

EXTERNAL TRADE INDICES OF NIGERIA*

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INTRODUCTION

In Nigeria, the Federal Office of Statistics (F.O.S.) is charged with the responsibility of compiling and updating much of the basic economic data including statistics of foreign trade. Prior to 1964 the F.O.S. provided foreign trade indicators such as "Unit Value", "Quantum" and "Terms of Trade" indices (see the Appendix for details), but they have been discontinued since then. From the beginning of this decade the need for these foreign trade indices has been seriously felt as Nigeria experienced tremendous growth in her trade with the rest of the world. Therefore, the present exercise is an effort to develop a new series of external trade indices, beginning from 1970.

This paper is divided broadly into four parts. The first part considers the objectives and the uses to which the indices could be put. The second part deals with a description of the methodology spelling out various techniques employed in combating conceptual as well as practical problems ranging from the source and quality of the data, selection of items, weights and formula considered relevant and suitable, down to the calculation procedure. Attention is devoted in the third part to the results that emerge including an assessment of the movements exhibited by the indicators over the reference period. The fourth part treats some problems to be considered in the future compilation of the series and the concluding remarks touch on the need to maintain continuity of the series.

A. OBJECTIVES AND USES

The aim of this statistical exercise is to establish a suitable framework for the calculation on a continuing basis of Import and Export Price and Quantum Indices. Its pre-occupation covers such features as the examination of definitional basis and data assembly problems with a view to seeking practical solutions. The indices constructed on an annual basis cover a period of five years, 1970-74, for which data are presently available.

The primary use of foreign trade indices is to measure the movement over time of prices and volume and thereby make it possible to assess the overall performance of a country's trade relations with the rest of the world. Since value is the product of volume and price, these indices, unfold the changes in total value of imports and exports which could be ascribed to price or volume changes and illustrate the relative changes of export and import prices. An examination of the indices facilitates the analysis of the effects of Terms of Trade. Besides, movements in the relative prices of exports

and imports explain changes in the purchasing power of exports of domestic produce, indicate the extent of price advantage or competitiveness and could be invaluable in the formulation of a dynamic foreign trade policy.

Trade indices can be used to explain the implications of variations in import and export volume and prices for domestic production, income, consumption, investment and general economic well-being. Trend analysis of trade indices could assist monetary authorities in short-term import programming, foreign exchange budgeting as well as long-term balance of payments forecasting.

Finally, apart from the analytical uses enumerated above, external trade indices equally serve an instrumental purpose. The import and export price indices can be used as deflators of either import and export values in foreign trade statistics or in the national accounts.

B. METHODOLOGY

1. Definitions and Concepts

The following definitions and concepts have been used in this study:¹

A commodity or commodity class is defined as an item of the trade classification described under the five or six digit rule of the Nigerian S.I.T.C. adaptation. Thus, commodity 51221- refers to Section 5 (chemicals), group 512 (Organic Chemicals) and the commodity is specifically Methyl Alcohol and Methanol. It is the final division into which a trade section has been broken. Experience has shown that several "commodities" include such a broad variety of product models and brands that they do not refer to any specific class.

Unit value of a commodity in a given period is the value traded in the period divided by the corresponding quantity. It represents, therefore, an average of the prices at which various consignments of the commodity moved during the period. The unit value index is a measure of changes over time in the form of a weighted average of commodity unit value relatives. In this paper, price index, unless otherwise stated, refers to unit value index.

Quantum or volume means value of commodities shipped expressed at the prices of a chosen base period. A quantum or volume index measures changes which would occur over time in values if the prices of the base period remained constant.

Gross (barter) terms of trade is defined as the ratio of the volume index of imports to the export volume index. It

*This statistical exercise was sponsored by the Central Bank of Nigeria and carried out in the Bureau of Statistics, International Monetary Fund, Washington, D.C. from April 1 through August 12, 1976.

¹UNCTAD: "Examination of Recent Developments and Long-Term Trends in World Trade and Developments," Statistical Paper General TD/138/Suppl. March 1972.

measures the real gain from trade, comparing imports actually received with exports actually shipped. Changes in this index show variations in the gains obtained from trade. A rising gross terms of trade indicator shows that more imports are purchased for a given volume of exports.

Net (barter) terms of trade is defined as the price of exports as a percentage of the price of imports. It measures the real cost of imports in terms of exports, and its changes represent the changes in the volume of imports which can be obtained in return for a given volume of exports through price relations only.

Finally, *income terms of trade*, also known as the *purchasing power of exports*, is derived by deflating the index of export values by the import unit value index.

2. Data Base

It is generally agreed that the accuracy and currentness of any statistics depend largely on the primary sources of information. Except for world commodity prices that are available for a number of Nigeria's primary commodities in several international publications, results of records on external trade transactions of the Board of Customs and Excise form the only existing *primary source* of external trade statistics of Nigeria. These documents are processed and published by the Office of Statistics, and the most detailed publication on this is the *Nigerian Trade Summary* which is the basic source of data for this exercise. It is published on a quarterly basis. Monthly data are, however, published for a limited number of commodities in the *Digest of Statistics* and the *Review of External Trade*. If monthly series of commodities selected for preparing the external trade indices could be provided, these indices could also be computed monthly.

Before going into an evaluation of this data base, it is necessary to look at the classification procedure adopted. The Nigerian external trade classification, to which the *Trade Summary* is patterned, is drawn up in line with the *Standard International Trade Classification (S.I.T.C.)*. All commodities are classified into *nine sections* (i.e., 0-8 according to kind, and those that could not be so identified form Section 9). Since commodities in a section are similar in kind, each section is divided further into more homogeneous groups according to degrees of similarity, each group is further subdivided into commodities. Each commodity is expected to be homogeneous in quality and composition over time. Information on each commodity includes the aggregate value and quantity involved in the trade transactions within a period. Up to and including December 1972, the data on quantity and value were expressed in units of the imperial measure, and the Nigerian pound, respectively; and from January 1973, the quantity data were expressed in metric measures, and those of value in decimal (naira) values. Crude petroleum quantities were expressed in barrels, and those published in tons and metric tons are converted to barrels by multiplying by 7.536 and 7.385, respectively. Similarly values shown in pounds were doubled to obtain naira equivalents.

In the construction of a good index number, there are several features of the basic data that need special consideration—accuracy, reliability, consistency, timeliness, ade-

quacy, availability and the suitability of the classification. The uses to which the index is to be put, determine the acceptability of the basic data for its construction. It is therefore necessary to examine the customs information published in the *Trade Summary* in the light of the above criteria.

The actual role of the Customs and Excise services in the compilation and processing of trade statistics is to ensure that external trade documents are completed and duly filed by importers and exporters or their agents for purposes of customs clearance. These documents are then transmitted to the Office of Statistics for scrutiny, processing, tabulation and publication. These data are thus a by-product of customs and excise functions; but since goods arriving at, or leaving Nigeria's territory, are subject to customs clearance (apart from a few exemptions such as ships, aircrafts, diplomatic and transit goods) the customs records constitute virtually complete information on the quantity and value of legal external trade transactions. It does not include data on trade through smuggling. The exports and imports are generally recorded at the time the goods cross the frontier. However, there are several defects in these data for purposes of calculating unit values for each commodity.

Customs records, and of course, the *Trade Summary*, do not furnish specific and separate price data for each individual product comparable through time, but rather aggregate values and quantities associated with a given consignment of a commodity defined under the trade classification. As earlier defined, the ratio of total value to total quantity of exports or imports, for a specific period of time, and calculated separately for each commodity, is called unit value, and it is used here as a substitute for price in the direct calculation of the trade indices. It is, thus, the average price per unit of all individual products covered by a heading of the commodity classification. Variations of the products or of their mixtures obviously affect the unit values. Besides, several entries have only value data available, and the lack of (and in some cases the availability of unrealistic or useless) quantity data, make it impossible to derive unit values directly. In several cases, the commodity classification is so broad that it does not refer to any product in actual fact, and average unit price in such a case will be meaningless. These deficiencies and several others have been noted and various procedures have been adopted to check and reduce their adverse impact on the indices.

3. Possible Approaches

From the past experience and current practices of a number of countries which have systematic trade records, there are four possible solutions to the problem of calculating external trade indices. Although each of these methods has its advantages and weaknesses, the choice depends on a number of factors such as the purpose which the indices are designed to serve, data and resource availability and the speed of computation, among others.

One method of price measurement is the Specific Price Index whereby information on price quotations is solicited regularly from either foreign suppliers or local importers and exporters or both. There is, however, a considerable work

load involved in the collection of this information. Additional problems with respect to sample design, coverage, specification control and product quality pose greater difficulties and render this method a time-consuming experiment. Above all, when consideration is given to the relevance of such index to the phenomenon being measured, the presence of a lead or lag between the "specific price" series and the corresponding value data tends to introduce an error whose magnitude will vary with conditions of trade contracts such as size and direction, delivery terms and payment arrangements.

