PROBLEMS OF DETERMINING AND MEASURING THE RELIABILITY OF NATIONAL ACCOUNTS IN DEVELOPING COUNTRIES

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Most developing countries have compiled national accounts on a regular basis only for the last few years. It has not yet been possible for them to collect many of the statistics necessary to obtain good coverage of their economic activities by methods which would generally be accepted as reliable. Consequently the checks on reliability imposed by the framework of the national accounts are often absent, and the accounts prepared contain many estimates of doubtful quality. These doubts can usually only be removed as statistics collected by better methods become available. This is proving to be a slow process, partly because of the shortage of trained statistical staff and the competing demands of social and demographic statistics and partly because of the inherent difficulties in collecting good statistics from small businesses and traditional households. The need to define traditional households as producers as well as consumers leads to our demanding extra information from this difficult sector. In addition it is often difficult for the national accounts statistician, and even more so for the user, to find out in the time available exactly how some of the statistics with which he is presented were obtained. When this cannot be done it is impossible to assess their reliability. Thus assessing the overall reliability of national accounts in developing countries for even a limited range of uses is at present largely a matter of personal judgment. The information necessary to make more objective assessments rarely exists and hence the problems which developed countries face in using such information are not yet within the experience of most developing countries.

INTRODUCTION

1. I believe that the uses made of a country's national accounts should set the standards of reliability required of them. For this reason I want to refer briefly to the uses made of developing countries' national accounts before turning to the problems of determining their reliability.

2. Countries which we describe collectively as developing differ very much among themselves in the extent to which they have used national accounting as a tool of economic policy or development planning. One development economist at a recent conference felt national accounting had little to offer as yet in planning in his country because the economy was structurally very simple and the urgent needs obvious. Other economists state that in their countries the existing national accounts are already extensively used but that further work is hampered by lack of accounts more comprehensive and reliable than those produced to date.

3. National accounts have been used in many developing countries for the following purposes:

    (*a*) to give policy-makers a grasp of the existing structure of the economy;

    (*b*) to examine particular economic problems in broad outline and to assess the impact of policies designed to cope with them;

    (*c*) to provide a framework within which to set targets or to forecast the progress of the economy;

    (*d*) to assist in presenting the country's case during aid negotiations and to help the donors of aid in forming their own aid policies.

4. Their use for some of these purposes is limited because the accounts so far produced are not detailed enough for more sophisticated work. On the other hand it is questionable whether sufficient use would be made of more sophisticated accounts to justify the cost of compiling them. Outside government there are few domestic users of national accounts in developing countries. In the government service there are usually only a few economists capable of analysing the accounts and their time is partly taken up with other work such as appraising individual development projects. Also with the shortage of trained statistical staff improving one branch of official statistics generally means foregoing improvements in another. At present there is an increasing demand for better social and demographic statistics in addition to national accounts. In these circumstances I feel the national accounts statistician should aim to improve the reliability of accounts sufficient for current uses rather than persuade his government to devote resources to producing sophisticated accounts which in practice may not be used.

5. Even the limited uses of national accounts impose standards of reliability which hardly any developing countries could yet meet. Many improvements can undoubtedly be justified. Assessing the impact of government policies for instance requires good estimates of change over relatively short periods of time and I do not think that successive years' national accounts in many developing countries provide these. Similarly the accounts produced by some of these countries are not yet sufficiently comprehensive to allow the structure of their economies to be fully grasped and in others the accounts are produced so long after the time period to which they relate that important changes will have occurred in the meantime.

6. Generally more than one factor affects the reliability of national accounts for any particular use. I will discuss six factors separately, some or all of which I believe must be considered in attempting to determine the reliability of the accounts for any of the purposes I have mentioned. These six factors are:

(a) the way in which the accounts are constructed;
(b) the coverage of items within an account;
(c) the reliability of the basic statistics;
(d) the effect of definitions relating to the traditional sector;
(e) the reliability of estimates of change produced from accounts for different years;
(f) the effect of delay in producing the accounts.

