

This PDF is a selection from an out-of-print volume from the National Bureau of Economic Research

Volume Title: Studies in Income and Wealth

Volume Author/Editor: Conference on Research in Income and Wealth.

Volume Publisher: NBER

Volume ISBN: 0-870-14163-5

Volume URL: <http://www.nber.org/books/unkn46-2>

Publication Date: 1946

Chapter Title: Measuring National Income in Colonial Territories

Chapter Author: Phyllis Deane

Chapter URL: <http://www.nber.org/chapters/c5697>

Chapter pages in book: (p. 145 - 174)

PART VI

Measuring National Income  
in Colonial Territories

PHYLLIS DEANE

*National Institute of Economic and Social Research  
London, England*



The difficulties in the way of measuring the national income of a backward territory spring from two main sources. First, the concepts and experience from which the national income estimator usually derives his definitions and methods have for the most part been developed in dealing with advanced industrial economies such as those of the United Kingdom or the United States. How far they are applicable to less advanced economies must be deduced from a series of practical tests. Second, data on which to base estimates are scarce. The relative inaccessibility of a backward territory and the poverty of its exchequer reduce to a bare minimum the material that can be collected locally or that can be compiled systematically by the administration. The possibility of combining the existing quantitative and qualitative information to form the basis of a useful estimate can be determined only by trying.

In October 1941 the National Institute of Economic and Social Research, London, undertook the enquiry into colonial national incomes described in this paper. Regarded as an experiment, it attempted to apply to selected colonial territories a method of measurement evolved to meet the circumstances of the United Kingdom. The research was done by myself under the direction and with the constant advice of a committee that includes Austin Robinson, Richard Stone, and W. Arthur Lewis, to whom, as well as to Charles Merwin, I am deeply indebted for assistance. From its outset the enquiry was facilitated by the readiness of British Colonial Office officials to offer every aid and encouragement. In addition, the valuable advice and material of officials in the colonial service and private individuals and companies, both in the United Kingdom and in the colony, to which the preliminary estimates for Northern Rhodesia have been submitted for criticism, will undoubtedly enhance the reliability and usefulness of the final estimates.

Several interdependent objectives were kept in view. It was hoped to test the wider applicability of the method and to adapt it to colonial conditions, to reveal and solve the main problems involved in obtaining the necessary measurements, to throw some light on economic conditions in the selected territories, and to construct a working basis for future estimates. Since the enquiry has so far been based entirely on published material or

other data available in the United Kingdom, the conclusions that can be drawn at this stage are provisional and subject to the corrections field surveys may render necessary.

The method that formed the basis of the experiment is described in detail in *The Construction of Tables of National Income, Expenditure, Savings and Investment* by J. E. Meade and Richard Stone.<sup>1</sup> In brief, national income is estimated from three viewpoints: income, output, and expenditure. The estimates of the items that make up the totals and the totals themselves are checked and cross-checked against one another. The aim, a thoroughly integrated series of estimates covering every aspect of the national economy and presented in a form that minimizes problems of definition, is achieved by the construction of accounts of national income, output, and expenditure, and of transactions with countries abroad on the lines indicated in Tables 1 and 2.

The colonies selected for study were Northern Rhodesia, Nyasaland, and Jamaica. Northern Rhodesia was chosen because it seemed to present in an extreme form the problems of a mixed economy. Nyasaland, similar in that its output contained a large element of self-subsistence production, was included because information came to hand with which the value of the methods used in calculating the self-subsistence output of Northern Rhodesia could be checked indirectly. Jamaica was taken as an example of a relatively advanced colonial economy and, in view of the greater amount of information available, the Jamaican estimates were carried back ten years. This paper is concerned principally with the estimates for Northern Rhodesia.

## 1 CONCEPTS

Since the concept of national income that formed the starting-point of the enquiry had been formulated primarily to meet the needs of the United Kingdom, problems of definition became of immediate practical concern. It was not that they were new, but that the conditions of this economy were such as to strike at

<sup>1</sup> *Economic Journal*, June-September 1941. For a practical illustration of the method see the White Papers published annually with the British Budget. The latest in this series is Cmd. 6623, 'An Analysis of the Sources of War Finance and Estimates of the National Income and Expenditure in the Years 1938 to 1944', published in April 1945.

the very roots of a concept appropriate to an exchange economy.

National income can be briefly described as the value of the customarily exchangeable goods and services currently produced by a nation or community. It can be measured in terms of (a) the rents, profits, interest, salaries and wages paid to individuals or retained by enterprises in return for their services in the current production of goods and services; or (b) the net value of each industry's contribution to the national aggregate of goods and services; or (c) the net value of the goods and services consumed or added to capital equipment. For the purposes of this enquiry it was measured in all three ways and the estimates checked against one another.

There are certain obvious difficulties in applying this form of measurement to a backward economy. If we ignore the complications arising from transactions with other countries, the distinction between income and outlay, for example, depends on the existence of two equal money flows—to nationals in return for their productive activity and from nationals to purchase goods and services for purposes of consumption or investment. In an economy where most output is not offered for sale but is consumed by the producer and his family, these two flows do not exist, or exist for merely a fraction of total output. The national income tables are thus deprived of a valuable cross-check; i.e., only one estimate can be made for the output of self-subsistence producers and it must be entered twice in the basic table.<sup>2</sup>

The distinction between income and output, however, depends upon a single flow arranged in two ways, not on different equivalent flows. Given inadequate records, approaching the total in two ways provides a cross-check that strengthens the estimate for self-subsistence output. Output can be estimated from such data as acreage and yields, and intake from per capita consumption of each commodity and estimates of population.

Other conceptual problems that arose during the experiment will be dealt with below. For example, how to define the nation in a territory where immigrant capital and labor play a large part in the exploitation of its economic resources. Where to draw the line between economic and non-economic activity for

<sup>2</sup> See Table 1, items 4 and 36; Table 3, items 4 and 35.

a community organized for self-subsistence. Or, how to evaluate untraded goods and services for which there was no market price and no market equivalent.