The second and the most commonly used of these approaches is the Unit Value Index. Where there is up-to-date data on the flow of merchandise goods across the borders, the calculation of commodity unit prices is likely to be more relevant to the measurement of variations in the price of actual trade transacted. This approach has been adopted here principally because of the ease with which the primary data could be obtained ensuring that a high proportion of trade transactions can be directly represented in the measure. The primary data are collected through the administrative operations of the customs authorities and are, therefore, less costly and provide greater coverage than specific price surveys. But the problems associated with the unit value method vary owing to quantifiability, heterogeneity of products jointly described and classified as a commodity and the stability over time of the product-mix of the commodity groups. The adverse influence of these defects on the unit value index so computed creates what is termed "unit value bias" which refers to the difference between the actual "unit value" and the estimate. The size of this bias will vary with the degree of heterogeneity and tend towards complete disappearance the more the commonly classified products are disaggregated to ensure uniformity. Consequently, the relative difficulties or limitations of other methods of price measurement, the ready availability of data, and the likelihood that reasonable measures of price change can be obtained from these data if they are carefully edited, recommend this approach.

A variant of the two methods discussed above is the combination of unit value index and the specific price index. Since the major problem of the former is nonhomogeneity, a unit value index could be constructed to cover homogeneous items while price information on the more heterogeneous items could be sought from a sample of suppliers or accredited dealers. For instance, manufactured items such as steel beams and cement may not pose any problem while specific price data on other diverse commodities like television receiver units and cars may be solicited. The outcome of such index so constructed is known as the "hybrid price index" and it minimizes the bias created by unit value approach and sidetracks the otherwise difficult problems associated with sampling on an extensive scale.

Finally, in the absence of reliable, accurate and up-to-date price and volume data of foreign trade, it is possible also to make use of movements in the export or import indices of a country's trading partners to assess the direction of price behavior. For instance, if the intention is, specifically, to measure the trend in import prices of say, country A, this

amounts to selecting a group of countries which are major exporters of merchandise goods to country A and which have detailed trade data including export indices. Such indicators when suitably weighted and averaged by their respective contributions to country A's imports yield what is called "Import (Export) Price Index" which may be regarded as a proxy for country A's import price index.

Straightforward as it seems, this method of deriving an indicator to monitor price changes via trading partners' price indices has some shortcomings. The feasibility of such calculation depends largely on availability of detailed trade information and its accuracy depends on the nature of data employed. For example, the nature of export price movements of the various countries coming into the computation may be different among themselves and from the import price movement of the hypothetical country A. It is possible to observe that country A with relatively low level of capital formation leans heavily on imports of consumer goods while the export price movements of her major trading partners are much more influenced by an upward trend in the prices of capital goods in spite of rather stable export prices of their consumer goods. Thus the index so derived may not necessarily be a true reflection of country A's import price behavior.

Secondly, the concept of measuring exports (f.o.b.) in the country of origin and imports (c.i.f.) in country of destination and the likely effect on prices of changes in the cost of freight and insurance may lead to an incorrect estimation of price variations. A third objection is the failure of such index to take care of the effect of exchange rate fluctuations, possible price advantage often associated with shifts in commodity markets and the lag that definitely exists between dispatch of goods and receipt of same. Although these limitations may cast serious doubts on desired results, however, it may be the easiest way in the face of resource and domestic data constraints. Apart from serving an ad hoc purpose, it can be used as a cross-check on the credibility of either "unit value" or "specific" price indices directly calculated.

4. Coverage

The calculation of unit value indices for exports and imports involves cross-valuation which is a multiplication of quantities in one period with unit values in another period. This poses a number of problems where the desirable qualities of accuracy, reliability, consistency and continuity are not met by the trade statistics. Beside the need for consistent pairing off of quantity with value data, cross-valuation presupposes consistency both in terms of quantity and values over time. In practice, however, basic data are inaccurate and variation in the degree of homogeneity of each commodity class exists. This makes it necessary to select the items and compute the indices on the basis of representative commodities.

However, the aim of deriving accurate indices with a selected number of commodities must be set off against the desirability of achieving maximum coverage. Thus, consideration has been given to the contribution of the individual

items to the total value of trade.¹ The first step in the selection process therefore is to establish a cutoff limit. Commodities that fall within the cutoff limit are then checked for specificity and to see that quantity data are available. The quantity and value for each selected commodity are compiled, and the unit values derived. In cases where the unit value is suspect unit values for exports to or imports from each of the listed partner countries are computed and compared over time and across countries to determine an adjusted "ideal" unit value for the commodity. The corresponding quantities are adjusted using the "ideal" price and the published values.² These unit values are then subjected to reliability check by observing their movements over the periods concerned and considering these in the light of external information, e.g., knowledge of local conditions, movements in world commodity prices, etc. Erratic and abnormal movements in each individual import and export unit value for each country are thereby investigated. Finally, the list of selected commodities is compiled with their corresponding quantity, value and price data. Coverage for each commodity section of the entire export and import for the periods is determined to evaluate the adequacy of the selection. Selection procedure for exports and imports differed slightly although commodities in Section 9, which contain commodities and transactions not classified according to kind are excluded in both exports and imports. These include personal effects and military imports among other imports. The contribution of Section 9 to total exports or imports has been comparatively low throughout the period. Other commodities omitted include ships, aircrafts and nonmonetary gold.

The commodity composition of Nigeria's exports has been highly concentrated on a few primary commodities with crude petroleum, only, accounting for about 74 to 93

¹ A basic outline of statistical considerations in the calculation of foreign trade indices is given in R. G. D. Allen, "Index Numbers of Volume and Price" in R. G. D. Allen and J. E. Ely, *International Trade Statistics* (Wiley, 1950).

² It is important to note that quantity and unit value used in the study for a typical commodity is interpreted in terms of a group of items varying in composition. The quantity, therefore, applies to the group "commodity" as a whole and its value.

per cent of aggregate exports between 1971 and 1974. Moreover, these commodities are fairly homogeneous in quality over time, compared with manufactures which are few in exports. The major statistical problems are some inaccuracies of the official data, and marked changes in the shares of different commodity sections in recent years away from agricultural commodity exports to crude petroleum exports which pose a weighting problem.

The preponderant share of crude petroleum exports in overall exports makes it necessary to apply separate criteria in the selection of oil and non-oil commodities. Firstly, all non-oil commodities that contributed up to 0.1 per cent of total non-oil exports in the base year (i.e. N400,000) were listed for scrutiny along the lines enumerated above. Thirty commodities from non-oil exports were selected. Since crude petroleum alone contributed more than 99 per cent of oil exports throughout the period, it was selected as the only item in that section. However, four other commodities in this section were also selected, but not used in the calculations. They are to be regularly watched for possible inclusion when less of crude petroleum and more of refined petroleum products are exported.

Table 1 shows the percentage contribution in terms of current period value of the various sections to total exports, as well as the proportion of each section covered in this exercise. The selected 31 items contributed between 96 to 99 per cent of total exports between 1970 and 1974 with crude petroleum accounting for more than 99 per cent of exports in Section 3, i.e., mineral fuels, lubricants and related materials. Similarly, each of the other sections had a coverage exceeding 80 per cent throughout the period and this is considered sufficiently high and adequate.

The selection of import commodities has been more difficult due to deficiencies with respect to the desirable characteristics, particularly the high incidence of heterogeneity. The cutoff limit initially adopted for imports was 0.02 per cent of total imports in the base year or a minimum value of N400,000 and the same procedure adopted for selecting non-oil export commodities was utilized for imports. This limit was lowered to increase the number of selected commodities and improve overall coverage.

TABLE 1
NIGERIA: EXPORT INDICES—SECTIONAL CONTRIBUTION AND COVERAGE OF SELECTED ITEMS

S.I.T.C. Sections	Contribution ¹ (per cent)					Coverage (per cent)					Number of Items
	1970	1971	1972	1973	1974	1970	1971	1972	1973	1974	
0	19.1	13.1	8.8	7.1	3.4	96.5	96.8	95.8	95.2	98.3	7
2	14.0	7.6	4.5	5.6	2.1	81.6	81.6	89.3	84.9	87.1	18
3	58.1	74.5	83.0	83.8	93.0	100.0	99.9	99.7	99.6	99.7	1
4	3.8	1.8	1.2	1.4	0.6	96.1	84.7	98.1	98.5	98.4	2
6	4.5	2.4	1.9	1.2	0.6	98.4	98.3	93.9	89.2	94.4	3
Other ²	0.5	0.6	0.6	0.9	0.3	—	—	—	—	—	—
TOTAL	100.0	100.0	100.0	100.0	100.0	96.0	97.2	98.3	97.5	99.4	31

¹ In terms of current period values.

