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Chapter I

THE NATIONAL PRODUCT AND ITS MEASUREMENT

THE national product comprises all commodities and services currently yielded by the economic system in response to the desires of its members, whether those desires are expressed individually or collectively. It constitutes a continuous flow of physical output, composed of the entire range of economic goods in all their diversity, and it results from the cooperation of every kind of resource. The variability of this flow, and its distribution among different types of output and different claimants to that output, have frequently been the subject of study. Inevitably such investigations necessitate extensive recourse to the technique of measurement, and for the most part measurement in money form. This is because appraisal in terms of a common unit, alike of individual components of output and of individual resources devoted to its production, alone makes possible aggregations and comparisons of the kind required by further analysis. Such valuations, like most other concepts of theoretical economics, involve an appeal, implicit or explicit, to the judgment of the market place. Insofar as that judgment is unambiguous, the physical constituents of the national product, or of any of its components, may be represented uniquely as an actual or imputed money flow. It is such flows that we seek to measure, provided always that adequate data for the purpose are available.

§1. *The Definition of the Product*

A definition of the national product in terms of current output might perhaps be thought exhaustive and free from ambiguity, but such is not the case. Among a great variety of dilemmas a few may be selected. For example, the commodities and services which constitute the product may be reckoned gross of the output required to maintain the existing apparatus of production, or they may be measured after appropriate deductions have been made for this purpose. In other directions also the product may be interpreted in ways varying greatly in inclusiveness. Thus among durable goods that render services directly, the services of some, but not of others, may be regarded as currently produced; residential property, for instance, is commonly placed in that category, but not furniture or automobiles. The outlay of the consumer for shelter is assumed to be spread over the whole life of his home; his outlay for other durable goods is considered to be concentrated at the moment of their original purchase. This treatment is convenient, but it is not entirely consistent. Again, output which does not reach the market is sometimes included and sometimes excluded: agricultural produce consumed on the farm is generally included, whereas the services of housewives are commonly excluded. Usually no account is taken of the output of illegal commodities and services, although estimates of their contribution to the product are sometimes made. Finally, services furnished by government are far from easy to classify. Do they form part, indirectly, of the output of private business, or should some of them be segregated and regarded as end products on their own account?

This catalog of uncertainties is very far from exhaustive. Only the more obvious and considerable difficulties encountered in the interpretation of the national product

have been listed, by way of illustration. Solutions of the problems mentioned have generally been more or less arbitrary, and have frequently been governed more by availability of data than by any other consideration. It is possible that some or even all of them might be resolved unambiguously, in terms of a single comprehensive definition of the national product, if sufficient time and trouble were devoted to the question, although it is unlikely that the result would allow of satisfactory statistical interpretation with the data at present available. It seems more probable, at least to the present writer, that the search for the "true" social product is one of those circle-squaring expeditions, amusing in themselves, but inherently incapable of producing any definite result.

Whatever the fruitfulness of such an inquiry, it lies outside the scope of the present discussion. We shall be concerned in this volume only with a more or less arbitrarily selected group of actual or imputed money flows—flows which may be taken, in suitable combinations, as measures of the product. Any such selection, whether dictated by statistical convenience or adapted to the requirements of a particular business-cycle theory, involves a segregation of the physical phenomena which are to be regarded as final output from those which are not to be so considered. Because statistical treatment implies a definition of the product, arbitrary though it be, an attempt must be made to explain the broad grounds for the definition adopted here.

In the present as in other studies the most important influence governing decisions in this field has been statistical convenience, but wherever possible I have used breakdowns which allow of alternative treatments. A detailed discussion of the conceptual coverage of the totals actually offered here is given in Chapter II. Among services imputed to durable goods, only those of residential

property are treated as final output. Besides being difficult to measure, the services of other durable goods have only a rather distant relationship to the business cycle. Even among residential rentals, the imputed portion is included only in order to match the portion which is actually responsible for a money flow.¹

Just as certain forms of output not represented by actual money flows are conveniently included in the product, it seems desirable to take account in some cases of money flows whose physical counterpart is dubious or even non-existent. Thus all governmental expenditures are assumed to represent production. On the other hand a volume of services equal to governmental receipts is considered unfinished, and is regarded as rendered to business rather than to the final consumer. That is, only the expenditure of the government in excess of its receipts is treated as final output. This procedure is dictated by the difficulty of achieving any more satisfactory distinction between governmental services which are finished and those which are unfinished. As a result, deficit financing of relief expenditures is likely to lead to a reported increase in the national product. Such an outcome may be regarded as unreasonable, but the impossibility of segregating government expenditures unequivocally into a productive and an unproductive category makes any other treatment still less satisfactory.

