COST-BENEFIT ANALYSIS
AND THE POLICY-MAKERS' OBJECTIVE FUNCTION:
THE CASE OF BRITISH REGIONAL POLICY 1960-1966

by

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ABSTRACT

This thesis has two aims. The first is to estimate the tangible efficiency returns to contrasting regional policies (distribution of industry policy and labor migration policy) as they were employed in Britain 1960-1966. Separate analyses are conducted for the sub-periods 1960-1963 and 1963-1966 and from the distinct points of view of the economy as a whole and the national government. The second aim is to estimate from the results relating to the economy viewpoint, the relative importance of different objectives of the regional program. Thus, the policy-makers' objective function (1960-1963 and 1963-1966) is derived as implicit in policy decisions.

After a preliminary review of policy developments, the broad nature of the policy-makers' objective function is defined. A function of Bergsonian form is employed relating the national level of welfare to the aggregation of levels of individual group welfare. Three objectives are defined: efficiency (increases in national income), equity in inter-regional income distribution, and inter-regional balance of population and industry. A model is then developed through which, with the use of policy return estimates, the relative importance of these objectives may be derived in the weights attaching to income created for different groups.

Using cost-benefit techniques, efficiency returns are next estimated. Distribution of industry policy is covered first (from both the economy and government point of view); then labor migration policy (from both points of view). Results suggest that, on chosen values for such parameters as the discount rate and the time horizon, distribution of industry policy was profitable from both points of view in both periods. However, it was not perhaps as profitable as elsewhere indicated. From the government point of view its return varied from somewhat under to somewhat over half the return from the economy point of view in the two periods respectively. The fall in profitability during the second period (from both points of view) was more marked for the economy than for the government.

In contrast to distribution of industry policy, migration policy looked highly profitable in both periods at the level of implementation adopted. Returns were slightly higher in the second than in the first period, indicating a minor improvement in the effectiveness of migration inducements. Again, from the government viewpoint, returns were lower than from the economy viewpoint. Relative to distribution of industry policy, the attractiveness of migration policy during the second period rather more than doubled from the economy viewpoint and rather less than doubled from the government viewpoint.

In the implied policy-makers' objective function, a high weight is estimated to have been attached to income created in the depressed regions (approximately twice as high in the second as in the first period). This indicates the significance attached to the intangible benefits (equity and balance contributions) of distribution of industry policy. By contrast, income created in prosperous regions for migrants from depressed regions was accorded either negative weights or weights less than unity. This indicates the extent to which the imbalance associated with migration was traded off against the efficiency and equity contributions of migration policy.

So far as the ranking of specific objectives is concerned, it is estimated that inter-regional balance was more important than inter-regional equity and that both were more important than measurable efficiency. Finally, estimates are derived of the total money valuations implicitly attached in policy decisions to the intangible benefits of distribution of industry policy over migration policy.

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INTRODUCTION

This thesis is based on a comparative cost-benefit analysis of the two fundamental approaches to the problem of regional unemployment imbalance as these have been used in Britain in two periods of policy expenditure, 1960-1963 and 1963-1966. The two approaches involve i) taking work to surplus labor in depressed regions (distribution of industry policy), and ii) taking surplus labor from depressed regions to work elsewhere (labor migration policy). The analysis is conducted separately from the points of view of the economy and the government. The periods adopted are described by renewed legislative attacks on the regional problem in 1960, 1963 and 1966.

While, for years partly coinciding with the periods of this thesis, two known estimates have been provided of the return on distribution of industry (D of I) policy, both were based on less than comprehensive analyses.[1] At the same time, there has been no known attempt to contrast D of I policy and migration policy from the point of view either of the economy or of the government, let alone both. Policy would thus

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[1] L. Needleman and B. Scott, "Regional Problems and the Location of Industry in Britain," Urban Studies, Vol. 1, No. 2 (November 1964), pp. 153-173; National Economic Development Council, Conditions Favourable to Faster Growth, London, HMSO, 1963, pp. 18-19.

appear to have been conducted in something of an informational vacuum.

In addition to the measurable money returns which the cost-benefit analysis provides, implications are derived regarding the relative importance in past policy decisions of the different objectives of the regional program. If the apparently less efficient policy was preferred to the more efficient, it would follow that, implicitly at least, the less efficient policy was seen as making additional contributions to objectives other than efficiency. The objective of efficiency is here defined in terms of measurable money effects.[1]

What is revealed in the comparison of monetary returns may be said to be the ex post structure of the policy-makers' objective function with respect to the regional problem. The relative importance of different policy objectives is assessed after the event on the basis of evidence provided in policy

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[1]It is also to be noted that following standard cost-benefit practice, efficiency is viewed as synonymous with the objective of growth, i.e., the goal of efficiency is that of (ideally) maximizing national income or (at least) increasing it. Thus, to quote only one authority:

> [B]enefit-cost analysis ... ranks projects and programs in terms only of economic efficiency. (... this means that projects and programs are judged by the amount that they increase the national product).

A. Maass, "Benefit-Cost Analysis: Its Relevance to Public Investment Decisions," Quarterly Journal of Economics, Vol. 80, No. 2 (May 1966), p. 208.

decisions. It is not claimed that the structure of the function revealed would necessarily coincide with the function which policy-makers had in mind at the stage of policy determination. It is merely suggested that policy outcomes imply, ex post, a certain weighting of policy objectives.

Another way of viewing this aspect of the analysis is to regard it as making minimum quantitative estimates of the value implicitly imputed in past policy decisions to some of the more intangible factors associated with regional policies, e.g., congestion costs in prosperous regions, debilitation of community life in depressed regions, violation of locational preferences associated with reluctant migration away from family roots, inequity in income distribution, political tension. In preferring the less efficient policy which also avoids the above costs, policy-makers may be seen as having implicitly placed a notional minimum value on these costs (of the extent of the efficiency sacrificed).

The advantage of estimating the dimensions of hidden value judgments in the above way is that they may be used as a framework in which to make normative assessments of policy prescriptions:

> If we are to judge our rulers fairly and adequately, it is important to understand their decisions, and to be able to distinguish their objective function ... Unless we know the facts it is hard to judge. 1

The purpose of the thesis is, therefore, two-fold: i) to estimate measurable money returns for D of I and migration policies, and ii) to estimate the apparent relative importance of different objectives of the regional program (the structure of the policy-makers' objective function).

In chapter 1 policy developments 1960-1966 are briefly outlined in their historical context. In chapter 2 the model is developed through which the structure of the objective function is determined. The methodology of the actual cost-benefit analysis is undertaken in chapter 3. Chapters 4-7 contain the estimation of measurable money returns for the two policies.[2] Results of chapters 4-7 are contrasted in chapter 8 and implications derived as to the structure of the policy-makers' objective function. Overall conclusions are presented in chapter 9.

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[1]G.C. Archibald and R.G. Lipsey, A Mathematical Treatment of Economics (London, Weidenfeld & Nicholson Ltd, 1967), p. 282.

[2]In order to secure greater balance in regard to chapter length, the estimation of returns for each policy from each point of view is not confined to discrete chapters. Thus, chapters 4 and 5 deal separately with the benefits and costs of D of I policy from the economy viewpoint. Chapter 6 deals with both benefits and costs of D of I policy from the government viewpoint while chapter 7 deals with both benefits and costs of migration policy from both points of view.

CHAPTER 1

REGIONAL POLICIES IN BRITAIN

For reasons explored in the next chapter regional policy in Britain has concentrated mainly on "taking work to the workers." Regional policy is therefore commonly synonymous with distribution of industry (D of I) policy. In this thesis, however, a wider compass is drawn such that both D of I policy and labor migration policy may be seen as fitting into what might be termed a regional program. The purpose of this chapter is merely to outline both policies in their historical contexts with special reference to the period under review.

1:(1) DISTRIBUTION OF INDUSTRY (D OF I) POLICY

The problem of regional imbalance in factor incomes and employment became a matter of concern during the great depression of the 1930's when pockets of excessively high unemployment occurred in the peripheral regions of the North, Wales, Scotland and Northern Ireland.[1] The Special Areas (Development and Improvement) Acts of 1934, 1936 and 1937 were designed to ameliorate this imbalance through expenditures on environment and public services, direct assistance to private industry, tax incentives and the construction of factories for sale or rent on trading estates.

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[1]Northern Ireland is excluded from this analysis as not being covered by the Local Employment Acts 1960 and 1963.

During the period 1945-1959 distribution of industry to depressed regions was achieved by similar inducements and also negative controls. The Distribution of Industry Acts of 1945, 1950 and 1958 continued in essential form the instruments of the pre-war period. In addition, direction of private development was controlled through the Town and Country Planning Act of 1947 under which Industrial Development Certificates (IDCs) were required for all new factories or extensions over 5,000 square feet. And until 1954 building licenses were also needed for all forms of building.

In application, however, both inducements and controls were minimal during the period; the general buoyancy of the economy until 1957 masked the structural and cyclical weaknesses of the outlying regions. Investigation of expenditures under the Distribution of Industry Acts and of conditions of IDC availability led McCrone to the conclusion that during the period, "regional policy was more or less in abeyance."[1]

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[1] G. McCrone, Regional Policy in Britain (London, G. Allen and Unwin Ltd., 1969), p. 115.
In 1947 the building of advance factories was halted until 1959 and the pressure on businessmen to go to depressed areas progressively eased from around 1949 onwards. The extremely low expenditures by the Board of Trade on the provision of factories for rent during the period is shown in A.J. Odber, "Local Unemployment and the 1958 Act," Scottish Journal of Political Economy, Vol. 6, No. 3 (November 1959), p. 211.

In light of the regional effects of the recession 1958-1959 a revised attack on the regional problem occurred in 1960 when this analysis begins. The Local Employment Act of that year replaced the previously few large "development areas" in which assistance was available by many much smaller "development districts" which could be scheduled as needing assistance or de-scheduled in accordance with the fluctuation of their unemployment rates around 4½%.

While the type of assistance provided under the new act was much the same as had been available previously (loans and grants for plant and machinery expansion schemes, precise amounts depending on the recommendation of a Board of Trade advisory committee, trading estate facilities for sale or rent, assistance to local authorities for reclamation of derelict land and improvement of basic public services), it was no longer necessary for firms to demonstrate that they could not raise the money elsewhere. There was one innovation too in the form of building grants for private construction in "development districts." To qualify for assistance, firms were required to show good financial standing and the intention to create a sufficient number of appropiate jobs in depressed regions (appropiate to the type of labor available). In addition, the Board of Trade reverted to a more stringent use of IDC control.[1]

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[1] McCrone, op. cit., p. 129.

The more active prosecution of policy could be seen in the figures for total expenditure on direct assistance and factory building (on trading estates):

Table I

Expenditure under the Acts of 1958 and 1960

	£000
1958-59	3633
1959-60	8559
1960-61	50541
1961-62	24038
1962-63	16074

Sources:

1) Estimates Committee, Seventh Report from the Estimates Committee, Session 1962-1963: Administration of the Local Employment Act 1960, London, HMSO, p. 22.

2) Board of Trade, Local Employment Act 1960: Annual Reports, London, HMSO.

Note: The extra large expenditure 1960-61 is attributable to major developments by the auto industry in Lancashire and Scotland.

Despite the efforts of the years 1960-1962, however, the regional problem was by no means solved. In terms of the dispersion of regional unemployment rates about the national mean, none of the depressed regions showed any relative improvement from June 1960 to June 1963. The downturn in the cycle (1963) again revealed the greater vulnerability of the outlying regions:

Table II

Percentage Regional Unemployment Rate Deviations from the UK Mean (June)

1960		1963
1.7	UK Mean	2.6
+0.2	North West	+0.5
+1.2	North	+2.4
+2.0	Scotland	+2.2
+1.0	Wales	+1.1

Source: Calculated from Ministry of Labour Gazette, Regional Unemployment Tables, London, HMSO.

Note: Comparisons are made at June to eliminate the seasonal variation effect.

The budget of 1963 (April) brought another escalation in D of I policy and its terms were embodied in the Local Employment Act of that year. Substantial additional incentives were offered to businesses setting up or expanding in "development districts." The basis on which assistance was given was also changed.

Standard grants (grants of a fixed amount involving no requirements as to financial standing, etc.) were introduced at the rates of 25% on the cost of buildings and 10% on the cost of plant and machinery in "development districts."[1] The intention was to create greater certainty as to the receipt of assistance and to simplify procedures which might previously

[1]Previous building grants had worked out at an average of 17% of cost. Ibid., p. 133.

have inhibited applications for assistance. Discretionary additional grants and loans of the former kinds could still be obtained. At the same time, "free depreciation" (the write-off of any amount of plant and machinery expenditure up to 100% in the first year) was permitted in "development districts." This represented the extreme case of accelerated depreciation.

On taking office in November 1964, the new Labour government extended IDC control to all factory developments of 1,000 square feet or more. It also required that new office development in London in excess of 3,000 square feet receive Board of Trade approval. The Control of Office and Industrial Development Act of 1965 formalized these requirements. In August 1965 office development control was extended to Birmingham. With these developments the period under review came to an end, although the regional problem was still by no means solved and government subsidy expenditure under D of I policy increased substantially in the years after 1966:

Table III

Expenditure under the Acts of 1963 and 1966

	£000
1963-64	30211
1964-65	40608
1965-66	42255
1966-67	55431
1967-68	46439
1968-69	54915
1969-70	82888

Source: Board of Trade, Local Employment Acts 1963 and 1966: Annual Reports; London, HMSO.

1:(2) LABOR MIGRATION POLICY

Before World War II labor migration was seen as an essential ingredient in the attack on the problem of localized unemployment. As early as 1928 the Industrial Transference Board was established to organise labor retraining and to provide grants and loans to enable surplus labor to move to employment elsewhere. The policy reached a peak in operation in 1936 with the subsidized movement of 43,000 people.[1]

In 1940, however, the Barlow report which had a strong influence on post-war regional policy recommended the decentralization and dispersion of population from the congested cities.[2] For the reason of congestion in prosperous regions and the other reasons examined in the next chapter, labor migration played little part in the post-war regional program.

During the period of analysis, three Ministry of Labour schemes were in operation to facilitate labor movement:

1) Resettlement Transfer Scheme (RTS)
2) Key Workers Scheme (KWS)
3) Nucleus Labor Force Scheme (NLS).

But the last two were effectively part of D of I policy.[3]

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[1] McCrone, op. cit., p. 98.

[2] Report of the Royal Commission on the Distribution of Industrial Population, Cmnd. 6153, London, HMSO, 1940.

[3] KWS provided relocation assistance to workers who were required to move with their firms to depressed regions. NLS subsidized firms setting up new factories in high unemployment regions when it was necessary, in recruiting unemployed workers, to send them to the parent factory temporarily for training.

Two nationalized industries, the National Coal Board and British Rail, operated in addition their own labor transfer schemes, but these are not included in this analysis.

Under RTS, unemployed workers, (or those about to become unemployed), with no immediate prospect of finding work in their home region are eligible (as of 1962) for the following assistance in securing work elsewhere:

All transferred workers:
- fare for interview for a new job elsewhere
- fare to the job if secured
- £5 settling-in allowance

Workers maintaining dependents in home region:
- weekly lodging allowance (up to 70s) for a limited period (up to two years)
- assisted fares for visits home (six per year)

Workers resettling permanently:
- household removal
- dependents' fares
- £40 for incidental expenses associated with movement to unfurnished accomodation
- part of the difference between sale and purchase price of old and new houses [1]

Average per capita assistance 1962-1966 came to just under £100. Before 1962 the scheme was rather more limited than as described above. But the small scale on which RTS was conducted throughout the whole period of this analysis is illustrated in the fact that the highest number of migrants assisted per annum was just over 4,000 (1965-1966).[2] The scheme was not one widely advertised.

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[1] Department of Employment and Productivity, Grants and Allowances to Transferred Workers, pamphlet EDL 123.

[2] Information supplied by the Department of Employment and Productivity.

CHAPTER 2

THE NATURE OF THE OBJECTIVE FUNCTION

One purpose of the analysis is to reveal the implicit importance attached by decision-makers to the different objectives of the regional development program, i.e., to estimate the parameters of the policy-makers' objective function.[1] In this chapter the form of the function which policy-makers may be seen as attempting (at least implicitly) to maximize is presented; then its arguments and finally the model used for estimating its parameters are established. This chapter, therefore, provides the methodology of one aim of the analysis.[2]

2:(1) FORM OF THE OBJECTIVE FUNCTION

The objective function of most government programs is complex in the sense of embracing more than one objective.

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[1] If there is widespread approval for social decisions and the social welfare function (SWF) is defined, not as a precise mathematical construct nor as unanimous consent, but as general consensus, the policy-makers' objective function may be defined as the SWF: see S.K. Nath, A Reappraisal of Welfare Economics (London, Routledge and Kegan Paul, 1969); J. Rothenberg, The Measurement of Social Welfare (Englewood Cliffs, N.J., Prentice-Hall, 1961). However, the definitional controversy surrounding the SWF is avoided here by referring only to the policy-makers' objective function without making more grandiose claims for it.

[2] It is not necessary, as might be thought, to assume full information and rationality on the part of decision-makers in order to establish the characteristics of the objective function. This is because the analysis is not concerned with defining the function which policy-makers thought they were maximizing. It is concerned rather with the function they were in fact found to be maximizing.

Efficiency (increases in national income) and equity in income distribution are the two terms usually emphasized. But there are likely to be others too. Nor need the several objectives be mutually consistent. Indeed, it has been shown on theoretical grounds that the most efficient use of resources is unlikely, in a regional context, to be the most equitable.[1]

Thus a question of substitution or trade-off between competing objectives could arise and the nature of the problem facing policy-makers could be stated in two broad alternative ways:

i) Maximize one objective subject to constraints representing minimum desirable conditions on the other objectives.

ii) Maximize a weighted sum of the contributions of policy to each different objective, the weights reflecting the relative importance attached to the different objectives. These weights represent the trade-off ratios between objectives.

Using the second approach, an objective function may be postulated in the most general form such that:

$$W = f(a_1 Y_1, a_2 Y_2, \ldots . a_n Y_n) \qquad (1)$$

where W = national welfare
Y_i = program objectives (in terms of program contributions to each)
a_i = weights attaching to each objective.

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[1] K. Mera, "Trade-off between Aggregate Efficiency and Inter-regional Equity: A Static Analysis," Quarterly Journal of Economics, Vol. 81, No. 4 (November 1967), pp. 655-674.

Or in Bergsonian form relating the national level of welfare to the set of levels of individual or individual group welfare (here summed):[1]

$$W = \sum a_i w_i \qquad (2)$$

where w_i = program benefits accruing to the i^{th} individual or group of individuals

a_i = weights attaching to benefits accruing to the i^{th} individual or group of individuals.

In operational form, equation (2), which will be used in this analysis, becomes:

$$\Delta W = \sum a_i \Delta w_i \qquad (3)$$

where w_i = program benefits defined specifically in terms of income accruing to the i^{th} individual or group of individuals.

Differential weights (a_i) attaching to the incremental benefits (income) of each individual or group of individuals indicate the relative importance of different objectives as income created for each individual or group of individuals contributes to or detracts from different objectives. In the next section the objectives which appear to have been associated with the regional program are identified.

2:(2) OBJECTIVES OF THE REGIONAL DEVELOPMENT PROGRAM

Objectives have not been specified totally in any clear and concise manner. But investigation of government pronouncements, allied to some degree of speculation,

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[1] A. Bergson, "A Reformulation of Certain Aspects of Welfare Economics," Quarterly Journal of Economics, Vol. 52, No. 2 (February 1938), pp. 310-334.

suggests three which may be said to embrace the notions used to justify regional policy: efficiency (increases in national income), equity in income distribution between regions and balance of population and industry over the whole country.[1] The last implies a rejection of labor migration from depressed regions as having a major role to play in attacking the regional problem.