THE WAY IN WHICH THE ACCOUNTS ARE CONSTRUCTED

7. Given sufficient data to compile the income, expenditure and production accounts independently the framework of the national accounts itself provides quite a powerful check on the consistency of the data employed, and the size of the statistical discrepancy between these accounts becomes a rough measure of their overall reliability. Similarly there are other theoretical identities such as investment and domestic saving plus the foreign balance which if the two sides are estimated independently provide further checks. Strictly speaking these checks

only allow the national accountant to reject, or fail to reject, the hypothesis that the statistics from which he has constructed his accounts are consistent with one another. If the hypothesis is rejected the framework of the accounts does not itself determine where the error lies, although it may help.

8. Unfortunately even these checks are not yet available to many countries since they have insufficient data to allow independent accounts to be drawn up. According to a survey carried out in October 1972[1] hardly any African countries had produced independent estimates of private consumption expenditure. Most had estimated the GDP by an income or production approach. They had then completed the expenditure account by deriving private consumption expenditure as the residual after subtracting each of the other items of expenditure from the income or production estimate. A similar survey of Asian national accounts in 1970[2] found the same situation there. In a number of countries where independent estimates of private consumption expenditure have been prepared the statistical discrepancy has been found to be unacceptably large. Because of the difficulties mentioned below of carrying out successful household surveys in developing countries it is usually the independent estimates of private consumption expenditure that are rejected. It is often forgotten that estimates of some of the other items, which determine the size of the residual, are also weak. Whichever item is derived as a residual, an extra problem is introduced in determining the reliability of the accounts since an important check on the consistency of the statistics used is removed.

THE COVERAGE OF ITEMS WITHIN AN ACCOUNT

9. Developing countries quite naturally limit the number of accounts and tables they present. Few of the English-speaking countries for instance attempt to produce the commodity account. If a whole account is missing the national accounts become less useful although not necessarily less reliable. But where items within an account are estimated from unreliable or incomplete data unreliable inferences can easily be drawn. An example of this poor coverage occurs often in those items relating to transactions with the rest of the world. Invisible transactions present particularly awkward problems of data collection which few countries have yet been able to solve to their own satisfaction despite pressing needs for information on the subject. Where it is known that many transactions go unrecorded it is extremely difficult to determine the reliability of the picture presented by the accounts.

10. Another example is the lack of direct estimation of private consumption expenditure already mentioned. This clearly affects the reliability of the expenditure account, as well as removing the consistency checks provided by independently constructed accounts. A particular problem arises in the coverage of the traditional sector where consumption is often assumed to consist entirely of its own production of goods and services. In reality many of the persons employed in the modern sector retain through the extended family system a foothold in the traditional sector. Some proportion of such persons' expenditures will be on goods destined for consumption there. Similarly, although possibly to a lesser extent, such persons will consume some of the production of the traditional

43

sector. Consequently when the national accounts are used for making comparisons between the traditional and modern sectors the results will be unreliable but little is yet known about the degree of unreliability.

11. No developing country has yet had the resources to carry out those surveys which would be necessary to obtain a really good coverage of all economic activities. For this reason it is common to find estimates of "orders of magnitude" in the accounts. Such estimates if based on the experience of people who know the country well can help in improving the accounts and thus also the structural picture of the economy. It would be unwise, however, to depend on such estimation for many other purposes. The problem lies in determining when an estimate based on experience is sufficiently accurate to be worth including for a particular purpose. This brings us to the question of determining the reliability of the basic statistics themselves.

THE RELIABILITY OF THE BASIC STATISTICS

12. Some of the statistics used in constructing national accounts arise as a by-product of an administrative process and are collected by officials not directly under the control of the statistical authorities. Other data have to be collected by statistical surveys or built up from informed guesses where surveys are not available.

(a) Administrative Statistics

I believe that the reliability of administrative statistics can only be determined by investigating the actual process of collection and thereby establishing exactly what the statistics mean. The problem here is largely finding the time to do this, although it can also be difficult to get administrative officials to understand some of the distinctions which economic statisticians have come to regard as obvious but which are unnecessary for the administrators' purposes. I will give two examples of the dangers of relying on administrative statistics without close investigation.

