# *The Cost of Capital to Irish Industry**

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*Abstract:* This study reviews the theoretical background to recent discussions of the measurement of the cost of capital. Particular attention is paid to the correct specification of tax variables (including depreciation, allowances, and reliefs). There is a discussion of the alternative ways of treating the effects of price changes (capital gains or losses) on the cost of capital. A number of alternative measures of the cost of capital to Irish industry are presented. It is shown that the ratio of labour to capital costs has risen steeply over the period 1953–69, no matter which definition of the cost of capital is accepted. Estimates of the elasticity of substitution are presented on the basis of data for capital, labour, wages and the cost of capital for the period 1953–69. In conclusion the appropriateness of an industrialisation policy based on capital subsidies is questioned in the light of the evidence presented on the behaviour of the cost of capital in the post-war period.

## I. *Introduction*

THE effect of taxation on the cost of capital has been the subject of considerable discussion in recent years. This discussion has taken place largely in the context of the study of investment behaviour and, more recently, the study of corporate financial structure and policy. The concept of the cost or "rental price" of capital arises also in the general area of the demand for factors of production, so that its measurement is of considerable theoretical and practical relevance. In this Note we outline the main conclusions of the recent discussion on the issue, without attempting to provide a comprehensive survey. We present calculations of an index of the cost of capital to Irish industry for the years 1953–1969, using a number of the alternative measures that have been discussed. These alternatives are compared and related to the behaviour of the

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wage rate in the same period. As an illustration we test the sensitivity of estimates of the elasticity of substitution of labour for capital in Irish industry to the various specifications of the cost of capital. Finally we discuss briefly the policy implications of our Results.

## II. *Theoretical Background*

The explicit incorporation of tax variables into the neo-classical theory of investment was due to Jorgensen (1963 and 1965). In his basic model, a present value maximising firm chooses investment and labour hiring programmes over an infinite horizon, subject to the constraints of a smooth production function and exponential depreciation,[1] i.e.

$$\text{Max} \sum_{t=1}^{\infty} (p_t Q_t - w_t L_t - q_t I_t)(1+r)^{-t} \tag{1}$$

Subject to

$$Q_t = F(L_t, K_{t-1})$$

$$K_t = I_t + (1-d)K_{t-1}$$

where $Q$ is output, $L$ is labour, $I$ is investment goods, $K$ is the capital stock, $p$, $w$ and $q$ are the prices of output, labour and investment goods respectively, $d$ is the rate of depreciation and $r$ is the money rate of interest at which the firm is assumed able to borrow or lend any amount at any date.

Maximisation yields the conditions

$$\frac{\delta Q_t}{\delta L_t} = \frac{w_t}{p_t} \tag{2}$$

$$\frac{\delta Q_t}{\delta K_{t-1}} = \frac{q_t[r+d-\dot{q}_t/q_t]}{P_t} = \frac{C_t}{P_t} \quad (3) \tag{3}$$

where $\dot{q}_t = q_t - q_{t-1}$

and $C$ is the cost of capital (the "rental price" or "user cost").

If $\dot{q} = 0$, the numerator of (3) reduces to

$$C = q(r+d) \tag{4}$$

1. The presentation is based on Coen (1971).

Jorgensen (1963) has justified this simplification on the assumption that "all capital gains from changes in the prices of capital equipment are regarded as transitory and do not affect the long-run demand for capital". This assumption becomes less plausible in a period of sustained inflation. On the other hand, inclusion of actual $\dot{q}/q$ as a measure of expected price change is based on the expectations of a rational investor with static expectations about the rate of increase in the price of capital goods. For convenience, we present the rest of our theoretical discussion omitting the $\dot{q}/q$ term, but some illustrations of its effect on the cost of capital are included in Part II of this Note. The inclusion of corporation taxes and allowances for interest payments and depreciation led to (4) being modified to read

$$C = q\left[\frac{1-tx}{1-t}r + \frac{1-tv}{1-t}d\right] \tag{5}$$

where $t$ = rate of corporation tax
$x$ = percentage of interest payments allowable against tax
$v$ = percentage of depreciation allowable against tax.

