Part Two

THE CORRECTION OF WEALTH AND INCOME ESTIMATES FOR PRICE CHANGES

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Discussion

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I Introduction

The problems connected with the deflation of estimates of national wealth and national income as measured in current dollars necessarily involve certain general considerations with respect to the use of the deflation technique. It will be well to bear in mind that the application of a deflating index to any dollar volume figure should be conceived as an indirect method of constructing an index of physical volume. If the deflating price index applied is constructed by the aggregative formula the method is, of course, subject to certain arithmetic imperfections, since the aggregative formula does not conform precisely with the requirements of the factor reversal test. However, with an exception to be noted shortly, this defect in an aggregative type index may fairly be regarded as a minor source of worry, and our discussion will be in terms of that formula.

Since we conceive of deflating income as an indirect way of constructing an index of physical volume, it is possible to define what we mean by a satisfactory deflation of a dollar volume figure through comparison with a corresponding directly constructed physical volume index. However, we must recognize that a single dollar volume series may quite properly have reference to, or correspond to, more than one physical volume series and may properly be deflated in more than one way. When, therefore, we seek to deflate national income, for example, we need to specify

precisely what physical volume we are seeking to measure through the deflation process. We propose to argue that the total social income may properly be deflated in at least two quite different ways and that certain segments of it may be deflated to represent at least three corresponding physical volumes.

The deflation of national income has sometimes been attempted by breaking the total into several constituents and applying a separate deflation index to each constituent series. When the constituent series correspond to the values of two mutually exclusive groups of commodities and services, as, for example, the classification of commodities and services of ultimate consumers into (a) consumers' commodities, and (b) consumers' services, the application of a separate price index to each constituent is a step in the direction of the direct construction of a physical volume index. If in the deflation process the breakdown were carried far enough, the substitution of the physical volume index technique for the deflation technique would be complete.

The application of a single deflating index to a dollar volume series assumes that all our P's (prices) and Q's (quantities) are positive. In the deflation of income we shall have occasion to deal with cases where some of the Q's are always positive and others always negative, i.e., with cases of a dollar volume that we may conveniently represent as $\Sigma PQ - \Sigma pq$. In such a case it will be necessary to deflate the positive dollar volume and the negative dollar volume separately and then take the difference of the two deflated figures. The application of a single deflating index to the net dollar volume leads to erroneous results. For example, let us assume two dollar volume series for which $P_1 = p_2 = 2$; $P_2 = p_1 = 1$; $Q_2 = Q_1 = 3$; $q_2 = -1$; $q_1 = -2$. Obviously our net physical volume has increased. If we deflate the net dollar volume directly, using an index constructed by the usual, aggregative formula, our price index in period 2 will be

$$100 \frac{P_2 Q_1 + p_2 q_1}{P_1 Q_1 + p_1 q_1} = 100 \frac{1 \cdot 3 - 2 \cdot 2}{2 \cdot 3 - 1 \cdot 2} = -25\%.$$

In period 1 it will be 100% ,as will the dollar volume index. The dollar volume index in period 2 will be

$$100 \frac{P_2 Q_2 + p_2 q_2}{P_1 Q_1 + p_1 q_1} = 100 \frac{1 \cdot 3 - 2 \cdot 1}{2 \cdot 3 - 1 \cdot 2} = 25\%.$$

The deflated dollar volume or physical volume index is thus −100% in the second period. Where we are dealing with a net dollar volume, the failure of the aggregative formula to conform to the factor reversal test is crucial.

The attempt to deflate wealth and income involves certain problems we shall do well not to forget. They have to do in part with the defects of existing price and physical volume measurements where there are changes in the physical and other specifications to which a price or a physical volume series applies, and in part with the fact that in comparing two dates (or places) we may find a number of items that occur only in one term of the comparison. In the language of the aggregative formula for a physical volume index,

$$\sum \frac{P_1 Q_2}{P_1 Q_1},$$

Q_1 for some item may be zero and P_1 indeterminate. So far as old commodity or service items have dropped out of national income or new ones have appeared and so far as qualitative changes have taken place in individual commodity or service items, there is no very satisfactory way of constructing a physical volume index either directly, or indirectly through deflation. We may seek to avoid both difficulties by the use of substitute commodities or services or by reference to a demand or a supply analysis. Thus we may regard an automobile (a) as the equivalent of so many horses and buggies, (b) as the equivalent of so many man-hours of labor, tons of steel, etc., or (c) as so many passenger miles of transportation. None of these devices is entirely satisfactory and while there is no reason to assume even a rough agreement among the results of the three devices, there may be some reason to think that limits can be placed by a proper use of (b) and (c).

At present our information concerning prices and physical volumes pertinent to the correction of wealth and income estimates for price changes is far from adequate. Also, experimentation with the use of the data available is in its infancy. Consequently, our discussion of the problems involved in wealth and income deflation will necessarily be fragmentary, hypothetical, and highly tentative.

One broad aspect of the deflation problem, although admittedly important, will receive only incidental mention—the application of the deflation technique to geographical comparisons. Present consideration will center on time comparisons; that is, we shall be concerned with price and physical volume index numbers for one time period using another time period as a base, where the data in both periods refer to the same country or region. We shall not be concerned with price and physical volume index numbers for one country using another country as a base, where the data refer to the same time period. However, many of the problems involved in the two types of deflation are quite similar.

The problems involved in correcting wealth and income estimates for price changes will be discussed in the two succeeding sections. The first is devoted to wealth estimates and the second to income figures. In each case the deflating process is outlined under the assumption of an isolated economy before proceeding to discuss the more complex problems involved in deflating wealth and income estimates for a nation which is part of a world economy and for various types of segments of the national total. A final section examines the ethical implications of the deflation process when applied to the measurements of social income and wealth that are derived from a consolidation of the accounts of private and public enterprises.

II The Correction of Wealth Estimates for Price Changes

Although much less has been done toward the development of deflated wealth estimates than toward the development of deflated income estimates, it will be convenient to consider first, problems connected with wealth deflation.

Most wealth items differ from income items in involving a larger number of possible alternative bases of valuation, no one of which can claim to be *the* valuation at current prices. Any deflation technique applied to a wealth estimate will consequently depend upon the basis of valuation.[1]

There has been a tendency in attempts to deflate wealth and

[1] See Simon Kuznets, Part One, Sec. III.

income greatly to over-simplify the deflation problem. This has been true more particularly in the case of wealth deflation. It has sometimes been assumed that a single price index, little more complex than the Bureau of Labor Statistics wholesale price index, may properly be applied to any available wealth estimates without regard to the basis of valuation employed in making the estimates. Most wealth estimates, however, rest in part at least on existing accounting records. So far as accounting valuations based on accepted accounting practices are employed in wealth estimates, items of wealth substantially identical, except for age differences, will be valued at any given date at different prices. In general, a wealth estimate based on good accounting records would embrace:

1) Land parcels, each valued at the price of its most recent transfer with some allowance for subsequent market appreciation or depreciation;

2) Other durable goods, each unit valued at its original cost less depreciation based on that cost and the unit's expected life;

3) Inventories valued at cost or market, whichever is lower.

Thus similar parcels of land and other durable goods will be valued at the prices prevailing at various dates, and the application of an index based on current prices will give erroneous results.

The objective of deflating wealth estimates may be considered as twofold: (1) to secure a revised estimate of the value of the stock of wealth for some base date in terms of a single set of prices; (2) to measure changes in the stock of wealth in terms of the single set of prices used in securing the revised total for the base date.

By adding the increment in wealth for the intervening period as secured by step (2) to the base date total secured by step (1), the total amount of wealth, valued at base date prices, can be measured as of any other date. Owing, however, to the numerous possibilities of error in computing in deflated prices annual increments of wealth for any extended period, a recomputation of the total stock of wealth in terms of base date prices should be undertaken at intervals as a check on such a procedure.

Essentially, the task of deflating the total stock of wealth to base date prices is one of estimating the physical inventories of

wealth items, and multiplying each item by its respective base date price. In considering this process further, it will be convenient to assume that wealth at any date may be classified under six heads:

Total Social Wealth as of.....

81) Sites and permanent improvements
82) Wasting natural resources
83) Other durable tangibles
84) Inventories
85) Intangibles
86) Net equity of residents in wealth located in other communities (i.e., gross equity in wealth located abroad less equity of persons residing abroad in wealth located in the area under consideration)
90) Total wealth owned by residents of area under consideration.

For an isolated community or for the world as a whole, item (86) will be zero. For the present we shall confine our consideration to such a situation. The problems involved in evaluating (a) the base date inventory in terms of a single set of prices, and (b) subsequent increments in the same prices, will be considered for items (81) to (85) separately.

81) *Sites and permanent improvements.* A major problem in the deflation of wealth is the segregation of those items of wealth and, in some cases, of those qualities of wealth items that may be regarded as not subject to wear and age deterioration or depletion. Unfortunately for the statistician, not all natural resources are non-wasting in this sense, and some man-made resources are substantially non-wasting; for example, some grading and stream diversion. The task of dividing a piece of real property into (a) site and (b) sub-soil rights which are wasting in character for purposes of a physical inventory of national wealth is troublesome, but nonetheless essential to a satisfactory deflation of wealth estimates. Even when segregated, no cost of production basis for the most part is available for the valuation of permanent wealth. Some type of market value or possibly capitalized earning power is the primary recourse. Fortunately, unless differing methods of valuation for these items (sites and permanent im-

provements) should lead to widely different valuations, the resulting difference in deflated measures of wealth will not be very important.

In the case of sites and permanent improvements the deflation problem is largely confined to its first aspect, the computation of a revised estimate of the valuation of the stock of wealth for some base date in terms of a single set of prices. The measurement of changes in the stock of wealth in terms of that set of prices is a problem of small importance in connection with this type of wealth.

The fact that physical increments in the stock of this type of wealth are negligible makes this a good opportunity to emphasize the need for distinguishing two types of increments in the unadjusted total value of wealth as between one date and another. Unadjusted wealth valuations for two dates may differ: because of (a) the value of the increment in the physical stock of wealth, and (b) changes in the valuation of the stock in existence at the first date. Correction of wealth measurements for price changes excludes mere market valuation changes from the measurements of deflated total social wealth or national wealth for an isolated community. Such capital gains, whether realized or not, do not represent increases in real wealth.

