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A DRAFT SYSTEM OF QUANTITY AND PRICE INDEX NUMBERS

Report of the Secretary-General

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I. INTRODUCTION

1. The work programme adopted by the Fifteenth Session of the Statistical Commission included the development of draft guidelines in respect of an integrated system of price and quantity statistics which fits into the framework of the national accounts and balances. This paper and document E/CN.3/402 set out the results of the work that has since been carried out in this subject. This document deals with the framework of a draft integrated system of price and quantity statistics and the concepts, definition and classification of the series of index numbers which it might include. Document E/CN.3/402 concerns the concepts, definitions and techniques of collection and use of the basic price and quantity data required for purposes of compiling the index numbers and other series of the draft system.

2. The work on developing draft guidelines in respect of an integrated system of price and quantity statistics which has been carried out since the Fifteenth Session of the Commission included a meeting of the Working Group on Statistics and Indices of Prices and Quantities, the Conference of European Statisticians, to discuss this question.^{1/} The conclusions reached by the Working Group have been taken into account in preparing this paper. Meetings on the subject are to be held in Africa and Latin America during the last quarter of 1969 and in Asia during 1970. The reports of the meetings held in 1969 will be available to the Sixteenth Session of the Statistical Commission.

3. The work of an integrated system of price and quantity statistics has not reached the stage where the draft guidelines set out in this paper, coupled with document E/CN.3/402 are complete in all respects. For example the definition of and the description of the computational relationship between certain series of index numbers included in the system should be elaborated; guidance should be provided in respect of the order of the priority in which the series of index numbers might be developed; the discussion of index number formulae, weighting and computation may need to be extended; and the problems of gathering and compiling

^{1/} See 'System of Quantity and Price Index Numbers, Conf. Eur. Stats/WG.31/2, and Report of the Session held in Geneva on 16-20 December 1968. Working Group on Statistics and Indices of Prices and Quantities. Conf. Eur. Stats/WG.31/4.

price and quantity statistics in respect of given kinds of economic activity should be dealt with more extensively. Further research and study will therefore be required in order to draft a complete set of guidelines. It is also necessary to have another round of consultations with national statistical authorities on the draft guidelines which emerge from the discussions of the forthcoming regional meetings and the Sixteenth Session of the Statistical Commission and the further research and study. The Commission, in considering this paper and document E/CN.3/402 may wish to indicate the aspects of the draft guidelines in respect of the integrated system which require extension, elaboration or modification and the lines along which the further work on the draft guidelines should proceed.

4. The draft integrated system of price and quantity statistics set out in this paper includes annual, quarterly and monthly series of index numbers in respect of the production and import of goods and services and their use in intermediate and final consumption, gross capital formation and exports. Covered are the traditional index numbers of producers' and consumers' prices, industrial and agricultural production, etc., as well as series compiled as part of national accounting in constant prices. The scope of the integrated system is discussed first in this paper. Dealt with next is the national accounting framework in which the index numbers are set. The composition and classification of the annual, monthly and quarterly series are then discussed in the light of the requirements for data, the framework, and the possibilities of compilation. The bases of valuation, the weighting, the base period and formulae to be used in the series of index numbers are then discussed in turn.

II. THE SCOPE OF THE INDEX NUMBERS

A. The type of flows to be covered

5. The index numbers of quantities and prices included in the system at this juncture relate to flows of goods and services. These flows may be partitioned into components of quantity and price in terms of units of measurement of each goods or service itself. The value of the transactions in goods and services

appear in the production and expenditure accounts of the national accounts and balances, and relate to gross output, intermediate and final consumption, gross fixed capital formation, increase in stocks, and imports and exports of goods and services.

6. Index numbers of quantity and price of the production, import and use of goods and services are required in dealing with questions of economic growth and fluctuations, inflationary and deflationary pressures, cost-price relationships, competitiveness and economic welfare. They are therefore commonly compiled as independent series as well as forming an integrated part of the national accounts. Both the requirements for national accounts compilations in constant prices and the needs for price and quantity statistics of the traditional type should, as far as possible, be accommodated in the system. Fitting the series of national accounting in constant prices and the traditional index numbers of quantity and price into a single coherent, articulated framework will enhance the analytical usefulness and reliability of these series of data.

7. While the value of labour and capital employed in production may also be partitioned into quantities and prices in terms of their own units of measurement, these series are not, at this time dealt with in the integrated system of index numbers. Study of, and experimentation with these measures are required before indexes in respect of the quantity and price of the primary inputs into production may be included in the system. Considerable experience has been accumulated in evaluating wages and salaries in terms of employment and wage and salary rates but not in expressing the share of capital in value added in terms of the quantity of capital employed and a rate of return to capital. Integrating these series into the system will facilitate their use for such purposes as measuring productivity, studying cost-price relationships, fitting production functions and measuring terms of trade.

8. Income flows such as interest, dividends, social security benefits, saving, are not covered in the system of index numbers. These flows cannot be decomposed into quantities and prices in terms of their own units of measurement. While

they can be expressed in terms of their purchasing power over given baskets of goods and services, the composition of the baskets should vary from one analytical use to another. Moreover, except for series in respect of the purchasing power of wages and salaries and national income and in respect of terms of external trade, such measures are not the subject of wide interest.

