

Optimal Labour Subsidies and Industrial Development in Ireland

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Précis: This paper calculates the employment subsidies implicit in the principal financial incentives provided by the Irish Government to foster industrial employment. These subsidies are compared with estimates of optimal employment subsidies, which take explicit account of the economy's social objectives and resource constraints. The paper concludes that, on average, the actual subsidies paid lie within the range of optimal subsidies, although in the case of individual projects, they may exceed the optimal. Finally, attention is drawn to the need for greater consistency between the levels of employment subsidies provided for the industrial sector and of social assistance paid to the unemployed.

I INTRODUCTION

For over twenty-five years the Irish Government has focused its attention almost exclusively on the expansion of the industrial sector as the vehicle of growth, employment creation and income redistribution in the economy. A complex range of financial and fiscal policies has been used to foster industrial development. The *financial* policies are administered by the Industrial Development Authority (IDA), which has statutory power to give *discretionary* financial assistance to "desirable" industrial projects. The main¹ financial assistance available is the payment of cash grants towards the

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1. We concentrate on the main element in a complex set of incentives – namely, the cash grants to new industry which can amount to 50 per cent of the total fixed investment. The complete set of incentives is presented in Industrial Development Authority (1979). The package offered has changed only very slightly over the past 15 years and represents the maximum assistance available to, but not necessarily received by, the majority of new firms investing in Ireland in that period.

cost of fixed assets. While the grant is paid towards the cost of capital, the *grant rate* (the grant as a percentage of the project's fixed assets) varies greatly, depending on what the IDA perceives as the benefit of the project to the national economy: "fast market growth on international markets; little risk of the technology becoming obsolete; high value added in Ireland; products suitable for export marketing; low investment per job created, or, for capital intensive projects, good potential for linkage or spin-off benefits by creating work for existing firms; and high skilled male content in employment" (IDA, 1979).

According to the IDA, the grant rate is calculated by examining the types of jobs to be generated and deciding how much a particular job "merits" in terms of grant aid (usually up to a maximum of about £5,000 per job), multiplying that figure by the *estimated* employment associated with the project, and expressing this sum as a percentage of fixed assets. The grant rate is then modified to take account of the other criteria listed above and, assuming that both the financial accounts of the project are in order and the project is *privately profitable*, the grant is paid in stages as the firm acquires the related fixed assets. The IDA claims that this method ensures that the grants subsidise employment, although grant payments at each stage relate to capital expenditures, irrespective of realised employment. The question of whether the IDA grant programme is subsidising capital or labour is very controversial, and two aspects are especially pertinent. First, even when the elasticity of substitution between capital and labour in production is zero, if the grant is a capital subsidy, it will encourage relatively capital-intensive industry. Secondly, as far as economic efficiency is concerned in the allocation of scarce resources, what matters critically here is how the grant is perceived by potential investors, and not by the government agents; should these perceptions diverge, then excessive use of capital may be encouraged. However, further discussion of this question is beyond the scope of the present paper, which accepts the IDA claim that the grant operates as a labour subsidy. (This issue is examined in greater detail in Kennedy, 1975, Killeen, 1975, Kennedy and Foley, 1978 and Ruane, 1979.)

In addition to the discretionary capital grant, all new projects are eligible for general *fiscal* assistance, through relief from corporation tax. New firms can avail of export sales relief (ESR), which gives *complete* exemption from corporation tax on all export sales for fifteen years (now up to 1990).² ESR

2. When sales revenue includes domestic sales, relief is granted on a proportionate basis, with prices adjusted to take account of any duties payable, and arms-length pricing used in the case of firms trading with associated companies. Since the Irish corporate tax rate, ignoring other deductions, was approximately 45 per cent throughout the period considered, the IDA considered that ESR outweighed all other incentives offered to induce foreign industry to locate in Ireland. Under recent legislation, with effect from January 1981, a maximum corporate tax rate of 10 per cent will be levied on all manufacturing companies, irrespective of whether they sell their output in Ireland or abroad.

is intended to encourage industry to produce for export, leading to increased output and employment, without creating balance-of-payments problems or increased competition for domestic firms. For firms which sell output on the domestic market, there are generous tax-deductibility allowances; these allowances and ESR are available to *all* new investment in Ireland and not merely to grant-aided projects.

The purpose of this paper is to examine the justification for government intervention in the Irish industrial sector and to derive some key parameters in determining the appropriate form and scale of such intervention. If, as is normally argued by both politicians and IDA personnel, the main reason for expanding the industrial sector is the creation of employment in that sector, then welfare economics suggests that the first best policy would be to subsidise employment in the manufacturing sector.³ Where possible, subsidies should be restricted to new projects in order to minimise intra-marginal transfers. This paper presents some preliminary estimates of appropriate subsidies for marginal male labour employed in Irish manufacturing industry and compares these with actual subsidies per job approved by the IDA, on the assumption that the IDA cash-grant programme effectively subsidises labour.

In Section II of the paper we outline the theoretical framework in which the estimates of optimal subsidies are derived, while in Section III we discuss the relevance of this approach to the Irish manufacturing sector and its necessary adaptation in the light of data limitations. In Section IV we present times series from 1963/64 to 1976/77 for optimal subsidies and compare these in Section V with the actual subsidies. Section VI provides a summary and conclusion of the paper.

II THEORETICAL FRAMEWORK

Consider an economy which is small and open, in the sense that it faces a given set of world prices which, for the purposes of our analysis, are assumed to remain constant. The economy has just one sector which we shall call the industrial sector. Industrial output (Q_I) is produced using a fixed stock of capital (K) and a variable labour factor (L) so that

$$Q_I \leq F(K, L) \quad (1)$$

where F represents the constant returns to scale production function. Labour in the industrial sector is employed up to the point where its value

3. While government policy has always emphasised the manufacturing sector, employment creation in socially profitable service industries is, of course, equally desirable.

marginal product (F_L) is equated to the institutionally-fixed rigid wage in industry (w) which is above the full-employment wage for the economy. The total stock of labour in the economy (N) is fixed in supply, and labour not employed in industry ($N-L$) is assumed to be unemployed. Industrial workers are assumed to consume all their wages, while the unemployed consume any transfer income which they may receive.

