PRICE STATISTICS REQUIRED BY DEVELOPING COUNTRIES FOR NATIONAL ACCOUNTING PURPOSES

Availabilities, Limitations and Priorities

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In both developed and developing countries, the national accounting statistician who wishes to establish a composite set of values in current and base year prices is faced with a series of difficulties arising from a lack of indicators which are adequate for relating quantities and values within the national accounting framework. Consequently, *ad hoc* solutions are extensively adopted and use is made of price data which in the majority of cases have been collected for completely different purposes. The inter-relationship of prices, quantities and values fundamental to the compatibility of the national accounts can therefore be, and often is, a rather tenuous one. In the case of many developing countries, the situation is accentuated by a very volatile behaviour of prices, a greater impact of price change and a much greater scarcity of useable statistical material. In addition, since structural change is frequently implicit in a development process, the pattern of values and of prices is often variable and irregular—this in turn creates problems in determining relative importance, in assigning weights and in imputing for prices of items not directly entering into the calculation of the indicators.

This paper analyses the series which are most commonly available, it points out the major deficiencies or limitations and it attempts to formulate a few guide-lines for determining priorities called for in an integrated network of price statistics.

PRELIMINARY NOTE

The present paper has been prepared largely on the basis of the author's experience in Latin America where the problem of volatile price levels and rapidly changing structural patterns is generally more extreme than in other developing regions. As a result, the paper may attach rather more importance to inflationary conditions and disparate price movements than would be so if some other environment had furnished the background material.

However, even in developed countries such as Canada, the United States, Western Europe and Japan, postwar price changes have been significant —the 1968 level being for instance, from 14 to 28 per cent above that of 1963 (giving an average rate of inflation varying from $2\frac{1}{2}$ to 5 per cent annually). So far as developing countries are concerned, some—including a few in Latin America—kept prices almost stable; the majority followed the trends in the developed regions; others, like Spain, Zambia, Ghana, India, Iceland, Yugoslavia and Laos, had above-average price changes; while within Latin America were the extreme cases of Argentina, Chile, Brazil and Uruguay where inflation proceeded at rates ranging from 50 to 200 per cent per annum. In such circumstances, it is obvious that for a great many countries, present-day price rises are sufficiently important to demand the special attention of national accounting statisticians and economists—this being particularly so for countries in a state of economic transition where patterns of expenditure, investment, trade and production are changing and varying influences apply to the component sectors of the national accounts.

This paper attempts to analyse the main price series available, to point out

some of the difficulties inherent in price measurement or price deflation and to suggest some scale of priorities which might be adopted in order to meet the most urgent needs of the developing countries and make the best use of scarce statistical resources. While the author is a staff member of the United Nations Economic Commission for Latin America (ECLA), it should be noted that the views expressed in the paper represent his own personal opinion and may not coincide with those of the ECLA Secretariat.

1. The Price Role

In principle, the price indicators needed by the developing countries for national accounting purposes are no different from those of the developed economies. In both cases, the accounts require a set of prices compatible with a statistical framework covering main components, groups of items and overall aggregates, arranged according to recognized classifications, valued in given terms and priced at specific points or under specific circumstances. Essential differences nevertheless exist in the importance which developed and developing countries attribute to price behaviour, in the priorities given to the collection, elaboration and presentation of the indicators, in the availability and reliability of the statistics and in the uses which can be legitimately made of them.

These differences result from a number of factors. In the first place, the lack of adequate statistical resources and an established statistical environment restrict the collection and elaboration of fully satisfactory series in the majority of the developing countries; secondly, for many of the latter—particularly in regions such as Latin America—inflationary conditions prevail which make the precise measurement of price changes more important and more difficult; thirdly, for countries whose economies are in a transitional stage, price changes tend to apply unevenly to the component sectors; fourthly, the structure of production, consumption, income distribution, and investment is likely to be more fluid in a country at a developing stage, with a consequential impact on the weighting patterns which apply to the prices; additionally, a greater importance is attributed to price levels of internationally-traded commodities because of the larger dependence of the developing countries on foreign trade; while finally, a more limited availability and quality of related value statistics in the developing countries seriously affects the type of price indicator which can be applied to them for national accounting purposes.

Hence, while on the one hand, prices tend to have a more direct impact on the economic growth of the developing countries, the problems in their measurement are more formidable, the resources available for their collection and elaboration are more limited and the resultant series are generally less complete and less informative than in countries where the statistical system is more sophisticated and the monetary environment a stable one.

