THE TREATMENT OF STOCK APPRECIATION IN THE MEASUREMENT OF NATIONAL INCOME*

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In the latest official national income publication the Australian Commonwealth Statistician has altered the treatment of stock appreciation in the measurement of national income at current prices. Previously, stock appreciation had been included in both national expenditure and national product. Now the amount of stock appreciation (the difference between the change in the value of stocks and the value of the change in stocks) has been deducted from investment in stocks, and consequently national expenditure, and from trading incomes, and consequently national income. The former procedure (including stock appreciation in national expenditure and national product) had been advocated by the present author, when editor of the first official national income publications issued by the Commonwealth Statistician. In this note an attempt is made to set out the reasons for this view. A new approach is also suggested for handling the item of stock appreciation in national income accounts, which does not rest on the assumption that stock appreciation is a capital gain which should be excluded from trading incomes and national product.

INTRODUCTION

The exclusion of stock appreciation from national product and expenditure at current prices is recommended by international statistical offices and this recommendation is followed, as far as is known, by all countries compiling national accounting data. The argument for deducting stock appreciation from income rests on the notion that stock appreciation represents a capital gain and should therefore be excluded from income. Even if this view of stock appreciation were correct, the implications would appear to be unfortunate. The principal use of estimates of national income today (this is certainly true for quarterly estimates) is in forecasting and analysis of changes in economic activity and for this purpose capital gains and losses should be included insofar as they are relevant for explaining behaviour. There is no theoretical objection to the inclusion of capital gains or losses in income—the economic definition of income is simply the maximum amount which can be consumed in a period without reducing net worth—and there is some empirical evidence that capital gains or losses do influence behaviour.[1] Thus even if stock appreciation did represent an addition to income in the form of a capital gain, there seems no clear theoretical or practical case for excluding it from income in the measurement of business income or

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[1]See, for example, the Australian Reserve Bank's study of the determinants of personal consumption expenditure, where national wealth is found to be a highly significant variable in explaining changes in personal consumption expenditure, *A Model of the Australian Economy*, Reserve Bank of Australia, Occasional Paper No. 3A, January 1970, p. 8. In a study of business behaviour during times of abnormal price inflation and stock appreciation (1945–46 to 1951–52), Mathews and Grant concluded that "It is clear that the action taken by Australian companies to increase their undistributed profits . . . fell short of the action theoretically required to counteract the accounting effects of inflation." *Inflation and Company Finance*, Law Book Company of Australia, 1952, p. 159.

national income where these totals are used for forecasting or explaining past behaviour.[2]

However, there is a case for valuing all items of national expenditure at a consistent level of prices—for example at the average of current prices of a particular period—and this requires the elimination of stock appreciation from the recorded change in the book value of stocks. This raises a technical difficulty since unless an equivalent addition is made to some other item of income or an equivalent deduction from expenditure the totals of national income estimated as the sums of income and expenditure will differ. This question is taken up in Part 2 of this paper, where it is argued that the problem is one of valuing items of income and expenditure consistently. Unfortunately, this leads to special problems of statistical estimation.

Stock Appreciation and Capital Gains

The justification for identifying stock appreciation with capital gains is based on three assumptions. First, that stock appreciation arises from the methods used by accountants to charge materials used against sales. The general method of charging materials to sales is the first-in first-out procedure which means that stocks shown in balance sheets will generally be valued at the latest cost of the goods held in stock.[3] Second, that book profits are increased by the extent of stock appreciation. Third, as a result, profits include a capital gain equal to the amount of stock appreciation. Because of the importance of the last two assumptions, it is worth quoting the arguments in full. *National Accounting Statistics, Sources and Methods*, states (p. 18):

> The effect of normal accounting methods is that in times of rising prices the money value of stocks increases by more than the physical volume valued at the prices of the year, and book profits thus incorporate an amount which from the present point of view must be regarded as a capital gain, not as income. The difference is described as *stock appreciation.*

A System of National Accounts (p. 111) comments similarly:

> The principles of stock valuation used in business accounting vary; and are often different from those required for the national accounts. While additions to, and withdrawals from, stocks which have been purchased are generally valued at purchasers' values, additions and withdrawals which have been processed internally are often valued at direct costs, explicit costs, or these costs plus a fixed margin, instead of at producers' values. Prices in respect of withdrawals may be assigned at cost on the basis of first-in, first-out; last-in, first-out; average over some period, etc., or if lower, market values

[2]As argued in the second part of this paper, however, it seems more reasonable in fact to regard stock appreciation as a capital loss, rather than a capital gain. The implications for the measurement of business income are, however, the same.