In Northern Rhodesia, a primitive native economy, largely dependent upon self-subsistence production, exists side by side with a highly capitalized modern industry operated by immigrants. It was estimated that in 1938 between 35 and 40 percent of total native income, about £1.08 million, was from self-subsistence production (Table 1). Profits drawn from the territory by foreign firms amounted to something like £5.4 million out of a total national income, defined to include this item, of £13 million.

a *National income and taxable income*

Before national income or output can be measured, the nation must be defined. Northern Rhodesia has two kinds of inhabitants. The true natives were estimated to number about 1.4 million in 1938. An immigrant population consisting of 13,000-14,000 Europeans and a few hundred Asiatics plays a disproportionate part in the colony's economic life. The European residents are in almost complete charge of the administrative, technical, and professional occupations of Northern Rhodesia without ever becoming its nationals in the usual sense of the word. Few employees of the government or of European industry—and there is almost no native industry above the individual craftsman level—expect to retire in the colony. Many stay for a few years only, maintain and educate their families in the United Kingdom, retain their commitments with British insurance companies, banks, etc., usually hold their savings abroad, and even do a large proportion of their current spending on their long leaves in their home countries. Nevertheless, the value of their output in Northern Rhodesia is substantial.

The activities of foreign companies present another facet of the same problem. The mining industry of Northern Rhodesia, estimated to contribute in 1938 50-60 percent, in value, of the total output of goods and services produced in the colony, is operated by firms registered in the United Kingdom, the United States, or South Africa, which conduct all their major administrative or financial operations, including sales, transfers to reserves, disbursements of profits, etc., in, say, London or New

York. The railways, banks, and a substantial proportion of the distributive trade are also conducted by foreign firms. The proportion of total output in the colony directly attributable to foreign firms amounted in 1938 to about two-thirds (see Table 3).

Though the European immigrants are often in outlook and intention citizens of another country and have no roots in the colony—only an accident of geography brings foreign firms into the colony—their intimate connection with the economic life of Northern Rhodesia cannot be ignored, for they are both the source and the agents of economic development. Some Europeans, of course, will make the colony their home, however backward and ill suited it may be to European habitation. The line between the permanent settler and the temporary resident is vague: the longest term colonist commonly carries on a host of transactions with financial, trading, and other institutions in the mother country that would not normally be undertaken by a native; and the shortest term transient may play an essential role in the colonial economy.

It seemed most practical to regard the Europeans as nationals and their output as part of national output. The portion of their expenditure that was spent or sent abroad, for whatever purpose, was entered as a separate item. Similarly, the income of Asiatic immigrants and of migrant labor from a neighboring territory was regarded as part of national income. Conversely, no attempt was made to calculate total income earned abroad by Northern Rhodesians, whether European or native. Only the portion of their income actually remitted to the colony was reckoned as part of its national income.

The income of foreign firms operating in the colony did not lend itself to similar treatment, however. Foreign shareholders receiving dividends from the colony could not logically be treated as nationals. Nor was it easy to regard the increases in the London balances of London firms operating in Northern Rhodesia as Northern Rhodesian saving. On the other hand, the income and output of these foreign firms are of particular interest to the administrator and economist, because they constitute both the principal source of government revenue and a large proportion of the colony's major physical asset.

Consequently, a second set of tables, 3 and 4, was constructed. They include, in addition to the income of residents, the income of foreign firms operating in the territory, and measure the value of all output produced within the colony, together with services rendered abroad by the colony's residents, or as it is called in this paper, taxable income.

The concept of national income of residents, used for Tables 1 and 2, had two main advantages. First, being an essential index of economic activity, in particular, of national purchasing power, it facilitates international and intercolonial comparisons; for example, on a per capita basis. Second, since the income to which it relates is both earned and spent by residents, all the relevant transactions the income, output, and expenditure columns record take place within the national boundaries and can thus be estimated independently. The cross-checking by our triple estimates—(a) the distribution of income by its main types, (b) the net contribution of each industry to output, and (c) the income flowing into each channel of expenditure—was invaluable to a calculation so insecurely based as an estimate of the national income of a backward territory. The outlay of income attributable to foreign firms cannot be accounted for separately, however. It is both earned and produced within the colony, but so far as it is distributed to foreign shareholders or enters the foreign balances of foreign firms, it is spent abroad. Since the channels of its expenditure are outside the colony they escape measurement.

Comparison of Table 1 with 3 and 2 with 4 reveals the principal differences in the logical framework of the two definitions. Briefly, when foreign firms are excluded from the community whose income is to be measured, their activities affect national income only so far as nationals derive income from them or in the amount of their payment of direct or indirect taxes to the government. Since their output is valued at the cost of the services rendered by nationals, their products do not appear in the visible trade balance, but the contribution of nationals to their output is entered as an export of services. And since their direct expenditure does not appear in the national account, their imports of materials are excluded from the visible trade balance.

In accordance with our definition of taxable income, the out-

put of all productive factors operating within the colony was regarded as part of total colonial output, regardless where their owners lived. Foreign firms were thus credited with a dual entity: their units operating within the territory were included in the national or colonial economy; their units operating abroad continued to be regarded as foreign. Hence all items of income and expenditure attributable to units operating within the colony, including the value of the service of capital provided by foreign shareholders, were recorded for the taxable income calculations. The output of persons working in the head office in London or New York, however, and the income on foreign investments made by the head office from balances held abroad were alike excluded from the Northern Rhodesian taxable output.

In other words, the output of foreign firms operating in the territory is valued, in Tables 3 and 4, at the factory or pithead price, or its equivalent; their operating surplus appears in full as part of total income; and the expenditure of this income is recorded net of income tax under 'remittances to foreign shareholders or banks'. The government no longer receives income taxes from 'abroad' on account of these companies. The companies' investments in fixed capital or in stocks within the colony become part of home investment but add nothing to total net investment since they are balanced by a corresponding decrease in holdings of foreign money or securities, or by an increase in foreign liabilities, which appears as 'foreign disinvestment'.

