Trends in company profitability

A research article prepared in the Bank's Economic Section. The article is largely the work of J. S. Flemming (who was with the Section on leave from Nuffield College, Oxford) with L. D. D. Price and D. H. A. Ingram.

In the last two or three years increasing attention has been paid to the problems faced by industrial and commercial companies in this country. These include low profitability and some of its main consequences – a massive deterioration in companies' financial position, leading to difficulties in obtaining finance for investment and a reluctance to invest. Similar difficulties have arisen in some other countries but these have generally been much less serious.

This article deals with the first of these issues and shows how far profitability has declined. It has already been shown elsewhere that, before tax, the rate of return on industrial and commercial companies' physical capital appears to have fallen from 13% per annum in 1960 to only 4% in 1974. But this article also attempts to measure the effect of taxation on profitability. The post-tax rate of return in 1960 is estimated to have been around 8%–9%, and would have fallen to zero by 1974 but for tax relief on increases in the value of stocks: if all companies had been able to take advantage of this relief the post-tax rate would have been about 3½%–4% but with many companies earning insufficient profits against which to set tax allowances, the average rate of return must in fact have been somewhat less. The experience of individual firms will, of course, have varied widely around this average. A concluding section of the article discusses changes in the rates of return, and considers how profitability could recover from the very depressed state of the past two years.

The effects of declining profitability on companies' behaviour, notably with respect to investment, are not discussed in this article, but it is hoped that it may be possible to throw light on them in a future study.

Industrial and commercial companies' rates of return

A number of recent studies have examined the profitability of companies in this country over the last decade or so.[1] Most of them show that profitability has fallen, but the extent of the decline has varied with the data and the methods used.

The national income and expenditure accounts, prepared by the Central Statistical Office, provide the most complete set of data available for industrial and commercial companies. A number of different versions of the rate of return can be derived from these accounts, ranging from one calculated from figures of pre-tax historic costs to a post-tax measure related to the 'operating profits' concept of current cost accounting. Measures of the pre-tax rates of return shown below have already been presented by Walker, of the Department of Industry,[1] who also demonstrated their close correspondence to estimates derived directly from company accounts. The more original part of the present article deals with the measurement of post-tax rates of return in a way which allows for the effects of both inflation and taxation not only on profits but also on the value of the physical capital employed by companies.

[1] G. J. Burgess and A. J. Webb, 'The Profits of British Industry', *Lloyds Bank Review*, April 1974. Andrew Glyn and Bob Sutcliffe, *'British Capitalism, Workers and the Profits Squeeze'* (Penguin, Harmondsworth, 1972). M. A. King, 'The United Kingdom Profits Crisis: Myth or Reality?', *Economic Journal*, March 1975. A. J. Merrett, 'Measuring Trends in Profitability', *Lloyds Bank Review*, October 1975. M. Panic and R. E. Close, 'Profitability of British Manufacturing Industry', *Lloyds Bank Review*, July 1973. J. L. Walker, 'Estimating companies' rate of return on capital employed', *Economic Trends*, November 1974 (updated in *Trade and Industry*, 24th October 1975).

Table A
Pre-tax rates of return 1960–1974 [a]

Per cent per annum

	Historic cost return	Column (1) after revaluation of the capital stock	Column (2) after revaluation of capital consumption	Real rate of return = column (3) less stock appreciation
	(1)	(2)	(3)	(4)
1960	*19·0*	*14·7*	*13·7*	*13·4*
1961	*16·5*	*13·0*	*12·0*	*11·5*
1962	*15·0*	*11·9*	*10·9*	*10·5*
1963	*16·1*	*12·8*	*11·8*	*11·4*
1964	*16·8*	*13·5*	*12·6*	*11·8*
1965	*16·0*	*12·9*	*12·0*	*11·2*
1966	*14·3*	*11·6*	*10·7*	*9·9*
1967	*13·6*	*11·1*	*10·3*	*9·9*
1968	*14·7*	*12·0*	*11·2*	*10·0*
1969	*13·3*	*10·7*	*9·9*	*8·5*
1970	*12·8*	*10·1*	*9·1*	*7·3*
1971	*13·1*	*10·0*	*8·9*	*7·3*
1972	*14·3*	*10·5*	*9·3*	*7·5*
1973	*16·5*	*11·4*	*10·1*	*6·6*
1974	*16·8*	*10·8*	*9·3*	*4·0*

[a] For definitions, see text.

To estimate the rate of return earned by companies on their UK capital stock of building, plant and machinery, vehicles and stocks,[1] it is necessary to exclude non-trading income and income from abroad. Earnings are thus defined as gross trading profits *plus* rent received *less* capital consumption (or depreciation) and stock appreciation. Interest is not deducted as the calculations refer to the return earned on the whole capital stock, not merely on the proportion financed by equity. The return on physical capital is independent of the way in which it is financed and should be measured accordingly.

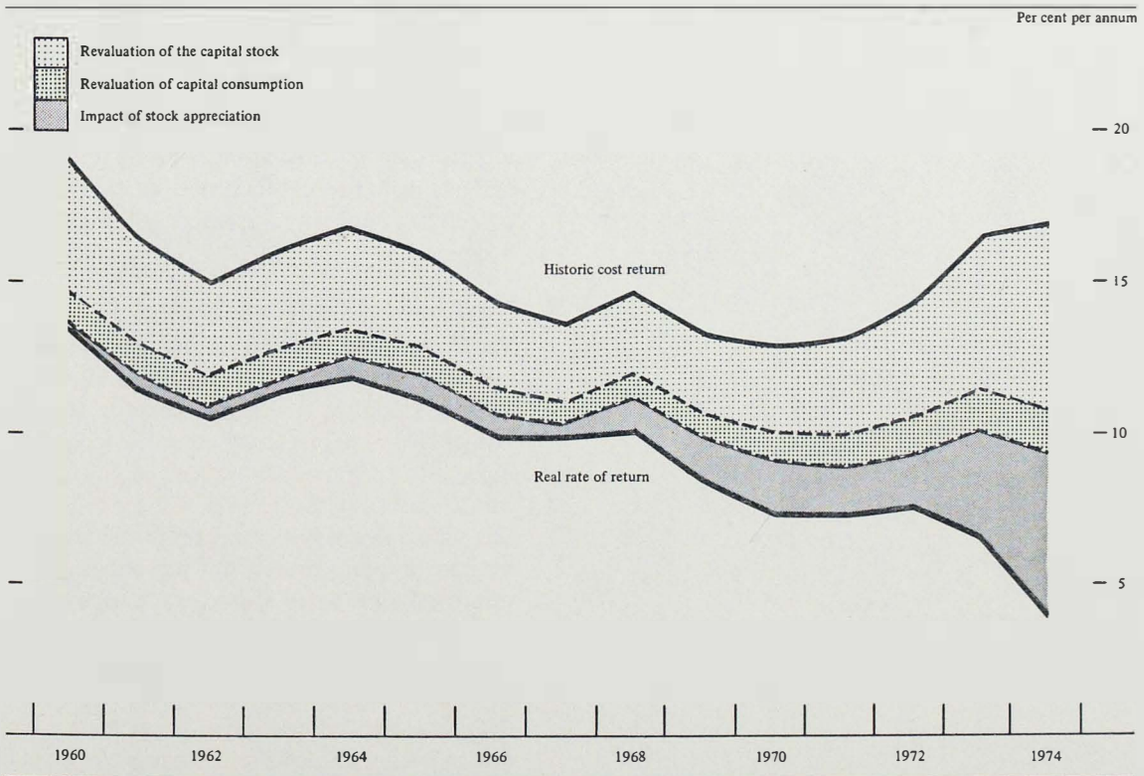
Pre-tax rates of return

Various measures of the pre-tax rate of return from 1960 to 1974 are set out in Table A and Chart A. In the text below, the calculations are illustrated by reference to the figures for 1974, the latest year for which complete figures are available.