The use of conventional accounting concepts in the measurement of the product is similarly dictated by statistical considerations, for most of the basic data are the result of accounting procedures. The correspondence of depreciation allowances and other elements of cost to economic criteria may be called in question, and certain adjustments to accounting measures made. But where, as

¹ Readers who prefer series which do not include imputed rentals will find the latter shown separately in Tables 40 and 42 in Appendix D, so that the desired adjustment to the totals may readily be made.

so often, measurement is a byproduct of other activities, we can never be certain that we are measuring exactly what we would most wish to measure.

In making broad decisions of the kind indicated, we may be sure that other decisions would produce other estimates. Such estimates would be no less arbitrary than those presented in this volume, though in absolute magnitude they might differ considerably from our own.² With few exceptions, however, choices other than those outlined above would lead to slight variation in the movement of the product reported through time.³ Where practicable, breakdowns have been given, so that readers who prefer other definitions of the product may make adjustments to the totals to meet their own purposes.

§2. *Outlay and Income as Measures of the Product*

The national product, however inclusively defined, can always be broken down in a wide variety of ways. Of these, two leading forms of aggregation, which we shall call Outlay and Income respectively, will be studied in the present monograph, both annually and quarterly. The first breakdown regards the product as composed of the entire range of commodities and services constituting final output; the second yields a measure of the resources employed in the production of that output.

Such a procedure has more than one object. Conceptually, the comparison of income and outlay provides two alternative breakdowns of a single total—the national income—on the one side as it is earned, and on the other as it is spent. Each breakdown is appropriate to the treat-

² The inclusion of services imputed to consumers' durable goods, for example, would lead to a substantial upward revision.

³ The outstanding exception is the veterans' bonus, distributed by the Federal government in the second quarter of 1936, and included in the estimates presented here.

ment of particular problems. Statistically, however, the situation is more complicated than this simple statement would imply. The measurement of the product can be carried out only by summation of its components. Calculations of outlay and income, which are obtained by summing different sets of components, yield alternative totals for the national product which in principle should be, but are not in practice, identical. Yet, discordant as they are, these estimates can be put to useful service. For while the two series—the one for outlay and the other for income—purport to measure the same phenomenon, they are largely independent of each other in respect of the sources upon which they rely. In the first place, therefore, they can be made to throw some light upon the magnitude of errors of measurement. And in the second place, an independent derivation of the two sets of estimates is an initial step toward the eventual construction of a single series for the national product, broken down both by composition and by origin.

The first task undertaken in the present study is a comparison of the kind just mentioned. The relationship between the two calculations, and the means of achieving comparability between them, are fully discussed in Chapter II, and the comparison itself is undertaken in Chapter III. It cannot be emphasized too strongly that the discrepancies observable are due to defects in the data, and not, as far as is known, to any conceptual disagreement between the alternative summations. Indeed, as has already been suggested, the discrepancies may be regarded rather as a measure of these defects.

The remainder of this section is given over to a brief description of the series assembled and the breakdowns used, an exposition that will serve also to summarize the scope of the first three chapters of this book.

Outlay. Viewed from the standpoint of outlay, the na-

tional product consists of private⁴ consumption and investment, together with such finished output as the government produces. The outlay of consumers may be further broken down among different types of commodities and services. Gross private investment comprises the output of producers' durable goods, business and residential construction, net additions to inventories, and the foreign balance. To obtain a figure for net investment, we deduct from this total an allowance for the current consumption of fixed capital (including residential structures). The best way of measuring the government's contribution to outlay will be discussed presently.

With the exception of services rendered directly to consumers, and net changes in business inventories, acceptable estimates on an annual basis for all of these items were readily available, or could be derived without difficulty. For consumers' services and for inventory changes it was necessary to make new estimates for this study; at the end of this volume each of these topics is treated in detail in a separate appendix.