[3]In times of falling prices, the valuation of goods held in stock may vary from these valuations where stocks are valued at the lower of cost or market. See, for example, *National Accounting Statistics, Sources and Methods*, London, Her Majesty's Stationery Office, 1968, pp. 391–392, and *A System of National Accounts*, United Nations, New York, 1968, p. 111.

may be utilized in the case of purchased goods. Thus, the accounts of business units in respect of stocks will probably neither reflect the mode of valuation nor measure the physical change in stocks which are wanted for the national accounts. The values on these accounts will reflect changes in the unit prices, in addition to changes in the quantities, of commodities; and will consequently include capital gains or losses arising from fluctuations in prices. Moreover, a limited degree of comparability will exist in the book values which business units give in respect of stocks.

Neither of these statements sets out clearly the way in which business profits are inflated by the amount of stock appreciation. However, since stock appreciation results from the method used for charging the cost of goods used to sales,[4] the assumption must be that the inflation of profits arises similarly from the method used for charging the cost of goods used to sales. Somehow or other, it is further implied, the method for charging goods used to sales must influence stock appreciation and profits by the same amount.

It is obvious, however, that this assumption is not valid. Profits are based on pricing policies adopted which, following general practice, may be assumed to be some variant of mark-up on costs.[5] Thus, the effect on profits of the different methods used of charging the costs of goods sold is measured by the difference in recorded costs in the alternative situations multiplied by the mark-up factor (when calculated as a percentage of cost).[6] It is apparent that this charge has no relationship to the amount of stock appreciation. In fact, if profits are calculated as a percentage mark-up on cost, profits will be greater the lower the amount of stock appreciation, given any particular increase in prices of materials purchased. In the extreme case, if the LIFO method is used to charge the cost of goods used against profit, stock appreciation will be nil, while profits will be higher (by the mark-up element) than where the method of costing goods sold is based on the FIFO principle (implying positive stock appreciation).[7,8]

The treatment of stock appreciation in the Australian national income accounts as it affects the measurement of business income was discussed[9] by

[4]Except, perhaps, in times of falling prices.

[5]This may not, of course, be true. However, it is an assumption often made by economists, and there is some theoretical evidence that this is the case. See, for example, the conclusions reached by Mathews and Grant, discussed later in the text.

[6]A detailed account of the effect on profit of different methods used to charge the cost of goods sold to sales is in Alan Hall, *Australian Company Finance*, Department of Economics, A.N.U., 1956, p. 56. Alan Hall's explanation is given in a note at the end of this paper. I am grateful to Alan Hall and the A.N.U. Press for permission to reproduce this note.

[7]Some further implication of the use of FIFO and LIFO are discussed in A. D. Brownlie, "Valuation of Stock Changes", *The Economic Record*, August 1959, p. 250.

[8]It should, in principle, be possible to test the relationship between stock appreciation and the level of profits by regression analysis. This was, in fact, attempted using both British and Australian data of stock appreciation and profits, with inconclusive results. The difficulty in this approach is that the available figures of stock appreciation are highly aggregated and at this level of aggregation the relationship is likely to be distorted as a result of differences in the ratio of stock appreciation to profits for individual firms and industries (as a result of different stock-output ratios), combined with likely variations in rate of change in profits of individual firms and industries, without allowing for stock appreciation.

[9]"Depreciation and Stock Appreciation Adjustments in the National Income Accounts", *The Economic Record*, April 1959, p.105; and *Inflation and Company Finance*, p. 159.

Mathews and Grant in two studies in the 1950s. In an article which presented estimates of stock appreciation, it was argued that these amounts should be deducted from national income. The argument is based on the assumption that all items of income and expenditure should be valued at a consistent set of prices:

> Obviously differences in the prices used to value different items tend to distort the results and make them less meaningful for most of the purposes for which the national income estimates are used. It is desirable, therefore, to convert all items in the estimates to a consistent basis of valuation, and this means valuing all items in terms of prices of the current period.[10]

This involves deducting "stock appreciation adjustments from recorded business profits in order to obtain estimates of income in terms of current prices, a concept which we describe as current income." They further comment that "paper figures for business profits do not reflect accurately the current incomes of business [and] it follows that the former should not be used in analysing the distribution of the national income between wages and business incomes."[11]

In effect, Mathews and Grant appear to be arguing that profits should be sufficient to cover any additional cost necessary to replace the value of stocks due to rising prices. To the extent that they are not, business savings will be deficient and a true measure of profit is obtained by deducting stock appreciation from actual business profits. They reach the same conclusion as the U.N. and other national income statistics, but for different reasons. To the U.N. stock appreciation should be deducted, since it represents a capital gain which should be excluded from income, while Mathews and Grant consider it to be a business loss to be offset against actual profit.