All profits (surplus) in the industrial sector ($Q_I - wL$) are assumed to be controlled by the government, and this surplus is the only source of government revenue,⁴ since any attempt to raise taxes on wages will only serve to increase nominal wage demands (to compensate for the decline in real after-tax wages). The government has two alternative uses for this surplus. In the first place, it can be used as wage subsidies to create additional industrial employment (reduce unemployment) on existing capital, so as to attain greater output at world prices (increase economic efficiency). (This model is in the same spirit as that used by Anand and Joshi, 1979.) Alternatively, it can be used to pay social assistance to the unemployed, so as to reduce the inequality in the distribution of income arising from the rigid-wage distortion. Unless the industrial surplus is large enough to achieve *full* employment, the government faces a trade-off between efficiency and equity at the margin; paying labour subsidies to increase employment reduces the surplus available to the unemployed. The simplest way to incorporate the equity-efficiency trade-off is to suppose that initially all the surplus is distributed to the unemployed and then to ask: What is the optimal level of industrial employment, given that for every new job created some of the transferred surplus to the unemployed has to be withdrawn? We define the *per capita* social assistance income to the unemployed (his share of the industrial surplus) as

$$y = \frac{F(K, L) - wL}{N - L} \quad (2)$$

Clearly y depends crucially on the level of industrial employment, L , and the government's task is to choose L to maximise welfare in the economy. Welfare in the economy is defined as

$$W = \frac{\sum_i (U_i)^\epsilon}{\epsilon} \quad (3)$$

where U_i is the utility function of the i th individual and ϵ is a free

4. This assumption can be dropped to allow for the fact that some profits remain in the hands of the owners of capital in the industrial sector, who have non-zero marginal propensities to consume. See Sen (1968).

parameter, indicating the government's attitude to equality. In the case where ϵ is less (greater) than unity, the government is inequality (equality) averse. For ϵ equal to unity, there is neither equality nor inequality aversion, and we have a general utilitarian welfare function of the form

$$W = \sum_i U_i \quad (4)$$

which in the case of our two-class economy may be written

$$W = LU^e + (N - L)U^u \quad (4a)$$

where U^e and U^u are the utility levels associated with being employed and unemployed, respectively. For ϵ equal to $-\infty$ there is complete inequality aversion and the welfare function is Rawlsian, which in our model implies that the government maximises the utility of the unemployed so that

$$W = U^u \quad (5)$$

Rather than considering the general individualistic welfare function throughout, we concentrate on the utilitarian and the Rawlsian values as polar cases. (We assume that the government is not equality averse, so that the utilitarian function represents the least egalitarian function which is plausible.) The utility functions of the employed and the unemployed are identical and defined over both income and leisure. The utility function of the employed is

$$U^e = U(w, l_e) \quad (6)$$

where w is the wage earned (income) by employed workers and l_e measures the leisure they enjoy. The utility function of the unemployed is

$$U^u = U(y, l_u) \quad (7)$$

where y is the level of social assistance received by the unemployed individual and l_u measures the leisure he enjoys.

The welfare maximum for both utilitarian and Rawlsian welfare functions is obtained by differentiating the expressions given by Equations (4a) and (5) with respect to L . At the welfare maximum, we assume that the following inequality constraints are *not* binding: $L \leq N$; $F(K, L) - wL \geq 0$; and $U^e \geq U^u$. Substituting and re-arranging, we obtain the following expressions for the utilitarian and Rawlsian shadow wages (w_U^* and w_R^* , respectively):

$$F_L = w_U^* = w - y - \frac{U(w, l_e) - U(y, l_u)}{U_y(y, l_u)} \quad (8)$$

$$F_L = w_R^* = w - y \quad (9)$$

In the case of both utilitarian and Rawlsian welfare functions, the main element in the shadow wage is the net cost in terms of government revenue of employing the marginal individual – the wage which he must be paid when employed (w) less the saving in terms of social assistance of his being employed rather than unemployed (y). In the case of the utilitarian welfare function the shadow wage is lower the higher the level of utility associated with being employed compared with being unemployed ($U^e - U^u$). In the Rawlsian case this utility-gain receives a zero social weight. If there is no change in utility (the elasticity of utility with respect to income is zero), the expressions for the shadow wage for both welfare functions are identical and given by Equation (9). Alternatively, if the change in utility coincides with the cost (in terms of government revenue) of employing the individual ($w - y$), then the expression for the shadow wage reduces to

$$F_L = w_U^* = 0 \quad (10)$$

which is the Pareto-efficient solution. Thus, while in the Rawlsian case the expression for the shadow wage is independent of the individual's utility function, in the utilitarian case the shadow wage depends crucially on the form of the utility function, ranging from zero when the benefits to the marginal individual employed just balance the costs in terms of government revenue of employing him, to $(w - y)$ when there is no gain in utility to be set against the revenue cost of having the individual employed.

We can rewrite Equations (8) and (9) to show the relationship between the subsidy per unit of labour and the social assistance paid to the unemployed when welfare is maximised as follows:

$$w - w_U^* = y + \frac{U(w, l_e) - U(y, l_u)}{U_y(y, l_u)} \quad (8a)$$

$$w - w_R^* = y \quad (9a)$$

In the case where the welfare function is Rawlsian, the per unit labour subsidy should be equal to the social assistance paid to the unemployed (i.e., employment should always be higher than under *laissez faire*). In any case where the welfare function is less egalitarian than the Rawlsian case, the per unit labour subsidy should *exceed* the level of social assistance given to the

unemployed, to an extent which depends on the parameters of both welfare and utility functions. We define the subsidy to labour when welfare is maximised as the "optimal labour subsidy". It is the maximum labour subsidy which is consistent with the government's welfare objectives.