Income. Regarded as a measure of the national product, income may be classified both by industrial origin and by type of income receiver.⁵ In general, elements of income are to be regarded as a measure of the contribution of the income receiver to the national product, but sometimes items are included (e.g. relief payments) for which there is little or no counterpart in output. The national income as a whole is equal to income distributed, together with the savings of business enterprises, corporate and non-corporate. Compensation of employees embraces wages and salaries, and also pensions where these are measurable. Individuals receive dividends and long term interest payments, but short term interest is assumed to be paid only

⁴ I.e., nongovernmental.

⁵ An example of such cross-classification will be found in Appendix D.

to business enterprises and consequently does not enter the income stream. Entrepreneurial withdrawals are payments received by individuals from unincorporated businesses. For some purposes relief payments, unemployment and old age benefits, and certain other items, may be included. By summing these various amounts, we obtain a total for aggregate income distributed to individuals. By adding to this a figure for business savings, we reach the national income as a whole.

All the annual estimates of income cited in this study have been taken from those compiled by Simon Kuznets, and presented in great detail in *National Income and Its Composition*, to which the reader is referred for further breakdowns and for a detailed discussion of terminology.⁶

Particularly in deriving quarterly estimates, and also for use in subsequent analysis, I have found it convenient to adopt a threefold classification of income. Since it will be referred to frequently, it is desirable to discuss it here. This classification is designed to conform, if only rather roughly, to the categories usual in economic analysis.

Residual Income is intended to represent as nearly as possible the return to enterprise (corporate and noncorporate) outside agriculture and the professions. It is true that even with this limitation it does not correspond accurately to the "profits" of the theory of distribution, for it consists largely of return to capital as well as to enterprise in the narrower sense of risk-bearing and initiative. It does, however, represent (as nearly as statistical treatment will allow) the variable portion of the product which accrues to the entrepreneur (including here the stockholder),

⁶ The other chief income compilations for the United States are those published by the Department of Commerce, by the Brookings Institution, and by the National Industrial Conference Board respectively. These extend over varying periods and also differ somewhat in concepts and coverage. For a comparison of the National Bureau estimates used in this volume with earlier estimates by W. I. King, and also with the Department of Commerce estimates, see Kuznets, *National Income and Its Composition, 1919-1938* (National Bureau of Economic Research, 1941), Ch. 10.

whether as profits strictly so called or as a return upon the capital he himself has invested. It comprises corporate dividends and savings (after corporation income taxes), and (except in the Service and Miscellaneous groups⁷) the withdrawals and savings of individual entrepreneurs. Profits arising in Agriculture, and the net income of individual entrepreneurs (mainly professional men) in the Service and Miscellaneous groups, have been excluded from residual income, perhaps somewhat arbitrarily, because of the difficulty in these groups of distinguishing true entrepreneurial earnings from forms of payment which are mainly a return to labor of one kind or another. (The same difficulty exists elsewhere, but on a smaller scale.) The definition of residual income adopted for this study is convenient also if it turns out, as one suspects it may, that fluctuations in economic activity are mainly industrial in origin. In short, residual income, as defined above, is intended to represent what may roughly be called "industrial profits."

The second principal category I shall call Short Term Income. It is intended to represent as nearly as may be the income accruing to labor (in the widest sense) employed by private business or engaged in the professions. Except insofar as some of the return to labor has already been included in residual income, it does this fairly accurately. It consists of wages and salaries in all industrial groups, together with the withdrawals and savings of unincorporated enterprises in Agriculture, Service and Miscellaneous, and a negligible amount of dividends and corporate savings accruing in Agriculture.