#### b *Inclusion of untraded goods and services*

The second main conceptual problem is that of defining the goods and services to be included in national income. Most national income estimators agree that, as a general rule, only goods and services customarily exchanged for money should be taken into account. In a pure subsistence economy, however, none of the goods or services produced comply with this condition. Theoretically, real income can be measured by calculating the output of all goods and services produced in terms of some common denominator—prices, manhours of work, calories, or some other index. But it cannot be measured as income, output, and expenditure, as we wished to do. The self-subsistence producer receives no money income that could be set out in the form

of rents, profits, wages, or salaries. Nor is the line between production and consumption clear enough for the two processes to be distinguished.

Actually, of course, there is no pure subsistence economy, just as there is no pure exchange economy. In a backward rural area of Central Africa most staple foodstuffs are produced by the families who consume them. Any surplus above the home consumption level—and this naturally varies with the time, the commodity, the demand, and the place—can be traded. Hence in a normal year the average subsistence producer engages in some irregular trade, either by barter or by means of the money earned in casual trade with administrators, missionaries, or other travelers, or received from migrant laborers. In areas near a town or some other ready market the native farmer tends to grow crops for sale as well as for his own needs.

Obviously, if the concept of national income is to have any meaning when applied to a colonial economy it must include the self-subsistence output of the native farmer. This in itself is in keeping with a concept of national income that allows for the inclusion of goods consumed on the farm as part of total agricultural output. Further, it should include the value of the wild foods, such as honey or game, or caterpillars—an important adjunct to the African's food supply—and the value of the huts or mats made by the producer for his family. In a more advanced colonial economy it would include, for example, the crops a laborer on a West Indian sugar plantation gathers from the small plot of ground he cultivates in his spare time.

Unless manhours worked and the value of output per man-hour are known, self-subsistence output cannot be estimated by the three approaches though it can usually be by two. Output can be estimated from data on acreages and yields, and intake from data on per capita consumption and population. In a self-subsistence economy saving is usually negligible and cannot be measured directly except so far as it takes the form of investment in capital equipment such as houses. Hence, for a mixed economy, an item corresponding to the value of the untraded output of subsistence producers appears in both the income and output columns. Theoretically the expenditure columns can be completed by a separate estimate of consumption and saving

or capital formation by subsistence producers. These two totals are a check on each other.

In including subsistence output, however, we strayed further from the usual definition of national output than is at once apparent. A great deal of the routine agricultural production in Central Africa—in some districts most of it—is done by women. Even when women are not the principal agricultural laborers, subsistence output commonly owes much to them and other dependents. The inclusion of the unpaid agricultural services of women as part of total economic activity would be acceptable to most national income investigators. But in a semi-subsistence economy it is not clear where the line between economic and domestic activity should be drawn. The women sow, cultivate, harvest, grind, and cook the corn. If we include any of these unpaid services in national income, as indeed we must, why should we exclude any? All could be included if the corn were valued after it had been fully prepared for consumption.

In practice, however, it might not prove feasible to evaluate all foods fully prepared. When making the preliminary estimates for Northern Rhodesia and Nyasaland, for example, the best that could be done was to evaluate corn as meal, groundnuts after being shelled, and so on. If expediency is to determine the line between services that are and are not to be included, field research must first be done. At present it seems illogical to exclude the value of women's services in collecting firewood, preparing and cooking food, and so on, yet include their work on the land. On the other hand, it is arguable that the inclusion of all women's services in the national income of some colonies, when they are excluded from that of others, would weaken the basis of international comparisons.

One other problem of definition, familiar to the national income estimator, arose with new significance in the peculiar circumstances of a backward economy—whether to include an annual value for the service of houses occupied by their owners. The dwelling of a rural Northern Rhodesian farmer exemplifies the dire poverty of the primitive home. Built to last, at most, five years, the hut falls into disuse when the occupier dies or moves to another area to cultivate new soil. There is usually no question of renting or buying a hut. Occasionally the town native

rents a piece of land and builds his own hut. He may pay additional rent for access to certain facilities such as water or sanitary arrangements. Still more occasionally he may be able to sell or rent a hut of village standards of construction to an employed native who has not the time or the energy to build his own. The more permanent type of dwelling—common in the towns—does command a sale price and a rent. Its standards of construction and conveniences, though low, are so far superior to the shack the average native would put up for himself that it is to all intents and purposes a different commodity.

It would seem that there is no case for imputing an annual value to the service of rural native huts no one would buy or rent; that in urban areas huts of the type built by the owner for his own use have so small a value that their imputable annual value is negligible; but that the more permanent native dwellings of the type usually found in the towns have an imputable annual value by no means negligible. Indeed, if we are to include an annual value for the huts built by some of the Northern Rhodesian mining companies for their employees (a substantial addition to their wages in kind), it seems logical to include also the annual value of houses owned by their occupants.

### *c Evaluation of untraded goods and services*

Before the goods and services to be included in national income can be aggregated, they must be expressed in terms of some common denominator. To parallel the monetary evaluation of the products of the exchange economy appropriate prices must be applied to subsistence output.

In the national output of Northern Rhodesia three kinds of goods and services had to be evaluated. First, the marketed goods and services; these were valued at their actual market price, known or estimated. Second, the goods and services not marketed, for example, the foodstuffs the farmer retained for family consumption; these had their counterparts in traded goods and were valued at the market price for the latter. Third, the goods and services for which no direct market counterpart existed or in which the known trade was so small and so irregular as to provide inconclusive evidence of a market counterpart. The implied assumption that the farmer could sell his untraded out-

put at the price he gets for his traded output is reasonable enough when the untraded goods are too few to affect the market. When traded goods form merely a tiny proportion of total output the assumption becomes difficult to justify. If a village community of some hundred or so inhabitants grows 750,000 pounds of maize and trades 50,000 pounds, it is a severe strain on the meaning of the price system to value the 700,000 pounds raised at the price per unit of the 50,000 pounds sold.

