

NOTES ON THE DEFLATION OF NATIONAL ACCOUNTS

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WHEN our friend, Roy Geary, suggested that I might devote my attention at this conference to some critical comments on the ideas that members of the Association had been developing and discussing on the deflation of national accounts, I hesitated. I was not at all sure that I would disagree with anything that had been said, or know why if I did. But one can always find a few points on which it seems worthwhile to comment, and others, perhaps deserving of thought, to draw into the discussion. I proceed to do so with the warning that the word 'notes' in the title above is to be taken literally.

1. There is some danger, I suppose, that abstract discussions of the form and detail of national accounts, and of their deflation, will give as much attention to items of small or even negligible importance as to items of major importance.

Thus, in preparing a formal list of the immediate sources of increase in the total of real consumption and increment in real net worth of a nation (or other economic unit) we specialists would note that this total is greater not only when (1) real income has risen, but also when (2) increase in real net worth for reasons not associated with saving, is greater than before or (3) larger gifts have, on net balance, been received from foreigners (or other 'outsiders'). Real income, we would then go on to say, may rise because (1a) more real resources are put into production, or (1b) more real net output is obtained per unit of real resources, or – also – because (1c) prices paid for the things purchased from foreigners decline in relation to prices received in sales of output to foreigners. And real net worth may increase, apart from saving, because (2a) upward 'capital adjustments' have taken place in real assets, or downward adjustments in real liabilities, or (2b) the relative price of foreign assets has increased or the relative price of liabilities to foreigners has decreased.

In principle, if we are to know whether and by how much a nation is better or worse off in the respect considered here, and if we are to obtain some of the figures necessary (though not

sufficient) to explain why, we need estimates of each of the changes mentioned.

In practice, however, some of the items in the catalogue are usually unimportant. This is very likely true of the capital adjustments (item 2b), such as those that record the uncovering of valuable mineral resources or the destruction of cities, to recall the sort of example of which Professor Pigou wrote. It is also likely that gifts to (or from) nations (item 3) are not substantial in most cases. Even the gain or loss from changes in the terms of trade (item 1c) has not usually been large in the United States, and this may well be true of some other countries as well. In 'normal' times, further, we may expect revaluations of foreign assets and liabilities to be of small importance.

On the other hand, it is well to keep such items in mind in case they become important, as they surely do on occasion, even for nations and even for periods as short as a year. The regularly published national accounts should not be cluttered up with many small items merely for the sake of formal completeness, but we need to know whether the items are small before we consolidate them with others or omit them entirely. When they are important they must be recorded in the national accounts, whether expressed in current or in constant prices, in identifiable form, if changes in income and wealth are to be properly measured and interpreted. The solution, sometimes suggested, of a full statement only at longer than annual intervals seems eminently sensible.

In describing changes in the economic well-being of groups smaller than nations, there is a higher probability that the items mentioned are important, over the short as well as the long term. I am rather doubtful, however, that the national accounts (as they are ordinarily conceived) are the place to include all the items relevant to the changing internal distribution of income. The special tables useful for this purpose need, of course, to be reconciled with the national accounts and differences clearly brought out, but there is a limit to what we should ask the national accounts to bear – especially if, as appears to be the trend, we try to broaden them to include balance sheets, inter-industry tables, and flow-of-funds accounts. (See, in this connection, the report of the Goldsmith Committee, which made some far-reaching proposals with respect to the United States accounts.)

2. A question that arises in measuring 'employee input' – and other inputs as well – in constant prices, is the degree of detail with which to deal. Sometimes there is nothing to do but use the total of all man-hours worked. But more often, I am sure, different categories of labour can be distinguished. When this is possible, it is desirable to use the information and calculate a weighted man-hours series, in which a man-hour paid at a high wage or salary rate is counted as more than a man-hour paid at a low rate. The derived 'employee increment' will be correspondingly different, as will be also the whole productivity increment. The difference between the unweighted man-hours series – the simple count of man-hours – and the weighted man-hours series has in fact been of some importance in the United States even over periods of a few years, as has been demonstrated with John Kendrick's calculations in a recent National Bureau publication on *Basic Facts on Productivity Change* (Occasional Paper 63).