If there were no allowances at all, i.e. $x=v=0$, (5) becomes

$$C = q(r+d)/1-t \tag{5}'$$

With all interest and depreciation written off (i.e., $x=v=1$), (5) reduces to (4) and corporation tax does not affect the cost of capital.[2] The expression for the cost of capital in (5) was criticised by Coen (1971) because of its restrictive treatment of depreciation. He proposed a generalisation later adopted by Jorgensen and his associates:[3]

$$C = q[(1-t)\rho + d](1-tz)/(1-t) \tag{6}$$

where $\rho$ is the before tax rate of return, i.e. $\rho = \frac{1-tx}{1-t}r$, and $z$ is the present value of the stream of depreciation allowances generated by £1 of investment.

Suppose interest payments can be written off in total. Then $\rho = r$, the firm's borrowing rate, and $(1-t)\rho = (1-t)r$ is the effective borrowing rate, after tax.

2. This, of course, is the situation with regard to labour costs, all of which are assumed current and fully written off in each period for tax purposes.

3. See for example Hall and Jorgensen (1971) and papers cited there. Coen's criticism is summarised in Coen (1971) p. 143.

If, in addition, the firm can write off true economic depreciation[4] it can be shown that $z = d/[(1-t)\rho+d]$, (6) reduces to (4) and we once more obtain the result that the cost of capital is independent of corporation tax. The same conclusion holds if no interest is tax deductible but full depreciation allowances are granted (i.e. the full cost of the investment good is written off in the first period). The latter means that $z = 1$, the former that $\rho = \frac{1}{1-t} r$ so that $(1-t)\rho = r$.[5]

So far no reference has been made to initial allowances on investment expenditure. In the United States they may take the form of tax credits, that is a proportion ($k'$) of the value of an investment is subtracted from the firm's total tax liability. In Ireland a proportion ($k$) of the value of an investment is deducted in assessing profits for tax purposes. Thus the value of the tax saving in this case is the proportion $kt$ of the value of investment. Inclusion of initial allowances leads to the following expression for the cost of capital:

$$\text{(i)} \quad C = q[(1-t)\rho+d](1-tk-tz+tzk)/(1-t)$$

or

$$\text{(ii)} \quad C = q[(1-t)\rho+d](1-tk)(1-tz)/(1-t) \qquad (7)$$

or

$$\text{(iii)} \quad C = q[(1-t)\rho+d](1-tk-tz)/(1-t)$$

The difference between these expressions is that in (i) depreciation is charged against the value of the investment less the amount that can be deducted for tax purposes (i.e. the initial allowance), in (ii) depreciation is charged against the value of the investment less the amount of the tax saving generated by the initial allowance, and in (iii) depreciation is charged against the full value of the investment.[6]

4. True economic depreciation is simply the true loss of economic value per period; in our notation this would be, in period $t$ for a £1 investment good bought in period 0, $d/(1+d)^{-t}$. Changes in the price of investment goods, assumed constant above, could be easily incorporated in the parameter if they occurred at a constant rate. The values of $d$ employed in capital stock estimates, e.g. Henry (1974) are usually much lower than the depreciation rates employed by firms and tax authorities. It is of interest to quote Samuelson's (1964) observation on this practice:

> Fast depreciation gimmicks in the Swedish, Japanese, German, British and American tax codes are *not* a return to just recognition of economic obsolescence—as any dealer in used machines will privately tell you. They are competitive bribes and giveaways, designed to undertax money income (and perhaps obviate the bias against capital formation inherent in taxing income rather than consumption or wealth), in order to attract investment from other countries and to stimulate the total of domestic investment growth. If we call spades spades, let's call bribes bribes.

5. The conclusion that $C = q(r+d)$ when no interest but full depreciation are written off for tax purposes follows from (5) by setting $x=v=0$ and multiplying $q$ by $(1-t)$.