Lastly, Long Term Income measures the return to holders of fixed claims against private individuals or businesses whether through the ownership of land or buildings, or

⁷ The industrial divisions cited here follow a classification based mainly upon that of the Bureau of Internal Revenue, and set out in detail in Appendix E.

through the holding of bonds or mortgages. It represents, approximately, the return to the ownership of land and natural resources, and of such capital as is remunerated by contractual obligation. It consists of long term interest payments among all industrial groups, together with net rentals (cash and imputed) received by individuals and appearing in the Finance group.⁸

The three kinds of income just mentioned—residual, short term and long term—together equal aggregate income *originating* in private business. This total differs from income *distributed* by private business by the amount—positive or negative—of business savings. Since dividends and entrepreneurial withdrawals are lumped together with business savings in the estimates for residual income in this volume, no estimates, either annual or quarterly, are presented here for aggregate income distributed by private business. The emphasis, in other words, is entirely upon income earned, rather than upon income actually received by individuals. This omission can be excused only on the ground that the objectives of the larger study of which these estimates form a part were the determining factor.⁹

There remains the government. Governmental agencies *distribute* two sorts of income: on the one hand wages, salaries and pensions (and, if it is desired to include them, relief payments), and on the other long term interest. If

⁸ The assumption made here, usual in compiling national income estimates, is that no short term interest payments are received as such by individuals. In fact, however, individuals do receive short term interest, e.g. from savings banks. While partial account is taken of this by treating institutions (other than the commercial banks) which distribute short term interest as aggregations of individuals, the series presented for long term income probably underestimate the variability of the payments which they are intended to include. Cf. Kuznets, *op. cit.*, Ch. 2.

⁹ The attention of those readers who are interested in income received, rather than in income earned, is directed to the annual estimates available in Kuznets, *op. cit.*; and to the monthly estimates (on a slightly different basis) to be found in Frederick M. Cone's *Monthly Income Payments, 1929-40* (U. S. Department of Commerce, 1940).

we are interested in the distribution of income as it affects individuals, then it is appropriate to add the former to short term income, and the latter to long term income. The estimates in question are presented in such a form (annual data in Table 41, quarterly data in Table 17) that this operation can easily be carried out if desired. For many purposes, however, it is best to keep income originating in private industry separate from income distributed by Government (regarded as an industrial division), since no residual income accrues to the latter, while the factors determining the policies of governmental agencies are entirely different from those influencing private business. It is for this reason that income distributed by Government has not been included in the threefold classification described above, or exhibited in Tables 12 through 15 which are based on that classification.

For a satisfactory picture of the national product—or rather of its dollar equivalent—we have not only to decide whether relief payments, and certain other doubtful items, should or should not be included; we have also to take account of the fact that the government *saves* income, for example when it constructs public works. It happens that governmental investment is not a function of the profit motive; it happens also that the definition and measurement of the public contribution to the community's net accumulation are matters of peculiar difficulty. For these reasons no estimates of savings by Government, or of public investment, will be presented in this volume.¹⁰ The government's net contribution to outlay, on the other hand, is of great importance for our purpose. This quantity, which will be called Net Public Outlay and is roughly equal to the combined cash deficit of all governmental

¹⁰ An estimate (by Kuznets) for savings by Government does however appear incidentally in Table 4 below; cf. *National Income and its Composition*, especially pp. 65-66 and 414-15, where the general problem of measuring governmental savings is discussed and the basis for this estimate will be found.

agencies, bears no direct relationship either to the volume of public investment or to savings by Government. The treatment of governmental transactions described here, and carried out in greater detail in subsequent chapters, is based upon the following postulates. (1) Governmental services, with the exception of postal activities, are rendered exclusively to business. (2) Public investment does not form part of the currently disposable national product. (3) The repercussions of public finance upon private incomes can be measured by a balancing item of the kind indicated. This treatment was dictated by considerations of statistical convenience. While it was supported by the type of analysis the author had in mind for the future, it is purely conventional in character and implies no theory as to the nature of governmental activity. It can easily be modified, and measurements of public activity appropriate to other assumptions can be substituted by any reader who so desires.

As we have seen, the ideal expression for the social product—in dollar terms—rests heavily upon individual judgment, and upon the character of the subsequent analysis for which the estimates are after all only raw material. In the last resort, the particular purpose in hand must dictate what should and what should not be included. For the interpretation of some social phenomena a different, perhaps a more sophisticated, approach would be required. It is sufficient, however, for the cruder ends of business-cycle and similar analysis, to posit a set of income flows which may or may not be adequately inclusive on the broadest social grounds, but which are statistically unambiguous, and may be assumed to fluctuate much as does the social product, could we measure it. This volume is intended only to present the material in such a way that in handling it others may make conceptual modifications with a minimum of trouble.