One example can be drawn from trade statistics which are almost always a by-product of customs control. Sometimes a value is fixed for customs duty purposes which is substantially different from the actual transaction value and in several countries this dutiable value has been recorded without adjustment in the trade statistics. The other example occurred in a country where mineral statistics were collected by mine inspectors whose main duties were to enforce mine safety regulations and make reports used to assess special taxes on mineral production. Since the production did not become liable for tax until it was sold they reported the value of sales as the value of production at the mine. One important mine was stock-piling production in the hope of a rise in prices and the statistics offered by the mine inspectors showed production there as declining when in fact it was quite steady.

(b) Statistics Collected by Surveys

The reliability of data obtained from statistical surveys depends partly on the

ability of respondents to answer the questions put to them. In developing countries respondents can be divided into three groups. Enterprises in the modern sector which keep detailed accounts of their business activities form one group; other "modern" enterprises form the second group; and the traditional sector and households form the third. We can expect different standards of reliability in the data supplied by these different groups and it is helpful when data supplied by each of them is shown separately in the national accounts. Because it is often the larger enterprises which keep detailed accounts this separation in reporting is sometimes done on the basis of size of enterprise. Thus the national accounts of Malawi distinguish the production of large and medium enterprises, small enterprises, and the traditional sector. Hence the user can see immediately what proportions of a given item derive from areas where good data collection is possible and from areas where it is known to be difficult.

Assuming the goodwill of those concerned there is usually little reason to doubt the reliability of data collected from those enterprises in the modern sector which keep detailed accounts, providing the request for data makes clear what is wanted. From such enterprises data is normally collected by postal questionnaires and these, together with the instructions used, are often published in the survey or census report. The national accounts statistician can thus form a reasonable impression of how well the data was collected.

Data relating to small enterprises, which tend to be the most numerous in retail trade and transport, is unlikely to be based on detailed accounts. Sometimes only the total value of receipts can be given by the respondent, and in some cases even this is not available. Many countries therefore limit their detailed enquiries to the establishments of the larger enterprises and collect very limited data from the others except possibly at infrequent intervals. In Ghana the annual Census of Industrial Establishments covers only those employing 30 or more people. Bench-mark data for the smaller establishments was collected in 1962–63 and this, adjusted for changes in employment, was recently still being used to provide data in respect of these establishments for the national accounts. In Malawi, in construction and in transport, the ratio of value added to total receipts obtained from a survey of larger businesses is applied to estimates of total receipts for the smaller businesses to obtain estimates of their value added. This method is very commonly used in developing countries. In developed countries surveys have shown that there are marked differences between establishments of different sizes, and from this we might infer that the estimates in developing countries based on this type of ratio method are unlikely to be very accurate, although they may be reliable enough for some purposes. Estimates of percentage changes in value added by small enterprises, for instance, are likely to be better than the estimates of its absolute level, provided changes in total receipts have themselves been accurately estimated. I believe, however, that until record-keeping improves the only way of collecting accurate data on small enterprises is to send enumerators to keep the records themselves for limited periods. Only when this has been done will we have the information needed to check the reliability of the much less expensive methods at present in use.

Data from the traditional sector and households is generally the least reliable in developing countries. Even where it has been possible to conduct field

45

surveys it is very difficult to tell how reliable the results are since so much depends on how well the enumerators responded to their training and how well the people giving the information co-operated with and understood the enumerators. In addition there is usually little other relevant data with which to compare survey results.

In the case of agricultural surveys, for example, data collected in earlier years may not be useful for comparison because of the effect a particular year's weather can have on production, especially that of traditional farmers. However agricultural statisticians now generally believe that data which is sufficiently reliable for most purposes can be collected in respect of the traditional sector's crop production by sending enumerators to measure acreages and to conduct crop cutting experiments to determine yield.