The first and third objectives have been frequently stressed in government pronouncements on regional development. The National Plan of 1965 declared that "regional policy (D of I policy) has a key role to play in the achievement of faster growth."[2] It would do this in two ways:

i) by reducing the need to retard economic expansion throughout the whole country as a result of inflationary pressure in the prosperous regions when excess factor capacity still existed in the depressed regions.

ii) by expanding the effective work force through reducing unemployment and increasing the activity rate of labor in the depressed regions.

At the same time, "the immediate problem (objective) of securing faster growth is closely related to the longer term problem (objective) of securing a more balanced regional development of industry and housing."[3] As was explained in

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[1]The precise meaning of "balance" does not appear to have been defined. It is to be understood as having a connotation such that population and industry is generally dispersed throughout the country (at least to the extent prevailing at the point of time in question).

[2]Department of Economic Affairs, The National Plan, Cmnd 2764, London, HMSO, 1965, p. 84.

[3]Ibid., p. 85.

another government publication, the concentration of population and industrial activity in the prosperous regions not only meant hardship for those compelled to migrate from depressed regions in search of work (violation of locational preferences), "it has damaged the community life in the denuded areas and caused congestion and bottlenecks in the booming regions."[1] Debilitation of community life in leaving regions would be the more serious to the extent that outmigration was selective, involving for the greater part a region's younger, more energetic and more able sections of the labor force. Dennison had already before the war observed that to undertake labor migration policy meant to guide away from the depressed regions the workers most likely to give those regions an economic viability.[2]

Since outmigration may clearly have a deleterious effect on leaving regions, it is not surprising that regional interest groups exert political pressure to prevent it. Reporting in 1963 on the problems of the North West, for example, the Lancashire and Merseyside Industrial Development Association

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[1] Department of Economic Affairs, Progress Report, No. 3, March 1965. All the above points relating to both growth and balance were also made in: Department of Economic Affairs, Progress Report, No. 1, January 1965. The points relating to balance were also made in: National Economic Development Council, Conditions Favourable to Faster Growth, London, HMSO, 1963, p. 19.

[2] S. Dennison, Location of Industry and the Depressed Areas (Oxford, Oxford University Press, 1939), pp. 190-192.

stressed, as a first principle, the need to arrest the drift of population to the South.[1] The desire to avoid the political tension which could arise from ignoring such pressure becomes, of course, itself a reason for preferring industrial dispersal to migration policy.

In addition to the disorienting effects on the migrant of being uprooted from home soil and in addition to the externalities associated with migration, other factors have been mentioned in support of the goal of population balance. In 1965 the then President of the Board of Trade, directly responsible for regional policy, gave two additional reasons for being opposed to labor migration.[2] The first was that labor was endemically immobile. "In a modern congested industrial country it is a costly, difficult and almost impossible task for the majority of the working population to move their families quickly to a new home."[3] Thus labor was unlikely to move without a prolonged period of unemployment and waste. The second reason was a much exaggerated version of one to which Archibald has attempted to give quantitative substance, i.e., that migration involves negative multiplier

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[1] See E.G.W. Allen, "Regional Policies and the North West," District Bank Review, No. 67 (September 1965), p. 37.

[2] D. Jay, "Distribution of Industry Policy and Related Issues," Economic Journal, Vol. 75, No. 300 (December 1965), pp. 737-741.

[3] Ibid., p. 739.

effects.[1] "It is probable that the loss of purchasing power taken away by the emigrants creates as much new unemployment as their departure was thought to reduce."[2] Jay concluded that the only practical way of getting surplus manpower into use was to feed in new employing units to activate the local economy.[3]

Turning to the second suggested objective of equity in inter-regional income distribution, it is hard to discover explicit reference to it in government pronouncements on regional matters.[4] However, there was one tangential reference to it during the period of the analysis as bound up

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[1] Archibald, "Regional Multiplier," op. cit., pp. 22-45.

[2] Jay, op. cit., p. 740.

[3] Jay's last argument relates closely to the notions of cumulative circular causation and polarization effects as propounded respectively by Myrdal and Hirschman. As labor migration proceeds from the depressed to the prosperous regions so the market in the latter regions expands, encouraging further investment and growth, while the market in the former regions contracts suffering the reverse effect. See G. Myrdal, Economic Theory and Underdeveloped Regions (London, Methuen, 1957), chaps. 3-5; A.O. Hirschman, The Strategy of Economic Development (New Haven, Yale University Press, 1958), chap. 10.

[4] One suspects two influences in its omission; the tendency in economics to emphasize efficiency to the exclusion of non-efficiency factors and the inconsistency between equity and the other objectives which might have been regarded as a difficulty in the development of a case for regional policy.

in appreciation of its political implications:

> The level of employment in different regions of the country varies widely, and high unemployment associated with the lack of employment opportunities in the less prosperous regions is usually thought of as a social problem. Policies aim, therefore, to prevent unemployment rising to politically intolerable levels and expenditure to this end is often considered a necessary burden to the nation, unrelated to any economic gain that might accrue from it.[1]

For further evidence of the probable recognition of equity as an objective it is possible to go back in time. The Special Areas Acts of the 1930's, constituting the foundations of D of I policy, were concerned solely with eliminating the extreme hardship found in pockets of especially high unemployment during the depression. Their rationale was based on the equity consideration. In 1944 the White Paper on employment policy committed the government, as a point of principle, to a high and stable level of employment <u>throughout</u> the country.[2] To the extent that the philosophy of the White Paper laid the basis for post-war social policy, its frankly expressed judgment in favour of inter-regional equity in income distribution may be regarded as continuing to obtain during the period of this analysis. On a more general level, such institutions

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[1]NEDC, <u>Conditions Favourable</u> ..., op. cit., p. 14.

[2]H.M. Government, <u>Employment Policy</u>, Cmnd 6527, London HMSO, 1944 (emphasis supplied).

as the progressive income tax system and the welfare state, suggest the policy significance of considerations of social justice. In light of the above points it seems reasonable to count equity along with efficiency and population balance as an objective of the regional development program.

2:(3) ESTIMATION OF THE PARAMETERS OF THE FUNCTION

Given the policy-makers' objective function as defined before in differential form:

$$\Delta W = \sum a_i \Delta w_i \qquad (3)$$

it is required to determine values for the weights (a_i). Before outlining the method of this analysis, alternative procedures for determining values for a_i are surveyed.

i) Maass has suggested that representative political institutions could and should generate trade-off values between objectives.[1] However, the suggestion appears to be somewhat utopian.

ii) In an ex ante project analysis, results may be presented under a range of values for a_i leaving the decision-making authorities to settle on the most acceptable weighting. Such a procedure is illustrated by McBride with respect to Appalachian highway development where he weights

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[1] A. Maass, "Benefit-Cost Analysis: Its Relevance to Public Investment Decisions," Quarterly Journal of Economics, Vol. 80, No. 2 (May 1966), pp. 208-226.

contributions to efficiency, regional well-being and the income of unemployed highway workers.[1] However, this approach is clearly not applicable to the ex post framework of this analysis.

iii) Foster has suggested that weights be inferred from the ratio of the average income of beneficiaries and payees to the population income mean.[2] Weights would here equal the adjustment ratio, a procedure really only covering the objectives of efficiency and equity.

iv) Recognizing that in a Bergson-type welfare function, weights may be viewed as marginal utilities of income for different individuals or groups, Eckstein has recommended use of the schedule of marginal income tax rates as implying a marginal utility of income curve (assuming the government to act on the principle of equi-marginal sacrifice).[3] Such an approach has been implemented by Haveman with respect to U.S. water resource projects and Nwaneri with respect to the

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[1] C.A. McBride, "Policy Matters in Investment Decision-Making," Regional Studies, Vol. 4, No. 2 (August 1970), pp. 241-253.

[2] C.D. Foster, "Social Welfare Functions in Cost-Benefit Analysis," in R. Lawrence (ed.), Operational Research in the Social Sciences (London, Tavistock Publications, 1966), p. 73.

[3] O. Eckstein, "Theory of Public Expenditure," in J. Buchanan (ed.), Public Finance: Needs, Sources and Utilization (Princeton, Princeton University Press, 1961), pp. 447-448.

site choice for a third London air-port.[1] Aside from being relevant only to the two objectives of efficiency and equity, this approach raises the question of the accuracy of the marginal tax rate schedule for the purpose in hand.

v) McGuire and Garn have estimated the marginal utility of money (or index of need) for different communities not from tax schedules but from grants-in-aid made by the Economic Development Administration to areas of high unemployment rates and low relative incomes.[2] This approach again relates only to the two objectives of efficiency and equity, besides being unhelpful in terms of data requirements for British regional questions.[3]

vi) Weisbrod has suggested that implicit weights be revealed from comparison of past policy decisions concerning preferences between investment projects:

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[1] R.H. Haveman, Water Resource Investment and the Public Interest (Nashville, Vanderbilt University Press, 1965), Epilogue, pp. 125-151; V.C. Nwaneri, "Equity in Cost-Benefit Analysis," Journal of Transport Economics and Policy, Vol. 4, No. 3 (September 1970), pp. 235-254.

[2] M.C. McGuire and H.A. Garn, "The Integration of Equity and Efficiency Criteria in Public Project Selection," Economic Journal, Vol. 79, No. 16 (December 1969), pp. 882-893.

[3] Under D of I policy there is no tight control over the regional distribution of subsidies, that distribution being dependent more on the locational preferences of subsidy receivers than those of the national government. That is not to say, of course, that the government has no control over the regional location of outlying area development. Clearly, to the extent that IDC control and government investment in estate factories and infrastructure improvement influence private locational choices, the government maintains some control.

> Suppose there is a project 2 which receives priority over project 1, of equal cost, even though the real benefits from project 1 are greater when a dollar's worth of additional income receives a weight equal to unity regardless of who receives it ... it follows that if project 2 is preferred nonetheless, then it must produce benefits that would be found to be at least as large as those from project 1 if appropiate differential weights were attached to the income received by each beneficiary. 1

Weisbrod applies this approach when the two goals of efficiency and equity alone obtain. It is, however, deemed appropiate for extension to the case of the three-dimensional objective function used in this analysis.

The Model

For the purpose of this analysis three groups of individuals may be defined:

1. population from depressed regions in depressed regions
2. population from prosperous regions in prosperous regions
3. population from depressed regions in prosperous regions (after migration). 2

Thus, equation 3 may be written:

$$\Delta W = a_1 \Delta W_1 + a_2 \Delta W_2 + a_3 \Delta W_3 \qquad (4)$$

Given that the regional development program has the three objectives already identified (efficiency, equity, balance),

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1 B.A. Weisbrod, "Income Redistribution Effects and Benefit-Cost Analysis," in S.B. Chase (ed.), Problems in Public Expenditure Analysis (Washington, Brookings Institution, 1968), p. 192.

2 The fourth case of population from prosperous regions in depressed regions is of no quantitative significance in the context of this study.

(4) may be re-written as:

$$\Delta W = (1+g_1+h_1)\Delta w_1 + (1+g_2+h_2)\Delta w_2 + (1+g_3+h_3)\Delta w_3 \qquad (5)$$

where 1 = weight attaching to income created for all groups as it involves a contribution to the objective of efficiency
g_i = equity premium attaching to income created for group i
h_i = balance premium attaching to income created for group i.

The values of g_i and h_i will vary in accordance with the equity and balance implications of creating jobs (income) for different groups. For example, income created for group 3 will necessarily involve greater population imbalance than income for group 1. Similarly, income for groups 1 and 3 will carry a higher equity premium than income for group 2.

The method of weight estimation adopted depends centrally on the double condition that the measurable efficiency return on D of I policy (which contributes mostly to the creation of income for group 1) was lower than that on migration policy (which contributes mostly to the creation of income for group 3), and that D of I policy was in practice the more preferred policy.[1] Since, in the absence of capital rationing, the policy with the higher tangible B/C ratio would be expected to be preferred, the intangible factors associated

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[1] Evidence that decision-makers indeed preferred D of I to migration policy is provided in section (2) of this chapter. Evidence is provided in chapters 4-7 that relative returns to the two policies conform to the first requirement.

with D of I policy may be said to have converted that policy's overall B/C ratio into <u>at least</u> equality with the B/C ratio of migration policy taking into account intangible effects. Hence:

<u>Migration Policy</u>:

$$(1+g_1+h_1)\Delta w_1+(1+g_2+h_2)\Delta w_2+(1+g_3+h_3)\Delta w_3 = B_{mig} \qquad (6)$$

<u>D of I Policy</u>:

$$(1+g_1+h_1)\Delta w_1+(1+g_2+h_2)\Delta w_2+(1+g_3+h_3)\Delta w_3 \geq B'_{mig} \qquad (7)$$

where B'_{mig} = total benefits of migration policy adjusted for the difference in total cost between the two policies, the adjustment factor being the ratio of total costs (C_{di}/C_{mig}). [1]

In order to solve equations (6) and (7) for $(1+g_i+h_i)$, g_i and h_i, it is necessary to assign values to Δw_i (the distribution of policy benefits between groups) and to reduce the number of other unknowns to two. These steps are outlined now in turn:

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[1] It is emphasized that this model does not provide coefficients relating to a <u>continuous</u> trade-off between use of the two policies. It is also emphasized that the derived weights reflect, as regards balance, not only avoided <u>non-efficiency</u> costs such as community debilitation and violation of locational preferences, but also <u>intangible efficiency</u> costs such as scale diseconomies in public service provision and congestion costs which would be expected to accrue were resources devoted to migration policy rather than D of I policy.

i) Distribution of Policy Benefits between Groups:

Determination of values for Δw_i is achieved by use of differential multiplier estimates for the whole economy, for depressed regions and for prosperous regions. An initial income injection in one type of region creates multiplier effects which spread through that type of region creating income in subsequent rounds there. The multiplier effects also spill over, via regional import-export linkages, into other regions creating income there too. The total effect is summarized in the national multiplier while regional shares are defined by the size of the regional multipliers.

A national multiplier of 1.46 rounded to 1.5 is justified and used in the main body of the cost-benefit analysis.[1] Brown et al. have estimated the multiplier for depressed regions to be 1.27, say 1.3 rounded up.[2] This estimate is well in line with both Archibald's estimate of the same multiplier (1.21) and an average of Steele's separate estimates of multipliers for depressed regions (1964) of 1.32.[3] So far as the size of the multiplier for

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[1] See chapter 4, section (5).

[2] A.J. Brown et al., "The Green Paper on the Development Areas," National Institute Economic Review, No. 40 (May 1967), p. 33.

[3] G.C. Archibald, "Regional Multiplier Effects in the U.K.," op. cit., p. 27; D.B. Steele, "Regional Multipliers in G.B.," Oxford Economic Papers. Vol. 21, No. 2 (July 1969), p. 281.

prosperous regions is concerned, it may be taken to be equal to that for depressed regions, after rounding. The average size for prosperous regions emerging from the only known study to provide information on this topic is 1.29 as against 1.32 for depressed regions.[1] Like the multiplier for depressed regions, this may be rounded to 1.3.

Thus, migration policy may be seen as yielding 100% of the initial benefit injection to the group from depressed regions in prosperous regions (group 3), a further 30% to the group from prosperous regions in prosperous regions (group 2) as multiplier effects spread through the prosperous regions (multiplier = 1.3), and the remaining 20% to the group from depressed regions in depressed regions (group 1) as multiplier effects spill over into depressed regions through import leakages (national multiplier = 1.5).[2] In terms of the proportionate distribution of total final benefits from migration policy, group 1 receives a share of 13%, group 2 a share of 20% and group 3 a share of 67%.

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[1] Ibid., p. 281.

[2] This procedure assumes that any benefit received by group 3 in subsequent rounds is captured in the rounded-up figure of 67%. To the extent that group 3 would represent so small a proportion of the total population of prosperous regions, this seems reasonable. At the same time, it is assumed that no further migration is stimulated by subsequent round effects so that group 3 receives no additional benefit by that means.

In similar vein, D of I policy may be said to yield 100% of the initial injection as benefits for the group from depressed regions in depressed regions (group 1), a further 30% to the same group as multiplier effects spread through depressed regions (multiplier = 1.3) and the residual 20% to group 2 as multiplier effects spill over into prosperous regions (national multiplier = 1.5).[1] In terms of the proportionate distribution of final benefits, group 1 receives a share of 87% and group 2 a share of 13%, group 3 receiving no share at all.

Substituting the assigned values for Δw_i into expressions (6) and (7) and normalizing by dividing each expression by its right-hand side yields:[2]

Migration Policy:

$$(1+g_1+h_1).13 + (1+g_2+h_2).20 + (1+g_3+h_3).67 = 1 \qquad (6a)$$

D of I Policy:

$$(1+g_1+h_1)(.87B_{di}/B'_{mig}) + (1+g_2+h_2)(.13B_{di}/B'_{mig}) \geq 1 \qquad (7a)$$

It remains to set the outstanding number of unknowns equal to two by imposing certain constraints on the model.

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[1] Again, it is assumed that no migration is stimulated by subsequent-round expansion in prosperous regions.

[2] Results of the model analyzed under alternative values for Δw_i are given in the sensitivity analysis of chapter 8, pp. 197-199.

ii) Model Constraints:

In order to give the analysis an origin, $(1+g_2+h_2)$ is set equal to unity implying that income for group 2 is neutral so far as the objectives of equity and balance are concerned, i.e., $g_2=0$, $h_2=0$. Moreover, the equity premium for group 1 may be set equal to that for group 3 since in both cases population from depressed regions receives incremental income, i.e., $g_1=g_3$.[1] Last, it is specified that $-h_1=h_3$. This constraint implies that, in terms of population balance throughout the country, the creation of a job for an unemployed man from a depressed region in a depressed region is an advantage exactly matched by the disadvantage of creating a job for him in a prosperous region.

Using the equality of left- and right-hand sides in (7a) with the first constraint $(g_2=h_2=0)$, the model of expressions (6a) and (7a) may be solved for total weights attaching to income created for different groups. With the second $(g_1=g_3)$

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[1] This procedure does not take into account the negative multiplier effect of migration policy on employment in depressed regions. For every seven emigrants from a region, it has been estimated that, as a result of the loss to the region of unemployment benefit, another worker loses his job (Archibald, "Regional Multiplier," op. cit., p. 36). On these figures g_3 might equal $.857g_1$. On the other hand, most emigrants go to prosperous regions where they receive higher wages than would have been the case had they secured a job in their home depressed region through D of I policy. On these grounds $g_3>g_1$. In light of the above contrasting influences, it seems reasonable to assume that $g_1=g_3$.

and third ($-h_1=h_3$) constraints, specific values may be derived for the equity and balance premiums. Moreover, by comparing the total benefits of D of I policy (B_{di}) against the total benefits of migration policy adjusted upwards for the difference in policy costs (B'_{mig}), imputed absolute money values may be estimated for the intangible advantages of D of I policy over migration policy.[1]

2:(4) SUMMARY

Using a Bergsonian welfare function with weights a_i reflecting the relative importance of the objectives of efficiency, equity in inter-regional income distribution and population balance, a model is outlined for determining values for a_i as implied in past regional policy decisions. The model rests on the condition that one policy (D of I policy) with a lower efficiency return than another policy (migration policy) is nevertheless preferred in policy decisions. It then follows that the intangible advantages of the first policy must make its overall return at least as attractive as that of the latter policy. Hence implicit conclusions may be derived as to the

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[1] Say, D of I policy yielded tangible benefits of £x and migration policy with the same expenditure would have yielded tangible benefits of £y (where $y>x$) yet was not preferred to D of I policy. It may then be concluded that the value of $y-x$ represents the hidden intangible advantages of D of I policy over migration policy as envisaged, albeit implicitly, by decision-makers.

relative importance of intangible considerations in past policy decisions. The procedure reveals, in other words, the structure of what might be termed the policy-makers' ex post objective function.

In what follows, cost-benefit analysis is employed to estimate the relative returns to D of I and labor migration policies in terms of measurable or tangible efficiency factors.