§3. *Quarterly Estimates of Outlay and Income*

The second main task undertaken in this book is to place the annual estimates for outlay and for income upon a quarterly basis. Just as these estimates, described in the preceding section, afford two more or less independent determinations of the level of the national product, so the associated quarterly estimates furnish substantially independent measures of its short run variability. In the same way, the breakdowns provided by outlay and by income respectively constitute the first step toward a unique quarterly series for the product, broken down simultaneously into outlay and income components. The interpolation¹¹ of the annual estimates presented in Chapter II is carried out in Chapters IV and V. Besides occasioning a number of special problems which will be discussed as they arise,¹² the business of interpolation involves certain general assumptions and questions of methodology with which it seems appropriate to deal at the outset.

The first question to be considered relates to the conceptual validity of short run measures as such, when used in studying the national product. Is there, in other words, any such thing as national income or outlay for periods shorter than a year? Or, perhaps we should say, for periods even as short as a year? The difficulties I have in mind

¹¹ The business of deriving quarterly outlay and income estimates from annual ones is not, of course, a case of interpolation properly so called. If figures (for example for daily retail sales) for February 15th, May 15th, August 15th and November 15th were obtained from data relating to June 30th in successive years, a true case of interpolation would result. Instead of referring to June 30th, annual income totals take the form of a 365-day summation; likewise, quarterly estimates represent a three-month summation rather than a single observation on a given day. In practice it is often necessary to neglect this distinction. Moreover the use of the term interpolation to cover the distribution of annual totals among quarterly or other subperiods, though not strictly accurate, is so convenient and so unlikely to give rise to misunderstanding that it has been adopted throughout the present study.

¹² See especially Chapters IV and V, and Appendices B and C.

affect some components of the national product much more seriously than they do others. Whether or not we can accurately measure such totals in practice, outlay by consumers and income distributed to individuals are rather definite quantities even over the shortest time interval we care to name, and are unlikely to cause difficulty. But the same is not true of outlay for new investment, or of income accruing as business savings. Both these items are a function of the gross income of the enterprise, a quantity which may be very difficult to measure in the case of industries with a long production process, such as shipbuilding. Moreover these items have to be reckoned after deduction of a series of what may be called contingent cost items, of which the depreciation of fixed equipment is by far the most important. Other such deductions are taxes, bad debts, damage claims and foreign exchange losses: all these represent costs which remain contingent unless and until liability is finally determined, which may not happen for many months after the close of the period considered. Meanwhile estimates have to be made, and these reflect not the true income or investment of the period but rather entrepreneurs' expectations, at a moment shortly after the close of the period, as to what the true income or investment of the period will turn out to have been.

Some readers may indeed object that a period even as long as a year is too short an interval in which to determine accurately such items as net investment and business savings. They will argue that accurate evaluation of the national product is possible only over a much longer period—a period comparable, for example, with the lifetime of equipment to be depreciated. This may in fact be the case. But in making estimates year by year, or quarter by quarter, we have to assume that entrepreneurs have correctly forecast the provision which will ultimately become necessary in respect of contingent liabilities incurred in the

present. For various reasons this assumption is likely to do more violence to the facts in the case of quarterly than in the case of annual estimates. There is evidence that corporation executives take somewhat less care in preparing quarterly than in preparing annual income statements.¹³ Moreover the average time which elapses between a transaction and the compilation of an annual income statement based upon it must be something like four times the corresponding interval in the case of a quarterly report. But although the difficulties involved in measuring national income quarter by quarter are greater than those encountered in its annual measurement they are difficulties of essentially the same kind.

It is plain that we do not measure what people are really earning so much as what they think they are earning. From the viewpoint of the social historian the first is perhaps of greater interest than the second, and our measures are correspondingly defective. From the viewpoint of the business cycle analyst, on the other hand, the situation is perhaps more fortunate. For the behavior of the entrepreneur is likely to be influenced primarily by what he thinks he is earning. While it is true that, broadly speaking, we have no alternative in the matter, estimates which follow the entrepreneur in the errors he makes are in some respects more useful than estimates which would ultimately correct all these errors, were it possible to compile the latter.¹⁴

The second type of problem I wish to discuss in this section is, like that just mentioned, peculiarly acute in treating quarterly data, but again by no means absent in compiling annual estimates. It is, however, more technical

¹³ See Appendix B, particularly §7.