III ESTIMATION OF OPTIMAL LABOUR SUBSIDIES FOR IRELAND

In this section we examine the reasons why the model outlined in Section II is an appropriate starting point for estimating optimal labour subsidies for the Irish economy. In the first place, the market wage in the expanding Irish industrial sector exceeds the full-employment wage for the Irish economy. This high wage level is maintained by

- (a) tight trade union organisation, which bargains in terms of *real* take-home pay in the sector.⁵ Irish trade unions are ultimately concerned with the wage levels of their members, rather than with employment creation or other measures to reduce the currently high levels of unemployment;
- (b) the government, which tends to pay wages related to historical trends rather than market conditions. The government as the major employer in the economy (controlling approximately 25 per cent of total employment) sets the pace for wage levels, and while it is difficult for any government to respond to changing conditions in individual markets, it would be in the interests of greater employment if it were to do so;
- (c) the proximity of the UK market, which tends to set a minimum limit on wages in certain types of activities. If Irish wages fall below this minimum, there will be an increase in emigration to the UK. However, in recent years, the wages and salaries of some of the more mobile categories of labour (e.g., teachers, academics, doctors) and, ironically, of some immobile categories (e.g., civil servants at intermediate ranks) have been higher in Ireland than in the UK;
- (d) social assistance to the unemployed, which influences the opportunity cost of taking a job. Social assistance to the unemployed has increased relative to the average level of earnings over the past decade, tending to reinforce the downward rigidity of the minimum wage.

While this assumption of a minimum-wage distortion is appropriate to Ireland, the implication of our single-sector analysis, namely, that labour not employed at this high wage is otherwise unemployed, is obviously unreal-

5. In the National Wage Agreement negotiations, the size of wage increases and actual levels discussed have been in *real* take-home pay terms (i.e., the money wage rates negotiated take account of actual and expected changes in both direct and indirect taxation).

istic. However, this limitation is not very serious since it can reasonably be argued that labour taking up employment on a marginal industrial project would previously have been unemployed.⁶ School leavers are undoubtedly the most important element in current structural unemployment in Ireland, whose "active population" is forecast to grow by over 1 per cent per annum in the next fifteen years, the fastest of any EEC country (see Walsh, 1975). It is clear that at current rates of investment and wages, many of these school leavers would not be absorbed into active employment without government intervention.

Secondly, in our derivation of the optimal subsidy in Section II the opportunity cost of using government revenue to generate additional employment is the social assistance income paid to the unemployed. In terms of the Irish economy, this amounts to saying that funds which are available to the IDA in order to assist new industrial projects and create additional employment could be used to increase the income payments to the unemployed, or extend the social assistance schemes to cover other low-income groups. In practice, the amount which the government pays to subsidise marginal employment is determined in the context of the economy's *capital* programme, *independently* of the level of social assistance given to the unemployed, which is decided upon within the *current* budget framework. Nevertheless, the opportunity cost of using government revenue to create additional employment is most appropriately measured in terms of the additional social assistance which could be given to those unemployed.

In our model in Section II, the government allocates its scarce revenue between employment creation and social assistance for the unemployed, so as to maximise welfare. Since it is not possible to simulate such a procedure for the Irish government, the approach we take is to assume that payments to the unemployed are optimally determined (i.e., taking into account the government's social and political objectives, as well as its economic constraints) and then ask what, if government behaviour is to be consistent, are the appropriate labour subsidies? (The justification for this approach, as opposed to the alternative of assuming that the actual labour subsidy paid is optimal and determining what is the appropriate level of social assistance, is that the *per capita* level of social assistance is derived *explicitly* within the government budgetary framework, taking account of social, political and economic constraints, while the effective subsidy to labour employed in manufacturing is derived implicitly in the complex IDA grant programme.)⁷

6. If the marginal individual employed on an industrial sector project vacates a job in another sector (e.g., services, agriculture) or another section of industry, which is subsequently filled by an individual who was previously unemployed, then allowing for these indirect effects, the marginal individual can be assumed to have been previously unemployed.

7. The effective labour subsidy is only subject to direct government approval when the total cash grant to the enterprise exceeds £1 million.

Thus, in terms of Equations (8a) and (9a), we take the actual social assistance paid to the unemployed (y) as a parameter in calculating the appropriate labour subsidy. In other words, we ignore the effects on the government's revenue constraint of larger than marginal changes in the level of unemployment. Taking this approach, it is quite straightforward to extend our analysis to non-government-controlled projects, since both the *direct* saving in terms of government revenue arising from employing an additional worker, and the utility-gain to that individual, are in practice identical⁸ for both privately-owned and government-controlled projects. This payment to the unemployed, irrespective of who will eventually employ them, provides the link between privately-owned projects and government-controlled projects which we use as a reference base. A further difference between our model and the system of subsidising labour in Irish manufacturing is that our model assumes a fixed stock of capital, while the labour subsidy paid is generally associated with an expansion of the capital stock. However, while this expansion will affect the optimality conditions associated with allocating the capital stock, the overall social profitability of the marginal project and the shadow wage for labour in any one period should not be affected.