2. The Available Series

Very frequently, the useable price information in developing countries is restricted to a consumer price index for the capital city; a wholesale price index covering manufacturers' or distributors' prices in a few specific markets (often

using out-moded or non-representative weights); a limited amount of producers' price material for the primary, but not the processing or manufacturing industries; some reasonably good information for the unit values of internationally-traded goods (priced at the customs frontier); and a heterogeneous collection of data of varying reliability covering such aspects as construction costs, wage rates in selected industries or unit charges for services like transportation and public utilities. In addition, there will generally be a few census enquiries with some quantities or values which can be used for deriving indicators in a unit or *per capita* form. The national accounting statistician is expected to utilize this information in such a way as to build up an interrelated set of national accounting estimates expressed in current and in constant prices. How this is done will depend both on his ingenuity and on the availability or reliability of the various statistical series. In nearly all cases, stop-gap measures must be adopted, since in very few instances do the existing price series (or those which can be elaborated with a minimum of work) correspond precisely to the quantity or value series within the accounts.

Much, too, will depend on the methodology used to construct the national accounting series. A conventional procedure is to develop a set of basic estimates for a bench mark period, e.g. a census year, in accordance with one of the accepted methods of national income estimation—this being in the majority of developing countries based on an output approach, seeing as the availability of data is usually superior to that for either expenditure or income and the results are normally of greater interest in policy making. The overall total thus obtained is then used as a "control" for other breakdowns—the customary practice being to establish firm estimates for the more readily calculated sectors (e.g. fixed investment, governmental expenditure, etc.) and to deduct these from the already-established total. In this way, a residual is left which by its nature contains the net error of other sectors plus the gross error of the original total. Estimates for other periods are made in a variety of ways. They may be calculated independent of the bench-mark figures or, more commonly, by applying indicators to the basic estimates which reflect subsequent changes in the prices, the quantities or the values. In some cases, the constant price series is established first (particularly when an output approach is used) and the current value series built up from it; frequently, the constant price series emerge from the deflation of a pre-established current price series; in other cases, the two series are established separately, prices then having an implicit function only; and finally, they may be calculated interdependently, with quantity, price and value data utilized in either series according to the nature of the component items and the availability of the statistics. It is in fact very rare for a developing country to adopt one invariable approach; and a variety of expedients are commonly adopted in order to provide what appears outwardly as a comparable and comprehensive network in base year as well as current year prices.

Since practices vary from country to country, no firm guidelines can be laid down as to the indicators which are normally required and the way in which they can be utilized. An attempt is nevertheless made below to examine the price series which are most commonly available; to assess in rough terms their applicability; to indicate some of the problems which must be faced and to suggest

priorities for filling the gaps or for improving the series so as to meet the more urgent needs of national accounting statisticians and economists. While attention will be drawn to the part which prices play in determining values of the national accounting components over time, a greater emphasis will be placed on their role as deflators, since in the majority of the developing countries value data are estimated directly (as when output is calculated in added value terms or when fixed investment is derived from trade and production statistics). Moreover, since little detailed information is available at the level of items or product classes —particularly in respect of expenditure on the GDP—most developing countries carry out their deflation at a fairly aggregative level. The analysis below will therefore be focussed for the most part on indexes applied globally to aggregates or to broad groups and only to a limited extent on an examination of prices for individual items or product classes.

3. The Consumer Price Index

In practically every developing country, the cost of living or consumer price index plays an important part in linking current and constant price data, since in normal circumstances it is the most accurate measure of purchasing power and price change generally available. It possesses the advantage that it is directly associated with the commodity flows which enter into final demand while through the medium of expenditure it is also related indirectly to wages, salaries and other sources of income. Certainly, so far as an income or expenditure presentation of the national accounts is concerned, the applicability of a consumer price index is generally accepted, since for private consumption— which for developing economies represents about two-thirds of the total GDP—practically the same items enter into the calculation of the values and the index. Moreover, the data in both cases refer to the same type of transaction, at the same point of pricing, with an identical treatment of taxes and of internationally traded items. There are, however, certain obvious divergences. The price index nearly always relates to a particular wage or income group within a main urban area (usually working class families in the capital city), while the value data cover the country as a whole; the index is of a Laspeyres type with fixed weights drawn from an often-restricted and outmoded household expenditure survey—thus failing to take into account changes in availabilities, qualities, consumer preferences and the development of new products which are embodied in the value series; the price index is furthermore affected by seasonal factors which may restrict its reliability when applied to income, expenditure or commodity flows spread throughout the year; it is often influenced unduly by price, production, import or other controls —also by scarcities and black market operations—in a way not reflected in the value statistics; in many countries, the danger exists that the index may be influenced for political purposes, especially in the short-run where a Government may wish to show prices, and hence keep wages, at an unduly low level; while, finally, even if the index is adequate for measuring overall price changes, faulty coverage can render it inaccurate at the group or sector level—thus making it of questionable utility when applied to the expenditure components.