More is involved than inter-industry differences in hourly earnings. Labour has changed its character and composition also within industries, for example, through a general improvement in the level of education, and eventually it may be possible to take these into account. When they are not, as is presumably the usual case, the measure of 'employee increment' covers the return to increased investment in education, among other things, as well as the rise in the real wages earned in a given type of work. Presentation of such a deficient measure, even when qualified, may lead to misunderstanding and misinterpretation of the facts on the distribution of national income as well as on the 'productivity increment'.

3. Neither Geary nor Burge were able to measure capital input and thus derive a 'property increment' for the countries they dealt with, but I am glad to see a note of optimism creeping into Geary's view of the possibility.

True, the measurement of capital input is not easy. For domestic capital, the problems caused by the variety of contractual arrangements with respect to property income – fixed payments, variable payments, and mixtures of the two – can be avoided, at least at this stage of development of constant-price accounts, by dealing with capital input as a whole. But there are plenty of other difficulties. Determination of the 'physical volume' of the services of capital involves all kinds of well-known problems – concerning quality changes, depreciation

and obsolescence, depletion and other items of capital consumption, and unused capacity, to mention a few – to the solution of which present answers contain arbitrary elements.

But a useful calculation can sometimes be offered, as has been done for the United States and other countries at meetings of the Association, and is done for additional countries at the present conference. Apart from short-term fluctuations, the deflated net book value of tangible assets provides a reasonably adequate approximation, I think, to an index of the 'physical volume' of services rendered by tangible capital. This measure is better, at any rate, than the depreciation charges, horsepower of equipment, fuel and other figures to which recourse has sometimes been had.

I find it more palatable, also, to use net rather than gross capital assets, even when the 'one-horse shay' may be supposed to render the same service with the same operating expenses to the day it collapses. Over a long period it makes a difference, as Kuznets' estimates for the United States have indicated. Use of gross rather than net capital assets amounts to equating the value of long-lived equipment of a given capacity to that of short-lived equipment of the same capacity. What is really involved in the proposal to use gross assets is, I think, a criticism of the straight-line depreciation formula, which is a matter handled better in other ways.

In the case of an economy in which capital invested abroad is substantial, the problem raised by contractual arrangements – the terms on which the investment is made – cannot be side-stepped if we are to measure capital input in constant prices. If the investment is 'direct', there is no reason why the quantity of input of capital abroad should not be determined in the same way as the input of domestic capital goods, using the appropriate foreign price series to deflate the value of the asset.

If the foreign assets consist of securities, there are two possibilities. In one, a problem of capital adjustment may enter. To illustrate the line of approach, it may be sufficient to say that if foreign price levels rise, or exchange rates alter, the volume of services of capital invested in foreign fixed-income securities must be assumed to decline, not because the real price of the services declines but because the quantity of capital declines as a result of downward capital adjustments. With appropriate changes, a similar procedure may be used for fixed-income debt

to foreigners. On the other hand, if price increases abroad are anticipated, and interest rates are agreed upon accordingly, the appropriate treatment involves an amortization allowance, which is to be deducted from the interest payment. Instead of a periodic capital adjustment, in other words, there is a periodic (but not 'straight-line') amortization charge on current account. In either case, however, real income declines and, along with it, the volume of input of capital invested abroad.

4. Improvement in the terms of foreign trade leads to a 'trading gain', as it is called by Geary and Burge.

This gain may be viewed as consisting of two components. In the U.S. national accounts one component is swallowed up in the consumption, domestic investment, or government purchases items. The sum of these three items is larger than it would be if there were no trading gain, to the extent that improvement in the terms of trade is taken in the form of bigger imports. The other component appears in the deflated net foreign investment item – provided it is deflated directly.