Historic cost return

The first measure of the rate of return shown is the one which corresponds most closely to conventional accounting procedures. The value of the capital stock and of capital consumption are measured at historic cost, and profits are taken to include stock appreciation. Thus,

Chart A
Pre-tax rates of return 1960–1974[a]



[a] For definition, see text.

gross trading profits (plus rent) net of depreciation at historic cost, but before deducting stock appreciation and interest, amounted to £9,900 million in 1974; the capital stock, valued at historic cost, was worth £58,900 million in mid-1974;[2] so the historic cost rate of return was 16.8%. It is evident that even on this basis – the one traditionally used by management and investors in assessing company performance – and after discounting cyclical movements, there was a fairly steady decline in the return on capital from over 16% to 13% during the 1960s. However, in the last few years this fall has been rapidly reversed, and in 1973 and 1974 the historic cost rate of return was higher than at almost any time since 1960.

[1] In principle, land should be included in the capital stock, but no reliable estimates are available. See also Appendix 1, page 46.

[2] As profits are earned during the course of the year, the average of the opening and closing capital stocks is taken.

Revaluation of the capital stock

But rates of return based on valuation of the capital stock at historic cost are a poor guide to the likely rate of return on newly-acquired similar capital which would have been bought at much higher prices. The rate of return on physical assets should ideally be based on their current value, but in practice this is often difficult to assess. Indeed, the poor quality of second-hand markets means that there can be considerable differences between the value of existing capital stock at current, or replacement, cost (which would be appropriate for a company considering new investment), or at net realisable value (which would be appropriate for a company considering disinvestment). In the absence of adequate information on realisable values (and disinvestment is in any case rare), estimates of replacement cost are used here: although not appropriate for all purposes, these are generally much more realistic than historic cost valuations.

The second measure shown in Table A and Chart A values the fixed-capital stock at replacement cost. The higher valuation results in a lower rate of return throughout the period, but shows a slightly smaller decline during the 1960s. More significantly, this rate of return has not recovered much since 1970 as has the historic cost measure, because faster inflation has sharply widened the gap between historic and replacement cost valuations of the capital stock. During most of the 1960s historic cost undervalued the capital stock by around 20%, but by the middle of 1974 the degree of undervaluation had increased to 36%: the capital stock was worth £92,000 million at replacement cost, so that profits of £9,900 million represented a rate of return of only 10.8%. The undervaluation of the capital stock will have continued to increase subsequently. If inflation were to stop today, the degree of undervaluation would then steadily diminish, but would not disappear completely until all the assets installed when prices were still rising had been retired.

Revaluation of capital consumption

The above measure needs further adjustment to remove the inconsistency of valuing the surviving capital stock at replacement cost while depreciating capital at historic cost, and a third measure of the rate of return, depreciating capital at replacement cost, is therefore shown. The argument for valuing capital consumption at replacement cost is essentially the same as that for the capital stock. The result of this adjustment is not dramatic: throughout the period the third measure is approximately one percentage point below the second measure. In 1974, for example, although capital consumption at replacement cost was £3,100 million, or 75% higher than depreciation at historic cost, this reduced profits net of depreciation only from £9,900 million to £8,600 million, giving a rate of return of 9.3%. Thus, the more serious distortion of the rate of return introduced by historic cost valuation of capital assets has arisen from undervaluing the surviving capital stock and not from undervaluing capital consumption.

The impact of stock appreciation

There remains a further important inconsistency in the third series: the profits on which it is based are derived from the accounts of companies and, under the accounting conventions at present in force, do not include the gains in monetary terms from the appreciation of fixed assets; the figures do, however, include similar 'holding gains' on stocks (as the cost of sales used for calculating profits is based on historic and not current costs).

The Sandilands Report recommended that 'holding gains' should be shown separately from 'operating gains', and in the fourth series stock appreciation has been deducted from profits.[1] This had an

[1] Stocks are valued at book value and should strictly be revalued at replacement cost. But given the relatively short period for which stocks are usually held, the difference between the two valuations is small.

exceptionally large effect in 1974 when, with inflation through the year approaching 20%, stock appreciation accounted for over half of the profit figure of £8,600 million quoted above; removing stock appreciation lowers the rate of return from 9.3% to only 4.0%.

This fourth series is a conceptually satisfactory measure of the real rate of return on physical capital gross of tax. But there is still scope for dispute as to whether this is the best measure of the real rate of return: for example, assets might be valued at constant purchasing power, thus including any holding gains attributable not to 'general' inflation but to the companies' good fortune in holding assets which have appreciated especially fast. For companies considered in aggregate the difference has usually been small enough to ignore. This was not, however, true in the two years 1973 and 1974, during which stocks appreciated by 17% and 26% while retail prices rose by only 10% and 18% respectively.

After adjustment for stock appreciation, the downward trend in the real rate of return over the last fifteen years is all too clear, falling fairly slowly from 12% around 1960 to 9% in the late 1960s, before dropping to as low as 4% in 1974. When prices were comparatively stable in the 1960s, conventional accounts showed a similar fall in the rate of return (although the recorded rate as such was too high); but as inflation accelerated, the inclusion of stock appreciation in reported profits masked the severe fall in the real rate of return since 1969.

The effects of taxation

The rate of return has so far been discussed and measured before tax, but for most purposes the owners and managers of companies are more interested in post-tax returns. The nature of, and changes in, company taxation make it impossible to define a single post-tax rate of return which is entirely appropriate for all purposes. So in this section two possible measures are discussed, each analogous to the pre-tax real rate of return presented above.

It is important that measures of profitability relating companies' earnings to their physical assets (irrespective of how these are financed) should be capable of comparison with the returns earned by savers on their holdings of financial assets. It is hoped that a subsequent article will discuss how the difference between these rates of return affects investment. For the present purpose, the taxes used in calculating the post-tax rate of return to savers should also be used in estimating companies' post-tax rate of return. This means that taxes on interest and dividends in the hands of recipients must be deducted along with direct company taxes. [1]

An incidental advantage of this approach is that there is no need to decide whether advance corporation tax should be treated as part of company taxation or as a withholding tax on dividends. If taxes on persons were ignored and advance corporation tax were treated as a tax on companies, as the name itself and its treatment in the official statistics would suggest, the relevant rates of return before the imputation system was introduced in 1973 would not be consistent with subsequent rates.

It is conventional practice to estimate the return on shareholders' equity interest in companies by combining dividend receipts with retained earnings. The measures presented here extend this treatment to bondholders and other creditors. In this way, post-tax profitability on all physical assets can be compared with a post-tax return to all the savers who have financed the investment – not only the ordinary shareholders. Most companies using discounted cash flow techniques are believed to use discount rates related to the cost of all sources of finance, not merely to the cost of equity finance. Measures of profitability which are most relevant to investment therefore require the broader base described above.

[1] Liability to capital gains tax may also arise for companies, but this has been ignored because liabilities cannot readily be related to the profits arising in any one year and because the sums involved are small.

