The cost of capital, finance and investment

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An earlier article [1] described how the profitability of industrial and commercial companies, as measured by their real rate of return on physical capital, had declined in recent years. The aim of the present article is to develop a comparable measure of the 'cost of capital' – that is, the cost to the company of the finance needed to acquire the physical capital. If profitability and the cost of capital are measured in a consistent manner, the relationship between the two should give a guide to companies' incentive to invest in new physical capital.

It is suggested that neither interest rates nor the cost of equity finance alone provide a good measure of the cost of capital, particularly in an inflationary period, and the measure proposed is therefore intended to relate to the cost of all sources of finance. Such a measure is necessarily somewhat imprecise, but suggests that the real post-tax cost of capital halved during the 1960s, from nearly 9% to around 4% per annum, before rising again in the last two years to around 5½%. Profitability also declined during the 1960s – perhaps a little faster than the cost of capital – but has subsequently fallen much further. This changing relationship between profitability and the cost of capital would be one way of explaining the low volume of investment in recent years.

Among other factors which have recently tended to deter investment, it is noted particularly that the fall in profits has deprived companies of (cheaper) internal finance, that inflation has substantially raised nominal interest charges, and that insufficient profits are preventing many companies from taking full advantage of investment incentives in the form of tax reliefs.

Interest rates as indicators of the cost of capital

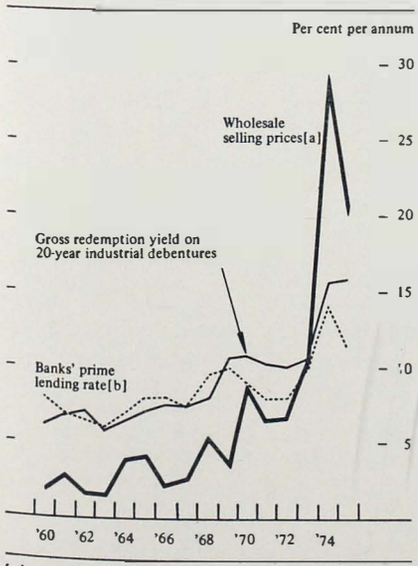
Long-term interest rates have often been used to indicate the 'cost of capital' to companies. The chart shows changes since 1960 in the redemption yield on industrial debentures with twenty years to maturity. From 1960 to 1965 the yield stayed around 6%–7% per annum but then rose to 10% in 1969, where it remained until 1973; there was then a sharp rise to 16% in 1974 and 1975. However, in calculating the effects of these increases in nominal interest rates on the cost of capital, account should also be taken of the contemporaneous rise in the rate of inflation.

If the expected rate of inflation over any given period exceeds the nominal interest rate for loans of a similar term, it should in principle be profitable to borrow merely to hold physical stocks during that period, unless the price of the goods in question are not expected to rise as fast as prices in general, or unless the goods are costly to store. Some (rather weak) evidence that stockbuilding is in part influenced by movements in short-term real interest rates is provided in a number of econometric studies. [2]

Decisions to invest in fixed assets should depend on inflationary expectations and the expected cost of borrowing over the whole life of the project. As with short-term borrowing, expected inflation will increase the expected return from investment in money terms; but although this will tend to offset the discouragement of having to pay high rates of interest, the borrower has to take two considerations into

Chart A

Inflation and nominal interest rates



[a] Percentage change through the year.
[b] Bank rate +2% up to 1972; thereafter, clearing banks' average base rate +2%.

[1] March *Bulletin*, page 36.
[2] See, for example, P. K. Trivedi 'Inventory Behaviour in UK Manufacturing, 1956–67', *Review of Economic Studies*, October 1970. The Bank and Treasury models of the economy each incorporates a relationship between stockbuilding, interest rates and price movements.

account. First, by raising nominal interest rates, inflation effectively shortens the life of 'long-term loans': interest payments will normally be constant in money terms throughout the life of the loan, whereas revenue will rise with inflation; even if revenue comfortably exceeds interest payments over the whole period, cash flow may well be negative in the earlier years, thus requiring refinance at uncertain interest rates – and lenders could be reluctant to accommodate a company with cash flow problems. Second, the relevant expectations of inflation relate to an average rate over the whole term of the loan. Not only are these expectations unobservable, but they are also unlikely to be held with any great confidence, so that even if long-term interest rates are low compared with the current rate of inflation, borrowing may still be discouraged by the possibility of a fall in the rate of inflation. If this were to occur early in the life of a loan, an apparently low 'real' rate of interest could become very high.

Table A
Effects of varying inflation on a 20-year project[a]
£ at current prices in roman type
£ at year 0 prices in italics

	Inflation continues at 20% per annum			Inflation falls to 5% per annum		
	Year 5	Year 10	Year 20	Year 5	Year 10	Year 20
(1) Price level (1 in year 0)	2·49	6·19	38·34	1·61	2·06	3·35
(2) Bond's market value	100	100	100	139	132	100
(3) Bond's real value [(2)/(1)]	*40·2*	*16·2*	*2·6*	*86·3*	*64·1*	*29·9*
(4) Real return	*5*	*5*	*5*	*5*	*5*	*5*
(5) Nominal return [(4)×(1)]	12·5	31·0	191·7	8·1	10·3	16·8
(6) Nominal interest payment	15	15	15	15	15	15
(7) Nominal cash flow [(5) – (6)]	– 2·5	+ 16·0	+176·7	– 6·9	– 4·7	+ 1·8
(8) Real cash flow [(7)/(1)]	– *1·0*	+ *2·6*	+ *4·6*	– *4·3*	– *2·3*	+ *0·5*

[a] For assumptions, see text.

The example in Table A is based on a 20-year bond with a 15% coupon, used to finance a project on which the return is initially £5 per annum, but thereafter grows with inflation. Figures are given for the fifth, tenth and twentieth years of the project, with two assumptions about the intervening rate of inflation and nominal rate of interest: first, that inflation stays at 20% per annum and market interest rates at 15% throughout; second, that the rate of inflation falls, averaging 10% per annum for the first five years and 5% per annum thereafter, while interest rates fall to 10% by the fifth year. The upper part of the table shows that in each case the real value of the bond declines quite sharply, although the fall is less steep when inflation slows down, because of the smaller rise in prices and the effect of lower interest rates on the market value of the bond.