The second phase in the reduction of a series of wealth estimates to a single set of base date prices consists in the valuation of the annual increments in the physical quantities of the various wealth items in terms of these base date prices. The valuation of these increments is important not only for deflated wealth figures, but also for deflated income figures, since for an isolated community it yields deflated saved income. In the case of sites and permanent improvements the annual increments in physical wealth will consist largely of a few items such as the elimination of land surface by the damming of a stream, or the making of land surface by providing drainage for an area.

82) *Wasting natural resources.* The valuation problem in the case of wasting natural resources, such as mineral deposits and soil fertility, is similar to that in the case of sites, but determination of a satisfactory valuation is more important, both for deflated wealth figures and for deflated income figures. This is true because in contrast to the situation with respect to sites and per-

manent improvements the physical quantity of wasting natural resources is by definition normally subject to change. Such resources are subject to depletion through use in a manner that allows setting up rules for the computation of decreases in the available stocks. While most such resources are not reproducible, in many cases our knowledge of the stocks existing at any date is incomplete, so that discoveries may add to the quantity available. The net annual increase or decrease in the stock of any wasting natural resource (resulting from discovery, depletion, etc.), when expressed in terms of base date prices, is thus an item in the valuation of the increment of total physical wealth. Since this item may be positive or negative, and since there may be important changes in the total physical stock of the resource in existence at different dates, the base prices (weights) used become more important than in the case of those permanent resources whose stocks remain relatively constant.

Because there are both positive and negative physical items, increments and decrements, it is important, as noted above in Section I, to apply the deflation process separately to positive and to negative items. It is necessary to distinguish two types of annual change in the physical stock of wasting natural resources: (a) depletion which is always negative and which is of a somewhat regular nature so that it can be approximated by some rule of thumb; (b) valuation readjustments which have some physical or legal basis and which occur irregularly. We have noted above that valuation readjustments due to mere price changes are not included in deflated social wealth or in deflated saved income, but not all valuation readjustments are of this type. Discovery leads to a valuation readjustment, although it is a valuation readjustment for which there is a definite physical basis. Damage due to an 'act of God' represents change in wealth which, like discovery, leads to a valuation readjustment for which there is a definite physical basis. Capital gains and losses that represent changes in physical assets should be included in measures of increments in deflated social wealth. There is undoubtedly a shady middle ground in which it is difficult to distinguish between revaluations due to changes in physical assets and those due merely to price changes, but this difficulty does not justify excluding from a measurement of changes in the stock of real wealth those

types of revaluation which obviously represent changes in the physical assets available. A more or less theoretical example of a revaluation that might well be included for some purposes although no change in physical units takes place is that which would result from the legal abolition of slavery.

The adjustment of depletion charges to represent base-date prices involves special and difficult problems because of the nature of the available data. While it is known that such charges may be based partly on eccentric valuations and partly on arbitrary percentages of gross revenue, etc., there is little basis for determining what part of reported charges is determined in any particular way. Hence it is difficult to know what adjustment to apply. However, the objective both of adjustments of depletion charges and of adjustments in discovery write-ups should be to provide figures that will represent for each year the value of the net change in reserve stocks known to exist as of each year end, those stocks being treated as potential stocks of the mined and worked-over mineral and valued by the deduction of costs of extraction, working over, etc., at base date prices (assuming the prevailing techniques of each year) from the value at base date prices of the mineral when extracted and worked over.

83) *Other durable goods.* Correction of book valuations of the stock of buildings, equipment, and other durable goods is perhaps less difficult than are the problems discussed in connection with sites and wasting natural resources. Nonetheless, comparisons of inventories of such durable goods at different dates are sufficiently complicated. Almost no two structures are alike even in a single year; not only are they different in physical characteristics, but their suitability for the purpose envisaged as well as the economic value of that purpose is subject to almost infinite variation. The difficulty of constructing a continuous and consistent index of prices over a period of years is of course much greater. To avoid this difficulty, it may be necessary to measure changes in the prices of buildings by changes in the prices of units of labor and materials used in their construction. Such a method involves several obviously false assumptions such as a fixed state of the arts, an unchanging prudence in erecting such structures, and an unchanged ratio of profits to other costs. A rough check on some of these errors may be had by physical volume indexes of square

feet of floor space, cubic feet of inclosed space, etc. The measures derived by such a method are necessarily extremely rough and unsatisfactory. It is, at best, the least bad alternative, an alternative all too frequently necessary in this field.

The problem of evaluating, at base year prices, the annual increments in this class of wealth are extensively discussed in Dr. Kuznets' volume on Capital Formation.[2] However, a brief comment may be attempted here. Three chief types of items included in such annual increments may be noted: (a) new construction, (b) depreciation, (c) real capital gains and losses. (a) The valuation basis for new construction should presumably be an estimate of what actual cost would have been, had base-date prices prevailed during its construction. Both those new constructions (and equipment installations) which are offsets against depreciation, etc., and those which represent net additions to the stock of durable goods should be evaluated in the same way. (b) Some of the comments made respecting depletion are applicable to depreciation. Available data afford a very inadequate basis for determining what valuations were used in computing depreciation charges. Hence adjustments to base-date prices, though essential, are not very secure. The objective of such adjustments should be to establish valuations to be depreciated on the same basis as that which is used for new construction under (a). (c) Real capital gains and losses are of less consequence here than for (82). No special comment seems called for.

84) *Inventories.* The problems connected with the correction of inventory valuations for price changes have been explored by Dr. Kuznets.[3] No special comment is necessary here except to say that for the estimator of national wealth this type of correction is not only easier to make than those considered above, but is also the most important type of correction, particularly for purposes of comparing wealth at two near-by dates.

The deflation of increments in inventories is theoretically a relatively simple matter. Inventories are by definition items that are counted or 'inventoried' at the beginning and end of each period. The obvious procedure is (a) to convert the physical

[2] *Commodity Flow and Capital Formation*, Volume I (National Bureau of Economic Research, 1938).

[3] *Studies, Volume One* (1937), Part Four.

inventory on each date into terms of base-date prices, i.e., deflate the dollar inventory figures, and (b) to take the change in their deflated value from the beginning to the end of the period as the deflated net increment. It is not, of course, possible to deflate the current dollar increment directly. Such a procedure would involve the difficulties noted in Section I above.

85) *Intangibles.* A discussion of the problem of the effect of corrections for price changes upon intangibles can be presented more satisfactorily after some consideration of the problems of deflation in connection with national income. It may be suggested at this point that the existence or non-existence of known intangibles in the list of social wealth items will not affect the physical volume of wealth. One reason for expecting this to be true may be mentioned here. To some extent intangibles represent valuations that might have been attached to certain of the tangibles. Thus an accountant, if he is persuaded to recognize such a value at all, may choose between (a) writing up the value of the permanent tangibles, (e.g., mineral resources), and (b) setting up an item called by some such name as 'good will'. It is obvious that if the former procedure had been chosen, the resultant revaluation would not represent an increase in the physical volume of national wealth.

In an isolated economy the increase in national wealth, corrected for price changes as measured along the lines outlined above, should also represent an index of the saved income of the nation in terms of physical units during the period under consideration.

Thus far we have assumed that we were dealing either with the world as a whole or with an isolated community. The problem of the deflation of wealth is simpler and less ambiguous as applied to an isolated community than it is when we abandon this assumption and attempt to deflate some type of distribution of wealth. The same is true of income. Three major types of distribution of wealth (and corresponding types of distribution of income) may be noted briefly:

1) By region (in the case of wealth, according to the residence of the owner or the situs of the wealth; in the case of income, according to the residence of the recipient or the situs of the wealth and labor from which the income is derived);

2) By the class of individual or family owner or recipient (distribution of wealth by size of holdings or of income by size of income);
3) By industry groups or types of economic activity (in the case of wealth, by types of industry to which the wealth is devoted; in the case of income, by types from which the income is derived).

When social wealth is divided into segments in any of these three ways, each segment may be deflated to represent the physical volume of wealth in existence and the changes in that physical volume. A given class or community of owners may be separated out and its holdings at two or more dates compared (without reference to other classes or communities) in terms of constant prices. The same process may be applied to the wealth attached to an industry or located in a geographic region. The deflation procedure in these cases should be the same as that outlined above for the deflated total wealth in an isolated community. It may be referred to as the wealth-extant technique.

While it is not difficult to apply this technique to the wealth *located* in a given area, it is hardly possible, on the basis of present information, to apply it accurately to the wealth *owned* by a particular class such as the residents of the United States. To make such an application, we should need to identify in the international account (a) the physical items of wealth located abroad and the total or fractional ownership claims upon them held by residents of the United States, and conversely, (b) the items of physical wealth located in the United States and the claims upon such wealth held abroad.

The procedure may conveniently be indicated in terms of the following equation:

(1) Wealth located in the United States
+(2) Wealth located abroad but owned by residents of the United States
−(3) Wealth located in the United States but owned by nonresidents
=(4) Wealth owned by the residents of the United States.

Item (4) may best be deflated through deflation of items (1), (2), and (3), although theoretically item (4) may be deflated directly. However, since data on items (2) and (3) are available largely in terms of equities, expressed in some cases as market values and

in others as par or as book values, deflation of these items to represent the physical assets claimed is difficult. A special problem arises in the case of debts, since these are specified in dollars or some other currency. A roughly satisfactory method is to assume that, when expressed in dollars, the same correction factor should be applied to them as to all wealth located in the United States. The algebraic sum of changes in the deflated values of (1), (2), and (3) should be equal to the deflated income saved by persons residing in this country.

Difficulties similar to those involved in applying the wealth-extant technique to a geographical distribution exist in applying it to a personal distribution of wealth. However, existing information lends itself to the application of this technique to an industrial distribution.