B. Frequency of compilation

9. For purposes of assessing current economic conditions, the quantity and price indexes relating to flows of goods and services are wanted more frequently than annually. In practice it will generally not be feasible to gather enough basic data for the compilation of monthly or quarterly quantity indexes in as great detail, or as rigorously, as annual indexes. A number of countries do, however, estimate domestic product and expenditure in some detail on a quarterly basis. In the case of price index numbers, most basic price series will necessarily be gathered on a monthly, or even more frequent, basis, but considerably more data will be available for weighting purposes annually than monthly or quarterly. It will therefore be advantageous to make use of the more comprehensive and reliable annual series of both quantity and price index numbers in improving the more current series. This could be done by compiling the monthly and quarterly series so that they extrapolate the latest annual index numbers.

10. Much more complete data may sometimes be available for purposes of compiling quantity and price index numbers at three or five year intervals or less frequently, than annually. For example, detailed and comprehensive enquiries into the production and distribution of goods and services may not be taken as frequently as annually. In these circumstances, use should be made of the detailed enquiries in order to compile benchmark series of indexes, preferably in the framework of input-output tables. The years for which the most complete data are available would serve as the weight and comparison basis for purposes of the annual series.

III. THE NATIONAL ACCOUNTING FRAMEWORK

11. The national accounting framework which it is suggested be used for purposes of the integrated system of index numbers of quantity and price is set out in matrix form in table 1. While table 1 consists of the production and expenditure accounts of the extended matrix of the revised SNA, a similar matrix may be constructed for the MPS. The scope of industries and commodities would be restricted to material production; and government bodies and the equivalent of private non-profit services would be treated as final consumers, not intermediate consumers, of commodities. There are other less essential differences between the two national accounting frameworks, but the types of classifications used in respect of transactors as well as transactions would be similar. Except for the differences in the treatment of government bodies and private non-profit services which have been noted above, the routing of transactions would also be similar.

A. Units of observation and classification

12. It may be noted from table 1 that two basic units of observation and classification are used in the production and expenditure accounts, namely, commodities and activities (establishments). The composition of the gross output of various industries and of imports are exhibited in the form of commodities and it is the commodities which are disposed of to the various types of intermediate and final use. On the other hand, establishments classified according to kind of activity are used in measuring the output, cost structure and capital formation of producers. A third set of classifications used in the accounts under discussion is the purpose or object of outlays on final consumption.

13. Each unit of observation and classification thus conforms to the manner in which the transactions to which it relates are organized and carried on. Further, the differing units of observation and classification used in table 1 correspond to the various analytical requirements for which series of quantity and price indexes are wanted. For example, attention is centered on the quantities and prices of commodities when assessing market conditions and

(Continued on page 12)

Annex to table 1

The entries in table 1 in terms of sub-matrices can be summarized as follows.

- T_{3.5} The intermediate consumption of commodities classified according to type, reckoned at basic values, by industries classified according to kind of economic activity. Trade and transport margins make up a separate category of commodities.
- T_{3.6} The intermediate consumption of commodities classified according to type, reckoned at basic values, by producers of government services classified according to kind of economic activity.
- T_{3.7} The intermediate consumption of commodities classified according to type, reckoned at basic values, of the producers of private non-profit services classified according to kind of economic activity.
- T_{3.8} Commodities classified according to type, reckoned at basic values, entering into household consumption expenditure in the domestic market classified according to object.
- T_{3.15} Additions to the stocks of commodities classified according to type, reckoned at basic values, held by industries classified according to kind of economic activity.
- T_{3.16} Additions to the stocks of commodities classified according to type, reckoned at basic values, held by the producers of government services classified according to kind of economic activity.
- T_{3.17} Commodities classified according to type, reckoned at basic values, entering into the gross fixed capital formation of industries classified according to kind of economic activity.
- T_{3.18} Commodities classified according to type, reckoned at basic values, entering into the gross fixed capital formation of the producers of government services classified according to kind of economic activity.
- T_{3.19} Commodities classified according to type, reckoned at basic values, entering into the gross fixed capital formation of the producers of private non-profit services to households classified according to kind of economic activity.

Annex to table 1 (continued)

T3.24	Exports of commodities reckoned at basic values.
T4.5 through T4.25	Commodity taxes, net, classified according to type of commodity on the commodities disposed of to the uses indicated by the columns.
T5.3	Commodity outputs classified according to type, reckoned at basic values, of industries classified according to kind of economic activity.
T5.4	Commodity taxes, net, classified according to type of commodity, on the outputs of industries classified according to kind of economic activity.
T6.3	Commodity outputs classified according to type, reckoned at basic values, of the producers of government services classified according to kind of economic activity.
T6.8	Government services entering into household consumption expenditure in the domestic market.
T6.9	Services produced for own use by government services classified according to kind of economic activity and purpose.
T7.3	Commodity outputs classified according to type, reckoned at basic values, of producers of private non-profit services to households classified according to kind of economic activity.
T7.8	Domestic services and private non-profit services classified according to kind of economic activity entering into household consumption expenditure in the domestic market.
T7.10	Services produced for own use by private non-profit services classified according to kind of economic activity and purpose.
T8.14	Final consumption expenditure on goods and services in the domestic market by resident households classified according to object.
T8.24	Final consumption expenditure on goods and services in the domestic market by non-resident households classified according to object.
T9.14	Final consumption expenditure by general government classified according to purpose.
T10.14	Final consumption expenditure by private non-profit institutions classified according to purpose.