More important perhaps is the picture shown by the last two lines of the table. If inflation continues at 20% per annum, cash flow is initially negative but becomes positive in the seventh year, and in the twentieth year alone is more than sufficient to redeem the bond – as might be expected with a negative real interest rate of 5% per annum. But the position is very different if inflation moderates. The cash flow remains negative until the eighteenth year (before allowing for interest on the accumulated deficit), and there is no possibility of redeeming the bond out of the returns on the project. In sum, for a borrower seeking to avoid risks, the *possibility* of a significant fall in the rate of inflation will raise the subjective real cost of long-term fixed-interest debt far above the difference between current nominal rates of interest and high current rates of inflation. Thus, leaving aside questions of preferred capital structure, it is not surprising that companies should be reluctant to raise long-term capital in the form of fixed-interest borrowing while considerable uncertainty about future rates of inflation persists. Moreover, such uncertainty is likely to be especially pronounced when the rate of inflation has been both historically high and unusually variable from year to year.

Equity finance

The uncertainty surrounding the likely rate of inflation is not the only reason for questioning the use of long-term interest rates as indicators of the cost of capital. For companies in aggregate, borrowed funds have not constituted more than around 30% of capital employed at historic cost: the rest of their capital is in the form of equity – largely built up from retained earnings. Estimates of the cost of capital, with which prospective returns on an investment may be compared, need to take account of the cost of equity itself, and also of the way in which changes in the proportions of debt and equity in a company's balance sheet affect the riskiness of their respective yields, and hence their market valuation. The simplest theoretical model of this interaction is that of Modigliani and Miller,[1] who demonstrate that under certain conditions the rate at which the market discounts a company's *total* returns is independent of the pattern of financing. In this case, the best estimate of the cost of capital would be a simple weighted average of the direct cost of each. But this theory is open to a number of objections about the assumed perfection of capital markets, the effects of certain taxes, and the problem of bankruptcy. These questions have been discussed by Stiglitz[2] and, with specific reference to the United Kingdom, by King[3] and Glyn.[4] However, Stiglitz and King assume that the rate of future price rises is known, which is not generally true. Inflation, especially when unanticipated, transfers real wealth from a company's debenture holders to its equity holders, and this particular problem can be overcome by combining the cost of the two types of capital in a way similar to that suggested by the Modigliani-Miller theorem (although less restrictive assumptions are necessary). This approach still has its limitations through ignoring other relevant factors, such as the availability of internal funds (which may provide a cheaper source of finance), these are discussed later.

But before describing how the total cost of capital can be derived in this way, it may be useful to illustrate the inadequacy of certain measures based on equity yields, which are often presented as being in 'real terms'. This can be done by assuming that a company has some long-term fixed-interest debt outstanding; that its current dividends and current and future real profits (before interest)[5] are given; and that the real cost of equity capital, i.e. the rate at which the market discounts expected real returns to shareholders when determining the share price, is fixed. An increase in the expected rate of inflation would reduce the real value of future interest payments due on the outstanding long-term loans. This would raise the present value of future equity earnings as, by assumption, expected future real profits are unchanged while future real prior charges fall. The price of ordinary shares should therefore tend to rise so that, as neither current dividends nor earnings have changed, the dividend and the earnings yields will each be reduced – even though, by assumption, the real cost of equity capital is unchanged. Thus, these equity yields are, in principle, as vulnerable to changes in expected inflation as is the 'real' cost of long-term debt.

A comprehensive earnings yield

A general measure of the cost of capital to a company, in which equity finance and borrowing are considered together, thus has two advantages. First, it combines the cost of the two major elements of company finance. Secondly, to the extent that inflation tends to make debt seem more expensive than it really is, and equity seem cheaper, an

[1] F. Modigliani and M. Miller, 'The Cost of Capital, Corporate Finance, and the Theory of Investment', *American Economic Review*, June 1958.

[2] J. E. Stiglitz, 'A Re-examination of the Modigliani-Miller Theorem', *American Economic Review*, December 1969.

[3] M. A. King, 'Taxation and the Cost of Capital', *Review of Economic Studies*, January 1974.

[4] Andrew Glyn, 'The Stock Market Valuation of British Companies and the Cost of Capital 1955–69', *Oxford Economic Papers*, July 1973.

[5] Real profits are defined as in the earlier article on trends in company profitability, i.e. profits adjusted for the effects of inflation on current cost principles.

important source of distortion in each separate measure is eliminated by considering them together. The overall cost of capital is the rate at which the company's future earnings are discounted by the capital market in valuing the securities on which those earnings will accrue – whether in the form of interest, dividends, or retentions. This discounted value of the future earnings of a company is the sum of the market values of its equity, preference shares, long-term debt, bank borrowing, and other borrowing. The cost of capital is therefore the discount rate at which this financial valuation equals the present value of future earnings. Unfortunately, expectations of future earnings are unobservable; and relevant future earnings are restricted to those on the *existing* volume of capital, which is itself an elusive concept. The simplest assumption, also made by Helliwell et al.,[1] is that expected real earnings on the existing capital stock (and any replacements) in all future years are equivalent to earnings in the current year. The ratio of current earnings to the financial valuation of companies then gives a measure of the ***real*** cost of capital. This approach requires no explicit allowance for inflation: if increases in money earnings due to inflation were taken into account, the resulting discount rate would be a measure of the nominal cost of capital.

Details of the calculation of the cost of capital on this definition are set out in the appendix. Estimates of the financial valuation of all industrial and commercial companies are not directly available and were made as follows. The market values of ordinary shares, preference shares, and long-term loans at the end of each year were estimated by dividing the corresponding annual dividend or interest payments by the yields on such assets as measured by the appropriate FT index.[2] To the value of these corporate liabilities was added the stock of bank advances to industrial and commercial companies; other borrowing by companies was ignored because comprehensive figures are not available, and those that are show that such borrowing, although large in gross terms, is balanced by a similar amount lent by companies.[3] The total obtained represents the market valuation of earnings by all companies, whether from domestic physical assets, financial assets, or overseas assets. For comparison with the rate of return on physical capital stock, only a valuation of earnings from the first set of assets is relevant. The total financial valuation is therefore reduced by the value of companies' financial assets (for which their holdings of liquid assets are a good