The measures of post-tax profitability presented in this article assume, as a simplification, that all interest payments, as well as dividends, are liable to income tax at the basic rate. In fact, the recipients of dividends and interest include individuals, banks, insurance companies and pension funds. Some of these recipients pay corporation tax, some are exempt from tax, some pay investment income surcharge and some pay higher rates of income tax. Again, some intermediaries, such as banks, pay tax only on their net interest receipts, but depositors are liable to tax on interest which they in turn receive from such intermediaries: in this way, tax is effectively paid on the whole amount. Identifying the appropriate tax rate in this context – which ideally should be the average of all the relevant marginal rates – presents enormous difficulties. The basic rate of income tax is used as the best available proxy.[1]

Tax-adjusted capital employed

To derive post-tax rates of return, it is not sufficient simply to deduct from companies' profits the tax accruing on those profits and then express the net profits as a proportion of total capital employed, as in the calculation of pre-tax returns. The effects of taxation on the appropriate measure of the capital employed must also be taken into account. The need for such an adjustment can be shown in a number of ways. The following example assumes that the tax system is such that the purchase of all assets in any one year can be set against taxable profits, thus reducing tax payments in the same year. With a tax rate of, say 50%, a company would have to finance only one half of new investment, and capital employed could then be thought of as no more than half the value of the capital stock. Tax would be paid only on cash flows, leaving discounted cash flow returns unaffected. In order to ensure that accounting returns are similarly unaffected by this 'neutral' tax system, the pre-tax capital employed needs to be reduced in the same proportion as pre-tax profits. To illustrate this in another way, if a company buys a machine and then sells it shortly afterwards for the purchase price, it is liable to repay the tax relief due on the initial purchase – there is a contingent tax liability on the disposal of assets if they realise more than their tax-written-down value, which in this case is zero; this contingent tax liability may be thought of as the Government's own equity stake in the machine.[2]

The details of these arguments depend upon the special features of the simplified example. Until recently, no tax relief has been available on additions to working capital. There have also been numerous changes over the years in investment allowances and grants. Table B shows that, as a proportion of gross fixed investment, allowances (including regional incentives) have varied between 70% in the early 1960s, over 100% in 1971 and 1972, and 90% in 1974.[3] Although incentives have rarely been as favourable as in the example above, first-year allowances on the purchase of fixed assets, and more recently stock relief, have enabled a large part of companies' tax liability to be deferred. The effect of such incentives is to provide a continual source of finance to companies, which appears in their accounts as deferred taxation, representing tax on the excess of the book value of their assets over the equivalent written-down value for tax purposes. There is also a notional tax liability on the surplus over book value when, after a period of inflation, assets are revalued at replacement cost. Finally, since 1974 there has also been tax deferred by way of stock relief. In

Table B

Depreciation allowances, investment grants and gross fixed investment: all companies 1960–1974

£ millions

	Depreciation allowances	Investment grants	Total equivalent depreciation allowances [a]	Gross fixed investment	Equivalent percentage depreciation allowance
	(1)	(2)	(3)	(4)	(5) = (3) ÷ (4)
1960	1,213	–	1,213	1,757	*69·0*
1961	1,352	–	1,352	2,014	*67·1*
1962	1,451	–	1,451	2,032	*71·4*
1963	1,752	–	1,752	2,007	*87·3*
1964	2,040	–	2,040	2,467	*82·7*
1965	2,161	–	2,161	2,667	*81·0*
1966	1,832	–	1,832	2,706	*67·7*
1967	1,687	201	2,167	2,697	*80·4*
1968	1,828	420	2,774	3,050	*91·0*
1969	2,000	564	3,253	3,556	*91·5*
1970	2,285	484	3,375	3,955	*85·3*
1971	3,089	540	4,419	4,038	*109·4*
1972	4,257	328	5,077	4,395	*115·5*
1973	5,004	232	5,492	5,699	*96·4*
1974	5,830	142	6,105	7,020	*87·0*

[a] The sum of investment grants (divided by the prevailing rate of corporation tax) and depreciation allowances.

[1] A. J. H. Orhnial and L. P. Foldes, 'Estimates of Marginal Tax Rates for Dividends and Bond Interest in the United Kingdom 1919–1970', *Economica*, February 1975, provide some relevant information. The data do not, however, extend beyond 1970 and there are no estimates of bank interest, which now accounts for more than half of the interest payments by companies.

[2] For a further discussion of some of these points, see M. T. Sumner, 'Neutrality of Corporate Taxation, or on not Accounting for Inflation', *Manchester School of Economic and Social Studies*, December 1975.

[3] These figures are quoted for illustrative purposes only. The grants and allowances shown in each year arose as the result of investment in earlier years. In calculating prospective rates of return, accruals based on the prevailing tax code have been used (see Appendix 1).

order to relate post-tax earnings to capital employed, not only must the normal tax accruals be deducted from post-tax earnings: deferred tax liabilities must also be deducted from capital employed.

When deferred tax liability is computed from the allowances in force at the time capital was installed, this may be thought of as giving a 'backward-looking' adjustment to the capital employed. However, for a firm considering new investment, earlier incentives are usually irrelevant; all that matters is current investment incentives. To take account of this, a second, 'forward-looking', measure of the tax-adjusted capital employed has been estimated. The scale of investment incentives in any year is measured by their present value per £100 of fixed investment. For example, 100% first-year allowances at a 52% tax rate would be worth £52 if tax were payable immediately – the cost to the company of £100 investment being then only £48.[1] The existing fixed-capital stock is then treated as if it had all been acquired in that year, so that its value is written down in line with the present value of current investment incentives.

In fact, the two approaches yield broadly similar measures of the tax-adjusted capital employed.[2] It may be recalled that total physical capital, before allowance for the impact of taxation, was estimated at £92,000 million in mid-1974. Ignoring for the moment the effects of tax relief on stocks (first announced in November 1974), the forward and backward-looking measures of the tax-adjusted capital employed in 1974 are £57,500 million and £64,000 million respectively – the former being smaller because investment incentives were greater in 1974 than in most previous years.

Post-tax earnings

The next step is to calculate post-tax earnings. The calculations (see Appendix 1) are complicated, again partly because of changes in the tax system, but the concepts involved are more familiar than those involved in measuring the tax-adjusted capital stock, and so require less explanation.

Statistics of taxes paid by companies are, of course, available, but they are not used here because they include taxes on non-trading income. Instead, the tax liability arising from each year's trading income is computed by reference to the provisions of the tax code in force at the time. As in the case of capital employed, both forward and backward-looking tax accruals are calculated: the forward-looking measure takes account only of current investment incentives; the backward-looking measure allows for the impact of past investment incentives on companies' actual tax bills. The difference between these two measures of tax accruing on trading profits is not great: for 1974, backward-looking accruals are calculated to have been £3,500 million and forward-looking accruals £3,800 million. Tax accruals are deducted from profits net of capital consumption and stock appreciation – the figure that was used to calculate the pre-tax real rate of return.

In 1974 tax accruals on either basis were almost equal to pre-tax real profits of £3,700 million; in fact, the forward-looking approach produced a loss of £100 million. There is, however, an important qualification. In November 1974, the Government introduced tax relief on increases in the book value of stocks of over 10% of trading profits. This measure gave relief to some profits earned in 1973 and, more importantly in view of the enormous amount of stock appreciation, could have reduced companies' taxes on their 1974 profits by as much as £2,100 million. But as companies were not aware of this reduction in their tax liability until November 1974, post-tax rates of return are

[1] This procedure treats conventional depreciation allowances as a modest incentive. The incentive could be more strictly defined as the difference between £52 and the present value of unaccelerated depreciation allowances.