The alternative is to construct an artificial price system that has some recognizable relation to actual value. But what value? Since the local market is small and its prices are relatively unresponsive indices of current value, an artificial price system may be constructed by tying local prices to those of the nearest large market. Though in doing this all effort to relate prices to the scheme of values of the local producing community—a scheme that differs materially from that of town-dwellers—is abandoned, it is probably inevitable in any attempt to evaluate subsistence output for remote areas. In many backward areas the concept of measurement is rudimentary and its relation to actual definite standards distant. Since a considerable proportion of trade is barter, natives do not exchange efficiently, especially when the sophisticated hawker sets out to confuse them.

On the other hand, as the remote areas are brought more closely into contact with the towns and with a regular system of exchange, their scheme of values tends to approximate the urban scheme. Differences shrink as the exchange economy extends and intensifies its influence. Meanwhile, it is of some use to be able to evaluate the output of rural districts in terms of its value in towns.

The obvious way to tie local prices to the central market price is to deduct transportation costs. To the agent at the railhead the value of a bag of corn ten miles away is its value at the railhead less the cost of transporting it. For any area within relatively easy reach of the market this method is appropriate. But for remote areas it is inadequate. In 1938 the average cost of transportation in Northern Rhodesia was reported to be 11d. per ton mile. When maize was worth 70/- per ton on the average, the cost of transportation exceeded the market price for maize produced 80 miles away. The capital of Barotseland Province is

over 200 miles from the nearest station on the railway line. In effect, therefore, large areas of Northern Rhodesia are beyond the reach of the market although not necessarily outside its influence.

For the preliminary estimates our solution was dictated by what seemed to be the prevailing local price system, if indeed it can be called a system. According to admittedly inadequate and often unverified information from persons with a first-hand knowledge of the territory, prices in areas beyond the sphere of regular contact with a large market apparently varied little if at all from what was regarded as the 'customary price'. Sanctioned by convention, this price evidently owed its origin to the few direct and indirect contacts between the local people and the nearest large market. It fluctuated little if at all in response to temporary changes in the market price, and although actual transactions might reflect these changes, it continued to guide local buyers and sellers until a more permanent change in the market price forced a corresponding local adjustment. Consequently, transportation costs were deducted from the market price until the customary price was reached, and the latter was applied to areas beyond. When the customary price was not known, it was assumed to equal the market price less transportation costs at what were regarded the limits of normal trade, that is, two days' loaded journey from the market.

## 2 STATISTICAL PROBLEMS

For the African colonies it was especially difficult to find adequate quantitative material on which to base estimates of income, output, and expenditure. It can fairly be said that as far as statistical information was concerned, the preliminary estimates were made under conditions as bad as, and in many respects worse than, they are likely to be again. Tables 1-4 are based upon material available in the United Kingdom on economic conditions in Northern Rhodesia in 1938. The extraordinary difficulties in the way of systematic fact collection in Central Africa and the consequent low standards of statistical reporting were aggravated by artificial limitations of space and time for which the war was largely responsible. Since 1938 standards of statistical reporting in many spheres have improved substantially

and each year tends to be better documented than the preceding. Moreover, since the preliminary estimates were completed and submitted for criticism to informed observers in Northern Rhodesia, considerable new information has come to hand that will provide a factual basis for many estimates now founded on guesswork.

a *The available data*

The gaps in the statistical information about a Central African colony are numerous. Even the customs statistics, which are collected for every colony, often contain considerable margins of error; the Central African administrations serve extensive, thinly populated areas through the greater part of which no permanent system of communications runs; the unrecorded trade across their long political frontiers is no doubt of small value in comparison with the European trade that passes by road or rail along the closely scrutinized routes, but relative to the incomes of the native population in the remoter areas it may substantially understate the customs statistics.

Income tax returns have been collected in most colonies, but in Africa from the immigrant communities alone. In Northern Rhodesia, for example, the income tax department assessed about 0.15 percent of the entire population and about 20 percent of the European population in 1938-39. From income tax assessments, the income accruing to large companies or to individuals in the highest European income group could be estimated fairly accurately, but neither national nor taxable income as a whole.

Land utilization, yield, and output statistics were almost entirely lacking, while figures on the number of productive units of various kinds, of factories, shops, places of entertainment, garages, etc., were either incomplete or non-existent. The most serious deficiency was in population and occupational statistics. In Northern Rhodesia the last prewar census was taken in 1931 but the natives, who constituted over 99 percent of the population, were not enumerated. There is no general collection of vital statistics in the colony. Totals of native populations are for the most part calculations by the administrative officers who count the adult males for taxation purposes and multiply this figure by a constant factor. Both the incentive and opportunity to dodge the enumeration the administrator conducts or requires

to be conducted in the course of his tour of a large district are sufficiently great to give even these official estimates appreciable margins of error. They have some value, however. The employment figures the Northern Rhodesian district officer can provide for his own district may be based on little more than the information he and one or two assistants have incidentally amassed while collecting the adult male poll tax. Ordinarily, they are not supported by anything in the nature of a scientific field survey. Nevertheless, since the contact of the administrator with the adult males of his district is semi-personal, his unsubstantiated figures are worth more than the responsible civil servant in this country would be able to claim for a similar kind of estimate.

Besides the official estimates and the few statistics collected in the course of routine administration, the main sources of data for estimating Northern Rhodesia's national income were special surveys, ranging from small local studies undertaken by a private investigator to the comprehensive official Ecological Survey of North Western Rhodesia. For an area so large and for a population so scattered as that of Northern Rhodesia a study covering a few villages or a few hundred people or a single urban area is obviously an inadequate basis for generalization. Nevertheless, in estimating the value of native consumption or of the output of certain independent workers, the results of all the surveys had to be used in conjunction with such qualitative information as could be gathered to indicate the limits of reasonable generalization. The usefulness of the generalizations depends on the number and variety of such surveys and on the quality of the information concerning their representativeness.

The estimation of colonial national incomes thus demands an unusual approach. In estimating national income in an advanced economy the estimator starts with a mass of analyzed and unanalyzed statistics and integrates them into a coherent whole. He already has considerable knowledge of the structure and workings of the economy as well as acquaintance with the distinctions useful for economic analysis. When he turns to colonial countries, he finds few quantitative data and must start with an assortment of purely qualitative information collected by administrators and social scientists for other purposes. His national income tables indicate the data he would like to acquire.