Table B
Financial valuation of industrial and commercial companies
£ millions

	Market value of companies' liabilities				Total	Companies' liquid assets	Proportion of income arising in the United Kingdom[a]	Financial valuation of earnings on domestic physical capital
	Ordinary shares	Preference shares	Debentures	Bank advances				
	(1)	(2)	(3)	(4)	(5) = (1)+(2)+(3)+(4)	(6)	(7)	(8) = [(5) – (6)] × (7)
End-year								
1960	20,120	1,725	1,654	1,965	25,464	3,320	0·799	17,693
1961	18,951	1,618	1,696	2,170	24,435	3,314	0·768	16,221
1962	23,995	1,829	2,440	2,470	30,734	3,320	0·760	20,835
1963	30,524	1,848	2,920	3,042	38,334	3,699	0·779	26,981
1964	29,304	1,814	2,924	3,781	37,823	3,696	0·769	26,243
1965	31,481	1,797	3,138	4,240	40,656	3,675	0·761	28,143
1966	25,975	1,638	4,558	4,409	36,580	3,577	0·766	25,280
1967	34,923	1,562	4,968	4,692	46,145	4,050	0·756	31,824
1968	46,243	1,292	4,948	5,071	57,554	4,311	0·728	38,761
1969	40,383	996	4,671	5,737	51,787	4,112	0·685	32,657
1970	33,275	742	5,223	6,747	45,987	4,257	0·663	27,667
1971	47,340	911	6,334	7,329	61,914	5,283	0·669	37,886
1972	56,330	774	6,112	10,319	73,535	7,458	0·650	42,950
1973	50,274	615	5,290	15,120	71,299	9,795	0·534	32,843
1974	21,800	499	3,788	18,834	44,921	9,685	0·472	16,631
1975[b]	47,100	600	4,500	19,800	72,000	12,000	0·52	31,000

[a] Ratio of UK trading income to UK trading income plus overseas earnings.
[b] Provisional estimate.

[1] J. Helliwell, G. Sparks and J. Frisch, 'The supply price of capital in macroeconomic models' in *Econometric Studies of Macro and Monetary Relations*, edited by A. A. Powell and R. A. Williams (London: North Holland, 1973).

[2] This method was also used by J. H. Ciccolo, 'Money, Equity Values and Income', *Federal Reserve Bank of New York Research Paper 7421*, October 1974.

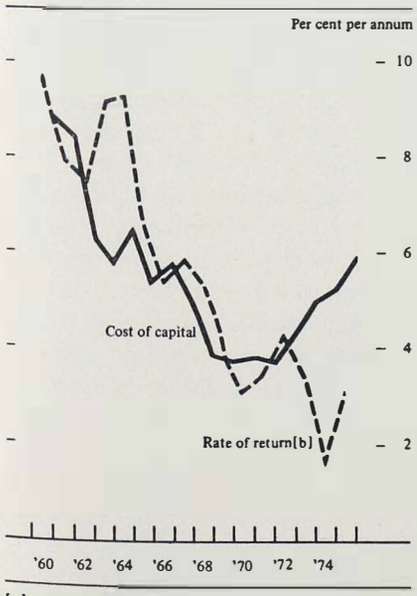
[3] See *Business Monitor* (M_3), which shows that 'trade and other debtors' mostly offset 'trade and other creditors'.

Table C
Post-tax real cost of capital, 1960–1975

Per cent per annum End-year	
1960	8·8
1961	8·4
1962	6·4
1963	5·8
1964	6·5
1965	5·4
1966	5·8
1967	5·0
1968	3·9
1969	3·8
1970	3·9
1971	3·8
1972	4·4
1973	5·0
1974	5·3[a]
1975[b]	5·9[a]

[a] After allowing for tax relief on stocks as described in the appendix.
[b] Provisional estimate.

Chart B
Post-tax real cost of capital and rate of return, 1960–1975 [a]



[a] After allowing for tax relief on stocks as described in the appendix.
[b] Forward-looking.

proxy), and then multiplied by the ratio of UK trading income to the sum of UK trading and overseas income (thus excluding overseas assets). [1] The resulting estimates are set out in Table B.

The earlier article on profitability has already described the measurement of industrial and commercial companies' earnings on physical capital, both before and after tax;[2] in the latter case, taxes payable by the recipients of interest and dividends are deducted as well as direct corporate taxation. Because the valuation of companies' securities should reflect the stream of post-tax earnings, the ratio of these earnings to the financial valuation gives a post-tax measure of the cost of capital (shown in Table C and Chart B). The meaning of the cost of capital before tax is less clear: it could be measured in a number of ways, two of which are discussed in the appendix.

Although the above estimates are no more than broad approximations and should therefore not be regarded as exact or definitive, they should nevertheless be a better guide to the cost of capital than nominal or real interest rates or equity yields (which are more commonly used). The smallness of the changes in this comprehensive measure from year to year is most striking, and contrasts sharply with the wide fluctuations which have occurred in interest rates and equity yields.

The estimates show a clear fall in the cost of capital in the 1960s, from nearly 9% per annum in 1960 to below 4% in 1968; but after fluctuating narrowly around 4% until 1971, the cost of capital appears to have risen again to around 5½% in the last two years. This rise could have resulted from greater uncertainty (e.g. about future rates of inflation or possible changes in government policy) which would be likely to increase the yield at which investors are prepared to lend to companies – even though the rate which they would seek on risk-free investments might not have changed. Also, tax relief on stocks could, paradoxically, have produced a rise in the measured cost of capital if investors were not inclined to treat it as a permanent reduction in taxation, because the financial valuation would then have risen less than post-tax profits. [3]

Glyn [4] derived a weighted average post-tax cost of capital of 4·5% for 1962-69. Although his figures do not indicate the downward trend shown above, it is notable that the average of the figures in Table C for the same period is about 5%. Glyn's estimates are based on a totally different method, relying on a comparison of data for 100 or so companies to measure the total cost of various sources of finance, including the effect on equity prices of increased borrowing. It is therefore encouraging that the results are broadly consistent.

Relative profitability and the valuation ratio

It was suggested earlier that the incentive for companies to invest might depend on prospective profitability relative to the cost of capital. Both are shown in Chart B, where profitability is measured by the forward-looking rate of return, [5] derived consistently with the estimates of the cost of capital (figures for 1974 are very unreliable because of problems in dealing with stock relief, and little significance should be attached to them – see the appendix). Each measure shows a downward trend in the 1960s, but whereas the cost of capital has subsequently risen somewhat, profitability has on balance declined further. Thus, *relative* profitability – defined as the ratio of the rate of return to the cost of capital – has fallen in the 1970s.

[1] It is assumed that the market values overseas and domestic earnings in the same way.
[2] Two measures of post-tax earnings were derived, one forward and one backward-looking. Only the former is considered here, as the aim is to relate profitability and the cost of capital to investment decisions.
[3] Nevertheless, stock relief did, in fact, increase the incentive to invest by raising profitability relative to the cost of capital.
[4] See footnote [4] on page 195.
[5] March *Bulletin*, page 42.

