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Part Four

CHANGING INVENTORY VALUATIONS
AND THEIR EFFECT ON BUSINESS
SAVINGS AND ON NATIONAL
INCOME PRODUCED

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Discussion

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SIMON KUZNETS

THE COMMENTS submitted below reiterate and amplify one of the points brought out in Mr. Fabricant's paper.¹ The distorting influence of business accounting practices on any measure of business savings, and hence of national income produced, is considerable, and the need for adjusting figures taken from business accounts must be clearly recognized. Of the various sources of distortion, the changing valuation of inventories appears, for recent years, to have had the largest quantitative effect on business savings and national income produced. It would, therefore, seem advisable to discuss the various aspects of this particular influence in some detail, even at the danger of stressing the obvious.

I National Income Produced, in Current Prices

National income produced may be defined briefly as the value of all commodities and services produced, minus the value of commodity wealth consumed in this production. Within commodity wealth consumed it appears advisable to distinguish between inventory commodities, i.e., raw and semifinished materials, finished nondurable commodities, and all finished durable commodities before they reach the hands of their ultimate consumers;

¹ Part Three, Sec. IV and V, 1.

and fixed capital, i.e., all finished durable commodities that are in the hands of their business users.

Let us adopt the following designations:

$q_n p_n$ = national income produced, in current prices, q_n being commodity volume and p_n being the corresponding price level,

q_g = quantity volume of all commodities and services produced,

p_g = current prices of all commodities and services,

q_m = quantity volume of inventory commodities consumed in the process of production (production being most broadly defined),

p_m = current prices of inventory commodities consumed in the productive process,

q_c = quantity volume of fixed capital consumed in the productive process,

p_c = current prices of fixed capital consumed in the productive process.

Then, obviously,

$$q_n p_n = q_g p_g - q_m p_m - q_c p_c \quad (1)$$

In the discussion below, we deal chiefly with national income produced, in current prices. The problem of adjusting it for changes in the price level will be mentioned only briefly in Section IV.

II The Inventory Valuation Problem

In connection with $q_m p_m$ the first point to be noted is that p_m designates the current price level of inventory commodities consumed in the productive process. If we deal, as we usually do in national income estimating, with annual magnitudes, p_m is the annual average price, weighted by quantities consumed in each distinguishable subdivision of the year (quarter, month, etc.).

The quantity of these inventory commodities consumed is properly expressed for business enterprises by the following equation:

$$q_m = q_{bi} + q_p - q_{e1} \quad (2)$$

where:

q_{bi} = quantity volume of inventory commodities in stock at the beginning of the year,

q_p = quantity volume of inventory commodities purchased during the year,

q_{ei} = quantity volume of inventory commodities in stock at the end of the year.

Hence:

$$q_m p_m = (q_{bi} - q_{ei} + q_p) p_m = q_{bi} p_m - q_{ei} p_m + q_p p_m. \quad (3)$$

Actually, from the accounting records we obtain the following value, which we designate as A_{mp} , for the cost of inventory commodities consumed:

$$A_{mp} = q_{bi} p_1 - q_{ei} p_2 + q_p p_3 \quad (4)$$

where:

p_1 = prices in which commodity stocks are reported at the beginning of the year,

p_2 = prices in which commodity stocks are reported at the end of the year,

p_3 = prices at which commodities are purchased during the year.

None of these three is likely to be equal to p_m , when prices of the commodities in question move up or down during the year. Since inventories are valued at cost or market whichever lower, if prices rise during the year and the immediately preceding period, p_1 will be lower than January 1 prices and hence decidedly lower than p_m , the average price for the year; and p_2 is likely to be higher than p_m , if the age of the closing inventory is under six months. Similarly, when prices decline, p_1 will be higher than p_m , and p_m is likely to be higher than p_2 . The average price of inventory commodities purchased during the year, p_3 , will differ from p_m in so far as the distribution of purchases within the year differs from the distribution of actual consumption in the productive process.

For practical purposes we may assume that $p_3 = p_m$. There is no way of ascertaining properly, in estimating national income, the distribution within the year of quantities of inventory commodities consumed and of those purchased. And it may be reasonably suggested that even when differences between the intra-annual consumption and purchase patterns are substantial, the resulting disparity between p_3 and p_m is likely to be of much

smaller importance than the difference between p_1 and p_2 , on the one hand, and p_m , on the other.

If $p_3 = p_m$, then

$$\begin{aligned} A_{mp} - q_m p_m &= q_{bi} p_1 - q_{ei} p_2 - q_{bi} p_m + q_{ei} p_m \\ &= q_{bi} (p_1 - p_m) + q_{ei} (p_m - p_2). \end{aligned} \quad (5)$$

When prices of inventory commodities consumed in the productive process rise, and the average age of stocks is under six months (which, for the business system as a whole, is quite definitely the case) both $(p_1 - p_m)$ and $(p_m - p_2)$ are negative quantities. Hence, in such a case, the value of inventory commodities consumed as reported by business accounts is too low as compared with the true one; and correspondingly, net income (in equation 1) is exaggerated by an amount exactly equal to that on each side of equation (5), signs disregarded. When prices of the commodities in question decline, the value of these commodities consumed in the productive process is exaggerated in the business account, the value on each side of equation (5) being positive; and hence net income is underestimated by a corresponding quantity.