6. The Irish case is represented by (7) (i). Equation 7 (iii), modified to take account of the fact that allowances are in the form of tax credits, applies in the US.

It is worth considering whether the various measures of the cost of capital outlined this far are highly correlated over time and whether using the "wrong" measure in an empirical study would seriously alter the conclusions reached. This topic is considered in the next two sections.

III. *Derivation of Cost of Capital in Irish Context*

The following is a list of the components of an index of the cost of capital, $C$, as discussed in the previous section, together with a brief account of the methods used to derive measures of the variables for Ireland.

$q$ = price index of capital goods. Obtained from the data given by Henry (1974) for the prices of (1) passenger and work vehicle, (2) plant, machinery and fixed assets, (3) buildings and (4) land. A weighted index of these price indices was constructed (base 1953 = 100) using the proportions of the four types of assets in the total capital stock of Irish manufacturing industry as weights.

$d$ = annual depreciation rate of investment goods. Henry's figure of an economic life of 30 years was used as an estimate of "true economic depreciation". A figure $d' = \cdot 10$ was used as an alternative depreciation rate. We based this estimate on the examples cited in Kelly and Carmichael (1968, pp. 125–138).[7]

$r$ = rate of interest, taken as the redemption yield on new National Debt issue.

$k$ = the initial capital allowance which can be written off against tax, calculated as a weighted average of the allowance on the four components of capital stock.

$t$ = the effective tax rate on profits in manufacturing industry. This is derived from the rate of Corporate Profits Tax, Schedule D income tax, and the proportion of profits attributable to exports. This proportion was assumed equal to the proportion of output that is exported.

Using these definitions, the following alternative measures of the cost of capital, $C$, have been estimated for Irish industry, 1953–69:

7. If, as Samuelson argues in the quotation cited in footnote 4 above, the rate of depreciation actually allowed by the tax authorities exceeds true economic depreciation, then the measure of the cost of capital should be altered by, for example, setting $v > 1$ in equation (5) above. This is a further way in which fiscal policy may lower the cost of capital.

$$C_1 = q(d+r) \qquad \text{(i)}$$

$$C_2 = q[(1-tk)r+d] \qquad \text{(ii)}$$

$$C_3 = q[(1-tk)r+d'] \qquad \text{(iii)} \quad (8)$$

$$C_4 = q[(1-tk)(r-\frac{\dot{q}}{q})+d] \qquad \text{(iv)}$$

$$C_5 = q[(1-tk)(r-\frac{\dot{q}}{q})+d'] \qquad \text{(v)}$$

Definition (8) (i) corresponds to equation (4), and (8) (ii) and (8) (iii) derive from 7 (i) on the assumption that interest and true economic depreciation are fully allowable for tax purposes. Similar, but slightly more complicated, definitions of the cost of capital could be derived from 7 (ii) and 7 (iii). 8 (iv) and 8 (v) are based on 7 (i) formulated to take account of the role of $\dot{q}/q$. They involve the assumption that gains from changes in the price of capital goods are taxed at the rate $t$. We have also calculated the ratio $w/C$ where

$w$ = average hourly earnings of (adult, male) industrial workers in manufacturing industry to base 1953 = 100.

The results of these calculations are presented in Table 1. Since all the variables are index numbers to the base 1953 = 100, no comparison of absolute magnitudes in Table 1 is valid. For example, while the two measures of $C$ which incorporate the high depreciation rate of 0·10 have higher absolute values at all times than the corresponding measures using a rate of 0·033, the opposite is true of their proportional rates of change, since the proportional increases caused by $q$ and $r$ will be greater in the set of $C$'s having the lower absolute magnitudes.