Table D

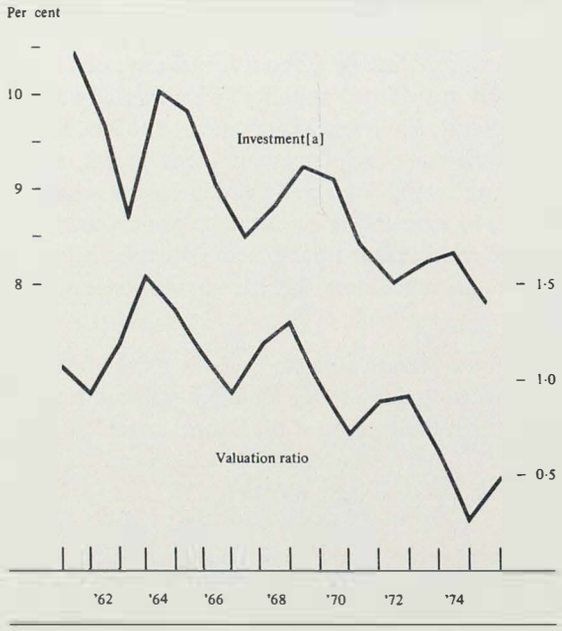
Ratio of financial valuation to replacement cost of capital, 1960–1975

End-year	
1960	1·07
1961	0·94
1962	1·19
1963	1·55
1964	1·36
1965	1·13
1966	0·92
1967	1·17
1968	1·32
1969	0·98
1970	0·71
1971	0·88
1972	0·93
1973	0·64
1974	0·29
1975[a]	0·48

[a] Provisional estimate.

Chart C

The 'valuation ratio' and investment



[a] Industrial and commercial companies' gross domestic fixed-capital formation as a percentage of capital stock (at replacement cost).

As the rate of return is the ratio of profits to physical capital employed valued at replacement cost (each adjusted for tax), while the corresponding cost of capital is the ratio of the same profit figure to the financial valuation of companies, relative profitability is simply the ratio of the financial valuation to the tax-adjusted replacement cost of capital. Table D and Chart C show the end-year values of this 'valuation ratio'. The ratio moves much more cyclically than does the cost of capital, because the capital market tends to adjust its financial valuation of companies in line with movements in their real profits, whether these are seen in retrospect to have been cyclical or more permanent. Apart from cyclical movements, the valuation ratio shows a clear downward trend, which has accelerated in recent years; by 1975 the financial valuation of companies' earnings on their physical capital was only around half the cost of replacing those assets with similar (part-worn) assets.

The valuation ratio and fixed investment

The role of the valuation ratio as a determinant of investment has been emphasised by Tobin and used in empirical studies on US data by Ciccolo.[1] The ratio is seen as measuring the divergence between the demand and supply prices of capital goods. On this basis, investment should be expected to occur when the demand price, as reflected in financial valuations, exceeds the supply price, as measured by estimates of the replacement cost of physical capital, i.e. when the valuation ratio exceeds unity. The same point was made forty years ago by Keynes: '[financial valuations] inevitably exert a decisive influence on the rate of current investment. For there is no sense in building up a new enterprise at a cost greater than that at which a similar existing enterprise can be purchased; whilst there is an inducement to spend on a new project what may seem an extravagant sum, if it can be floated off on the Stock Exchange at an immediate profit'.[2]

On this argument, there will be powerful forces tending to restore the valuation ratio to unity whenever it has moved above or below that point (though it should be stressed that the ratio cannot be measured accurately, so that any apparent divergence from unity must be treated with caution).[3] However, this process may take a considerable time because it depends mainly on the capital stock being increased or reduced by changes in the rate of investment – and there are difficulties and costs attached to rapid adjustment. The equilibrium towards which the capital stock is being adjusted is therefore likely to change (e.g. in response to technical progress, or to changes in tastes or in government policy) before the original equilibrium is reached; and the valuation ratio can accordingly be expected to diverge from unity more or less permanently. The response of aggregate investment to the aggregate ratio will also depend on the extent to which different industries find themselves in different situations. A particular industry's valuation ratio may exceed unity while the aggregate ratio is below it, and the industry in question would thus continue to invest.

Investment is no doubt more commonly assessed by comparing expected rates of return to the cost of capital, but to estimate each of these separately requires satisfactory measures of expectations. In the method used above to estimate the cost of capital, this problem is tackled by assuming that future real earnings from the existing physical capital will be the same as current real earnings. As earnings in any one year may be influenced by many factors, this assumption is not likely to be very realistic. For industrial and commercial companies as a

[1] James Tobin, 'A General Equilibrium Approach to Monetary Theory', *Journal of Money Credit and Banking*, February 1969. Ciccolo (see footnote [2] on page 196), page 21. See also Tobin, 'Monetary Policy in 1974 and Beyond', *Brookings Papers on Economic Activity 1, 1974*; and Barry Bosworth, 'The Stock Market and the Economy', *Brookings Papers on Economic Activity 2, 1975*.

[2] J. M. Keynes, *General Theory of Employment, Interest and Money* (London: Macmillan, 1936), page 151.

[3] For example, the financial valuation reflects earnings arising from the ownership of land, but no measure of land values can be incorporated in the physical capital stock; this particular omission gives an upward bias to the ratio.

whole, many factors affecting individual companies will tend to cancel out, but not all (e.g. cyclical factors). It is equally difficult to measure the prospective rate of return on new investment. The rates of return estimated in the earlier article relate current profits to the existing capital stock, but it is expected future earnings on new investment which are required. No allowance can be made for the fact that the profitability of additions to the capital stock may be different from the profitability of the existing stock, beyond assuming that there is a stable ratio between the two, so that the latter provides a useful proxy for the former.

However, the problem of measuring expected future earnings may be unimportant as far as influences on investment are concerned if, as suggested above, the incentive to invest is related to the *ratio* of prospective profitability to the cost of capital. Both of these items are ratios with expected profits in the numerator, so that any error resulting from the use of current profits as a measure of future profits affects each item in the same proportion.[1] The fact that such errors cancel out means that *relative* profitability, and the incentive to invest, can be estimated with greater confidence than the *absolute* level of either the cost of capital or prospective profitability. As has already been shown, relative profitability thus defined is equal to the valuation ratio, and the attraction of the hypothesis relating this ratio to investment lies in the fact that it can be measured without needing to solve the problem of estimating expected earnings.