It is thus quite clear that whether prices rise or decline, and inventories are reported at cost, or at cost or market whichever lower, the values of inventory commodities consumed, as reported in business accounts, differ from the value required for a proper estimate of national income.²

III Factors Determining the Size of Discrepancy Resulting from Changing Inventory Valuation

The discrepancy in question, the value of which was established in equation (5), may for the purposes of analysis be expressed somewhat differently:

² It is surprising to note in this connection that Colin Clark, in his *The National Income, 1924-31* (London: Macmillan, 1932), finds it necessary to correct for this peculiarity of business accounting only in years of declining prices and fails to correct for the influence of rising prices. The fact that accounting practices demand reporting inventories at cost or market, whichever lower, does not mean that in years of rising prices the valuation of the closing inventory is the same as that of the opening inventory, or that either is the same as the price level of inventory commodities consumed in the productive process,

$$A_{mp} - q_m p_m = q_{bi} p_1 - q_{ei} p_2 + (q_{ei} - q_{bi}) p_m. \quad (6)$$

If we ask ourselves now what determines the absolute size of this discrepancy, its sign being disregarded, it becomes obvious that:

a) Other factors held constant, the discrepancy is larger the larger the difference between p_1 and p_2 , i.e., the larger the change in the price level.

b) If $q_{bi} = q_{ei} = q_i$ the discrepancy is larger the larger q_i is. The same is true if $q_{ei} \neq q_{bi}$. The discrepancy is proportional to the magnitude common to both q_{bi} and q_{ei} .

c) If both prices and the quantity volume of commodity stocks change the absolute size of the discrepancy will tend to be larger if the quantity volume of commodity stocks increases; and will tend to be smaller, if the quantity volume of commodity stocks declines.

Proof:

When $q_{bi} = q_{ei}$, the discrepancy is

$$q_{bi} (p_1 - p_2); \quad (7)$$

when commodity stocks increase, $q_{bi} = q_{ei} - a$ ($a =$ positive constant) and the discrepancy becomes:

$$q_{bi} (p_1 - p_2) + a (p_m - p_2). \quad (8)$$

When prices rise $p_1 - p_2$ is invariably negative; and $p_m - p_2$ is likely to be negative if the average age of closing commodity stocks is under six months. Under such conditions, expression (8) will be of larger absolute size than expression (7).

When prices decline, $p_1 - p_2$ will be positive, and $p_m - p_2$ is also likely to be positive. Hence expression (8) will be larger than expression (7), both arithmetically and algebraically.

Obviously, if commodity inventories decline the discrepancy will be:

$$q_{bi} (p_1 - p_2) - a (p_m - p_2). \quad (9)$$

which will, for either rising or declining prices, tend to be of smaller absolute size than expression (7). Thus, secular and cyclical rises in commodity volume of inventories will, other conditions being equal, magnify the effect of changes in inventory valuation upon the discrepancy, and hence upon business savings and national income produced. Secular and cyclical declines in the commodity volume of inventories will have the opposite effect.

d) If the commodity volume of inventories and prices both

change, the discrepancy may vanish if, when commodity stocks increase:

$$q_{bi}(p_1 - p_2) = -a(p_m - p_2) \text{ or } \frac{a}{q_{bi}} = \frac{(p_1 - p_2)}{(p_2 - p_m)} \quad (10)$$

Since both a and q_{bi} are positive, $\frac{p_1 - p_2}{p_2 - p_m}$ must be positive in order that equation (10) be satisfied. But this can be the case only if the price movements change their direction at some point from p_1 to p_2 .

When commodity stocks decrease:

$$q_{bi}(p_1 - p_2) = a(p_m - p_2) \text{ or } \frac{a}{q_{bi}} = \frac{(p_1 - p_2)}{(p_m - p_2)} \quad (11)$$

In this case it would appear at first as if price movements do not have to change their direction within the year. But unless they do, $p_1 - p_2$ will be larger than $p_m - p_2$, and hence a would have to be larger than q_{bi} —obviously an impossibility. In the extreme case ($a = q_{bi}$), p_m would have to be equal to p_1 —again an impossibility under conditions of prices changing within the year in one direction only.

Hence, the effect of a change in commodity volume of stocks is not such as to allow cancellation of the discrepancy, unless prices both rise and decline within the year. But under such conditions, the discrepancy may vanish even if the commodity volume of stocks remains constant throughout the year.

IV National Income Produced, in Constant Prices

A brief consideration will show that the usual adjustment of national income produced for changes in price level does not correct for the discrepancy discussed above.

If we designate the constant price level in which income and its elements are to be expressed by P , with corresponding subscripts, then national income produced, in constant prices, is described by the following equation:

$$q_n P_n = q_g P_g - q_m P_m - q_c P_c \quad (12)$$

Hence

$$P_n = \frac{q_g P_g - q_m P_m - q_c P_c}{q_n}$$

$$P_n = \frac{q_g P_g - q_m P_m - q_c P_c}{q_n},$$

and

$$\frac{P_n}{P_n} = \frac{q_g P_g - q_m P_m - q_c P_c}{q_g P_g - q_m P_m - q_c P_c} \quad (13)$$

The price index p_n/P_n is obviously a ratio of two price measures, both constructed similarly but for two different years, the base year and the given year. In both, the price measure is obtained by taking the prices of all commodities and services produced, allowing all possible duplication (p_g and P_g); subtracting the prices of all inventory commodities and of all services consumed in the process of production (p_m and P_m), and again subtracting the prices of all fixed capital goods consumed in the productive process (p_c and P_c). In short, both p_n and P_n are largely measures of the prices of finished commodities and services produced and available for ultimate consumers and investors. Prices of unfinished commodities and services enter them only in so far as they represent net additions to or subtractions from inventories.

It is clear now that having both p_n and P_n , no correction can be made for the discrepancy by any usual adjustment for price changes. Indeed, the correct expression for national income produced, in constant prices, is:

$$q_n P_n = q_n p_n \frac{P_n}{P_n}$$

But if instead of $q_n p_n = q_g p_g - q_m p_m - q_c p_c$, we have a magnitude $A_{np} = q_g p_g - A_{mp} - q_c p_c$, then when we adjust for price changes, we obtain the following magnitudes:

$$\begin{aligned} A_{np} \frac{P_n}{P_n} &= [q_n P_n - q_{bi} (P_1 - P_m) - q_{ei} (P_m - P_2)] / (P_n/P_n) \\ &= q_n P_n - (P_n/P_n) [q_{bi} (P_1 - P_m) + q_{ei} (P_m - P_2)]. \quad (14) \end{aligned}$$

The discrepancy in this case may be absolutely smaller or larger as compared with that in income produced in current prices, depending upon whether P_n/p_n is smaller or larger than 1. But its relative magnitude, i.e., its ratio to the correct value of national income produced, will be the same whether measured in current or in constant prices.