The deflation of expenditure data with an outmoded, non-representative

and incomplete consumer price index can therefore introduce appreciable error which becomes increasingly greater according to the degree of inflation, the extent of change in price structure and the distance in time from the original weight-base. When applied to investment and to consumer durables which by their nature are normally excluded from the index, deflation by a consumer price series has little validity except to the extent that prices in all sectors of the economy move uniformly. This latter is of course a key factor in determining the usefulness of any set of price indicators since, if all prices move in a uniform manner, any index will suffice for deflation purposes. Unfortunately, in those developing countries where inflation is chronic, this uniformity of price change holds true only for limited groups of commodities with similar supply or demand conditions. Thus, at the sub-group level within the consumer price index, one could as a rule expect, say, meat prices to move uniformly. When the commodity group is more heterogeneous, like clothing, different factors frequently affect the components--in which case the price pattern, and the quantitative structure also, can differ appreciably over the course of time. When dealing with a composite of heterogeneous groups or sub-groups such as durables and non-durables, the price dissimilarities will generally be more acute, particularly in a time period long enough to encounter substantial modifications in production techniques, trade and price controls, consumer demand and sources of supply. Hence, in the developing countries—more so than in the developed regions with a more stable economic environment and a less volatile price system—the consumer price cannot be accepted *per se* as an adequate expenditure deflator, particularly at the level of the major components. It is, however, usually the best indicator or set of indicators available; and providing its use is restricted to related aggregates, e.g. private consumption expenditure—also earnings and income—the errors introduced may not be so large as to call for an immediate improvement to the index. In any event, any improvement must generally be co-ordinated with overall statistical policy, since the index is normally designed with other objectives in mind—its application in a national accounting framework being only one of its incidental uses.

The reliability of the index must also be judged in relation to the accuracy of the value data to which it is applied. Thus, if private consumption expenditure is obtained as a residual and value estimates for groups or sub-sectors are derived from an inadequate expenditure survey, there is little justification in striving for a perfection of indexes at the group level and any reasonable series will provide a compromise.

A fairly low priority will therefore be assigned in most developing countries to improving or replacing the existing consumer price series, providing that the weighting is logical and up-to-date, its coverage acceptable, the price changes not too extreme, and the national accounting data of a type where no very great precision is possible for the values or the related quantities. Where, however, a commodity flow approach is used for estimating consumption expenditure, individual prices have a more important role and countries will need to examine critically any indicators derived from the consumer price series. When doubts arise regarding representativity, coverage, reliability and applicability, the statistician may find it preferable to use some alternative series—perhaps specially

collected for deflation purposes—and not rely on the components of an index which can be erroneous or erratic when patterns are subject to change and prices are volatile. For similar reasons, the use of the consumer price index for items other than private consumption expenditure should, under fluid price conditions, be avoided, particularly because of the wide divergence which can be expected in a changing economy for the prices of industrial products, investment and consumer goods.

4. The Wholesale Price Index

The deflator most commonly used, and misused, in developing countries for output and investment data (including changes in inventories) is the wholesale price index.[1] In typical cases, it is a badly weighted series, relating to a limited and not representative selection of commodities, revised at infrequent intervals to take account of structural change, doubtfully accurate at an aggregative level and subject to wide margins of error when applied to items, groups or product-classes. By its nature, it refers not to a point of production but to distribution or intermediate sale; and, except in those cases where the producer also acts as the distributor, the basic data tend to include some intermediate costs like transportation, handling, storage, distributor's commission or profits plus indirect taxes payable up to the point of wholesale. Furthermore, it commonly relates to a single geographical location and fails to take into account regional cost or price variations; the qualities of items priced are not necessarily those of greatest importance for the national accounting sectors to which it is applied; adequate distinction is infrequently made between imported and domestically produced components; while the number of observations is generally insufficient to sustain a group or sub-sector breakdown in the detail required by the national accounting statistician. Since the prices are gross, the index shares the weakness common to virtually[2] all price indicators of being incompatible with net or added values. It is therefore suitable for applying only to those items, sectors or transactions such as investment in plant, equipment and inventories which are also in gross terms—alternatively, to intermediate purchases in those cases where the difference between wholesale prices and prices paid by the producer is negligible (that is to say, when transportation and other costs between points of wholesale and point of input can be ignored). Even in such cases, its weighting system frequently makes the index of dubious validity, since this is often established in a nebulous fashion, without adequate information regarding the distribution, let alone the production or investment pattern.[3]

To improve the situation, a choice has to be made between eliminating the main defects of the index or substituting it with more satisfactory price indicators. Since it is normally designed and elaborated to meet other objectives, little can

[1] In some countries it is even used for deflating governmental consumption and expenditure.

[2] Note that indexes reflecting trade or profit margins are expressed in net terms. Similar margins could theoretically be developed for values added in production; though in practice this is normally not a feasible solution.

[3] In some developing countries, no weighting system at all is used, the assumption being that the number of price observations for each industry is a reflection of relative importance (alternatively, that all price observations are equally good for indicating price change).

as a rule be done to improve the series; and even if its coverage can be extended and its weighting pattern kept up-to-date, it must still remain an unsatisfactory index for most national accounting purposes. In particular, its weights will still conform to a distribution rather than a production or investment pattern; the prices will inevitably remain in gross terms, inclusive of many post-production charges as well as intermediate costs; the distinction between domestically-produced and imported components will probably remain obscure; and although perhaps acceptable under stable conditions or uniform price change, its suitability when price movements are erratic or extreme will in nearly all cases be dubious.