The similarity between the changes in investment and the valuation ratio as shown in Chart C suggests that a relationship exists between the two variables: both have moved cyclically about a falling trend, with investment appearing to follow the valuation ratio. According to a preliminary econometric investigation, the valuation ratio itself goes a long way towards explaining the quarterly movements in industrial and commercial companies' investment, and is a slight improvement on a version of the traditional 'accelerator model' in which investment is determined by changes in output and the size of the existing capital stock. When the valuation ratio is divided into its two components – the financial and the replacement cost valuations of the capital stock – the explanation of investment is further improved; and the inclusion of variables to measure output only slightly adds to its explanatory powers.

Further work is in progress to determine the relative merits of these two methods, and to examine whether they can be combined in some way. It is not surprising that discrimination between the two is difficult: higher output and capacity utilisation tends to raise profits and has therefore been associated with a higher financial valuation. But output, profits and the financial valuation could well diverge in the future, and an assessment of their respective influence on investment would then become important.

Other factors affecting investment

The recent fall in investment may owe something to low output and to low profitability – it is difficult to isolate the effects of one from the other – but several other factors also need to be considered: in particular, the decline in the availability of (cheaper) internal finance stemming from the fall in profits; higher nominal interest rates which create cash flow problems for companies even when 'real' interest rates are low; and the inability of companies to take full advantage of fiscal investment incentives, again because of insufficient profits. It is particularly in the last two or three years that these deterrents to investment have become critically important.

[1] Two caveats should be stated. First, the errors cancel out exactly only if profits are expected to be the same in all future years; but for companies as a whole, this condition is likely to be met closely enough for any remaining errors to be trivial. Second, future earnings relevant to the cost of capital are those expected by marginal purchasers of company securities, whereas earnings relevant to expected profitability are those expected by company managements. Where these groups of people are not identical, expectations could differ, but there is little reason to believe any such difference to be systematic.

Table E
Industrial and commercial companies: financial surpluses and investment, 1960–1975

£ millions

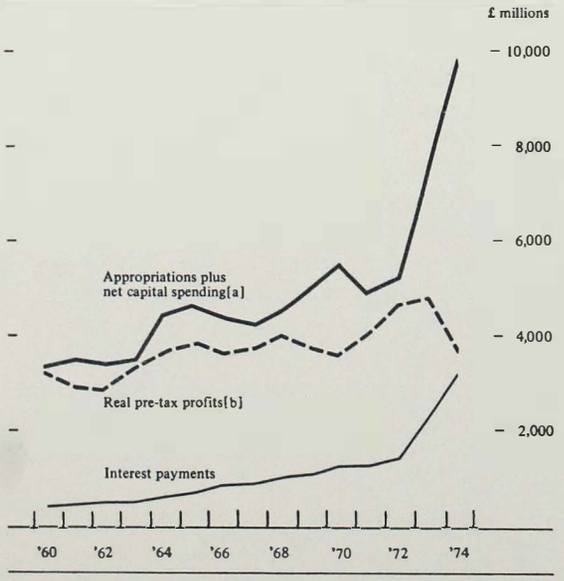
	'Net savings'[a]	Net fixed investment	Value of physical increase in stocks	Financial surplus (+)/ deficit (–)
1960	1,665	874	566	+ 225
1961	1,242	1,056	246	– 60
1962	1,001	1,004	– 23	+ 20
1963	1,476	885	170	+ 421
1964	1,765	1,237	654	– 126
1965	1,687	1,292	457	– 62
1966	1,351	1,178	267	– 94
1967	1,493	1,076	206	+ 211
1968	1,876	1,243	354	+ 279
1969	1,700	1,489	353	– 142
1970	1,178	1,644	433	– 899
1971	1,489	1,508	– 94	+ 75
1972	1,944	1,577	– 166	+ 533
1973	2,493	2,089	822	– 418
1974	543	2,723	1,079	–3,259
1975[b]	1,042	3,009	–1,631	– 336

[a] Saving net of capital consumption, stock appreciation and taxes on capital, plus capital transfers.

[b] Provisional estimates.

Chart D

Profits, appropriations and net capital spending



[a] Tax, interest and dividend payments plus capital spending net of capital consumption and stock appreciation.

[b] Gross trading profits and rent, net of capital consumption and stock appreciation.

Internal finance

So far, it has been implicitly assumed that firms are indifferent as to whether internal or external finance is used. Although dividends will have to be paid in future on retained earnings, companies may nevertheless have reason to prefer internal finance. Quite apart from a natural managerial wish to avoid the scrutiny which outside financing entails, taxation may affect the choice to be made between the two types of finance. King[1] provides a detailed account of such considerations in respect of UK companies and suggests that the cost of capital could rise steeply when external finance is used.

Under these circumstances, measures of the cost of capital such as the one derived above, which underlies the valuation ratio, do not tell the whole story. If internal funds are the cheapest form of finance, the relevant marginal cost of capital will depend on the amount of planned investment relative to the available internal funds. If planned investment is larger, it has to be re-evaluated in the light of the (higher) cost of external funds; if worthwhile investment still exceeds available internal finance, external capital will be raised, while in intermediate cases investment will be constrained by available internal funds. The incidence of this constraint cannot be deduced from aggregate data – although this may, in fact, not be a serious problem in empirical studies because the relationship of investment to internal funds will be smoother (though not linear) for companies as a whole than for individual firms.

The first column of Table E shows the amount of retained earnings available to companies for net investment, after providing for replacement investment and stock appreciation; these two items are deducted because they represent the first call on retentions and enable companies to maintain their existing scales of activity. To the extent that net investment exceeds these 'net savings', companies will, in aggregate, be in financial deficit, and will need to raise additional external finance (or to reduce their holdings of financial assets). In many years companies have actually been in surplus, and on average had only a very small deficit from 1960 to 1973, although net capital expenditure on fixed assets and stocks (at current prices) totalled more than £22,000 million over the fourteen years. But in 1974, when net savings dropped sharply because of the decline in profitability, companies required external finance for most of their net investment. Recourse to further external finance was much reduced in 1975, but only because of a sharp cutback in net investment: fixed investment fell in real terms and stocks were rapidly run down.