CHAPTER 3

THEORETICAL FRAMEWORK OF THE COST-BENEFIT ANALYSIS

Before the cost-benefit analysis can proceed its main features must be established. In this chapter the following questions are discussed in order: the definition and measurement of costs and benefits, the evaluation criterion, the discount rate and the time perspective.

3:(1) DEFINITION AND MEASUREMENT OF BENEFITS AND COSTS

A detailed explanation of the various benefits and costs associated with D of I policy and labor migration policy is given in the following chapters where their quantitative assessment is undertaken. In this section, it is necessary to indicate only the broader conceptual issues underlying the definition and measurement of benefits and costs.

Benefits and costs are definable only in relation to particular objectives. In the cost-benefit analyses to follow, only measurable or tangible efficiency benefits and costs are estimated. Non-efficiency factors and intangible efficiency effects are captured in the weights derived from the model of the last chapter.

As well as varying with respect to different objectives, the definition of benefits and costs varies with the point of view from which the analysis is undertaken. From the

point of view of the economy as a whole, efficiency benefits are estimated as additions to national output which in the absence of policy would not have occurred. From the point of view of the economy, costs are defined as real resource costs necessary to operate the policies under review. Transfer payments, unless they are used as surrogates for real resource costs, are excluded.[1] Private operating costs are treated as deductions from profit rather than additions to resource cost and account is taken of opportunity costs by way of the interest rate used for discounting. From the point of view of the government, benefits are defined simply as incremental Exchequer revenue; costs as Exchequer outgoings associated with the policy. All transfer payments are now included in costs.

So far as real resource expenditure by the public sector is concerned, it is assumed that the immediately foregone alternative existed in the same sector. Thus the funds used to finance regional development, it is assumed, would have been raised by the government even in the absence of the policies and used for some other public sector purpose.

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[1]Capital subsidies paid under D of I policy are thus excluded. They represent simply a proportion of the investment cost which would have been incurred without the policy as firms expanded elsewhere.

Hence no net income injection is connected with government expenditure.

The assumption made here is fully consistent with the usually implicit assumption made in cost-benefit analyses of single projects where net income injections are not considered.[1] The same assumption, however, cannot be applied to private investment since the policies could have stimulated a net change in aggregate capital formation one way or the other.[2]

Despite the distortions of market imperfections, indivisibilities and unemployment, benefits and costs are measured throughout in terms of market prices (1960). It is thus assumed that labor earnings reflect marginal labor product, that prevailing levels of factor earnings are not affected by implementation of the policies under review and

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[1] A second assumption is also implied, viz. that the size of the multiplier in the public sector opportunity foregone is the same as the multiplier associated with expenditure in the two policies under review. While this may not have been true, differential multipliers cannot be taken into account.

[2] Such a possibility requires the assumption of net money creation to finance the net increase in capital formation.

that labor employed on, say, the construction of factories in depressed regions is likely to have been drawn from a more or less fully employed pool. While these assumptions may not be entirely realistic, it is not considered that satisfactory shadow prices can be devised.[1]

3:(2) EVALUATION CRITERION

In comparing tangible efficiency effects of the two policies it would be convenient to use the internal rate of return (IRR) as the evaluation criterion. This is that rate of interest which equates benefits and costs at present value. The great advantage of IRR is that, by contrast with present value criteria, it does not require specification of a rate (or rates) of discount for the analysis. The fact that IRR is not, under conditions of negative inflows towards the end of program time spans, unique is not important in the context of this analysis as such conditions are not encountered.[2] Since, however, the model of chapter 2 requires calculation of policy benefits and costs at present value, IRR would not be appropiate.

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[1]For a sceptical view of shadow prices based on the practical difficulty of establishing them, see R.N. McKean, "The Use of Shadow Prices," in Chase (ed.), op. cit., pp. 33-77.

[2]The non-uniqueness of IRR is emphasized in J. Hirshleifer, "Theory of the Optimal Investment Decision," Journal of Political Economy, Vol. 64, No. 4 (August 1958), pp. 329-352.

A present value criterion, the benefit/cost ratio (B/C ratio), is therefore used. The B/C ratio is chosen over the net present value (NPV) for the reason that NPV provides a meaningless comparison between two programs on which vastly different sums of money were spent. It is much more useful to compare each program's contribution per unit of cost.

In constructing B/C ratios, the following principle is adopted: that D of I policy is placed in a favourable light vis-a-vis migration policy. This principle does not conflict with standard econometric practice whereby the phenomenon under analysis is cast in the least favourable light. The reason is that the main phenomenon under analysis is the <u>difference</u> in B/C ratios between the two policies and this difference is minimized by the principle adopted. It is emphasized that this principle is subject to the other conditions of the analysis, in particular the avoidance of shadow prices on the cost side of D of I policy (for data reasons), and the comparison of policy returns at actual rather than equal levels of policy implementation (for methodological reasons).

3:(3) DISCOUNT RATE

Use of a present value criterion such as the B/C ratio requires choice of a rate at which to discount future cost and benefit streams to present value. As the exact rate is difficult to specify, the plan of the analysis is to use a reasonable range of rates showing the results at the beginning, middle and end of this range.

To the extent that expenditure on a chosen policy displaces funds from consumption and/or alternative investments, it may be argued that the discount rate should reflect both the social rate of time preference (STP) and the social opportunity cost of capital (SOC).[1] On the other hand, it may be argued that the source of funds makes no difference if real input resources are seen as being removed from alternative use in the private sector. Thus, Baumol argues that it does not matter whether these resources are drawn from the production of producers' or consumers' goods; in both employments they would

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[1] For a statement of this principle, see: M.S. Feldstein, "Opportunity Cost Calculations in Cost-Benefit Analysis," Public Finance, Vol. 19, No. 2 (1964), p. 118; and J.V. Krutilla and O. Eckstein, Multiple Purpose River Development, Studies in Applied Economic Analysis (Baltimore, Johns Hopkins Press, 1955), pp. 52-53.

have been required to yield the same going rate of return.[1] This argument hinges crucially on the notion that input resources rather than liquid funds are displaced from other uses.

For a different reason, Mishan and Nichols are also of the opinion that the source of funds is irrelevant to opportunity cost estimation. If the market opportunity rate=d and STP rate=r, then the opportunity cost of funds drawn from consumption is the highest value which can be attached to such funds, not simply their value in consumption. When d>r, which is likely to be the usual case,[2] this opportunity cost is therefore d. Thus, so long as d>r, the opportunity cost of all funds is d, irrespective of their source.[3] This argument, while concentrating on funds displacement, depends crucially on the definition of opportunity cost as the highest alternative returns foregone, not simply the actual alternative return foregone.

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[1] W.J. Baumol, "On the Social Rate of Discount," American Economic Review, Vol. 58, No. 4 (September 1968), p. 792.

[2] See page 48.

[3] E.J. Mishan, "A Proposed Normalization Procedure for Public Investment Criteria," Economic Journal, Vol. 77, No. 4 (December 1967), p. 790; A. Nichols, "On the Social Rate of Discount: A Comment," American Economic Review, Vol. 59, No. 5 (December 1969), pp. 909-911.

It is clear that the question of whether the distinction between STP and SOC is important in respect of the discount rate remains open. It depends on definitions of displacement and opportunity cost. The method adopted in this study allows for both possibilities that the distinction is and is not important. Before outlining that method, a brief review is provided of interest rate approaches rejected as inappropiate.

3:(3a) Rejected Approaches

These may be summarized under two headings: the SOC-rate and shadow-price approaches.

i) SOC-rate Approach:

Since there is no reason to expect that SOC = STP, sole use of SOC precludes allowance for consumption displacement or STP. This argument applies whether the recommended SOC rate is the government borrowing rate, the marginal rate on comparable projects in the private sector or the general rate of return on investments in the private sector.[1] Inasmuch as

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[1]The government borrowing rate has been widely recommended for government projects. For example, nationalized industries in Britain were expected during the period of this analysis to secure a yield equal to the Exchequer borrowing rate (plus a premium for self-financing). See: H.M. Government, Financial and Economic Objectives of the Nationalized Industries Cmnd. 1337, London, HMSO, 1961. The other two rates are recommended respectively by J. Hirshleifer et al., Water Supply, Economics, Technology and Policy (Chicago, University of Chicago Press, 1960), p. 272; R.N. McKean, Efficiency in Government through Systems Analysis (New York, John Wiley & Sons, 1958), ch. 5.

the government borrowing rate is recommended, it is further rejected for the reasons that this analysis (from the economy viewpoint) covers private as well as government expenditures and that, even for government expenditures, it scarcely reflects real SOC. The government borrowing rate is affected by such influences as domestic and international monetary conditions which have no bearing on real opportunity cost.[1]

ii) Shadow-Price Approach:

Improvement on sole use of an SOC rate may be achieved by introducing SOC as a shadow price attaching to costs of the policy and by discounting all benefits and adjusted costs

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[1]Discussions on the validity of the government borrowing rate are to be found also in O. Eckstein, Water Resource Development: The Economics of Project Evaluation (Cambridge, Mass., Harvard University Press, 1958); Feldstein, "Opportunity Cost Calculations in Cost-Benefit Analysis," op. cit., pp. 117-139; P.D. Henderson, "Notes on Public Investment Criteria in the U.K.," Bulletin of the Oxford University Institute of Economics and Statistics, Vol. 27, No. 1 (February 1965), pp. 55-89; J. Hirshleifer, "Investment Decisions under Uncertainty," Quarterly Journal of Economics, Vol. 80, No. 1 (February 1966), pp. 252-277; Hirshleifer et al., op. cit., pp. 139-150; A.R. Prest and R. Turvey, "Cost-Benefit Analysis: A Survey," Economic Journal, Vol. 75, No. 4 (December 1965), pp. 683-735.

by STP.[1] However, this approach presents difficulties in the way of defining the shadow price. What proportion of returns in the alternative use would have been reinvested? Is it justified, for reasons of procedural simplicity to assume as Eckstein and Feldstein do, that returns in the alternative use would have occurred in perpetuity?

3:(3b) Method of this Analysis

An approach which avoids the complications of the shadow-price approach yet, unlike the SOC-rate approach, embraces both SOC and STP, is what might be termed the weighted average approach. An average is used of the foregone rate of return (cost) on funds withdrawn from alternative investments (SOC) and of the time preference rate·

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[1] See: Eckstein, Water Resource Development . . ., op. cit., pp. 99-104; and O. Eckstein, "A Survey of the Theory of Public Expenditure Criteria," in J.M. Buchanan (ed.), Public Finances: Needs, Sources and Utilization (Princeton, Princeton University Press, 1961), p. 462; S.A. Marglin, "The Opportunity Costs of Public Investment," Quarterly Journal of Economics, Vol. 77, No. 2 (May 1963), pp. 274-289; S.A. Marglin, Public Investment Criteria (Cambridge, Mass., M.I.T. Press, 1967); S.A. Marglin, "Economic Factors Affecting System Design," in A. Maass et al., Design of Water Resource Systems (London, Macmillan, 1962), pp. 159-225; M.S. Feldstein, "Net Social Benefit Calculation and the Public Investment Decision," Oxford Economic Papers, Vol. 16, No. 1 (March 1964), pp. 114-131; Feldstein, "Opportunity Costs ...," op. cit., pp. 117-139.

(cost) applying to funds withdrawn from consumption (STP). Weights are the proportions of total funds used from each source.[1] The discount rate (i) may thus be defined as:

$$i = d\theta + r(1 - \theta) \qquad (1)$$

where θ = proportion of each £1 of expenditure displacing investment
d = pre-tax rate of return on alternative investment (SOC)
r = rate of social time preference (STP)

The alternative investment opportunity in this model is taken to be in the private sector. This does not, however, imply that displacement of public opportunities is ignored. It is taken into account on the argument that displaced public opportunities presumably displaced private opportunities at an earlier stage. The model also takes account of the possibility that the distinction between SOC and STP is unnecessary in estimating the discount rate. If such is the case, $\theta = 1$ and $i = d$.

Results are presented under two boundary conditions for θ; at the top end $\theta = 1$ for the reason just given and at the bottom end $\theta = 0.4$ as based on the breakdown of public receipts between personal taxes on the one hand and borrowing and other taxes on the other. The notion is that personal taxation affects mainly consumption while borrowing and other

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[1] See Krutilla and Eckstein, op. cit., pp. 53-54.

taxes affect mainly investment.[1] It remains to specify d and r.

i) Return on Private Investment (d):

The marginal social rate of return on private investment may be as high as 30% after taking into account the fact that investment enhances returns to other factors.[2] However, with no certain guidance as to the true social return it is assumed that it is approximated adequately by the private return.

Since investment in the private sector is undertaken up to the point at which the rate of return equals the cost of capital, an estimated cost of capital rate as might be used in the private sector is calculated to give an estimate of d. This involves weighting the estimated costs of each type of capital funds employed by the proportion in which each type is estimated to be used.[3]

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[1]Figures are used for 1966-1967, the first year in which corporation tax receipts were shown separately from income tax receipts. On the grounds explained in the text, θ appears to have been in that year about 0.6 (CSO, Financial Statistics, London, HMSO, No. 91 (November 1969), tables 11, 12, 23, 24, 25, pp. 14-15, 27-29) and there would not seem to be any reason why this proportion should have been markedly different in the earlier years of the 1960's. In order to be on the safe side, however, its minimum value is taken, quite arbitrarily, to be 0.4.

[2]Henderson, op. cit., p. 73.

[3]It is not thought necessary to adopt the Modigliani-Miller thesis that the cost of capital is not so much a weighted average as the cost of the unlevered stream of capital funds alone. For the thesis, see F. Modigliani and H. Miller, "The Cost of Capital, Corporation Finance and the Theory of Investment," American Economic Review, Vol. 48, No. 3 (June 1958), pp. 261-296.

Table I

Weighted Average Cost of Capital Estimates

Source of Capital	Historical Proportion of Financing	1960-64 (April)	1964-65 (April) Pre-tax costs	Post-1965 (April)
	%	%	%	%
1) Ordinary Shares	22.0	17.3	18.3	20.0
2) Retained Earnings	64.0	17.3	18.3	17.1
3) Debt (incl. pref. shares)	14.0	7.0	7.0	7.0
4) Weighted Average		15.9	16.7	16.3

Source: CSO, Economic Trends, London, HMSO (1967), table H, p. xiii for average financing proportions 1961 and 1962 (the latest available) of large quoted companies.

The weighted average cost of capital is presented pre-tax as the corresponding return required would be the social yield of private investment.[1] The results differ slightly as between 1960-1964, 1964-1965 and post-1965 due to the April 1964 and

[1] The case for using post-tax rates as is often done would seem to be justified only in the event that benefits are tabulated post-tax in the feasibility study of an investment. In this analysis benefits are examined pre-tax. For an example of another recommendation that a pre-tax discount rate be used, see Baumol, "On the Social Rate of Discount," op. cit., pp. 788 and 802.

1965 revisions of the U.K. tax system.[1]

The post-tax return basis used on ordinary shares is taken from the estimated 8% achieved on average by equity investors, 1919-1966 (excluding the war).[2] It is grossed up for company tax, and in the post-1965 period, withholding and capital gains taxes, assuming a dividend pay-out ratio of 50%. Realistic variations in the ratio would change the results for the overall weighted average cost of capital only about 0.5% in either direction.[3]

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[1]Pre-tax costs of capital from the different sources are based on estimated post-tax costs adjusted for the following taxes:

	1960-4(April)	1964-5(April)	Post-1965(April)
Income/Profits Tax	53.75%	56.25%	-
Corporation Tax	-	-	40.00%
Withholding Tax	-	-	41.25%
Capital Gains Tax	-	-	22.00%

Note: Capital gains tax liability for private individuals varied 1965-1966 between 50% of their marginal tax rate on unearned income and a maximum of 30% on long-term gains. 22% is an estimate of the average rate. The results vary little for rates in the range 20-25%. See A.J. Merrett and A. Sykes, Capital Budgeting and Company Finance (London, Longmans, 1966), p. 43.

[2]Ibid., p. 38.

[3]With a pay-out ratio of 80% the weighted average cost of capital in the post-1965 period rises from 16.3% to 16.7%. With a pay-out ratio of 20% it falls to 15.9%. Under the old (income) tax system the pay-out ratio does not affect the results.

The cost of retained earnings is based on the same 8% since to justify retention rather than distribution of profits the firm must, in the shareholders' interest, earn on retained earnings at least the yield shareholders would secure after all taxes, were the profits distributed. This 8% is grossed up for company tax and, in the post-1965 period, for capital gains tax (on the notion that retained earnings, if they are employed profitably, enhance the price of company shares). The cost of debt (preference capital can be ignored as insignificant) is based on the gross-of-tax interest rate on borrowed capital which rose from around 6% to 8% between 1960-1966.[1] An average of 7% is taken. The overall average cost of capital computed on this basis would appear to be, say, 16% (line 4, table I).

ii) Social Time Preference Rate (r):

STP is the result of a value judgment on the part of society (or government acting on society's behalf) as regards the relative desirability of present and future consumption. It will depend on a mixture of social norms and judgments as to future conditions. Feldstein has demonstrated that non-

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[1] Financial Statistics, op. cit., No. 33 (January 1965), table 71, p. 88; No. 68 (December 1967), table 75, p. 89.

judgmental factors influencing it are the level of wellbeing of society and the growth rate.[1] Admittedly guessing, Henderson has estimated that a rate of 3-4% might have been reasonable for the U.K. during the first half of the 1960's.[2] This resembles the sort of figure (2½-3%) which Eckstein seemed to have in mind, albeit for the U.S.[3]

These figures are postulated on the assumption that the social time preference rate is likely to be lower than the private, an assumption based on one of three arguments:

> (a) Individuals have myopic time preferences paying insufficient attention to the interests of future generations.
> (b) Individuals really do lose their selfishness when they act as a collectivity (thus politically revealed preferences would be found to favour other generations more than would market-revealed preferences).
> (c) If an individual can be sure that others will act in such a manner as to favour future generations, then he will too. 4

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[1] M.S. Feldstein, "The Social Time Preference Discount Rate in Cost-Benefit Analysis," Economic Journal, Vol. 74, No. 1 (March 1964), pp. 114-131.

[2] Henderson, op. cit., p. 67.

[3] Eckstein, Water Resource Development, op. cit., pp. 101-104; Eckstein, "Theory of Public Expenditure," op. cit., p. 462.

[4] The arguments come originally from Pigou, Colm and Sen respectively and are summarized in S.A. Marglin, "The Social Rate of Discount and the Optimal Rate of Investment," Quarterly Journal of Economics, Vol. 77, No. 1 (February 1963), pp. 95-111.

It may be argued, on the other hand, that, given continued growth of per capita income, use of a lower discount rate in order to favour the future is tantamount to robbing the poor to pay the rich. On this argument the market rate of interest would be taken to be the STP rate. Moreover, there are those who, for ethical reasons, refuse to go against the dictates of the market and thus would use the market rate.[1] In order to guard against the possibility that 3% is an understatement, the rates of 3%, 6% and 8% might be used in the analysis but, as table II below shows, only 3% is significant in terms of establishing a range of discount rates (i).

iii) Discount Rates (i):

On the basis of the method outlined, the following matrix of discount rates emerges using the source of funds approach to opportunity cost estimation with d=16%:

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[1] For example, McKean, Efficiency in Government, op. cit., p. 120; and R.N. McKean, "Cost-Benefit Analysis and British Defence Expenditure," Scottish Journal of Political Economy, Vol. 10, No. 1 (February 1963), p. 28.

Table II

Discount Rates

(θ) \ (r)	0.03	0.06	0.08
1.00	16.0	16.0	16.0
0.40	8.2	10.0	11.2

If the source of funds approach to opportunity cost estimation is rejected, a single rate of 16% applies since d>r. From table II a discount rate range of 8-16% emerges. Costs and benefits are accordingly discounted in the analysis at 8%, 16% and an intermediate rate of 12% which may be the most likely.

