6	4	-	7	3	0	0	-
West Africa:										
Benin	6	2	-	2	1961-86	1	1	-	-	1959-86
Burkina Faso	4	3	-	-	1957-88	4	1	-	-	1959-86
Cape Verde	1	1	-	-	1967-88	-	-	-	-	-
Côte D'Ivoire	10	4	1	-	1956-88	2	1	-	-	1958-80
Gambia	5	4	-	3	1956-84	1	-	-	-	1981
Ghana	9	12	3	4	1935-85	2	-	-	-	1968
Guinea Bissau	-	-	-	-	1980-84	-	-	-	-	-
Liberia	8	5	2	-	1963-87	2	-	-	-	1964-73
Mali	4	5	1	1	1960-88	-	2	-	-	1964-86
Mauritania	-	1	1	-	1965-87	2	1	-	-	1964-86
Niger	1	10	-	-	1961-84	-	1	-	-	1978-83
Nigeria	7	8	2	3	1960-88	1	1	-	-	1970-81
Senegal	3	4	5	-	1962-88	1	1	-	-	1959-85
Sierra Leone	2	4	3	1	1959-88	-	1	-	-	1964-76
Togo	10	1	-	-	1960-84	-	1	-	-	1965-79
Subtotal	70	64	18	14	-		16	11	0	0 -
Sub-Saharan Africa	355	294	59	42	-	54	33	0	0	-
United Nations	60	10	-	-	1938-87	18	1	-	-	1938-85
ECA	13	1	1	-	1950-74	1	-	-	-	-

Source: Compiled from IDE (1990).
I = irregular M = monthly
A = annual SA = semi-annual (but merged with quarterly)
Q = quarterly BM = bimonthly (but merged with monthly)

Annex D: National accounts statistics of sub-Saharan African countries, 1991

Country	Summary information (12)			Final expenditure (17)			Production by kind of activity (13)		
	Number	No. up-to-date	Aver. lag	Number	No. up-to-date	Aver. lag	Number	No. up-to-date	Aver. lag
East Africa:									
Burundi	6(50.0)	1(8.3)	1.7				2(15.4)	0	3.0
Comoros									
Djibouti	6(50.0)	0	9.5						
Ethiopia	3925.0)	1(8.3)	1.3)						
Kenya	7(58.3)	7(58.3)	0.0	3(17.6)	3(17.6)	0.0	1(7.7)	1(7.7)	0.0
Madagascar	5(41.7)	1(8.3)	5.8						
Malawi	7(58.3)	0	1.6	1(5.9)	0	5.0			
Mauritius	10(83.3)	7(58.3)	0.3	6(35.3)	6(35.3)	0.0	2(15.4)	0	1.0
Mozambique	4(33.3)	1(8.3)	3.0						
Reunion	8(66.7)	0	3.0						
Rwanda	7(58.3)	1(8.3)	1.7				2(15.4)	0	2.0
Seychelles	7(58.3)	0	1.0	1(5.9)	0	1.0	3(23.1)	0	1.0
Somalia	6(50.0)	0	6.0	1(5.0)	0	10.0			
Tanzania	7(58.3)	7(58.3)	0.0	2(11.8)	2(11.8)	0.0			
Uganda	3(25.0)	0	3.7						
Zambia	7(58.3)	3(25.0)	1.1	1(5.9)	0	5.0	2(15.4)	0	3.5
Zimbabwe	9(75.0)	2(16.7)	2.6	8(47.1)	0	3.1	2(15.4)	0	3.0
Central Africa									
Angola	2(16.7)	0	6.0						
Cameroon	12(100)	0	4.9	3(17.6)	0	6.0	2(15.4)	0	7.0
Central Africa Rep.	3(25.0)	0	4.0						
Chad	2(16.7)	1(8.3)	1.0						
Congo	10(83.3)	0	2.5						
Equitorial Guinea	4(33.3)	2(16.7)	1.0				1(7.7)	1(7.7)	0.0
Gabon	4(33.3)	0	2.0						
Sao Tome & Princ.	2(16.7)	0	3.0						
Zaire	2(16.7)	0	4.0						
South Africa									
Botswana	11(91.7)	0	5.0	2(11.8)	0	5.0	3(23.1)	0	5.0
Lesotho	9(75.0)	1(8.3)	1.7	3(17.6)	0	3.3	1(7.7)	0	8.0
Namibia									
South Africa	10(83.3)	10(83.3)	0.0	7(41.2)	7(41.2)	0.0			
Swaziland	7(58.3)	0	3.1				2(15.4)	0	4.0
West Africa									
Benin	6(50.0)	0	2.0						
Burkina Faso	8(66.7)	0	6.3	3(17.6)	0	6.7	2(15.4)	0	7.0
Cape Verde	6(50.0)	0	3.0	3(17.6)	0	3.0	2(15.4)	0	5.0
Côte D'Ivoire	5(41.7)	0	7.8						
Gambia	5(41.7)	0	1.0	1(5.9)	0	1.0	2(15.4)	0	4.0
Ghana	7(58.3)	0	3.9	1(5.9)	0	5.0	2(15.4)	0	5.4
Guinea	-	-	-	-	-	-	-	-	-
Guinea Bissau	10(83)	4(33.3)	2.4	2(11.8)	0	4.0			
Liberia	5(41.7)	0	2.0						
Mali	8(66.7)	6(50.0)	2.3						
Mauritania	5(41.7)	0	2.2	1(5.9)	0	2.0			
Niger	5(41.7)	0	4.6						
Nigeria	7(58.3)	7(58.3)	0.0				2(15.4)	2(15.4)	0.0
Senegal	7(58.3)	0	3.7						
Sierra Leone	8(66.7)	0	1.0	4(23.5)	0	3.5	2(15.4)	0	2.5

Annex D Continued...

Togo	6(50.0)	0	7.8						
Some non-African countries									
Malaysia	7(58.3)	6(50.0)	1.1	4(23.5)	3(17.6)	2.0	1(7.7)	0	8.0
India	10(83.3)	9(75)	0.1	11(64.7)	8(47.1)	0.4	2(15.4)	2(15.4)	0.0
Brazil	7(58.3)	0	2.0						
Chile	7(58.3)	2(16.7)	2.1				3(23.1)	0	6.7
Netherlands	12(100)	12(100)	0.0	9(52.9)	7(41.2)	0.4	3(23.1)	3(23.1)	0.0
Canada	11(91.7)	10(83.3)	0.2	6(35.3)	6(35.3)	0.0	3(23.1)	1(17.7)	1.3

Source: Compiled from UN (1993b).

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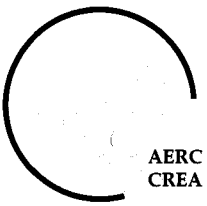

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ISBN 9966-900-82-9