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INTRODUCTION

By R. C. Geary

NOBODY doubts the usefulness of certain macro-economic entities at constant prices. Many countries have regular (monthly, quarterly, annual) indexes of industrial and agricultural output, imports and exports. As far as single time series analysis is concerned, these indexes are more significant than indexes based on the corresponding current values, since the latter are affected by the vagaries of prices. Or perhaps a better way of putting it is that, possessing both price and quantum series, one is in a position to *explain* changes in value by changes in price and volume when price *or* quantum indexes are available.

Many countries also have fully articulated systems of national accounts at current prices. These are designed to define clearly and unambiguously the macro-economic items which they contain, to show how the economic system works in displaying the intersectoral flows, using the balancing function (the accounting identities) to ensure internal consistency. The problem arises: is a fully articulated set of balancing accounts at constant prices a valid concept? And, if so, what are the practical difficulties?

A highly consolidated system of five accounts at current prices is as follows:

1. Domestic product account:	$P = C + I + E - M$
2. National income account:	$Y = P$
3. External account:	$E - M = N$
4. Consumers' account:	$C + S = Y$
5. Capital account:	$I + N = S$

For simplicity, transfers, indirect taxation, factor incomes from abroad had been ignored, i.e. assumed nil. The symbolism requires little explanation: consumption C includes government as well as households, S is saving, I is investment while E and M are exports and imports respectively. The concept is gross, i.e. no account is taken of capital consumption. Clearly the system is articulated, each of the eight symbols appearing twice, on different sides of the identities.

If the constant price series is conceivable it should bear a close formal resemblance to the current price series, if only because in the base year the current price and constant price systems must be identical. Here is a constant price series fulfilling this condition:

1. Domestic product account: $P' = C' + I' + E' - M'$
2. National income account: $Y' = P' + T'$
3. External account: $E' - M' + T' = N'$
4. Consumers' account: $C' + S' = Y'$
5. Capital account: $I' + N' = S'$

The primed letters signify the constant-price values of the earlier current price system, so that $C' = C/p_C$, $I' = I/p_I$, etc., where the p's are the appropriate price indexes. The later system will be observed to be articulated also. Incidentally, the system seems to meet R. Stone's objection that 'it is impossible to find a unique set of deflated values of the non-commodity transactions in the accounting system such that the accounts continue to balance in real terms'.[1] Of course, the end is achieved by a high degree of consolidation, by ignoring certain items, and by accepting particular definitions of items like savings (S) which are not uniquely deflatable. Both Burge and Geary indicate in the papers which follow how additional items could be introduced and how items deflated in more than one way can be treated, by the expedient of 'increments'.

The constant-price system of five relations will be seen to consist of four only, since any one is redundant, i.e. there are four 'equations' between the nine variables involved, the original eight and T', the external trading gain, presently to be explained. Four of these variables can be deflated in one way only: C', I', E', and M' have their customary meaning. Now N, the excess of imports over exports, or net investment abroad, may arise purely through differential import and export price trends, i.e. though $E - M = N$ is, e.g., positive, $E' - M'$ may be negative. Accordingly, most workers in this field reject the constant-price account

$$E' - M' = N',$$

as possibly involving a negative price deflator $p_N = N/N'$ for the surplus N. The view taken is that N should be deflated separately

[1] *Quantity and Price Indexes of National Accounts*, Organization for European Economic Co-operation, Paris, 1956.

and T', the trading gain, introduced as a balancing item in account 3. Then, to complete the articulation, T' is added to account 2, giving real national income something of an economic welfare connotation.

Unfortunately there is no consensus about the deflation of N. J. L. Nicholson[1] originated the idea that the deflator should be the import price index and, at Portoroz, he argued cogently in favour of this concept, which was later adopted by the Organization for European Co-operation.[2] G. Stuvel[3] has lately favoured the implicit gross domestic product price index (i.e. P/P') as the deflator of N. In paper No 4 in this book S. Fabricant, having regard to the use of N, would like appropriate capital formation price indexes. Burge calculated an export price index in the contrary case: happily for Geary (who is inclined to agree with Burge) in *his* calculations, he had not to choose between Nicholson and Burge, since, in the material period, Ireland always had an import surplus (i.e. N negative) to be deflated by an import price index on either concept!

However, the consensus is that N should be deflated by some positive price index and that 3 should represent the form of the account. According to the viewpoint taken in the present introduction, T' should involve a formula of calculation (in terms of E, M, and their price indexes) which would vanish when p_E and p_M are equal. On this there is no general agreement. Of course T' is zero in the base year. Then with the five variables C', I', E', M', and N' known, the remaining four variables P', Y', T', and S' are regarded as *defined* by the four equations. Of the five constant price accounts indicated, those numbered 1 and 3 are generally accepted, though 3 is subject to the qualifications indicated above. Account 1, an elaborated version of which is published for many countries in the *United Nations Yearbook of National Accounts*, will be seen to be the aggregation, at the national level, of the double-deflation system of estimation of added value at constant prices, invariant for the unit of aggregation, e.g. whether individual establishment, industry, etc.

It is not suggested that the constant-price series of accounts

[1] Attribution by A. L. Bowley in *Studies in National Income 1924–1938*, 1944.

[2] *Statistics of National Product and Expenditure*, No. 2, 1938 and 1947–55, 1957.