It is to be noted that this range is only roughly consistent with the rates typically used or suggested in cost-benefit analyses in the U.K. This is to be expected because other rates are based on reasoning that has been rejected here. For example, Foster and Beesley in their investigation of the feasibility of the Victoria Line used 4%, 6% and 8% as based unabashedly on the fact that "government projects are usually required to earn at least as much as their opportunity cost in the private sector measured by the cost of borrowing to the government (plus some risk premium)."[1]

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[1] C.D. Foster and M.E. Beesley, "Estimating the Social Benefit of Constructing an Underground Railway in London," Journal of the Royal Statistical Society, Vol. 126, Part I (January 1963), p. 56. My emphasis.

Since nationalized industries during the period under review were expected to make around 8% as based on the borrowing rate plus the surplus requirement, it can be assumed that their projects were discounted at roughly that rate.[1] Other government projects were likely to be discounted at around that rate as well. Thus, for example, 7% was used in the analysis of the Channel Tunnel Project; McKean's suggestion as regards British defence expenditures was for a rate of 6-8% as based on the riskless rate of interest adjusted to include a risk premium.[2] Henderson suggested a minimum of 5% as being a riskless rate based on the 3-4% STP rate grossed up to allow for the displacement of funds having a yield greater than 3-4% in the private sector.[3] The rates used in this analysis are somewhat higher than these other rates because they are not founded on the government borrowing rate, and, for the return on private investment, they are the pre-tax rates.

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[1] H.M. Government, Public Expenditure in 1963-64 and 1967-68, Cmnd. 2235, London, HMSO, 1963. Indeed, 7½% was used in the electricity supply industry, see: M.G. Webb, "Rate of Discount and Inflation with Particular Reference ot the Electricity Supply Industry," Oxford Economic Papers, Vol. 18, No. 3 (November 1966), pp. 352-358.

[2] McKean, "Cost-Benefit Analysis," op. cit., p. 28.

[3] Henderson, op. cit., pp. 77-84.

3:(4) TIME PERSPECTIVE

The analysis is divided into two periods. The first provides estimates of policy B/C ratios as regards expenditure incurred April 1960 - March 1963; the second as regards expenditure incurred April 1963 - March 1966. For each period benefits are allowed to extend over a "basic" time horizon of six years from the initial year in which costs are incurred. This is the period over which, it is estimated, emerge all jobs resulting from expenditures under D of I policy over the three years in question.[1] It provides minimum estimates of B/C ratios, placing a high value on the uncertainty associated with benefit accruals.

Sensitivity analysis is then employed in chapter 8 to develop B/C estimates with benefits extending over less restricted time horizons. Results are there shown for benefit inflows from the first year of each expenditure period over ten and fifteen years. These extensions are based on the somewhat severe but unavoidable assumption that the total income figure at the end of the "basic" six-year period (when all jobs are estimated to have materialized) is a reliable measure of annual real income during all subsequent years.

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[1] The evidence on which this position is based appears in chapter 4, p. 66.

3:(5) SUMMARY

The procedures to be adopted in the cost-benefit analysis are now summarized. Only tangible efficiency effects are measured explicitly. They are also measured net of effects which, without the policy, would be expected to have occurred anyway.

The definition of benefits and costs varies with the point of view of the analysis. From the point of view of the economy as a whole, efficiency benefits are defined as policy contributions to national income. Costs are defined as real resource costs necessary to operate the policy. From the point of view of government, policy benefits and costs are simply incremental Exchequer inflows and outflows. Opportunity costs are taken into account in the discount rate.

The immediately foregone alternative use of public funds is assumed to have been in the public sector; for private funds in the private sector. Both, nonetheless, have the same SOC deriving from the rate of return in the private sector. The argument is that if public funds are traced back far enough their origin lies in the private sector. Benefits and costs are measured in terms of 1960 market prices with no adjustments for market imperfections, policy discontinuities or unemployment.

The evaluation criterion used is the B/C ratio rather than IRR or NPV. In constructing B/C ratios the principle of casting D of I policy in a favourable light is adopted.

A range of discount rates is used (8%, 12% and 16%) as derived from weighted average estimates of the cost of funds displacing investment and funds displacing consumption. Weights are proportions of funds used from each source.

The analysis is divided into two parts relating to expenditure 1960/61-1962/63 and 1963/64-1965/66. The time horizon in the "basic" analysis is six years from the first year of each expenditure period. This is extended to ten and fifteen years through use of sensitivity analysis.

CHAPTER 4

DISTRIBUTION OF INDUSTRY POLICY: ECONOMY BENEFITS

Before developing the estimates of D of I policy benefits, it is necessary to define the general model underlying the computation of both benefits and costs and hence the relevant B/C ratio. From the point of view of the economy as a whole, the B/C ratio for D of I policy is estimated for each expenditure period (April 1960 - March 1963) and (April 1963 - March 1966) on the basis of the following model:

$$B/C_{dip,e} = \sum_{r=1}^{n} \sum_{t=1}^{m} \frac{(\Delta Y+\Delta Z+\Delta I+\Delta X)\beta + \Delta E}{(1+i)^t} \Big/ \sum_{r=1}^{n} \sum_{t=1}^{m} \frac{\Delta G+\Delta I+\Delta M}{(1+i)^t} \qquad (1)$$

where ΔY = change in labor income due to job creation under the policy
ΔZ = change in profit due to the policy
ΔI = change in private capital formation due to the policy
ΔX = change in balance of trade due to the policy
β = multiplier
ΔE = deflation of national income avoided through the policy
ΔG = real public expenditure due to the policy[1]
ΔM = movement costs facing firms relocated under the policy
i = discount rate
r = 1 ... n regions
t = 1 ... m years over which costs and benefits run.

As consistent with the principles established in chapter 3, the model defines benefits as net additions to national output

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[1]This phrase is used throughout as an abbreviation for real resource costs incurred as a result of public expenditure under the policy.

resulting from implementation of the policy and costs as real resource costs necessary to operate the policy.

The first item on the benefit side (ΔY) represents the change in labor income from job creation associated with assistance extended under the policy. It comprises the difference between earnings actually received in jobs created under the policy and earnings which, it is estimated, would have been received in the absence of the policy. Item ΔZ, representing the change in profit associated with the policy, has two components: a change in total profit arising from a changed level of total activity as a result of implementation of the policy, and a change in unit profit at any level of activity. In the latter case, ΔZ is measured as the obverse of changes in total unit cost facing firms which move from their original location to a depressed region. The possibility of locational disadvantage is here weighed against the possibility of operational economies due to movement.

The third item (ΔI) represents the net change, if any, in private investment resulting from the policy. Attaching to capital formation which, without the policy would not have occurred, is a double-barrelled income effect. On the one hand, jobs are created, the labor income and profit accruing from these being subsumed under the previous benefits (ΔY and ΔZ). On the other hand, a "pure" income effect results from

the injection as expenditure is incurred on investment goods. Item ΔI represents this second effect. A net change in private investment could result from the competing effects of incentives offered under the policy, IDC controls and the release from possible constraints on development which might have operated had projects been attempted in the congested rather than the depressed regions.[1]

The fourth item (ΔX) reflects the possible impact of the policy on the balance of trade (over and above the increase in exports representing a proportion of the increase in output already taken into account). The above four items, since they are income injections (or withdrawals), are multiplied by the multiplier (β) in order to yield an estimate of the ultimate effect of the policy on national income.

The last benefit item (ΔE) is that amount of national income which might have been sacrificed in the absence of the policy but which is allowed to materialize under the policy. The hypothesis is that with a narrower spread of unemployment rates over the different regions comprising the country,

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[1] It is assumed that the unit cost of capital and land does not vary with a project's regional location. In the case of plant and machinery costs this is unexceptionable. In the case of land, unit costs would be expected to be higher in the congested regions. But the excess cannot be quantified.

a higher rate of growth may be sustained for a given level of inflation.[1] It, therefore, follows that if the policy was at all successful in terms of narrowing the spread of unemployment rates, it would have rescued an amount of national income (▲E), which would have had to be sacrificed in the absence of the policy if the going rate of inflation, no more, was to be maintained.[2]

The first item on the cost side (▲G) measures the real public expenditure associated with the policy. It is that amount of public expenditure which, it is estimated, would not have been devoted in the absence of the policy to the projects to which it was devoted under the policy.[3] The second item (▲I) represents the net change in private investment expenditure occasioned by the policy. It is identical to the same item on the benefit side. As well as being an income injection, investment expenditure is also a resource cost.

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[1] See section 4:(6).

[2] Of course, it is possible that policy-makers would have been prepared to tolerate a higher rate of inflation rather than sacrifice growth. However, the assumption that the going rate of inflation was as high as could be tolerated seems reasonable.

[3] This item, unlike ▲I, does not appear as a benefit (a net income injection) because it is assumed that government expenditure, if not incurred on regional development, would, in the absence of the policy, have been incurred on some other government purpose. See page 34.

The third item (▲M) measures the once-for-all cost faced by an enterprise of moving under the policy. While changes in operating cost are treated as deductions from profit on the benefit side, movement cost is included as a capital item on the cost side.[1]

Aside from the obvious intangibles alluded to in chapter 2, certain factors conceivably warranting inclusion are excluded from the model:

i) The costs of operating the Regional Development Councils, established during the period of the analysis in order to assist in regional planning. Except where expenditure on such councils is clearly identified as part of D of I policy, it is regarded as belonging to a separate and wider government function than D of I policy.

ii) The costs and benefits of manpower re-training programs. The government has invested in training centres throughout the country with additional expenditure going to the depressed regions.[2] As with general regional planning, re-training is regarded as a separate government policy.

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[1]Like ▲G, this item is regarded as a mere diversion of resources so that it is not included as a net benefit as well as a cost. The rationale here is that the cost of movement as measured in the analysis is covered by government subsidies and thus, on the assumption from footnote 3 page 58, reflects expenditure which would have been incurred anyway in the absence of the policy.

[2]Ministry of Labour, Ministry of Labour Gazette, Vol. 76, No. 2 (February 1968), pp. 104-106.

iii) Employment creation directly associated with policy infrastructure investment, viz. jobs created in the process of undertaking infrastructure investment. This factor may be excluded on the assumption used before that labor employed on, say, factory construction comes from a more or less fully employed pool. Thus, labor resources are merely diverted to policy use; no net employment is created.[1]

Estimation of the cost side of expression (1) is deferred until the next chapter. In this chapter the benefit side only is estimated. Each item is taken in turn.

4:(1) INCREASED EARNINGS FROM JOB CREATION (ΔY)

Gross increased earnings resulting from the operation of D of I policy are those earnings attaching to jobs created in depressed areas by firms either receiving government assistance or operating in government-provided premises. Over the "basic" period of analysis these earnings accrue each year from the year (t) in which a job is created through until year $t = 6$.[2] From this cumulated sum of earnings are to be deducted earnings which, it is estimated, would have attached

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[1] See chapter 3, page 36.

[2] Since in both periods of analysis the time horizon is so short, it seems reasonable to make the assumption that a job, once created, remains in existence up until year $t = 6$.

to the jobs created under D of I policy had these jobs been created in the absence of the policy, either in the same region or in some other region. Allowance must also be made for the possibility that, in the absence of the policy, the same aggregate number of jobs might not have materialized, given the short supply of labor and space in the prosperous and growing regions. This is to say that growth in output might have been contained by factor constraints.[1]

The following expression summarizes the separate components of ΔY:

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[1] A case might also be made for deducting earnings which would have been secured in the absence of the policy through migration to the growth regions of a proportion of the depressed regions' unemployed labor force. Given the shortage of labor, however, in the prosperous regions it is perhaps realistic to assume that migrants would have filled jobs which, in the absence of the policy, would not have moved to depressed regions. In this event, there is no need to make the additional deduction for foregone migrant earnings since they are taken into account within the total deductions made for earnings attaching to relocated jobs which would not have moved without the policy. The assumption that foregone migrant earnings are already taken into account is also consistent with the principle of placing D of I policy in a favourable light.

$$\Delta Y = \sum_{r=1}^{n} \sum_{t=1}^{m} p\alpha\chi\left[E_{(ra)t}\, J_{(ra)t} - \lambda\left(E_{(rh)t}\, J_{(rh)t}\right)\right] \qquad (2)$$

where E_{rt} = male manual adult annual earnings by region r and time t. [1]

J_{rt} = jobs which it was planned at the time of receiving approval for schemes would be created in each region r at time t. [2]

(ra) = region of job creation under D of I policy

(rh) = region in which jobs would have been created in the absence of D of I policy

p = earnings adjustment factor assumed constant over both time and regions. This is included to account for the fact that not all jobs created would fall into the male manual adult worker category.

α = proportion of planned job creations (J_{rt}) actually realized. This is assumed constant over regions and is calculated to vary over time.

χ = proportion of planned job creations which would not have gone to region (ra) in the absence of D of I policy. This is assumed constant over both time and regions.

λ = proportion of planned job creations which would have been able to exist in region (rh) in the absence of D of I policy. This allows for variation in the aggregate number of jobs extant both under the policy and in its absence. It is assumed constant over time and regions.

$\Sigma J_{(ra)} = \Sigma J_{(rh)}$, the difference being in the regional distribution of the common total.

The separate parts of the expression are estimated in this section in the following order: jobs and job parameters ($J_{(ra)t}$, α, χ, $J_{(rh)t}$, λ), earnings and earnings parameter (E_{rt}, p).

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[1] The basic earnings unit is taken to be earnings of male manual adult workers, this being the sole earnings series available on a regional basis.

[2] It is necessary to work from job creation plans since actual realizations are not published in regional detail.

4:(1a) Planned Job Creations ($J_{(ra)t}$)

Table I shows the total number of jobs which firms planned ultimately to create when offered assistance and which it was planned would ultimately be created when the cost of constructing government factories was approved.

Table I

Planned Employment Associated with Total Government Assistance Approved

	1960-1	1961-2	1962-3	1963-4	1964-5	1965-6
England	30,300	8,100	20,400	22,300	36,757	43,842
Wales	6,800	2,800	800	1,000	2,088	6,389
Scotland	20,300	16,700	5,900	18,500	21,390	42,267
Total	57,400	27,600	27,100	41,800	60,235	92,498

Source: Local Employment Acts 1960 and 1963: Annual Reports, London, HMSO, Table V, 1960-1963; Table VI, 1964-1966.

The total for England requires to be disaggregated by regions. For the financial years 1964-1965 and 1965-1966 an official breakdown is provided by "development districts" (DDs) (the North East, Merseyside, Devon and Cornwall) and other "development districts" (ODDs) in unpublished material supplied by the Board of Trade.[1] For the preceding four

[1] Board of Trade, Progress Report on Applications for Assistance under the Local Employment Acts, 1960 and 1963, April 1964, 1965, 1966.

years (1960-1964) it is necessary to prorate the total for England. This is achieved on the basis of the proportionate spread of total assistance over the same regions as given in the unpublished material. For the years 1960-1964, 1964-1965 and 1965-1966 a χ^2 test reveals a strong lack of independence between estimated job creations as given in the unpublished material and job creations calculated by prorating. The prorating procedure is therefore considered to be satisfactory. Details are displayed in Appendix 1, table I. Other minor estimating procedures required are indicated in the remainder of Appendix 1.

Final estimates of regional job creations as planned at the time at which expenditure was approved ($J_{(ra)t}$), are shown in table II which combines the data of table I and Appendix 1:

Table II

Job Creations by Regions as Planned in the Year in which Expenditure Approved

	1960-1	1961-2	1962-3	1963-4	1964-5	1965-6
Yorks	32	35	-	391	309	394
Midlands	97	104	-	-	-	-
London, SE						
Southern	973	1,045	-	-	-	-
North West	22,367	957	9,424	2,886	10,045	15,602
South West	2,636	656	286	535	1,376	1,614
North	4,195	5,303	10,690	18,488	25,027	26,232
Total	30,300	8,100	20,400	22,300	36,757	43,842
Wales	6,800	2,800	800	1,000	2,088	6,389
Scotland	20,300	16,700	5,900	18,500	21,390	42,267
GRAND TOTAL	57,400	27,600	27,100	41,800	60,235	92,498

4:(1b) Proportion of Planned Prospective Job Creations Realized (α)

It is unlikely that the above estimates give a true indication of new jobs created each year. There are reasons to suppose that the annual net addition to the total number of jobs filled is less than the number of jobs which firms estimated they would create. First, firms may be inclined to exaggerate the number of jobs they are likely to create in DDs in order to lend weightier support to their applications for assistance. Second, there may be a genuine but misguided excess of optimism on the part of firms as regards their future development.[1] Third, since it takes time to construct a plant and equip it, a lag is to be expected between the offer of assistance and the creation of jobs so that the planned job creations associated with assistance offered in each year should be spread over future years.

Assessment of the rate of build-up of job creations is necessarily hazardous but there is tentative evidence available on which to base estimates. Since 1964 the Board of Trade has conducted annual sample enquiries into the

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[1] Seventh Report from the Estimates Committee on the Administration of the Local Employment Act, 1960, Session 1962-1963, London, HMSO, p. 211.

proportion of past planned job creations coming to fruition. In this thesis an average of the findings over the relevant period is taken as an estimate of the proportion of past plans materializing each year. Table III consolidates the Board of Trade findings:

Table III

Proportion of Planned Job Creations Materializing

Financial years in which assistance offered	Proportion of planned job creations materializing	By financial year end
1960-61	72%	1964
1960-62	73%	1965
1960-63	84%	1966
1960-64	72%	1967
1960-65	75%	1968
1960-66	87%	1969

Source: Local Employment Acts 1960 and 1963: Annual Reports, 1964-1969, passim.

Rounded up, the figures suggest that, on average, 78% of job creations materialized within three years of the last year in which job creation plans were made. In order to take account of the expected exaggeration in planned job creations, it is assumed that this proportion (78%) also represents the full extent of total realizations relative to plans. Thus jobs are treated as, on average, materializing within three years from the end of the year in which they were planned, or not materializing at all. This denotes a

otal gestation period of three and one half ($3\frac{1}{2}$) years eginning from the mid-point of the year in which jobs were lanned.[1]

It remains to estimate the annual rate of build-up over he $3\frac{1}{2}$ year period in which jobs are taken to emerge. The vidence on this matter is taken from Howard's study of ndustrial movement, where it is suggested that, during the eriod 1960 to end-1965 (almost exactly coincident with the eriod over which this thesis runs) the rate was, roughly peaking, as follows:[2]

60% employment growth between $\frac{1}{2}$ - $1\frac{1}{2}$ years
20% employment growth between $1\frac{1}{2}$ - $2\frac{1}{2}$ years
10% employment growth between $2\frac{1}{2}$ - $3\frac{1}{2}$ years.

These average findings imply that if 78% of planned job creations result in additional jobs in the first $3\frac{1}{2}$ years of a project's life, estimated job creation for the first six months (x) may be determined thus:

$$.78 = x \left\{1.6 + .20(1.6) + .10(.20(1.6) + 1.6)\right\}$$

So: $x = .36$.

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[1] This assumption is justified on the grounds that further growth after $3\frac{1}{2}$ years is likely to be minimal. See, R.S. Howard, The Movement of Manufacturing Industry in the UK, 1945-1965, London, HMSO, 1968, p. 21.

[2] Ibid.

From this information the average annual rate of build-up, or the time vector of α, would appear to be:

6 months	(to end financial year in which estimate made)	.36
½ - 1½ years	(to end second financial year)	.22
1½ - 2½ years	(to end third financial year)	.12
2½ - 3½ years	(to end fourth financial year)	.08
		.78

It is emphasized that these figures can be no more than approximate. They are based on proportions expressed in round terms and which, so far as the rate of annual build-up is concerned, were derived from the growth experience of firms in only a single year (1965). Moreover, the estimates of annual build-up relate to all firms which moved, not merely those which created jobs with the aid of government assistance. However, there is no alternative but to use average approximations.

Application of the estimated proportions to the planned job creations of table II yields estimates of the jobs resulting each year from assistance. These are presented in table IV. Annual totals are shown separately in terms of estimated job creations attaching to expenditure in each period (April 1960 - March 1963 and April 1963 - March 1966). The job flows resulting from expenditure April 1960 - March 1963 extend to March 1966 and from expenditure April 1963 - March 1966 they extend to March 1969.