On the other hand the reliability of household expenditure surveys in developing countries is still considered poor. Where studies of the errors in such surveys have been carried out the results have been disturbing. Recall errors in particular have been shown to be large. In two surveys in Ghana in 1961 in which both daily and weekly recordings were used it was found that the weekly record of total expenditure fell below the daily by 17 per cent in one survey and 22 per cent in the other. More recent work in the same country compared results from recall periods of one day, two days, three days and seven days. The difference between the daily record and the seven days record for bread (the worst item) was as much as 70 per cent[3]. Much more work of this sort is clearly necessary to establish reliable ways of collecting data from households.

(c) *Other Methods*

The field survey is usually the only way of directly collecting data on the traditional sector and households but it is extremely time-consuming and expensive. Many gaps in the statistics have to be filled at present by other means. This is especially true of the statistics of non-agricultural activities in rural areas, such as house-building and the collection of fuel and water. It is also often true of traditional sector statistics on minor crops, livestock and agricultural inputs. A very common method where a survey is not possible is to assume or guess at, on the basis of whatever information is available, various technological or biological ratios, such as the life span of a building, the milk-yield of cows or the laying rate of hens, and then to apply these to census data to derive the estimates needed for the national accounts. For example the number of new dwellings constructed in rural areas of Belize (British Honduras) was recently estimated by using the assumed average life of a dwelling, an estimate of the stock of dwellings and the estimated rate of growth in the number of families. Many similar examples could be quoted.

Clearly the reliability of the results obtained depends partly on how well the basic ratio or average can be estimated and partly on the adequacy of the information contained in the appropriate census. The censuses, whether of the human population, of housing, of business establishments, or of agricultural holdings, are traditionally carried out at intervals of five or ten years, so that the national accounts statistician may be faced with making an estimate based on a crude ratio applied to data from a census five or more years old. In fact a brief analysis

of the dates of the most recent population census for 152 developing countries reveals that for about half of them the most recent census was taken in 1967 or earlier and for 25 of these countries there had been no census since 1961[4].

The sources of information for estimating or guessing the ratios themselves are fairly varied. Often the general experience of government officials in the Public Works Department or Ministry of Agriculture is called upon. Sometimes these officials can provide information relating to households or enterprises which take part in State-organized development of extension schemes. For example, before the results of the recent agricultural census in Swasiland were available for national accounts purposes estimates relating to the production and consumption of rural households were based mainly on the reports of field officers and extension workers who visited a relatively small proportion of households during their normal duties. When methods such as this have to be used the estimates obtained may clearly be much less reliable than those obtained from good surveys. The problem lies in deciding when they are actually so unreliable as to invalidate the use for a particular purpose of the accounts in which they appear. Sometimes it is possible to show that even large errors in a particular item do not affect the results of the analysis. More often we are left guessing.

The Effect of Definitions Relating to the Traditional Sector

13. The reliability of developing countries' national accounts is sometimes weakened by the difficulties of definition which arise in particular in dealing with the traditional sector. I will discuss two of the problems here. One is the problem of defining the values to be used for consumption and production when goods and services are not marketed but consumed by their producers. The other is the problem of defining the production boundary itself.

14. Households in the traditional sector fulfil a dual role, acting both as producers and as final consumers. In respect of those goods they produce for their own consumption no monetary transaction takes place, and values have to be imputed. Where the same or similar goods are offered for sale in the modern sector it is reasonable to use their values, but the difficulty lies in deciding whether producers' values or purchasers' values should be used. If we want to measure the economic activity of the traditional sector then producers' values are clearly appropriate, and it would be wrong to include in the valuation a distributive process which does not exist. On the other hand when welfare comparisons are required I would argue that the same good yields the same utility whether it is consumed in the modern or in the traditional sector. If this is accepted then the traditional sector consumption from own production should be valued at purchasers' prices to make the welfare comparison reliable. In practice the same value is used for production for own consumption and consumption from own production or the production and expenditure accounts would not agree. Usually producers' values are chosen and hence the welfare comparison is distorted unless adjustments are made, which they rarely are.