Fiscal policy, operating mainly through initial allowances on capital expenditure, has played a part in keeping down the rate of increase in the cost of capital in Ireland as is apparent from a comparison of the alternative measures of $C$. The initial capital allowances ($k$) were first introduced in 1956 at an overall rate of about 15 per cent, but by 1969 this had been raised to almost 40 per cent. The role of $k$ in moderating the effect of increases in $q$ and $r$ can be seen from a comparison of the rate of increase in the cost of capital as measured by $q(d+r)$ with that as measured by $q[(1-tk)r+d]$.

## IV. *An Illustration*

To illustrate the consequences of choosing different measures of the cost of capital we present below estimates of the elasticity of substitution between labour and capital in Irish industry, assuming a CES production function. It is a well known property of such a function that in the two-input case the elasticity of substitution can be estimated, without the assumption of constant returns to

TABLE 1: *Index numbers to the base 1953 of the cost of capital and the ratios of labour to capital costs*

| *Year* | $q(d+r)$ | $q[r(1-tk)+d]$ | $q[r(1-tk)+d']$ | $q[(r-\frac{\dot{q}}{q})1-tk)+d]$ | $q[(r-\frac{\dot{q}}{q})(1-tk)+d']$ | $\frac{W}{q(d+r)}$ | $\frac{W}{q[r(1-tk)+d]}$ | $\frac{W}{q[r(1-tk)+d']}$ | $\frac{W}{q[(r-\frac{\dot{q}}{q})(1-tk)+d]}$ | $\frac{W}{q[(r-\frac{\dot{q}}{q})(1-tk)+d']}$ |
|---|---|---|---|---|---|---|---|---|---|---|
| 1953 | 1·000 | 1·000 | 1·000 | 1·000 | 1·000 | 1·000 | 1·000 | 1·000 | 1·000 | 1·000 |
| 1954 | 0·957 | 0·957 | 0·957 | 0·900 | 0·962 | 1·100 | 1·100 | 1·080 | 1·000 | 1·000 |
| 1955 | 0·978 | 0·978 | 1·000 | 0·500 | 0·740 | 1·125 | 1·125 | 1·100 | 2·000 | 1·400 |
| 1956 | 1·120 | 1·076 | 1·082 | 0·334 | 0·628 | 1·042 | 1·085 | 1·079 | 3·494 | 1·859 |
| 1957 | 1·196 | 1·153 | 1·145 | 0·638 | 0·835 | 0·998 | 1·035 | 1·042 | 1·870 | 1·429 |
| 1958 | 1·217 | 1·163 | 1·158 | 0·883 | 1·012 | 1·030 | 1·078 | 1·082 | 1·374 | 1·177 |
| 1959 | 1·163 | 1·066 | 1·095 | 1·000 | 0·989 | 1·112 | 1·219 | 1·181 | 1·256 | 1·308 |
| 1960 | 1·207 | 1·163 | 1·158 | 0·873 | 0·983 | 1·149 | 1·193 | 1·198 | 1·589 | 1·411 |
| 1961 | 1·272 | 1·218 | 1·214 | 0·726 | 0·912 | 1·174 | 1·226 | 1·230 | 2·057 | 1·637 |
| 1962 | 1·272 | 1·174 | 1·202 | 0·687 | 0·900 | 1·300 | 1·408 | 1·376 | 2·407 | 1·837 |
| 1963 | 1·217 | 1·131 | 1·183 | 0·922 | 1·048 | 1·424 | 1·533 | 1·465 | 1·880 | 1·654 |
| 1964 | 1·348 | 1·240 | 1·271 | 0·520 | 0·829 | 1·434 | 1·550 | 1·521 | 3·718 | 2·332 |
| 1965 | 1·544 | 1·403 | 1·384 | 0·981 | 1·125 | 1·304 | 1·435 | 1·455 | 2·052 | 1·790 |
| 1966 | 1·641 | 1·490 | 1·453 | 0·922 | 1·107 | 1·361 | 1·499 | 1·537 | 2·422 | 2·018 |
| 1967 | 1·717 | 1·533 | 1·497 | 1·000 | 1·178 | 1·375 | 1·540 | 1·577 | 2·360 | 2·004 |
| 1968 | 1·913 | 1·653 | 1·592 | 0·981 | 1·172 | 1·380 | 1·597 | 1·659 | 2·692 | 2·253 |
| 1969 | 2·163 | 1·870 | 1·768 | 0·657 | 1·042 | 1·402 | 1·622 | 1·716 | 4·617 | 2·911 |