Table IV

Estimated Annual Job Creations

1st Period

	1960-1	1961-2	1962-3	1963-4	1964-5	1965-6
Yorks	12	20	12	6	2	-
Midlands	34	60	34	20	8	-
London, SE	-	-	-	-	-	-
E and S	350	590	346	204	84	-
North	1,510	3,232	5,538	3,324	1,706	856
North West	8,052	5,264	6,286	3,978	1,206	754
South West	948	816	1,490	350	86	22
Wales	2,448	2,504	1,720	1,056	320	64
Scotland	7,308	10,478	8,234	4,926	2,244	472

2nd Period

	1963-4	1964-5	1965-6	1966-7	1967-8	1968-9
Yorks	140	198	256	156	72	32
Midlands	-	-	-	-	-	-
London, SE	-	-	-	-	-	-
E and S	-	-	-	-	-	-
North	6,656	13,078	17,168	10,248	5,150	2,098
North West	1,038	4,250	8,172	8,868	2,676	1,248
South West	192	614	948	564	304	130
Wales	360	974	2,880	1,736	834	512
Scotland	6,660	11,770	22,142	13,344	6,784	3,382

4:(1c) Proportion of Estimated Job Creations (αJ/rt) which would not have occurred in Region (ra) in the Absence of D of I Policy (χ)

Of the estimated job creations shown in table IV only a proportion would be expected to have occurred in region (ra) in the absence of the policy. These would be jobs created by firms which would have moved to region (ra) irrespective of the policy. The remainder of jobs (χ), it may be assumed,

would have been created in the region of origin (rh) of the firm undertaking the move.[1] Clearly, the policy had an effect on total earnings to the extent that it caused movement from one location to another.

Traditional location theory provides three reasons for industrial movement:

(a) Labor shortages and/or physical constraints preventing expansion at the original location.

(b) Market orientation on the part of firms expanding to meet a growing demand, viz. the case where proximity to the market outweighs the advantages of centralized supply, e.g., the manufacture of weight-gaining products.

(c) Materials orientation on the part of expanding firms, e.g., the manufacture of weight-losing products.

To these three cases may be added two others:

(d) Legal prevention of expansion at a firm's original location through IDC control.

(e) Financial inducements to expand at a distance through regional development inducements.

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[1] It is possible that a firm would have chosen to develop in some prosperous region other than its own region of origin had it been able to secure IDC approval in the absence of the policy. The probability of such an occurrence is deemed to be so slight, however, that no allowance is made for it in the estimates.

Of the firms which moved to depressed regions during 1960-1965, those moving for one of the first three reasons given above would presumably have moved irrespective of the policy, while those moving for the fourth and fifth reasons alone would have preferred to develop at their original location. Determination of ✖ thus becomes a question of estimating the proportion of total moves resulting from implementation of the policy rather than from the other "market" forces.

The fact is that most firms are likely to have moved for a combination of the different reasons. Nonetheless, an attempt may be made to separate out a proportion of firms which it is estimated would have moved regardless of the existence of the two-pronged policy.

Evidence as regards the impact of the policy on movement is fragmented and somewhat conflicting. Having found a significant least-squares relationship between industrial movement and the severity with which IDC control was exercised (1949-1965), one study concludes that controls certainly did help to influence movement.[1] However, it is

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[1] A. Beacham and W.T. Osborn, "The Movement of Manufacturing Industry," Regional Studies, Vol. 4, No. 1 (May, 1970), pp. 41-47.

not possible from this study to define the proportion of moves which would have occurred in the absence of the policy. Moreover, the authors claim, without test, that financial inducements may be assumed to have had an insignificant effect.[1]

Another study maintains that neither controls nor incentives are likely to have had much influence on the pattern of industrial settlement.[2] Insofar as incentives are concerned, this conclusion is reached on the basis of computations as to their impact on company costs. It is concluded that the reduction in costs would be insufficient to offset what are usually regarded as being typical additional costs resulting from movement.[3] On the question of IDC control, the conclusion of ineffectiveness rests on evidence of IDC refusals and the alleged weakness in application of the control.[4]

A study by the Confederation of British Industry (CBI) also claims, on the basis of a sample enquiry among its

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[1]Ibid., p. 45.

[2]R. Thomas, "The Financial Benefits of Expanding in the Development Areas," Bulletin of the Oxford Institute of Economics and Statistics, Vol. 31, No. 2 (May 1969), pp. 77-78.

[3]Ibid., p. 85.

[4]Ibid., p. 86.

members, that neither IDC control nor inducements have exerted much influence on movement.[1] It is claimed that only 3½% of the schemes in the South East and East Anglia, for which an IDC was required, were actually directed to depressed areas and that financial incentives "are not a prime-mover influencing a firm's location decision."[2] But it is not surprising that the CBI should come out against IDC controls. And, while the need to expand may have been more of a spur to movement than the availability of allowances, it does not follow that incentives exerted no influence. Without incentives, it is possible that some firms, wanting to expand, would have nevertheless desisted. Moreover, incentives might have influenced the location choice of firms coming into the country from abroad.

A more useful and objective study, based on a questionnaire enquiry into firms which moved in the period 1958-1963 suggests that roughly 40% of 71 firms which moved, did so against their initial will, most of them as a result of IDC control. Of the remaining 60%, some were influenced by financial inducements.[3]

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[1] CBI, Regional Development and Distribution of Industry Policy (London, CBI, 1968).

[2] Ibid., paras. 11.52 and 12.56.

[3] G.C. Cameron and B.D. Clark, Industrial Movement and the Regional Problem (Edinburgh, Oliver and Boyd, 1966), pp. 76-77.

Method of Estimation: An attempt is now made by another approach to estimate the proportion of moves which would have occurred for "market" reasons irrespective of the policy. The procedure is to test the following model in the linear form:

$$M = f(F,L) \tag{3}$$

Thus:

$$M = a + b_1F + b_2L + u \tag{4}$$

where M = number of moves to peripheral areas
F = number of IDC refusals
L = total government expenditure on grants, loans, tax allowances and factory buildings
u = error term.

Since F and L are indices of the two policy factors affecting industrial movement, the intercept (a) may be regarded as an estimate of that number of moves which would have occurred even if F=0 and L=0. As such, it may be viewed as an estimate of the number of moves resulting from purely "market" forces. Conversely, M-a yields an estimate of moves attributable to the policy. The results of testing model (3) then require to be translated into amounts of employment resulting from moves in the two categories.

Data: There are weaknesses in the data (as displayed in Appendix 2), available for this test. It is emphasized that the series on M relates only to manufacturing industry and

that it may understate the number of moves which actually occurred. This last possibility derives from the fact that the figures relate only to survivors at end-1966 and some firms which moved, especially in the earlier years, may be expected to have closed down. The series on F cannot capture the full effect of IDC control since some applications are abandoned after informal discussions with the Board of Trade but before being officially refused, and others never materialize at all because potential applicants expect to be refused.[1]

Measurement of inducements in terms of total expenditure on a combination of different measures implies that each measure had essentially the same impact on movement. While this is unlikely, aggregation of expenditures is considered to be satisfactory as a measure identifying the composite effect of inducements. Besides, separation of measures into distinct independent variables would lead, with the exception of tax allowances, to the problem of multi-collinearity. More seriously, the series on F is available only from 1960 so that an extended time series analysis is not possible. The fact that data on M terminate in 1965 compounds

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[1]Board of Trade, Board of Trade Journal, London, 9 July 1969, p. 107.

this problem, the upshot being that the regression must be run over only six observations.

Results: The results of testing equation (4) are given below:

Table V

1) Estimated Coefficients for Variables Determining Movement

Constant	F	L	
31.9	+.124 (.638)	+.850 (2.140)	R^2 .747 DW 1.35/

t-values in parentheses
/ = autocorrelation test inconclusive at the 5% level

2) Predicted Moves

1960	1961	1962	1963	1964	1965
63	64	63	67	85	121

32 of the above totals are estimated to be due to the market (Constant (a)=31.9, see above)

With due recognition of the data qualifications referred to before, these results imply that, on average, 42% of moves during the period would have occurred even if D of I policy had not existed. It may, however, be more realistic to divide the period into its distinguishable parts. The first four years (1960-1963 inclusive) display a marked similarity in terms of moves estimated from the equation. Escalation is then observed in 1964 and 1965 following the Act of 1963

and the intensification by the new Labour government of IDC control and its increase of expenditures incurred on regional development.

Results for the period 1960-1963 imply that, on average, 50% of moves were associated with "purely" market forces; in 1964 only 38%; in 1966 a still lower 26%. These results conform to expectations, given the policy intensification after 1963. The results for the period 1960-1963 also conform closely to the findings of Cameron and Clark (for the period 1958-1964) referred to earlier. If the greater proportion of their 40% of reluctant movers changed location, as they argue, primarily as a result of IDC control, and a small proportion of the 60% of non-reluctant movers reacted to financial inducements, 50% would appear to be a likely average of moves affected by controls and/or inducements.

While it may thus be said that about 50% of moves (1960-1963) to the peripheral regions could be attributed to D of I policy, the more significant proportion for this thesis is that relating to the <u>amount of employment</u> resulting from moves which could be said to be attributed to the policy. However, a test of an equation equivalent to (4) with employment in moves (M_e) substituted as the dependent variable

in place of numbers of moves (M) yielded insignificant results, with an incorrect sign on the coefficient for refusals.[1]

There is evidence to suggest that the proportion of jobs created each year in region (ra) as a result of the policy (✗) was probably higher than the proportions of 50%, 62% and 74% derived from the test of equation (4). First, moves to peripheral areas secured under the policy were likely to have been, on balance, the larger employing units. This is because larger firms would be better able to withstand non-market removal to second-best locations. Moreover, smaller firms would be in a better position to circumvent IDC restrictions in congested regions.[2]

Since the results of testing equation (4) agree closely with those of Cameron and Clark, it may be permissible to use these authors' estimate of the proportion defined here as ✗. Cameron and Clark found that 81% of employment created was in firms which initially did not want to go to depressed regions.[3] This figure, however, requires to be adjusted for two reasons.

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[1] $M_e = 41.5 - \underset{(2.055)}{.164F^+} + \underset{(1.127)}{.184L}$

t-values in parentheses
+ = wrong sign.

[2] Evidence of circumvention by smaller firms is provided in A.E. Holmans, "Industrial Development Certificates and Control of Growth of Employment in SE England," Urban Studies, Vol. 1, No. 2 (November 1964), pp. 138-152.

[3] Cameron and Clark, op. cit., p. 77.

First, some proportion of the 81% may be expected to have gone to depressed regions in any case as a consequence of capacity and labor constraints not appreciated by firms at the time of movement but which would be likely to have become effective had firms attempted to develop in their region of origin. This proportion is estimated at around 8% of the total of jobs created.[1] Second, Cameron and Clark's proportion of 81% does not include jobs created by those firms which moved primarily as a result of financial inducements. These jobs might be taken as representing 2% of employment created.[2]

On this evidence it would seem reasonable to assume that 75% of jobs created were moved as a result of the policy. In the absence of the policy an attempt would have been made to create them in their regions of origin (rh).

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[1] Of the firms not wanting to move initially, 30%, all small, were compelled to move by capacity and labor constraints (ibid., p. 90) which in employment terms might be 10%, using the ratio of employment in small firms moved to total employment in moves, $\frac{1}{3}$ (ibid., pp. 76-77). 8% is thus obtained as (.10 x .81), rounded.

[2] 16% of employment created by Cameron and Clark's free choice group of companies (accounting for 14% of total employment created) might have been attributable to financial inducements (ibid., p. 82). 2% is thus obtained as (.16 x .14), rounded.

Thus, it is assumed in this analysis that $\alpha = .75 = (.81 - .08 + .02)$. This same proportion is applied, reasonably, to jobs from abroad as well as to jobs from other home regions.

4:(1d) Estimated Prospective Jobs Created in Region (ra) by Regions of Origin ($\alpha\Delta J_{(rh)t}$)

Having established an estimate of the proportion of jobs which would not have existed in the depressed regions without the policy ($\alpha\Delta J_{(ra)t}$), it is necessary to establish their regions of origin in order to estimate earnings which would be expected to have attached to these jobs in the absence of the policy.

Estimation of the regional origin of jobs created is based on probabilities derived from a matrix of moves by origin and destination for the period 1960-1965. Table VI shows this matrix, converted to proportions (probabilities):

Table VI

Destination/Origin Matrix (Proportions of Total Employment Resulting from Moves)

Origin \ Destination	Scot.	Wales	North	NW	SW	Yorks	Mid.	SE
Scot.	.07	-	.01	-	-	-	-	-
Wales	-	-	-	-	-	-	-	-
North	-	-	-	-	-	-	-	-
NW	-	.11	.07	.11	-	-	-	-
SW	-	.03	-	-	.03	-	-	-
Yorks	-	-	.21	.02	-	.33	.25	-
Mid.	.24	.42	.23	.25	.26	.30	.25	.05
SE	.50	.41	.34	.59	.55	.12	.48	.88
Abroad	.19	.03	.14	.03	.16	.25	.02	.07
	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Source: calculated from Howard, op. cit., Appendix E, p. 43.

Notes:

1) Figures relate to jobs moved 1960-1965 and extant 1966.

2) Moves assumed to be "pure" market moves and omitted from the matrix are:
   a) moves having no allocated regional source
   b) moves having too small a complement of employment to be identified numerically by Howard.
   c) moves from a region with DDs to another non-adjacent region with DDs.

Use of this matrix involves certain assumptions. First, it is assumed that the transfer proportion from one region to all other regions was the same each year throughout the period. Second, it is assumed that the number of jobs extant at end-1966 as given in the matrix provides a fair reflection of all jobs created throughout the period. In fact, of course, some

jobs would have emerged and disappeared again before end-1966. Third, apart from the moves assumed to be "pure" market moves as indicated, the matrix embraces jobs which could have emerged as a result of either market or policy factors. Thus, it must be assumed that the calculated proportions apply as they stand to policy moves.

4:(1e) Proportion of $\alpha\lambda J/(rh)t$ which would have been able to Materialize in the Absence of D of I Policy (λ)

It has been estimated that in the absence of the policy an attempt would have been made to create $\alpha\lambda J_{rt}$ elsewhere than in the regions in which they were created under the policy and, by implication, $\alpha(1 - \lambda)J_{rt}$ in those regions. The regions of origin of $\alpha\lambda J_{rt}$ have also been estimated.

The proportion of both $\alpha\lambda J_{rt}$ and $\alpha(1 - \lambda)J_{rt}$ which would actually have been able to materialize in the absence of the policy is now estimated. Allowance has already been made for the few developments frustrated by capital and labor constraints, which would have been transferred, against the original wishes of their creators, to the depressed regions.[1] Here attention is paid to those jobs which, similarly frustrated but not transferred, would never have materialized

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[1] See page 80.

in the absence of the policy. To the extent that the policy avoided the consequent restriction of output, its effect is to be included as a benefit.[1]

It is likely that those jobs originating in the outlying regions would have been able to emerge in their regions of origin ($\lambda = 1$). But, given the capacity and labor constraints in the Midlands and South East (the prosperous regions), it is likely that a number of firms, wishing to expand, would have been faced with the choice of moving away from the region or stagnating.

Without any specific guidance on the numbers which would have chosen not to move away (and therefore not to expand), as against the number which would have been able to expand, a range, arbitrary though reasonable, is used. It is assumed that, at one pole, 100% of $\alpha\beta J_{(rh)t}$ originating in the

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[1] It is assumed here that the output effect would be proportional to the effect of the policy on the aggregate number of jobs extant in the economy. Doubtless some substitution of capital for labor would occur given labor shortages, so that the change in restriction of output would be less than the change in restriction of jobs. However, use of a spread of values for λ ranging up to $\lambda = 1$, rather than a single precise value, takes account of this possibility.

Midlands and South East would have been able to materialize, ($\lambda = 1$). At the other pole, 25% of the same amount is assumed, ($\lambda = .25$). Results for $\lambda = .75$, perhaps the likeliest single value for λ, are also shown, while results for $\lambda = .50$ may be derived by interpolation. Thus, for the purposes of this analysis:[1]

$\lambda = 1, .75, .25$ for relocated jobs originating in the Midlands and South East
$\lambda = 1$ for other relocated jobs.

4:(1f) Regional Earnings (E_{rt})

Earnings figures for each year and region are average weekly earnings for male adult manual workers. Use of this series involves two main assumptions:

(a) Differential average earnings figures as between regions reflect differences in real productivity and not price differentials. Since there is no effective basis available on which to make corrections for monetary distortions of relative regional earnings, this assumption is unavoidable.

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[1]The other side of the question under consideration in this section is the possibility that, in the absence of the policy, $\lambda > 1$. Such an effect would be associated with IDC controls if these restrained expansion. But this possibility is not considered for two reasons. First, given the labor shortage in prosperous regions, expansion would have been likely to take an input substitution bias in favour of capital. Any effect in this regard is examined in section 4:(3) below. Second, restriction of the value of λ to $\lambda \leq 1$ places D of I in a favourable light.

(b) Regional productivity differences result from regional differences within each industry and not, as is possible, from differences in the employment composition of industries within each region. This assumption is not regarded as unreasonable as it has been found, using shift-share analysis, that differences in employment composition account for only a small part of inter-regional differences in weekly earnings.[1]

Data are provided on a twice annual basis (April and October). For each financial year ($April_t$ - $March_{t+1}$) averages of $April_t$, $October_t$ and $April_{t+1}$ are used. One observation (October 1960) is omitted from the series and is estimated by linear interpolation. Results are displayed in Table VII:

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[1] "The Effect of Regional Employment Structures on Average Earnings," Ministry of Labour Gazette, Vol. 77, No. 3 (March 1969), pp. 232-234.

Table VII

Average Weekly Earnings (Male, manual, over 21)

shillings per week

	North	Y,H	L,SE	SW	West	Mid.	NW	Scot.
1960-1	284.46	281.96	299.25	269.79	294.92	306.04	282.63	267.92
1961-2	299.06	296.64	318.28	285.33	308.14	319.86	298.67	282.67
1962-3	304.03	305.70	332.06	297.36	323.13	330.67	309.00	292.50
1963-4	321.20	322.50	351.50	317.33	341.03	350.50	326.50	311.11
1964-5	349.84	348.72	377.54	342.97	364.75	379.64	353.28	339.31
1965-6	377.70	373.78	404.79	365.86	386.04	405.84	381.44	369.44
1966-7	394.31	386.75	422.00	379.81	401.22	417.72	398.55	390.67
1967-8	415.06	406.00	436.50	397.39	422.86	430.79	419.89	413.36
1968-9	445.00	435.56	492.54	426.19	457.44	489.93	453.86	447.00

Source: Ministry of Labour Gazette, Regional Earnings Enquiries, April, October.

Notes:

1) L,SE figures represent weighted averages for all regions which come under this general title, e.g., Eastern and Southern, East Anglia, South East, London and South East. Weights are numbers of adult male employees by respective regions.

2) Midlands figures embrace West and East Midlands similarly weighted.

4:(1g) Earnings Adjustment Factor (p)

Ideally, it is required that account be taken of the breakdown of estimated job creations by age, sex, occupation and industrial as well as regional sub-categories. Data in such detail, however, are not directly available. Modifications to E_{rt} are therefore introduced by use of the "earnings adjustment factor" (p) which is calculated from available series. It is estimated as a weighted average of annual "earnings adjustment factors" for each region from the following expression:

$$p = \sum_{r=1}^{n} \left\{ \sum_{t=1}^{m} J_t \left[\frac{\sum_{t=1}^{m} (J_t p_t)}{\sum_{t=1}^{m} J_t} \right]_r \right\}_r \Bigg/ \sum_{r=1}^{n} \sum_{t=1}^{m} J_{rt} \qquad (5)$$

where J_r = jobs created under the policy in each region r
J_t = jobs created under the policy in each year t
p_{rt} = earnings adjustment factor for each region r in year t.