In the circumstances, it would seem preferable to use it as little as possible (e.g. for deflating inventory changes or investment in machinery and equipment) and to look for other indicators which reflect more satisfactorily the price movement of the national accounting components.

5. Producers' Price Series

The series logically applicable to output data are producer rather than wholesale prices. These are commonly used in two ways: first, in the construction of the basic estimates, when price data are applied directly to quantities in order to express production in value terms. This is as a rule possible only for homogeneous product classes, as for example, crops and livestock, timber, minerals, gas and electricity production and certain quantifiable items like telephonic communications and railroad transportation. The prices concerned may relate to consecutive time periods (for the current price series) or to a fixed period (for data at base year prices). Their second application is in the deflation of existing value series—alternatively in the derivation of current price series when the basic data are established initially in terms of base year prices.

Unfortunately, suitable producer series—either as price quotations or as price indexes—are conspicuous by their absence; and those that do exist are (like wholesale prices) in gross terms. They include the price element relating to intermediate purchases, and often post-production costs such as transportation, distribution and commercialization (depending on the point at which the prices are collected).[4] Furthermore, they generally refer to specific markets or locations and thus tend to ignore regional differences—the problem being particularly acute in developing countries where information from rural areas is often meagre and of questionable accuracy. In addition, they frequently refer to qualities, to transactions and to conditions of sale not typical of production as a whole. In the same way, the items selected may no longer be (or may never have been) representative; indirect taxes are often included; and when prices are averaged for the whole year, they can fail to take into account a production flow which is spread unevenly during the various months. For agricultural and mineral production in some of the countries, special problems may arise, as when prices are derived from trade statistics which reflect nominal rather than transaction values. In many developing countries (especially in the southern hemisphere),

[4]In some cases, countries will endeavour to adjust their prices for this—though more frequently the index is applied "as is," any adjustment being made to the values, *post hoc*.

agricultural statistics suffer from the further defect that the values and prices may relate to a different time period—values being based on quantities produced during the crop year (e.g. July to June) and the price deflator to a calendar year in conformity with other indicators or the rest of the national acccounts.[5]

With regard to inputs, prices are generally available for isolated industries or activities only. At times, prices paid by farmers are tabulated while costs in the construction industry—usually of principal materials only—are also collected. In addition, some mining and public utility cost data may provide an indication of price change; but for the majority of activities countries tend to fall back on the wholesale price index (one of its least objectionable applications) or else ignore the input problem entirely. That is to say, in the latter event they adopt a single rather than a double deflator technique and assume that productivity changes are negligible. This question has admittedly little significance for the primary industries and the service activities where intermediate purchases are relatively small and productivity changes not very far-reaching. Nevertheless, changes do occur in extraction techniques, in labour efficiency, in farming methods, in the use of equipment and in managerial or administrative ability—thus necessitating either separate treatment of inputs and outputs or adjustments to the gross price indicators wherever these are utilized over any lengthy time period.

There still remains the problem that supply prices as such are not always compatible with the national accounting data to which they are applied. In this respect, much depends on the way the values are obtained and the price conditions applicable. Where rightly or wrongly some particular price series has been utilized in constructing the value estimates (as in Bolivia where mining is valued at the export price less an allowance for inland freight and similar charges) the same price series should be used reciprocally to relate current and constant price data. In all cases, the indicators ought thus to reflect as closely as possible the conditions which were implicit in the value estimates. (Hence, when production refers to non-calendar years, the price series should also be on that basis.) Considerably more freedom is possible when the monetary situation or the production structure is stable since price movements will then be small and the difference between one indicator and another unimportant. When, however, the production pattern changes rapidly (as in developing countries passing through an early stage of import substitution and industrialization) or when prices are subject to frequent, violent or erratic change (as in Brazil for recent years), more care needs to be exercised in the choice of the indicators and in their application to the national accounts.

The way in which improved indicators can be developed will inevitably depend on the statistical possibilities and the obstacles faced by each country. For many, it should not be too difficult to develop satisfactory supply prices for the primary industries. For manufacturing, the problems will undoubtedly be greater; but if carried out in conjunction with annual, quarterly or monthly production enquiries (normally necessary for the calculation of quantum series) data indicative of prices paid and received by representative firms and establish-

[5]Even for manufacturing, the values frequently refer to the financial year adopted by individual firms for balance sheet or tax purposes. This may or may not be the calendar one. Price series however are nearly always on the calendar year basis.

ments can perhaps be collected. Construction is likely to raise difficulties especially if countries are to get away from the traditional "cost of input" approach when estimating the price changes applicable to output. Once more, the problem is not insuperable, providing adequate statistical resources can be found in order to obtain representative data reflecting final costs (perhaps based on a sample of construction processes or specified types of finished construction, e.g. houses, schools, roads, etc., of given size and material). A still greater problem is the services sector where output is difficult to value, let alone to price. Where for instance, output is measured on a net or marginal basis, e.g. wholesale and retail trade, or the services of financial intermediaries, the statistician may find it more practical to adopt alternative methods—calculating current and constant values independently in order to avoid deflation, or else using *quasi*-price indicators of the type discussed later in this paper. As already indicated, decisions must depend on the situation prevailing in each country; and, as with other sectors for which supply (and input) prices are desirable, the improvement of the indicators ought normally be co-ordinated with an overall statistical programme in order to make optimum use of scarce statistical resources.