scale but assuming neutral technical change, from a log-linear relationship between the input ratio and the input price ratio,

$$\text{Log}\frac{K}{L} = \log a + b \log \frac{w}{C} \qquad (9)$$

where $b$ is the elasticity of substitution.[8] This relationship has been estimated for Irish industry by ordinary least squares for the period 1953–1968, using Henry's (1974) estimates of the capital stock $K$ and the five different measures of the cost of capital, $C$, listed above. The estimates of $b$, together with their $t$ statistics and $\bar{R}^2$, are presented in Table 2.

TABLE 2

| | $b$ | *t value* | $\bar{R}^2$ |
|---|---|---|---|
| $C_1$ | 1·60 | 5·4 | 0·65 |
| $C_2$ | 1·40 | 7·6 | 0·79 |
| $C_3$ | 1·42 | 10·2 | 0·87 |
| $C_4$ | 0·38 | 2·4 | 0·24 |
| $C_5$ | 0·81 | 4·8 | 0·60 |

*Data Sources:* $K$ from Henry (1974), $w/C$ as described in Section III, $L$ = total numbers employed in transportable goods industry, C.I.P. data.

These results suggest that the estimate of $b$ is affected by the definition of the cost of capital variable. While there is no great difference between the $b$ estimates for $C_1$, $C_2$, and $C_3$, the $\bar{R}^2$ increases by one-third when $C_3$ is used instead of the simplest and frequently-used $C_1$. Further, the effect of allowing for capital grants (as in all specifications other than $C_1$) is to lower the estimate of the elasticity of substitution. The most striking feature of the results is the contrast between the $b$ estimates obtained from cost of capital measures (such as $C_4$ and $C_5$) which include the rate of change in capital goods prices. Estimates based on these specifications were much lower, but also yielded lower $\bar{R}^2$, than those based on $C_1$, $C_2$, and $C_3$. Thus it seems that ignoring capital allowances and capital gains leads to an overestimate of the elasticity of substitution. This bias is reinforced by the likely understatement of labour costs implicit in our use of the earnings rate.[9]

However, it would be unwise to regard the particular estimates in Table 2 as

8. In view of our definition of $w$ and $L$, $b$ is the partial elasticity of substitution between male labour and capital.

9. That is, we have not taken account of the rise in labour costs attributable to higher employer social security contribution, longer paid holidays, more generous provisions for notice of dismissal, etc.

firm estimates of value of the elasticity of substitution, due to the very simplified approach implicit in estimating in equation (9).[10]

V. *A Recent Extension of the Theory*

In a recent paper, King (1974) shows that the effect of taxation on the cost of capital is considerably more complex than the previous studies allowed. In particular, when the appropriate legal constraints are placed on the firm's behaviour, the cost of capital depends critically on the firm's financial policy (that is, whether investment expenditures are financed by borrowing, issuing new shares, or retaining profits). The constraints which King incorporates are (i) that the firm can borrow but not lend at the market rate of interest (the firm's debt is non-negative); (ii) that dividends be no greater than current profits net of tax and interest payments (dividends cannot be financed out of the proceeds of a share issue or debt flotation). When these constraints are ignored or are not binding, and interest and true economic depreciation are written off against tax, King agrees with the definition of the cost of capital presented in (4) above, i.e. $C = q(r+d)$ (ignoring the influence of $\frac{\dot{q}}{q}$), and its implication, strongly emphasised in Stiglitz (1973), that corporation tax is not distortionary.[11] However as King (1974) observed

> . . . since the tax system introduces a wedge between the different methods of raising capital, it is also obliged to legislate against certain actions whereby the company would otherwise be able to take advantage of these tax differentials or loop-holes. For example, we have seen that in certain circumstances it is optimal to issue shares in order to convert capital gains into dividends, or to pay higher dividends now by borrowing against future dividends. Because of these possibilities the cost of capital may differ from the expression [shown in equation (6) above]. Nor are these constraints simply minor complications. The very existence of tax differentials between alternative methods of raising funds and rewarding shareholders makes legal constraints inevitable. So a correct understanding of how taxation affects the firms investment policy requires a proper analysis of the effects of these constraints.