V Magnitude and Effect of the Adjustment for Recent Years

It is of interest to consider the magnitude of the discrepancy discussed above and the effect of the adjustment for such discrepancy on the current estimates of national income produced and of that income element which reflects the discrepancy fully, viz., net business savings (Table 1).

TABLE 1
ADJUSTMENT OF CURRENT ESTIMATES OF BUSINESS SAVINGS,
PROFITS OR LOSSES AND NATIONAL INCOME PRODUCED
FOR EFFECTS OF CHANGING INVENTORY VALUATIONS

YEAR	RE- VALUATION OF INVEN- TORIES IN- CLUDED IN		INCOME PRODUCED		NET BUSINESS SAVINGS		BUSINESS PROFITS OR LOSSES	
	ESTIMATE	PRESENT ESTIMATE	ADJUSTED	PRESENT ESTIMATE	ADJUSTED	PRESENT ESTIMATE	ADJUSTED	
	(millions of dollars)							
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	
1929	-712	80,757	81,469	2,583	3,295	8,552	9,264	
1930	-4,331	67,969	72,300	-4,903	-572	912	5,243	
1931	-3,308	53,499	56,807	-8,052	-4,744	-3,718	-410	
1932	-1,520	39,545	41,065	-8,942	-7,422	-6,193	-4,673	
1933	2,440	41,813	39,373	-3,094	-5,534	-881	-3,321	
1934	2,131	49,575	47,444	-1,429	-3,560	1,257	-874	
1935	785	54,955	54,170	310	-475	3,382	2,597	

Col. 3, *National Income, 1929-36*, prepared by the Division of Economic Research, U. S. Bureau of Foreign and Domestic Commerce (Washington, 1937), Table 1, p. 11

Col. 5, *ibid.*, Table 8, p. 24

Col. 7 = Col. 5 + dividends paid out; see *ibid.*, Table 24, p. 31

Col. 4 = Col. 3—Col. 2 Col. 8 = Col. 7—Col. 2

Col. 6 = Col. 5—Col. 2 For derivation of Col. 2 see text

The estimates of income produced, net business savings and business profits and losses (i.e., savings before payment of dividends) are taken from the most recent publication on the subject by the Department of Commerce, and need no further explanation. But the derivation of the measures of the discrepancy, given in column 2, needs to be stated briefly.

For years prior to 1936, we have estimated in the National

Bureau's study of capital formation the volume of commodity stocks held at the end of each year by the business system, i.e., farmers, all business enterprises in mining, manufacturing, construction and trade, and all corporations in the fields of public utilities, service and finance. These commodity stocks were measured in both 1929 prices and current valuation as reported in the accounts of the business firms; in addition we had price indexes measuring the average annual price level of the commodities in question.

We were thus able to estimate for every year the following magnitudes: $(q_{ei} - q_{bi}) p_m$, and $(q_{ei} p_2 - q_{bi} p_1)$. These magnitudes appear in columns (2) and (3) of Table 3 in Mr. Fabricant's paper,³ and refer to all inventories except those in the hands of farmers. Farmers' stocks were excluded because the procedures used to estimate income produced from farming take no account of changes in current inventories.

The revaluation of inventories included in present estimates of national income produced and net business savings is obvious from equation (6) which can be rewritten as follows:

$$\begin{aligned} q_m p_m &= A_{mp} - q_{bi} p_1 + q_{ei} p_2 - (q_{ei} - q_{bi}) p_m \\ &= A_{mp} + [(q_{ei} p_2 - q_{bi} p_1) - (q_{ei} - q_{bi}) p_m]. \end{aligned}$$

It can now be seen why Mr. Fabricant estimates the revaluation of inventories included in the current estimates as

$$[(q_{ei} p_2 - q_{bi} p_1) - (q_{ei} - q_{bi}) p_m];$$

and it is this magnitude that is entered in column (2) of our table.

It may be observed that the adjustment thus made possible affects materially the estimates of national income produced, raising them in years of contraction and lowering them in years of recovery. It also changes somewhat the year-to-year movement of income totals, bringing them into what seems to us better conformity with our general notions of the course of depression and recovery in this country. The unadjusted totals of income produced show almost as great an absolute decline from 1929 to 1930 as from 1930 to 1931, or from 1931 to 1932. The adjusted totals show that the contraction from 1929 to 1930 was much less appreciable than during the two years following. The unadjusted total shows a rise from 1932 to 1933; the adjusted one shows a

³ Part Three, Sec. V, 1.

decline from 1932 to 1933, thus exhibiting a movement similar to that of income paid out.

The effect of the adjustment on business savings is, naturally, the most marked. From 1929 to 1932 inclusive, the cumulative total of business savings is reduced from —19,314 million dollars to —9,443, or by more than one-half. For the entire period, 1929–35, the cumulative total of net savings in the unadjusted figures is —23,527 million; in the adjusted, —19,012. The adjustment serves to bring out the fact that revaluation of inventories tends to intensify greatly the otherwise sensitive element of business savings or business profits—reducing them still further during the years of declining prices that usually accompany depression, and raising them still further during the years of rising prices that usually accompany recovery.

VI Broader Aspects of the Problem

The correction for the effects of changing valuation of inventories, as well as the adjustment for the difference between original cost and reproduction value bases of depreciation deductions (discussed by Mr. Fabricant), serves to raise some broad questions concerning national income concepts. The introduction of these corrections means that our measure of national income produced, and especially of business savings or business profits and losses (if we treat dividends as a residual rather than as a cost share), departs from what the business system as a whole considers its net profit or loss or its contribution to net income produced. In effect, the adjustments for the inconsistencies of the accounting system are analogous to the distinction the estimator makes between entrepreneurial withdrawals and business savings for individual entrepreneurs, most of whom make no such sharp distinction in reality; or to the attempt of the national income estimator to place a precise figure upon entrepreneurial incomes in such branches as farming, retail trade or construction, in which a large number of the entrepreneurs have but a vague notion as to the amount of their net incomes.