Annex to table 1 (continued)

- T_{11.3} Protective import duties.
- T_{11.4} Other import duties.
- T_{11.5} Values added, that is compensations of employees, operating surpluses, provisions for the consumption of fixed capital and indirect taxes, net, of industries, classified according to kind of economic activity.
- T_{11.6} Values added of the producers of government services classified according to kind of economic activity.
- T_{11.7} Values added of domestic services and the producers of private non-profit services to households classified according to kind of economic activity.
- T_{24.3} Imports of commodities reckoned at c.i.f. values.
- T_{24.6} Direct expenditure abroad on goods and services by the producers of government services classified according to kind of economic activity.
- T_{24.8} Final consumption expenditure abroad by resident households.

competitiveness, studying sources of demand and supply for goods and services, or balancing demand against supply. In analysing the conditions and efficiency of production and the well-being of producers, however, establishments classified according to kind of economic activity are of interest. And, in examining the changes in the level and composition of household consumption and the activities of government, the primary interest is in quantity and price series on consumption expenditures classified according to the object or purpose of these outlays.

14. The use of commodities as a unit of observation and classification is also fundamental to the compilation of quantity and price index numbers since elementary series (units of measurement) for this purpose must be expressed in terms of individual commodities, or varieties of commodities. For example, the cross-classifications of the gross output of commodities by type of commodity and kind of activity furnish the basis for building up quantity and price series in respect of the output of industries. This cross-classification also furnishes the basis for classifying commodities according to the industry in which they are characteristically produced. A classification of commodities of this type can be of considerable assistance in passing from indicators in terms of commodities to indexes in terms of industries. Similarly, the cross-classifications of the various forms of final expenditure according to object or purpose and type of commodity are basic to compiling series of index numbers concerning these outlays.

B. Valuation and other characteristics

15. Table 1 calls for the valuation of the supplies and dispositions of commodities at approximate basic values, i.e., the value on the market of commodities at the establishment of their producers exclusive of net commodity taxes levied at that point. The producers' values of the gross output of commodities are divided into approximate basic values and net commodity taxes. The purchasers' values of intermediate and final expenditure on commodities, i.e. the market value at which these outlays are made, are divided into approximate basic values, trade and transport margins and net commodity taxes. Net

commodity taxes in respect of a given commodity are equivalent to the indirect taxes reduced by subsidies levied on the commodity, each of which vary with the quantity and value of the commodity and the source of disposition of the commodity.

16. Valuation at approximate basic values is emphasized in the production and expenditure accounts of the revised SNA in order to value commodities as uniformly as is possible for such purposes as input-output analysis in constant, as well as current, prices. Uniform valuation of commodities is also of assistance when using the commodity-flow approach in compiling quantity and price indexes, because the series in respect of the supply - the gross outputs and imports - of each type of commodity can be valued independently irrespective of the various forms of disposition. The data in respect of the various dispositions of the given types of commodities can then be compiled by adding the appropriate series on net commodity taxes and trade and transport margins.

17. Uniform valuation of commodities also facilitates checking the consistency of quantity and price series in respect of the supply and use of categories of commodities when these series are compiled independently rather than through the commodity-flow approach. It is evident from table 1 that the total values in current prices of the supply and dispositions of each category of commodities must be identical if valued in the same manner. It may be shown that this is also the case for values in constant prices, provided the total supplies and dispositions of commodities are valued identically and are compiled on the same weight base and formula.^{2/} If series of price and quantity index numbers are compiled so that the product of the two in respect of each group of commodities is equal to the corresponding index numbers of value, the price index numbers of the total supply and the disposition of these commodities will also be equivalent.

C. The basic input-output tables and the integrated system of index numbers

18. Two tables of basic input-output data, which focus on commodities and

^{2/} See "The identity: Total final expenditure equals total value added", paras. 4.107 - 4.111, A System of National Accounts, United Nations, New York, 1968.

and industries respectively, can be derived from the matrix of table 1. One table consists of the entries in rows and columns 3 and 4 and portrays the sources of supply and disposition of various types of commodities. The other table consists of the entries in row and column 5 and portrays the gross outputs and inputs of industries. Tables 2 and 3 and 11 and 12 of the revised SMA are versions of these tables in current and constant prices respectively, abbreviated to omit such cross-classifications as category of commodity and object of household expenditure or category of commodity and kind of activity of industries making fixed capital outlays.^{3/}

19. These tables are of interest here not only because tables 11 and 12 call for comprehensive and co-ordinated series of constant-price data, but also because the tables detail the valuable framework which national accounting furnishes for purposes of devising and compiling an integrated system of quantity and price index numbers. The national accounts framework makes possible the systematic coordination and interrelation of classifications, definitions and weighting of the index numbers so that the series can be used jointly, compared and cross-checked. The framework also delineates the building blocks which might be used in compiling the various series of index numbers and how series classified in one fashion might be converted to series classified in another fashion. Moreover, the classifications and definitions of the national accounts reflect the analytical uses to which the index numbers are put and a number of the practical problems of compiling them.

20. There are therefore advantages to fitting into this framework the monthly or quarterly index numbers of quantities and prices which are frequently compiled independently of the national accounts though, as will be indicated later, it will be necessary to abbreviate or omit certain classifications of the framework, to use simpler forms of valuation and to reduce the burden of collection and compilation in other ways. It will also be necessary to supplement the series of the framework in certain respects.

^{3/} See annex 8.3, A System of National Accounts, United Nations, New York, 1968.

21. A number of countries may find it feasible to follow or complete the input-output framework once every five years or so only. They may therefore need to simplify it for purposes of the annual data as well as the more frequent series.