² Sections 1, 5, 8 and 9.

In Table 2 is presented the per cent contribution and coverage of the sections. On the whole 268 commodities were selected, and they give an overall coverage that ranges between 62.6 per cent in 1970 to 71.9 per cent in 1974.

5. Calculation Procedure

Following selection of items, the next pertinent question is what to measure. If the price or quantity relatives are obtained for all items under consideration, it is possible to examine the change in the value of a given basket of commodities if prices on one hand, or quantities, on the other, were to remain constant. In other words, the use of either current-year or base-year weights is crucial to the computation of trade indices. Whatever may be the choice will be dictated by the purpose of such an index.

The interest may be focused on either observing the nature of price movement over time or using it as a deflator. For the former, a fixed weight index serves the purpose of trend analysis. It is a base-weighted index and defined as *Laspeyres Index*, i.e.,

$$PL = \frac{\sum P_1 Q_0}{\sum P_0 Q_0} \quad \text{and} \quad QL = \frac{\sum Q_1 P_0}{\sum Q_0 P_0}$$

- where PL = Laspeyres (base weighted) Price Index
 QL = Laspeyres (base weighted) Quantum Index
 P₁ = Price of a given commodity in the current year
 P₀ = Price of a given commodity in the base year
 Q₁ = Quantity of a given commodity in the current year
 Q₀ = Quantity of a given commodity in the base year

For computation purposes, these indexes are expressed as

weighted averages (arithmetic means) of commodity price relatives

$$PL = \Sigma \left(\frac{P_1}{P_0} \frac{P_0 Q_0}{\Sigma P_0 Q_0} \right), \quad QL = \Sigma \left(\frac{Q_1}{Q_0} \frac{P_0 Q_0}{\Sigma P_0 Q_0} \right)$$

Similarly, a current weighted index which could serve an instrumental purpose is defined as *Paasche Index*, that is, using the same notation as above,

$$PP = \frac{\Sigma P_1 Q_1}{\Sigma P_0 Q_1} \quad \text{and} \quad QP = \frac{\Sigma Q_1 P_1}{\Sigma Q_0 P_1}$$

where PP and QP denote Paasche (current weighted) price and quantum index, respectively.

In practice, the quantum index is base-weighted while price index may be either current or base weighted depending on the objectives in focus. A common practice is to construct a Laspeyres quantum index and derive the Paasche price index since a value index is the product of Paasche price and Laspeyres quantum indexes.¹ This is the method adopted by the Federal Office of Statistics (1948-1964), and other countries like Belgium, France, and Norway.² The approach is also simpler because it eliminates the necessity of computing independent unit value and quantum indexes as practiced by Portugal, Switzerland, and the United Kingdom.²

The theoretical expectation is that the Laspeyres index will move differently to the Paasche index with the difference varying with the degree of correlation between price and quantity changes.³ When the divergence between the two series is substantial resort is sometimes had to an average—usually geometric—of the Laspeyres and Paasche indexes.

¹This is also true if Paasche and Laspeyres price and quantum indices are interchanged (i.e., $V = PLQP = P^PQL$).

²UN: *Supplement of the Statistical Yearbook and the Monthly Bulletin of Statistics*, 1972, Second Issue.

³Earl Hicks and L. Boccia, "Problems of Trade Indices for Latin America," *IMF Staff Papers*, Vol. II, No. 3, November 1952.

TABLE 2
NIGERIA: IMPORT INDICES—SECTIONAL CONTRIBUTION AND COVERAGE OF SELECTED ITEMS

S.I.T.C. Sections	Contribution ¹ (per cent)					Coverage (per cent)					Number of Items
	1970	1971	1972	1973	1974	1970	1971	1972	1973	1974	
0	7.6	8.1	9.6	10.3	8.9	88.8	89.1	89.9	88.6	86.9	26
1	0.5	0.4	0.4	0.4	0.5	86.8	77.8	85.9	82.8	86.8	8
2	2.2	1.9	2.1	2.2	3.7	79.4	88.5	88.1	86.6	89.8	11
3	2.9	0.8	1.0	1.1	3.2	79.6	63.7	85.1	82.3	94.3	9
4	0.1	0.1	0.1	0.1	0.2	36.5	28.5	37.1	40.3	68.1	2
5	11.7	11.3	10.4	10.9	11.0	45.1	39.7	41.7	47.2	51.6	33
6	29.9	29.6	27.1	26.4	30.1	64.7	69.9	68.9	72.4	76.2	78
7	37.4	39.7	40.2	40.1	35.2	71.5	69.1	70.9	73.2	72.5	76
8	5.2	6.6	8.4	7.7	6.6	42.7	45.4	48.3	48.5	48.2	25
9	2.5	1.5	0.7	0.8	0.6	—	—	—	—	—	—
TOTAL	100.0	100.0	100.0	100.0	100.0	62.6	65.5	67.3	69.8	71.9	268

¹In terms of current period values.

It should be noted that Laspeyres indexes use constant weights thus facilitating the description of price and quantum movements from year to year while Paasche indexes, which employ moving weights, are, strictly speaking, restricted to base period versus current period comparisons. Period-to-period changes in Paasche price (quantum) indexes arise not only from price (quantity) changes but also from weighting changes.

We believe that with the changing structure of trade and the proliferation of product varieties, the calculation of useful trade indicators must necessarily involve a thorough scrutiny of commodity unit values and consequent adjustment of quantities. Therefore it was necessary to set up worksheets showing the scrutinized unit values and it was a comparatively easy step from where to combine the unit value relatives with fixed weights to obtain a Laspeyres price index. The Paasche price index was, of course, derivable as the by-product of the Laspeyres quantum index calculations. The results of the two price index calculations are, in fact, relatively similar.

Closely related to the weighting problem is the choice of a base year. In resolving this, due consideration was given to the structure of Nigeria's external trade and commodity price behavior between 1970 and 1974. The early part of the period saw Nigeria convalescing from the effects of the civil war followed by a respite in 1971. But between 1972 and 1973 the low export prices coupled with the adverse effect of the Sahelian drought somehow depressed her export values. In 1974 there was a dramatic price spiral for primary commodities, crude petroleum and manufactured goods. Thus there are two possibilities: choose for a base either a less abnormal year or an average of two or more less abnormal years. But the latter may not necessarily yield a normal year and it poses a problem of direct reference either now, for comparison purposes, or in future when a change of base is desired. Despite the price variations of 1974, it is still considered a more acceptable base year because its weights are more likely to be appropriate for the measurement of future price and quantum developments.

The calculation procedure adopted in the statistical exercise is fraught with difficulties associated with either the computation of unit values, coverage adjustment or level of aggregation. In the first category, the problems encountered manifest themselves in form of missing quantities, unreliable quantities and hence values, disappearing items and erratic unit value series. Without quantities, direct calculation of unit values may be impossible and this is dealt with in two ways. For a missing entry for just one year, the price movement of a related item within the commodity group is imputed to fill the gap. Where the quantities are not documented for the entire period and the values of such items are significantly high beside satisfying other selection criteria, as experienced in S.I.T.C. Section (8), a weighted price movement of two or more related items is substituted.

For example, with respect to Books and Pamphlets (S.I.T.C. 892-10) whose base-year value is ₦ 13.2 million but whose unit value is indeterminate, a weighted average of the price movements of such inputs as Printing Inks (S.I.T.C.

533-20) and Other Printing and Writing Paper (S.I.T.C. 641-20) is substituted. A similar treatment is given to Newspapers and Periodicals (S.I.T.C. 892-20) with Printing Inks and Newsprint Paper (S.I.T.C. 641-10) as recognized inputs.

But where an item totally disappears in a particular year, the volume index reflects no trade while the price movement of the other items in the group is deemed to be true for the commodity, e.g., Cocoa Powder (S.I.T.C. 072-20) in 1972. Moreover, erratic unit values are cross-checked for consistency with published world commodity prices; and through disaggregation by country of origin or destination a reliable average price from representative markets is taken. In this and other cases quantities are also recalculated by dividing published values by adjusted unit prices.