The nature of King's results may be illustrated by means of a simple case. Assume that the tax system allows interest and true economic depreciation to be written off, that the price of investment goods is constant and that firms and individuals

10. Curiously, there are no estimates of the elasticity of substitution in Irish manufacturing with which our rough estimates can be compared. For example, Henry (1972) estimates production functions for fourteen sub-sectors of Irish industry but uses a formulation which, while allowing the elasticity of substitution to vary, constrains it to be less than one.

11. Stiglitz criticises Jorgensen's (1963 and 1965) cost of capital formulation, i.e. our equation (5), on the grounds that it confuses the marginal and average cost of capital. The criticism appears to depend on his definition of $x$, a variable which Jorgensen defines unclearly as "the percentage of the *cost of capital* allowable against tax". If it is defined as the percentage of *interest payments* as in (5), then the basis of Stiglitz's criticism of this particular point is not clear.

can borrow at the same rate of interest $r$. Then, when the constraint that the firm's debt be non-negative is imposed, the results are as follows:

($a$) when borrowing is the cheapest source of finance,

$$C = q(r+d)$$

($b$) when undistributed profits are the cheapest source,

$$C = q\left[\frac{1-m}{(1-n)(1-t)}r+d\right], \tag{10}$$

($c$) when the issue of new shares is the cheapest source

$$C = q\left[\frac{1-m}{\theta(1-t)}r+d\right],$$

where $m$ is the marginal rate of income tax on unearned income, $n$ is the rate of tax on capital gains *accrued* (in Ireland $n = 0$ at present), $\theta$ is the net amount shareholders would receive if £1 of retained earnings were distributed.[12]

Ignoring $q$ and $d$, we may make inferences about the magnitude of the terms containing $r$ in 10 ($b$), 10 ($c$). First both terms must be less than $r$, i.e.

$$\frac{1-m}{(1-n)(1-t)} < 1$$

$$\frac{1-m}{\theta(1-t)} < 1 \tag{11}$$

because they apply only when borrowing is not the cheapest source of finance. Second, since in Ireland $n = 0$ and $\theta = 1-m$, the above terms become

$$\frac{1-m}{1-t} < 1 \text{ and } \frac{1}{1-t} < 1 \text{ respectively.} \tag{12}$$

Thus, on the basis of this particular model, a positive rate of corporate taxation, $t$, is sufficient to rule out the issue of new shares as a source of investment funds.

12. If profits are taxed at a flat rate, and in addition shareholders pay income tax on their dividends, then $\theta = 1-m$.

Furthermore, undistributed profits are the cheapest source as long as the marginal rate of tax payable by shareholders, $m$, exceeds the rate of corporation tax, $t$. In practice, of course, firms do not often resort to new share issues. The use of retained earnings is encouraged by the absence of any capital gains tax; in this example, a capital gains tax equal to the marginal rate of income tax of shareholders would guarantee that borrowing was the sole source of investment funds. It should be emphasised that the exclusion of share issues and the presumption in favour of borrowing as a means of financing investment is partly a product of the simplifying assumptions outlined above. King (1974) should be consulted for a much more complete discussion.[13]