22. Coordinating the monthly, quarterly, annual and less frequent series in the fashion outlined above will make it possible to base the more current series on the more complete, less frequent data, in addition to making conjunct analytical use of these data. More complete, less frequent data in current values, as well as in constant prices, may be used for these purposes, for example, in weighting current series of indicators.

23. In the case of series of price index numbers it will be necessary to supplement the data which best fits into the national accounting framework. For purposes of the integrated system of price index numbers, price series are needed in respect of sales and purchases which take place during a given period, but for other forms of analyses of market conditions, especially in the case of heavy capital goods, price series are required concerning contracts made during a given period. Also, Laspeyres price index numbers are wanted for a number of purposes though Paasche price index numbers best fit into the national accounting framework.

IV. THE CONTENT OF THE SYSTEM

A. General features

24. As was said earlier in this paper, it is necessary to reduce the detail of classification and to simplify other aspects of the national accounting framework in order to devise an integrated system of index numbers of quantity and price which is feasible to compile. Table 2 sets out the system of annual and more frequent index numbers which emerges from reducing the detailed production and expenditure accounts of table 1 to what is thought to represent a desirable and feasible set of goals for compiling price and quantity series. In addition to the series outlined in table 2, the proposed system includes the compilation, at least at five-year intervals and more often if feasible, of tables 11 and 12

Table 2. Suggested series of quantity and price index numbers

Description of series	Frequency		
	Monthly	Quarterly	Annually
I. Supply and disposition of commodities classified according to kind of activity where characteristically produced and type of commodity			
<u>Supply</u>			
A. Domestic gross output and total supply of commodities			
1. Goods - Quantity and price (producers' values) <u>1</u> / indexes in respect of characteristic products of goods producing industries	X		X
2. Distribution and transport services			
(a) Wholesale and retail trade			
(i) Price (purchasers' values) <u>1</u> / and quantity indexes of sales classified by type of commodity			
(1) Wholesale trade	X		X
(2) Retail trade	X		X
(ii) Price (producers' values) <u>1</u> / and quantity indexes of gross margins classified by type of commodity and disposition			X
(b) Restaurants and hotels			
(i) Price (purchasers' values) <u>1</u> / indexes	X		X
(ii) Quantity indexes		X	X
(c) Transport, storage and communication - Quantity and price (purchasers' values) <u>1</u> / indexes			
(i) Goods transport		X	X
(ii) Passenger transport		X	X
(iii) Storage and communications		X	X
3. Other services of industries			
(a) Financial, insurance, real estate and business services - Quantity and price (purchasers' values) <u>1</u> / indexes			X
(b) Medical, dental and other health services			
(i) Price (purchasers' values) <u>1</u> / indexes	X		X
(ii) Quantity indexes		X	X

Table 2 (continued) Suggested series of quantity and price index numbers

Description of series	Frequency		
	Monthly	Quarterly	Annually
(c) Recreational services			
(i) Price (purchasers' values) <u>1</u> / indexes	X		X
(ii) Quantity indexes		X	X
(d) Personal and household services			
(i) Price (purchasers' values) <u>1</u> / indexes	X		X
(ii) Quantity indexes		X	X
B. Imports of commodities			
1. Quantity and price (c.i.f. plus import duties) indexes			X
2. Quantity and price (c.i.f.) indexes		X	X
<u>Disposition</u>			
C. Intermediate consumption of commodities by industries			
1. Goods			
(a) Price (producers' values and quantity indexes, reflecting customary use to which various types of commodities are put	X		
(b) Price (producers' and purchasers' values) and quantity indexes reflecting actual disposition of commodities			X
2. Services - Quantity and price (purchasers' values) <u>1</u> / indexes			X
D. Consumption of commodities by government services and private non-profit services to households - Quantity and price (producers' and purchasers' values) <u>1</u> / <u>2</u> / indexes		X	X
E. Final consumption of commodities by households, divided into durable, semi-durable and non-durable goods and services			
1. Price (producers' and purchasers' values) and quantity indexes, reflecting customary use to which various types of commodities are put	X		
2. Price (producers' and purchasers' values) and quantity indexes, reflecting actual disposition of commodities			X

Table 2 (continued) Suggested series of quantity and price index numbers

Description of series	Frequency		
	Monthly	Quarterly	Annually
F. Gross fixed capital formation classified by type			
1. Price (producers' values) and quantity indexes, reflecting customary use to which various types of commodities are put	X		
2. Price (producers' and purchasers' values) and quantity indexes, reflecting actual disposition of commodities			X
G. Exports of commodities - Quantity and price (producers' and f.o.b. values) indexes	X		X
II. Output, intermediate consumption and gross capital formation by kind of activity			
<u>Industries</u>			
A. Gross output of commodities by kind of activity			
1. Goods producing industries - Quantity and price (producers' values) <u>1</u> / indexes	X		X
2. Distribution and transport			
(a) Wholesale and retail trade - Quantity and price indexes in respect of gross margins (producers' values) <u>1</u> /		X	X
(b) Transport, storage and communication - Quantity and price (producers' values) <u>1</u> / indexes		X	X
3. Other industries			
(a) Financial, insurance, real estate and business services - Quantity and price (purchasers' values) <u>1</u> / indexes		X	X
(b) Medical, dental and other health services - Quantity and price (purchasers' values) <u>1</u> / indexes		X	X
(c) Recreational services - Quantity and price (purchasers' values) <u>1</u> / indexes		X	X
(d) Personal and household services - Quantity and price (purchasers' values) <u>1</u> / indexes		X	X
B. Intermediate consumption of commodities by kind of activity - Quantity and price (purchasers' values) indexes			X