One particular class of private projects plays a vital role in the Irish development strategy, namely, foreign projects. To demonstrate how these projects may be examined within our framework, we consider a foreign project in which all the capital used is foreign-owned and financed, and all the profits from which are repatriated. In this case the sole effect of the project arises from the additional employment which is generated. What is the cost *to the government* then of having an additional worker employed on a foreign project? The cost is given by the subsidy which must be paid to the foreign investor to employ the marginal individual, *less* the income transfer saved by having the individual employed rather than unemployed, and the gain in utility to the individual newly-employed, as evaluated by the government. Thus while, in the case of government-controlled projects, the government equates the marginal social benefit of employing an extra worker (his value marginal product) to the marginal social cost (the wage less the transfer income saved and the utility gain to the individual newly-employed), in the case of the foreign project the benefit of having the individual employed rather than unemployed, as measured by his value marginal product, is zero, as it accrues to foreign investors who are zero-weighted in the social welfare function. The social cost is given by the

8. Little and Mirrlees (1974) argue that there are only two respects in which evaluating a private-sector project differs from the evaluation of a government-controlled project. The first difference relates to the opportunity cost of capital and the second, which concerns us here in particular, to the treatment of the profits which accrue to the private sector which may affect the appropriate labour subsidy. See Little and Mirrlees, Section 7.1.

subsidy which must be paid, less the transfer income and the utility-gain enjoyed. Therefore, in the case of foreign projects, if the subsidy necessary to persuade foreign investors to employ the marginal individual is effectively the same as that for a government-controlled project, the government should be indifferent between employing the marginal individual itself and paying the subsidy to the foreign firm to employ the individual. If the subsidy required by the foreign investor is less, then the existence of these foreign investment projects clearly reduces the revenue constraint on the government's welfare function, and employment on foreign investment projects should expand until the labour subsidy required to persuade the marginal foreign project to locate in Ireland equals that on a government project. Similarly, if the subsidy required is higher than that on government-controlled projects, the government should not encourage such foreign investment projects, as it would be able to achieve a given, desired increase in employment at a lower cost in terms of scarce revenue by employing such individuals on its own projects.

The case of foreign projects illustrates how the optimal labour subsidies which we estimate are appropriate to many types of projects because y is taken as a parameter in estimating them. The maximum amount which should be spent on creating the marginal job in domestic or foreign-owned projects is determined endogenously, given the country's social welfare function. The marginal job in all cases is assumed to be homogeneous, which assumption also applies to the section of the labour force for which the subsidies we estimate are appropriate. We do not claim that all labour in the Irish economy is homogeneous, but rather confine our attention in this paper to unskilled males, who comprise a large portion of the unemployed at present.

We now turn to consider the data available to estimate labour subsidies from 1963/64 to 1976/77 and the appropriate specification of the labour-subsidy equation. The first variable which we must measure is the social assistance paid to the unemployed. In our analysis we use both *Unemployment Assistance* (UA) or "dole" (which is a straightforward income transfer to the unemployed for the duration of their unemployment) and *flat-rate Unemployment Benefit* (UB) (which is an insurance-related benefit, associated with a fixed sum which the individual pays while employed) as measures of social assistance. (Because of the small number of workers involved and the complexity of the calculations, the pay-related Unemployment Benefit scheme was ignored. Details of how each of these schemes operates may be found in Department of Social Welfare, 1978.)

The other variable on which we need data to calculate labour subsidies is the market wage earned by the marginal male employed on grant-assisted industrial projects. The results of the detailed (project-by-project) analysis

in McAleese (1978) suggest that wages and salaries in government- or IDA-assisted projects correspond closely to the levels of wages and salaries in the manufacturing sector generally, so that we can quite confidently use a general index of *average* earnings for manual workers in manufacturing employment to measure the wage on the marginal project. (McAleese's results support our assumption that nominal wages on grant-assisted projects are not pushed up by the full extent of the employment subsidy implicit in the IDA grant scheme.)⁹ The wage and social assistance data used are available from the author on request.

Finally, we must specify the welfare and individual utility¹⁰ functions. Rather than consider any particular welfare function, we consider both the utilitarian and Rawlsian functions as relevant polar cases for the Irish economy. In the case of the utility function, we would ideally like to use a general formulation such as the CES and parameterise it with values appropriate to the Irish economy. The CES case is discussed in detail in Ruane (1979), which shows that the value, but not the range, of optimal subsidies is influenced by the choice of utility function. Unfortunately, not only do we not have estimates for most of the CES parameters, but we do not have any data on the leisure variable itself converted into income terms. The only version of the CES which allows us to estimate the change in utility without actual data on leisure¹¹ in the two sectors is the Cobb-Douglas case, which is defined as

$$U = l^\alpha y^{1-\alpha} \quad (11)$$

where α and $(1 - \alpha)$ are the partial elasticities of utility with respect to leisure and income, respectively,¹² and $0 \leq \alpha \leq 1$. In this case the utility change associated with taking up an industrial job weighted by the marginal utility of income is given by

$$\frac{\beta \frac{\alpha}{w} l^{1-\alpha} y^\alpha - y}{1 - \alpha} \quad (12)$$

9. It can reasonably be argued that individuals coming from the unemployment pool are likely to earn less than "average" wages, so that our estimates of the optimal subsidy are biased upwards. However, as there is no obvious basis on which to adjust these data and since both labour and jobs are heterogeneous in practice, it seems preferable to use the "average" earnings figures and not attempt any *ad hoc* refinements.

10. In evaluating the change in utility associated with becoming employed, we consider the utility of the family unit in question (i.e., single, married, etc.). It is assumed that the individual in question is the sole earner in the family, and that the tax and social assistance schedules implicitly adjust family units to an equivalent scale.

11. In the Cobb-Douglas case, the elasticity of substitution between income and leisure is unity, so that only relative leisure differences matter.