When the constraint that dividends cannot be paid by issuing shares or floating debt is imposed, the expressions for the cost of capital will include a variable which links present to future in a way that makes it difficult to make simple judgements on how taxes will affect investment. The firm's expectations about future tax policy become relevant, so that the appropriate specification of the cost of capital variable is no longer clear-cut. For example, if the firm anticipates that in some future period, changes in tax rates will occur which make undistributed profits a better source of finance than borrowing, the cost of capital is given approximately by

$$C = q\left[r+\frac{1-n}{1-m}d\right] \tag{13}$$

when the price of investment goods is constant, and firms and individuals can borrow at the same rate of interest. Furthermore, the relevance of the firm's anticipations about tax policy make it clear that the *announcement* of future tax changes will affect the firm's investment behaviour; these effects need not be small. Thus, in this framework the cost of capital becomes much more complex than studies of investment behaviour have allowed and the interpretation of their results is made more difficult. Since the appropriate measure of the cost of capital is now seen to involve assumptions about the situation facing the typical firm and shareholder, we have made no attempt to provide Irish data for this model.

## VI. *Implications for Policy*

The measurement of the theoretically valid concept of the cost of capital has received little or no attention up to now in Ireland. We believe that this neglect is not unimportant, in view of the role of this concept in the formulation of policy towards employment and industrialisation. In this article we have reviewed the

13. In Ireland this whole question is further complicated by the fact that there is an abatement of 20 per cent of income tax applicable to dividends or interest on "certain stocks, shares or securities issued by Irish companies carrying on business wholly or mainly within the State". In 1967, 98 companies qualified under this provision. Cf. Finance (1972), para. 43–46.

recent literature on the cost of capital, presented Irish data for some of the indices that have been discussed, and used these indices in a simple econometric application. The results of this application suggests that it is not a matter of indifference which measure of the cost of capital is used in empirical studies.

One point emerges unequivocally from our study: the cost of capital, under any reasonable definition, has been rising less rapidly than the cost of labour (or earnings) over the post-war years. Indeed, if the cost of capital is defined to include (as a deduction) the current rate of increase in the price of capital goods, then, in the very recent past, the cost of capital may have become negative, due to the failure of the money interest rate to rise as rapidly as the price index of capital goods. This phenomenon is probably widespread in advanced western economies.[14]

Our findings should be used in assessing the appropriateness of certain government policies towards employment-creation. We rely very heavily on tax-relief and initial capital allowances in attracting industry to Ireland. Our calculations show that these policies have accentuated the fall in the cost of capital relative to that of labour. We have not, however, taken the capital grants provided by the Industrial Development Authority into account, whose effect is clearly to lower yet further the cost of capital to those investing in Ireland.[15] The undoubted effect of these distortions in the market for factors of production is to increase the tendency towards capital-intensity over and above that which would exist in a free market. Hence the rate of job-creation per £1 of public subsidy (be it explicit, in the form of capital grants, or implicit, in the form of tax reliefs) is lower than it would be if a wage subsidy were used. A wage subsidy would provide incentives for the use of *less* capital-intensive techniques than would be warranted under the present regime, and on the whole would seem more consistent with the prime goal of the IDA (1972) ("full employment and the elimination of involuntary emigration") than the present policy of subsidising capital. Nor is there any presumption that less capital-intensive industries or techniques are inferior according to other criteria possibly considered by the IDA, such as domestic value added or growth potential. It is clear that many capital-intensive projects are very demanding in terms of foreign exchange requirements, and do not necessarily stimulate further growth in domestic industry. An example of a wages subsidy policy is the Regional Employment Premium, introduced in the United Kingdom in 1967. Interestingly, a recent survey by the Confederation of British Industry reported that the Premium had been "particularly useful" in Northern Ireland.[16] We feel that the results of our attempts to measure the cost of capital in an Irish context lend support to the case for redirecting our industrialisation subsidies away from capital and towards wages.

14. Nordhaus attributes the fall in the share of profits in GNP in the US to a rise in the wage-rental ratio that led to relatively little substitution of capital for labour (1974).

15. These grants have averaged £2,500–£3,000 per job in recent years, according to a report in the *Irish Times*, 16 August 1974.

16. *The Economist*, 27 July 1974, p. 79.

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