Mathews and Grant suggest, in *Depreciation and Stock Appreciation Adjustments in the National Income Accounts*, that the stock appreciation adjustment is necessary in order to value all items at "a consistent basis of valuation". Since the adjustment is proposed to profits, it would appear that the inconsistency lies in the valuation of profits. However, the source or nature of this inconsistency in the valuation of profits is not clear. It appears to derive from the fact that historical rather than replacement cost is generally the method used to value the cost of goods sold against sales. Adjustment from an historical to a replacement cost basis would not, however, affect profits by the amount of stock appreciation. This point is, in fact, noted in *Inflation and Company Finance*: "Accounting profits under historical-cost pricing are roughly equivalent, in regard both to size and rate of change, to current income under replacement-cost pricing."[12] The adoption of replacement-cost pricing, however, would largely eliminate stock appreciation. In other words, if business firms charged the cost of goods sold at replacement prices, the change in stocks shown in balance sheets would not include stock appreciation but profits would be much the same as under historical cost pricing. There seems no justification, therefore, for arguing that the use of historical, rather than replacement, cost pricing leads to an inconsistent basis of valuation of profits.

[10]"Depreciation and Stock Appreciation Adjustments . . . , " p. 106.
[11]*Ibid.*, p. 117.
[12]Page 163.

What does happen, of course, is that if historical, rather than replacement, cost pricing is adopted, the real value of assets is diminished in times of rising prices. On the basis of an examination of the financial position of companies between 1945–46 and 1952–53 Mathews and Grant conclude that "The rise in prices meant . . . that the money capital of companies was eroded, in the sense that it could no longer finance the same volume of physical assets." This seems to be the real justification for deducting stock appreciation from reported figures of business profit—it measures the extent to which the net worth, in *real terms*, is eroded as a result of the combination of rising prices and historical cost pricing. In other words, Mathews and Grant propose that business income should take into account not only actual profits but also changes in the values of assets held by businesses. But while this may conform to the economists' concept of income, it is not the basis on which income is usually measured in the national income accounts. In national accounting, incomes (whether of companies, other businesses or of wage and salary earners) generally cover only incomes earned from current productive activities—changes in capital items as a result of revaluations are not included in the measurement of income or total national income.

But even if incomes were to be defined on the broader basis so as to include changes in values of assets, this would still not justify the deduction of stock appreciation from national income. The deduction from business income would be balanced by an equivalent adjustment to other incomes, reflecting the fact that (real) incomes are higher because of the lag between the passing on of higher costs as prices of output. This is explained by Mathews and Grant: "In a period of inflation, historical-cost accounting and historical-cost pricing imply a shift in real incomes from companies to consumers, and the substitution at such time of current-cost accounting and replacement-cost pricing merely restores the pre-inflation pattern."[13] Hence the decline in real income of businesses would be matched by an increase in real income of consumers, when businesses charge goods against the cost of sales at historical prices rather than at replacement prices.

Consistent Valuation of National Income and Expenditure

The problem still remains, however, that if profits are to be measured as shown in accounting records and items of national expenditure are to be valued at a consistent level of prices, the two totals of national income and national expenditure will differ by the amount of stock appreciation. The difficulty arises from the fact that current cost of final output is not consistent with current costs of production when prices are rising, as a result of the delay, measured by the period of stock turnover, in passing on the increases in costs. Thus consistent valuation of items of national income and expenditure involves the revaluation of expenditure items to those prices which are consistent with current costs of production. Alternatively, the adjustment could be made to income items. The adjustment of expenditure or income items to eliminate stock appreciation would involve, firstly, estimating the amounts of stock appreciation in each industry and then tracing through these amounts to subsequent or preceding transactions

[13] *Inflation and Company Finance*, p. 164.

to the stage of final expenditure or items of income. This could be done using the matrix of transactions shown in an input-output table, but would be difficult to do each year. Possibly, however, for practical purposes a *pro rata* adjustment determined from estimates made in a single year using input–output data could then be applied to expenditure or income items in other years.