¹⁴ However, we can and do attempt to exclude profits realized from the sale of capital assets and through the revaluation of inventories; and to place depreciation upon a current cost basis. This is a concession to the social historian, but in business cycle analysis we may prefer to use series which are uncorrected even for these items.

in nature. For the task of deriving short run measures of the national product presents a special aspect of a more general statistical problem: that of combining monthly or quarterly series of a partial character with more comprehensive measures available at less frequent intervals. In deriving annual measures this difficulty has to be faced whenever the data are more extensive or reliable in some years than in others;¹⁵ in deriving monthly or quarterly estimates it is practically never absent. The general problem is one which always appears when an attempt is made to combine the results of sample with the results of census inquiries. Problems of this type are so important, and pervade so completely the field of economic time series, that some discussion of them will not be out of place. In any case an account of the general lines upon which I have attempted a solution in the present study is a necessary preliminary to an adequate appraisal of the results set forth in the pages to follow.

The general method is familiar. Thus one starts with totals for the national product as a whole, or for one or more of its components, available for some or all years—totals which are derived for the most part from census inquiries (e.g. the Census of Manufactures or the *Statistics of Income*) and are presumed to cover completely their respective fields. If coverage is known to be incomplete, or (worse still) to vary in completeness from year to year, allowance must if possible be made for such deficiencies. Then, so the process continues, with the help of sample data (e.g. indexes of output, payrolls, or other appropriate monthly or quarterly information) one builds up a set of figures which represent the presumed results of the census inquires already mentioned, had these been available at more frequent intervals and covered shorter periods of time than is actually the case.

¹⁵ Cf. Kuznets, *National Income and its Composition*, Ch. 11; *Commodity Flow and Capital Formation*, Vol. I (National Bureau of Economic Research, 1938), Part II.

Broadly speaking, there are two alternatives. The task may be viewed either as a problem in the weighting of index numbers or as a problem in interpolation. It is simpler statistically to look at the matter as a problem in weighting, but that approach is at the same time less realistic. We might, for example, take the census results for some base year, and then by extrapolation derive national income totals over an extended period of time at quarterly or monthly intervals. What we should in fact obtain is an index of national income weighted according to its known composition in the base year. Plainly the difficulty with this method is that the index grows more and more out of keeping with reality as the distance from the base year increases. For the bias exhibited by the extrapolating series leads to progressively greater errors in the total index.

The second of the two alternatives—to view the matter as a problem in interpolation—has the advantage that it allows for the continuous removal of the bias inherent in the quarterly or monthly sample series by checking the latter against successive (or at any rate frequent) annual totals derived from census data. Use is made of census totals, not only for some arbitrarily chosen base year, but for all years for which they are available. This method has been followed consistently in the present volume, although it gives rise to certain difficulties of its own.

For purposes of business cycle investigation it is of course the short run—sometimes very short run—fluctuations that are significant. The reliability of the movement between successive items, say from quarter to quarter, is therefore even more important than the absence of longer run bias affecting their absolute size. And this is equally true, whether the resulting data are eventually to be analyzed by the variate difference method, or in other ways—for example by removing a fitted trend. In particular, if annual figures are split up into their quar-

terly constituents by simple proportion with the help of an interpolating series which does not conform absolutely to the annual data (and no interpolating series ever does this perfectly in practice) the movement from the last quarter of one year to the first quarter of the next will be subject to a wide margin of error. Furthermore, over the year ends the figures will suffer from a serious lack of comparability. This consideration was of such obvious importance that I was tempted more than once to abandon the quarterly interpolation of continuously available annual data in favor of extrapolation from a single base year on the "weighted index" plan, i.e. the first of the two possible alternatives outlined above. Nevertheless the bias appearing over a period as long as a decade or more seemed so serious, and the difficulty of choosing a single base year for all the series so great, that I considered it worth while to make substantial efforts to overcome the weakness of the interpolation method rather than to adopt the alternative.