When we are deflating segments of total social wealth, we may seek to take account of the effect of price changes upon the distribution of wealth. For this purpose two formulas may be suggested. The first depends in part upon the wealth-extant technique. In comparing the purchasing power of the wealth held by individuals in different wealth classes, for example, we may estimate first the values in current dollars of the various equities in the wealth, including intangible wealth. All values, including those applicable to land and intangibles, must be expressed in terms of current prices regardless of whether this involves recognizing both realized and unrealized capital gains and losses. Only thus can changes in the distribution of the command over goods and services be measured. The total wealth figures so obtained should next be divided into the deflated total value of wealth extant, as determined by the method appropriate to an isolated community, and the current value of each segment then multiplied by the resulting ratio. In other words, the wealth-extant technique is applied to determine the total physical volume of wealth in constant prices at a given date, and current prices are employed for purposes of distributing that total. If the movement of prices since the base date had affected each type of wealth equally and if the distribution of intangible items of wealth had remained unchanged, the share of each segment in the physical stock of wealth would be the same, whether the wealth-extant method of deflation or the one just outlined were

used. The latter method may be referred to as the wealth-extant-total-distributed-on-current-valuations. Two subvarieties of this method may be distinguished: the use of (a) current book valuations, (b) market values of the equities.

Theoretically this method, with either valuation basis, is applicable to any of the three types of distribution listed above: geographic, industrial, and personal. It does not lend itself to a distribution where information refers principally to one segment as, for example, when we are interested in the wealth owned in the United States. However, the international claims in such a case may play a sufficiently small part in the national total so that a rough adjustment will suffice. The equation on page 96 (which is applicable to this and various other forms of deflation) may, for the present purpose, be used to determine the net external credit; that is, item (2) minus item (3). It may be assumed that, for a rough approximation, the same percentage correction should be applied to this net figure as is applied to the total wealth located in the United States. The resulting figure for total wealth owned in the United States in deflated dollars might then be distributed by wealth classes according to the method of the total-extant-distributed-on-current-valuations. Or an industrial distribution might be made treating the international account as if it were one of the industries.

In applying the total-extant-distributed-on-current-valuations method to saved income, it should be applied separately to the wealth on January 1 and the wealth on December 31. The result of such a procedure may be thought of as the logical conclusion of attempts to deflate savings as measured in current dollars by an appropriate index of the price of investment goods. The savings of any person on the basis of current valuations will, of course, equal his claims on December 31 minus his claims on January 1. The sum of all such differences will equal the total savings measured in current valuations. For any year the deflated savings of any person will also equal his wealth as determined by the total-extant-distributed-on-current-valuations formula on December 31 minus his wealth, determined in the same fashion, on January 1, and the sum of such individual deflated savings will equal total deflated savings.

A second possible meaning, which also takes account of the

effect of changes in the prices of wealth items upon the distribution of wealth, may be suggested for deflated wealth as applied to various segments. This concept is that of the wealth of the segment in current prices, deflated by an index of the prices of consumption commodities and services purchased by the owners of the wealth. Such a measure should be obtained by deflating current values of wealth at different dates by appropriate cost of living index numbers. The current values used should theoretically be the same as those employed in the method previously suggested, including capital gains and losses on the holdings of equities in both tangibles and intangibles, and employing either a book value or a market value of equities basis of valuation. This method of deflation of wealth, which may be referred to as the consumption-exchange method, is easy to apply either to determine the total deflated value of wealth owned in the United States or its personal distribution.

It is not intended to imply that the methods of wealth deflation here suggested are the only possible methods. Enough has been said, however, to make clear that several methods are possible. Unfortunately, for purposes of wealth distributions no single method can be designated as the best. For total social wealth the wealth-extant method seems to be the most serviceable. Since it is to be presumed that wealth is desired by individuals not for its own sake but either because it yields an income or because it may be used to finance consumption in the future, changes in the relative values of various forms of wealth have the same effect on the individual investor as savings or withdrawals of savings. Therefore, for distribution a method of deflation that takes account of changes in wealth valuations seems indicated. However, any such method involves an arbitrary assumption of some bill of commodities and services for which wealth actually owned might hypothetically be exchanged by the individual owner.

III The Correction of Income Estimates for Price Changes

In discussing the correction of social income for price changes, it will be convenient to follow a procedure similar to that followed in the case of wealth in the preceding section. We shall assume

as our starting point that the values of the income items are based directly upon existing business records.

In order to outline more clearly what we are first proposing to measure, i.e., the physical volume of goods and services made available each year by the economy, there is presented below a list of the principal items of goods and services, consumed or saved, that make up the national income defined as a total of ultimate products. The list is an adaptation of that in an article by Clark Warburton.[4]

Total Social Income

1) Food, including beverages, tobacco, and purchased meals
   a) In kind
   b) Purchased
2) Clothing, laundry, jewelry, etc.
3) Home furnishings
4) Housing
   a) Owned by occupant
   b) Rented
5) Non-business transportation
   a) Purchased
   b) Furnished by owned autos, etc.
   c) Use of highways, streets, bridges, etc.
6) Non-business communication
7) Health maintenance
8) Recreation, amusement, art, literature
9) Education
10) Religion and services of miscellaneous social organizations
11) Miscellaneous government services
12) Insurance
13) Use of banking and currency facilities
14) Miscellaneous privately-provided goods and services

100 Total of (1) to (14), consumed income

15) Net additions to inventories (including business and government, but not consumers' inventories)
16) Net additions to gold and silver stocks
17) Net additions to stock of durable goods held by business concerns and governments, and of houses and automobiles owned by consumers

[4] 'Value of the Gross National Product and its Components, 1919-1929', *Journal of the American Statistical Association*, December, 1934.

18) Net increase in the nation's external credit

200 Total of (15) to (18), saved income, excluding market valuation readjustments

300 Total of 100 and 200, total national income

The total represented by item 100 equals consumed income if we assume, for convenience, that, except for houses and automobiles, consumers' commodities as well as services are consumed in the year of purchase and that consequently the inventories of all consumers' commodities (except houses and autos) are zero. Of course, this assumption is not true and leads to errors in the portrayal of year-to-year changes in income, and to the omission of a total of wealth that is important in absolute if not in percentage terms. The warrant for such an incorrect assumption is partly that the percentage errors are not large, but mainly the inadequacy of present data on consumers' stocks. Were satisfactory data available on stocks of any other consumers' commodity, it would, of course, be accorded treatment similar to houses and automobiles rather than electric energy.

Item (18) disappears when we are considering the world as a whole or an isolated economy. For simplicity we shall make the assumption that item (18) is not involved for a first consideration of the problems of income deflation. On this assumption, the total of items (1) through (17) may be taken to represent either the total income derived from the community's human and property resources or the total of consumed income plus saved income for the year (excluding market valuation readjustments).

One qualification of this assumption, due party to the present state of our information, may be noted. The assumption implies that estimates of total social income by the debit net value product method and by the ultimate products method will be equal. Theoretically, the two definitions should come to the same thing. Actually, there are difficulties in making the accounts balance precisely. Thus there is difficulty in apportioning the gross revenues of certain industries (other than income from investment) between consumption and business uses. This is true of transportation and communication and more especially of such government services as those rendered by the Army and the Navy. With government services, there is a question not only of apportionment but also of determination of the gross value product of the service to be apportioned. Indeed, we may fairly class gov-

ernment services with imputed incomes with respect to the valuation problems involved in their determination.[5]

Questions regarding the determination of the debit net value products of certain types of business are also unsettled, as well as questions regarding the portion of their gross revenues (other than property income) that is assignable to consumption. Among these types of business are insurance, investment banking, real estate brokerage, and commercial banking. The entry on behalf of each of these types of business in both the debit net value product column and the ultimate products column is still a matter of dispute.[6]

Under these conditions, the net value product definition of national income still leaves opportunity for differences of opinion as to some of the items to be included in our list of ultimate products. However, there is substantial agreement on most items.

In attempting to deflate social income to determine the physical volume of ultimate products, we may note first that the technique for handling items (15), (16), and (17) has already been discussed in the preceding section. Deflation technique here involves its application separately to the positive net physical increments of wealth during the period and the net physical decrements during the period (or else separately to the opening and closing inventories).

Items such as (1b), (2), and (3) call for little discussion. They have been conceived as typical of all ultimate products in many over-simplifications of the deflation problem. They may be treated as a group and a single deflation index applied, if that seems most convenient. However, one limitation on the use of a single index may be mentioned. For some ultimate products, available price and dollar volume data are more satisfactory than available physical volume data. For other ultimate products, highly satisfactory physical volume data may be available while either price data or dollar volume data may be not entirely satisfactory. Under these conditions, the direct use of a weighted physical volume series seems indicated.

[5] See G. C. Means, Part Five, discussion by Simon Kuznets and Dr. Means' reply; Gerhard Colm, *Volume One*, Part Five, discussion by Simon Kuznets and Dr. Colm's reply.

[6] See M. A. Copeland, *Volume One*, Part One, pp. 23-6.

Several of the items on our list represent imputed incomes or incomes that must be evaluated by a process equivalent to imputation. This is true of items (1a), (4a), (5b), and (5c), as well as some other items. The imputation process necessarily involves some assumption regarding values and care should be taken that this same assumption is employed in the deflation process applied to these series.

Some items involve a peculiar difficulty for deflation because the only physical measure applicable to them is monetary, i.e., a dollar. This is the case with the services rendered to ultimate consumers by money stocks and checking accounts and with the services rendered to ultimate consumers by insurance companies. Perhaps the only solution in such a case is to treat these items along with the inevitable residual category, assuming that it is safest to consider them as needing the same percentage correction for price changes as all other ultimate products in the aggregate.

In an isolated community, the deflated social income that results from the procedures described above may be regarded as an index of the physical volume of production. We should recognize, however, that existing production index numbers differ from it in two major ways:

1) They correspond to deflated gross value product rather than, as in the case of deflated national income, to the deflated net value product of the economic system. They include production of durable goods for replacements as well as for additions;

2) They do not include the production of services, which are included in deflated national income.

Deflated net value product, however, corresponds to what economic theory has usually meant by production.

It was noted above that more than one deflation of the same dollar volume may be possible. The discussion up to this point has been of the procedures required to deflate national income in its credit aspect as the value of ultimate goods and services. National income may also be treated in its debit aspect as a set of primary distributive shares—payroll, interest, profits, etc. We may deflate national income in its debit aspect in order to measure changes in the physical volume of services of labor and wealth used by the economic system in the productive process.