Such consistency on the part of the national income estimator in his attempt to measure what the net income actually is, rather

than what people *think* their net incomes are, seems to me fully justified. It is of importance for us to know the total net output of commodities and services during given periods, measured in terms of both current and constant prices. How else can we gauge the success of the economic system in providing commodities and services for ultimate consumption and for increase of the capital stock? True, the global measure of national income produced is in itself insufficient for such purposes; it must be supplemented by the various significant allocations, such as by industrial source, by functional type of income share, by regions, by social groups, by size among consuming units. But the properly measured total is obviously indispensable, either as the first or as the last step in this sequence of national income measurements.

On the other hand, we do lose a valuable aspect of national income measurements by making them depart from what the income recipients in the nation believe their incomes to be. For what consumers or entrepreneurs think their net incomes to be provides at least a partial explanation as to why they act as they do as consumers or entrepreneurs. An increase in the net profit of an enterprise, even though it is but a reflection of revaluation of inventories of the kind discussed above, is nevertheless real so far as it may stimulate the enterprise to further expansion or to a more generous dividend policy. And if a farmer thinks that his net income has increased, even though this increase is due only to his failure to take proper account of the depreciation of land or equipment, he may still be impelled to expand his activity. Whether such expansion will actually follow depends, of course, upon the enterprise's or farmer's ability to find the means for it; but the stimulus, provided by an increase in apparent net income, is present nevertheless.⁴

The discussion above suggests a definite choice among the several alternative approaches to national income measurements that appear in any discussion of national income concepts. One can either attempt to measure national income produced as a sum total of what income producers think their incomes are, or

⁴ It is perhaps not an overstatement to say that the disparity between real and apparent net income constitutes an important factor in business cycles. A similar point, obviously suggested by the experience in Germany during the inflation years, was elaborated by F. Schmidt (see his 'Die Industriekonjunktur—ein Rechenfehler!', *Zeitschrift für Betriebswirtschaft*, 2 Sonderheft, 1927).

as the value of the net output of commodities and services. Both approaches cannot be satisfied by one estimate, but demand two distinct totals. Perhaps we should estimate both *real* income produced and *apparent* income produced. And if we do, we should probably distinguish and measure real income paid out and apparent income paid out; or any other pair of real and apparent national income totals.

The purpose of these remarks is not to indicate and justify a definite choice. Although if a choice is to be made, it seems to me more important, in the present state of our knowledge, to measure real national income produced as a basis for observing fundamental changes over substantial time periods than to measure apparent income produced, which is useful only as a factor in explaining some short term changes in economic behavior. But then there is nothing, except labor, to bar a simultaneous measurement of real and apparent income. However, the important point is that the two approaches are incompatible in one estimate. Such incompatibility is also true of the uses to which the net income measures may be put.

Discussion

I M. A. COPELAND

The nature of the correction for changing inventory valuations that Dr. Kuznets proposes to apply in estimating social income may be conveniently understood for an isolated community, if we divide its total net value product into three parts according to objects of expenditure during the year, thus:

- a) Total value of goods and services consumed;
- b) Saved income invested in additions to the stock of durable goods;
- c) Saved income invested in additions to inventories.

Neither (a) nor (b) is relevant. Item (c), which may be either positive or negative, is precisely what Dr. Kuznets proposes to correct. When it is on a book-value basis ¹ it is p_2q_{ei} minus p_1q_{bi} . Dr. Kuznets would apply p_3 or p_m , an average price for the year, to both physical inventories, q_{bi} and q_{ei} , in lieu of using respectively the year's opening and closing prices, p_1 and p_2 . Thus, in effect, he applies a deflation technique, but applies it separately for each year. His correction therefore eliminates the effects of price change within each year but does not eliminate the effects of price change as between any two years. We may refer to his technique as 'partial deflation'.

Dr. Kuznets' argument for this correction begins with an equation, equation (1), as a premise. He tells us that this equation is obviously true. Its truth was not obvious to me. Indeed, when I first read his equation I thought it was obviously false. I now think it is his definition of 'national income produced at current prices', or $q_n p_n$. If so, it becomes true by definition. I therefore

¹ For the usual estimates of 'net value product' for agriculture, which do not employ the accountants' inventory-purchases formula for cost of goods sold or used, this statement needs some qualification.

do not wish to question its validity as an equation. I do urge that other definitions of 'net value product at current prices' may properly be held and that this particular definition involves an incorrect usage of statistical terms.

As I have elsewhere repeatedly pointed out,² the expression 'net value product at current prices' is ambiguous for several items unless the valuation basis is specified. The item here under consideration is a case in point, and book valuation is one possible basis for it. Thus, we may properly estimate 'net value product at current prices, inventories being on a book-value basis'. This is the concept of social income at current prices that I have urged as the basic concept. Dr. Kuznets has not questioned the accuracy of existing estimates for this concept as he seems to tell us he has; rather he has offered us a different concept of social income.

Before considering the merits of his proposed concept I wish to question the correctness of designating it as "income . . . in current prices". The main purpose of setting up a concept 'income at current prices' would seem to be to carry us as far as possible towards income in stable dollars without attempting to correct the data of estimate for changing prices or other changing valuations. The chief advantage in adhering to current prices is that one avoids the subjectivity inherent in possible alternative methods of deflation. Clearly Dr. Kuznets' concept starts the process of correction for price changes³ and therefore is not properly called income at current or uncorrected prices.

Dr. Kuznets urges that when and only when his partial deflation technique has been applied to the type of saved income under consideration, the job of correcting for price changes may be finished by applying the usual deflation technique as a complementary process. I concur.

While Dr. Kuznets' correction enables us to deflate saved income by subsequent use of the time-honored deflation technique, I feel bound to repeat my statement of a simpler deflation technique for saved income that is open to us. The year-end inven-

² See, for example, Part One, Sec. II, 3.