The device adopted for this purpose I have called the *graduation of raising factors*.¹⁶ The ratio of the annual census totals to the sum of the four quarterly (or twelve monthly) sample figures represents the factor by which the latter must be raised in order to provide complete coverage, i.e. in order to yield an interpolation of the former.¹⁷ In the absence of perfect conformity between the two series (annual and quarterly) this factor will vary

¹⁶ The term "graduation" is no more strictly appropriate in this context than is the term interpolation. Nevertheless it remains convenient to call the distribution of annual totals or ratios graduation, when this is done in an arbitrary fashion or in terms of some mathematical function; and to reserve the term interpolation to denote the use of some monthly or quarterly series as a basis for the distribution of the annual data (whether or not such a series is itself a sample of the population whose aggregate is being distributed). Nor is this usage likely to give rise to misunderstanding.

¹⁷ Where the interpolating medium is in index form, the ratio in question may have no physical meaning, i.e. may afford no measure of the coverage of a sample. But the problem discussed has still to be faced.

from year to year, usually exhibiting a well-marked trend or bias. In cases where the variation is sporadic the interpolating series has to be rejected as unsuitable for the purpose at hand. But where the raising factor for a single year alone stands outside the picture, and the remainder conform, further examination will often permit a reconciliation of the two series, perhaps with the help of additional information.¹⁸

Let us consider the common case in which the interpolating medium conforms reasonably well with the annual data, but the raising factor exhibits a definite trend. The abrupt change from a given raising factor for the last quarter of year One to a (slightly) different raising factor for the first quarter of year Two is responsible for the year-end discontinuity which it is desired to eliminate. We can readily overcome the difficulty if we graduate the series comprising the raising factors.¹⁹ The amount of graduation introduced into the original data by this process is of course extremely small. The device just described was used throughout, except in the interpolation of the net incomes of corporations and hence of residual income, where it could not be applied. These and other difficulties, especially as they arise in connection with the interpolation of profits and losses, are discussed fully in Appendix B.

The procedure outlined, for the use of interpolating media with the help of graduated raising factors, will not, if applied in its simplest form, lead to a set of quarterly

¹⁸ Here, as so often, judgment must be exercised. One would like to present the evidence in detail, each time such a decision has to be made, but it is impossible to do so except in a very few special cases. See Appendices B and C.

¹⁹ For the graduation of raising factors a straight line, or occasionally a moving cubic, was used. (Regarding the general question of graduation, see Appendix G.) A more refined procedure for use with monthly data, in which a cubic is fitted to the raising factors for successive years, has recently been devised by V. Lewis Bassie of the Department of Commerce. (See Frederick M. Cone, *Monthly Income Payments 1929-40*, Department of Commerce, 1940, pp. 27-28.) For the treatment of quarterly data, especially if rigorous agreement between quarterly and annual figures is not insisted upon (see below), simpler methods would appear to give adequate results.

figures which add up exactly to the annual data from which the quarterly measures are derived. This drawback can be overcome, for example by computing a series of successive approximations, in which the first interpolation obtained is used to carry out a second interpolation, and so on. The principal advantage of exact agreement between quarterly and annual data is that the calculations become self-checking. But it is doubtful whether, at any rate in the field of outlay and income estimates, exact agreement has any other advantages. For the annual estimates themselves are by no means so accurate that it is worth taking great pains to secure complete conformity to their level in cases where interpolating media suggest what are in effect slight revisions of the annual data. Minor conflicts of evidence are common, and it may well be that the "best" annual estimate and the "best" quarterly or monthly estimate yield series which do not agree exactly within the confines of a single year. At this point I can do no more than record that at an early stage in the study it was decided that continuous comparability from quarter to quarter was more important than exact year to year conformity of the quarterly with the annual data. Since the two criteria can be combined only with an excessive expenditure of labor, the advantage of obtaining interpolations which would be self-checking had to be sacrificed. The annual data in the first five tables (Chapter II) are presented as the best available annual measures, and the quarterly data in subsequent tables (Chapters IV and V) as the best available quarterly estimates. There has been no intensive effort at precise reconciliation, although a few of the more considerable discrepancies for which I have not made adjustments are discussed in footnotes to the tables containing the quarterly series.