[3] 'Asset Revaluation', *Economic Journal*, June 1959.

displayed above is the only one conceivable if the concept be regarded as valid. G. Stuvel[1] has another. Those who do accept the concept see in it a useful definitional function, especially important when one considers the practical difficulty of constructing suitable price deflators for items like savings considered in isolation, and some researchers have found it necessary to make such estimates for their economic growth series. At Portoroz there was in fact an interesting discussion on this point in the Economic Growth session. Protagonists who favoured, as an alternative, savings as a percentage of GNP might have recognized that the alternative also involved a price-deflation theory. At any rate, the fully articulated system imparts consistency to the definitions of the constant-price items: whether it is the right kind of consistency remains to be seen.

None of the papers which follow address themselves specifically to the formidable theoretical difficulties of constructing suitable price deflators for items conceptually uniquely deflatable; difficulties which are not by-passed by using the direct method of literally valuing constituent quanta in each flow at base-year prices. All practitioners are familiar with these difficulties, the quality problem, the estimation of government and other services, and the like. Disappointingly little progress has been made in recent years with the solution of this congeries of problems. However, the problems raised in the papers seem possible of isolation, and discussion should be revealing.

At the Portoroz conference W. W. Flexner submitted an interesting paper on 'An Analysis of the Nature of Aggregates at Constant Prices', not reproduced here because it has been published elsewhere.[2] His novel viewpoint involves the revaluation of current quantum output at base year constituents of materials and factor input per quantum unit of base year output. Aggregation over many industries (to give macro-economic flows) of these various constituents (e.g. of employee compensation) yield estimated constant-price values for the various constituents, which will differ from the conventional constant-price values (e.g. labour hours per base year wages per hour) unless there has been no structural change between base and current year. The difference Flexner terms the 'deflation defect', which

[1] *Op. cit.*

[2] *The Review of Economics and Statistics*, published by Harvard University, Vol. XLI, No. 4, November 1959.

includes as a special case what Geary terms the 'productivity increment'.

A Footnote on the Trading Gain

In the discussion at Portoroz, A. L. Gaathon advanced an interesting objection to the method of external surplus deflation advocated by Burge and Geary—call it the B-system. Gaathon envisaged two countries A and B trading with a third (perhaps the rest of the world) but not with one another. His illustration was on the following lines:

	Current values		Price indexes		Trading gain
	Exports	Imports	Exports	Imports	(B-system)
Country A . .	1,000	500	2	1	250
Country B . .	500	1,000	2	1	250

The total trading gain for the two countries combined (with current exports = 1,500 = current imports and price indexes still 2 and 1 for exports and imports respectively) would be 750 instead of 500 (= 250 + 250 in the last column of the table). The sum of the trading gain for the countries A and B separately is not equal to the trading gain of 'country' A + B: this is the objection.

Incidentally the B-system trading gain, as is easily seen, can be established directly as

$$\left\{\begin{matrix}\text{Smaller of current}\\ \text{exports or imports}\end{matrix}\right\} \times \left(\frac{1}{p_M} - \frac{1}{p_E}\right)$$

The Nicholson principle (call it the N-system), on the other hand, gives as trading gain

$$(\text{Current exports}) \times \left(\frac{1}{p_M} - \frac{1}{p_E}\right),$$

so that the N-system is not open to the Gaathon objection. If, however, there were only two trading partners say A and R (rest of world) the B-system would give a trading gain for both combined as nil, which seems reasonable, whereas the N-system would not.

It may be well at this stage to set down certain algebraic conditions which seem desirable in the formula for the trading gain:

(1) The trading gain should be nil when export and import price indexes are equal.

(2) In the two-country case (or one country and rest of world) the sum of the trading gains should be nil.

(3) The Gaathon point: two countries on amalgamation should have a trading gain with the rest of world equal to the sum of the trading gain of each country.

(4) The surplus of exports over imports, if positive, should be regarded as part of exports or, if negative, part of imports.

Let us consider surplus-deflators in two classes:

(i) those which depend in some linear way on import and export price index numbers;

(ii) those which do not.

Those in class (ii) do not satisfy condition (1) to which the writer attaches much importance; those in class (i) do. The B-system satisfies (1), (2), and (4) but not (3). The N-system satisfies (1) and (3) but not (2) and (4). Instead of using the B-system one might use as a deflator of the surplus

$$P = \frac{1}{2}\left(p_E + p_M\right)$$

which would imply a trading gain of

$$T'' = (E' + M')\left(\frac{p_E - p_M}{p_E + p_M}\right)$$

This deflator would satisfy conditions (1), (2), and (3) but not (4). Incidentally, T'' for A in the foregoing example is 1,000/3 and for B it is 1,250/3. For the two countries combined it is 2,250/3, (= 1,000/3 + 1,250/3) which meets the Gaathon objection.

Of course, those who favour deflators in class (ii) above can reasonably object that the four conditions specified are loaded against them. Perhaps it would be well not to exaggerate the practical importance of all these differences of concept. Translated into actual figures they might not give very different results for most countries. This remains to be seen.

In correspondence M. D. McCarthy made the interesting point (which the writer accepts) that, in the interest of consistent aggregation using the B-system, surpluses and trading gains should be established separately for each pair of trading partners.