6. External Trade Prices

For practically all developing countries, the most reliable statistics are those relating to international trade. As a result, the trade sector of the expenditure account ought to be the easiest to deflate, and the results the most reliable. In actual practice, this may not be so, for a variety of reasons. In the first place, it covers not only merchandise but also services; and while full data are available for the former, exceedingly little is known regarding the latter. In consequence, a sub-sector which may be sizeable in a country like Mexico (where tourism is important) may not be adequately covered by price indicators. Secondly, trade statistics are expressed in terms of quantities and values, prices being an incognito which is derived from the inter-dependence of the three variables. Since trade patterns change considerably from one year to another, and since many items cannot be measured satisfactorily in conventional quantity terms, e.g. machinery or aircraft, unit value indexes do not necessarily provide an accurate indication of price movements. They are moreover currently weighted and in that respect differ from other price series which are generally base-weighted. Thirdly, in some countries mineral or agricultural products (e.g. bananas) may be valued at nominal rather than transaction prices; alternatively, under-invoicing of imports may take place to avoid customs duties, or quantities may be mis-stated to circumvent licensing regulations. Fourthly, the statistics commonly refer to the month or year when the customs entry is registered—which may differ substantially from the time of purchase, importation or use (as in the case of bonded goods, of imports by the government and of imports liberated provisionally pending clarification of regulations concerning the duties payable). Finally, the trade balance, which is the element often shown in the national expenditure account, cannot be deflated satisfactorily with a single indicator and calls for separate treatment of imports and exports (as well as a sub-division between goods and services) in order to give a statistically-sound result.

For the majority of the developing countries, an improvement to the price or unit value indexes will nevertheless have a low priority, since standards of accuracy are by and large much higher than those of other indicators. Moreover, with a few exceptions, e.g. Venezuela, the trade balance is small in relation to the total GDP; and only when services are important or when trade valuation methods are dubious would urgency for improvement appear to exist.

7. Quasi-price Indicators

For some aspects of income, expenditure and output, e.g. governmental consumption expenditure, professional and personal services, transportation, etc., price data are not normally available and *quasi*-price indicators, like average *per capita* salaries, earnings, profits, etc., or unit costs and charges have to be utilized. In a few instances, these indicators are already in index form, as when an existing wage rate index can be utilized. More frequently, the data require some prior elaboration before being applied within the national accounting framework.

A principal use of the *quasi*-price material is to construct a series in current prices—the average wage rate, income level, transportation charge, etc. being applied to appropriate quantity data in order to provide values in the prices of each accounting period. The same *quasi*-prices may serve as deflators in order to obtain the equivalent constant price series—though the latter may also be obtained more directly by extrapolating base year values with the quantity indicators. In this latter case—also when the two series are calculated independently—deflation is avoided and the prices or *quasi*-prices are merely an implicit link between the two sets of figures.

The problems and defects of the *quasi*-price indicators stem largely from, in many cases, a rather tenuous association with the value series, an over-reliance on the accuracy of the original data (as when total earnings are divided by numbers employed in order to arrive at an average *per capita* income), an inadequate weighting system plus all the limitations of a single indicator system which ignores changes in productivity. In this connection it is to be noted that when applying many indicators, input prices are considered to be indicative of output prices—as when wage rates are used in place of end-product prices. In the developing countries, two conflicting influences support the contention that an analogy of this kind is valid only in a very short run. On the one hand, the development of secondary and tertiary industries creates a pressure on already scarce supplies of qualified labour—wage rates tending to rise, *ceteris paribus*, faster than productivity. On the other hand, increased literacy, better education, newer techniques, changes in the capital/labour relationship, more efficient administration and organization tend to promote a growth rate for productivity which is more rapid than that suggested by the labour inputs. This applies not only to industry but also to the service activities such as transportation and communication where a more intensive as well as a more extensive use of equipment (e.g. jet aircraft and micro-wave transmission) plus a rapid improvement in the infra-structure (better roads, better traffic controls, a radio-communication network, etc.) have affected productivity in recent years and will no doubt

continue to do so in the future. Even for the commercial sector, including banking, insurance and other financial intermediaries—and to some extent even the government sector—the adoption of new techniques e.g. electronic computers is influencing output; and uncorrected indicators based on wages, income or service charges can well lead to errors in the national accounting data.