Secondly, attention was given to the type of aggregation which will facilitate the stratification of commodity sections into homogeneous groups and the combination of such groups to satisfy both S.I.T.C. and modified B.E.C. (Broad Economic Categories¹) classifications. This is particularly necessary for such sections as Manufactured Goods (6), Machinery and Transport Equipment (7) and Chemicals (5) which is broken up into Basic Chemicals (divisions 51 and 52) and Chemical Products (53-59). Manufactures are classified into Textiles, subdivided into Floor Coverings (Group 657) and Other Textiles (i.e., groups 651-656), Metallic and Non-Metallic Products (divisions 66-69) and Other Manufactures (61-64). Finally, the Machinery aspect of Section 7 is classified into Consumer Household Durables (i.e., domestic telecommunication equipments—items 11 to 29 of group 724, domestic equipment electrical of group 725 and non-electrical items 41-43 of group 719) and Other Capital Equipments (i.e., all other commodities in divisions 71 and 72). Transport Equipment division is also split into Passenger Cars and Other Transport Equipments—items 11-15 in group 732 and the rest of division 73 respectively. Each of the other sections, Food (0), Beverages and Tobacco (1), Crude Materials (2), Fuel (3) and Animal and Vegetable Oils and Fats (4) is treated as a homogeneous section and later combined with other sections to suit the end-use classifications.

The third major problem pertains to the combination of sample values to obtain population estimates. The type of sectional disaggregation just explained above is necessary because of the different price characteristics of various products. If it is assumed as is the case here, that the price movement of commodities not covered is the same as that of the selected units, the validity of such assumption will be stronger, the greater the degree of homogeneity within each group, and the error margin will also be smaller, the greater the dissimilarity between such groups. An example is S.I.T.C. Section 5 where the price movement of Basic Chemicals is different from that of Chemical Products. Hence the estimate for each group is separately raised to group population level before the groups are weighted to obtain overall indices, either by commodity sections or economic categories.

¹UN, *Classification by Broad Economic Categories*, Statistical Paper, Series M, No. 53.

But with respect to quantum indices, a similar assumption may not necessarily be true: that movement in the quantum of covered items will be the same as that of the excluded items. The adjustment then takes a new form. An implicit price index is first derived by dividing sample value at current prices by the sample value at constant prices. The implicit price index obtained is the estimated population price index. The population value index is then divided by this implicit price index to obtain the estimated population quantum index. It can be expressed as:

$$Q^* = V \div P_1 = \frac{\Sigma P_1 Q_1}{\Sigma P_0 Q_0} \div \frac{\Sigma' P_1 Q_1}{\Sigma' P_0 Q_1}$$

where Q^* = Estimated population quantum index
 V = Value Index
 P_1 = Implicit Price Index
 $\Sigma P_1 Q_1$ = Current year population value
 $\Sigma P_0 Q_0$ = Base year population value
 $\Sigma' P_1 Q_1$ = Current year sample value
 $\Sigma' P_0 Q_1$ = Current year sample value at constant price

Thus the adjustment is based on the circularity relationship between value index, Laspeyres quantum index and Paasche price index, which is $V = Q.P$. By algebraic manipulation, quantum index is the quotient of value index and estimated Paasche price index.

C. RESULTS

In the results that follow, unless otherwise stated, base-weighted (Laspeyres) price indices have been used to report price movements for the period under study. This is because, as earlier stated in the paper, current weighted (Paasche) unit value indexes do not, strictly speaking, measure pure price changes from one period to the next, but changes of a given

period from the reference base year only. But base weighted (Laspeyres) unit values can safely be used for such comparisons. This is not to discredit the Paasche price indices which may be useful proxies in the absence of Laspeyres price indices. In the previous trade indices compiled for Nigeria between 1954 and 1964, only derived Paasche price indices were published.¹ And in this exercise, both Laspeyres and Paasche series are shown side by side in Tables 3b, 5b and 5c. The results tend to confirm that in most cases, there is no significant difference between them.

1. Exports

In 1974, non-oil commodities accounted for only 7 per cent of the total value of exports. Referring to Table 1, which includes contributions of the various commodity sections to total export, this contrasts with 42, 25, 17 and 17 per cent for 1970, 1971, 1972 and 1973 respectively, a steady decline throughout the period. The growth in the value of overall exports is, therefore, due to remarkable increases of value of petroleum exports. In Table 3a is shown the summary of these changes and the effect on them of volume and price changes. More detailed tables on same are 3b and 3c. The volume indices of all major non-oil exports either declined or stagnated between 1970 and 1972 and appeared to have improved between 1972 and 1973, by about 10.7 per cent. But the index fell again by 24.1 per cent in 1974, due mainly to a substantial drop in the exports of cocoa, groundnuts, which products contribute 60 per cent of non-oil exports. The other commodities affected are rubber, palm kernels, and tin metals. Non-oil exports showed annual decrease in price and volume, hence a substantial decrease in value in 1971 and 1972.

¹ Federal Office of Statistics, *Digest of Statistics*, Volume 17, No. 1, January 1968.

TABLE 3a
 NIGERIA: EXPORT INDICES, 1970-1974
 (1974 = 100)

Kind of Exports	1970 (1)	1971 (2)	1972 (3)	1973 (4)	1974 (5)	Per Cent Changes				
						1971 (6)	1972 (7)	1973 (8)	1974 (9)	
VALUE										
Total	15.1	22.0	24.5	38.9	100.0	45.7	11.4	58.8	157.1	
Oil	9.5	17.7	21.9	35.3	100.0	86.3	23.7	61.2	183.3	
Non-Oil	92.5	81.2	59.6	88.2	100.0	-12.2	-26.6	48.0	13.4	
QUANTUM										
Total	59.3	77.9	90.7	100.2	100.0	31.4	16.4	10.5	-0.2	
Oil	53.2	73.9	88.9	97.9	100.0	38.9	20.3	10.1	2.1	
Non-Oil	143.1	134.3	119.1	131.8	100.0	-6.1	-11.3	10.7	-24.1	
PRICE										
Total	21.2	26.3	26.3	38.2	100.0	24.1	-	45.2	161.8	
Oil	17.8	24.0	24.8	36.1	100.0	34.8	3.3	45.6	177.0	
Non-Oil	67.2	57.6	47.9	66.7	100.0	-14.3	-16.8	39.2	49.9	

Source: Summarized from Table 3b. Note: price indices are the base-weighted type.

TABLE 3b
NIGERIA: EXPORT INDICES BY S.I.T.C. COMMODITY SECTIONS
(1974 = 100)

S.I.T.C.	Commodity Sections	Weights per 1000	Prices ¹				Quantum				Values			
			1970	1971	1972	1973	1970	1971	1972	1973	1970	1971	1972	1973
	All sections	1,000	21.2 (25.5)	26.3 (28.3)	26.3 (27.0)	38.2 (38.8)	59.3	77.9	90.7	100.2	15.1	22.0	24.5	38.9
	Non-oil sections	67	67.2 (64.6)	57.6 (60.4)	47.9 (50.0)	66.7 (66.9)	143.1	134.3	119.1	131.8	92.5	81.2	59.6	88.2
0	Food and live animals	34	76.5 (71.4)	61.2 (63.3)	51.0 (49.3)	63.9 (62.1)	118.0	132.9	128.2	130.2	84.3	84.2	63.2	80.9
2 & 4	Raw materials	27	54.9 (58.0)	51.6 (56.3)	39.9 (47.5)	68.1 (72.6)	171.5	135.9	108.0	139.6	99.5	76.5	51.3	101.4
2	Crude materials (excluding fuels and lubricants)	21	56.7 (60.1)	52.3 (56.9)	40.1 (48.6)	74.2 (79.3)	166.2	139.0	106.2	130.0	99.8	79.1	51.6	103.1
4	Animal and vegetable oils and fats	6	48.5 (51.5)	49.1 (54.1)	39.1 (43.1)	45.8 (54.4)	190.8	124.4	115.0	174.9	98.3	67.3	49.9	95.1
6	Manufactured goods	6	68.9 (67.5)	63.9 (62.5)	65.8 (64.6)	76.2 (66.5)	158.9	135.1	117.1	107.4	107.3	84.4	75.6	71.4
3	Mineral fuels and lubricants	933	17.8 (17.8)	24.0 (24.0)	24.8 (24.8)	36.1 (36.1)	53.2	73.9	88.7	97.9	9.5	17.7	21.9	35.3

¹Each Laspeyres (base-weighted) price index is published with the corresponding Paasche (current-weighted) index shown in brackets below it.

TABLE 4a
NIGERIA'S AND DEVELOPING ECONOMIES' EXPORT PRICE INDICES¹
OF PRIMARY COMMODITIES (EXPRESSED IN U.S. DOLLARS)
(1974 = 100)

Items	1970 (1)	1971 (2)	1972 (3)	1973 (4)	1974 (5)	Per Cent Changes			
						1971 (6)	1972 (7)	1973 (8)	1974 (9)
Nigeria's overall exports	18.7	23.4	25.2	36.6	100.0	25.1	7.7	45.2	173.2
Developing Economies' overall exports	32.3	34.2	37.1	50.0	100.0	5.9	8.5	34.8	100.0
Nigeria's non-oil exports	15.7	21.2	23.7	34.6	100.0	35.0	11.8	46.0	189.0
Developing Economies' agricultural non-food exports	43.9	44.3	50.0	81.6	100.0	0.9	12.9	63.2	22.5
Nigeria's crude petroleum exports	15.7	21.2	23.7	35.3	100.0	35.0	11.8	48.9	183.3
World crude petroleum exports	35.3	35.3	38.2	40.6	100.0	-	8.2	6.3	146.3

Source: Unit value indices of developing economies exports and price indices of their agricultural non-food exports and world crude petroleum exports are adapted from U.N. *Monthly Bulletin of Statistics*, Vol. XXX, No. 4 of April 1976.