³ Another income estimator, less concerned with algebra, might have used either p_1 or p_2 instead of p_m . This makes clear the subjectivity involved in Dr. Kuznets' partial deflation.

tories rather than the annual increments in inventories may be fully deflated by the time-honored technique, and the annual increments may then be computed from these deflated figures.

Although the problem of deflating saved income invested in durable goods is *in theory* similar to that of deflating saved income invested in inventories, Dr. Kuznets' discussion has the great advantage of breaking saved income into these two parts, and of making clear that *practically* the part he deals with is easier to handle alone and also is much the more important part of the whole for the income estimator to handle.

An inconvenient corollary of Dr. Kuznets' concept of partially deflated book-value income may be noted. Unlike income at current prices and fully deflated income, this partially deflated income does not correspond to a single clear-cut concept of social wealth. Indeed, by hypothesis, Dr. Kuznets applies two valuations to each year-end inventory, one for the preceding year and one for the following year.

II MILTON FRIEDMAN

Whether revaluations of inventories should be included in or excluded from 'national income in current prices' can best be considered in connection with the broader problem of the treatment of changes in the capital structure in general.

The capital structure of a national economy—expressed in monetary terms—can be changed through:

(1) Utilization of the available productive resources, i.e., through 'physical' additions to the stock of capital;

(2) 'Real' consumption of capital, i.e., through under-maintenance;

(3) Changes in the demand structure and consequent shifts in the relative valuation of capital goods;

(4) Technological developments making for obsolescence;

(5) 'Non-produced' additions to or subtractions from capital, e.g., the gold mine discovered by chance, or the capital brought in by immigrants;

(6) Changes in monetary conditions bringing about general price revaluations.

If we adhere strictly to a monetary definition of income as equal to the value of the goods and services consumed during the year, plus the wealth at the end of the year, minus the wealth at the beginning of the year, then estimates of national income will include changes arising from all these sources. The net effect of these six factors will represent the 'savings' during the year. This, I take it, is Dr. Copeland's position.¹

It seems to me, however, that our tendency to accept the above definition of national income is a result of a tendency to think in static terms. Of the six possible modes of change in the capital structure, only the first two are relevant to static analysis. For under conditions of unchanging tastes and preferences of consumers, of constant technology, of given resources, and of a stable money system, none of the other types of change could arise. The remaining four modes of changing the capital structure represent the effect of dynamic factors, the effect of fundamental changes in the economic structure.

The definition of national income given above implies that, at one time or another, all changes in capital structure pass, as it were, through income. In a static state satisfying the conditions listed above this is indeed the only way in which the capital structure can be enlarged or reduced. In a dynamic state, however, it seems better to conceive of the capital structure as subject to alteration in other ways than through the utilization of some part of the income stream.

By following this procedure we depart from the stationary state fiction that all changes in the capital structure represent more or less deliberate decisions to 'save' rather than to 'spend', and we approach what seems to me a more realistic notion; namely, that changes in the underlying factors of our economy result in similar dynamic changes in the capital structure.

I am suggesting, therefore, that we define income as the value of the commodities and services consumed during the year, plus changes in the capital structure of the first two types listed above. By so doing we admit the possibility that the capital structure may be changed other than through the utilization of the income stream. The dynamic changes in the capital structure will affect the stream of income available in future years, but they will not

¹ Part One, Sec. V, 8.

be allowed to affect the current income stream. This procedure does not, of course, attempt to insulate income from the effect of all 'dynamic' or accidental changes. Factors affecting the stream of commodities and services directly—as, for example, factors making for a bumper crop of strawberries—are not, and should not be, abstracted from.

It is, of course, impossible to declare one of the two definitions of income outlined above 'valid' and the other 'invalid'. Fundamentally, the choice between them rests upon one's personal opinion as to the relative significance of the concepts, and their usefulness in analyzing the economic system.

Application of the definition of income suggested would lead to the following treatment of some of the debatable items: Revaluations of assets, whether arising from changes in the general price level, shifts in relative prices, or obsolescence would be excluded from income. (Mr. Copeland favors, it would seem, the inclusion of all three; Mr. Fabricant favors the exclusion of the first but the inclusion of the second and third.²) Capital brought in by immigrants, losses from floods, earthquakes, etc., would likewise be excluded. (Mr. Copeland again favors their inclusion,³ while Mr. Fabricant favors their exclusion.⁴)

If the principles suggested above were followed, it would be well, of course, to present along with estimates of national income, estimates of changes in the capital structure arising from various dynamic changes in the economic system.

It is recognized, of course, that hard and fast lines cannot be drawn separating the six types of change listed above; that, consequently, the present suggestion does not provide as simple and clearcut a solution as might, on the surface, appear. Thus, Mr. Fabricant has indicated the difficulties in distinguishing 'unforeseen' obsolescence from depreciation, and in deciding which additions to productive resources analogous to the discovery of gold mines should be considered as 'produced' by expenditures on exploration. But the lack of hard and fast dividing lines is, of course, not peculiar to the present problem, and offers little excuse for accepting a less satisfactory concept. The borderline

² Part Three, Sec. V, 1 and 3.

³ Part One, Sec. V, 5.

⁴ Part Three, Sec. VI.

cases are, after all, relatively unimportant; the great bulk of the changes in the dollar value of the capital structure offers little difficulty.

The decision as to which of the six types of capital change shall be included in 'income' seems to me entirely distinct from the problem of the prices in terms of which the commodities and services making up the income stream are to be valued.

III ARTHUR W. MARGET

I do not understand Dr. Kuznets' argument to be concerned with the problem of how to treat such 'profits' (or additions to 'business savings') as result from the appreciation in value of inventories still *unused* in the productive process between the time they were purchased and the time an estimate is made of the addition to 'profits' or to 'business savings' constituted by this appreciation. This is a matter that deserves discussion both on its own account and for the light it might throw on the treatment of additions to 'wealth' in estimates of income. It is, however, not directly involved in what I take to be Dr. Kuznets' specific problem; namely, the computation of 'profits' on commodities actually 'consumed' in the productive process, in the sense of being *used* in the process of manufacture.