While such an adjustment would lead to consistent valuation of items of incomes and expenditure, it would lead to an imbalance in the social accounting tables. Consider, for example, the case where expenditure items are increased in value by the amount of stock appreciation. The personal capital account would be out of balance by the amount by which personal consumption expenditure was increased by revaluing the item of expenditure to current replacement cost (i.e., the amount of stock appreciation attributable to consumption expenditure). At the same time, the balance of the business capital account would be upset by the deduction of stock appreciation from the change in the book value of stocks without, at the same time, making a deduction from business profit. It is suggested that the imbalance in these accounts could be eliminated by a capital item, representing a revaluation adjustment, which would appear as a deduction from business savings and an addition to personal savings. The adjustments would have the same implication as the adjustment proposed by Mathews and Grant as far as business saving is concerned—it would show the loss of real capital as a result of rising prices and historical cost pricing—and would show the real gain accruing to consumers as a consequence of the delay in passing on increases in cost to final buyers. At the same time income items would properly reflect current income arising from productive activity and items of national income and expenditure would be valued consistently.

Conclusion

In this note it has been argued that stock appreciation should not be deducted from national income, as is proposed by the U.N. We accept the results of research by Mathews and Grant that stock appreciation is not reflected in reported figures of business profit, but we disagree with their contention that stock appreciation should be treated as a negative item of business income and deducted from national income. Instead, we propose that adjustment for stock appreciation in the national income accounts should be made to expenditure items and in sector capital accounts. Where capital accounts are consolidated in one account (as is the practice, for example, in the Australian estimates), the amounts would presumably be shown either in two entries or netted out.

Whether or not the treatment suggested in this paper is feasible, it does seem that the practice adopted by national accounting statisticians in deducting stock appreciation from business income (and national income) leads to figures of business income which are neither a true measure of factor earnings of profits nor a reflection of businessmen's assessments. Since this makes the figures of doubtful value for purposes of economic analysis, including the development of regression equations which explain investment in terms of profit changes and comparisons of trends in shares of factors of production, the procedure seems undesirable. At the least, it would seem not an unreasonable request to ask that

statisticians also give full details (which in many cases are not given) of the stock appreciation adjustments. However, if the argument in this paper is correct, and if it is not feasible to adjust expenditure or income items to reflect consistent valuations, an alternative treatment for stock appreciation would be to show it as a separate item of expenditure, representing an unallocated valuation adjustment. In the absence of separate sector accounts this amount would then simply be transferred to the combined capital account.

NOTE[14]

The Effects of Inflation on Profits

To illustrate the relevant issues, it is sufficient to consider an enterprise buying goods for re-sale and maintaining a constant volume of stocks and sales. The ratio of stocks to sales defines a "turnover period" (e.g., three months) within which stocks and sales are equal. Let C be the average cost price per unit of purchases in one such period, and D the excess of that average over the corresponding average in the previous turnover period. The goods sold in any period are the opening stocks of that period, bought at the average cost price of the previous period, $C-D$. Closing stocks are bought in the current period at the average cost price, C, so that if stocks are valued at cost (F.I.F.O.), stock appreciation for the period is D. Under L.I.F.O. book-keeping, there is no stock appreciation. Let M be a mark-up element in selling price. If pricing is based on replacement cost, M is added to the current cost price, C; if pricing is based on original cost, M is added to the prevailing cost price of the previous period, $C-D$. Gross profit per unit of sales in any period consists of the excess of selling price over the cost price of purchases in the same period *plus* stock appreciation.

Then we have the following comparison of results for any turnover period:

	Replacement Cost Book-keeping and Pricing (L.I.F.O.)	Original Cost Book-keeping and Pricing (F.I.F.O.)
(a) Selling Price	$C + M$	$C - D + M$
(b) Current cost price	C	C
(c) Stock appreciation	—	D
(d) Gross profit: (a) − (b) + (c)	M	M

Hence the gross profit reported under the two systems is eventually the same (except that if M is based on a percentage mark-up it will be slightly smaller when the base to which the percentage is applied is original cost rather than replacement cost). In neither case does inflation produce a spurious increase of "paper profits" (as it would if replacement cost pricing were combined with original cost book-keeping—in which case gross profit would appear as $M+D$).

[14] *Australian Company Finance*, by A. Hall, Department of Economics, Research School of Social Sciences, Australian National University.

But in the F.I.F.O. case the reported profit is kept up only by bringing stock appreciation to account, without making provision for the replacement of stocks at higher cost; this lack of provision is passed on as a "benefit" to consumers in the form of a lower selling price, as the first line of the table shows.

More complicated assumptions, such as allowing for changes in the volume of stocks and sales, or allowing for items of cost which do not affect the valuation of stocks, would not seriously change the essential features of our illustration.