[2] This results from the generally steady increase in investment incentives. The divergence of the two measures in 1963 and 1964 can be explained by a rapid increase in investment and initial allowances in 1963. One effect of the introduction of corporation tax in 1965 was to reduce the value of these incentives.

Table C

Pre and post-tax real rates of return 1960–1974[a]

Per cent per annum

	Pre-tax	Post-tax			
		Forward-looking		Backward-looking	
1960	13·4	9·7		8·3	
1961	11·5	8·1		7·0	
1962	10·5	7·6		6·4	
1963	11·4	9·2		7·3	
1964	11·8	9·3		7·6	
1965	11·2	6·6		6·0	
1966	9·9	5·5		5·2	
1967	9·9	5·9		5·5	
1968	10·0	5·4		5·5	
1969	8·5	3·9		4·6	
1970	7·3	3·1		3·7	
1971	7·3	3·5		4·4	
1972	7·5	4·3		4·9	
1973[b]	6·6	3·4	(6·3)	3·9	(5·6)
1974[b]	4·0	−0·3	(4·1)	0·2	(3·5)

[a] For definitions, see text.

[b] Figures in brackets take account of tax relief on stocks.

shown both inclusive and exclusive of this relief.[1] The measure was intended as a relief on stock appreciation. But it is worth noting that, as increases in the book value of stocks in excess of 10% of profits (whether because of stock appreciation or of stockbuilding) are currently allowable against profits for tax purposes, at the margin stockbuilding now effectively attracts free depreciation, just as most fixed investment does.

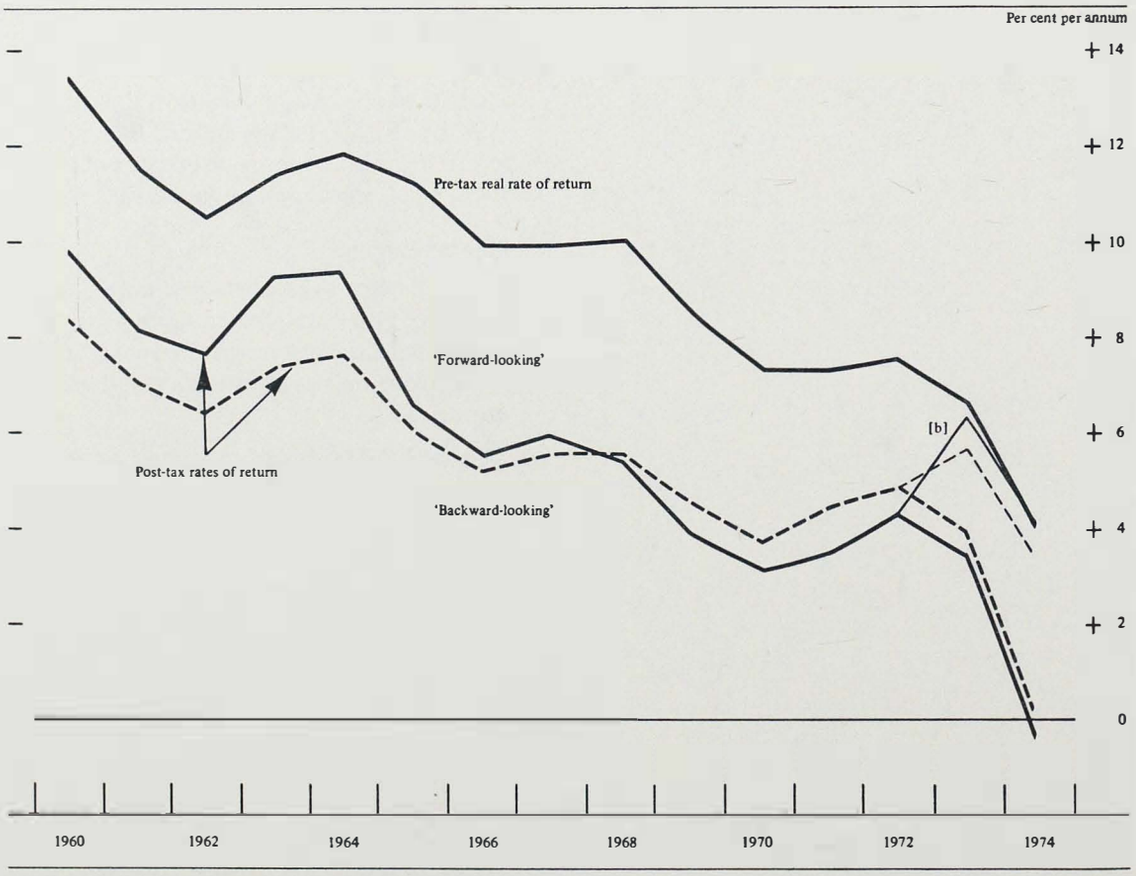
Post-tax real rate of return

Table C and Chart B show the estimates of the post-tax real rate of return obtained by dividing post-tax profits by the tax-adjusted capital stock.

The two measures fluctuated around 7%–9% during the early 1960s, but the post-tax return thereafter followed the pre-tax return down: by the end of the decade, the post-tax return had reached about 3½% as compared with the pre-tax return of 7½%. Each measure subsequently remained fairly stable until 1974. The share of stock appreciation in gross trading profits then rose dramatically, from an average of 5% in the 1960s and 14% in 1970–72, to 27% in 1973 and 44% in 1974. This lowered the post-tax real rate of return almost to zero in 1974 (on the forward-looking basis, as has been mentioned, it was in fact just negative). Tax relief on stocks, announced in November 1974, has subsequently raised the rate to 3½%– 4%, but anticipation of this relief is likely to have been small, and for most of 1974 the managers of companies would have thought that, on average, their real rates of return were negligible. Closely associated with these very low rates of return were, of course, the severe cash flow problems faced by companies at that time.

Chart B

Pre and post-tax real rates of return 1960–1974[a]



[a] For definition, see text.

[b] After allowance for stock relief.

[1] The relief also reduces the measures of the tax-adjusted capital employed in 1974; the forward and backward-looking measures fall by £11,200 million and £2,600 million respectively.

As the post-tax rate of return was lower than the pre-tax rate of return throughout the period under review, taxation is likely to have discouraged some of the investment that would have taken place at any given cost of capital. Before the introduction of tax relief on stocks there was an additional discouragement to projects requiring relatively large amounts of stocks to be held; and it is worth noting that if it were decided to tax 'operating gains' as defined by Sandilands – allowing stock appreciation, but not stockbuilding, to be charged against taxable profits – this bias would be reintroduced.

Data for 1975 are as yet incomplete, but as the value of the capital stock (at replacement cost) probably increased rather faster than profits, pre-tax rates of return are likely to have fallen slightly and post-tax rates of return may have been as low as in 1974. Stock appreciation in 1975 was probably not as large as in 1974 so that rates of return at historic cost will have fallen by one or two percentage points.