In other words, we may use deflation to measure in physical terms the 'input' that results in the 'output' of our economic system.

In terms of uncorrected prices, total national income in debit terms and in credit terms are necessarily equal. In general, the correction of national income for price changes over a series of years will make the two volumes unequal, except in the base year, in which physical output and input are both equal by definition to 100 per cent. Over a period of years the output curve will ordinarily increase more rapidly than the input curve, and this more rapid increase may be taken to measure the increased efficiency of the economic system.

The input series is composed of two major parts. The first is compensation of employees deflated by the changes in the rates of compensation or an index of man-hours of input weighted by the various levels of earnings rates. The second part is deflated property income derived from the wealth used by the economic system in the production of goods and services. The complexity of the existing financial structure of our economic system obscures the relationships involved in computing a deflated property income figure analogous to the deflated labor income figure. In the case of labor we may think of various classes as each receiving on the average so many cents per man-hour. In the case of wealth we may think of various groups of the ultimate owners (equity holders) as receiving each so much per factory-hour. Perhaps the most convenient way to compute the deflated property income constituent of our deflated input index is to construct an index of the physical volume of wealth used in production each year and weight it by the total property income in the period selected for the determination of weights. This weighted plant-hour series might then be added to a correspondingly weighted man-hour series to measure physical input for the economic system.

The input series may represent the services of labor and wealth used by the economic system as described in the preceding paragraph or it may represent an index of the services available for use regardless of whether they were or were not employed by the economic system. When unemployed services of labor and wealth are included, a comparison of the volume of deflated income in

the sense of commodities and services with the volume of input yields a rough measure of the social losses due to the incomplete utilization of available economic resources in periods of unemployment of labor and wealth.

Comparisons between the trend of the index of the physical volume of labor input and that of the physical volume of wealth input should provide interesting information concerning the effect of mechanization on the proportion of factors as between wealth and labor.

Thus far we have been discussing the problems involved in deflating estimates of total social income upon the assumption of an isolated economy. Except for an income estimate for the entire world, such an assumption is contrary to fact. Our task is incomplete without an analysis of the additional complications introduced when the estimate to be deflated is for a segment of the world economic system. The three principal types of segments distinguished above in the discussion of wealth (see pages 95-6) also require discussion for income: (1) by geographic area (a) from which derived, or (b) in which received, (2) by size-of-income classes; (3) by the industry from which derived.

Two additional types of distributive share that are of special interest in the case of income are by race and by degree of urbanization of the community in which the income recipient lives. Deflation technique for an income distribution by race may be thought of as analogous to that for a distribution by size-of-income classes and, similarly, deflation technique for a distribution by degree of urbanization of the community in which the income recipient lives may be conceived as a special case of distribution by geographic areas.

It is important to emphasize that in discussing the incomes of the various segments it is, in many cases, desirable to include capital gains and losses in estimating income in current prices.[7] It may also be desirable, in some cases, to include in income such secondary distribution items as gifts and certain kinds of government income such as relief. Owing to the limitations of available data for the first two types of income distribution the only practicable procedure is to estimate and deflate the income received directly by individuals, unless in property incomes we are to

[7] See Clark Warburton, *Volume One*, Part Two, pp. 97-101.

include market appreciation and depreciation of securities in lieu of credits and debits to surplus.

For many types of distributive shares, the deflation that is of most interest is to an index of the volume of commodities and services that can be acquired in exchange for the income received by the group in question. The deflation of distributive shares to an index of the volume of commodities and services that can be acquired may take several forms. The procedure that especially suggests itself is to deflate the income received by an index of prices of commodities and services actually purchased by the recipient of that income.

For types of distributive shares that represent income received, this method of deflation seems sharply defined so far as consumed income is concerned. The weights and prices are selected with a view to constructing indirectly through deflation an index of the physical volume of commodities and services actually consumed. When we come to saved income, however, the ambiguities of the deflation process for wealth segments are present. The two principal alternatives that are open may be suggested, the alternatives already considered in connection with the deflation of wealth. One is the application of the consumed goods indices to saved income. The second method, which assumes that it is possible to apportion the income of each segment between consumed and saved income, is the construction of an index of the prices of saved goods by dividing total savings in deflated dollars into total savings in current dollars, current dollars being determined either on a book value or market value basis. The resultant index is used to deflate the saved income of each distributive share, on the assumption that the prices of the investment goods acquired by it have fluctuated in the same way as those of all saved goods. Saved income deflated in this way is then added to consumed income deflated by a cost of living index. This second method has the effect of distributing deflated savings, estimated by the wealth-extant method, in accordance with the distribution of wealth increments measured in current dollars. It is the counterpart for income of the 'wealth-extant-total-distributed-on-current-valuations' procedure described on page 97. Deflating saved income by this second method gives a result for the total deflated

income of each segment that approximates the 'goods actually purchased' idea more closely than does the first method.

As an alternative to this second method, the index of the prices of saved goods may be combined with the index of prices of consumed commodities and services into an overall index for deflation purposes, using base-year amounts of consumed and saved income as weights, but this device may get into difficulties in a period when negative savings are involved.

The analysis of income by geographic region may have reference either to the income derived from or received in a nation. In contrast to the situation in an isolated economy the two concepts are not ordinarily identical. Procedures to be followed in estimating and deflating these two figures for a nation are similar to those which must be used in estimating and deflating the income derived from or received in any other type of geographic region, although fuller data are available on international relationships than on most interregional transactions.

Just as in the case of a single business enterprise the net value of product is equal to the total value of the product less payments to other enterprises for commodities and non-personal services, so in the case of the nation, the value of commodities and services imported from abroad must be deducted from the value product of the domestic economy in order to estimate the value derived from the domestic economic system alone. These relationships may be conveniently set forth in an equation. The result, representing the difference between two sets of values, cannot be deflated directly for the reasons noted in the Introduction. Hence, each item in the equation below must be deflated independently by an appropriate price index.

(1) Value of commodities and services consumed by residents of the United States
+(2) Net increment in wealth located in the United States
+(3) Value of commodities and services exported
−(4) Value of imported commodities and services
=(5) Value derived from the economy of the United States.

The chief method of deflation for item (1) is, as already noted, the same as that discussed for consumed income in an isolated

economy. The technique for an isolated economy is also applicable to item (2). Items (3) and (4) should presumably be deflated by the prices involved in the international transactions they represent. In the case of merchandise, the deflations would thus be of the type already worked out by the Department of Commerce. The algebraic sum of the first four items after deflation would represent the deflated value for item (5), the value derived from the economy of the United States.

We are also interested in a deflated figure that will represent the income received by residents of the United States, including accruals. Such a figure may be computed by adding to the value of commodities and services consumed in the United States the net increment in the wealth owned by residents of the United States as computed by the formula given above on page 96. In this case, however, as noted above on pages 97-9, several possibilities are open for the deflation of saved income.

To deflate a personal distribution of income the procedure suggested above on page 106 for distributive shares representing income received may be followed, using either of the two methods of deflating saved income there outlined. The first—the application of consumed goods indices—is much simpler but the second—the analogue to the 'wealth-extant-total-distributed-on-current-valuations' procedure—will in most cases give more satisfactory results.

It is possible, of course, to measure changes in the deflated income derived from the various industries that make up the nation's economy. It is relatively simple to deflate the net value product of an industry by an index of the prices of a bill of commodities and services for multiples of which it might be exchanged and thus obtain a measure of changes in the relative value of the product of each industry. It is not so easy, however, to deflate the net value product of an industry to an index of the physical volume of its production of commodities and services. For this purpose, account must be taken of changes in the prices of items that the industry in question must purchase from other industrial groups. If an enterprise had only direct labor and material costs and borrowed no money and if, further, an unchanging set of manufacturing operations were performed by the business year after year (i.e., if there were no vertical or horizontal

integration or disintegration), we might construct a measure of its deflated net value of product, using a price margin index as a deflator. Such a procedure may be applied somewhat roughly even where indirect costs, such as taxes are present.

Theoretically the deflation of the net value product of an industry in the latter sense would involve constructing for articles and services purchased by the industry from other industries an index of the prices paid (so far as this is feasible) and then deflating the values of commodities and services so purchased. In the same way, the value of the total product of the industry should be deflated by an index of its prices. The difference between the two deflated figures would represent the deflated net value product. A first step toward constructing indices needed to compute such a deflated figure for agriculture has been taken by the Bureau of Agricultural Economics, which computes an index of prices farmers receive and an index of prices farmers pay for various goods used in production.

There is no reason to assume that such a deflated net value of product would vary from year to year in proportion with the net value of product deflated to give an index of the volume of commodities and services obtainable in exchange for that net value product. In a new and rapidly expanding industry, net physical output may often increase much more rapidly than the physical volume of commodities and services that workers in and owners of the enterprises can command with their distributive shares. It has been suggested that the so-called productivity theory would not call for equality of output and reward in such a situation, partly because of changes in technique and partly because of the inelasticity of consumers' demand. Nonetheless, the probability of divergent movements of deflated net value of product in an exchange value sense and deflated net value of product in a productivity sense seems to support the view that it is dangerous to talk about the distributive shares derived from an industry as the income produced in that industry.

As in the case of wealth, the methods of deflation discussed above by no means exhaust all the possibilities. They indicate, however, the necessity for defining clearly the objective of any deflation in order that the most appropriate technique may be chosen.

IV Deflation and Ethics

We have noted that in an isolated economy deflated social income represents what economic theory has usually meant by production. It may be added that deflated social wealth represents what economic theory has usually meant by wealth, and that, except for what may be called real capital gains and losses (such as those due to discovery, and unanticipated fire and flood), deflated saved income represents what economic theory has usually called savings. As H. J. Davenport has pointed out, these concepts inevitably have an ethical connotation.

The application of the consolidation process to balance sheets and income statements to estimate national wealth and income dodges many difficult questions, and gives the resulting totals an appearance of objectivity. Deflation also is a statistical process that appears to be thoroughly objective, and does not allow two income estimators much leeway to apply differing ethical conceptions. Yet the result of these two processes enables us to clarify out thinking concerning certain types of activity that are individually gainful but socially useless or even wasteful.