As a statistical description of the economy, they must be used with considerable reserve.

b *The preliminary estimates*

i ESTIMATES BASED ON SYSTEMATICALLY COLLECTED STATISTICS

The preliminary estimates made for Tables 1-4 were of three main kinds. First of all there were estimates derived directly from reliable statistical data. The activities of foreign companies are well documented in their annual reports and in the reports of certain government departments, such as the Northern Rhodesian Lands, Mines and Survey Department, to which they send returns regularly, not only on their expenditures and receipts, profits and remittances abroad, but also on such matters as the pensions, gratuities, and leave pay disbursed abroad, or for expenditure abroad, to their European staff. In addition, certain colonial government departments, such as the Income Tax Department, the Customs Department, and the Treasury, periodically publish data systematically collected in the course of routine administration.

Estimates in Table 1 entirely based on this kind of material are numbered 8, 9, 10, 12, 16, 28, 39, and 41; largely based on it are items 15, 26, and 31; partly, items 17, 23, 24, 34, 42, and 45. About 58 percent of the national income total, about 55 percent of the national output total, and about 43 percent of the national expenditure total are founded on reliable statistics from large companies or government departments; in Table 2 about 83 percent of the total income originating in receipts from abroad and about 87 percent of total expenditures abroad, and the corresponding items as well as the additional items in Tables 3 and 4.

Company and departmental figures were not always provided in the required form, however, and some adjustments had to be made before they could be incorporated in the national income tables. For example, some foreign companies operating in Northern Rhodesia serve neighboring territories also and they do not always report separately for each colony. A small percentage of Northern Rhodesian railway track was operated as part of the Southern Rhodesian track and the relevant statistics were buried in the Southern Rhodesian reports.

Customs statistics also required some adjustment. Since Northern Rhodesian imports are valued f.o.b., the cost of transport to the Northern Rhodesian border had to be estimated. For some commodities rail and shipping charges were calculated; for others, the average proportionate increase in these costs on a representative consignment valued f.o.b. was ascertained. In accordance with the definition of national income underlying Table 2 both exports and imports had to be adjusted to exclude the income and expenditure of foreign firms. No exports or imports by foreign companies were included. The value of exports to be removed could be ascertained from company reports since their entire output was exported. The value of imports to be removed had to be deduced by inspection of the import list, and by the extraction of goods presumably destined for the mining companies, all of which were foreign-owned.

Income tax returns presented another problem of adjustment, since the fiscal years of companies may not coincide with calendar years. For example, a company whose fiscal year ran from September to September would return for assessment in June 1938 its income for the year 1936-37, while a company that worked to the calendar year would make a return for 1937, and a company whose accounts ran from March to March would make a return for 1937-38. All would appear in the Income Tax Department's report as income assessed in 1938-39. Fortunately sufficient information was readily available on the giant mining and railway companies, which together accounted for over 90 percent of total company income originating in the territory, to make reliable adjustment possible. The adjustments for smaller companies were considerably less reliable.

#### ii ESTIMATES BASED ON SCIENTIFIC LOCAL SURVEYS

The second type of estimate was based primarily on the results of scientific field surveys. Though complete, reliable, and accurate within their limited terms of reference, they were not usable by the national income investigator without modification. Indeed they were not always even in quantitative terms. To convert them into the quantities required it proved necessary to make several highly arbitrary assumptions about their representativeness and their implications, assumptions that often had to be founded upon purely qualitative evidence.

The nature of the surveys that could be used and of the unverified assumptions varied considerably. Several surveys covered native consumption in different areas and different kinds of commodity. Once the assumptions had been made concerning the relative representativeness of each, the evidence could be combined and such general estimates of native consumption as are given in Table 1, items 35 and 36, made. European consumption has not been surveyed as a whole, though there are official family budget statistics for a sample of Southern Rhodesia's European population. Since the occupational composition of this sample was broadly similar to that of the European population of Northern Rhodesia it was assumed that the survey results could be applied to that colony, after allowing for such known differences as the variation in the size of the average family.

Clearly, estimates from such data can at best indicate no more than the principal orders of magnitude. They can usually be improved if their details are checked against other sources of information. Items 34 and 35 of Table 1 were only partly based on budget or consumption surveys. Import statistics, for example, were a valuable source of information on such matters as the local consumption of European food and clothing, and of manufactured goods in general. By checking details derived from generalizations from the surveys against this more reliable type of data not only were the details themselves improved but also the generalizations as a whole confirmed.

One of the most valuable of the surveys whose results were used, in conjunction with a mass of more or less representative information on the average yield of each commodity gathered from the reports and experiments of local agricultural stations, the first Ecological Survey, collected for each agricultural district in the western half of Northern Rhodesia details on the size of garden, the rotation of crops, and the pattern of cultivation characteristic of the tribes in the district. It had to be assumed: (1) that the output of typical gardens described in the Survey could be accepted as average for the districts concerned; (2) that the patterns of cultivation characteristic of the western half of the territory could be applied to apparently similar agricultural districts in North-Eastern Rhodesia. This is a serious weakness in the basis of the estimates for native agricultural output (Table

1, items 18 and 19) but now that the Ecological Survey for North-Eastern Rhodesia has been published, it can be eliminated from later estimates.

Unfortunately, this type of survey material does not reflect annual variations in output. The average yield of the typical garden multiplied by the average number of gardens in each district gives figures on standard output in a normal year. Many factors may cause the level and pattern of output of a particular year to diverge from this norm. If able-bodied males go to work in towns, the area of new land cleared annually, and hence the cultivated area of the district, will be reduced. Yields also may decline as labor for routine cultivation is drained off. A drought affects the yields of some crops more than others. The depredations of wild animals or a decision to plant less of a particular crop make for smaller harvests of some commodities and perhaps larger of others. The effect of factors such as these is very difficult to take account of quantitatively.