Behaviour of the rates of return

The steadiness of the slow decline in the post-tax real rate of return during the 1960s was to some extent obscured by cyclical movements. The fall could have resulted from a host of reasons such as a gradual disappearance of more profitable investment opportunities (perhaps because they had already been undertaken); fast changing technologies lowering the profitability of existing capital; greater competition as tariffs were reduced and restrictive practices abolished; or – if it was accompanied by a fall in the cost of capital – a willingness on the part of savers to accept lower real returns. In any event, although the post-tax rate of return was more than halved during the 1960s, the fall was slow and steady enough to give no definite cause for concern that it was somehow inhibiting a satisfactory development of the economy.[1]

But the more rapid fall in real rates of return since 1972 – although later mitigated in the case of the post-tax return by tax relief on stocks – has been too great to be attributable to any of the longer-term changes in economic behaviour such as those suggested above. At the same time, there was little or no change in the rate of return including stock appreciation. Many companies may have been unaware of the impact of stock appreciation on profits and have been content if published earnings, expressed as a percentage of capital employed, were broadly maintained. Initially, therefore, there was little pressure to increase prices to produce an acceptable rate of return on current, rather than historic, costs. The fall in profits at current costs has subsequently been widely recognised but, faced first with a price code controlling domestic selling prices on the basis of historic costs, coupled more recently with very depressed demand at home and abroad, companies have been unable to raise their real profitability.

However, despite these constraints, companies' (pre-tax) return at historic cost has recovered sharply since 1970 while their rate of return at replacement cost, but including stock appreciation, has been fairly stable since the mid-1960s. This stability suggests that companies were adjusting their prices each year in a way which took account of the need to value fixed capital at replacement cost, though not to cover stock appreciation. Companies are not, of course, completely free to fix their selling prices, particularly in the competitive conditions prevailing in export markets where overseas suppliers may not face the same cost pressures. Nevertheless, companies' overall pricing policy must have played some role in stabilising the return at replacement cost including stock appreciation. This stability could in fact have resulted quite fortuitously from companies maintaining their selling prices at a fixed margin over historic variable costs (i.e. materials and labour). The margin should originally have been set to include provision for

[1] It is hoped to consider these questions further in the later article mentioned above.

depreciation; and with prices of capital goods having risen broadly in line with variable costs, a company which maintained its provision for depreciation as a constant proportion of variable costs should have ensured that the provision increased sufficiently to cover depreciation at replacement cost.

Table D shows the effects of inflation on the pre-tax real rates of return for three 'representative' firms which continue to apply a fixed margin to historic costs. Obviously the damage is greatest to the firm with the slowest turnover of stocks, but even for the majority of firms, which hold stocks for only a few months, real profitability almost disappears at the 25%–30% rate of inflation recently experienced in the United Kingdom.

As and when inflation moderates, that part of the fall in the real rate of return which is attributable to stock appreciation will be reversed almost immediately if historic cost margins can be maintained at their present size.[1] Provided that prices of capital goods do not in future rise appreciably faster than the cost of labour and materials to which the margins are applied, maintenance of these margins during a period of slow inflation could raise the pre-tax real rate of return back to the average (around 7%) of the early 1970s. Whether or not profitability will improve when the economy recovers from the present recession depends essentially on the form which the recovery takes. One counterpart to the low profitability of 1974 and 1975 was the increase in real wages relative to national disposable income – a trend which will need to be reversed if profitability is to improve. The current policy of restraining wage increases to make room for growth in investment and exports should, if successful, enable profitability to increase. But the pre-tax real rate of return is most unlikely to revert to the average of 1960–68, even if inflation continues to slow down appreciably and historic cost margins are maintained.

The effects of lower inflation and economic recovery on post-tax profitability are more difficult to assess: the implications of the Sandilands Report for company taxation are currently under consideration. Under the present tax code, stock relief would cease to be effective – and could even be clawed back – when the rate of inflation is low, as the rise in the book value of stocks would be likely to fall below 10% of profits. For this reason, the post-tax rate of return may not rise as much as the pre-tax rate, but even now it is not far below the average of the late 1960s. But even if inflation and stock appreciation were completely eliminated, rates of return as measured from historic cost accounts would remain overstated, as fixed assets would continue to be undervalued – and more so than in the past because the sharp rise in prices in the last few years will have further increased replacement costs relative to historic costs. Thus, even without inflation, traditional accounts would distort rates of return for a considerable period, and a move from historic cost accounts – as recommended by the Sandilands Committee – would still be desirable.

Table D

Illustrative examples of the impact of inflation on real profit margins

Percentages in italics

	Firm X	Firm Y	Firm Z
Historic cost mark-up	*30*	*20*	*10*
Stock turnover (number of times per year)	1	3	5
Effective real net profit margin[a] with costs rising (per cent per annum):			
0	*17½*	*15¾*	*7½*
5	*11¼*	*13¾*	*6½*
10	*5¾*	*12*	*5¼*
20	*– 4¼*	*8¼*	*3¼*
30	*–12½*	*5*	*1¼*
Rate of inflation at which the real net profit margin is eliminated	15½	45½	36½

[a] Net of provision for depreciation at replacement cost. These calculations are described in detail in Appendix 2.

[1] The present price code could prevent these margins from being maintained in a period of economic recovery when unit costs tend to fall.

Appendix 1

Sources and methods

This appendix identifies the data used in the paper and outlines the derivation of the series underlying the calculations of the rates of return.

Data and sources

Annual data on industrial and commercial companies are used throughout, unless otherwise indicated. Wherever possible, reliance has been placed upon figures published by the Central Statistical Office (CSO); the major source has been *National Income and Expenditure 1964-74* (Blue Book), with supplementary information obtained from earlier issues. Table references are based upon the latest Blue Book.

Data	Source	Description
Gross trading profits	Blue Book, Table 35	Sources and Methods,[1] Chapter 7, pages 207, 215, 217–26
Rent	CSO series	Sources and Methods, Chapter 7, pages 208, 227–8
Stock appreciation	Blue Book, Tables 35 and 79	Sources and Methods, Chapter 13, pages 391–3, 404–5
Net capital stock and capital consumption[1]		
[a] Historic cost	CSO series, first published in *Economic Trends*, November 1974	*Economic Trends*, November 1974, pages xxxv, xxxvi
[b] Replacement cost	Blue Book, Tables 66 and 72	Sources and Methods, Chapter 12, pages 383–7
Dividends on ordinary shares	Blue Book, Table 35	Sources and Methods, Chapter 7, pages 210, 230–2. Blue Book, pages 111–12
Debenture, loan and other interest, and preference dividends	Blue Book, Table 35	Sources and Methods, Chapter 7, pages 210, 230–2
Gross domestic fixed-capital formation	Blue Book, Table 35	Sources and Methods, Chapter 12, pages 360–82
Book value of stocks and work in progress	Blue Book, Table 79	Sources and Methods, Chapter 13, pages 390–407
Statutory depreciation allowances (all companies)	Blue Book, supplementary table, page 124	Sources and Methods, Chapter 12, pages 388–9
Investment grants (all companies and industrial and commercial companies)	Blue Book, Tables 33 and 35	Sources and Methods, Chapter 7, page 214

Capital stock estimates

Valuations of the fixed-capital stock, whether derived directly from company accounts or by means of CSO perpetual inventory methods, are not perfect. This article uses capital stock data compiled by the CSO, which are reasonably consistent in scope with figures for industrial and commercial companies' profits. These estimates of the capital stock nevertheless present certain drawbacks, arising both from the methods of calculation and the statistical content and scope of the series. The drawbacks are outlined below; but some indication of the reliability of the statistics generally is given by the CSO in Sources and Methods, where it is estimated that statistics for the gross capital stock at replacement cost are accurate only to within ±10% to 20%.

a The perpetual inventory method relies upon assumptions about the average *length of life* of various categories of asset. Lives range from ten years for road vehicles to eighty years for buildings, with most plant and machinery falling between twenty-five and fifty years. There is a lack of firm statistical evidence in this area, and the degree of arbitrariness of these 'length of life' assumptions constitutes an important potential source of error. In a recent CSO paper,[3] estimates of manufacturing industry's capital stock and consumption were shown to vary widely according to different assumptions about average life. If, for example, the assumed 'length of life' during the post-war period was thought to be rather high and was reduced by 20%, the effect would be to lower the gross and net capital stock by around 15% while raising capital consumption by about 10%.

b Capital assets are *classified by ownership*, rather than by the industries using them, so that distortions will arise where assets are leased to industrial and commercial companies by financial institutions. A correction has been made for

[1] Rita Maurice, ed, *National Accounts Statistics: Sources and Methods* (HMSO, 1968).