The question, then, has to do with the prices assigned to the inventory commodities that are used in the productive process during the period under examination. As I understand Dr. Kuznets' contention, it is that the prevalent practice of valuing goods at cost or market, whichever lower, results, during periods of price change, in an overestimation or underestimation of the profits 'actually' made; and that the only way of correcting this distortion is to value goods used in the productive process not at the prices they bear in the inventory valuation as affected by current accounting practice, but at the prices they bear in the market at the time they are being used.

The underlying theoretical justification for Dr. Kuznets' method is the general doctrine of opportunity cost; since what he argues, in effect, is that the true measure of the 'cost' of a given commodity used in production is what that commodity would

obtain in the market. This is a solid foundation; and the method has the further advantage that it proposes to treat symmetrically the 'costs' of materials used in manufacturing and the imputed 'costs' of certain types of material and labor used in the estimate of 'profits' in such lines of activity as agriculture. I cannot believe, however, that Dr. Kuznets' method, *properly applied*, would give results for the measurement of 'income produced', when the latter is understood to include *all* gains or losses from entrepreneurial activity over a given period, which differ in any essential respect from the results obtained by the methods now employed.

The reason for this conclusion constitutes at the same time a specification of what is involved in a 'proper' application of the proposed method. In essence, the point simply amounts to a warning against supposing that the measurement provided by Dr. Kuznets' formula for 'income produced' through the use in production of accumulated inventories, presents a complete measure of the total gain or loss accruing to the entrepreneur as the result of the process in question. For this gain or loss should include also the *gain or loss accruing to the entrepreneur because he purchased his inventory at a price different from that which he charges himself when he uses the materials in question.*

I cannot believe that Dr. Kuznets proposes to regard gains or losses of the latter type as of no importance for an estimate of the 'real' gains of entrepreneurs. The lags between the rise in costs—including the costs of materials—and the rise in selling prices are very 'real' phenomena, in the sense that it is precisely these lags that are instrumental in changing the proportions in which the different sectors of the economic system are in a position to exercise command over 'real' resources. This is a commonplace of monetary theory, which has insisted for generations upon the fact that price lags may be the means whereby a 'redistribution of wealth' is effected during periods of price change. To disregard the differences in the amount of pecuniary profits as between entrepreneurs who have shown different degrees of foresight in accumulating inventories at low 'cost' would be to disregard the differences in the command over real wealth that these differences in pecuniary profits are certain to bring.

This granted, then the choice between Dr. Kuznets' method and current methods will turn largely upon the extent to which

it is felt to be desirable to segregate gains of the type indicated from the gains that would accrue if all entrepreneurs had no gains on inventories and charged themselves for materials of production at the prices prevailing when these materials are used. Some might prefer to regard the 'income produced' that is measured by Dr. Kuznets' formula as the only true 'income', the gain on inventory being regarded as an addition to 'business savings' comparable to that which would result from an appreciation in the value of fixed assets. Others might argue that the gains in inventories are really gains accruing to entrepreneurs in their capacity as dealers in the materials in question, and therefore as truly 'income' as the gains of those who are solely traders in commodities and make their profit by selling at a price above cost. The important thing, in any case, is that any measure of 'income produced' that is not to result in a distortion of the 'real' facts of the situation must include both types of gain, and not merely 'income produced' as measured by Dr. Kuznets' formula.

Hence the difference between the results obtained from the use of Dr. Kuznets' formula and those obtained from the use of current accounting methods, instead of affecting the *total* entrepreneurial gain from the productive process, merely affects the allocation of the two parts of this gain as between the gain on inventories, on the one hand, and the gain from the productive process when inventories used in that process are charged at the market prices prevailing at the time of use, on the other.

It will be seen, also, that the questions raised by Dr. Kuznets with respect to the 'true' and 'apparent' gains of entrepreneurs during periods of price change are really concerned with much broader problems than those covered by his formula. At bottom, what is involved is the general position expressed in Mr. Fabricant's paper,¹ and concurred in by the writer, to the effect that, in order to estimate what 'actual' profits are being made, attention must be paid to the relevant 'period', and that in many cases we are warranted in characterizing profits computed over a fraction of such a period as 'unreal', in the sense that they do not reflect what the sober second judgment of the market will decide these profits 'actually' should have been thought of as being. I agree

¹ Part Three.

entirely that we must be prepared to consider methods designed to correct the estimates of 'profits' in such a way as to bring them more nearly in accord with the 'realities' of the situation. I cannot believe, however, that Dr. Kuznets would assert that the particular method he proposes will accomplish this purpose.

He would certainly not argue, for example, that gains on inventories are entirely illusory. These gains remain 'real' so long as entrepreneurs fail to make subsequent losses that cancel their gains; and I cannot see that the method under discussion provides us in advance with knowledge as to the degree of wisdom with which different entrepreneurs will husband their respective gains. On the other hand, I am sure that Dr. Kuznets would not argue that the mere fact that gains are calculated on the basis of imputing market prices to inventories will guarantee that these gains will not be canceled by subsequent losses. 'Market' prices represent the result of entrepreneurial judgments of the moment; they, and the gains computed on the basis of them, are therefore as much subject to a more sober second judgment as are valuations of fixed capital, which are also the result of market judgments. Given the unfortunate tendency, in boom times, to regard a temporarily favorable profit situation as permanent in character, any device that will tend to undeceive over-optimistic producers as to the extent of their probable 'profit' over a 'period' of sufficient length is to be welcomed. Such devices should, however, be presented for what they are, and not as devices for representing the 'true' condition of affairs, as that condition will be revealed by subsequent market events.