This kind of problem cannot be adequately considered at a distance from the colony. Often it cannot even be clearly formulated from the published information. However, two crude attempts were made to adjust for variations in total output. First, the differences in available labor power were allowed for by making the yield of each garden a function of the number of productive units available for its cultivation. A man or a woman available for work throughout the year was called a single productive unit; children between 5 and 15 and males exempt from taxation because unfit to work for wages, half a unit each; able-bodied males in employment, some of whom were available for agricultural work part of the year, a quarter of a unit each. These values were based on what seemed the relative contributions to output of the various groups of labor. Too little was known of their relative productive efficiency for any more precise calculations.

Second, the annual harvest reports of the agricultural officers in each area were interpreted quantitatively. Probably for tribes so near the bare subsistence level, with so few facilities for storage or for alternative disposal of their crops, the local agricultural officer can be relied upon to report from observation all the wider fluctuations in the total yield of the staple foodstuffs.

His reports, however, are rarely quantitative. Hence for each crop not one average yield but a wide range of average yields was sought, and within this range several smaller ranges were distinguished corresponding to such descriptions as 'very poor', 'normal', 'good average' yield, and so on. Above and below these usual ranges a still more arbitrary figure was applied to conditions of famine or glut. Into this framework were fitted the annual comments of the agricultural officers. For example, a 'good' crop of maize was assumed to represent an average yield of 600-800 pounds per acre; a 'poor' crop, 400-600 pounds, a 'normal' or satisfactory crop, 500-600 pounds. So far as possible these figures were based on reports that described the yield both quantitatively and qualitatively. For some crops acreages described as other than 'normal' had to be guessed.

If the agricultural officials could be induced to set quantitative limits to the range of yields implied by each harvest report for the chief crops, annual estimates of native agricultural output could be computed that would indicate at least the principal orders of magnitude. Meanwhile, in view of the extraordinary difficulties in the way of taking any sort of census of native agricultural output, especially when a large proportion of total output is produced for self-subsistence, it may be worth while to follow the method we used, crude as it is. An investigator with opportunities for direct local research and with access to unpublished information about local economic conditions and organization accumulated by administrators and other interested observers might be in a position to make some very useful estimates.

### iii ESTIMATES BASED ON MISCELLANEOUS DATA

Besides the two major sources of reliable data—regular reports and special surveys—a vast amount of miscellaneous information was pressed into service; e.g., data on yields or prices extracted piecemeal from the many official and unofficial publications that happened to mention a yield or a price for a given commodity in a given area. They varied widely in character and reliability. Items 2, 6, and 11 of Table 1, for instance, are generalizations from very small surveys whose representativeness is unknown. Item 20 is an aggregate that includes such very different types of estimate as a proportionate adjustment of incomplete reports

from European slaughterhouses or a correlation of the game consumed by natives with the firearms possessed by them. For items 21 and 25 the time natives spent in such occupations as collecting various wild foods or weaving mats was estimated; the value of their output was then computed either from the labor value of the time spent or from the quantity and value of the goods produced. Sometimes an estimate was the average of two approaches. The number of each kind of distributive agency—hawkers, native stores, European or Indian owned stores, and so on—was estimated on the basis of actual reports from one province and on some arbitrary assumptions concerning the correlation between them and such factors as population, purchasing power, area, and other items that seemed relevant. To get the net value of distribution these results were combined with estimates of the average net value of output by each type of agency. For item 27 of Table 1 total net value was checked against another equally crude result based on the estimated proportionate share of distribution in the total value of retail output.

Item 24 was based upon incomplete evidence on the output of European factories in the annual official reports for the colony; item 30, on population data for the various sections of the community and on such additional data as the average rents paid by Europeans or by natives in the various urban areas, and the construction costs and length of life of a native hut. Since the value of a rural hut was negligible, only the value of new village huts built during the year was included, and no attempt was made to impute an annual value to native huts in rural areas. European expenditures abroad (Table 2, item 13, and part of item 45, Table 1), estimated largely by generalizing from the results of a small ad hoc investigation into the expenditures abroad of Kenya administrative officials, were confirmed or amended from information in Northern Rhodesia company or official reports.

Obviously many of the estimates derived from these miscellaneous data were so crude that even the rough orders of magnitude implied are doubtful. On the other hand, the number of wild guesses could probably be reduced to negligible proportions if direct local enquiries could be made.

*c Reliability of the estimates*

Clearly, colonial national income estimates must be based on much less reliable and precise material than is usually to be had in most countries. The relative inaccessibility of the remote districts; the shortage of skilled personnel; the hostility, in some circumstances, of the native, due perhaps to fear of being taxed or to religious taboos, and often to a variety of such causes; the inability of even the willing native to cooperate effectively when neither he nor the official is sufficiently acquainted with each other's habits of thought to be able to ask questions and give answers that would depict the situation are examples of the obstacles to the establishment of an adequate system of statistical reporting in a backward colonial economy. For quantitative information, an investigator must rely mainly on administrators' estimates.

The margins of error are difficult to establish with any degree of certainty. Some idea can perhaps be gained from the population estimates. As far as the native share of Northern Rhodesia's national or taxable income was concerned, the estimates in Table 1, for example, depend largely on population statistics. Native income and consumption, the value of the native output of agriculture, animal products, and subsistence manufacture, as well as of the total output of housing are all based originally on per capita estimates. Hence, although the errors in other weak estimates tend to be reduced by cross-checking, the errors in the population estimates appear in all three columns of Table 1. The margin of error in the population estimates can thus be regarded as indicating the minimum conceivable margin of error in the national or taxable income totals.

Of the population estimates made for the territories where not even a partial enumeration of the native population has been attempted R. R. Kuczynski writes: "they are at best reasoned guesses which may easily be off the mark by 20 or more percent."<sup>3</sup> Estimates in the official reports for Northern Rhodesia's European population in 1938 differ by 6 percent. If we assume that 20 and 6 percent represent the margin of error in the estimates of native and Asiatic income and of European income respectively, and if we apply these percentages to the first column of

<sup>3</sup> *Colonial Population* (Oxford University Press, 1937), p. 6.