12. This formulation implies constant returns in utility. This assumption can be relaxed to allow for increasing or decreasing returns. See Ruane (1979).

where the parameter β expresses the fixed quantity of leisure enjoyed by the employed individual as a fraction of the fixed quality of leisure enjoyed by the unemployed (i.e., $l_e = \beta l_u$ where $0 \leq \beta \leq 1$). Thus the expression for the optimal subsidy when the government's welfare function is utilitarian is given by

$$w - w_U^* = y + \frac{\beta w^\alpha (1 - \alpha) y^\alpha - y}{1 - \alpha}. \quad (13)$$

To conclude this section, we consider what the appropriate values might be for α and for β , the ratio of leisure enjoyed by the employed to that enjoyed by the unemployed. As already stated above, there are no empirical estimates for such parameters in the Irish economy, so that we are forced to consider *sensible* values for these parameters which lie within the range determined by our assumptions about returns to scale. The two values which we choose for β are (1) $\beta = 1$, namely, leisure is assumed identical for both the employed and the unemployed, and (2) $\beta = 0.75$, namely, that the leisure of the employed is three-quarters of the amount of leisure enjoyed by the unemployed. This value for β was based on the assumption that the loss of leisure incurred when the individual becomes employed can be measured by the number of hours spent working (about 40 per week) which constitutes approximately 25 per cent of total hours in the week (168). Thus, the amount of time available for leisure when employed (assuming that leisure includes sleep) is taken as 0.75 times that when unemployed.

The values we consider for α within the zero-one range are $\alpha = 0.25, 0.5$ and 0.75 . These values are chosen simply as being intermediate values, since we have no basis for determining precise values. When α is equal to zero — that is, the partial elasticity of utility with respect to income is unity — the gain in utility associated with becoming employed is equal to the change in income ($w - y$) and when the welfare function is utilitarian, the optimal subsidy is equal to the market wage, w . This is the highest possible value for the optimal subsidy. At the other extreme, if there is no utility change associated with becoming employed and the welfare function is utilitarian, the optimal subsidy is simply the level of social assistance paid to the unemployed (y). This is identical to the case where the welfare function is Rawlsian, when any utility change induced receives a zero social weighting. Thus, the range of the optimal subsidy, assuming constant returns in utility, is from y , the social assistance paid to the unemployed, to w , the wage paid to the employed.

IV OPTIMAL SUBSIDIES FOR LABOUR IN IRELAND

In this section we present estimates of optimal labour subsidies for Ireland for the period 1963/64 to 1976/77. We calculate labour subsidy indices for both utilitarian and Rawlsian welfare functions; in the former case we have six series of estimates for different values of the parameters α and β , while in the Rawlsian case, there is a single series as the optimal subsidy is independent of α and β . The average labour subsidy series is based on the assumption that the marginal individual employed is a representative member of the unemployment pool,¹³ which comprises individuals receiving Unemployment Assistance and Unemployment Benefit, and with different family status (single, married, married with children), for each of whom the *social* cost of unemployment differs.

We note from Tables 4.I and 4.II that, with the exception of the Rawlsian case, the optimal subsidy is always higher when there is no loss in leisure, showing that if the disutility of effort associated with employment is ignored, the optimal subsidy will be over-estimated. Furthermore, the labour subsidy is highly sensitive (within the range y to w) to the parameter values of the utility function; the subsidy is lowest when the welfare function is Rawlsian, and for the utilitarian function it is lower, the greater the loss in leisure (the lower is β) and the smaller the weight of income (consumption) in utility (the larger is α). The maximum value of α consistent with a non-negative change in utility (yielding a labour subsidy identical to the Rawlsian solution) is approximately 0.78 when $\beta = 0.75$; for values of α higher than 0.78, the individual would incur a loss in utility in taking up employment and these cases have been ruled out by assumption. This value is highly sensitive to the value of β ; clearly, the lower is β , the lower the value of α which yields a zero change in utility.

Unfortunately, we have no basis for choosing between these various estimates of labour subsidies for the Irish economy. It is often argued that leisure is highly valued in Ireland, so that the value of $\alpha = 0.25$ is perhaps a reasonable minimum, and $\alpha = 0.5$ may be closer to the true estimate, but beyond this point is pure guesstimation. Furthermore, since, with the exception of the Rawlsian case, we have assumed that the elasticity of substitution is unity, when in practice it is likely to be less than unity, we have *overestimated* the value of the utility change to the newly-employed individual, and hence *overestimated* the labour subsidy to a greater extent, the larger the loss in leisure associated with becoming employed.

13. This implicitly assumes that the composition of job applicants is similar to that of the unemployment pool. In practice, however, job applicants are less likely to come from among the long-term unemployed who are receiving UA, and social and family pressures are likely to lead to greater effort at job search by "married" individuals, even though the ratio of social assistance to the net wage is higher for them. Estimates of optimal labour subsidies by different classes of individual are available from the author.

Table 4.I: Annual optimal labour subsidies (£), 1963/64 to 1976/77 (with leisure differences between sectors)

Year	Parameter values	Utilitarian ^a			Rawlsian ^b
		$\beta = 0.75$ $\alpha = 0.25$	$\beta = 0.75$ $\alpha = 0.50$	$\beta = 0.75$ $\alpha = 0.75$	
1963/64		478.6	387.7	264.8	178.6
1964/65		529.0	430.2	296.0	202.5
1965/66		555.7	453.0	319.1	218.0
1966/67		624.7	515.3	357.7	261.9
1967/68		656.0	543.0	378.0	282.4
1968/69		735.2	615.6	428.0	337.7
1969/70		859.1	723.0	506.3	406.6
1970/71		1,004.8	851.6	602.0	494.3
1971/72		1,138.2	968.2	691.3	571.7
1972/73		1,298.2	1,102.3	787.4	646.2
1973/74		1,564.2	1,338.4	966.3	815.0
1974/75		1,845.1	1,579.9	1,141.2	965.5
1975/76		2,414.6	2,088.5	1,523.0	1,349.7
1976/77		2,839.7	2,467.0	1,824.0	1,615.3

a Equation estimated: $w - w_U^* = y + \frac{U(w, l_c) - U(y, l_u)}{U_y(y, l_u)}$

b Equation estimated: $w - w_R^* = y$

Notes: (i) The wage data used to calculate these optimal subsidies were based on the average annual earnings of males employed in manufacturing industry published in the *CIP Analysis of Principal Results* (1963/64-1973/74) and the *QII* (1973/74-1976/77), net of average social insurance and income-tax contributions.