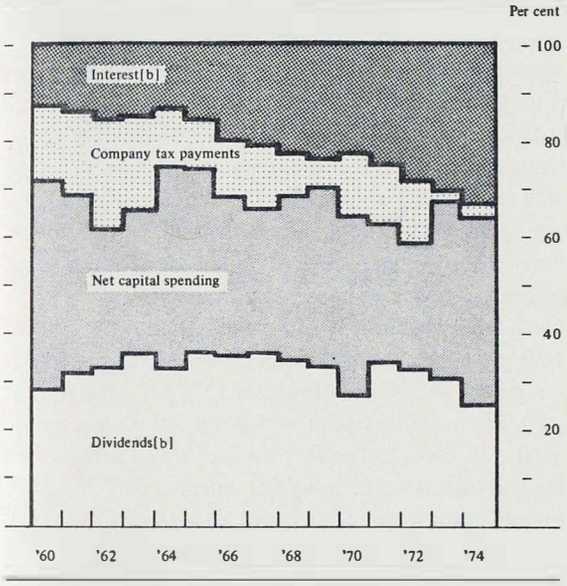
The recent shortage of internal finance reflects the growing pressure upon companies' real earnings. Chart D shows how industrial and commercial companies' real profits (including rent), after deducting stock appreciation and capital consumption, but before tax and interest, grew only modestly from 1960 to 1973, and fell sharply in 1974. This measure of profits (derived in the earlier article) represents the best available estimate of companies' 'real income', i.e. the amount available, along with non-trading income and income from abroad, for distribution to creditors (as interest), to the Government (as taxation) and to shareholders (as dividends), while maintaining the real value of the companies' assets. To the extent that these distributions leave a surplus of income, firms are retaining profits to finance net investment. If the real rate of return had not fallen, profits would have remained almost large enough to cover net capital spending as well as dividends, interest and tax payments, even though, as can be seen from the top line in the chart, total demands on income have grown sharply in recent years.

Much of this increase stems from the rising burden of nominal interest payments. Chart E shows how the relative size of various company outgoings has changed markedly during the period 1960–74:

[1] See footnote[3] on page 195.

Chart E

The distribution of appropriations and net capital spending[a]



[a] To provide a consistent series, investment grants have been treated as negative taxation, and advance corporation tax in 1973 and 1974 has been treated as a tax on dividends and excluded from company tax payments.

[b] Gross of tax.

Table F
Debt ratios

Per cent

End-year	Ratio of borrowing to capital employed[a] Nominal	Market	Ratio of bank advances to total borrowing[b]
1960	14·1	9·7	31·3
1961	13·8	9·7	33·9
1962	17·9	14·5	32·8
1963	19·6	16·5	35·5
1964	21·4	17·9	39·9
1965	21·7	17·9	40·9
1966	24·9	21·5	37·6
1967	25·4	21·5	37·5
1968	25·8	19·7	37·6
1969	24·0	18·8	42·8
1970	25·2	19·5	44·4
1971	21·0	19·5	47·9
1972	21·0	18·6	55·8
1973	25·0	19·5	62·4
1974	27·7	19·5	65·0
1975[c]	20·9	16·1	69·1

[a] Ratio of outstanding debentures, loan stocks, preference shares, and bank borrowing net of liquid assets, to the (backward-looking) tax-adjusted capital stock at replacement cost. Debentures, loan stocks and preference shares are at nominal or market values as indicated.

[b] Ratio of bank advances to total nominal indebtedness.

[c] Provisional estimates.

the share of dividends has recently fallen, reflecting both statutory limitations and a response to the decline in real profits; interest payments have risen sharply with increased borrowing and higher nominal interest rates; and tax payments, after growing little in the early 1970s, fell sharply in 1973 and 1974. This fall occurred not because of the introduction of stock relief (which did not affect tax payments until 1975), but because both interest and fixed investment are allowable against taxable profits, so that the rise in these two items relative to profits has reduced the share of profits, before interest, taken by taxes (see below).

Income-gearing and capital-gearing

The charts reveal the increasing pressure on industrial and commercial companies' cash flow, resulting from the growth of interest payments, which rose from 13% of pre-tax real profits in 1959 to 87% in 1974. Thus, companies' 'income-gearing', as measured by the ratio of interest payments to real pre-tax profits, rose more than sixfold over the period. But as was discussed earlier, high interest payments at a time of inflation represent in part – and often in full – a repayment of debt in real terms. Clearly, no company can disregard the obligation to make these payments, the need to finance them, and the uncertainty about the terms on which new finance might be available to cover any real repayment of existing debt. However, a company's concern about its high income-gearing should be eased by the effects of inflation on its balance sheet. A company which kept the nominal value of its borrowings constant while inflation raised the value of its assets would be reducing its gearing in balance-sheet terms, and its net worth would rise. But if, for example, its bank borrowing were allowed to rise in proportion to the value of its assets, the firm would be able to re-borrow part of its interest payment – or, indeed, a greater sum if the nominal interest rate were lower than the growth in the money value of its assets.

Thus, in an inflationary period a rather different picture of the burden of a company's borrowings is given by its 'capital-gearing', which may be measured by the ratio of its outstanding borrowing to the replacement value of its assets (adjusted for tax). Table F presents two such ratios for industrial and commercial companies, taking long-term liabilities at nominal and market values respectively. [1]

Total indebtedness as a proportion of capital employed has fallen on balance since 1967, but its composition has shifted heavily towards bank borrowing. Even taking the higher, nominal, valuation of other forms of debt, bank borrowing rose from 31% of total indebtedness at the end of 1960 to around 70% at the end of 1975, with most of the change occurring after 1971. This change in the pattern of borrowing would be a rational response to uncertainty about future rates of inflation, and hence about the *real* cost of long-term fixed-interest debt. The net effect is that companies have borrowed short rather than long, and have therefore had to rely on rolling over a growing amount of short-term debt while borrowing to cover their cash outflow as long as inflation, and nominal interest rates, have remained high. Because the availability and cost of this future borrowing are uncertain, this has almost certainly deterred investment, but the deterrent effect is exaggerated by focusing exclusively on 'income-gearing'.

Tax problems

By increasing the deductions which a company can make against profits for tax purposes, high nominal interest rates create another problem tending to depress investment. If allowable deductions reduce taxable profits to zero, companies will not be able to take full advantage of

[1] The method of estimating the nominal value of outstanding debt is set out in the appendix. The market values were estimated as in the calculation of the cost of capital.

Table G
Industrial and commercial companies: income and tax allowances, 1970–1974

£ millions	1970	1971	1972	1973	1974
Gross trading profits[a]	5,963	6,582	7,623	9,523	11,172
Rent and non-trading income	510	519	623	1,017	1,352
Total UK income	6,473	7,101	8,246	10,540	12,524
Depreciation[b] [c]	2,217	2,981	4,087	4,778	5,534
Interest	1,193	1,199	1,397	2,267	3,168
Stock relief[c] [d]	–	–	–	2,621	5,088
Total allowances	3,410	4,180	5,484	9,666	13,790
Allowances as a percentage of total	*53*	*59*	*67*	*92 (67)* [e]	*110 (69)* [e]

[a] Including stock appreciation.