Table 1, the margin of error in the total is about 11 percent. Making the same assumptions for Table 3 and assuming in addition that foreign company incomes have a low margin of error, say about 2.5 percent, we get a total margin of error for taxable income of 7.8 percent.

As rough guesses of the margin of error in the totals in Tables 1-4 these percentages are undoubtedly low. The margin of error in the total income estimate in Table 1 can safely be assumed to be over 11 percent, and in Table 3, over 8 percent. More detailed study of the individual items in Table 1 suggests a total margin of error of about 15 percent. The error in the details of Tables 1-4 will vary greatly, probably from 2 to 50 percent in the significant items.

The colonial national income estimator has thus not only a different approach from that of his colleagues in the United Kingdom or the United States. He gets a different result. The construction of national income tables for colonial territories must often be no more than an attempt to establish the orders of magnitude attributable to each income group, industry, or item of expenditure in the national total. Most of the individual figures have little or no intrinsic value because the information is altogether too scanty for close estimates. They are, however, essential elements in the picture of the economy, particularly of the more backward colonies, suggested by all available evidence. The estimates will become more accurate as data are collected systematically; and in the more advanced colonies guesswork may practically be eliminated for all except the subsistence sectors of the economy.

The experiment in colonial national income measurement raised more problems than it solved. It has not paved the way to effective international or even intercolonial comparisons, although it reveals the bigger obstacles. Despite the limitations of colonial statistics and the statistical reporting system and the peculiarities of the economic organization of a primitive economy, it has proved that intelligible and revealing national income tables can be constructed for even the most backward territory and with the most inadequate information. The preliminary estimates for Northern Rhodesia, which are no more than a systematic interpretation of the scanty quantitative and qualita-

tive data available in the United Kingdom, have been submitted to the scrutiny of observers with an intimate first-hand knowledge of the colony. From the criticisms so far received and from the new data that have come to hand, there is reason to believe that the picture, though inaccurate in detail, is essentially faithful in outline.

There seems little doubt that a series of comprehensive, up-to-date, and reasonably accurate national income estimates could be made for any colony. Its practical value in planning the development of the uncharted economies of the British Colonial Empire would be considerable.

TABLE 1

National Income, Northern Rhodesia, 1938  
Income, Output, Expenditure, at Factor Cost*Preliminary Estimates<sup>a</sup>*

NET NATIONAL INCOME	£ MILLION	NET NATIONAL OUTPUT	£ MILLION	NET NATIONAL EXPENDITURE	£ MILLION
<i>Individual incomes of:</i>		<i>Net output of:</i>		<i>Personal consumption of:</i>	
1 Europeans	3.58	16 Mining	2.49	34 Europeans	2.74
2 Native independent producers	0.56	17 European agr.	0.18	35 Native (cash)	1.81
3 Native subsistence producers (cash)	0.09	18 Native subsistence agr.	1.21	36 Native (subsistence)	1.08
4 Native subsistence producers (kind)	1.08	19 Native economic agr.	0.10	37 Asiatics	0.05
5 Natives in employment (wages)	1.21	20 Animal products	0.22	38 Total personal consumption at market prices	5.68
6 Asiatics & colored people	0.07	21 Misc. native foods	0.05	39 Indirect taxes	0.47
7 Total	6.59	22 Total agr. & pastoral industries	1.76	40 Total personal consumption at factor cost	5.21
8 Company income	0.39	23 Forestry	0.25	41 Current gov. expenditure on goods & services	0.87
9 Gov. income from trading services & property	0.12	24 European mfr.	0.01	<i>Capital formation of:</i>	
<i>Net income from abroad of:</i>		25 Native mfr.	0.06	42 Europeans & gov.	0.38
10 Europeans	0.02	26 Transport	0.62	43 Natives & Asiatics	0.03
11 Natives	0.08	27 Distribution	0.48	44 Total capital formation	0.41
12 Government	0.41	28 Government	0.33	45 Foreign expenditure <sup>b</sup> & investment by Europeans & gov.	1.11
13 Total net income from abroad	0.51	29 Misc. services	0.54	46 Residue	0.03
14 Residue	0.02	30 Housing services & construction	0.51	47 Total net national expenditure at factor cost	7.63
15 Total net national income at factor cost	7.63	31 Net income from abroad	-0.04		
		32 Residue	7.63		
		33 Total net national output at factor cost			

<sup>a</sup> It must be emphasized that these figures and those in Tables 2-4 are the unvised working figures prepared from material available in the United Kingdom. They have been submitted for criticism in Northern Rhodesia and most of them will require adjustment when more accurate information becomes available. They are given here by way of illustration only.

<sup>b</sup> This is expenditure not already included under item 34 above. It equals the sum of items 13 and 14 in Table 2.

TABLE 2  
National Income, Northern Rhodesia, 1938  
The Balance of Payments

*Preliminary Estimates*

INCOME GENERATED BY RECEIPTS FROM ABROAD		£ MILLION	CURRENT EXPENDITURE AND INVESTMENT ABROAD		£ MILLION
1	Nationally produced exports f.o.r.	0.44	10	Retained imports at border	3.68
2	Exports of services to mine & rail companies	3.23	11	Imported transport service	0.17
3	Net inflow of cash or goods from migrant labor	0.08	12	Imported distribution service	0.05
4	Income from foreign property	0.02	13	Expenditures abroad by Northern Rhodesians	0.77
5	Tourist expenditures	0.09	14	Government investment abroad	0.34
6	Receipts from foreign missions, etc.	0.07			
7	Taxes on foreign companies	0.41			
8	Residue	0.67			
9	Total income generated by receipts from abroad	5.01	15	Total current expenditure and investment abroad	5.01

See note a to Table 1.