Individual "earnings adjustment factors" (p_{rt}) are themselves estimated from the following expression:

$$p_{rt} = \left(\sum_{g=1}^{6} K_g X_g \right)_{rt} \qquad (6)$$

where K_{grt} = proportionate relationship by region r and year t of average weekly earnings in each job category to the base series (male, adult manual)
X_{grt} = proportion of job creations estimated to fall by region r and year t into job category g
g = male adult manual, male juvenile manual, male adult administrative-technical-clerical (ATC), male juvenile ATC, female manual, female ATC.

Data: Individual "earnings adjustment factors" (p_{rt}) are shown with data sources in Appendix 3. Owing to data constraints, the following job categories are omitted in the calculation of p_{rt}: female juveniles (manual and ATC) and managerial (both sexes). It is also emphasized that no adjustment is possible for jobs created according to industry of creation. The assumption is, therefore, made that the regional average level of earnings applies over all industries.

Other assumptions involved in the computation of p are:

a) The national proportionate division of jobs between different job categories applies in all regions.

b) The national proportionate relationship of earnings for male manual workers to earnings for other categories applies in all regions.

c) The series of ATC category as a proportion of total employees, available for manufacturing industry alone, can be used for all industry.[1]

d) The series on ATC earnings, available only for October, can be used against averages of $April_t$, $October_t$ and $April_{t+1}$ as they are used in the other earnings series.

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[1]Since on average 95% of assistance 1960-1966 went to manufacturing industry, this seems fair. Local Employment Acts 1960 and 1963: Annual Reports, all years, Appendix 3.

Result: The earnings adjustment factor (p) is estimated to be .824 for the first period and .831 for the second. An average of .83 is used for the whole analysis.

4:(1h) Summary (ΔY)

Expression (2) may now be estimated in its entirety to yield results for the benefits of D of I policy so far as incremental labor earnings are concerned (ΔY). Results, expressed in 1960 prices, are as follows:

Table VIII

Incremental Labor Income from Job Creation

£000 (1960 prices)

1st Period	λ=1	λ=.75	λ=.25
1960-61	16.2	2335.6	6267.4
1961-62	44.6	5131.0	13428.0
1962-63	71.0	7887.4	20580.4
1963-64	94.2	9951.0	25775.8
1964-65	142.2	11867.2	29570.6
1965-66	165.6	12758.6	31306.6
2nd Period			
1963-64	40.0	2529.0	6091.8
1964-65	127.0	8257.2	19690.6
1965-66	294.0	18535.6	43838.2
1966-67	429.6	25280.2	58658.0
1967-68	569.2	30091.0	67505.6
1968-69	416.2	29683.4	72405.8

Note: deflation index: "Index of Prices of Final Output Sold on the Home Market," Central Statistical Office, National Income and Expenditure, London, HMSO. This index is also used in subsequent tables.

4:(2) CHANGE IN PROFIT DUE TO D OF I POLICY (ΔZ)

Implementation of the policy is likely to have affected total profit in two ways: through a change in the level of industrial activity even though profit per unit of output remained the same, and through a change in unit profit. Thus, the overall change in total profit resulting from the policy may be written:

$$\Delta Z = C(z) + A(\Delta z)$$

where C = change in the level of industrial activity as a result of the policy
A = level of industrial activity under the policy
z = unit profit.

C(z) and A(Δz) are dealt with in turn.

4:(2a) Change in Total Profit due to a Change in the Level of Industrial Activity (C(z))

In the last section, 4:(1), it was assumed that, due to factor constraints in the prosperous regions, a proportion of jobs created in the depressed regions and originating in the prosperous regions might not have materialized had an attempt been made, in the absence of the policy, to create those jobs in their regions of origin. It is now assumed, reasonably, that total profit would have been affected in the same manner as total earnings. Thus, so long as factor constraints exerted any influence at all, profit adjustments

are required which correspond to the effect on earnings of the assumptions that either 25% or 75% of jobs originating in the prosperous regions might not have materialized in the absence of the policy (λ = .25 or .75).

Data: In order to estimate the quantitative impact of these adjustments, recourse is had to the relation of employment earnings to gross trading profit as these comprise the value of total output. During the period 1960-1968, gross trading profit of all corporations as a proportion of earnings from employment ranged from 30% (1960) to 25% (1967) with a mean of 27%.[1] Assuming the mean relation to be applicable to differential labor earnings arising from implementation of the policy, C(z) is estimated as .27(ΔY).

Results: Table IX shows the additions to total profit resulting from increases in the level of industrial activity corresponding to λ = 1, .75 and .25:

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[1] Ministry of Labour Gazette, No. 247 (1966), Table II, p. 2; No. 259 (1967), Table II, p. 5; No. 296 (1970), Table II, p. 5.

Table IX

Changes in Total Profit Resulting from Changes in the Level of Industrial Activity under D of I Policy (C(z))

£000 (1960 prices)

1st Period	λ=1	λ=.75	λ=.25
1960-61	4.4	630.6	1692.2
1961-62	12.0	1385.4	3625.6
1962-63	19.2	2129.6	5556.7
1963-64	25.4	2686.8	6959.5
1964-65	38.4	3204.1	7984.1
1965-66	44.7	3444.8	8452.8
2nd Period			
1963-64	10.8	682.8	1644.8
1964-65	34.3	2229.4	5316.5
1965-66	79.4	5004.6	11836.3
1966-67	116.0	6825.7	15837.7
1967-68	153.7	8124.6	18226.5
1968-69	112.4	8014.5	19549.6

4:(2b) Change in Total Profit Resulting from a Change in Unit Profit (A(Δz))

This item is estimated on the basis of a change in unit operating costs resulting from the policy. It is necessary to determine whether movement under the policy tended to present firms with a net locational advantage or disadvantage.

Contributing to an increase in private operating cost would be possible increases in transport and communication costs, lower labor productivity resulting from a lower degree of skills among the labor force and loss of general agglomeration economies such as ready equipment servicing and

proximity to the centres of technological development. On the other hand, offsetting economies might be expected in the form of a plentiful supply of cheaper labor, lower rents and rates, cheaper service costs and improved working facilities. It is not possible to make a certain estimate of the net effect of these influences. But evidence may be brought to bear on the determination of a likely value.

In a study of 98 cases in which firms opened up new branches or transferred existing units, Luttrell found that total cost per unit in the first three years taken together was 35% higher than at the parent factory, being roughly double in the first year, half as great again in the second and one-sixth higher in the third. Little variation was detected between different industries.[1] After the first three years the effective cost differential probably disappeared. Over the longer term, additional operating costs may level out at between zero and 10% per annum above such costs at the parent factory, the spread depending on the type of organization established in the regions (the greater the degree of independence, the lower the cost excess).[2] It was concluded that, after the first three years,

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[1] W.F. Luttrell, Factory Location and Industrial Movement, Vol. 1 (London, NIESR, 1961), pp. 298-300.

[2] Ibid., pp. 312-320.

locational disadvantages were normally small and probably outweighed by the gains of movement.[1]

Hague and Dunning, studying only 15 firms, found that on average the annual cost excess associated with movement was 0.8% of turnover higher than in London and that it might be up to 3 - 4%.[2] In another study Dunning concluded that development area operations might be 1 - 2% of turnover higher than operations in growing areas.[3]

While some of the above results related to periods well before 1960 they may be substantially valid for the periods under review. But there are two qualifications which suggest that the cost excess estimates are biased slightly upwards. The first is that in the period since the above studies occurred, the sizeable investment in the road development program may be expected to have generated external economies reducing additional transport cost. Moreover, the improvement in office communications and management methods in the last 10-20 years may be expected to have exerted a similar influence on additional communication cost.

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[1] Ibid., p. 355.

[2] D.C. Hague and J.H. Dunning, "Costs in Alternative Locations: The Radio Industry," Review of Economic Studies, Vol. 22, No. 59 (1954-1955), pp. 211-212.

[3] J.H. Dunning, "Manufacturing Industry in the New Towns," The Manchester School, Vol. 28, No. 2 (May 1960), p. 159.

Going further than this, there is evidence to suggest that the net locational effect is probably insignificant. Picton found, on the basis of an analysis of six companies which moved from the Midlands to Wales, that cost comparisons were not of immediate significance in the establishment of branch factories. More important in the location decision were large, obvious advantages such as having more space or better access to a good supply of labor. This concentration on certain major influences was made possible, he argued, because the main elements in the total cost of a branch were controllable by management regardless of location. Management, in other words, could decide which part of the organization to operate at a branch in such a way as to keep costs at a minimum. Thus, "the location of branches was in large measure immaterial to the firms and they were at little disadvantage in being induced to establish them in development areas."[1]

Other studies appear to confirm the hypothesis of management control over cost and hence its implication of minimum locational disadvantage. Investigation of 28 firms moving to Northern Ireland between 1932 and 1962 led Law to conclude that, as a result of minimizing transport costs by

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[1] G. Picton, "Notes on the Establishment of Branch Factories," Journal of Industrial Economics, Vol. 1, No. 2 (April 1953), p. 131.

shipping high value-added products, of selling through the parent organization or a central agent so as to keep in touch with market developments and of introducing new production methods, the additional costs of distance were more than offset.[1]

On a survey of 200 firms moving away from Birmingham to assisted areas in the post-war period, Loasby also found that management control over costs may lead to a net saving after movement. Initially, there appeared to be some disadvantage as Luttrell indicated. But the incentive to greater cost consciousness provided by movement and the revamping of operations in a new plant, re-scheduling of delivery runs etc., appeared to lead to an offset over the longer term.[2]

As evidence to support the likelihood that net locational disadvantage was minimal, reference may also be made to the footloose nature of firms which moved. If firms which moved were largely those in industries with moderate or low localization coefficients, no marked disadvantage in terms of operating cost would be expected. The localization coefficient (LQ) is defined as follows:

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[1]D. Law, "Industrial Movement and Locational Advantage," The Manchester School, Vol. 32, No. 2 (May 1964), pp. 131-154.

[2]B.J. Loasby, "Making Location Policy Work," Lloyds Bank Review, No. 83 (January 1967), pp. 28-52.

$$LQ = S_{ir}/N_{ir} \Big/ S_r/N_r \qquad (8)$$

where S_{ir} = number of employees in industry i in region r
N_{ir} = number of employees in industry i in the country
S_r = number of employees in all industry in region r
N_r = number of employees in all industry in the country.

Taking the amount of assistance (by industry) offered to firms going to depressed regions as an indicator of movements by industry, and using the localization coefficients calculated by Sargent Florence for 1951, some 74% of assistance 1960-1966 went to firms in industries with coefficients of 0.4 or under; 42% went to firms in industries with coefficients under 0.4.[1] Moreover, Nicholson concluded, again on the basis of localization coefficients that most of British manufacturing industry is footloose. "Trades with moderately low coefficients (i.e., less than 0.4) are the most important in the economy, accounting for approximately 70% of employment and net output in manufacturing industries."[2]

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[1] P. Sargent Florence, Post-War Investment, Location and Size of Plant (Cambridge, Cambridge University Press, 1962), Appendix B, pp. 38-43. These calculations are made on the basis of unweighted averages of the LQs of industries falling into main industrial categories. Miscellaneous manufactures are not allocated since it is difficult to determine a LQ for them. Results are displayed in Appendix 4.

[2] R.J. Nicholson, "Regional Location of Industry," Economic Journal, Vol. 67, No. 303 (September 1956), p. 471.

Finally, Luttrell claimed that roughly two-thirds of manufacturing industry was potentially mobile in the sense that transport costs, as a result of the dispersion of both sources of supply and markets, did not appear to be of much significance in relation to choice of location.[1] The smallness of the country would also contribute to this insignificance in that transport costs must represent a small proportion of total cost.[2]

On the basis of the foregoing evidence, it would seem reasonable to assume that, for all intents and purposes, locational movement under D of I policy involved no significant disadvantage in terms of production costs. Thus, in this analysis $A(\Delta z) = 0$ and final results for ΔZ are given by the figures of table VIII.

4:(3) GROSS PRIVATE INVESTMENT ASSOCIATED WITH D OF I POLICY (ΔI)

In this section the possibility is explored that the policy affected the amount of gross private capital formation undertaken in the economy. Only a net change in gross private investment associated with the policy is considered; any

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[1] Luttrell, op. cit., p. 319.

[2] On the basis of 1963 data, transport costs have been estimated to average roughly 9% of the total cost of producing and distributing with most industries being in the range 2-5%. See, S.L. Edwards, "Transport Cost in British Industry," Journal of Transport Economics and Policy, Vol. 4, No. 3 (September 1970), p. 269.

investment which would have occurred irrespective of the policy is ignored. Any net change is to be incorporated in the analysis as an income injection or withdrawal as well as an addition to or deduction from resource costs.

The a priori expectation as to the effect of the policy on private investment embraces conflicting possibilities. On the one hand the imposition of IDC control, which was applied with greater rigor from 1960, would be expected to have exerted a disincentive effect on private investment. Prevented from expanding in the area of their choice, some firms might not have expanded at all, or else modified their expansion schemes. Reference to this possibility has been widespread, although concrete evidence on the matter is singularly lacking.[1]

On the other hand, it is possible that as more jobs might have materialized with the policy than without it ($\lambda = .25$, $\lambda = .75$), so more accompanying investment might have been undertaken than in the absence of the policy. At the same time, increased and more easily available capital subsidies, introduced in 1960 and 1963, would be expected to

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[1] For studies in which the danger of IDC control has been emphasized, see: A.E. Holmans, "Restriction of Industrial Expansion in SE England: A Reappraisal," Oxford Economic Papers, Vol. 16, No. 2 (July 1964), pp. 235-261. A. Beacham and T.W. Buck, "Regional Investment in Manufacturing Industries," Yorkshire Bulletin of Economic and Social Research, Vol. 22, No. 1 (May 1970), pp. 19-25.

have exerted a stimulating effect on private investment inasmuch as they reduced the supply price of capital to the private investor. Moreover, the introduction of standard grants in 1963 might have had a favourable effect on investor confidence by removing the uncertainty associated with non-standard grants, formerly available.

The net impact of these conflicting possibilities is determined by use of tests on the aggregate private investment function. Two tests are employed. The first involves the insertion of policy variables (IDC control and investment incentives as used under D of I policy) into the gross private investment function to determine, by regression analysis, whether these variables served as significant determinants of the level of gross private investment. If they did, then the amount of investment directly connected (positively or negatively) with implementation of the policy may be established.

The second test is used as a check against the possibility of measurement weaknesses in regard to policy variables in the first test. It comprises an F-test for structural change in the investment function (exclusive of policy variables) as between the periods before and after the introduction of policy measures. If changes appeared in

the structure of the function either after 1960 as compared with the pre-1960 period or after 1963 as compared with the pre-1963 period, it would be concluded that new influences on investment behavior were at work in the later periods. Although it might then be possible to connect such influences with implementation of D of I policy, the strength of the test lies chiefly in conditions of insignificant results. If no apparent structural change occurred, it would be concluded that no significant new influences (policy measures or whatever) operated.[1]

Detailed application of both analyses is shown in Appendix 5. In both cases it is found that no significant change in private capital formation could be associated with implementation of D of I policy. It is, therefore, concluded that $\Delta I = 0$.

So far as IDC control is concerned, this conclusion conforms to the suspicion of the Hunt Committee:

> We accept that the operation of the control inevitably generates some degree of frustration ... We also find it difficult to gainsay the view that the control is exercising some inhibiting effect on growth, even if only to a limited extent ... We do not think that the volume of expansion which is being lost, on the evidence available, is large. 2

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[1]This test is equivalent to a test employing a dummy shift variable to represent the possible effects of the policy.

[2]Hunt Committee, The Intermediate Areas, Cmnd. 3998, London, HMSO, pp. 105-106.

The evidence underlying this statement is that officials seem to have operated the system of control with flexibility, that few IDC refusals occurred after 1960 and that between 1964 and 1967, 80% of the refused firms undertook some form of expansion, some in depressed regions, others in urban overspill areas.[1]

So far as the positive effects of incentives are concerned, the conclusion of this analysis agrees with an implication of a recent study which found that the impact of incentives on company costs would scarcely be enough to offset the early disadvantages associated with industrial movement.[2] This conclusion was reached with respect to incentives introduced in 1966 and would be expected to be even more valid with respect to the weaker, pre-1966 incentives under review here. Finally, the results suggest that, even if the policy did exert both negative and positive influences on private capital formation, the effects would appear to have been mutually offsetting.

4:(4) CHANGE IN BALANCE OF TRADE (ΔX)

The effect on exports of the increased output associated with D of I policy has already implicitly been taken into account inasmuch as a proportion of incremental output would

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[1] Ibid., p. 103.

[2] Thomas, "The Financial Benefits," op. cit. pp. 77-88.

be exported. However, the policy might be expected to have affected the balance of trade in at least three other ways.

First, to the extent that production costs were affected, the direction of industry to new locations might have influenced price and hence both import-saving and export propensities. Second, newly located firms in depressed regions would reduce the factor supply available for exporting and import-saving concerns already established, while in prosperous regions IDC control would protect such concerns from a certain amount of competition for factors. Third, imports (of raw materials and other inputs into the production process) would, presumably, have been affected by the impact of the policy on total output.

All three of these effects may be taken in practice to have yielded a sufficiently insignificant change in the balance of trade as to be excluded from quantification. As regards the first, it has been shown that no marked change in production costs was likely to have resulted from relocation under the policy.[1] In the second case, it may be assumed that the two possibilities, in any event of minor consequence, were

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[1] See this chapter, section (2b).

mutually offsetting.[1] In the third case, estimation would be hazardous and the effect relatively small. Omission places D of I policy in a favourable light (without major distortion of results). Accordingly, no value for ΔX is included in the analysis.

4:(5) MULTIPLIER (β)

The foregoing benefit items are to be multiplied up in order to arrive at estimates of final income created. The multiplication factor should, ideally, embrace both the ordinary multiplier and the accelerator as the two interact, the latter defining the reaction of induced investment to the multiplied change in income.

There is no known British quantification of the size of the super-multiplier combining the two effects, or, indeed, of the accelerator. This is, doubtless, because the accelerator coefficient is likely to be so variable. It may be expected to vary markedly between regions in accordance with the degree of regional excess capacity (demand/supply conditions) and industrial structure (production techniques).[2]

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[1] Discussion of this point in one other study, albeit for the period 1945-1954, treats it as insignificant. See: J. Sykes, "Some Results of Distribution of Industry Policy," The Manchester School, Vol. 23, No. 1 (January 1955), p. 17.

[2] T. Wilson, "The Regional Multiplier: A Critique," Oxford Economic Papers, Vol. 20, No. 3 (November 1968), p. 380.

It will also be expected to vary over time with changes in these same factors, fluctuations in demand significantly affecting the coefficient over even the short-term.

One possible approximate approach might be to use estimates of the gross marginal capital-output ratio (ICOR). But the serious problem of variability would be thereby overlooked and available estimates are certain to be too high for application to depressed regions with high surplus capacity. For example, Beckerman et al. provide ICOR estimates for 1956-1962 of 7.4 and 4.9, depending on whether or not the output contribution of labor is included.[1] Nicholson provides an ICOR estimate of 5.06 for 1948-1964 and even Barna's average (assumed equal to the marginal) capital-output ratio (for manufacturing) of 3.0 would seem to be too high.[2]

Since the above procedure appears to be unsatisfactory, no explicit account is taken of the accelerator effect. However, some implicit recognition is given the accelerator by use of a slightly high multiplier estimate. The annual

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[1] W. Beckerman et al., The British Economy in 1975 (London, NIESR, 1965), p. 30 and pp. 35-36.