It will be useful to review the nature of these processes in order to see their significance for the type of ethical judgment involved in such terms as wealth and production. The consolidation of income accounts involved in the net value product formula does not require the income estimator to say whether any business for which he is computing a net value product is socially useless or parasitic. It does require the income estimator to draw a line between (a) that part of the gross revenues (other than property income received) of the enterprise whose net value product he is computing that derives from the sale of ultimate products, i.e., consumption commodities and services and additions to social wealth, and (b) that part of such revenues that derives from the sale of intermediate products and services to other enterprises. By the same token, this consolidation process requires the income estimator to distinguish for an enterprise whose net value product he is computing between those expenses which represent payments to other enterprises for intermediate products or the value of wealth used up through depreciation, depletion,

etc., and those expenses and other debit items that represent ultimate distributive shares. Thus the consolidation of accounts requires the income estimator to look at the economic system as a whole, identifying the net unduplicated value of the products it turns out and the cost of the services of labor and wealth employed. Through defining the values of ultimate products and the amounts of the various distributive shares, the consolidation process defines the two methods of deflating income which yield measures of the physical volume of (a) social production, (b) input. So far as deflated income estimates imply an ethical judgment, this judgment appears to center on the relationships between social input and social output, i.e., it has to do with the efficiency or the wastefulness and possible parasitism involved in payments for the employment of wealth and labor in ways that may or may not produce as large a volume of social output as some alternative employment might provide. Not only does this afford a somewhat narrow range of ethical judgments but also the ethical judgments of course cannot derive merely from the statistics. One must in addition make the ethical assumption that on the whole it is socially desirable that, for a given physical volume of social input, the physical volume of social output should be as large as possible. The ethical judgment, on this assumption, that some forms of employment of labor and wealth that result in private gain are socially useless or undesirable has to do chiefly with situations in which employment increases the dollar volume of ultimate products without increasing their physical quantity. The consolidation process and deflation together make it theoretically possible to identify such activities.

The identification of socially useless and wasteful input, however, requires us to establish for each unit of output that certain units of input are a condition both necessary and sufficient and that when the necessary and sufficient condition for every unit of output is provided, some unnecessary units of input remain.

Deflation of social income enables us to measure changes in the relation between total social output and total social input, but no absolute unit of measurement common to the two physical volumes is available. In comparing the volume of social output with the volume of social input a base period is essential. We cannot say that a given volume of input is needlessly large in

comparison to a year's social output. We can only say that as between two years input is larger in comparison to output in one year than in the other. The identification of an activity as not contributing to the deflated social income implies comparison with another period or situation (hypothetical perhaps) in which the activity is absent and production undiminished.

In making such a comparison of input and output other things must remain constant. If we are to establish fully that the decline in a given item of input does not involve a corresponding decline in output, we need a case where this given item of input declines and where there is no change in any output item or in any other input item. Unfortunately, in actual comparisons other changes are certain to obscure the comparison in which we are interested. Technological improvements may lead to savings in input that offset increases in input items suspected of being unnecessary. An increase in the density of population may result in a poorer social proportion of factors. We cannot hope to identify as socially useless any form of economic activity merely by comparing overall measurements of total social input and total social output for two or more actual periods. If and when fairly satisfactory measurements of social input and output are available for a period of years some statistical technique may perhaps be developed that will assist in isolating connections between specific input and specific output changes. Wanting this, we must have recourse to the type of theoretical isolation that economic theory has extensively employed in the past.

Two corollaries of these considerations concerning relations between input and output may be noted. (a) Not only are measurements of input and of output independent, so that input cannot in general safely be used to measure output; but also we cannot conclude that the addition of a specific item of input will necessarily involve an increase in output. (b) When, without any change in technique or in the physical amounts of any item of input, there is an increase in the dollar volume of ultimate products (and, of course, concomitantly of distributive shares) there can be no increase in the physical volume of output of ultimate products. Input is a necessary condition to output even though not a sufficient condition.

As economic theorists early recognized, the obvious example

of a primary distributive share derived without a clearly corresponding input or output item is monopoly profit. It seems clear that the introduction of a monopoly into an economic system will involve a curtailment of output and thus a decrease in deflated social income, although the net value product formula is applied unmodified to the monopoly's accounts.

If the monopoly continues, its profits may be capitalized as an intangible asset. In the consolidation of balance sheet accounts to determine social wealth this intangible item clearly will not cancel out. It is an item in the dollar value of social wealth. The same will be true of the grant of the right to charge toll at a bridge. Assuming that the toll is not a form of payment to induce either the construction or maintenance of the bridge, the toll will involve no change in the social output or deflated social income, and conceivably it will increase the dollar volume of annual income by precisely the amount of tolls collected during the year. If the toll does not increase deflated social income, consistency would seem to require that its capital value should not increase deflated social wealth.

Now if we modify the assumption concerning the payment of tolls so that a part of the revenues from tolls is used to defray the cost of maintenance of the bridge, the result will be that deflated social income (i.e., output) will be increased by the amount by which the bridge would otherwise have depreciated. The capitalized value of the unexpended balance of revenue from the tolls will, however, continue as an asset item on the consolidated national balance sheet in current dollars. The argument that led us before to conclude that when wealth is measured in deflated dollars this item disappears is still applicable. The capitalized value of monopoly profit may be conceived as analogous to the capitalized value of residual toll income. While a part of the gross revenue of the monopoly is employed to defray the cost of production of the monopoly's product, there is a balance of excess profit arising from the monopoly of the production, the capitalized value of which presumably appears as an asset on the monopoly's balance sheet.

The analogy to the toll bridge may readily be extended to include the capital value of a patent or a trade mark. In these cases, however, the monopoly income is paid for a type of labor

that contributes to our stock of technological knowledge. This knowledge might be conceived as a form of wealth but is not ordinarily regarded as capable of a satisfactory money evaluation. Its continued existence clearly has nothing to do with the continuance or expiration of a patent right. We conclude, then, that deflating social wealth may be assumed to eliminate the values of intangibles such as patents and copyrights. However, in a computation of the distribution of social wealth even in deflated dollars all these intangible items should be taken into account.

A theoretical consideration of the bearing of the net value product of a monopoly upon deflated social income emphasizes the danger of using such an expression as 'the income produced by an industry' to designate an estimate of national income in terms of distributive shares. Such a designation confuses different concepts of deflated social income; as applied to a monopoly it confuses the deflated net value product of the monopoly in a productivity sense and in an exchange value of distributive shares sense (cf. p. 109). As applied in other cases it may involve a confusion of social input and social output.

Unfortunately, it is easier to identify a socially useless activity in theory then in practice. While monopoly elements are pervasive in our economic system, cases of pure monopoly are rare if not nonexistent. Rather, we should look for what has been called monopolistic competition. The difficulty in practice in identifying socially useless activity that partakes of a monopolistic character may be illustrated by a consideration of sales effort. An increase in sales effort (input) may involve an increase in the current dollar volume of national income without a proportionate increase in the physical volume of national income. We may think of sales effort as in part at least directed not so much toward increasing an ultimate product as toward increasing the consumer's willingness to pay for it. But it must be recognized that a portion of sales effort takes the form of providing entertainment by radio and subsidizing newspapers and periodicals. Moreover, sales effort provides market information. Existing practices respecting sales effort creates problems for the national income estimator. Some of the apparent value of ultimate products, such as cigarettes, should be subtracted from these products

and set up as a separate imputed income account, representing the value of such services as radio broadcasting and market information. An argument might be made for counting among these services the education of those consumers' tastes which respond most readily to sales effort.

The application of the deflated social income technique to determine which activities are socially useless is by no means easy. We should recognize, moreover, that it is subject to quite definite limitations. Consolidation of accounts and deflation together identify certain goods and services as ultimate products but this list may include various items that many would regard as socially deleterious or at best of doubtful value. Shoddy goods, harmful patent medicines, and other forms of 'illth' should, of course, be included by the impartial income estimator, weighted by their market values, in his measurement of the physical volume of social product. A similar comment applies to wealth. Consolidation and deflation together may be taken to eliminate intangible items. They do not, however, eliminate such items as the burglar's jimmy or the library of a shyster lawyer.

In spite of the difficulties involved in applying the social usefulness criterion afforded by deflated social income and in spite of its marked limitations, it may be worthwhile to suggest forms of 'economic' activity that the deflation technique for the measurement of social output and input seems likely in whole or in part to call in question. To some extent at least, the net value product derived from a so-called 'merchants protective association' may involve an increase in the current dollar volume of social income without a proportionate increase in the physical volume of the income. The extent to which an increase in net value products derived from the business of stockbrokers, investment bankers, or realtors can be identified with an increase in physical volume of national income is by no means clear. In the case of the activities of national military establishments, we may wish to distinguish physical volume of product, as measured from a national point of view, from physical volume of product measured from a world point of view. The mutually destructive activities of two armies can scarcely be counted as productive from a world point of view; from the national point of view of each nation considered separately, the activities of its army might be

regarded as productive. In the case of lawyers' services, some activities may be assumed to be reflected in a physical volume of national production index; others may resemble more closely the status of the 'services' rendered by a so-called merchants protective association. There is difficulty also in determining the extent to which the lobbyist, the ward heeler, and the walking delegate increase deflated social income.

But difficulties attach to other types of economic activity. How far the activities of banks, courts, and police can be made to reflect themselves in any measure of the physical volume of national income is something of a question. Moreover, in products such as automobiles and clothes, improvements in quality represent a type of increase in the physical volume of output that is extremely difficult to show statistically. Again, as J. M. Clark has pointed out,[8] some products are clearly multidimensional in that a single physical volume series cannot adequately represent them. Thus railroad passenger service cannot be measured by either number of passengers or number of passenger miles alone. This difficulty is doubtless present in less aggravated form for other products commonly represented by a single series. In view of all the difficulties in our physical volume measurements there is some danger of confusion between failure to be recorded in a physical volume of production index because of (a) technical difficulties in the construction of physical volume indices, and (b) the social parasitism of the type of industry involved.