[b] Amounts actually allowed (and therefore less than potential allowances).

[c] Allowances on both replacements of, and additions to, the capital stock. These are larger than the estimates used in the first article to calculate real post-tax profits, when attention was focused exclusively on returns on the existing capital stock, so that tax relief on net investment in fixed assets and stocks was ignored.

[d] Increase in book value of stocks, less 10% of gross trading profits (less short-term interest).

[e] Excluding stock relief.

fiscal incentives to invest – even though their reported earnings may be unaffected under the system of deferred taxation accounting. Data on individual firms would be needed to measure such 'profit exhaustion', but a broad indication is given in Table G.

Even though the figures understate potential allowances, for industrial and commercial companies as a whole they exceeded total income in 1974, suggesting that a large number of individual companies were in such a position. Indeed, many companies are known to have had no mainstream corporation tax liabilities on profits earned at that time. If allowable deductions exceed income, they can be carried forward – and in some cases backwards. Thus, the benefits of excess allowances are usually deferred and their value is thereby reduced by an amount which depends on the company's nominal discount rate and the length of time before tax is due to be paid. If this period were as long as five years (which is unusual but by no means unknown), and the discount rate were 10% per annum, £100 of tax relief accruing now would be valued at only £62; at a discount rate of 15% per annum, the value would fall to £50. The total loss of effective tax relief on interest would raise the net cost of borrowed funds from the rate of interest less corporation tax to the rate of interest itself. With corporation tax at 52%, the relevant cost of capital could thereby be doubled.

Conclusion

Throughout the 1960s, the cost of capital on the measure presented in this article fell fairly rapidly and continuously. It tended to move broadly in line with the real rate of return on capital (as measured in the previous article), and in most years the cost of capital was below the rate of return. After a period of relative stability from 1968 to 1971, the cost of capital has subsequently risen as the market valuation of companies has fallen even more markedly than their current earnings – perhaps reflecting increased uncertainty about future profitability. On the other hand, the rate of return continued to fall until 1974; and on the argument of the present article, this relative movement must have led to a reduction in investment by industrial and commercial companies. Three factors which must also have discouraged investment in the last few years were discussed in the final sections of the article.

No attempt has been made here to consider fully the policy implications of these results. But it is clear that a recovery of profitability could not fail to stimulate investment – both by affecting the comparison with the cost of finance, and by reducing or eliminating the importance of the other factors discussed.

Real earnings

£ millions

	Pre-tax [a]	Post-tax [b]	
1960	3,208	1,558	
1961	2,988	1,364	
1962	2,904	1,330	
1963	3,346	1,571	
1964	3,722	1,706	
1965	3,833	1,521	
1966	3,616	1,467	
1967	3,777	1,594	
1968	4,052	1,515	
1969	3,795	1,233	
1970	3,638	1,091	
1971	4,085	1,456	
1972	4,706	1,883	
1973	4,817	1,637	*2,492* [c]
1974	3,686	– 149	*1,915* [c]
1975 [d]	3,575	195	*1,831* [c]

[a] Gross trading profits plus rent less stock appreciation and capital consumption.
[b] Forward-looking definition (see March *Bulletin*, page 41).
[c] Figures in italics take account of tax relief on stocks.
[d] Provisional estimates.

Appendix

Sources and methods

This appendix identifies the data used in this article and outlines the derivation of the series underlying the calculations of the cost of capital and the valuation ratio.

Data and sources

Annual data on industrial and commercial companies are used throughout, unless otherwise indicated.

Data	Source	Description
Dividends on ordinary shares	Blue Book, [1] Table 35	Sources and Methods, [2] page 210
Other dividends, debenture and loan interest:		Blue Book, pages 111 and 112, for a discussion of the imputation system
Industrial and commercial companies	Blue Book, Table 35	
All companies (by category)	Blue Book, Table 32	
Dividend yield on ordinary shares (FT-Actuaries industrial 500 shares)	*Financial Statistics*; Bank of England *Statistical Abstract*	*Financial Statistics* Notes and Definitions (April 1975), page 39 *Guide to FT Statistics* 2nd Revised Edition, page 10
Dividend yield on preference stocks		
Redemption yield on 20-year debentures		
Bank advances	Bank of England *Quarterly Bulletin*	
Liquid assets	*Financial Statistics* 'Selected liquid assets of industrial and commercial companies'	*Financial Statistics* Notes and Definitions (April 1975), page 30
Nominal debt values	*The Stock Exchange Fact Books*	

The derivation of the cost of capital

The cost of capital is defined as the rate at which future earnings are discounted by the capital market; it is estimated as the ratio of real post-tax profits to the market (financial) valuation of the capital stock. The derivation of the earnings series is described in detail in an article in the March *Bulletin* (page 45), and estimates are reproduced here. The calculation of the financial valuation is described below.

The financial value of the capital stock

This is the sum of companies' financial liabilities, i.e. equity, loans, preference shares and bank advances, all valued at market prices. Estimates of the first three can be made from published information on dividend and interest payments by industrial and commercial companies, and on the yields on equity, preference stocks, and debentures. The method – derived by Ciccolo [3] – is the same in each case and an example (for equity) is given below.

The dividend yield on ordinary shares in the FT-Actuaries index is calculated as the ratio of dividends to the market value of the equity of the companies covered by the index; dividends are gross of tax and refer to the total in the year up to and including the most recently declared. Assuming that the average yield on the equity of this group of companies is typical of industrial and commercial companies as a whole, the market valuation at the end of any year is given by the total of dividends paid by these companies in that year, divided by the published dividend yield for the end of the year. (To allow for the fact that the index is based on dividends announced and that payments will usually be made some weeks later, the average dividend yield for the fourth quarter of the year was used.)

The market values of preference shares and of debentures and loan stocks are derived in a similar manner.

The counterpart of industrial and commercial companies' total liabilities is the total market value of their assets but, as well as domestic physical capital, this includes their financial assets and overseas physical capital. However, the earnings

[1] *National Income and Expenditure 1964–74*, Central Statistical Office.
[2] Rita Maurice, ed, *National Accounts Statistics: Sources and Methods* (HMSO, 1968).
[3] See footnote [2] on page 196.

series relate only to domestic physical capital, so two further adjustments were made. First, holdings of liquid assets by these companies were subtracted from the total financial valuation; second, the resulting figure was multiplied by the ratio of profits to profits plus overseas income, to exclude overseas assets.[1]

Advance corporation tax

Before April 1973, dividends were recorded gross of personal tax in the national income accounts. Since then, they have been recorded net, with the corresponding advance corporation tax (ACT) allocated to company tax payments. Dividends on ordinary and preference shares paid after 6th April 1973 have therefore been divided by $(1 - t)$, where t is the personal tax rate, before calculating the market value. Also because of this change in company taxation, an abnormal number of dividends announced in 1972 were not paid until the following years; an adjustment has been made for this.