General Note: Unit value indices of Nigeria in Naira are computed in U.S. dollars using the par rate market rate quoted by the IMF in the *International Financial Statistics*, Vol. XXIX, No. 7 of July 1976.

¹Whereas indices of the group of Nigeria's primary commodities are those of unit value, the price indices for developing economies agricultural non-food exports and world crude petroleum exports are calculated using market price quotations—exports, imports or wholesale prices. The latter are therefore not strictly comparable with the former, although both are base-weighted indices.

The value indices of oil exports increased by 86.3, 23.7, 61.2, and 183.0 per cent in 1971, 1972, 1973 and 1974 respectively. The export volume of oil, which increased at a decreasing rate between 1972 and 1974, and corresponding sharp price increases were responsible for substantial increases in the value of exports, especially in 1974 following the increases of crude petroleum prices.

A broad validity check on the export unit value indices presented so far, is done by the comparison of the trends of these indicators with those of other developing countries, with the indices (expressed in U.S. dollars). Results in Table 4 include Nigeria's overall exports; Nigeria's vis-a-vis developing economies non-oil exports, and Nigeria's crude petroleum exports compared with world crude petroleum exports. With respect to the overall, and non-oil exports, there appears to exist a very positive relationship, with comparable annual increases. The number of observations is so small that a correlation test will be untenable. The commodities covered in both cases are mostly agricultural non-food exports whose quoted international prices are nearly the same as Nigeria's export unit values for each of the commodities. The position is nearly the same with crude petroleum price indices, the difference lying in the magnitude of price increases. Another validity check of the export unit value indices is a comparison with indices of wholesale prices of Nigeria's export commodities. The latter is calculated by applying the weights in the base year, 1974, to the wholesale price indices of thirteen major export commodities. In 1974 they contributed 99.8 per cent to the value of total exports and include commodities such as crude petroleum, cocoa, groundnuts and their products, palm kernels, hides, cottonseed, rubber, tin and plywood. The expectation is that the corresponding unit value and wholesale price indices will be close in magnitude and similar in trend. The results shown in Table 4(b) confirm this expectation.

In conclusion, whereas the contribution of oil to value of exports increased steadily because of the improvement of its prices, that of non-oil commodities continued to decline due to decreases in the volume of exports. The validity checks seem to confirm the movement demonstrated by results in Nigeria's export prices during the period.

2. Imports

Summary of the results of import indices is given in Table 5a, while Tables 5b and 5c give detailed breakdown of these on the bases of economic classes and commodity sections. Value and volume of imports increased by more than 40 per cent in 1971, which reflects liberalization of controls after the civil war for purposes of reconstruction. Value declined by 7.6 and volume by 13.1 in 1972. The former rose by 23.7 and 42.1 per cent, with corresponding volume increasing at much lower rates in 1973 and 1974. Although value of imports in 1974 was more than twice that of 1970, increase in volume for the period was just 45.6 per cent. Further breakdown shows that the value of imports for all the four end-use classes were of the same pattern, but there were higher increases in the value of exports of capital goods, raw materials and transport equipments than consumer goods in 1973 and 1974.

The variations in value are directly related to changes in the volume of export. However, while import volume increased by 40.0 per cent in 1971, it fell by 13.1 in 1972, picked up again by 7.5 in 1973 and improved further by 11.2 in 1974, unit value indices by overall imports increased steadily by 2.3, 5.9, 12.3 and 27.6 in 1971, 1972, 1973 and 1974, respectively.

In terms of composition (see Table 2), manufactured goods, machinery and transport equipment (sections 6 and 7), dominated imports with 60-70 per cent of total imports throughout the period. Food items and beverages generally accounted for about 10 per cent of imports.

A validity check on the import unit value indices and through a comparison of Nigeria's overall imports with major trading partners' exports to Nigeria.¹ Secondly, Nigeria's imports of manufactured goods are compared with exports of manufactured goods by developed nations. The data, which are shown in Table 6, are expressed in U.S. dollars with 1974 = 100. Directly calculated overall unit value indices of

¹The selection of countries included in calculating the index is based on data from IMF/IBRD *Direction of Trade*, Annual 1970-1974, 1975.

TABLE 4b
NIGERIA'S EXPORT UNIT VALUE AND WHOLESALE PRICE¹ INDICES
(1974 = 100)

Type	1970	1971	1972	1973	1974	Per Cent Changes			
						1971	1972	1973	1974
Overall exports: Unit value	21.2	26.3	26.3	38.2	100.0	24.1	—	45.2	161.8
Wholesale price	24.5	27.0	28.1	39.7	100.0	10.2	4.1	41.3	151.9
Oil exports: Unit value	17.8	24.0	24.8	36.1	100.0	34.8	3.3	45.6	177.0
Wholesale price	21.0	24.7	26.6	37.8	100.0	17.6	7.7	42.1	164.6
Non-oil exports: Unit value	67.2	57.6	47.9	66.7	100.0	-14.3	-16.8	39.2	49.9
Wholesale price	72.2	58.0	48.1	65.1	100.0	-19.7	-17.1	35.3	53.6

¹Computed by the IMF Bureau of Statistics. Wholesale prices on international markets of major commodities exported by Nigeria weighted with their 1974 export values.

TABLE 5a
NIGERIA: INDICES OF IMPORTS BY ECONOMIC CLASSIFICATION¹
1970-1974

Kind of Imports	1970 (1)	1971 (2)	1972 (3)	1973 (4)	1974 (5)	Per Cent Changes			
						1971 (6)	1972 (7)	1973 (8)	1974 (9)
VALUES									
Total	42.7	61.6	56.9	70.4	100.0	44.3	-7.6	23.7	42.1
Consumer goods	44.5	67.3	64.6	78.7	100.0	51.2	-4.1	21.8	27.1
Capital goods & raw materials	41.1	56.1	46.6	58.5	100.0	36.5	-17.0	25.5	70.9
Transport equipments	61.1	86.7	79.6	100.6	100.0	41.9	-8.2	26.4	-0.6
QUANTUM									
Total	68.7	96.2	83.6	89.9	100.0	40.0	-13.1	7.5	11.2
Consumer goods	77.5	111.4	96.8	98.1	100.0	43.7	-13.1	1.3	1.9
Capital goods & raw materials	63.7	83.9	69.7	78.3	100.0	31.7	-16.9	12.3	27.7
Transport equipments	64.2	101.6	100.2	110.8	100.0	58.3	-1.4	10.6	-9.8
PRICE ²									
Total	64.4	65.9	69.8	78.4	100.0	2.3	5.9	12.3	27.6
Consumer goods	60.8	64.2	69.2	80.7	100.0	5.6	7.8	16.6	23.9
Capital goods & raw materials	64.8	65.3	68.0	75.3	100.0	0.8	4.1	10.7	32.8
Transport equipments	72.4	72.5	77.7	86.2	100.0	0.1	7.2	10.9	16.0

¹ Summarized from Tables 5b and 5c which are detailed tables of the indices prepared along the lines of the existing S.I.T.C. and end-use classifications.

² Base-weighted. The current-weight indices are shown in Tables 5b and 5c.

Nigeria and its proxy derived from her major trading partners exports to Nigeria appear to be very closely related with comparable annual increases showing marginal difference. A similar relationship appears to exist between the indices of Nigeria's imports of manufactured goods and developed countries' exports of manufactured goods. But in this case the difference between corresponding changes is wider than the earlier case. Nevertheless, the comparison made here is not to suggest that these so-called proxies can effectively be substituted for direct import unit price indices but they may be utilized for checking.

3. Terms of Trade

Having examined price and quantity variations in exports and imports, consideration is now given to terms of trade indices. In Table 7 is shown the three indices of terms of trade—Commodity or Gross (barter) terms of trade, Net (barter) terms of trade, and Income terms of trade. Previous publications of Nigeria's trade indices,¹ showed only net terms of trade, based on current-weighted price indices. But this paper not only presented the three indices of terms of trade but also results for net and income terms of trade using the two types of price indices. The purpose of using the two price indices is to show their close approximation to each other. Generally, the nature of analysis and its underlying assumption will determine the terms of trade indicator to use.