IV SIMON KUZNETS

The adjustment for the effects of changing inventory valuations is a single operation the results of which may be set forth in a three-fold fashion: (a) it serves to evaluate the inventories consumed in the process of production at their market price at the time of their consumption, rather than at their book value; (b) it excludes from national income gains or losses arising from the rise or decline in prices of commodities held in stock; (c) it im-

explicitly includes changes in inventories only in so far as they represent accretions to or depletions from the stock of commodities comprising the inventories.

Each result of the adjustment (all are closely related of course) suggests some aspect of the basic argument for such an adjustment. (a) If national income in current prices is to have any consistent meaning, the characteristics of current market valuation should obviously apply both to the gross national product and to the commodities consumed in its production. Hence, both fixed capital and other commodities consumed in the productive process should be evaluated at the market price prevailing at the time of consumption, just as the finished product is taken at its current market price. (b) If national income is to represent the net current value of commodities and services produced, it cannot and should not include any appreciation or depreciation of the existing stock of wealth, except as such appreciation or depreciation results from diverting commodities to and from this stock. Just as we exclude from national income gains and losses on sales of assets by individuals, so we should exclude gains and losses arising from the holding of commodity stocks. (c) Finally, the assumption that in an income study changes in inventories should be confined to those representing actual inflow or outflow of commodities is the only one consistent with the statements under (a) and (b).

In the light of these considerations, the objections raised by Dr. Copeland and Dr. Marget do not appear valid. As I understand them, these objections are: (1) That income in current prices should "carry us as far as possible towards income in stable dollars without attempting to correct the data of estimate for changing prices or other changing valuations". But the income in current prices, as defined here, i.e., inclusive of the adjustment for the effect of changing inventory valuations, "starts the process of correction for price changes and therefore is not properly called income at current or uncorrected prices" (Dr. Copeland). (2) That the adjustment suggested has the inconvenient corollary of applying "two valuations to each year-end inventory, one for the preceding and one for the following year" (Dr. Copeland). (3) That the adjustment proposed eliminates gains or losses sustained by the entrepreneurs on inventories actually consumed in

the productive process, these gains and losses arising because of a lapse of time between the purchase of the commodities by the entrepreneur and the sale of the finished product in which the consumed inventory is embodied. And these differential gains and losses of entrepreneurs are of crucial importance and should not be neglected in any computation of national income (Dr. Marget).

(1) This writer must confess an inability to appreciate clearly the meaning of Dr. Copeland's first objection. It cannot very well mean that national income in current prices can be obtained only if the investigator adds indiscriminately whatever data are reported by various economic agents on what they consider their income receipts or income earnings to be. Let us assume that entrepreneurs, in reporting their net income, fail to deduct depreciation of fixed capital, a practice that was quite prevalent before the corporate income tax law taught the business community the benefits of such a deduction. Under these circumstances, would Dr. Copeland claim that national income at current prices should be governed by the income reported, without allowance for depreciation, on the ground that costs should be taken at the book values reported by concerns and that any attempt to correct for them initiates the process of price correction? And if the answer to this question is negative, as it obviously would be, why should we not correct for the omission by entrepreneurs, in their calculation of costs, of the disparity between the book value of fixed capital and inventories and their current market value at the time of consumption? Whether this correction is to be designated as 'deflation' depends upon definition. But, surely, income in current prices is not synonymous with a concept of income in which the data are left uncorrected from the viewpoint of a consistent definition, and hence are a mechanical total of heterogeneous parts, at the mercy of the diverse accounting practices of business and other enterprises.

Another aspect of the same objection is perhaps revealed by Dr. Copeland's statement that "the chief advantage in adhering to current prices is that one avoids the subjectivity inherent in possible alternative methods of deflation"; which he illustrates in a footnote by saying "another worker, less concerned with algebra, might have used either p_1 or p_2 instead of p_m ". But it is

obvious that "subjectivity" in this case cannot mean freedom of choice resulting from an uncertainty of a theoretical character, but rather that resulting from the possibility of choice among various practical means, i.e., among various price series. And the illustration of the subjectivity is ill chosen. The other worker, if he at all wishes to measure national income at current prices *prevailing throughout each year, must use* p_m ; he cannot use p_1 or p_2 . The only freedom he has is in choosing series to represent p_m ; in which choice, owing to the paucity of price series, his imagination or restraint may operate differently from those of another worker.

(2) Dr. Copeland's second objection, viz., that the adjustment suggested implies two valuations for each year-end inventory, seems to be based upon a misunderstanding of the argument presented in my paper. This argument attempted to show the significance and necessity of the correction for a single year; for this reason p_m was stated in terms of a single year. But, obviously, if we deal with a series of years, there is nothing to prevent us from expressing the inventories at each year-end in terms of a single, constant price level; obtain for each year the changes in inventories, in terms of that single, constant price level; convert these changes to current prices prevailing through each year; and then obtain the adjustment for each year by subtracting from these changes the differences within each year between the beginning and end-year inventories in terms of their changing book valuations. As a matter of fact, it is in this fashion that the adjustment has been computed for the tables in both Mr. Fabricant's and my own papers—the constant price level used being that for 1929.

To express the same point in algebraic terms, let us denote P_m as the constant price level; q' , q'' , etc. and p' , p'' , etc. as the quantities and prices for the single years. Then equation (3) can be rewritten as the following series of equations, each for a single year:

$$q'_m P_m \frac{(p'_m)}{(P_m)} = (q'_{bi} P_m - q'_{ei} P_m + q'_p P_m) \frac{(p'_m)}{(P_m)},$$

$$q''_m P_m \frac{(p''_m)}{(P_m)} = (q''_{bi} P_m - q''_{ei} P_m + q''_p P_m) \frac{(p''_m)}{(P_m)}.$$

The adjustments for each single year would then be:

$$(q'_{ei}P'_2 - q'_{bi}P_1) - \left[(q'_{ei}P_m - q'_{bi}P_m) \frac{(P'_m)}{(P_m)} \right],$$

$$(q''_{ei}P''_2 - q''_{bi}P''_1) - \left[(q''_{ei}P_m - q''_{bi}P_m) \frac{(P''_m)}{(P_m)} \right].$$

Thus, in a series of years the most effective way in which the adjustment could be made would be to translate inventories for all year-ends in terms of a single constant price level—a step that would be apparent in the argument were it developed for a series longer than a single year.