(ii) The social assistance data used to calculate these optimal subsidies came from the *Annual Reports of the Department of Social Welfare*. The calculation of an average social assistance cost was based on information concerning the distributional structure of the unemployed published in the *Trend of Employment and Unemployment*.

V ACTUAL AND OPTIMAL LABOUR SUBSIDIES

In this section we derive the average *actual* subsidies per job approved by the IDA for the period 1963/64 to 1976/77 and compare these with the optimal subsidies estimated in the last section. To calculate average actual subsidies we must make some assumption on how the IDA operates the grant programme. The assumption which we make is that the substantial

Table 4.II: Annual optimal labour subsidies (£), 1963/64 to 1976/77 (with leisure identical in both sectors)

Year	Parameter values	Utilitarian ^a			Rawlsian ^b
		$\beta = 1.0$ $\alpha = 0.25$	$\beta = 1.0$ $\alpha = 0.50$	$\beta = 1.0$ $\alpha = 0.75$	
1963/64		523.0	458.0	407.4	178.6
1964/65		577.0	507.3	453.1	202.5
1965/66		605.9	534.3	487.9	218.0
1966/67		680.1	607.0	549.5	261.9
1967/68		714.0	640.2	583.1	282.4
1968/69		799.4	726.7	667.6	337.7
1969/70		933.2	852.4	787.4	406.6
1970/71		1,099.5	1,000.8	928.0	494.3
1971/72		1,232.1	1,133.8	1,053.4	571.7
1972/73		1,405.4	1,289.5	1,195.8	646.2
1973/74		1,689.8	1,561.4	1,455.7	815.0
1974/75		1,993.0	1,842.9	1,719.7	965.5
1975/76		2,601.6	2,429.2	2,286.8	1,349.7
1976/77		3,053.1	2,854.8	2,690.7	1,615.3

a Equation estimated: $w - w_U^* = y + \frac{U(w, l_e) - U(y, l_u)}{U_y(y, l_u)}$

b Equation estimated: $w - w_R^* = y$

Notes: As per Table 4.I.

grants paid on approved projects are *labour* subsidies — that is, we accept completely the IDA claim that the grants subsidise labour rather than capital.

Since the IDA grants are paid on a once-for-all basis when the project is first established, this lump-sum subsidy must equal the present value of a stream of labour subsidies for the duration of the project. Therefore, to compare the actual grant figures with those presented in Tables 4.I and 4.II, we calculate the annual subsidy implied by the lump-sum grant paid by the IDA. Table 5.I shows the average lump-sum grant per job (worker), together with the number of projects *approved* by the IDA in each year. By “grant approved” we mean the grant per job which was agreed by the Board of the IDA on the basis of the estimated number of jobs associated with a given project. This figure differs from the actual grant per job paid because it includes projects which were approved, but which were not actually established, and it relates to the estimated number of jobs

associated with a project and not with the actual number. In practice, since the amount of the lump-sum grant is fixed in relation to the capital stock before the project is established, the actual grant per job will differ from the grant approved, to the extent that employment is over- or under-estimated at the approval stage. We use the grant "approval" figures for two reasons, one negative and one positive. First, a time series for the average actual grant per job is not available, and as such the approval figures are the only measure of IDA "expenditure" on job creation; and secondly, the approval figures relate to what the IDA Board agreed was the appropriate grant per job. Within the IDA there is considerable unofficial consensus that, at the approval stage, applicant entrepreneurs tend to exaggerate the expected employment associated with projects. To take account of the fact that this consensus may work its way into the decision on how large the grant per job should be (i.e., the grant approved is lower than the Board would view as appropriate, but it accepts the actual grant will be higher because the employment figure is over-estimated), we have calculated a series for the average grant per worker on the assumption that only 70 per cent of projected employment is realised. To date, there has been no *published* study of the relationship between actual and projected jobs, but internal IDA sources suggest that 70 per cent is probably a reasonable estimate of actual as a percentage of projected employment.¹⁴ The fourth column in Table 5.1 shows the "effective grant per worker" under this assumption.

In the final column of Table 5.1 we have obtained estimates for the "average grant per male worker" by dividing the total grant approved in each year by the number of projected *male* jobs. This series is interesting for two reasons: first, the pressure within the IDA is to create male rather than female jobs (note the list of desirable project characteristics presented in the first paragraph of Section I); if we take an extreme interpretation of this policy and assume that the IDA does not give any subsidy to female employment, then the total grant approved must relate to the estimated male employment and this final column measures the grant per male job under this restrictive assumption. To the extent that additional female employment is considered as an economic objective, this figure exaggerates the grant per male job approved. Secondly, throughout this paper we have been concerned with the optimal subsidy for male labour in the Irish economy, and it seems appropriate to attempt to estimate some measure of the actual subsidy approved for male labour. Unfortunately, neither this figure nor the figure for the grant per worker, when it is assumed that only 70 per cent of projected jobs are realised, can be estimated after 1973/74

14. This figure of 70 per cent also coincides with the figure obtained by McAleese; the result of his analysis, but not the analysis itself, is published in McAleese (1978), p. 80-81.