Table 2 (continued) Suggested series of quantity and price index numbers

Description of series	Frequency		
	Monthly	Quarterly	Annually
C. Value added by kind of activity			
1. Goods producing industries			
(a) Quantity indexes (producers' values) <u>1</u> /	X		X
(b) Price (producers' values) <u>1</u> / indexes			X
2. Distribution and transport			
(a) Wholesale and retail trade			
(i) Quantity indexes (producers' values) <u>1</u> /		X	X
(ii) Price (producers' values) <u>1</u> / indexes			X
(b) Transport, storage and communication			
(i) Quantity indexes (producers' values) <u>1</u> /		X	X
(ii) Price (producers' values) <u>1</u> / indexes			X
3. Other industries			
(a) Financial, insurance, real estate and business services - Quantity and price (purchasers' values) <u>1</u> / indexes			X
(b) Medical, dental and other health services			
(i) Quantity indexes (purchasers' values) <u>1</u> /		X	X
(ii) Price (purchasers' values) <u>1</u> / indexes			X
(c) Recreational services			
(i) Quantity indexes (purchasers' values) <u>1</u> /		X	X
(ii) Price (purchasers' values) <u>1</u> / indexes			X
(d) Personal and household services			
(i) Quantity indexes (purchasers' values) <u>1</u> /		X	X
(ii) Price (purchasers' value) <u>1</u> / indexes			X

Table 2 (continued) Suggested series of quantity and price index numbers

Description of series	Frequency		
	Monthly	Quarterly	Annually
D. Gross fixed capital formation by kind of activity			
1. Goods producing industries - Quantity and price (purchasers' values) indexes		X	X
2. Distribution and transport			
(a) Wholesale and retail trade - Quantity and price (purchasers' values) indexes		X	X
(b) Restaurants and hotels - Quantity and price (purchasers' values) indexes		X	X
(c) Transport, storage and communication - Quantity and price (purchasers' values) indexes		X	X
3. Other industries			
(a) Financial, insurance, real estate and business services - Quantity and price (purchasers' values) indexes		X	X
(b) Medical, dental and health services - Quantity and price (purchasers' values) indexes			X
(c) Recreational services - Quantity and price (purchasers' values) indexes			X
(d) Personal and household services - Quantity and price (purchasers' values) indexes			X
<u>Producers of government services and private non-profit services</u>			
E. Gross output of services by kind of activity - Quantity indexes			X
F. Value added - Quantity indexes			X
G. Gross fixed capital formation - Quantity and price (purchasers' values) indexes		X	X

Table 2 (continued) Suggested series of quantity and price index numbers

Description of series	Frequency		
	Monthly	Quarterly	Annually
III. Final consumption of goods and services by object or purpose of expenditure			
A. Household final consumption expenditure by object			
1. Quantity indexes	X		X
2. Price (purchasers' values) indexes	X		X
B. Final consumption expenditure of private non-profit institutions by purpose - Quantity and price (purchasers' values) indexes			X
C. Government final consumption expenditure by purpose - Quantity and price (purchasers' values) indexes			X

1/ Purchasers' values equal producers' values in the case of service industries and retail trade. In the case of the annual series of indicators in the supply of commodities and the output of industries consideration should be given to the use of approximate basic values in addition to the form(s) of valuation indicated in the description of the series.

2/ Purchasers' values only in respect of the quarterly series.

of the new SNA. These tables call for the compilation of the building blocks for the quantity and price series as well as basic indexes in respect of input-output relationships.

25. The suggested series of table 2 are organized according to the three major kinds of classification of the national accounting framework - type of commodity, kind of activity of classes of producer, and object or purpose of the final consumption expenditure of classes of transactor. As in the case of the framework, the series concern (i) the supply and disposition of commodities, (ii) the gross output, input and capital formation of producers, and (iii) the final consumption expenditure of households and government and non-profit bodies.

B. Simplifications in classification

26. In order to limit the basic data required to compile the suggested series, the cross-classifications of the national accounting framework, for example, commodities and kind of activity of producers in respect of gross output, intermediate consumption and gross fixed capital formation; and commodities and object or purpose in respect of the consumption expenditures of households or government bodies - have been eliminated. Nonetheless, elementary series in respect of individual commodities necessarily are the building blocks for compiling the price and quantity series in respect of given industries, objects of household consumption expenditure, etc.. It would be desirable, if feasible, to compile annual series in respect of the gross output and intermediate consumption of industries cross-classified according to kind of activity and type of commodity as in tables 11 and 12 of the new SNA. The feasible detail in classification will also often be greater in the case of the annual series than in the case of the monthly or quarterly series. The detail in classification which might be sought in the annual indexes is illustrated in tables 9 through 16 of the new SNA^{4/}.

^{4/} See annex 8.3, A System of National Accounts, United Nations, New York, 1968.

C. Simplifications in valuation

27. Another major simplification of the national accounting framework in the proposed series is the use of producers' and purchasers' values without separating out approximate basic values in the case of the monthly or quarterly series. Basic values are not called for because price series of sales or purchases are less difficult to gather when valued at producers' or purchasers' values, respectively, than when valued at basic values. In order to arrive at basic values, not only must indirect taxes per unit of measurement levied on commodities be eliminated from the prices, but subsidies per unit of measurement received on commodities must be added to the prices. The use of basic values is especially difficult in the case of the countries with centrally planned economies. Moreover, many forms of current economic analysis do not require data valued at approximate basic values.