A related and perhaps more serious difficulty is that there is too much room for differences in ethical judgments in deciding on the inclusion of some items as ultimate products. We noted above that in the present state of our techniques of measuring national income a complete balance between the value of ultimate products and the cost of ultimate distributive shares is not possible. So long as such a balance is not fully worked out there is some opportunity for genuine differences of ethical opinion concerning the counting or not counting of some items in the list of ultimate products. Fortunately such differences are confined to relatively few items. It is to be hoped that the lack of objectivity regarding these marginal items may be diminished by further research.

[8] *Studies in the Economics of Overhead Costs*, (University of Chicago Press, 1923), Ch. X.

V Summary

Our principal findings with respect to the deflation of wealth and income may be summarized in the following fourteen propositions:

1) Deflation is an indirect way of constructing various kinds of indices of physical volume.
2) Where income figures represent the difference between a positive and a negative dollar volume series, the positive and negative incomes must be deflated to base period dollars separately, the difference between the deflated figures being the deflated net income figure.
3) In an isolated economy the object of the deflation of wealth may be considered as twofold: first, to secure a revised estimate of the value of the stock of wealth for some base date in terms of a single set of prices; second, to measure changes in the stock of wealth in terms of the single set of prices used in securing the revised total for the base date.
4) In an isolated economy, deflated wealth is a measure of changes in the physical volume of (1) sites and permanent improvements, (2) wasting natural resources, (3) other durable tangibles, (4) inventories.
5) Intangibles do not appear in the total value of deflated wealth.
6) In an isolated economy, the value in current prices of the ultimate products of the economy may be deflated to represent an index of the physical units of output of commodities and services. The result measures what economic theory has usually regarded as production.
   a) Consumption commodities and services will, of course, be deflated by an index of their cost.
   b) The increment in deflated wealth will be equal to the deflated saved income for the period.
7) In an isolated economy the total net value product considered as the distributive shares of labor and property may be deflated to represent an index of the physical volume of input—in effect a weighted index of man-hours, factory-hours, etc.

8) When we come to consider various types of distribution, wealth may be deflated so that each distributive share represents in physical volume terms changes in the physical volume of wealth actually owned, i.e., the number of acres, machines, etc., in each share. This method of deflation, referred to as the wealth-extant method, takes no account of the effect of changes in the prices of wealth items on the distribution of wealth. The method is the same as that for an isolated economy.

9) In computing the deflated values of distributive shares of wealth or income by geographical areas, classes of individuals, or industry groups, the values to be deflated should for most purposes include the revaluations of both tangibles and intangibles at current prices, on either a book value basis or a market value of equities basis.

10) One method of deflating wealth for distributive purposes is to pro-rate the total deflated wealth, as determined by the wealth-extant technique, on the total wealth in current dollars (intangibles and write-ups included). This method is referred to as the wealth-extant-total-distributed-on-current-valuations method. Saved income for distributive purposes may also be deflated by this technique.

11) For distributive purposes wealth may also be deflated by the use of index numbers of consumers' goods appropriate to the various classes of wealth owners. This consumption-exchange technique may also be employed to deflate saved income.

12) There is no direct way to deflate the income derived from a community to represent a physical volume of products. The following relationships, using the United States as an illustration, may be used for the purpose. The income derived from the economy of the United States in deflated terms may be determined by deflating each item in the left hand member of the equation:

(1) Value of commodities and services consumed by residents of the United States
+(2) Net increment in wealth located in the United States
+(3) Value of commodities and services exported
−(4) Value of imported commodities and services
=(5) Value derived from the economy of the United States.

13) The net value product of an industry may be deflated to represent approximately its physical volume of output by expressing in deflated dollars (a) its gross value of products, (b) the deductions for commodities and services purchased from other enterprises and for depreciation and depletion.

14) Estimates of national wealth and income through the processes of consolidation of individual accounts and deflation together make it theoretically possible to identify economic activities that result in private gain but are socially useless or undesirable. The theoretical possibility of such identification derives chiefly from the distinction between deflated social income in the sense of output and deflated social income in the sense of input. A specific item of input may increase the dollar volume but not the physical volume of output.

Discussion

I R. T. BYE

There has been considerable protest at the inclusion, in the paper by Messrs. Copeland and Martin, of what they frankly state to be an ethical bias. They even go so far as to declare that almost any economic analysis must necessarily proceed from some ethical preconceptions. I am not sure I should go along with them altogether on this, but that is not my present concern. I wish rather to emphasize that it is not necessarily unscientific to describe the economic system in terms of its purposes, nor does such a description, in my judgment, involve an ethical bias that is in any way likely to weaken the objectivity of the findings. If I may illustrate from the field of physiology: it is obvious that the organs of the human body have certain functions to perform —the heart to promote the circulation of the blood, the stomach and intestines to carry on the processes of digestion, and so on. The physiologist necessarily studies these organs in relation to those functions, and we can hardly accuse him of bias when he devises certain instruments to measure the action of the heart or the digestive power of the stomach. The economic system likewise exists for the purpose of accomplishing certain objectives, which are summed up in the word 'economy', Broadly, this word may be defined as 'making the scarce means of production go as far as possible in maximizing utility'. Given such an objective, it is entirely possible to describe the economic process in terms of the institutions that have grown up to promote it, without departing from strictly scientific procedure; and if we could devise means of measuring that elusive thing we call utility, it would be perfectly scientific to classify the various institutions with respect to their utility-yielding power. An ethical implication in the statement of the objective itself need not interfere with the scientific validity of the findings reached in relation to that ob-

jective, provided the conclusions are established by strict cause-and-effect analysis after the objective has once been stated. Therefore, I see no impropriety on the part of the authors in giving us a definition of production and then developing techniques for deciding whether a given item of input yields an increment of product, in the sense in which they define it. Whether "it is socially desirable that, for a given physical volume of social input, the physical volume of social output should be as large as possible" is, as they state, an ethical matter, but that has nothing to do with the technique; for whether a given input does in fact give as large a physical volume of social output as possible is not a matter of ethics at all, it is purely a question of scientific fact. There is no virtue in scientific men making a pretense of entire abstraction from ethical preconceptions. In the last analysis, the value of science consists in its ability to serve our ends, which involves its application to ethical problems. It is only important that in scientific work ethical judgment should not be allowed to warp our observations of fact, or to interfere with the strictly logical analysis of cause-and-effect relationships.

II SOLOMON FABRICANT

Messrs. Copeland and Martin suggest the construction of an index designed to measure the 'physical volume of input'. The input series, it is stated, is composed of two major parts, one representing man-hours of labor and the other some measure of real (or physical volume of) services derived from wealth used in the productive process. The 'physical volume of wealth used in production' is offered as the specific measure of the real input of wealth (III); and this is further clarified in the phrase 'factory-hours'. Minor parts of the input series are not mentioned except perhaps in the 'etc.' in the seventh proposition of the summary.

Two difficulties trouble me in considering these interesting suggestions. First, how can Messrs. Copeland and Martin reconcile their measure of income (which *includes* rents earned by intangible assets) with their measure of input (which includes the physical volume of services derived from labor and wealth—the latter *excluding* intangibles)? Second, just what is meant by 'used' in the phrase "services of wealth used in the productive process"?

It is pointed out by the authors that the 'physical' volume of output in the base year is equal to the 'physical' volume of input in the same year, and both are 'by definition' equal to total national income. If the 'services' of intangible wealth are not included in input, how can this be true? It is indeed surprising that the statement is made that intangibles do not appear in the total value of deflated wealth (proposition (5) of the summary). The distinction between the real social capital embodied in a new technical process, invention, or formula, or in organizing a going concern, and that embodied in tangible goods, does not seem satisfactory. There are, of course, many statistical reasons for making the distinction, but these are not offered as the primary reason. If, for statistical or other reasons, the measure of input does not include the services of other agents of production (besides those of labor and tangible capital goods) any deviation of the input curve from the output curve will arise not only from changes in the efficiency of the economic system but also from changes in the quantity of these other services.

As to the second difficulty: what do 'factory hours' really stand for? Is idle machinery to be considered as contributing to the input? And what about machinery and plant held in reserve? The same difficulty arises when one asks whether one's heart is idle between beats. The cycle of movement of the heart is clearly one organic process. It should not be divided into parts except to describe the process. *If* the business cycle also is an organic unit we may not logically define input (of capital, at least) except in terms of a whole business cycle period.

There are other difficulties in defining the input of capital. It is suggested that land sites and permanent improvements tend to remain fixed (II). An important question arises here concerning obsolescence. If a given type of land is abandoned because its product can no longer command an adequate price, can we say that there has been no decline in the capital resident in the land? Of course, obsolescence of this sort may not necessarily be considered as a charge against income. But Messrs. Copeland and Martin do not separate charges or credits on capital account from income, despite their admission that economists have usually eliminated at least certain capital changes from their measures of saving.

Another point: the problem of a base period raised below by Mr. Friedman comes in again in the statement concerning the measurement of "the social losses due to the incomplete utilization of available economic resources in periods of unemployment of labor and wealth." It is implied here that the base year situation of employment of capital and labor is accepted as the criterion of full employment (this is explicitly mentioned in Sec. IV). It is further implied that the economic system can really continuously function at full steam. But if the nature of the system is such that it must work in cycles, some other criterion than the base period must be selected by which to measure the social losses arising from incomplete utilization of economic resources (including intangibles). I have here in mind theoretical models of economies different from the present economy in one or more respects: e.g., a socialist economy. Another difficulty of the base period arises in weighting the input of capital by the property income in the base period. If (as Messrs. Copeland and Martin suggest) capital gains and losses are to be included in property income, the choice of the base period becomes especially serious. The 'weight' given the input of a particular capital good may be relatively huge (and positive or negative) in one base year and small in another.

III MILTON FRIEDMAN

The process of deflation represents an attempt to get behind the monetary veil in which economic transactions are ordinarily shrouded and to measure changes in magnitudes that are considered in some sense more fundamental than value sums. In order to perform this task it is essential explicitly to recognize and analyze the more fundamental magnitudes the changes in which it is desired to represent by an index. Only if this were done would it be possible to obtain satisfactory criteria on the basis of which different methods of deflation could be judged and the results they yield analyzed. If, as has been done by Messrs. Copeland and Martin, the aim of deflation is stated solely in such intrinsically ambiguous terms as the construction of 'an index of physical volume' without further analysis of the fundamental ends for which such an index is desired, it is in-

evitable that mechanical criteria will be employed, that solutions offered will be in the nature of assertions rather than of answers susceptible to 'proof', and that the choice among alternative solutions will be almost entirely arbitrary. The absence of basic criteria of judgment makes for an analysis that is necessarily confined to the consideration of a series of related problems, each treated more or less on its own merits.