Since productivity studies are complicated and generally imprecise (the basic data being rather crude and the resulting co-efficients insensitive to small changes), allowance for productivity is exceedingly difficult. *Ad hoc* adjustments may therefore leave the data even more inaccurate than they were originally. A more practical solution would seem to be a frequent change in the reference year, or a frequent revision to the benchmark data, so that no series is carried forward long enough for it to be influenced seriously by a modification to the input-output relationships.

The desirability of replacing *quasi*-price indicators by actual prices is of course self-evident, though in most cases the nature of the national accounting series may make this difficult or impossible. For example, in the case of wholesale and retail trade (which is specifically mentioned since in some developing countries, e.g. Guatemala, it can represent as much as 25 per cent of the total GDP), price series are not feasible and current and constant price data have to be established independently or reliance placed on estimated margins. Unfortunately the information needed to establish the latter is nearly always inadequate and across-the-board margins are customarily applied in accordance with perhaps a sample enquiry, but quite often only the subjective judgment of the national accounting statistician. Substantial room accordingly exists for improvement in this and in related fields; and even though few developing countries are as yet relying on a commodity flow approach for expenditure measurement (fixed investment being a notable exception), this situation is gradually changing as more and more use is made of input-output matrices for the inter-relation of production flows and final demand. Fairly high priority would therefore seem justifiable for the improvement of the *quasi*-price series, beginning in most cases with those service sectors such as trade or finance where the data are the weakest and the impact of inaccuracies the most far-reaching.

8. Special Problems

(*a*) *Non-commodity Flows*

One of the most difficult aspects of national accounting deflation is the expression of non-commodity flows in constant prices; and any method of effecting this must necessarily involve a large element of arbitrariness.[6] Distinct from the commodity flows which comprise the major portion of the accounts, no transactions take place to which inter-related prices and quantities can be assigned and no deflators can be fully adequate. The main sectors concerned are those relating to the distribution of national income (earnings, profits, interest, etc.), taxes, transfer payments and savings, the consumption of fixed capital, net factor

[6]On this and related points, see Richard Stone, *Quantity and price indexes in national accounts*, OECD (Paris), 1956, pages 89–96.

income from abroad, the terms of trade effect, and the inevitable "statistical discrepancy."

In some cases, an *ad hoc* solution can be found by applying a price series which has some relation—albeit indirect—with the non-commodity flow. Mention has, for instance, already been made of the customary practice of deflating *income* data by the consumer price index—the reasoning being that it measures fairly well any price movement for goods and services purchased with such income. To the extent that there are no time lags and that savings, investment and transfer payments are ignored—alternatively that price changes for the latter follow the trend of consumer prices—this reasoning can be considered acceptable. However, savings are in many countries a substantial part of the total; while price movements for consumption and investment goods in developing countries tend to follow very divergent trends (the dominant influence for the prices of many investment goods being overseas prices plus the exchange rate—these factors having only an indirect impact for consumption goods and services which are principally of domestic origin.) In many cases, *savings* are accordingly deflated in a makeshift fashion by applying an indicator which approximates the price movement for investment goods (sometimes based on a wholesale price series, sometimes on external trade statistics and sometimes on specially collected data). In doing so, the assumption is implicitly made that the savings are invested entirely within the country in producers' durables, transport equipment and construction—thus ignoring land, inventory changes, the foreign trade balance, all investment abroad plus deferred consumption expenditure.

In many countries, *governmental receipts* are dealt with on the assumption that they are partly analogous to investment and partly to consumption expenditure, particularly salaries and wages. When available, the corresponding price or *quasi*-price indicators are therefore applied for deflation purposes. When no suitable price indicator can be found—as in the case of *transfer payments* and, according to viewpoints in some countries, profits, the income of unincorporated enterprises, interest on public or private debt, etc., the expedient is frequently adopted of applying an implicit price deflator which is derived from some related aggregate, such as the GDP total or a component sector for which values have already been established in current and constant prices. This method certainly has the advantage that it reduces the discrepancies between the totals for the various accounts—most of all when part of the aggregate is calculated as a residual. It is, however, only a makeshift arrangement which, because of its arbitrariness, cannot achieve any high standard of accuracy.

Net factor income abroad is occasionally deflated by indexes reflecting price movements overseas, though more commonly national indicators are applied, sometimes based on unit values from trade statistics and sometimes on a consumer price series. For the *terms of trade effect*, the conventional import or export unit value indexes are accepted as appropriate, though opinions differ as to the manner in which they should be applied. The most common practice is to deflate the current value of exports by both export and import unit values and calculate the terms of trade effect as a residual (this being automatically at

base-year prices). An argument can however be sustained for applying the same indexes to the value of imports, thus arriving at an alternative and equally logical result. The problem stems from the fact that the terms of trade effect is, as its name suggests, not a merchandise flow, and has moreover various interpretations according to the algebraic sign of the balance and the period during which any surplus is spent or deficit repaid.