Table 5.I: *Average grant per worker (£) approved by the Industrial Development Authority, 1963/64 to 1976/77*

<i>Year</i>	<i>Number of projects</i>	<i>Average grant per worker</i>	<i>Effective grant per worker</i>	<i>Average grant per male worker</i>
1963/64	40	705.3	1,008	1,126.0
1964/65	40	845.6	1,208	1,625.0
1965/66	66	935.4	1,337	1,502.0
1966/67	47	861.8	1,231	1,602.7
1967/68	75	1,007.4	1,439	1,576.6
1968/69	104	1,322.2	1,889	2,038.8
1969/70	134	1,772.0	2,531	2,819.3
1970/71	84	2,250.3	3,215	3,089.6
1971/72	68	1,040.2	1,486	1,376.3
1972/73	103	2,276.8	3,252	3,069.3
1973/74	110	2,402.9	3,433	3,301.5
1974/75	n.a.	3,043.0	n.a.	n.a.
1975/76	n.a.	3,175.0	n.a.	n.a.
1976/77	n.a.	2,759.0	n.a.	n.a.

Source: Data from 1963/64 to 1973/74 were derived from firm-by-firm data on the IDA-McAleese file. "Average grant per worker" in each year was taken as total grants approved divided by the number of projected jobs associated with the relevant approvals. The "effective grant per worker" column is estimated on the assumption that only 70 per cent of projected jobs are realised, while the project capital stock is expected to be exactly equal to that approved. This takes into account the fact that the IDA personnel are aware of the consistent bias and take it into account at the approval stage. Data from 1973/74 to 1976/77 were supplied by the Planning Division, IDA.

as they were estimated from the raw data on the McAleese-IDA data file for the earlier period.

For each of the three series in Table 5.I, we calculated the implicit annual subsidy to labour in each year (i.e., expressed the lump-sum subsidy approved in terms of the equivalent annual subsidy for the duration of the project). In Table 5.II we present estimates for the annual average grant per worker which are based on several assumptions about the time horizon of the project, the rate of inflation, and the appropriate discount factor.¹⁵

One possible assumption we can make about the period over which the subsidy is expected to operate is that the project continues indefinitely, employing individuals who would otherwise be unemployed. However, in practice the IDA is rather less optimistic about the likely duration of the marginal project, and a shorter period is likely to be implicit in the lump-

15. Estimates for the other two series are available from the author on request.

sum subsidy which it offers. Furthermore, from the point of view of the owner of the project, the time horizon perceived is also likely to be relatively short as he takes into account the depreciation of his capital, etc. and, if he is an exporter, the length of the tax holiday on exports. In order to take account of different expectations of the duration of the project, we consider three possibilities for the project: (i) that it continues indefinitely; (ii) that it lasts fifteen years, and (iii) that it lasts ten years.

Rather than make definite assumptions about the rate of inflation over the duration of the project, we assume that the real value of the actual subsidy is constant so that inflation can effectively be ignored. Thus we can compare the annual subsidy approved for any one year with the optimal subsidy for the same year. To the extent that the optimal subsidy changes in *real* terms — because, for example, social assistance to the unemployed is increased — the comparison of first year annual subsidies is inappropriate.

There is an extensive literature on the question of the appropriate discount rate on government projects and how the rates used in practice differ from the social opportunity cost of using these funds. Scott (1977) estimates the social rate of discount for the UK using the rate of increase in the real level of supplementary benefits as a measure of the rate of decrease of the marginal social value of government expenditure, and the net yield on consols as a measure of the pure rate of time preference. He concludes that the discount factor currently used by the UK Government is above the test rate of discount which he estimates; the current rate used in the UK is 10 per cent, while the “Best Guess” in Scott’s calculation is 4.5 per cent when the growth in base income is 2 per cent, and 6 per cent when the growth in base income is 3 per cent.

Unfortunately, to date, as far as we are aware, no one in Ireland has undertaken an analysis of the appropriate discount rate for the Irish economy. In fact, it is not even clear what rates are used for the nationalised industries, although in general, one would suspect that the norms established in the UK apply in Ireland. For our calculations we use two different discount rates: 10 per cent and 5 per cent, corresponding to the actual UK rate and a mixture of the Scott “Best Guess” rates, respectively. To the extent that the high rate represents the market rate of interest faced by the firm, it captures the annual value of the lump-sum subsidy to industry; to the extent that the lower rate measures the social opportunity cost, it represents the annual cost of the subsidy to the government.

Comparing Tables 4.I, 4.II and 5.II, one immediately notes two striking points. First, there is considerably greater fluctuation from year to year in the average *actual* grant approved per employee to private projects, compared with the variation in the estimated *optimal* grant per employee. Secondly, in virtually all cases, the optimal grant exceeds the average grant

Table 5.II: *Average grant per worker (£) in manufacturing industry approved by the Industrial Development Authority, 1963/64 to 1976/77*

Year	Lump-sum grant approved	Annual equivalent sum – infinite time horizon		Annual equivalent sum – 15-year time horizon		Annual equivalent sum – 10-year time horizon	
		D.R.: 10%	D.R.: 5%	D.R.: 10%	D.R.: 5%	D.R.: 10%	D.R.: 5%
1963/64	705.3	64.1	33.6	87.2	64.8	104.5	87.0
1964/65	845.6	76.9	40.3	104.5	77.7	125.3	104.3
1965/66	935.4	85.0	44.1	115.7	85.1	138.6	114.1
1966/67	861.8	78.4	41.0	106.6	79.2	127.7	106.3
1967/68	1,007.4	91.6	48.0	124.6	92.6	149.3	124.2
1968/69	1,322.2	120.2	63.0	163.5	121.5	195.9	163.1
1969/70	1,772.0	161.1	84.4	219.1	162.9	262.6	218.5
1970/71	2,250.3	204.6	107.2	278.2	206.8	333.5	277.5
1971/72	1,040.2	94.6	49.5	128.6	95.6	154.1	128.3
1972/73	2,276.8	207.0	108.4	281.5	209.3	337.4	280.8
1973/74	2,402.9	218.5	114.4	297.1	220.8	356.1	296.4
1974/75	3,043.0	276.6	144.9	376.2	279.7	450.9	375.3
1975/76	3,175.0	288.6	151.2	392.6	291.8	470.5	391.6
1976/77	2,759.0	250.8	131.4	341.4	253.6	408.8	340.3

Source: IDA-McAleese file.