An excellent illustration is provided by the 'wealth-extant-total-distributed-on-current-valuations' method proposed "to take account of the effect of price changes upon the distribution of wealth" in "deflating segments of total social wealth." The method is to distribute the "total physical volume of wealth in constant prices at a given date" among the different segments according to the proportion of the total wealth in *current* prices owned by each segment. The only justification offered for this particular method is that "if the movement of prices since the base date had affected each type of wealth equally and if the distribution of intangible items of wealth had remained unchanged, the share of each segment in the physical stock of wealth would be the same" whether the method just outlined were used or a separate physical volume index were computed for each segment (II). Granted that the method proposed by Messrs. Copeland and Martin in some way takes into account the effect of price changes, any number of other methods can be devised that also do so 'in some way' and that satisfy the one criterion the authors employ. Thus an arithmetic, geometric, harmonic, or any other average between the two contrasted procedures is equally valid, if no other criterion is employed. Granted also that the authors recognize the existence of alternative procedures, the listing of alternatives is scarcely a substitute for an analysis designed to enable a choice to be made among them or to indicate reasons why a choice cannot be made; and an incomplete list of alternatives chosen presumably on the basis of unexpressed but implicit criteria may not even be a complement to such a more fundamental analysis.

I THE USE OF DEFLATION TO MEASURE TECHNOLOGICAL CHANGE

The authors consider two principal types of deflation, one designed to measure 'real output' or command over goods and

services, the other designed to measure 'real input' or the quantities of factors of production employed or available. In both, the procedure suggested is, essentially, to select a base year, and compute for other years the total value of commodities and services or of factors of production using base year prices. In fact, practical difficulties make such a procedure difficult or impossible and hence it is necessary to employ the indirect method of computing aggregative price indices using base year quantities and then deflate current value totals by the indices so computed.

The theoretical problems involved in the first type of deflation —that designed to measure 'real output'—have been extensively considered by many writers. There is general agreement that no method has been devised that is entirely satisfactory even when 'tastes and preferences' can be assumed to remain unchanged, and that the method assumed by Messrs. Copeland and Martin has a very definite bias—economic, not mathematical in nature —which is likely to be the more important the farther away the base period. This bias arises because a sum of money that in a later year will buy the same basket of goods as that consumed in the base year will yield a larger 'real' income, since the fact that price relations are different in the second year makes it possible to buy with the same amount of money a basket of goods more desirable than that consumed in the base year. Hence, the use of the index proposed by the authors overstates rises in the cost of living and thus understates rises in 'real output'.

It seems less frequently to be recognized that the problems that arise in deflation designed to measure 'real input' are similar in nature and that a similar bias results. The input price index assumed by the authors involves the determination of the value of the combination of factors of production employed in the base year at the prices of later years. However, with unchanging techniques, a sum of money sufficient in a later year to purchase that combination of factors represents a larger 'real input' and makes possible a larger output. For, at the prices of the later year the combination of factors employed in the base year is no longer the best combination; and for the same cost a combination can be purchased that will make possible a larger output. The use of the index discussed thus overstates the rise in input costs and understates the rise in the volume of input. Assuming no difficulties in

measuring output in a comparable fashion, there would thus be a tendency to overstate the extent of technological improvement.

The authors believe that a comparison of the two types of indices provides a basis for estimating the degree of technical change. Fortunately, for this purpose, the biases in the two indices are in opposite directions and thus to some extent counterbalance each other. While the output index understates rises in the volume of output, the input index understates rises in the volume of input. However, the divergence between two indices, each of which is subject to a bias, can scarcely provide an accurate measure of changes in technology even though the two errors are in opposite directions. Add to this the necessity of assuming 'constant tastes', if the comparison is to be meaningful, and the difficulty of obtaining an adequate measure of the quantity of capital, i.e., of the price of a unit of capital, as well as the lesser difficulties with the other factors of production, and the possibility of actually employing the procedure suggested by Messrs. Copeland and Martin seems exceedingly small.

The derivation of a measure of 'real input' that would provide an adequate basis for measuring changes in economic efficiency is even more complicated and difficult than the measurement of 'real output'; for the former involves the latter and other difficulties as well. This is easily seen by even a brief and incomplete consideration of the basic theoretical problems. It is evident, in the first place, that we do not wish to measure 'real input' in the classical sense of 'real' costs, i.e., the pain costs involved in productive activity. For this would entirely leave out of account non-human factors of production unless the exceedingly unreal and obsolete notion of a real cost of 'abstinence' were assumed. But what other common unit can be used to measure volume of input? Obviously, input is valued only for the output it makes possible. Hence the only way by which the volume of input can be measured is in terms of the volume of output. Were the analysis to stop at this point it would seem as if there were but a single problem—the measurement of 'real output'. We can, however, go somewhat farther, and ask the question—to what extent is the change in output over some specified period a result of a change in the quantity of the available resources, and to what extent does it result from a change in the way in which these re-

sources are employed.[1] In order to answer this question it would be necessary to determine the volume of 'real output' that *would* have been produced had techniques remained unchanged. A comparison of this series with the actual 'real output' then provides a measure of the change in efficiency.

In order to obtain for any particular year the two figures needed —namely, actual 'real output' and the 'real output' that would have been produced had techniques remained unchanged—it is necessary to determine four things: first, the various combinations of output items that *could* have been produced with the resources available in the given year had techniques remained unchanged; second, the particular combination of output items that *would* have been produced; third, the 'real ouput' that combination represents; fourth, the 'real output' the combination actually produced represents. In order to arrive at the first it would be necessary to know the 'production functions' corresponding to the techniques of the base year; to arrive at the second, it would theoretically be necessary to solve the equations of general equilibrum—not, note, the classical equations applicable under conditions of perfect competition, but those applicable to the real economy; to arrive at the third and fourth requires the solution of the problem of measuring 'real output' not only for actually consumed baskets of goods but also for hypothetical ones.[2]

My purpose in stating the problem in this fashion is not, of course, to suggest any practical solution, but rather to indicate the complexity and difficulty of the problem, and the kind of knowledge required for an exact solution. The real problem, of course, is how, on the basis of observable data, to arrive at approximations to this exact solution that can be reasonably expected to be sufficiently close for the purposes for which they are desired.

[1] This separation is to a considerable extent artificial: technological change affects not only the way in which resources are employed but also the quantity and character of the resources themselves.

[2] Certain of the difficulties with the usual methods of measuring 'real output' not heretofore mentioned should be noted. First, they take no account of the way the output is distributed among the various consumers; second, by presenting a figure supposedly relating to the community as a whole, they implicitly assume that 'utility' is comparable among individuals and that it is measurable.

As these comments have implied, and as would be obvious in any event, the choice of the base year is of crucial importance in problems of deflation. Yet the authors nowhere consider this problem except for a brief comment in the section on 'Deflation and Ethics'.

The authors may object to the criticisms voiced above on the grounds that different formulae will give essentially similar results or that they were concerned not with the index number problem but with other aspects of deflation. As to the first point, its validity has not yet been demonstrated. Moreover, even if it were correct it would not mean that the results could, without further investigation, validly be interpreted as Messrs. Copeland and Martin have suggested. As to the second point, I have argued that a failure to consider the fundamental problems of deflation underlying the selection of index numbers has resulted in an unsatisfactory analysis of those problems which are dealt with by the authors.

2 THE RELATION OF 'INCOME DERIVED FROM AN INDUSTRY' TO 'INCOME PRODUCED IN AN INDUSTRY'

Some comment seems called for by the authors' assertion that "the probability of divergent movements of deflated net value of product in an exchange value sense and deflated net value of product in a productivity sense seems to support the view that it is dangerous to talk about the distributive shares derived from an industry as the income produced in that industry" (III).

The meaning of the two types of deflated net product referred to in this quotation is most easily seen by considering an industry that produces a single homogeneous product, is completely integrated vertically, and in some sense maintains its capital intact. All the expenses of such an industry will be distributive shares, the value of its net and total product will be identical, and both will be equal to the distributive shares derived from it. In such a case the 'deflated net value of product in a productivity sense', according to the authors' definition of that term, would be obtained by dividing the total current value of the output of the industry by the price of the homogeneous product it produces, i.e., it would be equal to the number of units of product produced. The 'deflated net value of product in an exchange value

sense' would be equal to the total current value of output divided by an index of the prices of goods and services purchased by those who receive distributive shares from the industry. It is thus obvious that divergent movements between the two will depend solely on whether the price of the homogeneous product produced by the industry rises, remains constant, or falls relative to the price index employed. If the price of the product rises, deflated net value in a productivity sense will fall relative to deflated net value in an exchange value sense, and conversely.

The divergency on which Messrs. Copeland and Martin lay such great stress is thus solely a reflection of a change in relative prices. And I must admit that I cannot see the bearing that the existence of changes in relative prices has on the question of whether 'distributive shares derived from an industry' should be identified with 'income produced in that industry'.

Dr. Copeland has elsewhere objected to the identification of these two notions[3] and the paper under discussion contains numerous comments to the same effect. The equality of income derived from an industry and income produced by an industry is admittedly a purely arithmetical result: profits are computed in such a way that income derived from an industry is necessarily equal to the value of the product of an industry and the latter is defined as equal to the income produced by an industry. The objection to this terminology seems basically to rest on a feeling that it implies an ethical justification of incomes obtained by the recipients of distributive shares. This attitude derives in part from an identification of economic productivity as valued in the market place and social productivity considered from a broader point of view; and in part from the acceptance of the J. B. Clarkian doctrine that individuals 'ought' to receive what they produce. Dr. Kuznets has elsewhere noted the incorrectness of the first of these notions.[4] The second seems to me equally unjustified. Under a laissez-faire economy individuals may be able to obtain the value product attributable to their activities; but this is fundamentally different from saying that such a system of distribution is ethically desirable. 'To each according to his abili-

[3] *Volume One*, Part One, pp. 7, 48-9.
[4] *Volume One*, Part One, pp. 35-7.

ties' may be the rule; 'from each according to his abilities, to each according to his needs' may nevertheless be the ethical objective.