[2] See also the following section on capital stock estimates.

[3] *Development of UK capital stock estimates for the UK*, J. Hibbert, T. Griffin, J. L. Walker; presented to the International Association for Research in Income and Wealth, at a conference in Finland, August 1975.

the reverse situation, where companies let property to outsiders, by including rent receipts in profits. This approach is preferable to adjusting the capital stock data, where the property concerned cannot be identified satisfactorily. Further distortions may arise from the treatment of *sales and purchases of secondhand assets.*

c A major deficiency is the exclusion of *land* from the CSO's estimates of the capital stock. Revell and Roe (*Economic Trends*, May 1971) gave some idea of the extent to which capital employed was thereby understated: in 1966, land held by *all* companies was equivalent to about one sixth of total company capital on a national accounts basis (i.e. fixed capital plus the book value of stocks). The lack of suitable price indices for land makes it impossible to update these estimates satisfactorily.

d The use of *price indices* to revalue the capital stock provides scope for further error. Compilation of price indices for any goods is difficult, but the problems are even greater when earlier vintages of the capital stock are valued.

e With the rapid growth of *North Sea oil and gas activities* – a completely new technology – the CSO have had to devise new criteria for classifying assets and to make assumptions about the lives of these assets. The latter present special problems in a new industry where no assets have yet been retired, and where account has to be taken of the unique nature of the assets and the destructiveness of the North Sea.

Derivation of the rate of return

Pre-tax rates of return

The methods of calculating the various measures of the pre-tax rate of return are fully described in the main text; the corresponding algebraic formulations are as follows:

Historic cost rate of return:

$$\frac{GTP+R-CCH}{FH+W}; \tag{1}$$

a after revaluation of the capital stock:

$$\frac{GTP+R-CCH}{FR+W}; \tag{2}$$

b after revaluation of capital consumption:

$$\frac{GTP+R-CCR}{FR+W}; \tag{3}$$

Real pre-tax rate of return:

$$\frac{GTP+R-CCR-SA}{FR+W}; \tag{4}$$

where

CCH is capital consumption at historic cost,
CCR is capital consumption at replacement cost,
FH is net capital stock at historic cost,
FR is net capital stock at replacement cost,
GTP is gross trading profits,
R is rent received by companies,
SA is stock appreciation, and
W is book value of stocks and work in progress.

For future use it will be convenient to define real pre-tax earnings:

$$Y \equiv GTP+R-CCR-SA. \tag{5}$$

Post-tax rates of return

The following formulae are for real rates of return after all taxes on profits, including those on their distribution as dividends and interest payments. As noted in the main text, taxation affects rates of return not only because post-tax profits are smaller than pre-tax profits, but also because taxation reduces the relevant capital base.

Backward-looking rate of return

Under this approach, the capital base is reduced by the amount of tax which a company would have to pay if it were to sell its assets for their replacement value. This contingent tax liability depends on the depreciation which has been allowed over the life of those assets. The relevant capital base is the company's stock of assets at replacement value net of this tax liability. Stocks and work in progress could not be written down for tax before November 1974, and the formula can thus be written as:

$$\begin{aligned} CB &= FR-c(FR-TWDVF)+W \\ &= (1-c)FR+cTWDVF+W, \end{aligned} \tag{6}$$

where

CB is tax-adjusted capital stock (backward-looking),

$TWDVF$ is tax-written-down value of fixed assets, and

c is the corporation tax rate.[1]

This leaves $TWDVF$ to be calculated. In comparing two successive years, $TWDVF$ is increased by the value of gross fixed investment in the later year, but reduced by the value of:

a any investment grants received, and

b statutory depreciation allowances (but excluding investment allowances because these did not reduce the amount of investment that could be written down in subsequent years).

$TWDVF$ at the end of year t is thus estimated as:

$$TWDVF_t = TWDVF_{t-1} + G_t - GR_t - (SD_t - INVA_t), \qquad (7)$$

where

G_t is gross fixed investment,

GR_t is investment grants paid,

SD_t is statutory depreciation (adjusted where possible to cover industrial and commercial companies only), and

$INVA_t$ is investment allowances. The Inland Revenue's 107th Report gives the ratio of investment allowances to all capital allowances during the financial years 1952/53 to 1961/62, and the latter are reported in the Blue Book. Up to 1960, the Blue Book aggregates initial and investment allowances, but provides a sectoral breakdown which shows that companies took 85% of the total. After 1960, investment allowances are separately identified in the Blue Book but not by sector. Of the total, 85% has been attributed to companies, and no deduction has been made for any allowances due to financial companies.

Data are available from which changes in $TWDVF$ for *all* companies can be constructed from 1948. To provide a starting point for the series, it was assumed that in 1948 $TWDVF$ was equal to two thirds of FR. (This fraction is based on the assumption that statutory 'lives' and CSO 'lives' of fixed assets were the same until that date,[2] so that $TWDVF$ and FR would diverge only because the former was valued at historic cost and the latter at replacement cost.) Since 1959 it has been possible to work with data for industrial and commercial companies alone: on the basis of their share of investment at that time, it was estimated that they accounted for 98% of the $TWDVF$ estimate for all companies in 1960 (since then their share has fallen). The resulting estimates of industrial and commercial companies' $TWDVF$ for 1959–74 are set out in Table A below.

Table A

Derivation of the tax-written-down value of the fixed-capital stock [a]

£ millions: *percentage in italics*

	(1) G	(2) SD	(3) GR	(4) $INVA$	(5) (1)+(4)−(2)−(3)	(6) $TWDVF$	(7) FR	(6)/(7)
1949						5,300	8,000	*66*
1959	1,425	1,084	–	106	447	9,139	16,400	*56*
1960	1,659	1,195	–	302	766	9,905	17,700	*56*
1961	1,898	1,332	–	365	931	10,836	19,200	*56*
1962	1,907	1,428	–	349	828	11,664	20,700	*56*
1963	1,881	1,697	–	444	628	12,292	22,100	*56*
1964	2,288	2,005	–	527	810	13,102	23,800	*55*
1965	2,436	2,124	–	548	860	13,962	25,900	*54*
1966	2,423	1,799	–	167	791	14,753	27,600	*53*
1967	2,366	1,655	195	35	551	15,304	28,200	*54*
1968	2,615	1,791	408	5	421	15,725	30,900	*51*
1969	3,001	1,950	548	1	504	16,229	34,400	*47*
1970	3,357	2,217	462	–	678	16,907	39,000	*43*
1971	3,467	2,981	512	–	– 26	16,881	44,000	*38*
1972	3,777	4,087	314	–	−624	16,257	50,700	*32*
1973	4,621	4,778	222	–	−379	15,878	61,800	*26*
1974	5,850	5,534	134	–	182	16,060	78,500	*20*

[a] For definitions, see text.