[2] R.J. Nicholson, Economic Statistics and Economic Problems (London, McGraw-Hill, 1969), p. 228. T. Barna, "The Replacement Cost of Fixed Assets in British Manufacturing Industry in 1955," Journal of the Royal Statistical Society, Vol. 120, Part 1 (1957), pp. 1-36.

earnings and profit figures used to measure income injections will, after the first year of the analysis, incorporate a part of the effect of the multiplier impact from the previous year(s) (to the extent that multiplied income emerges as higher per capita income rather than increased employment). Thus, application of the unadjusted multiplier to these subsequent annual income figures will overstate the resulting change in final income. As the extent of this overstatement cannot be gauged accurately, no adjustment to the multiplier is undertaken. But the margin of overstatement is attributed to the accelerator.

The ordinary national multiplier has recently been estimated to be 1.46 (say, 1.5).[1] Use of this multiplier involves a series of assumptions:

a) The national multiplier may be used in place of separate regional multipliers. To the extent that the analysis is being conducted from the point of view of the economy as a whole, this is justified. Spill-over effects in the multiplier process from one region to others (due to inter-regional import-export relations) are thereby taken into account. On the other hand, use of the single national

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[1] A.J. Brown et al., "The Green Paper on the Development Areas," Appendix, National Institute Economic Review, No. 40 (May 1967), p. 33.

multiplier does assume away regional variations for reasons other than differential trading relations with other regions (due to differences in regional size and in production techniques). These other reasons would be as follows: differential regional propensities to import from abroad, differential distributions of income and hence marginal consumption propensities (MPC) within regions and differential input-output relations within regions.

b) The multiplier is constant over time.

c) A single multiplier may be applied to different types of income injection. While it would be expected, for instance, that MPC was higher in relation to labor earnings than to profit, use of a common figure here is consistent with its usage over different regions with different income distributions and different input-output relations (assumption(a)).

d) The multiplier is instantaneous in operation.

None of the above assumptions is regarded as being out of line with conventional use of multiplier estimates. The size of β in this analysis is, therefore, taken to be 1.5 as given above.

4:(6) AVOIDED DEFLATION OF NATIONAL INCOME (ΔE)

Government pronouncements on the benefits of D of I policy emphasized that the policy would be expected to help avoid regional concentrations of excess demand so that there would be less need to hold back general expansion due to inflationary pressure in the growing regions.[1] In order to define the extent to which the policy enabled the government to avoid deflation, recourse is had to the trade-off curve between wage or earnings inflation and unemployment (the Phillips Curve). Two hypotheses are tested, both of which suggest that the operation of D of I policy might have shifted the Phillips Curve for the whole economy (the aggregate Phillips Curve) leftward to reduce the national rate of wage or earnings inflation for any national level of unemployment.

The first hypothesis (the "aggregation" hypothesis) is that D of I policy, by narrowing the spread of regional unemployment rates, could shift the aggregate Phillips Curve to the left. If individual Phillips Curves in the low-demand regions displayed flatter slopes than the curves for the high-demand regions, a transfer of employment from high- to low-demand regions would reduce the rate of wage or

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[1] National Plan, op. cit., p. 84; Progress Report, op. cit., No. 1.

earnings change in the former regions more than it would increase the rate in the latter regions.[1] The second hypothesis (the "drift" hypothesis) is that the transfer of industrial activity from high- to low-demand regions under D of I policy could also cause a leftward shift in the aggregate Phillips Curve. This would derive from moderation of the upward pressure on labor incomes in the prosperous regions (and hence throughout the whole country as "wages drift" is contained).

If a significant leftward shift in the aggregate Phillips Curve (1960-1969) resulted from the reduction in dispersion of regional unemployment rates which D of I policy presumes to achieve, it may be argued that, without the policy, the rate of wage or earnings inflation ($\dot{W}/W$ and $\dot{E}/E$ respectively) would have been higher than was actually the case; to the extent, for example, of AB for the unemployment rate (u) of OC in figure 1:

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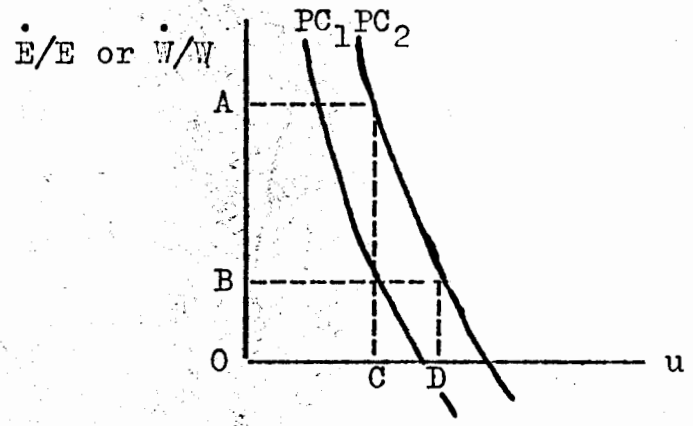
[1] See: R.G. Lipsey, "The Relationship between Unemployment and the Rate of Change of Money Wage Rates in the UK, 1862-1957," Economica, Vol. 27, No. 105 (February 1960), pp. 1-31.

Figure 1

Aggregate Phillips Curves



where PC_1 = Phillips Curve with policy
PC_2 = Phillips Curve without policy

Let OB be the going rate of wage or earnings inflation at the unemployment rate OC. In order then in the absence of the policy to hold the level of $\dot{E}/E$ or $\dot{W}/W$ at OB, it would have been necessary to tolerate additional unemployment of CD. Avoidance of CD may thus be said to reflect the benefit of D of I policy sought in this section. As in the case of other jobs created by the policy, it would be measured in terms of earnings and associated profit.

For the purpose of testing the "aggregation" and "drift" hypotheses a measure of dispersion in regional unemployment rates is introduced as an additional explanatory variable

into the conventional equations of the aggregate Phillips Curve (1960-1969).[1] Multiple regression analysis is then used to test for significance in the relation between income inflation and dispersion. If dispersion proves to exert a significant effect on the rate of income inflation, (and hence on the position of the aggregate Phillips Curve), a direct estimate of CD in figure 1 may be made.

Details of the two-stage least squares regression method are shown in Appendix 6. As the results suggest that the spread of regional unemployment rates exerted no significant shift effect on the aggregate Phillips Curve 1960-1969, no value is included in the analysis for ΔE. The finding of non-significance concurs with that of Thirlwall, albeit for a period only partly overlapping his (1951-1966).[2]

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[1] Other studies to have adopted this procedure (for different periods than analyzed in this analysis) are: G.C. Archibald, "The Phillips Curve and the Distribution of Unemployment," American Economic Review (Papers and Proceedings, Vol. 59, No. 2 (May 1969), pp. 124-134; A.P. Thirlwall, "Demand Disequilibrium in the Labour Market and Wage Rate Inflation in the UK," Yorkshire Bulletin of Economics and Social Research, Vol. 21, No 1 (May 1969), pp. 66-76.

[2] Ibid., passim.

4:(7) SUMMARY: D OF I POLICY BENEFITS (ECONOMY)

Consolidation of the results of the six preceding sections yields composite estimates for the benefits of D of I policy (economy viewpoint). These are shown in table X where the totals of tables VIII and IX are combined and multiplied by 1.5, the multiplier:

Table X

Benefits of D of I Policy (Economy)

£000 (1960 prices)

1st Period	λ=1	λ=.75	λ=.25
1960-61	30.9	4449.3	11939.4
1961-62	85.0	9774.6	25580.3
1962-63	135.3	15025.5	39205.7
1963-64	179.5	18956.7	49102.9
1964-65	270.9	22607.0	56332.0
1965-66	315.5	24305.1	59639.1
2nd Period			
1963-64	76.2	4817.7	11604.9
1964-65	241.9	15730.0	37510.6
1965-66	560.1	35310.3	83511.8
1966-67	818.4	48158.8	111743.5
1967-68	1084.3	57323.4	128598.2
1968-69	792.9	56546.9	137933.0

CHAPTER 5

DISTRIBUTION OF INDUSTRY POLICY: ECONOMY COSTS

The benefits of D of I policy from the point of view of the economy have now been estimated. In this chapter the costs are estimated. As defined in expression (1) of chapter 4, these comprise the following items: real resource costs incurred as a result of public expenditure under the policy (ΔG) - abbreviated here and elsewhere to real public expenditure -, change in private capital formation due to the policy (ΔI) and movement costs facing firms relocated under the policy (ΔM).

5:(1) REAL GOVERNMENT EXPENDITURE UNDER D OF I POLICY (ΔG)

Total government expenditure on real goods and services as associated with the policy divides into four categories. Thus:

$$\Delta G = G_1 + G_2 + G_3 + G_4 \qquad (1)$$

where G_1 = expenditures (capital and current) incurred by the Board of Trade for regional development under section 2 of the Local Employment Acts 1960 and 1963

G_2 = additional public investment directed to the depressed regions in order to improve the socio-economic environment and thus to assist in attracting private capital

G_3 = net changes in public expenditure (capital and current) associated with scale effects and resulting from the impact of the policy in forestalling migration from the depressed to the prosperous regions

G_4 = miscellaneous expenditure.

These categories are now estimated in turn.

5:(1a) Board of Trade Expenditure under Section 2, Local Employment Acts (G_1)

This category of public expenditure, comprising both capital and current real resource expenditures, covers investment in factories for sale or rent in depressed areas by the Industrial Estates Management Corporations which manage Board of Trade properties under the Acts (Section 2, 1960 and 1963), as well as current expenditures of the following kinds:

- site maintenance expenditures by the Management Corporations on Board estates;
- net cost of revenue earning services of the Management Corporations (e.g., canteens, heat, light and power supplies);
- administrative cost of D of I policy as this encompasses: headquarters and local administration and office expenses, and expenses of the Board of Trade Advisory Committee (BOTAC) which determines the level of assistance to be extended under the Acts to individual firms;
- miscellaneous current account expenditures (e.g., bad debts, the property valuation service of the Inland Revenue Valuation Office as it is used to determine sale prices and rents on government-built factories in depressed areas).

Results: Total expenditures under G_1 are shown in Table I:

Table I

Board of Trade Expenditures under Section 2 of Local Employment Acts 1960-1963

£000

	1960-1	1961-2	1962-3	1963-4	1964-5	1965-6
1) Capital Expenditure	6995	10959	7065	6405	6007	7681
2) Current Expenditure	1144	1282	1222	1240	1430	1581
3) Total	8139	12241	8287	7645	7437	9262

Sources:

i) Civil Appropriation Accounts, Class VI, Vote 4 1960-1961 and 1961-1962; Class IV, Vote 3 1962-1963/1965-1966, London, HMSO.

ii) Local Employment Acts 1960 and 1963: Accounts, 1960-1961 / 1965-1966.

Note: In 2), depreciation and interest on capital employed are deducted from published account totals as they are merely notional charges which are accounted for in this analysis in the discounting process.

5:(1b) Additional Public Overhead Investment (G_2)

This item comprises capital expenditure by central and local governments which is outside Section 2 of the Local Employment Acts yet may be said to have been directed to depressed areas as part of the policy of promoting local development. It is investment designed to improve the socio-economic environment and thus to assist in attracting private capital. "An increased programme of capital investment ... in the less prosperous regions ... would ... provide a direct stimulus to the regional economies."[1]

Two aspects of public investment, declared the National Plan, were of particular importance: housing and major road schemes.[2] It went on to explain that public housing programs would be geared to the needs of different regions and that,

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[1] NEDC, Conditions Favourable to Faster Growth, op. cit., p. 26.

[2] National Plan, op. cit., p. 96.

in particular, the rate of building would be accelerated in Scotland, Wales and the North. "Better housing in these regions could make a significant contribution to their economic growth."[1] Moreover, "in reviewing its advance road programme, the government will take into account specific regional developments and problems."[2]

In addition to housing and road expenditures outside the Local Employment Acts, G_2 encompasses certain environmental and transport expenditures within the Acts, but outside Section 2. These are the acquisition and improvement of derelict land (Section 5, 1960 and 1963) and the improvement of basic services such as water, transport and sewerage facilities (Section 7, 1960 and 1963). Thus, G_2 may be said to embrace regional expenditures on housing and environment (H and E) and roads and transportation (R and T) as these were designed to supplement Section 2 of the Acts.

Method of Estimation: Estimation of G_2 is undertaken by use of a model of the determinants of per capita investment on H and E, R and T. It is posited that per capita investment in each region of the country is a function of the population density of the region (thousand persons per acre),

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[1]Ibid., p. 173.

[2]Ibid., pp. 96-97.

the rate of regional unemployment, the rate of population growth in the region (over the preceding five years) and the degree of urbanization in the region (proportion of the regional population living in county boroughs and urban districts over the size of 20,000).

A direct regression test of this model, however, is inappropiate in consequence of the severe multicollinearity between regional density, unemployment and urbanization. Preliminary regression tests on pooled cross-section and time-series data revealed marked instability and hence unreliability in the coefficients as different independent variables were omitted. The same tests also showed that the rate of change of population was never significant, whatever the permutation of variables in which it was included. Even with no other independent variables it was insignificant.

A modified version of the basic model is therefore tested. The rate of change of population is omitted. Urbanization is also omitted and the effect of unemployment captured in a dummy variable equalling one for regions of traditionally high unemployment rates, which also received per capita public investment over and above the amount explained by density, and equalling zero otherwise. The collinearity between unemployment and density is thereby

reduced and the coefficient on the latter is allowed to encompass the effects of urbanization.

Thus, a model of the following form is tested:

$$G_{2rt} = f(X_{1rt}, X_{2rt}) \qquad (2)$$

where G_{2rt} = regional per capita public investment in H and E, R and T in year t

X_{1rt} = regional population density in year t

X_{2rt} = regional unemployment dummy.

The model is tested in linear and non-linear forms so far as X_{1rt} is concerned.

An advantage of this model is that the unemployment dummy (X_{2rt}) may be varied as equalling either zero or one for high unemployment regions. This means that experiments may be conducted to determine which of these regions in different years received per capita public investment in H and E, R and T over and above the amount explained by X_{1rt}. Once $X_{2rt} \neq 1$ for certain high unemployment regions in certain years, collinearity between unemployment and

density is to all intents and purposes removed.[1]

The variable X_{1rt}, doubtless, picks up, in addition to the effects of density and urbanization, some of the effect of the syndrome of regional underdevelopment (low quality amenities, low per capita income, inadequate communications networks, etc.) which an explicit and continuous measure of unemployment, here absent, would represent. To this extent, the coefficient (b_2) on the unemployment dummy (X_{2rt}) is expected to understate the impact on G_2 of regional underdevelopment and hence also the cost impact of D of I policy in attacking the problem of underdevelopment.

On the other hand, the dummy (X_{2rt}) embraces all effects not explicitly included in the model and, in this sense, could overstate the impact. It is not, however, anticipated that this latter bias will be serious since factors omitted are likely to be those comprising the syndrome of underdevelopment reflected, as explained above,

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[1] Use of a more conventional type of model having separate dummy variables for all high unemployment regions was not chosen to provide final results, as:
a) it involved a greater degree of collinearity than did the chosen model, and
b) the regional dummy variables picked up practically all effects, leaving X/1rt with uniformly insignificant coefficients in all versions of the model.
This type of model, however, was used in preliminary investigations to determine which regions in which years appeared likely to have had additional per capita public investment in H and E, R and T (see p.122).

partly in X_{1rt} and partly in X_{2rt}.[1]

In light of the above considerations, therefore, the model is likely to understate the effect of underdevelopment on regional public investment. This is in line with the guiding principle of the analysis to cast D of I policy in a favourable light. At the same time, however, the dummy will reflect an <u>average</u> additional amount of public investment over those regions and those years in which significance occurs. To the extent that a proportion of policy costs are thereby brought forward in time, their discounted value will be higher than would be the case without an average.

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[1] Substantiation of this point may be found by reference to the set of independent variables usually included in models of the determinants of public investment expenditure. See, for example:
S. Fabricant, <u>Trend of Government Activity Since 1900</u> (N.Y., National Bureau of Economic Research, 1952);
G.W. Fisher, "Determinants of State and Local Government Expenditures: A Preliminary Analysis," <u>National Tax Journal</u>, Vol. 14, No. 4 (December 1961), pp. 349-355;
G.W. Fisher, "Interstate Variations in State and Local Government Expenditure," <u>National Tax Journal</u>, Vol. 17, No. 1 (March 1964), pp. 57-64;
R.W. Bahl and R.J. Saunders, "Determinants of Changes in State and Local Government Expenditures," <u>National Tax Journal</u>, Vol. 18, No. 1 (March 1965), pp. 50-57;
S. Sachs and R. Harris, "The Determinants of State and Local Government Expenditures and Intergovernmental Flows of Funds," <u>National Tax Journal</u>, Vol. 17, No. 1 (March 1964), pp. 75-85;
E. Kurnow, "Determinants of State and Local Expenditures Re-Examined," <u>National Tax Journal</u>, Vol. 16, No. 3 (September 1963), pp. 252-255;
N.A. Michas, "Variations in the Level of Provincial-Municipal Expenditures in Canada: An Econometric Analysis," <u>Public Finances</u>, Vol. 24, No. 4 (1969), pp. 597-613.

This fact is unlikely to prejudice severely the results, being in the nature of a partial offset to the understatement of costs referred to above.

A possible bias introduced into the results could arise from the fact that central government investment in one region is not always designed specifically to promote development only in that region. There may be spillover effects into other regions. For example, port developments at Humberside serve the East Midland region as much as Yorkshire and Humberside; many trunk road schemes are part of the national network of road developments benefiting all regions no matter where the actual investment is undertaken. Externalities of this sort cannot, unfortunately, be fully recognized in the analysis. However, the bias is unlikely to be serious if the effects are more or less offsetting as between regions.

Data: Data and data sources are shown in Appendix 7. Here it is necessary briefly to discuss use of some of the data. Cross-section data over regions are pooled with time-series data to augment the number of observations which would be available given the use of cross-section data alone. Thus, a set of dummy variables (Y_t) is included to represent the effects of shifts in relations as between different years

such that Y_t is 1 for observations in year t, and 0 otherwise. The number of annual dummies included equals n-1 where data are pooled over n years. The first year is taken to represent the "base" relationship, subsequent shifts in the intercept term of which being measured by the dummies. Regional public investment data are available only for four of the six years under review (1962-1963 to 1965-1966).

Results: Preliminary investigations using two models having density as an independent variable along with regional dummy variables, suggested which regions were likely to have had additional per capita public investment in H and E and R and T. One model used cross-section data for each year separately; the other pooled cross-section and time series data. Both indicated that only Wales and Scotland appeared to have had significant amounts of additional investment.[1] The first model suggested that Wales was favoured as regards public investment in 1964-1965 while Scotland appeared to receive additional investment in 1963-1964, 1964-1965 and 1965-1966.

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[1] If a region failed to display significance in these models when the regional dummies appeared to pick up a large part of the density effect (see p.119), it could reasonably be concluded that they lacked additional investment over and above the amounts explained by X_{1rt}.

On the basis of these investigations the following values were inserted into the main model for the unemployment dummy (X_{2rt}):

1 for Scotland, 1963-1964, 1964-1965, 1965-1966
1 for Wales, 1964-1965
0 for all other observations.

As non-linear formulations provided a more satisfactory fit, results are reported for tests of the model being non-linear in X_{1rt}. Results are as follows:

Table II

Estimated Equations for Public Investment in Housing and Environment, Roads and Transport 1962/63-1965/66

Constant	X_1^{-1}	log X_1	X_2	Y_1	Y_2	Y_3			
+9.20	+1.21* (2.92)		+6.92* (5.07)	+2.209* (2.47)	+4.13* (4.89)	+6.69* (8.18)	R^2 DW	.853 2.27o	(1)
+2.24		-0.09* (2.74)	+0.31* (2.97)	+0.20* (3.08)	+0.35* (5.39)	+0.49* (7.82)	R^2 DW	.798 2.37o	(2)

where * = significant at the 5% level at least
o = no autocorrelation at the 5% level
t-values in parentheses.