In general, it may be said that the problem of deflating the non-commodity flows is a conceptual one; and unfortunately no system has yet been devised whereby both commodity and non-commodity flows can be combined in a precise unequivocal manner for establishing inter-related values in current and constant prices. As in the developed countries, the national income statistician will therefore be forced to exercise his ingenuity, using price or *quasi*-price indicators which appear to be fairly well related to the value data and to rely on a reconciliation of aggregates to control the size of any resulting error.

(*b*) *Non-marketed Commodities*

In many countries, especially in the less-developed regions, some of the population is located wholly or partially outside the market economy. As a result some flows may escape measurement, or present difficulties when an attempt is made to express them in quantity, price and value terms. Typical examples relate to the auto-consumption of farm products, the owner-construction of homes and other buildings plus the production of clothing, furnishings and sundry items for own use or for exchange within the confines of the local (non-market) economy. The magnitude of the output involved and the method of attributing prices or values to the components naturally vary from country to country according to the geographical environment, the means of communications, the literacy of the population, the type of production and the adequacy of the statistical services. In many cases, only part of the product-flow escapes direct measurement—financial or economic pressures, storage and deterioration problems often compelling producers (particularly those at the margin of the market economy) to trade some of their output immediately, notwithstanding the marketing or locational difficulties which may prevail. Producers subsisting entirely on their own production are (in Latin America at least) normally those in extremely primitive and isolated areas, e.g. the jungle regions of Brazil and Colombia. For the remainder, their inclusion in the national accounting aggregates depends largely on the character of the statistical services and the extent to which available resources are sufficient to overcome geographical, educational and other difficulties when enquiries of a censal, inter-censal, sampling or *ad hoc* nature are carried out.

The problem of assigning prices to the subsistence sector has to be considered in two ways. For changes over time—as in the deflation of current values or vice-versa—some reasonable method of imputation can generally be worked out since the price trend for similar products in the market and non-market sectors is not likely to diverge very much. The main difficulty arises in determining an absolute price level which is appropriate for calculating the value of production or consumption in current or in bench-mark periods. In this case, a means must be devised for estimating value on a supply-price basis (e.g. farm-

gate prices for crops and livestock). Where part of the production is sold, the same or similar prices can be applied—providing always that one can obtain the information. When the latter is impossible or when none of the output moves into the market economy, prices in the most appropriate nearby market ought to be used (adjusted if possible for transportation and other intermediate charges).

The problem is of course not one peculiar only to pricing, since still greater difficulties have to be faced in quantifying the non-market sector (quantities being notoriously more difficult to estimate than prices). The solution to the price problem will therefore depend very much on the treatment given by each country in its national accounts to the quantification and valuation of the subsistence sector—this, as pointed out earlier, depending on a multiplicity of variable factors including the resources which a country is willing to set aside in order to obtain meaningful statistics. In particular, the relative importance of the sector will have to be considered since in some cases—as in Africa or South East Asia—it is likely to be highly important; in others, e.g. in the temperate zone of Latin America, negligible, in which case greater priority will very likely be given to the solution of other problems of greater consequence within the national accounting system.

9. Requirements and Priorities

From the preceding sections of this paper it will be seen that in the developing countries (and, even in countries with a more developed economy and a more sophisticated statistical system) the price indicators adopted for building up the national accounting estimates are often subject to shortcomings which curtail their reliability and usefulness. In the first place, it rarely happens that the price series are specially calculated for application within a national accounting framework—the customary procedure being to make the best use of whatever indicators are currently available, applying them to that part of the national accounts to which they appear relevant. Since, however, the available series are nearly always designed for other purposes, their relevancy or their applicability in a national accounting context is often questionable. This is particularly the case for indexes when the weight-base is remote, the coverage restricted, the representativity limited, the price movement substantial and the structural patterns variable in respect of both values and quantities. When prices move slowly, or when changes apply uniformly, the errors introduced through the adoption of non-representative indicators are very much reduced. However, for many developing economies (particularly those where pressures on the balance of payment are severe), inflation is chronic and prices are extremely volatile. Furthermore, trade barriers, exchange and price controls, tax policy and general demand/supply factors tend to apply unequally to each sector or sub-sector of the economy so that uniformity of price change can be expected only in very general terms.

The effect of using unsuitable price indicators, either for building up the basic value series or for deflating current price estimates can in such cases be appreciable. This is particularly so when a general price series, e.g. the consumer price or wholesale price index is applied in global form to loosely-related or to

heterogeneous components, e.g. to consumption and investment; to goods and services; to durables and non-durables; to imports and local production; to traditional and non-traditional products; and so on. When price changes follow distinct trends for each category (and within the categories, for each homogeneous group), it is obvious that as far as possible separate price series should be adopted, with a weighting pattern and a representativity which conforms to the particular product-mix or item-mix inherent in the national accounts. In the same way, the pricing conditions should correspond to those used in determining the values—supply prices being adopted for output, purchase prices for inputs, retail prices for private consumption expenditure, and so on. In each case, the price quotation should exclude (or include) those marginal elements which were omitted from (or included in) the value of the respective components —failing which, appropriate adjustment ought to be made to offset wrongly included (or excluded) elements.[7] Adjustments of some kind should, if possible, be likewise made to take account of both quality and productivity changes, most of all when the price series extend for any lengthy period (i.e. over and above a few years) and when technological progress is rapid or appreciable. This is however a difficult solution and countries may find it preferable to reduce the impact of such changes by a frequent revision of the time-base.