15. The problem of defining the production boundary affects the reliability of both welfare comparisons and the measurement of economic activity. The United Nations' revised System of National Accounts recommends including the

47

primary production of households and their production of dwellings. While this covers most of their activities it apparently excludes important tasks such as collecting and transporting water and milling grain which some countries include in their accounts but others do not. As traditional ways of life change and households buy in the market goods and services which they used to produce for themselves outside the production boundary the reliability of comparisons over time is clearly affected. It is very difficult to determine to what extent this happens. Much more serious, however, is the fact that in defining many of the productive activities of households as being within the production boundary we greatly increase the problems of obtaining reliable basic statistics. As we have seen it is as yet very difficult to discover how reliable household surveys in developing countries can be. Thus although in principle the definitions we use may improve the national accounts, in practice they may result in the inclusion of more statistics of dubious reliability.

THE RELIABILITY OF ESTIMATES OF CHANGE

16. There are four main causes of unreliability in estimates of change produced from accounts for different years. These are:

(a) changes in the definitions used in compiling the accounts;
(b) changes in the statistical methods and procedures used to collect the data;
(c) the use of methods of collecting data which, although they are repeated in successive years, are not designed to measure change over time;
(d) inadequate constant price estimates.

17. Changes in the definitions or coverage of items in the accounts often occur as more information becomes available. This is particularly true during the first few years in which national accounts are compiled for a country. Unfortunately few attempts are made to preserve comparability over time by continuing for a few years to produce accounts on the old basis. Much the same comments apply to changes in methods of data collection, which also occur frequently in the early years of national accounting. Users thus find difficulty in assessing the reliability of comparisons between accounts of different years because it is exceptional for full statements of the sources and methods used to be published. Most countries do draw attention to changes in definitions, but changes in the methods of collecting the data often go unreported.

18. Even where there have been no changes in definitions or in methods of collecting data, estimates of change over time may still be unreliable for the third reason given above. To determine the effect on reliability of calculating changes from annual estimates which were not designed for this purpose we need information about the probable errors in the annual estimates themselves. As we have seen this difficult to obtain even when the estimates are based on a survey. Where they are built up from administrative statistics or assumptions any assessment of error is a matter of guesswork.

19. Estimates at constant prices are desirable as soon as a country has produced national accounts for long enough to be able to make comparisons

over time. Those developing countries which have tried to make estimates at constant prices, however, generally admit that the range of indices used is more limited than they would like. Also where rapid changes in the economy are occurring it is very difficult to keep indices reasonably accurately weighted. There is not very much the user can do about assessing the reliability of constant price estimates, except by inferences drawn from the methods used where a description is available to him.

The Effect of Delay in Producing the Accounts

20. Delay in producing the accounts is a problem which faces all countries attempting to use historical information as a basis for current policy measures and the economic situation of developing countries in particular can change substantially from year to year. This is partly because their economies are small and the performance of even one large enterprise may have a big effect, and partly because they are predominantly agricultural and a particular year's weather may also have a big effect. Hence the accounts should be produced very soon after the time period to which they relate if they are to be at all reliable for current policy purposes. Often however they are considerably delayed. A study of 40 African developing countries in October 1972[1] revealed that as at that date only eight countries had published current price estimates of GDP by industrial origin for 1971, and for 15 countries the latest estimate was for 1968 or earlier. Of the 23 countries which had constant price series 16 had constant price estimates of GDP by industrial origin but of these only seven had figures later than 1969. Because delay in producing the accounts limits their usefulness it is likely that it also limits the resources which governments are prepared to devote to improving them.

References

[1] See "Planning and the Current Availability of National Accounts Statistics in Africa"—a paper presented at the OECD Study Session on "National Accounts and Development Planning in Low-Income Countries", Paris, November 1972.
[2] See "National Accounting in Asia", OECD 1970.
[3] See "Sampling for Household Surveys", Economic Commission for Africa, 1968.
[4] United Nations Vital Statistics Report. Data available as of January 1, 1973.