Moreover, to object to a terminology that identifies the income derived from an industry with the income produced by it on the grounds that payments are received for the production of commodities and services that from a social point of view represent disservices and illth seems to imply acceptance of the ethical principle that each person 'ought' to get what he produces and objection to the present system of distribution solely on the grounds of an improper evaluation of 'product'. The result is that argument centers on the less important point, while the fundamental ethical issue is neglected and insufficiently emphasized.

IV M. A. COPELAND

With Dr. Bye's affirmation of the propriety of economists' concerning themselves with ethical judgments I am in entire agreement. See my discussion of this point in the *American Economic Review* (XXI, 68).

In his comment on Dr. Kuznets' paper, Dr. Bye has charged me with "confusing the unit of measurement with the thing to be measured." I wish to reply with a countercharge. Dr. Bye has confused the definition of a term with the full complement of the things that may be predicated of it. A definition, as I see it, need not provide us with a description of the thing defined. It should merely enable Dr. Bye and others, inculding myself, to agree on what we are talking about, i.e., to limit the use of the term defined so that it is uniquely determined. Such a limitation, however, does not prevent us from finding out anything we can about the thing designated by that term, except that it makes sure we all mean the same thing by the term. We may define distance, mass, and force in terms of their respective methods of measurement (say, a rule, a suspension balance, and a spring balance). This does not prevent us from discovering that two masses attract each other with a force that varies inversely as the square of the distance between them. Similarly when I urge a definition of wealth in terms of accounting processes, I certainly do not mean to prevent anyone from investigating the ethical significance of wealth, or from making in the measurement of wealth

corrections for any given accounting practice when we agree that that practice gives rise to a need for such corrections. But I do urge that our investigation of wealth will be more objective if we keep out of our definition descriptive predicates not essential to a mere definition.

V M. A. COPELAND AND E. M. MARTIN

1) Dr. Fabricant asks: "If the 'services' of intangible wealth are not included in input, how can" it be true "that the physical volume of output in the base year is equal to the physical volume of input in the same year and both are 'by definition' equal to the total national income?" This question is apparently based on a misreading of our statements concerning the relation between input and output measures. Since the subject is apparently difficult and others have also been confused, it may be well to restate our position in more detail.

The movements of at least three different sets of input and output, or credit and debit, series may be compared:

a) Dollar value of input and output expressed in current prices,

b) Dollar value of input and output deflated to represent changes in physical volume,

c) Indices of the physical volume of input and of output.

We here are interested in comparing the movements of (c), physical volume of input and of output measures. We may select the same base year for both and assume that the figures for input and for output are both equal to 100 in that year. This is a simple and accepted statistical device. The validity of this assumption of base year equality is not affected by questions of the scope of the measures of input and output used. It is in this sense that we have stated "in the base year . . . measurement of physical output and of input are both equal by definition to 100 per cent."[1] Since the input and output figures for years after the base year measure changes in physical volume only, the movements of

[1] Although (b) is an indirect method of obtaining physical volume measurements, the method of deflation that has been assumed for the purpose of our analysis does not in general make deflated dollar figures of input and output actually equal in any year. It might be argued that in the base year all deflation indices will equal 100 per cent, since (a) the dollar values of input and output in current prices are equal in 'that year', (b) the deflated dollar figures will be the same as the undeflated

neither the input nor the output series can be affected by changes in the 'services' of intangible wealth, the item that seems to concern Dr. Fabricant.

We have not suggested that measures of input and output in current dollars be contrasted. If complete and accurate data were available, measures of input and output in terms of current dollars would be equal in every year. Nor have we said that measures of input or output in current dollars should be compared with measures of input or output in terms of physical volume as Dr. Fabricant's question asserts. Our point is solely that divergence is likely to appear between the movements of a series representing the physical volume of input and that of a series representing the physical volume of output, and that this divergence is a rough measure of changes in the efficiency of our economic system.

2) Dr. Fabricant suggests that our argument for not including the 'services' of intangibles in measures of changes in physical volume "does not seem satisfactory". We believe we may fairly postpone replying to this criticism until Dr. Fabricant indicates why he finds our argument unsatisfactory.

3) Dr. Fabricant asks "What do 'factory hours' really stand for?" We pointed out that at least two different assumptions are possible, one including and the other excluding certain idle factory hours. Our answer, then, is that the term may stand for either a measure including these idle hours or a measure excluding them, according to the purpose the measurement is intended to serve.

4) Dr. Fabricant objects to our saying that wealth and labor are idle during a depression and that their idleness involves waste. Apparently it is agreed that measurements of social waste due to incomplete utilization of available resources necessarily imply a possible alternative utilization that avoids the wasteful idleness. In suggesting a year of prosperity as indicative of such a possible alternative utilization, of course we never asserted that this base year could be taken to represent full employment—only that if

dollar figures and hence equal to each other. For all labor and property incomes and for consumed income we may readily choose the same base year. But for saved income we cannot. Rather, we must select a base date, say January 1 of the base year for the other deflation indexes. Hence, deflated saved income for this year will not in general equal the undeflated figure.

properly selected it may represent fuller employment than some other period the relative wastefulness of which it is desired to measure. But beyond this Dr. Fabricant's objection is fundamental. In comparing business cycles to heart beats, he in effect asserts that cycles cannot be moderated at all except by a catastrophic change in our economic system.

5) Dr. Fabricant asks: "If a given type of land is abandoned because its product can no longer command an adequate price, can we say that there has been no decline in the capital resident in the land?" What apparently he means is: "Can we say that there has been no decline in the physical volume of wealth represented by land?" Thus he seems to hold that market depreciation (a price change without any physical deterioration or depletion) should be reflected in a physical volume index.

Mr. Friedman uses the somewhat high-sounding language of an absolutist philosophy to make what boils down to the following three points:

1) Only the aggregative formula has been investigated, and the findings might have been different had some other formula been employed;
2) There are practical difficulties in developing actual satisfactory measurements of input and output;
3) A divergent movement between deflated net value product in a productivity sense and deflated net value product in an exchange-value sense is due solely to relative price movements, and hence offers no reason for distinguishing income derived from an industry from income produced in an industry.

1) *Only the aggregative formula has been investigated, and the findings might have been different had some other formula been employed.* Mr. Friedman apparently feels that the burden of proof should rest on us to establish that other formulae would give essentially similar results. Our argument, however, was largely confined to distinguishing and exploring the significance of various meanings for deflated wealth and deflated income, using this single formula by way of illustration and, in general,[2] using any base period at random.

[2] However, in discussing measurements of social waste due to unemployment of labor and wealth, we found it convenient in comparing two periods to take the period of greater employment as a base in the sense of using this period as a standard of comparison for measuring the decrease in efficiency in the period of less full employment of labor and wealth.

That some formula may exist that would cause some distinction drawn by us to disappear is admittedly possible. We think Mr. Friedman will agree that all the distinctions we drew and explored would remain had we couched our discussion in terms of some type of geometric mean formula or median formula. If this is so, we suggest that we may fairly ask Mr. Friedman again to respond to the challenge we submitted at the meeting of the Conference; namely, to illustrate some part of our findings that would be invalidated by the selection of a formula other than one of these three types.

2) *There are practical difficulties in developing actual satisfactory measurements of input and output.* It must of course be conceded that measurements of changes in the physical volumes of social input and output are certain to be rough under present conditions. However, those who insist on a high degree of precision had best choose some field of activity other than estimating national wealth and income.

The measurement difficulties about which Mr. Friedman is concerned do not seem to have deterred others to the same extent. Dr. Kuznets has already provided measures of deflated national income in an output sense. As to the difficulty of obtaining a satisfactory measure of social input, this measure depends chiefly on adequate measures of the quantity of capital (or wealth) and of the quantity of labor. Dr. Kuznets' measures of capital formation necessarily involve measurements of the quantities of all kinds of capital assumed to have increments (or decrements) during the period under consideration. Moreover, in estimating labor income as a part of the process of estimating national income, estimates of the total man-years of employment have been developed. Thus substantially the two main elements for measurements of changes in social input (except for measurements of changes in the stock of nonwasting, non-reproducible wealth, and these are assumed to be zero) are admittedly at hand.

3) *A divergent movement between deflated net value product in a productivity sense and deflated net value product in an exchange value sense is due solely to relative price movements, and hence offers no reason for distinguishing income derived from an industry from income produced in an industry.* We agree that a divergence between deflated net value product in a productivity sense and deflated net value product

in an exchange-value sense may be regarded as due solely to relative price movements. But so long as two separate measures exist they should be carefully distinguished and each assigned an appropriate name. It seems to us useful to reserve the term 'income produced' in an industry for a measure that when deflated, represents an output measurement. The term 'income derived from' an industry is, we believe, a more appropriate title for the debit measurement of net value product in current dollars, which, when deflated, represents the goods that the primary distributive shares might claim.

Mr. Friedman surmises that the interest in this distinction "derives in part from an identification of economic productivity as valued in the market place and social productivity considered from a broader point of view." We do not, of course, identify these things. On the contrary, we insist on the distinction. We fear others may fail to make it if 'productivity' is used without the qualifying verbiage Mr. Friedman here offers us. If he will always use qualifying words such as those quoted above in conjunction with terms like 'product' and 'productivity', there is no need for further argument.

Mr. Friedman also concludes that our desire to distinguish productivity as valued in the market place (that is, distributive shares received) and social productivity considered from a broader point of view (that is, output) is due in part to an acceptance of the doctrine that individuals ought to receive what they produce. One need not accept this view, and we do not, to be interested in knowing whether individuals may receive primary distributive shares for withholding production or for engaging in pursuits that may properly be called rackets. One might hold, as we do, that "individuals should receive primary distributive shares only if their actions tend to increase the aggregate social output," without reading proportionality into the proposition and making it embrace the secondary distribution so that it reads, "individuals ought to receive just what they produce". One may be interested in incentives without being worried about abstract justice.