Although five-year interval is too short to warrant a generalized statement of the trend of the terms of trade, certain features are noticeable. All the indices of terms of trade exhibit favorable increases in 1971, the highest increase of 42 per cent being for income terms of trade. Commodity terms of trade decreased by 24.6 per cent and 3.7 per cent in 1972 and 1973, but increased again by 11.5 per cent in 1974. Net (barter) terms of trade decreased in 1972 by 5.6 per cent, and then rose sharply by 28.6 and 106.2 per cent (using base-weighted indices). The income terms of trade index continued to increase in 1972 but at a lower rate of 5.1. It picked up again in 1973 at an annual rate of 40.7 and a record high of 192.4 per cent in 1974. Thus the favorable income terms of trade situation is attributable to the interaction of export and import prices between 1973 and 1974.

D. OTHER PROBLEMS TO BE CONSIDERED IN THE FUTURE COMPILATION OF THE SERIES

In providing a framework for the renewal of external trade indices, a number of general and maintenance problems are considered not only to improve the quality of such series in the future but also to ensure the continued accuracy of compilation. The first observation relates to the accuracy of the basic data. If the quality of the basic data is to be improved, additional attention should be given by the Board of Customs and Excise to volume declarations on the bills of entry and bills of lading in order to facilitate the determination of accurate unit values. At present, the interest of the Board of Customs and Excise seems to be concentrated on

¹ Federal Office of Statistics: *Digest of Statistics*, 1968, *Op. Cit.*

TABLE 5b
NIGERIA: IMPORT INDICES BY ECONOMIC GROUPS, 1970-74
(1974 = 100)

Economic Groups	Weights per 1000	Prices ¹				Quantum				Values			
		1970	1971	1972	1973	1970	1971	1972	1973	1970	1971	1972	1973
Overall	1,000	64.4 (62.2)	65.9 (64.1)	69.8 (68.1)	78.7 (78.4)	68.7	96.2	83.6	89.9	42.7	61.6	56.9	70.4
1. Consumer goods	358	.8 (57.4)	64.2 (60.4)	69.2 (66.7)	80.7 (80.3)	77.5	111.4	96.8	98.1	44.5	67.3	64.6	78.7
(A) Non-durable	235	62.5 (58.2)	65.7 (61.3)	70.5 (67.8)	83.0 (82.5)	83.2	114.4	96.8	96.9	48.5	70.1	65.7	79.9
(i) Food	95	50.4 (50.2)	53.1 (48.0)	60.5 (57.6)	85.1 (80.9)	74.9	117.5	105.5	99.3	37.6	56.4	60.7	80.3
(ii) Textiles	55	57.7 (51.0)	64.1 (63.0)	69.7 (71.4)	77.9 (85.5)	132.4	158.1	123.9	104.7	67.5	99.6	88.4	89.5
(iii) Others	85	79.2 (79.8)	80.8 (80.2)	82.2 (81.0)	83.9 (82.2)	60.4	82.7	69.6	89.1	48.2	66.3	56.4	73.2
(B) Semi-durable	110	54.5 (54.6)	58.6 (57.4)	62.4 (62.4)	75.3 (75.9)	71.1	110.6	102.2	99.0	38.8	63.5	63.7	75.1
(C) Durable	13	82.3 (73.1)	83.0 (74.2)	101.8 (99.4)	83.8 (78.7)	30.6	64.8	53.7	111.4	22.4	48.1	53.3	87.6
2. Capital goods & raw materials	504	64.8 (64.5)	65.3 (66.9)	68.0 (66.9)	75.3 (74.7)	63.7	83.9	69.7	78.3	41.1	56.1	46.6	58.5
(A) Machinery & other capital equipment	204	69.2 (69.6)	68.4 (68.9)	71.4 (68.9)	79.7 (79.9)	70.1	106.7	85.9	89.4	48.8	73.4	59.2	71.4
(B) Raw materials	268	62.8 (62.3)	63.7 (64.8)	66.6 (64.7)	73.5 (70.7)	56.8	73.6	62.4	74.5	35.4	47.6	40.3	52.7
(i) Crude materials	39	61.9 (71.6)	67.0 (75.7)	70.7 (79.6)	92.1 (88.3)	36.3	41.7	40.6	47.7	26.0	31.6	32.3	42.1
(ii) Processed for industry	229	63.0 (61.3)	63.1 (63.8)	65.9 (63.1)	70.3 (68.9)	66.3	87.0	72.7	87.0	40.7	55.5	45.9	60.0
(C) Fuels & lubricants	32	53.1 (49.6)	58.6 (67.2)	58.9 (66.3)	62.3 (62.3)	80.2	24.1	26.6	39.2	39.8	16.2	17.7	24.5
3. Transport equipment	138	72.4 (68.8)	72.5 (65.8)	77.7 (74.7)	86.2 (83.5)	65.2	101.6	100.2	110.8	44.1	66.9	74.8	92.5
(A) Passenger cars	46	80.3 (80.1)	82.0 (81.7)	82.9 (81.5)	91.5 (91.1)	13.1	34.2	80.4	84.0	10.5	27.9	65.5	76.5
(B) Other transport equipment	92	68.4 (67.8)	67.6 (63.8)	75.1 (72.2)	83.6 (80.9)	90.2	135.8	110.2	124.3	61.1	86.7	79.6	100.6

¹ Each Laspeyres (base-weighted) price index is published with the corresponding Paasche (current-weighted) index shown in brackets below it.

TABLE 5c
NIGERIA: IMPORT INDICES BY S.I.T.C. COMMODITY SECTIONS
(1974 = 100)

S.I.T.C. Commodity Sections	Weights per 1000	Prices ¹				Quantum				Values			
		1970	1971	1972	1973	1970	1971	1972	1973	1970	1971	1972	1973
All sections	1,000	64.4 (62.2)	65.9 (64.1)	69.8 (68.1)	78.7 (78.4)	68.7	96.2	84.4	89.9	42.7	61.6	56.9	70.4
0 & 1 Food	95	50.4 (50.2)	53.1 (48.0)	60.5 (57.6)	85.1 (80.9)	74.9	117.5	105.5	99.3	37.6	56.4	60.7	80.3
0 Food & live animals	90	48.2 (48.8)	51.5 (47.0)	59.6 (57.3)	85.1 (80.7)	76.5	120.8	107.3	101.1	37.3	56.8	61.5	81.6
1 Beverages & tobacco	5	87.6 (89.8)	80.7 (81.7)	77.1 (64.5)	85.7 (84.3)	48.7	60.2	74.6	68.6	43.7	49.1	48.1	57.8
2 & 4 Raw materials	39	61.9 (71.6)	67.0 (75.7)	70.7 (79.6)	92.1 (88.3)	36.3	41.7	40.6	47.7	26.0	31.6	32.3	42.1
2 Crude materials inedible (excluding fuels & lubricants)	37	62.2 (72.4)	67.0 (76.6)	70.4 (80.6)	92.5 (88.7)	36.1	42.0	40.3	47.7	26.1	32.2	32.4	42.3
4 Animal & vegetable oils & fats	2	57.9 (59.4)	66.8 (56.7)	76.2 (64.1)	85.0 (81.7)	40.0	35.7	46.4	47.7	23.8	20.3	29.7	39.0
3 Mineral fuels, lubricants, etc.	32	53.1 (49.6)	58.6 (67.2)	58.9 (66.3)	62.3 (62.3)	80.2	24.1	26.6	39.2	39.8	16.2	17.7	24.5
5 Chemicals	111	73.8 (72.3)	75.8 (74.5)	77.8 (76.4)	81.4 (79.8)	64.4	86.1	70.6	87.9	46.5	64.1	54.0	70.1
(i) Basic chemicals	26	56.2 (52.7)	59.4 (58.4)	63.5 (61.8)	73.2 (71.4)	76.3	95.8	72.56	82.5	40.2	55.9	44.9	58.9
(ii) Chemical products	85	79.2 (79.8)	80.8 (80.2)	82.2 (81.0)	83.9 (82.3)	60.4	82.7	69.6	89.1	48.2	66.3	56.4	73.7
6 Manufactured goods	303	61.4 (57.4)	62.8 (63.1)	65.9 (65.3)	71.9 (73.6)	75.3	96.8	78.4	84.0	43.2	61.0	51.2	61.9
(a) Textiles	57	58.2 (50.96)	64.8 (63.2)	70.1 (71.5)	78.1 (85.4)	128.0	154.4	121.9	103.7	65.3	97.5	87.2	88.5
(b) Metal products	165	65.8 (64.5)	65.0 (67.4)	68.7 (65.9)	70.9 (69.1)	59.7	72.0	62.9	87.7	38.5	48.6	41.5	60.6
(c) Others	81	54.5 (53.5)	57.0 (57.0)	57.5 (57.5)	69.4 (71.9)	69.7	106.4	79.3	85.3	37.3	60.7	45.6	61.4
7 Machinery & transport equipment	355	70.9 (69.3)	70.5 (67.8)	75.0 (72.1)	82.4 (81.4)	66.7	103.4	90.3	98.6	46.2	70.1	65.1	80.3
(a) Machinery	216	70.0 (69.7)	69.2 (69.0)	73.2 (70.1)	79.9 (79.8)	68.2	104.5	84.1	90.9	47.6	72.2	58.9	72.6
(b) Transport equipment	138	72.4 (68.6)	72.5 (65.8)	77.7 (74.7)	86.2 (83.5)	64.2	101.6	100.2	110.8	44.1	66.9	74.8	94.5
8 Miscellaneous manufacturers	66	54.9 (56.0)	59.9 (57.0)	64.3 (63.3)	76.8 (75.6)	61.9	108.7	115.1	109.3	34.7	62.0	72.9	82.6

¹Each Laspeyres (base-weighted) price index is published with the corresponding Paasche (current-weighted) index shown in brackets below it.