28. The analytical values of index numbers of output and input-output data are, however, enhanced by valuation in approximate basic values. Valuing these series at approximate basic values avoids at least part of the overstatement, or understatement, in producers' values of the contribution to the quantities of production made by kind of activities, or commodities, which bear relatively heavy, or light, net indirect taxes. Approximate basic values should therefore be used in the case of input-output tables of the system and at least in the case of annual series on output as well. This would involve dividing the current values used as weights, or in deflation, and the corresponding price series, into approximate basic values and net commodity taxes. Data on the rate of selected indirect taxes and subsidies per unit of commodity might be used for this purpose.

29. It may also be necessary to modify the manner in which trade and transport margins are dealt with in the national accounting framework in order to make it feasible to compile the annual and more frequent data on the supply and disposition of commodities rapidly. The question is discussed below.

D. Frequency of compilation and nature of the various series

30. The annual series suggested in table 2 cover all flows in respect of goods and services included in the constant-price tables of the revised SNA^{5/}. The monthly and quarterly series are limited to urgently needed data for purposes of assessing current economic conditions which it is thought could be gathered and compiled rapidly. It will be necessary to use fewer series of indicators and more approximate methods of compilation in the case of monthly and quarterly index numbers than in the case of the annual index numbers. In general, the monthly and quarterly series should extrapolate the latest, complete annual series that is available. This approach would increase the reliability of the monthly and quarterly series and ensure that these data and the correlative annual series are comparable enough to be used in combination.

1. Annual series

31. The annual index numbers in respect of the gross output of commodities and industries and the value added of industries are to be valued at producers' values and approximate basic values, while the annual series in respect of the various dispositions of commodities are, ideally, to be valued at both producers' and purchaser values. Producers' values, as used in the latter case, include import values, c.i.f. plus import duties. The differences in price and quantity between the producers' and purchasers' values in the case of each type of commodity and each form of disposition are of course the price and quantity components of the distributive-trade and transport margins in respect of the category of commodities and the form of disposition. This ideal approach allows for the cross-classification of price and quantity series in respect of distributive-trade and transport margins according to type of commodity and form of disposition.

32. However, in the case of the domestic uses of commodities, it may be impracticable to match producers' and purchasers' prices precisely enough to compile these series. Where producers' prices differ from one disposition to another, the matching would require the collection of series of prices at the

^{5/} Tables 9 through 16, except 10, annex 8.3, A System of National Accounts, United Nations, New York, 1968.

establishments of producers and/or concerning imports in respect of each type of disposition. While national experience indicates that it is feasible to differentiate between exports and domestic uses in gathering price series, it is questionable whether it is practicable to distinguish between various domestic uses in gathering these series. In the case of large countries, if producers and importers, on the one hand, and purchasers, on the other, are found in many locations and prices vary with location, matching producers' and purchasers' prices would also raise the difficulties of defining the marketing areas of the clusters of producers and importers. It may therefore be necessary, in general, to restrict valuation in the case of the series on the various domestic dispositions of the supply of categories of commodities to purchasers' values. It may however be feasible to value the total supply of each category of commodities in producers' and purchasers' prices and to compile price and quantity series in respect of the distributive-trade and transport margins involved. As will be indicated later in this paper, however, it is also frequently difficult to ascertain whether an increase in the gap between the producers' price and purchasers' price of a commodity is due to an increase in the price, or in the quantity, of the distributive-trade and transport services.

33. While series in respect of producers' and import prices and quantities should be gathered directly from producers and importers, series of purchasers' prices and quantities would not necessarily be gathered directly from purchasers. Retail trade outlets and service establishments are usually suitable for purposes of gathering price and quantity series in respect of household consumption; and exporters and external trade data are the appropriate source of export prices and quantities. Industries and government bodies who use large quantities of given intermediate materials should be suitable sources of purchasers' prices in respect of these commodities, but their purchases of certain intermediate materials and of fixed assets will often be too intermittent for them to be useful respondents in respect of prices. A number of purchasers' prices on intermediate materials and fixed assets will therefore need to be gathered from wholesalers, or it may be necessary to estimate these

purchasers' prices from producers' prices plus distributive-trade and transport mark-ups. Wholesale and retail trade outlets are considered important sources of information on purchasers' prices and quantities of goods disposed of to households and small-scale producers, in addition to furnishing data on distribution margins. Purchasers are however appropriate sources of data on quantities or values in respect of fixed capital formation, intermediate consumption and stocks of large-scale producers.

2. Monthly and quarterly series

34. The suggested monthly series mainly concern the production, import and export of goods. Monthly series are more urgently needed and more easily gathered in respect of goods than in respect of services. Demand and production are more unstable and strategic for economic conditions in the case of goods than in the case of services; and prices and quantities are more easily measured and ascertained in the case of goods than in the case of services.

35. Nonetheless it is proposed that monthly series of prices be compiled in respect of both the goods and services which enter into household consumption. These series are needed in order to compile monthly indexes of prices paid by households. It appears feasible to compile monthly series in respect of quantities, as well as prices, of the household consumption of goods on the basis of data obtained from retail trade outlets.

36. The monthly series suggested in respect of production are price and quantity indexes of the gross output of the various types of goods and goods producing industries and quantity indexes of the value added of the various industries.