Notation: D.R. = discount rate.

approved, usually by a considerable amount. For example, looking at 1973/74, the average annual optimal subsidy per employee ranged from £800 (Rawlsian case) to £1,700 (when the elasticity of utility with respect to income is high and the welfare function is utilitarian) approximately, while the highest estimate of the annual actual grant approved was £360 per employee. There are several reasons why the actual grant approved could be very different from the optimal grant. First, if the difference between the grants arises from other social costs which are not covered in our analysis; in such a case the actual grants paid may be optimal when account is taken of these other aspects of the project. To the extent that there is a labour subsidy implicit in the other incentives available to manufacturing industry (e.g., the ESR scheme) or there are social costs associated with employment, then the actual grant paid may well be optimal. Only in the context of a full project appraisal exercise could such a situation be verified.

Secondly, the lower actual grant paid may reflect, not the IDA's unwillingness to pay the optimal subsidy where required, but rather its considerable success in bargaining with private entrepreneurs on marginal employment. This success indicates that the allocation of more resources to achieve the job-creation objective would most likely be socially profitable. Finally, the optimal subsidies estimated here relate to marginal employment, while the actual subsidies estimated relate to average employment. The crucial question here is, what proportion of grant-aided manufacturing jobs are marginal in the sense that if a programme of assisting new industry did not exist, how many of the new jobs would have been generated? Assuming that all jobs are marginal, then clearly the IDA programme has been *on average* highly socially profitable, if other social costs associated with employment have been small. To the extent that a considerable proportion of the jobs which are grant-aided are intra-marginal, then the actual grant paid per job could exceed that socially-profitable (optimal) level.

VI SUMMARY AND CONCLUSIONS

In this paper we have begun the task of estimating labour subsidies for Ireland. Despite the extensive and prolonged intervention of government in the Irish modern sector in order to increase employment, no serious attempt has previously been made to answer the question, "How much should the government be willing to pay to have the marginal individual employed in the manufacturing sector, given its resource constraints and social objectives?" Of course, the government should attempt to pay as little as possible to the private sector to generate jobs, but it is important that it be aware, given

its commitment to job creation and to the unemployed, of the extent to which it should be prepared to subsidise the marginal job. The failure to determine from a welfare standpoint what the appropriate level of assistance should be has perhaps led Ireland to be over-influenced by the amount which other competing countries are willing to offer to obtain multi-national projects. A recent example of this appears to have been the negotiation between the Irish Government and the Ford Corporation in Spring 1977 to determine how much assistance the Irish Government should give Ford in order to establish a new project in Ireland rather than in the UK. In the event, the UK Government paid the higher sum and the project is to locate in South Wales; however, there was considerable concern expressed by IDA personnel at the time that both because the unemployment problem in Ireland is relatively more serious than in the UK and because the project was particularly desirable on other criteria, Ireland should have been willing to pay more to persuade the Ford Corporation to invest in Cork. This points to the danger of not having some method of measuring social profitability; the fact is that the project may have been socially profitable for the UK and not for Ireland, or vice versa, or indeed may not have been profitable for either.¹⁶ The point made by Levy and Sarnat (1975) in a less-developed country context, namely, that competition between different countries for foreign investment has "induced many of them to offer more and more liberal benefits to investors without any prior attempt to assess the optimality, or even the desirability of such concessions", may well be appropriate here.

Estimating the social cost of labour and the appropriate employment subsidies is a first step in the direction of appraising projects from a social viewpoint, and although the estimates presented here are fairly crude, they do succeed in taking account of some of the elements of the social opportunity cost of unskilled labour which seem important in the Irish context — in particular, the source of marginal employment, the role played by social assistance, the possibility of differences in leisure associated with being employed and unemployed, and finally, the valuation of income and leisure by individuals. The most striking result of our analysis is that the actual subsidies paid in practice fall well within the range of the optimal subsidies estimated (assuming that the grants operate as labour subsidies). Even when the government's welfare function is Rawlsian, implying that the government is only concerned with the welfare of the unemployed, the optimal subsidies estimated (ignoring the other social costs associated with job creation) are considerably higher than the actual subsidies, *on average*. This suggests that if the social-assistance and job-creation policies could be operated more

16. Recent discussions with personnel in the UK Department of Trade and Industry suggest that the UK's offer of a higher grant was rational on economic grounds, because of planned redundancies of skilled labour in South Wales associated with rationalisation of the UK steel industry.

consistently, through the recognition of this relationship between them, then economic welfare could be increased.

Finally, in conclusion we should note two important points. First, the optimal subsidies are being compared with the *average* actual subsidies, so that while the grant programme is on average socially profitable, labour subsidised on each individual project may not be if the variance in the scale of subsidies given is high. A study of this question should be an important IDA research priority. Secondly, the optimal subsidy estimated is not a target, but rather a maximum figure consistent with the employment of marginal workers being socially profitable. In other words, if the IDA pays a subsidy higher than the optimal subsidy, then the employment created is actually welfare reducing (i.e., the economy would be better-off without the employment on the project in question). The IDA should pay as low a grant as possible to generate additional employment, but it should not refuse any project a labour subsidy equal to the optimal subsidy, if such a subsidy is required to ensure the profitability of the project.

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