For those sectors where no price series are normally available—notably the non-commodity flows—the problem is a conceptual one which can only be solved in an arbitrary way by applying price indicators which are related indirectly to the particular value data. This problem is however one which applies equally to developed and developing countries, and falls largely outside the scope of the present paper. For subsistence agriculture, owner-construction of dwellings and other items which tend to lie beyond or at the margin of the market sector, some method of imputation or estimation based on equivalent prices for marketed items ought to be used. Care must however be exercised to ensure that the prices chosen are consistent with those implicit in values independently assigned to the non-market sector.

Finally, all prices should be obtained, elaborated and applied in such a way as to provide a network of indicators compatible with the national accounting framework. That is to say, they should be arranged, classified and where necessary sub-divided so that they are individually applicable to each cell of an accounting matrix and thus provide a satisfactory measure of uniformity and compatibility for the various components, for overall aggregates and for series in current and constant prices. This in turn necessitates a high degree of consistency for price indicators, *inter se*, and *vis-a-vis* quantity and value data. Where, for instance, extensive use is made of fixed weight quantum indexes for extrapolating benchmark series, the price indicators should preferably be of the Paasche type. (Where moving current weights are not practicable, the weights should at least be up-to-date and subject to frequent revision to reduce the effect of structural change.) On the other hand, where the principal constant price series are obtained by deflating current values with a fixed weight price

[7]If output is valued at factor cost, prices should for instance exclude indirect taxes. For some items, e.g. tobacco, alcohol and gasoline, changes in the level of taxation in successive time periods can be substantial.

indicator (e.g. the consumer price and wholesale price indexes), consistency would demand that remaining price deflators be of the same fixed weight type (leaving the constant price or quantity series implicitly with moving current weights).

It will be obvious that for many of the developing economies, especially those where statistical services are still at an early stage, the elaboration of an integrated network of prices is at present too ambitious a proposal; and until adequate resources and background material are available, the countries may have to concentrate merely on eliminating the worst of the weaknesses of existing indicators and/or supplement them with the more readily-calculated indicators. There is furthermore clearly little point in striving for an accuracy in the price indicators much in excess of that possessed by the value or quantity data to which they are applied. Since for the majority of the developing countries, analytical interest is focussed mainly on the dynamic sectors of the economy and since output generally provides the foundation-stone of the national accounting aggregates, a preference will probably be given to improvements of the production price series. This is particularly desirable because of a traditional over-reliance on wholesale price indexes, the widespread use of single rather than double deflation technique and the scarcity of knowledge regarding price behaviour of inputs.

A fairly high priority should probably be given to prices for investment goods, especially as their trend in developing countries can differ widely in relation to other price series. In particular when—as in most countries—estimation of investment values is made with a commodity flow approach, careful attention should be given to production or import prices and to commercialization margins. In the case of consumption goods, the commodity flow approach is at present little used by the developing countries. Nevertheless, if they are to avoid calculating private consumption expenditure as a residual, a better knowledge of prices for component elements is also required, either in relation to production plus commercialization or to final demand (better still, to both). In the same way, improved estimates of wholesalers' and retailers' margins are needed in most countries—most of all since this sub-sector is important and existing information generally very rough. Attention must also be given to the prices implicit (or explicit) in the series for public administration, banking, insurance, transportation and the ownership of property, since direct pricing is difficult and considerable reliance must be placed on *quasi*-prices or indirect methods of estimation.

The priorities which each country may wish to give to the improvement of the indicators will necessarily vary according to circumstances. Much will depend on the statistical resources available, the degree and uniformity of price movements, the extent of change in production, commercialization and consumption patterns, the representativity of the existing indicators and the reliability of the data to which the prices are applied. A country with little price change and uniform price conditions is in a very different situation from one where price changes are both considerable and erratic. Likewise, a country with scarce statistical resources will need to accept standards of accuracy which might be considered deficient in a more wealthy or more sophisticated statistical environment.

Since, moreover, prices are only one aspect of national income estimation and are often established initially for other objectives, steps to improve the indicators should ideally be taken as part of a general statistical programme. Until this has been formulated, the national accounting statistician may be forced to continue using many inadequate indicators—concentrating his efforts on an improvement of those series where he can exert a direct influence (e.g. trade margins) and ensuring that the remaining indicators are used logically and reasonably in conformity with the accounting framework and acceptable standards of accuracy.