37. The monthly price and quantity indexes of imports, the domestic production and total supply of goods should be classified by type of commodity. In addition, the total supply of categories of goods should be classified according to the customary end-use to which the goods are put. The customary end-use might be intermediate consumption, household final consumption or gross fixed capital formation, at home as well as abroad. Alternatively, actual exports might be included among the end-uses and the difference between total supply and exports of each category of goods would be distributed among the customary

domestic end-uses. In either approach, when a category of goods is usually put to more than one end-use, it will be useful to define the customary pattern in terms of the last year for which complete data are available. It is not suggested that complete data on the actual disposition of the supply of commodities be compiled more frequently than annually primarily because of the difficulties and burden of gathering detailed series on intermediate consumption and stocks and matching series on the supply and disposition of commodities.

38. Because of the problems of gathering the required indicators, some of the series listed in table 2 are recommended to be compiled each quarter only though they are urgently needed in assessing short-term economic conditions. This is so, for example, in the case of the quantity and price indexes of the gross fixed capital formation of industries, government and private non-profit services. Where the gross fixed capital formation is not likely to be great and variable, annual data only are called for, in view of the difficulties in gathering and compiling the series.

39. The other quarterly series listed in table 2 concern quantity index numbers of the gross output and value added of service industries and the value added of government and non-profit services. The short-term fluctuations in these activities are unlikely to be substantial and the required indicators are difficult to gather. It is also suggested that quarterly index numbers be compiled in respect of the final consumption expenditure of government and non-profit services.

V. SCHEMES OF CLASSIFICATION

40. The established international schemes of classification should be used in the classifications of the index numbers of the system in respect of the kind of economic activity and the object or purpose of outlays on final consumption. These schemes of classification are the International Standard Industrial Classification (ISIC) and the classifications of household goods and services,

government purposes and private non-profit purposes of the new SNA.^{6/} A suitable international classification of commodities is not available at this juncture.

41. The broader levels of the commodity classification should be defined in terms of the kind of activity where the commodities are characteristically produced. This will link the two main classifications of the system and facilitate the transformation of data classified according to type of commodity into data classified according to kind of activity and the reverse. The commodity classification should have two levels of classification beyond the detailed categories of the kind of activities where specified commodities are characteristically produced. Not infrequently, establishments classified to an ISIC group, the most detailed category of the ISIC classification will produce a range of characteristic commodities which in terms of process of fabrication, physical composition, use etc. may be grouped into distinct, markedly differing categories, the members of which also differ, but to a lesser extent. Criteria for raising the two detailed levels of the commodity classification which should yield a suitable scheme for purposes of the system of price and quantity index numbers are (i) the use to which commodities are put, (ii) the cost-structure, raw materials used, physical composition, process and technology of fabrication and (iii) durability and performance characteristics. The use of these criteria should result in delineating detailed commodity categories, the members of which are relatively homogeneous in respect of the sources and circumstances of demand and supply and in variation in, if not level of, prices.

VI. VALUATION

42. While the use of producers' and purchasers' values in the suggested annual and more frequent series is emphasized on practical grounds, the requirements for other modes of valuation should not be overlooked. Attention has

^{6/} International Standard Industrial Classification of All Economic Activities, Statistical Papers, Series M, No.4, Rev.2. Classification of household goods and services, table 6.1, Classification of the purposes of government, table 5.3, Classification of the purposes of private non-profit bodies serving households, table 5.4; A System of National Accounts, United Nations, New York, 1968.

already been called to the advantages of approximate basic values for purposes of input-output analysis, applying commodity-flow techniques in order to compile consistent quantity indicators of the supply and disposition of goods and services, and portraying the structure of production. It would be desirable to have value added at true, or at least approximate, constant factor values for purposes of measures of productivity. (In the case of true factor values or basic values, the direct and indirect intermediate inputs into production, as well as the output, are valued in factor values or basic values, respectively. In the case of approximate factor values or basic values, the output only is valued in this manner.)

43. Though it may be impracticable to gather price series at approximate basic values, it is feasible to gather current and base-year data on the approximate basic value of the gross output of the individual commodities produced by industries. As was said earlier, these data, coupled with quantity indicators of commodity outputs and data on changes in commodity-type indirect taxes and subsidies per unit of commodity, will furnish the means of compiling quantity and price index numbers of the supply and disposition of the gross output of commodities and the value added of industries which are expressed in approximate basic values. The corresponding net commodity taxes can also be computed. Compilation of value added in true basic values will require the inversion of the input-output tables which give estimates in approximate basic values. The preparation of quantity and price index numbers of the value added of industries which are valued at approximate factor values, is more difficult because certain types of indirect taxes and subsidies will not be linked to the individual commodities produced or purchased. It would be necessary to make assumptions as to the allocation of these taxes and subsidies among commodities. In order to use true factor values it would be necessary to invert input-output tables showing approximate factor values in order to value the direct and indirect intermediate inputs into each industry at factor values.

44. As was indicated earlier, with matched series of producers' and purchasers' prices and data on values or quantities, price and quantity series of distributive-trade and transport margins can be calculated. The integrated system also calls

for the compilation of price and quantity series in respect of the services of the distributive trades and transport, based on quarterly data gathered from these producers. In the case of wholesale and retail trade, the suggested series in respect of gross margins should be compiled as the difference between aggregates of the sales of commodities and purchases of the commodities, in other words, by use of double deflation.