The estimate of the tax-adjusted capital stock, CB, is used as the denominator in calculating backward-looking post-tax rates of return. The numerator is simply real pre-tax earnings, Y, net of tax accruing on those earnings; as explained in the main text, the tax liability of shareholders and creditors is also included. This tax liability will itself reflect past tax regimes as these determine the amounts of depreciation chargeable at any time.

[1] In some circumstances a liability to capital gains tax can arise, but the relationship of accrued liability to any one year's profit is so remote, and the sum involved so small, that this factor has been ignored.

[2] See footnote [3] on page 45.

Table B
The present value of tax allowances per unit of investment

	a (Capital stock weights)	a' (Fixed investment weights)
1960	0.470	0.462
1961	0.493	0.484
1962	0.513	0.504
1963	0.570	0.558
1964	0.570	0.558
1965	0.453	0.441
1966	0.380	0.378
1967	0.407	0.408
1968	0.417	0.417
1969	0.391	0.391
1970	0.393	0.391
1971	0.350	0.345
1972	0.387	0.389
1973	0.460	0.469
1974	0.491	0.502

Forward-looking rate of return

In the approach just presented, the valuation of companies' capital employed reflects their actual tax position, but this depends on the tax regimes in existence for many years past. This approach may not yield the best measure of the effects of taxation on firms' views of the prospective returns on investment, because these returns will depend on current investment allowances and will be affected by tax allowances on earlier investment only if these are large enough to prevent a company from taking (immediate) advantage of new investment allowances.

To try to produce a measure more relevant to investment decisions, a forward-looking approach has been developed. The capital base is given by:

$$CF = (1-a)FR+W, \tag{8}$$

where

CF is tax-adjusted capital stock (forward-looking), and

a is the present value of all tax allowances (including normal depreciation) per unit of investment.

Corresponding to this change in the capital stock estimate, tax accruals are calculated not to reflect depreciation allowances on past investment but by applying the present value of current investment incentives per unit of investment, a', to replacement investment, CCR, in the year in question. It should be noted that it is the rate of return on the *existing* capital stock which is to be measured. Consequently, the tax reliefs stemming from investment allowances must be limited to replacement investment alone. The measure a' differs from a because tax allowances vary as between buildings, plant and machinery, and vehicles, and these components have different weights in capital consumption, CCR, and the capital stock, FR. Estimates of a and a' are set out in Table B. The discount rate used in both calculations is the yield on five-year gilt-edged stock, adjusted for tax.[1]

The derivations outlined below take account of the different rates and systems of taxation since 1960.

1960–1964

The tax system during this period combined a flat-rate profits tax, c^p, with the standard rate of income tax, t. There was no distinction between retained and distributed profits. On the assumption that profits were large enough to attract profits tax, interest payments were effectively tax-deductible to the company; interest recipients are assumed to have been subject to standard rate income tax.

Forward-looking measure Companies' own tax liability as defined above is

$$(c^p+t)(GTP+R-INT)-a'CCR,$$

or, using (5),

$$(c^p+t)(Y+SA+CCR-INT)-a'CCR,$$

where INT is gross interest payments.

The interest recipients' tax liability is $tINT$; shareholders' own tax (at the standard rate) has already been included in the companies' tax liability.

These tax liabilities have to be subtracted from pre-tax earnings, Y, and divided by the tax-adjusted capital stock to give the forward-looking post-tax rate of return (1960–64)

$$\frac{Y-(c^p+t)(Y+SA+CCR-INT)+a'CCR-tINT}{(1-a)FR+W},$$

or

$$\frac{(1-c^p-t)Y-(c^p+t)SA+(a'-c^p-t)CCR+c^pINT}{(1-a)FR+W}. \tag{9}$$

Backward-looking measure Companies' tax liability is

$$(c^p+t)(Y+SA+CCR-INT)-(c^p+t)(SD-AFY \cdot N/G);$$

and the interest recipients' tax liability is $tINT$; this gives a backward-looking rate of return (1960–64) of

$$\frac{(1-c^p-t)Y-(c^p+t)(SA+CCR)+c^pINT+(c^p+t)(SD-AFY \cdot N/G)}{(1-c^p-t)FR+(c^p+t)TWDVF+W} \tag{10}$$

where

AFY is all first-year depreciation allowances (first-year allowances+initial allowances+investment allowances), and

N/G is the ratio of net to gross fixed investment by industrial and commercial companies. (This term is included so that tax relief on net investment does not form part of the return on the existing capital stock.)

[1] If replacement investment were constant each year and prices were stable, CCR would provide a correct measure of depreciation allowances. But as allowances are based on historic cost, inflation will reduce their value. This is the reason for discounting investment incentives in calculating a', so that the discount rate used should strictly have been based on expected inflation.

1965–1972

This system consisted of a corporation tax rate, c^c, on all company income after normal deductions, including interest. Dividends were additionally taxed at the standard rate of income tax. Investment grants were also introduced in this period.

Forward-looking measure Companies' tax liability is

$$c^c(GTP+R-INT)-a'CCR,$$

or

$$c^c(Y+SA+CCR-INT)-a'CCR;$$

while that of the shareholders and interest recipients is

$$t(INT+zGDIV),$$

where

GDIV is gross dividend payments, including those classified as profits due abroad,[1] and

z is the ratio of profits to profits plus net overseas income.[2]

The forward-looking rate of return (1965–72) becomes

$$\frac{Y-c^c(Y+SA+CCR-INT)+a'CCR-t(INT+zGDIV)}{(1-a)FR+W}$$

which reduces to

$$\frac{(1-c^c)Y-c^cSA+(a'-c^c)CCR-(t-c^c)INT-tzGDIV}{(1-a)FR+W}. \qquad (11)$$

Backward-looking measure The backward-looking rate of return (1965–72) is similarly derived as

$$\frac{(1-c^c)Y-c^c(SA+CCR)-(t-c^c)INT-tzGDIV+c^cSD+GR-(c^cAFY+GR)N/G}{(1-c^c)FR+c^cTWDVF+W}. \qquad (12)$$

1973 onwards

The imputation system is similar in concept to the pre-1965 system. Tax is levied at a single rate, c^i, on qualifying income; dividends are distributed net together with a tax credit, the imputed tax (ACT) being paid by the company. ACT counts as part of the company's overall payment, the balance being known as its mainstream liability.[3]

Forward-looking measure Companies' mainstream tax liability is

$$c^i(GTP+R-INT)-a'CCR-tGDIV$$

or

$$c^i(Y+SA+CCR-INT)-a'CCR-tGDIV \text{ (where } tGDIV \text{ is ACT);}$$

and the shareholders' and interest recipients' tax liability is

$$t(GDIV+INT).$$

Therefore, the forward-looking rate of return (1973 onwards) is

$$\frac{Y-c^i(Y+SA+CCR-INT)+a'CCR+tGDIV-t(GDIV+INT)}{(1-a)FR+W},$$

or

$$\frac{(1-c^i)Y-c^iSA+(a'-c^i)CCR-(t-c^i)INT}{(1-a)FR+W}. \qquad (13)$$

Backward-looking measure The backward-looking rate of return (1973 onwards) is similarly derived as

$$\frac{(1-c^i)Y-c^i(SA+CCR)-(t-c^i)INT+c^iSD+GR-(c^iAFY+GR)N/G}{(1-c^i)FR+c^iTWDVF+W}. \qquad (14)$$

[1] Profits due abroad represent a taxable distribution, to foreign owners, of profits earned on assets in the United Kingdom.