But, in fact, the Department of Commerce deflates the net foreign balance by the double-deflation method, in which exports and imports of goods and services, including factor returns, are deflated separately, with the real balance derived from the difference between the two deflated series. As a result, the Department of Commerce's deflated net foreign investment item includes a component that is equal and of opposite sign to the component included in the rest of the GNP account. The application of the double-deflation method to the net foreign balance takes the trading gain out of the U.S. accounts.¹

¹ Perhaps the following example will make clearer what I am trying to say. Assume an economy with a single export, the entire production of which is exported in period 0, to pay for an identical dollar value of imports. Assume, also, that the price of the export rises by 50 per cent, but that no change occurs in the price of imports. Now compare the three alternative situations in period 1: 1a, in which the entire production continues to go abroad, financing foreign investment; 1b, in which only enough production is exported to pay for a constant volume of imports, with the balance consumed domestically; and 1c, in which half of the gain is used to finance foreign investment and the other half finances higher consumption. In current prices, we have:

	0	1a	1b	1c
Production	100	150	150	150
Consumption	0	0	50	25
Exports	100	150	100	125
Imports	100	100	100	100
Foreign investment	0	50	0	25

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While I have used the export price index in the footnoted example, there is, of course, a question concerning the deflator to use in putting the net foreign balance into constant prices. I do not favour the export or the import price index, or any combination of them, whether the net foreign balance is positive or negative. The appropriate deflator seems to me to be the price of the assets acquired – the foreign price if the assets are abroad, the domestic price if they are within the country. This procedure would require breaking up the net foreign balance into its two components, capital exports and capital imports, but it would meet the test of world consolidation as well as the use of export and import prices (as would many other indexes). However, the data problem forces a simpler solution, such as the implicit GCF deflator, even though the solution does not meet the consolidation test.

Some persons may be troubled by certain of the implications of the deflation suggested. Consider the simple example of a product which can be consumed or exported to finance the acquisition of foreign property. Assume the domestic and export prices of the product are identical and that the export price rises in relation to the price of foreign property. If the product is used to acquire foreign property, deflated GNP will be larger than if the product is consumed. But this result is not peculiar to the problem under consideration. It is generally the case that shifting from dearer to cheaper commodities makes a person (or nation) better off.

5. The real income of a nation depends on the volume of resources it puts into production, the product it gets per unit of resources, and the purchasing power of the product in terms of the goods and services finally consumed and invested. In

In constant prices, using the export price to deflate the net foreign balance, we have:

	0	1a	1b	1c
Production	100	100	100	100
Consumption	0	0	33	17
Exports	100	100	67	83
Imports	100	100	100	100
Foreign investment:				
Direct deflation	0	33	0	17
Double deflation	0	0	-33	-17
Trading gain:				
Direct deflation	0	33	33	33
Double deflation	0	0	0	0

The direct deflation procedure yields results invariant to change in the way in which the trading gain is used.

the terminology of Geary and his colleagues, real income equals factor input plus productivity increment plus trading gain.

If we are to understand how real income changes, it is desirable to distinguish between the two increments or gains. We should recognize, however, that a distinction is being made between related, not independent, factors.

There is a functional relation between the productivity increment and the trading gain. Other things constant, we may expect that the bigger is the productivity increment, the smaller is the trading gain. This negative relation does in fact appear in the figures for the United States, when long-term changes in the output per unit of resources of different industries are compared with corresponding changes in relative prices. I would expect the correlation to be of some importance even for small nations, especially those concentrating heavily on the production of a few export commodities and providing a substantial fraction of the total supply entering world trade. When technological and other improvement develops a productivity increment, it tends also to develop a trading 'loss'. The effect of the improvement is the sum of the two, in the absence of other factors impinging on the terms of trade. Since there are such other factors, we do want to keep the productivity gain separate from the trading gain. But in presenting the figures, and in using them for analysis, the relation I have mentioned must be kept in mind. It is especially important to avoid the reckless charges of exploitation, to which misinterpretation of changing terms of trade has sometimes led.

In this connection, perhaps a further comment is warranted. It might be argued that the productivity increment reflects domestic or internal changes, while the trading gain reflects external changes, and the two should on that account be viewed as independent. I would question this argument. I have already indicated that the trading gain reflects internal as well as external changes. It may be said with equal truth that the productivity increment reflects external as well as internal changes. What happens to output per unit of input within a country, region, industry, or firm reflects, in part, changes in the knowledge, materials, equipment, and services that the country or other unit obtains from the outside, and the scale of markets generated by the economy of which it is a part.