(3) Dr. Marget emphasizes the importance of differential gains and losses arising from the time-disparity between purchase of inventories and their eventual sale in the form of a finished product, not so much as an objection to the adjustment suggested as a warning that national income obtained after this adjustment excludes these important differential incomes of entrepreneurs. With this viewpoint this writer is in complete agreement; and far from denying the importance of entrepreneurial gains and losses arising from this source, I have stressed in the concluding section of my paper the importance of measuring them. But it is my opinion, which need not be elaborated further here, that it is advisable to confine national income to the flow of commodities and services; and to prevent confusion by excluding from it all elements of capital appreciation and depreciation as a subject for separate study and measurement.

Some comments are, however, in order with reference to the success of the adjustment suggested in eliminating all the entrepreneurial gains and losses arising from the lags that Dr. Marget discussed. The time span between the date of inventory purchase and of its sale in the form of a finished product consists of two periods: (a) the period of inventory holding, elapsing between purchase and the beginning of the process of consumption; (b) the period of production, extending from the moment the inventory enters the productive process to the moment it is sold. The adjustment suggested would fully eliminate gains and losses arising from price changes extending over both periods only if: first, p_m rather than p_2 is used in the adjustment; second, p_m is taken to designate the market price of the inventories consumed at the

point where this process of consumption finally matures, i.e., at the point of sale. But actually the adjustment as applied in both Mr. Fabricant's paper and my own uses p_3 and not p_m .

As a matter of theoretical necessity, it is quite obvious that p_m rather than p_3 should be used in the adjustment; and that p_m should be understood in the specific meaning given to it above. For once a decision is made that national income should exclude all elements of revaluation of assets, a complete elimination of such elements in connection with inventories is realized only under the conditions stated.

But in actual practice it is impossible to obtain p_m , since cost of materials is usually reported in accounting records as indicated in equation (4) above.¹ We are therefore forced to use p_3 rather than p_m in the adjustment. This means that while, theoretically, we would wish to exclude the type of entrepreneurial gains and losses that Dr. Marget emphasizes, the practical exigencies of the situation force us to leave them in. The practicable adjustment succeeds in eliminating largely those gains and losses which arise from holding inventories that have not yet reached the point at which p_m becomes a reality.

(4) With reference to the difference between p_3 and p_m , and to the statement in my paper suggesting that this difference is likely to be small as compared with that between p_m and p_1 or p_2 , I would like to enter a qualification suggested by Milton Friedman. In a letter discussing this point, Mr. Friedman writes:

"I was troubled by your assumption that equating p_m to p_3 would make little difference. If this is not done, then to your equation (5) must be added the term $q_p(p_3 - p_m)$. Now the difference between p_3 and p_m will tend to be considerably smaller than the difference between p_m and p_1 or p_2 . But will not q_p tend to be considerably larger than q_{bi} or q_{ei} ? If, as you say, the average age of inventories is considerably less than six months, then the inventory will be considerably less than the quantity purchased during the year."

¹ This is subject to exceptions, which will become especially important if the apparent tendencies among the more advanced members of the accounting profession to change the treatment of inventories gain in extent. On the bearing of these changes on the present topic, see below.

With this comment I am in complete agreement; and now that it has been indicated above that p_m should refer to market prices current at the very end of the process of consumption, the possibility of a disparity between p_s and p_m is greater than it would have been were p_m to refer to a point of time closer to the date of purchase. But as indicated above, the use of p_s rather than of p_m is forced by practical exigencies.²

This discussion may be concluded by an indication that the recent developments in accounting practice point to an increasing dissatisfaction of accountants and of the business community with the practice of valuing inventories at changing book valuation; and constitute attempts to modify inventory valuation and income computation in a direction approaching that discussed above. Of the three methods that have developed recently in accounting practice, one is identical with the adjustment indicated: the procedure designated as the 'last-in, first-out' method (as contrasted with the traditional 'first-in, first-out' method) in which inventory entering the finished product is calculated on the basis of current market prices rather than on the basis of original cost or other book values. The other two methods also tend in the same direction. The base or normal-stock method involves the setting of a given commodity volume of inventories as the base or normal stock, to be treated as indispensable equipment and kept intact at fixed prices. The result is that when prices rise, a larger dollar volume is drawn out of current income to cover the cost of the basic inventory, and net current income is reduced accordingly; and corresponding changes occur during periods of declining prices. Thus, the enterprise does not count in its net income the gains and losses on its base or normal inventory accruing from price rises or declines; although gains and losses sustained on excesses or deficiencies over the base inventory are included. The third method, the reserve procedure, calls for a

² However, the use of p_s instead of p_m has the pragmatic value that it assures the identity of the national income total obtained by adding income payments to individuals and net savings of enterprises with the total obtained by adding consumers' outlay on finished consumers' goods with net capital formation. The use of p_m would disturb this identity. For a more detailed discussion of the comparability of the national income totals obtained by these two methods, and the effect on this comparability of the adjustment for changes in inventory valuations, see the author's *National Income and Capital Formation, 1919-1935, A Preliminary Report*, Appendix D (National Bureau of Economic Research, 1937).

systematic, periodic reservation, in years of rising prices, of an amount out of net income to cover increased cost of inventory holding; these reserves being turned back into net income in periods of declining prices. Several important business concerns have adopted one or the other of these new procedures.³ These developments impress one as an effort by business firms and the accounting profession to look behind the monetary form to the more lasting real processes—and it is for this reason that they result in a closer agreement between accounting and business procedures and the basic concept of national income.

³ For an interesting review see Ross G. Walker, 'The Base-Stock Principle in Income Accounting', *Harvard Business Review*, Vol. XI, no. 1 (Autumn 1936), pp. 76-94.