TABLE 6
NIGERIA'S IMPORT UNIT VALUE INDEX, TRADING PARTNERS EXPORT UNIT PRICE INDEX, AND
EXPORT UNIT PRICE INDEX OF MANUFACTURED GOODS OF DEVELOPED ECONOMIES (EXPRESSED IN U.S. DOLLARS)
(1974 = 100)

Items	1970 (1)	1971 (2)	1972 (3)	1973 (4)	1974 (5)	Per Cent Changes			
						(1) & (2) (6)	(2) & (3) (7)	(3) & (4) (8)	(4) & (5) (9)
Nigeria's overall imports	56.8	58.2	66.8	75.5	100.0	2.5	14.8	13.0	32.5
Trading partners exports to Nigeria ¹	59.0	62.0	68.0	81.0	100.0	5.1	9.7	19.1	23.5
Nigeria's import of manufactured goods	58.7	59.8	68.4	74.8	100.0	1.9	14.4	9.4	33.7
Exports of manufactured goods by the developed nations ²	61.7	64.8	69.8	82.1	100.0	5.0	7.7	17.6	21.8

¹Computed with export unit value indices of Nigeria's major trading partners, including U.S.A., United Kingdom, Belgium, Denmark, France, Germany, Italy, Netherlands, Norway, Sweden, Switzerland, Canada, Japan, Finland, Greece, Ireland, Spain, Australia, India and Brazil, and the values of their exports to Nigeria in 1974 were used as the weights on their respective export price indices. Relevant data on other trading partners are not available. Computed by IMF Bureau of Statistics from data in *Direction of Trade*, Annual, 1970-74 and IMF Data Fund.

²Defined to include S.I.T.C. sections 5-8, and the source is UN *Monthly Bulletin of Statistics*, April 1976, Vol. XXX, No. 4. Current-weighted unit value indices of manufactured goods have been published for developed nations and are therefore not strictly comparable with those of Nigeria which are base weighted.

TABLE 7
TERMS OF TRADE INDICES—1970-1974
(1974 = 100)

Items	Notations	1970 (1)	1971 (2)	1972 (3)	1973 (4)	1974 (5)	Per Cent Changes			
							1971 (6)	1972 (7)	1973 (8)	1974 (9)
Import and Export Indices										
Export quantum index	Q _e	59.3	77.9	90.7	100.2	100.0	31.4	16.4	10.5	-0.2
Import quantum index	Q _i	68.7	96.2	84.4	89.9	100.0	40.0	-12.3	6.5	11.2
Export price index	(P _{1e})	21.2	26.3	26.3	38.2	100.0	24.1	-	45.2	161.8
	(P _{2e})	25.5	28.3	27.0	38.8	100.0	11.0	-4.6	43.7	157.7
Import price index	(P _{1i})	64.4	65.9	69.8	78.7	100.0	2.3	5.9	12.8	27.1
	(P _{2i})	62.2	64.1	68.1	78.4	100.0	3.1	6.2	15.1	27.6
Export value index	V _e	15.1	22.0	24.5	38.9	100.0	45.7	11.4	58.8	157.1
Terms of Trade Indices										
Gross (barter) terms of trade	G	115.9	123.5	93.1	89.7	100.0	6.6	-24.6	-3.7	11.5
Net (barter) terms of trade	(T ₁)	32.9	39.9	37.7	48.5	100.0	21.3	-5.6	28.6	106.2
	(T ₂)	41.0	44.1	39.6	49.5	100.0	7.6	-10.2	25.0	102.0
Income terms of trade	(I ₁)	23.4	33.4	35.1	49.4	100.0	42.7	5.1	40.7	102.4
(purchasing power)	(I ₂)	24.3	34.3	36.0	49.6	100.0	41.2	5.0	37.8	101.6

Notes

1) $G = \frac{Q_i}{Q_e} \times 100$; $T = \frac{P_e}{P_i} \times 100$; $I = \frac{V_e}{P_i} \times 100$.

2) P₁ and P₂ are base and current weighted price indices respectively; therefore, T₁ and T₂, I₁ and I₂ are each calculated using P₁ and P₂ respectively.

declared values of trade for purposes of duty assessment and revenue collection.

A noticeable feature in the *Nigeria Trade Summary* is the incidence of the lumping of a number of heterogeneous items together, thus rendering the derived series of unit value erratic over time. Examples of this are Electrical Apparatus for Making and Breaking (S.I.T.C. 722-20), which is not specific, or Other Coated Sheets (S.I.T.C. 674-89) which is all-embracing. Within each division, the values of the commodities "not elsewhere specified" appear relatively high

compared with the rest of the division. These are problems of classification and specification which can be solved, firstly, by a thorough and regular revision of not only Nigeria's adaptation of the S.I.T.C. but also the customs forms (i.e., bills of entry and bills of lading) on which trade declarations are made. Also, completed forms should be screened to ensure that they are fully and accurately completed before turning them in for collation.

Maintenance problems relating to the actual computation of the trade indices include the special attention which needs

to be given in the event of the appearance of new commodities and the disappearance of old ones in external trade. When the necessity arises to introduce a new commodity, probably because it has become important in trade, two assumptions need to be made to the effect that from the base period to the current period, the change in the value and price of the new item is the same as those of the other commodities in the sample. Therefore, both the value and the price of the new item are carried backwards using the movement of the value and price indices of the remaining items in the sample. Thus, by relating the alternated base period value to the adjusted price, new quantity and hence current period value at constant prices (P_0Q_1) could be calculated. The calculation of the quantum index will not in this case involve adjustment to the base year value, but for the price index the base-year value is increased to incorporate the deflated current value.

The disappearance of a commodity may be of a temporary, seasonal or permanent nature. If the disappearance is temporary, the volume index would continue to reflect no trade while the price index is adjusted to indicate the average movement in the index of the remaining items within the group. But where the disappearance is permanent in nature, substitution of an item of equal importance could be made. If such substitution is not possible, the volume index is left unchanged while, if the price movement of the disappearing commodity is similar to the price movement of the rest of the sample, the base-year value of the commodity in question is dropped for price index calculation purposes. The problem of seasonality may take the form of temporary disappearance of commodities and could be dealt with as above. The problem of appearance and disappearance of items requires expert handling.

A problem raised by the computation of short-term indices is whether monthly, quarterly, and annual series should be calculated independently. As for the price index, the best solution would seem to be to calculate the short- and long-term series independently because unit values are not strictly additive. But with respect to quantities, monthly or quarterly quantum indices could be averaged as a direct cross-check against annual calculations.

Finally, one of the criticisms of Laspeyres base-weighted indices is that the base-weights may become unrepresentative because they do not reflect the changes in the composition of the commodities. Through the reconstruction of the index on the basis of a revision of weights at regular intervals of say, five years, accommodation is made for expected changes in product composition and variety as well as the general pattern of contribution.

SUMMARY AND RECOMMENDATIONS

Following an outline of the objectives of the paper, a consideration of methodological issues for deriving external trade indices show that their direct computation could be done with satisfactory results. Vital to this are accurate, reliable, and adequate primary data coupled with painstaking

calculation procedures. The results that emerge can effectively serve the various analytical and instrumental uses enumerated and the validity checks appear to confirm their plausibility.

This project presents two sets of price indices—base-weighted and current-weighted. Although they are conceptually different and sometimes used for different purposes, the exercise has revealed that in Nigeria's case, trends in both indices may not be significantly divergent. While the two series will be continued simultaneously, it is recommended that the Laspeyres (base-weighted) index be published while the Paasche (current-weighted), which is compiled as a by-product of the Laspeyres quantum index calculation be kept in files for instrumental uses such as the deflation of appropriate national accounting components.