Dividends remitted abroad

These are included in profits due abroad in the appropriation accounts of industrial and commercial companies and must be added back to UK dividends on ordinary shares. Dividends remitted abroad are published in the *United Kingdom Balance of Payments* (Pink Book) (but a small adjustment is required to allow for a difference in coverage). They are recorded net of tax and have therefore to be divided by $(1 - t')$;[2] also, the totals for 1973 and 1974 have been adjusted to eliminate the 'bunching' of dividends in anticipation of ACT. The total thus derived for all companies was then allocated between industrial and commercial companies and financial companies in the same proportion as for UK dividends.

Debenture and loan interest and dividends on preference shares

These payments are published separately only for all companies. Estimates were based on the assumption that the shares of preference dividends and debenture interest in the category 'other dividends, debenture and loan interest' are the same for industrial and commercial companies as for all companies.

Tax relief on stocks

The introduction of tax relief on changes in the book value of stocks was announced in November 1974. This could not have been reflected in market valuations at the end of 1973 (even though in retrospect it affected post-tax profitability in that year), but was presumably fully discounted by the market at the end of 1975. The estimates of the cost of capital presented in the article accordingly make no allowance for stock relief in 1973, but take it fully into account in 1975. It is very difficult to assess the extent to which market valuations at the end of 1974 reflected the existence of stock relief. Even before it was announced, some investors may have anticipated a reduction of company taxation, but the markets in equities and fixed-interest stocks did not rise sharply until the New Year. It was decided to calculate the cost of capital at the end of 1974 as the average of post-tax profits before and after allowing for stock relief, divided by the end-year financial valuation. The figures for 1974 should therefore be regarded with great caution, as also should those for the post-tax rate of return which have been similarly treated. (In principle, the same problem arises with changes in corporation tax rates, which are usually announced retrospectively and may not have been anticipated; such changes are, however, quantitatively much less important.)

Alternative estimates and the nominal value of debt

The accuracy of the above calculations of market valuation clearly depends on whether the yields chosen are representative for all industrial and commercial companies. Revell[3] suggests that, because of their greater marketability, quoted companies' shares are traded at a significant premium over those of unquoted companies, i.e. that unquoted shares will generally yield more. Grossing up all companies' dividends by the yield on quoted shares may therefore overstate the value of equity.

Alternative market value estimates are published by the stock exchange, but these have two main drawbacks. First, the information relates only to listed companies registered within the United Kingdom, and is thus not comprehensive. Second, the subdivision of the total into industrial and commercial companies and financial companies can only be approximate (although the same problems apply to the compilation of national accounts data). The two sets of estimates generally move broadly in line, but the estimates from stock exchange data are consistently lower, presumably because of the more limited scope.

[1] The average of two ratios $Y/(Y+O)$ and $(Y+SA)/(Y+SA+O)$ was used, where Y is real pre-tax profits, SA is stock appreciation and O is income from abroad. An end-year estimate of the ratio has been interpolated.

[2] t' is the withholding tax on dividends remitted abroad, which was taken to be 15% before April 1973. Thereafter, the ACT rate has been used.

[3] J. R. S. Revell, *The Wealth of the Nation* (Cambridge: Cambridge University Press, 1967).

However, in spite of their limitations for the present purpose, stock exchange data are the only source of information on nominal debt values. Until 1972, data were available for March of each year: in order to widen the coverage and adjust to end-years, they have been multiplied by the ratio of end-year market values of debt (calculated as described above) to the market values computed from stock exchange data for the following March. Only the coverage adjustment has been necessary since 1972. This method is obviously crude, but further refinements would be unlikely to make much difference to the clear picture which emerges in Table F.

The cost of capital before tax

The cost of capital as estimated above is a post-tax measure, defined as the rate at which earnings are discounted by companies' owners and creditors, i.e. the recipients of post-tax earnings. Companies will, of course, take taxation into account in their investment decisions, to which the post-tax cost of capital will therefore be relevant.

A pre-tax measure could, however, be useful for some purposes such as the assessment of public sector investment projects. It was suggested in the earlier article that taxes on companies' earnings could be regarded as payments to the Government on their own share of capital employed – as measured by deferred taxation arising from investment in fixed capital or stocks. Consistently with this view, the cost of capital before tax can be calculated as the ratio of pre-tax earnings to the financial valuation plus the value of the deferred tax provisions.

It is, however, very difficult to evaluate deferred tax provisions. The backward-looking approach shown in the first column of the table simply adds to the financial valuation the actual amount of deferred taxation in companies' balance sheets (calculated as in the earlier article). But this approach treats deferred taxation as if it represented an actual amount due immediately to the Government. Such a view could conceivably be appropriate for a government attempting to measure the 'social' cost of capital. But the private owners of a company are more likely to regard deferred tax as a remote and contingent liability, and hence to value the earnings on that part of the capital stock financed by deferred taxation in the same way as earnings on the rest of the capital stock. This implies that a more forward-looking measure of the pre-tax cost of capital could be produced by dividing the pre-tax rate of return by the valuation ratio: the ratio of the rate of return to the cost of capital, and therefore the valuation ratio, is then the same both before and after tax.

Except in 1974 (when, as mentioned earlier, tax relief on stocks makes estimates very unreliable), the two series show some, but not much, similarity. Moreover, these are not the only possible methods of calculation. It would therefore be unwise to place too much weight on these figures: as markets do, in fact, take tax into account, the pre-tax cost of capital cannot be directly observed.

Two measures of the cost of capital before tax[a]

Per cent per annum

	Backward-looking	Forward-looking
1960	14·8	12·5
1961	14·4	12·2
1962	11·3	8·8
1963	10·4	7·4
1964	11·6	8·7
1965	11·6	9·9
1966	11·9	10·7
1967	10·1	8·5
1968	8·9	7·6
1969	9·3	8·7
1970	9·8	10·3
1971	8·4	8·3
1972	8·3	8·1
1973	8·6	10·2
1974	7·2	14·0
1975[b]	4·5	6·4

[a] For definitions, see text.
[b] Provisional estimates.