§4. *Character of the Estimates*

The data presented here are intended as global estimates, i.e. they are designed to apply to the continental United States, and to cover the whole of the item specified for the period described.²⁰ They are given throughout in current dollars, and no attempt has been made in this volume to deflate any of the items.²¹ All the more important quarterly series are shown after adjustment for seasonal variation, but where possible the same series have also been given in unadjusted form. Concerning the precision of the estimates, no summary statement can be made. Among individual components, some indications of the accuracy of the quarterly profits series, upon which the interpolation of residual income is based, will be found in Appendix B (§§6, 16 and 19). The precision of the totals will be discussed at length, as regards their general level in Chapter III and as regards their behavior through time in Chapter VI.

Some mention should be made here of the reasons underlying the choice of the period studied. Almost all the annual data considered basic to this study go back as far as 1919, and have been kept more or less up to date. Similarly the bulk of the interpolations could be carried back to 1919, with one important exception: the quarterly sample of corporation profits, upon which the interpolation of residual income is based, begins for practical purposes in 1920 and does not become really adequate until several

²⁰ For a discussion of the precise geographical coverage of various components of the income totals see Kuznets, *National Income and its Composition*, Ch. 3; and for omitted items *ibid.*, Ch. 9, and Ch. III below. Some notes on the coverage of the commodity estimates will be found in Kuznets, *Commodity Flow and Capital Formation*, Vol. I (National Bureau of Economic Research, 1938), Parts I and VIII; and Ch. III below. The estimates for consumers' services are described in detail in Appendix A below.

²¹ Much of the annual data reproduced here will, however, be found expressed in constant as well as in current dollars in the original publications.

years later. For this reason a serious effort to place residual income upon a quarterly basis is possible only beginning with 1921. Moreover, in some other series for which early data are exiguous, the violence of movement in 1920 makes interpolation difficult. For the construction of totals, all components must obviously be available for the whole of the period. It seemed wisest therefore to select 1921 as the initial year for all estimates.²²

All of the estimates have been carried through 1938, thus supplying eighteen annual or seventy-two quarterly observations. There is no reason why eventually they should not be continued still further forward, although adequate data for 1939—for example the *Statistics of Income*—are not available at this writing. Indeed the estimates even for 1938 must still be regarded as provisional in some cases, and it is to be expected that use of the 1939 Census will lead to some revision of the figures for 1937 and for earlier years as well. A more or less continuous improvement takes place in the quality and coverage of source material as the years go by.²³ The absence of the very few series (annual and quarterly) which cease to be available is far outweighed by the large number of new series which have been developed in recent years by both governmental and private agencies. If a few particularly dark spots are to be selected, more reliable data are perhaps still most urgently needed today, as regards industrial divisions, in Distribution (Retail and Wholesale), and in the Service group; and as regards general topics, in the measurement of inventories.

²² The interpolation of some of the corporate net income series was carried back through 1920 as an integral part of the work of deriving reliable estimates for 1921. Such quarterly estimates as were derived in this field for 1920 will be found in Appendix B, although no further use is made of them.

²³ The census reports for 1929, 1933 and 1935 are especially noteworthy as benchmarks.

Ideally, in a monograph of this kind, sources and methods should be described in such a way that any interested reader, with adequate time on his hands, could reconstruct any or all of the estimates presented. Unfortunately a study which takes in as much territory as the present one cannot hope to get very close to this ideal. I have nevertheless endeavored not only to indicate at appropriate points every source consulted, but also, without presenting an unwieldy mass of detail, to explain as clearly as possible the character of the steps involved and the assumptions made in the construction of every estimate. To this end discussion in the text has been supplemented by extensive footnotes to the tables, and by a series of appendices. In particular, the quarterly estimates for the net incomes of all corporations in the United States in selected industrial groups, now available for the first time, have been deemed of sufficient interest to warrant an extended description of their derivation (Appendix B).

To some readers, however, statistical detail, and even the general validity of the resulting estimates themselves, will be of less interest than broader questions of concept and methodology. As a byproduct of the more extensive study which has yet to be completed, the current volume is inevitably more concerned with the presentation of basic data than with the analysis and interpretation of the results obtained. Nevertheless, both the comparability of outlay and income, and the general problem of short run estimation, involve important questions of methodology which will be discussed as they arise. Finally, some light is thrown upon the precision of the estimates themselves, a subject concerning which almost nothing has been known hitherto.