Priority attention should be given to the calculation of current short-term measures, firstly for exports then imports, since they are regularly required for the evaluation and revision of current monetary and fiscal policies. Particular attention should be paid to proper scrutiny of unit value data in the collation stage at the F.O.S. Regular reviews of the weights and coverage should be carried out at the Bank. In order to yield more useful series for historical analysis, the construction of a backward-looking annual indices with say, 1970 as base, is necessary to create a link-up with the present series and the old series (i.e., 1948-1954, 1954-1964, 1964-1970, 1970-1974).

The present exercise has been handled manually because of the short period covered. But in order to cope with the volume of work involved and obtain fast and accurate results as proposed above, adequate staff resources and computational facilities will be needed. Therefore, the Federal Office of Statistics and the Central Bank of Nigeria should muster resources towards a joint arrangement which will ensure the updating of present series and the bridging of old gaps.

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APPENDIX A
EXTERNAL TRADE INDICES OF NIGERIA, 1948-1964

Index numbers of volume and prices of exports, imports and terms of trade, dating from 1948 have been compiled and published by the Federal Office of Statistics. In 1954, following a revision of trade classification, there was a break in the existing series, and a new series with 1954 as base was introduced. These second series were published until 1964 when further compilation of trade indices was discontinued. Notes on the compilation of these series are contained in *Supplement to Digest of Statistics*, Vol. 5 No. 1, January 1956, and *Supplement to Digest of Statistics*, Vol. 5 No. 3, July 1956. Appendix B is a table showing the coverage and weights for the 1954-based import indices. And Appendix C includes tables of various trade indices between 1948 and 1964.

The broad objectives for compiling these indices are the same as those of the present project and in both cases, all the calculations are based on the same source of official statistics. In the 1948-based series, 19 export items with a coverage of 96 per cent, and 56 import items with a coverage of 65 per cent were used in the calculations. In 1954, selected items were 21 and 109 in number, with coverage of 95 and 76 per cent for exports and imports, respectively. Al-

though the basic principles applied in calculating the 1948-54; and 1954-64 series appear to be the same as those of the present exercise, certain methodological differences can be observed. Several deficiencies in the former system can be noted in the summary of the methodology cited above, especially in areas of calculation procedure. The handling of coverage and coverage adjustment, scrutiny of selected items to ensure consistency of unit values and corresponding quantity adjustments, are some issues which might have been deficiently handled or completely omitted. For example, it appears more emphasis was laid on achieving high coverage than precision through proper scrutiny and selection of homogeneous items followed by appropriate coverage adjustments.

For an economy like Nigeria, with an ever increasing sophistication and variability in international trade, what appeared to be minor omissions and mistakes in methodology must be taken care of regularly in order to derive relevant and precise indices. The present exercise only attempted to do this. Nevertheless, for long-term data need in the area of external trade indices, the 1948-1964 series are very useful.

APPENDIX B

IMPORTS: QUANTUM AND PRICE INDEX NUMBERS 1955. (1954 = 100)
COVERAGE AND WEIGHTS APPLIED

S.I.T.C. Sections	1954 Value (£'000) of Total Imports by Sections	No. and Value of Items Selected		Percentage in 1954 of			Weight (%) 1954
		No.	Value (£'000)	Sectional Totals to Total Imports	Selected Items by Sections	Coverage (%) Col. 4/Col. 2	
0. Food	12,031	6	10,217	10.6	11.9	84.9	10.7
1. Drink & Tobacco	4,445	2	3,907	3.9	4.5	87.9	3.9
2. Crude Materials	1,532	1	1,409	1.3	1.6	92.0	1.3
3. Mineral Fuels	5,599	5	4,699	4.9	5.4	83.9	4.9
4. Animal and Vegetable Oils and Fats	32	1	24	0.0(3)	0.0(3)	75.0	0.0(3)
5. Chemicals	4,786	21	2,540	4.2	3.0	53.1	4.2
6. Manufactured Goods	54,234	29	45,175	47.6	52.3	83.3	48.8
(i) Textiles							(29.3)
(ii) Metals							(12.7)
(iii) Miscellaneous							(6.8)
7. Machinery & Transport Equipment	20,053	20	3,086	17.6	15.1	65.3	17.8
(i) Machinery							(8.2)
(ii) Transport Equipment							(9.6)
8. Miscellaneous Manufacturers	9,420	24	5,388	8.3	6.2	57.1	8.4
9. Transactions	1,937	-	-	1.6	-	-	-
Total Imports	114,069	109	76,445	100.0	100.0	75.9	100.0

APPENDIX C

APPENDIX C1

INDEX NUMBERS OF THE QUANTUM OF IMPORTS AND EXPORTS, 1949-54
(1948 = 100)

Period	Imports				Domestic Exports
	Food, Drink and Tobacco	Textiles and Clothing	Metals and Engineering Products	Total (Including Miscellaneous Items)	
1949	134	144	150	137	121
1950	152	131	176	145	123
1951	205	136	174	159	118
1952	201	214	215	206	123
1953	235	106	242	219	139
1954	309	248	264	258	145

APPENDIX C2

INDEX NUMBERS OF THE QUANTUM OF IMPORTS AND EXPORTS, 1955-65
(1954 = 100)

Period	Imports—S.I.T.C. Sections (a)										Total All Sections	Domestic Exports
	0	1	2	3	4	5	6	7	8			
1955	108	110	108	118	140	151	121	133	139	124	99	
1956	137	116	117	129	105	173	130	144	166	138	110	
1957	150	114	107	146	170	182	127	133	148	134	106	
1958	150	112	117	165	251	185	140	172	174	151	105	
1959	177	117	116	187	346	225	139	201	198	164	126	
1960	202	121	120	194	288	256	164	226	271	192	124	
1961	190	117	130	230	262	263	173	219	283	195	147	
1962	221	95	134	236	332	349	145	199	247	182	156	
1963	166	56	170	253	388	386	152	195	246	177	162	
1964	157	61	194	289	678	425	176	310	256	213	181	
Quarters:												
1964	March	143	62	191	226	588	447	179	244	301	210	176
	June	133	41	181	371	688	402	134	275	190	179	188
	September	140	67	165	319	775	454	174	315	239	210	198
	December	223	75	235	243	722	447	199	356	305	240	151
1965	March											
	June											

Source: Federal Office of Statistics, Lagos.

Notes: 1. The present Quantum and price Indices for external trade are based on 1954 as it was in the year that the S.I.T.C. was introduced in the official trade statistics. Both indices are based on the calculation of average unit values of selected S.I.T.C. items in each S.I.T.C. division and these items cover about 76 per cent of all Imports and 98 per cent of all Exports. Further information concerning the calculation of these indices can be obtained on application to the Office of Statistics.

APPENDIX C3

INDEX NUMBERS OF IMPORT AND EXPORT PRICES, 1949-1954
(1948 = 100)

Period	Imports				Domestic Exports	Terms of Trade
	Food, Drink and Tobacco	Textiles and Clothing	Metals and Engineering Products	Total (Including Miscellaneous Items)		
1949	105	101	104	102	104	102
1950	117	100	104	105	115	110
1951	131	132	125	130	157	121
1952	138	129	145	137	163	119
1953	138	107	136	122	142	116
1954	134	96	132	114	158	133

APPENDIX C4
 INDEX NUMBERS OF IMPORT AND EXPORT PRICES, 1955-1965
 (1954 = 100)

Period	Imports—S.I.T.C. Sections (a)									Total All Sections	Domestic Exports	Terms of Trade	
	0	1	2	3	4	5	6	7	8				
1955	100	104	104	98	64	98	92	110	97	98	88	90	
1956	97	104	106	102	87	94	96	112	97	100	83	83	
1957	105	110	115	100	82	94	94	121	103	102	84	82	
1958	101	113	112	97	81	101	88	119	102	99	85	86	
1959	98	111	115	100	71	97	89	114	104	97	89	92	
1960	99	115	116	97	69	101	92	123	110	102	90	88	
1961	101	118	123	102	75	100	92	121	107	102	84	82	
1962	88	124	117	116	79	91	92	125	115	101	80	79	
1963	103	116	107	112	58	96	98	127	117	107	84	79	
1964	102	108	133	126	59	99	100	134	129	110	86	78	
Quarters													
1964	March	119	114	124	129	68	101	97	117	124	108	85	79
	June	113	110	114	122	55	104	119	149	110	125	75	60
	September	112	109	90	146	57	100	102	142	130	114	85	74
	December	106	114	106	108	55	102	103	136	171	130	80	62
1965	March												
	June												

Source: Federal Office of Statistics, Lagos.

Notes: 1. See page 60.

2. The index of the terms of trade is calculated by dividing the price index for Domestic Exports by the price index for Imports; it is thus an indicator of the quantity of imported goods that can be obtained in exchange for a constant quantity of Nigeria's exports. Because the base year of the index (1954) was one of inflated cocoa export prices the terms of trade since 1954 appears to have been unduly unfavorable.