[2] This adjustment is made to limit the tax liability to those dividends paid out of domestic trading income. Two ratios were computed, $Y/(N+A+Y)$, and $(Y+SA)/(N+A+Y+SA)$, where N is non-trading income, and A is income from abroad less taxes paid abroad. The first of these implies that overseas income is fully disposable, while the second (as a result of consolidation of accounts) would imply that allocations have to be made for stock appreciation out of overseas income in proportions equal to those out of domestic income. The ratios computed were very similar, except for later years, when stock appreciation became important. It is difficult to determine the extent to which overseas income is disposable, and an average of the two ratios was therefore taken.

[3] The mainstream liability cannot fall below a certain proportion (c^i-t) (the difference between the company and personal tax rates) of the company's taxable income. It can be demonstrated (using the mainstream tax equation and incorporating *all* capital allowances, *CA*) that this condition becomes binding when: $GDIV \geq GTP-INT-CA$, i.e. when gross dividends are equal to or exceed taxable income. At this point tax reliefs become largely ineffective. This possibility is ignored, although some companies may have lately found themselves in this position.

Stock relief Both formulae can be modified for the stock relief scheme announced in November 1974, whereby tax was charged not on the full amount of stock appreciation, but only on the equivalent of 10% of profits net of other (i.e. short-term) interest, if this was less. Hence $0.1c^iGTP'$ is substituted for c^iSA in the numerator in 1973 and 1974, where GTP' is the relevant income.

The denominators also need to be modified. It was noted in the text that any increase in the value of stocks (because of a rise in either price or volume) can, at the margin, be offset against taxation. This feature is incorporated in the forward-looking indicator by replacing W with the term $(1-c^i)W$ in 1973 and 1974.

The backward-looking indicator takes account of the fact that relief has been allowed on increases in book value only after 1972. Thus, in that year the tax-written-down value of stocks ($TWDVS$) was equal to the book value. In subsequent years

$$TWDVS_t = TWDVS_{t-1} + 0.1GTP'_t. \quad (15)$$

Stocks are then treated analogously to fixed capital, so that

$$CB = (1-c^i)(FR+W)+c^i(TWDVF+TWDVS). \quad (16)$$

It should be noted that this approach may overstate post-tax rates of return because all companies are assumed to have had taxable profits large enough to enable them to take advantage of stock relief.

Appendix 2

Historic cost pricing, inflation and profitability

The impact of historic cost pricing on profitability during a period of inflation can be shown in a simple model. Firms are assumed to apply conventional margins to historic direct costs. Taxation is ignored. Suppose that this historic margin, h, is applied to (historic) direct costs C_{-1} where the subscript refers to the previous time period, and where a 'period' is the average delay between companies' purchases and sales. If p is the annual rate of (cost) inflation and n the number of 'periods' per annum, then $C = C_{-1}(1+p/n)$, so that the real gross profit per unit of output,

$$(1+h)C_{-1} - C = \frac{C(h-p/n)}{1+p/n}.$$

Gross margins of this kind need to be quite large to allow for depreciation. Industrial and commercial companies' fixed capital is, on average, two and a half to three times as large as their working capital. If the average life of fixed capital is twenty years (as assumed by the CSO), then annual depreciation should be equivalent to 2 1/2×1/20 = 12 1/2% of working capital at replacement cost. This means that real profits net of depreciation are

$$C\left(\frac{h-p/n}{1+p/n} - \frac{0.125}{n}\right).$$

The relevant figures for mark-up, h, and stock turnover, n, depend on the level of aggregation. For the company sector as a whole, n lies between 1 and 2,[1] and the mark-up on the costs of imports and labour is quite large. However, because an individual company's direct costs include its suppliers' mark-up, that company's mark-up is lower than for the sector as a whole; similarly, a single firm usually holds stocks for only part of the time that they remain in the system. For these reasons the following arbitrary combinations of figures are considered for illustrative purposes.

	a	b	c	d	e
h (percentage)	*30*	*25*	*20*	*15*	*10*
n	1	2	3	4	5

The real net margin is given by substituting values of h and n into the expression

$$RNM = \left(\frac{h-p/n}{1+p/n} - \frac{0.125}{n}\right),$$

and the resulting values are shown in Table C.

Table C
Real net margins

Per cent

	a	b	c	d	e
Inflation rate per cent per annum					
0	*17½*	*18¾*	*15¾*	*12*	*7½*
5	*11¼*	*15¾*	*13¾*	*10½*	*6½*
10	*5¾*	*12¾*	*12*	*9*	*5¼*
20	*– 4¼*	*7¼*	*8¼*	*6½*	*3¼*
30	*–12½*	*2½*	*5*	*4*	*1¼*
Inflation rate at which real net margin disappears	*15½*	*35¼*	*45½*	*46*	*36½*

As might be expected, companies with the slowest turnover of stocks are the most vulnerable to faster inflation: even with a gross mark-up of 30%, company *a* does not earn sufficient profits to cover depreciation once inflation exceeds 15% per annum. But the real profits of *all* companies in the example – regardless of the combination of margin and stock turnover – almost disappear when inflation is not much higher than recently experienced in the United Kingdom. This assumes, of course, that companies do not consequently alter their pricing behaviour. One alternative would be for companies to adjust their mark-up on historic costs in line with the rate of inflation in order to maintain a constant real rate of return on capital employed.

Capital employed in the above example is 2 1/2 times work in progress; thus, if the desired rate of return is r per annum, then

$$\frac{h-p/n}{1+p/n} - \frac{0.125}{n} = 2.5r/n.$$

If r = 5%, then

$$\frac{h-p/n}{1+p/n} = \frac{0.125}{n} + \frac{0.125}{n} = \frac{0.25}{n},$$

[1] At the end of 1974 the book value of stocks and work in progress held by companies was £24,789 million, while companies' total value added in that year was nearly 50% larger, at £36,242 million. Their total sales will have been somewhat higher than value added.

and to achieve a 5% return the historic margin must be set at

$$h^* = p/n + \frac{0.25(p+n)}{n^2}.$$

Table D illustrates the mark-up on historic costs which companies in the above example would need to apply in order to maintain a constant rate of return of 5% on capital employed.

Table D
Mark-up on historic costs for 5% return on capital

Per cent	a	b	c	d	e
n equals	1	2	3	4	5
Inflation rate per cent per annum					
0	*25*	*13*	*8*	*6*	*5*
5	*31*	*15*	*10*	*8*	*6*
10	*38*	*18*	*12*	*9*	*7*
20	*50*	*24*	*16*	*12*	*9*
30	*63*	*29*	*19*	*14*	*11*

Not unexpectedly, the required mark-up rises as inflation accelerates; the longer stocks are held, the larger is the proportionate rise in the mark-up. In all the cases considered, however, once inflation reaches its recent UK rate of 25%–30%, the mark-up on historic costs needs to be twice as large as when prices are stable. But the current price code is designed to hold historic cost margins (although defined differently to the above) at reference levels based on margins in 1968–72, when prices were rising much more slowly than at present, and when real rates of return were already substantially below the average of the previous decade.