45. It is important to reconcile the figures of the total distributive-trade and transport margins obtained from these two series of data. In gathering series of purchasers' price it is frequently difficult to determine whether two adjacent observations in time, or space, of the price of an item are comparable in respect of the quantity of distributive-trade and transport services. It is often impracticable to include certain aspects of the embodied services of this type in the specification of items to be priced. For example, while the specifications can distinguish between purchases in self-service retail outlets and service retail outlets, it is often impracticable to distinguish between the quality of the service and range of available goods in the case of the latter. Or, unless the item is unusual, it may not be feasible to specify the transport chain through which it passed. In the MPS, such differences are treated as price and not as quality differences, i.e., not as differences in the quantity of embodied production. In the SNA, however, differences in the magnitude or quality of the distributive-trade and transport services embodied in a variety of a commodity are treated as differences in quality, and not as differences in price. This is so because not only are the costs of production greater but the behaviour of buyers clearly indicates that they assign values to this type of differences.

VII. WEIGHTING, BASE PERIOD AND FORMULAE

46. This section of the paper deals with the weighting, base period and formulae to be used in compiling price and quantity index numbers of the flows listed in table 2. The questions of base periods and formulae will be discussed together, since these topics are obviously closely linked, one with the other.

A. Weighting

47. The value aggregates to be used as weights in compiling a given series of index numbers are of course determined by the flow covered by the series. Thus, the weights for price and quantity index numbers of the gross output of commodities, or of industries, valued at producers' values, should be the value of the gross output of these commodities, or of industries, during the base period valued at producers' prices. If quantities and prices are to be used as weights for the price and quantity index numbers of gross output, respectively, again these weights should be components of the gross output during the base period valued at producers' values. And, the index numbers of value added listed in table 2 should be weighted by base-period value added at producers' prices in the national accounting sense, i.e. the value of gross output at producers' prices less the value of all intermediate consumption at purchasers' prices.

48. Some countries compile price index numbers of a more restricted concept of gross output than is used in input-output analysis and national accounting. These systems of price index numbers are usually called "net sector" indexes. Gross output is in these instances limited to the output of establishments principally engaged in a kind of activity which is disposed of outside the given kind of activity. The correlative concept of supply (gross output) of commodities might be the supply of commodities of a given category which is not used in producing other commodities of this category.

49. The "net sector" price indexes avoid the duplication of transactions between establishments defined as belonging to the same kind of activity which occurs in price index numbers of gross output; and are of particular value in assessing the terms of trade of each of the defined kinds of activity with the rest of the economy and in delineating the structure of prices. The "net sector" indexes are more useful analytically than the price indexes of gross output particularly in the case of broad categories of kind of industries or commodities. However, the "net sector" price index numbers vary with the detail of the kind-of-activity classification that is used; are not additive; and are not easily used in conjunction with input-output tables and national

accounting data as they are usually compiled. Further, price index numbers of value added are better measures of the terms of trade between a given kind of activity and the rest of the economy and of the price structure of production.

50. "Net sector" quantity index numbers are often compiled in respect of the part of the gross output of agriculture which gives to non-agricultural units. While these index numbers do not have any strong analytical advantages over index numbers of value added, they may be easier to compile than the value added series. Whether this is so depends on the types of basic data that are available in respect of agricultural production and inputs.

B. Base period and formulae

51. For purposes of comparability, as well as simplification of work, the same weight and comparison base period should be used for all series of index numbers concerning quantities and for all series of index numbers concerning prices. A year would be the best period to use; and it is desirable to use the same year as weight and comparison base. The base year for the annual quantity index numbers used in estimating national accounts at constant prices should be a past year, and the Laspeyres formula should be used in compiling the index numbers. So that the product of the quantity and price index numbers in respect of a given flow will equal the value index number for the flow, the base year for the price index numbers should be the current year; the Paasche formula should be used in compiling these index numbers.

52. While the arrangements outlined above would be suitable for purposes of annual series of index numbers compiled as part of the national accounts, the use of current year weights in monthly and quarterly price index numbers, and even preliminary annual series, is impracticable. Further, for a number of the uses to which series of price index numbers are put, it is desirable to use past-year weights and the Laspeyres formula. The various annual, monthly and quarterly series of price indexes listed in table 2 should therefore be compiled, using a past year as the weight and comparison base and the Laspeyres formula. Publication of current-year weighted index numbers might be restricted to selected annual series published as part of national accounting in constant prices.

53. It will be useful to compile annual quantity index numbers, as well as price index numbers, of the Paasche type. Marked differences between Paasche and Laspeyres index numbers in respect of quantities, as well as prices, would indicate that the weight-base year for the indexes should be altered. The weight and comparison base year for the system of index numbers should be shifted preferably every five years, but at least every ten years. The structure of production and prices of a country is likely to change so rapidly that a shift of the base year every five years is desirable.

54. In shifting the base year of the series of index numbers, it may be desirable to compile index numbers which are cross-weighted in terms of the new and old base year, i.e., which are derived from either the Fisher or the Edgeworth formula, for the old and new base years and the intervening period. With either of these formulae, the two years are used as weight bases for both quantity and price indexes; and the product of these indexes is equal to the corresponding value index. Some countries have found it desirable and practicable to use the last year for which complete data are available as a moving weight base in compiling series of index numbers. In the case of annual index numbers, but not monthly or quarterly indexes, some of these countries use the Fisher formula. While the use of a moving weight base may be burdensome, it is advantageous in keeping the composition of the series of index numbers up to date; and results in series of index numbers which reflect year-to-year changes more accurately than series of fixed-base index numbers. In order to measure long-term changes, the series of annual index numbers would be chained together. When a moving, relatively current weight-base year is used, the same weight base year may be used in the case of the quantity and price index numbers.