6. A related point may be made in connection with the deflation of the value added by an industry.

The double-deflation method for the net foreign balance sometimes leads to a change in the sign of the balance. For examples, compare Tables I-1 and I-2 in the recent official report on *U.S. Income and Output*. This possibility is a major objection to the use of the double-deflation method in transforming the foreign balance.

As has been known for some time, such a reversal of sign is possible also in the application of the double-deflation method in calculating the constant-price net value added by an industry, that is, in getting its real net output. It will tend to occur, for example, when the price of materials rises in relation to the price of the product, and this leads to the economizing of materials by substituting for them the labour and capital used by the industry. If materials constitute a large fraction of the total input in the base period, if the rise in the relative price of the materials is great, and if total productivity – output per unit of all resources – is slow to change, it may in fact occur.

Is this an objection to the use of the double-deflation method in getting at the net output of an industry? It is, if the objective is to determine the change in the industry's purchasing power – that is, to measure the industry's output from its own point of view. If the objective is to determine the industry's contribution to the nation's output the objection does not hold. The appearance of a negative net value added will then signify a disequilibrium situation in the current period and suggest that the industry is obsolescent; or it may indicate that the weight-base price situation was abnormal.

7. The notion of disequilibrium appears also in connection with the interesting suggestion, in the UN paper on *A System of Price and Quantity Indexes for National Accounts*, that in deflating the net foreign balance it may be prudent to choose the deflator that yields the more conservative results. For 'the relative price rise for the goods comprising the export surplus of the country represents only a contingent trading gain, which may not be realized because of subsequent change in export-import price relationships . . .' Accountants have been arguing this sort of book-keeping for generations.

One may think of changes in the terms of trade as falling into three classes. One, like the seasonal, follows a more or less

regular pattern which can be anticipated, and adjustment to it made – not by being conservative in the choice of deflator, but by ‘deseasonalizing’ the result. The second includes irregular changes, like occasional fires, the probability of which is fairly well known and for which allowance is appropriately made by setting up a reserve, credits to which are charged to current operations, and debits are viewed as capital adjustments. The third class includes all other changes.

I suspect that many, if not most of the changes in terms of trade and other items of interest in the present connection fall in the third category. Changes associated with business cycles, for example, are not regular enough to be counted in the first class, nor lend themselves to the treatment appropriate to the second. If this is true, is it not better to choose the most appropriate deflator, whether or not it is conservative? It is well to be conservative, but not to pursue the policy by what some might feel was doctoring the accounts. The ‘facts’ should be set forth with such notes, interpretations, and qualifications added as are desirable.

In this connection, mention may be made of the inadequacies of the straight-line or similar method of depreciating capital assets, to which Stuvell has recently drawn attention. The appropriate procedure, it seems to me, is to replace this method with one that allows for changes in the rate of wear and tear. An output method of allocating depreciation, rather than capital adjustments for abnormal or subnormal depreciation rates, is what is needed.

8. Also related to the question of disequilibrium is the matter of inter-industry shifts, as Kuznets likes to call them, or structural changes, as Geary names them in his paper.

If input is all inclusive, covering all factors of production, and each is measured by a value weighted index, such as I have suggested above, the effect of inter-industry or structural changes will vanish. For in effect, the use of such weights assumes that the unit of quantity of an input is a dollar’s worth in the base period. With all inputs covered, there are no economic branches of lower or higher productivity: all are alike.

This is an assumption that cannot be fully justified, and indeed might be rejected by many who feel that agriculture, for example, is indeed an industry of low productivity.

What, in fact, might cause the average hourly earnings of labour (or rates of return on property) to differ among in-

dustries in the base period? Surely differences in the quality of labour, such as arise from differences in education, innate ability, acquired skill, age, and in some cases sex, play a very significant role. But there are other reasons, as well: difference in the cost of living; the many differences subsumed under the catch-all 'non-economic advantages and disadvantages' (including amortization of investment in education); the possibility – perhaps I should say certainty – that the economy is not in full equilibrium in the base period, so that some portion of the differentials reflect adjustments still under way to changes in demand, technology, etc.; and imperfections in the market, which are not always easy to distinguish from factors causing lags in adjustment. I rather suspect that when agricultural labour is said to be less productive, reference is being made largely to this last factor. But the wage differential can hardly be said to measure it adequately. The question deserves further empirical and theoretical investigation.