TABLE 3

Taxable Income of Northern Rhodesia, 1938  
Income, Output, Expenditure, at Factor Cost  
*Preliminary Estimates*

NET TAXABLE INCOME		£ MILLION	NET TAXABLE OUTPUT	£ MILLION	NET TAXABLE EXPENDITURE	£ MILLION		
<i>Individual incomes of:</i>								
1	Europeans	3.58	<i>Net outputs of:</i>		33	Europeans	2.74	
2	Native independent producers	0.56	15	Mining		34	Natives (cash)	1.81
3	Native subsistence producers (cash)	0.09	16	European agr.	0.18	35	Natives (subsistence)	1.08
4	Native subsistence producers (kind)	1.08	17	Native subsistence agr.	1.21	36	Asiatics	0.05
5	Natives in employment (wages)	1.21	18	Native economic agr.	0.10	37	Total personal consumption at market prices	5.68
6	Asiatics & colored people	0.07	19	Animal products	0.22	38	Indirect taxes	0.47
7	Total	6.59	20	Misc. native foods	0.05	39	Total personal consumption at factor cost	5.21
8	Company income	6.19	21	Total agr. & pastoral industries	1.76	40	Current gov. expenditures on goods & services	0.87
9	Gov. income from trading services & property	0.12	22	Forestry	0.25	<i>Capital formation of:</i>		
<i>Net income from abroad of:</i>			23	European mfr.	0.01	41	Europeans & gov.	0.38
10	Europeans	0.02	24	Native mfr.	0.06	42	Natives & Asiatics	0.03
11	Natives	0.08	25	Transport	1.10	43	Total net capital formation by nationals	0.41
12	Total net income from abroad	0.10	26	Distribution	0.67	44	Foreign expenditure & capital formation by Europeans & gov.	1.11
13	Residue	0.02	27	Government	0.48	45	Foreign firms' home capital formation	3.47
14	Total net taxable income at factor cost	13.02	28	Misc. services	0.33	46	Foreign firms' foreign capital formation	-3.47
			29	Housing	0.54	47	Total net capital formation by foreign firms	0.00
			30	Net income from abroad	0.10	48	Remittances to foreign shareholders or banks	5.39
						49	Residue	0.03
			31	Residue	-0.04	50	Total net taxable expenditure at factor cost	13.02
			32	Total net taxable output at factor cost	13.02			

See notes to Table 1; for definition of 'taxable income' see Sec. 1a.

TABLE 4  
Taxable Income, Northern Rhodesia, 1938  
The Balance of Payments

*Preliminary Estimates*

INCOME GENERATED BY RECEIPTS FROM ABROAD		£ MILLION	CURRENT EXPENDITURE AND INVESTMENT ABROAD		£ MILLION
1	Exports at border	9.34	8	Retained imports at border	7.02
2	Net inflow of cash or goods from migrant labor	0.08	9	Imported transport service	0.17
3	Income from foreign property	0.02	10	Imported distribution service	0.05
4	Tourist expenditures	0.09	11	Expenditure abroad by Northern Rhodesians	0.77
5	Receipts from foreign missions, etc.	0.07	12	Remittances abroad to foreign shareholders and banks	5.39
6	Residue	0.67	13	Net gov. capital formation abroad	0.34
			14	Net capital formation by nationals abroad	- 3.47
7	Total income generated by receipts from abroad	10.27	15	Net capital formation	- 3.13
			16	Total current expenditure and investment abroad	10.27

See note a to Table 1; for definition of 'taxable income' see Sec. 1a.

NOTES ON SOURCES

The Northern Rhodesian estimates were based on an accumulation of facts, estimates, and opinions drawn from every source that could be found to have a direct or indirect bearing on economic activity in the colony. Some of the yield figures, for example, were drawn from the agricultural reports of neighboring territories. The estimates of European expenditure were, in part at least, based on information in the *Economic and Statistical Bulletin of Southern Rhodesia*. The following list by no means exhausts the publications used and consulted in the preparation of the preliminary estimates, but it does give the main sources of directly relevant data and so contains the more solid foundations used in the construction of Tables 1-4.

*Official publications of the Northern Rhodesian Government*

*Blue Book for 1938*

Annual Departmental Reports

Bulletins of the Department of Agriculture

C. J. Trapnell and J. N. Clothier, *The Soils, Vegetation and Agricultural Systems of Northwestern Rhodesia: Report of the Ecological Survey, 1937\**

Report of the Director of the Census 1931

\* A companion volume, giving the results of the Ecological Survey of North Eastern Rhodesia, was published in Northern Rhodesia in 1943. It is being used in the revision of the preliminary estimates.

Memorandum on the Economics of the Cattle Industry in Northern Rhodesia, 1935, and Further Memorandum with special reference to the Native Cattle Industry

S. Milligan, Report on the Special Position of the Agricultural Industry, 1934

Capt. C. R. S. Pitman, Report on a Faunal Survey of Northern Rhodesia, 1934

Report of the Nutrition Committee, 1939

*Official Reports of the United Kingdom Government*

Report of the Commission Appointed to Enquire into the Financial and Economic Position of Northern Rhodesia, 1938 (Col. No. 145)

Report by Major G. St. J. Orde Browne on Labour Conditions in Northern Rhodesia, 1938 (Col. No. 150)

Report of the Rhodesia-Nyasaland Royal Commission (Cmd. 5949, 1939)

*Other Publications*

*Modern Industry and the African*, ed. J. M. Davis (London, 1933)

Lord Hailey, *An African Survey* (London, 1938)

Audrey Richards, *Land, Labour and Diet in Northern Rhodesia* (London, 1939)

S. H. Frankel, *Capital Investment in Africa* (London, 1938)

Company reports of British South Africa Co.; Rhodesia Railways, Ltd.; Rhokana Corporation; Roan Antelope Copper Mines, Ltd.; Mufulira Copper Mines, Ltd.; Rhodesia Broken Hill Development Co.; and Nchanga Consolidated Mines, Ltd.

Publications of the Rhodes-Livingstone Institute, Northern Rhodesia, 1940-42, especially Godfrey Wilson, 'An Essay on the Economics of De-Tribalization in Northern Rhodesia' in 2 parts, published separately, and Max Gluckman, 'Economy of the Central Barotse Plain'.