In order to check the reliability of the selected values for X_{2rt}, other feasible arrays of values were tested. These were:

1 for Scotland, 1962-1963 as well as other years
1 for Wales, 1965-1966
1 for Wales, 1963/64-1965/66
1 for Wales, all years
1 for North and North West, all years (including these regions both separately and jointly).

None of these alternatives yielded better results than those displayed in table II.

Of the two best formulations displayed, equation (1) gives the more satisfactory fit. It is, accordingly, used as the basis of estimating the cost of additional public investment associated with regional development. It indicates that Wales and Scotland in the years in which $X_{2rt} = 1$ showed an excess of public investment in H and E, R and T over and above that amount explained by X_{1rt} of the order of £7 per capita. Thus, as minimum estimates of total additional public investment in category G_2, the following amounts are derived from the model:

Table III

Estimated Additional Public Investment (G_2)

	Scotland		Wales		Total
	pop. (000s)	£000	pop. (000s)	£000	£000
1962-63	-	-	-	-	-
1963-64	5205	36019	-	-	36019
1964-65	5206	36026	2676	18518	54544
1965-66	5204	36012	-	-	36012

It is seen that no value for G_2 is included for the first period of the analysis (1962-1963). On the evidence presented in the remainder of this section, it is extremely unlikely that, if no significant additional investment occurred in 1962-1963, any significant additional

investment would have occurred in the two previous years (for which comprehensive data are unavailable).

However, it is possible to incorporate minimum estimates for the first period of the analysis from information on central government expenditure under Sections 5 and 7 of the Local Employment Acts. These expenditures are subsumed under the estimates of G_2 when significant results are obtained (as for the second period of the analysis). When, however, insignificant results are obtained from the model these expenditures are to be included separately. Table IV shows the results of taking them into separate account for the first period of the analysis:

Table IV

Additional Public Investment under Sections 5 and 7 of the Local Employment Acts

	£000
1960-61	665
1961-62	634
1962-63	318

Source: Civil Appropiation Accounts, Class V, Vote 1 1960/1-1961/2; Class VI, Vote 1 1962/3; Class V, Vote 9 1960/1-1961/2; Class VI, Vote 13B 1962/3.

The break in estimated public investment between the two periods of the analysis, though abrupt, is regarded as being reasonable. In the first place, it must be seen as

in part a consequence of understatement of results for the first period rather than overstatement for the second. This derives from strict use of significance tests in determining whether or not additional investment occurred in region r in year t and is not serious since it provides minimum cost estimates for D of I policy.

In any case, however, the break coincides well with the renewed determination in 1963 to attack the regional problem. At the beginning of the year, the Economist was declaring that the government at last had the regional problem under consideration "at the highest level."[1] In January, too, a Cabinet Minister was appointed for the first (and only) time with special responsibility for a depressed region (the North East) and in April a revised and more powerful Local Employment Act came into force.

In the same year two White Papers were published having specific reference to the development problems of Central Scotland and the North East.[2] These were additional to the 1963 White Paper referred to previously which had a large section devoted to regional development.[3] Finally,

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[1] The Economist, Vol. 206 (12 January 1963), p. 116.

[2] Scottish Development Department, Central Scotland: A Programme for Development and Growth, Cmnd. 2188, Edinburgh, HMSO, 1963; The North East: A Programme for Regional Development and Growth, Cmnd. 2206, London, HMSO, 1963.

[3] NEDC, Conditions Favourable . . ., op. cit., pp. 14-29.

blueprints were obviously being prepared for the establishment in the following year of the new regional planning machinery.

Of particular relevance in connexion with regional infrastructure investment, however, was the clear intention at this time to use it as an instrument of regional development. References to this effect have already been quoted from one 1963 White Paper and the National Plan (1965).[1] In addition, the other two White Papers of 1963 placed heavy reliance on the development role of infrastructure investment. In one, it was stated that:

> Very large sums are already being spent throughout Central Scotland on the infrastructure required by an expanding or progressive society. But to make the region as attractive as possible to new industry, it is necessary to speed up and co-ordinate the essential groundwork for prosperity.
>
> The government have therefore decided, as from the current financial year (1963-1964), to increase the rate of investment over a wide field throughout Central Scotland. 2

In the other White Paper, it was said: "The direct inducements to economic expansion in the region [the North East] must be backed by faster modernization and improvement of its social capital.[3]

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[1] Ibid; the National Plan, op. cit. See pp.115 of this thesis.

[2] Central Scotland, op. cit., p. 16. My emphasis.

[3] The North East, op. cit., p. 21. While the tests reveal no increase, in fact, in expenditure in the North East during the period of this analysis, casual inspection of data reveals a marked increase from 1966-1967 onwards.

While it is thus expected that in the second period of the analysis a sharp increase in infrastructure investment should appear, it is necessary to indicate that the precise extent of the estimated increase also seems reasonable. £101 million was budgeted for road development in Central Scotland 1964-1969, an average annual expenditure of £20 million.[1] This figure, it is emphasized, relates to only a part of Scotland. Between 1962 and 1965 public authority housing construction in Scotland rose sharply from 19,000 units per annum to 28,000 units, an increase of 47%.[2]

So far as overall public expenditure on H and E, R and T was concerned, the total Great Britain change less the Scottish change 1962/63-1963/1964 was -£28 million, or an average fall of £3.1 million per region while in Scotland the increase was £32.3 million.[3] On this approximate basis, additional expenditure 1963-1964 in Scotland would appear to have been of the order of £35 million. Moreover, in the two years following 1963-1964 investment in Scotland more than

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[1] Central Scotland, op. cit., p. 16.

[2] Abstract of Regional Statistics, op. cit., No. 2 (1966), table 26, p. 36.

[3] Ibid., No. 1 (1965), table 17, p. 25; No. 2 (1966), table 19, p. 29. Use of these figures can give only approximate results as no account is taken in them of density and urbanization effects. Their use is designed only to show the reasonableness of the order of magnitude of the estimates derived from the model.

maintained its differential over other regions. Between 1963-1964 and 1964-1965 total Great Britain investment in H and E, R and T fell by around 3% while in Scotland investment rose by 9%.[1] In 1965-1966, the respective changes were positive 10% and 20%.[2] Use of an annual estimate of G_2 for Scotland of around £36 million, therefore, seems entirely safe.

In Wales the increase in H and E, R and T between 1963-1964 and 1964-1965 was £7.5 million as against an average fall for all regions except Wales and Scotland (the regions receiving significant surplus investment) of £6.1 million.[3] In that it captures some of the excess due to Scotland and also takes into account the impact of density on public investment, the figure of around £18 million used, therefore, seems reasonable.

Estimates of additional investment in H and E, R and T due to regional underdevelopment may now be summarized:

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[1] Ibid., No. 2 (1966), table 19, p. 29; The National Plan, op. cit., pp. 98-99.

[2] Abstract of Regional Statistics, op. cit., No. 2 (1966), table 19, p. 29; No. 3 (1967), table 22, p. 30.

[3] Ibid., No. 2 (1966), table 19, p. 29; National Plan, op. cit., pp. 98-99.

Table V

Total Estimated Additional Public Investment (G_2)

£000

1st Period		2nd Period	
1960-61	665	1963-64	36019
1961-62	634	1964-65	54544
1962-63	318	1965-66	36012

5:(1c) Change in Public Expenditure Associated with Scale Effects (G_3)

To the extent that D of I policy forestalled migration to prosperous regions, it would be expected to have affected the location of public expenditure insofar as such expenditure follows population. If any differential scale effects existed in the provision of public goods between the regions which migrants would have left and the regions to which they would have gone, migration would have activated them. Total public expenditure would thus be expected to have differed from the level it would have attained in the absence of the policy.

No value is included in the analysis for the impact of scale effects. Two reasons underlie this decision, the first relating to the small amount of migration likely to have been forestalled, the second to the relationship between regional per capita public investment and regional population density.[1]

[1] Since area as much as population size is likely to affect regional per capita investment, density of population rather than merely population size is regarded as the appropiate base measure for scale effects.

(i) Estimated Forestalled Migration:

The fundamental reason for excluding estimates of the effect of forestalled migration is that it would be likely to have been negligible. The estimated extent of movement could not be expected to have been large enough to affect the values for X_{1rt} (measured to two decimal places) in either leaving or receiving regions.

Forestalled inter-regional migration (ϕ_r) is estimated from the outmigration propensity of the unemployed in region r:

$$\phi_r = \sum_{r=1}^{6} \frac{2_{mr}}{U_{1r} + 2U_{2r}} \Big/ 6 = \sum_{r=1}^{6} \frac{mr}{3(U_{1r} + 2U_{2r})} \qquad (3)$$

where mr = outmigration rate of the active population (employed and registered unemployed) from region r to all other regions
U_{1r} = proportion of employed in the active population in region r
U_{2r} = proportion of unemployed in the active population in region r
r = Scotland, North, North West, Yorkshire and Humberside, South West, Wales. 1

Thus, ϕ_r is measured as the mean outmigration rate of the unemployed from the more depressed regions. It is derived on the basis of taking m to be the weighted average of the out-migration rates of the employed and unemployed with the

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[1]The prosperous regions of the Midlands and South East are excluded as outmigration from these regions would have little or nothing to do with unemployment.

assumption that the latter is twice the former.[1]

In the absence of evidence on the relative regional out-migration rates of the employed and the unemployed in the U.K., recourse is had to U.S. findings. Saben has found that in the early 1960's the relationship was 1:2, a relationship which is supported by Lansing and Mueller in their study of U.S. migration.[2] It is not felt that the institutional context would make for much variation in the relationship as between the U.S. and the U.K.

Three factors suggest themselves as contributing to differences in the institutional context: the greater tradition of migration in the U.S., the greater reliance on and excess demand for subsidized municipal housing in the U.K. and the higher ratio of employment income to unemployment relief in the U.S. The first two factors would make for a lower overall rate of migration in the U.K., but

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[1] If $m_r = \ell(u_{1r}) + 2\ell(u_{2r}) = \ell(u_{1r}+2u_{2r})$

where ℓ = out-migration rate of the employed, it follows that

$$\ell = m_r/(u_{1r}+2u_{2r}), \text{ and if } \phi = 2\ell, \phi = 2_{mr}/u_{1r}+2u_{2r}$$

[2] S. Saben, "Geographic Mobility and Employment Status, March 1962 - March 1963," Monthly Labor Review, Vol. 87, No. 8 (August 1964), p. 875; J.B. Lansing and E. Mueller, The Geographic Mobility of Labor (Ann Arbor, University of Michigan Press, 1967), p. 70.

not necessarily a different relationship in the movement of the unemployed relative to that of the employed. The third factor would be expected to contribute to a higher relative propensity to move among U.S. unemployed workers. Use of the U.S. data referred to above might, therefore, overstate the U.K. propensity of the unemployed to move. In thus increasing the estimates of forestalled unemployed migration, it lends strength to the conclusion that the amount of migration forestalled was unlikely to have activated inter-regional scale effects on public service provision. All other data used in the estimation of $\emptyset_r$ are displayed in Appendix 8.

Result: Table VI shows the estimated rate of out-migration of the unemployed from region r together with the overall average as used in this thesis:

Table VI

Annual Unemployed Out-Migration Rates by Region 1961-1966

	Scot.	North	NW	Y,H	SW	Wales	Average
%	N.a.	2.5	1.6	2.0	2.9	2.2	2.5

Sources:

1) calculated from Census of Population 1966, Migration Tables, Table 6, pp. 180-202.

2) calculated from CSO, Abstract of Regional Statistics, London, HMSO (1969), Table 9, p. 13; Table 13, p. 19.

Application of the probabilities shown in table VI to the numbers of new jobs which, in the absence of the policy, would not have existed in the depressed regions ($\alpha\delta J_{rt}$), yields the annual estimated out-migration totals from each region of workers who, without the policy, would have remained unemployed. As many migrants would take with them their families, these totals require to be adjusted upwards. A conservative estimate of the required multiplicative adjustment factor might be 2.[1] In order not to prejudice conclusions by building into the analysis an assumption biased in favour of negligible migration effects, a higher factor of 3 is used. Table VII thus shows regional estimates of total out-migrants based on an adjustment factor implying that the average migrant family size would have been 3. The average out-migration rate of (2.5 x 3)% is used over all regions.

---

[1] 52% of total migration 1961-1966 was represented by the economically active population (Population Census, op. cit. (1966), pp. 180-202). The size of the factor (2) is also used in a recent (Canadian) study: J. Vanderkamp, "The Effect of Out-Migration on Regional Employment," Canadian Journal of Economics, Vol. 3, No. 4 (November 1970), p. 544.

Table VII

Estimated Out-Migrant Totals

	Scot.	North	NW	Y,H	SW	Wales	Total
1st Period (1960/63-1965/66)							
	1896	888	1438	-	208	456	4886
2nd Period (1963/64-1968/69)							
	3604	3060	1252	46	156	408	8526

For each leaving region the estimated totals are so small that no quantitative impact on public expenditure is to be expected. The estimated total out-migration from Scotland, the region which would have provided the greatest number of migrants, over the whole of the second period, represents a proportion of only .0008 of the total population of Scotland. Furthermore, had all migrants gone to the South East or the Midlands regions their impact there would not be expected to have been more than marginal. On the extreme assumption that all out-migrants would have gone to only one of the above receiving regions, it is still impossible to derive a measurable impact on regional density and hence on per capita public expenditure. In the second period when migration would have been predicted as higher, the total for the whole period represents a proportion of total population of only about .0006 for the South East and .0012 for the Midlands. On this evidence no value for G_3 requires to be included in the analysis.

(ii) Functional Relation of Density to Public Investment:

This same conclusion is supported by evidence as to the likely relationship between regional population density and per capita public investment in regions. This relationship evinces the existence or non-existence of scale effects and may be defined most satisfactorily in terms of a rectangular hyperbola, the elasticity of which is naturally unity. Thus, aggregate expenditure on public investment would be predicted from this relationship to remain constant given a change in regional densities, at least within the range of observations covered in the sample used. The model from which the fitted equation is derived is identical in form to that of the last section. Thus:

$$G_{3rt} = (X_{1rt}, X_{2rt}, Y_1 \ldots Y_t) \qquad (4)$$

where G_{3rt} = regional per capita public investment in year t
X_{1rt} = regional population density in year t
X_{2rt} = regional unemployment dummy
Y_t = annual dummies 1963-64/1968-69.

The "best" fit regression equation is:[1]

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[1] Data used for this test are shown in Appendix 8, Part B. The period is 1962/63-1968/69. The result displayed is similar to that for a log-linear equation in the same variables and markedly better than for a purely linear equation wherein the coefficient b_1 is insignificant over all arrays of values tested for X_{2rt}.

$$G_{3rt} = \underset{}{13.60} + \underset{(4.46)}{2.55^{*}X_{1rt}^{-1}} + \underset{(4.74)}{7.98^{*}X_{2rt}} + \underset{(2.24)}{3.91^{*}Y_{1}} + \ldots \underset{(10.14)}{17.75^{*}Y_{6}} + u \quad (5)$$

$$R^2 = .854 \qquad DW = 2.71^{o}$$

where * = significant at the 5% level at least
o = no autocorrelation at the 5% level
t-values in parentheses.

Values for X_{2rt} in this equation are as follows:

1 for Scotland 1963/64-1968/69
1 for North 1966/67-1968/69
1 for Wales 1964-65
0 otherwise.

Alternative arrays of values for X_{2rt} were tried, but none yielded better results. It may, therefore, be concluded that, so far as public investment is concerned, a second reason appears to obtain for regarding scale effects as being negligible.[1]

5:(1d) Miscellaneous Public Expenditure (G_4)

In this category are included two items: expenditure on the Highlands and Islands Development Board created in November 1965 with powers to stimulate the development of the Highlands and Islands, and estimated expenditure attaching to the administration of the KWS and NLF labor schemes which formed a part of D of I policy.[2]

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[1] No precise data are available on regional public current expenditure.

[2] See chapter 1, page 11.

Expenditure on the first item occurred in only the last of the years under review. Administrative expenditure on KWS and NLF is derived from the estimate of RTS administrative cost used later.[1] It is based on the number of workers assisted under KWS and NLF as a proportion of the number assisted under RTS (an average annual proportion of 2%).

Combined miscellaneous expenditure estimates appear in table VIII:

Table VIII

Estimated Miscellaneous Public Expenditure

£000

		1960-1	1961-2	1962-3	1963-4	1964-5	1965-6
HIDB	a)	-	-	-	-	-	100
KWS/NLF	b)	5.9	5.9	6.1	8.1	8.5	8.9

Sources:

a) House of Commons, Hansard, 29 May 1970, pp. 643-644.

b) Calculated from information supplied by the Department of Employment and Productivity.

5:(1e) Summary Results for Public Expenditure (ΔG)

Bringing together the results of the preceding four sections yields the composite estimates for ΔG to be used in this analysis:

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[1] See chapter 7, page 169.

Table IX

Government Expenditure Associated with D of I Policy (▲G)

£000

	1st Period			2nd Period		
	1960-1	1961-2	1962-3	1963-4	1964-5	1965-6
G_1	8139	12241	8287	7645	7437	9262
G_2	665	634	318	36019	54544	36012
G_3	-	-	-	-	-	-
G_4	5.9	5.9	6.1	8.1	8.5	108.9
▲G	8809.9	12880.9	8611.1	43672.1	61989.5	45382.9
1960 prices	8809.9	12505.7	8078.0	40213.7	55596.0	38888.5

5:(2) GROSS PRIVATE INVESTMENT ASSOCIATED WITH D OF I POLICY(▲I)

As well as representing a net expenditure injection into the economy, any change in private capital formation occasioned by the policy is also a resource cost. This item has been examined in chapter 4, section 3, the finding being that ▲I = 0.

5:(3) PRIVATE MOVEMENT COSTS UNDER D OF I POLICY (▲M)

While possible changes in operating cost due to movement under the policy have been incorporated in the analysis as deductions from profit, the once-for-all cost involved in siting an enterprise (be it an entire firm or merely a branch) in a depressed rather than a prosperous (usually home) region, is included on the cost side of the account. This is because it is, by nature, a capital outlay. Chief among its components would perhaps be the cost of training labor and of moving key personnel to the new location. Others, however, may be imagined;

for instance, the cost of moving records and office equipment. Total movement cost for all firms locating in depressed regions under the policy is adjusted downwards by (1 - α), the proportion of jobs which would have gone to depressed regions anyway in the absence of the policy.[1]

Data: No precise data are available for the cost of movement. Figures for subsidies provided to meet such cost, however, may be used as surrogates. While these data are unlikely exactly to reflect movement expenditure, they may be taken as minimum estimates.

Information on two types of subsidy payments is available for use. First, grants, additional to building grants, are offered under Section 4 of the 1960 Act in respect of "unusual initial expenses incurred by reason of the choice of a development district as the location of a project."[2] Second, grants are paid towards labor relocation under KWS and towards labor training under NLF as explained before.[3]

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[1] α = .75, see chapter 4, section (1c). The assumption used here is that movement cost is proportional to the number of jobs created.

[2] Local Employment Act 1960, Annual Report 1961, London, HMSO, p. 8.

[3] See page 11.. Grants under KWS are paid to workers. But to the extent that the costs involved would, presumably, have had to be met by firms in the absence of the scheme, they may be regarded as surrogate movement costs facing firms.

Results: Table X displays subsidy expenditures under the above two categories as deflated to 1960 prices and adjusted for $\alpha = .75$:

Table X

Estimated Costs of Movement (ΔM)

£000

1st Period	Unusual Initial Expenses	Labor Transfer Expenses	Total	1960 prices	α=.75
1960-61	2.7	14.3	17.0	17.0	12.8
1961-62	1.2	6.2	7.4	7.2	5.4
1962-63	1.8	2.5	4.3	4.0	3.0
2nd Period					
1963-64	0.7	5.4	6.1	5.6	4.2
1964-65	0.6	20.0	20.6	18.5	13.9
1965-66	0.5	23.4	23.9	20.5	12.3

Sources:

1) Local Employment Acts 1960 and 1963, Annual Reports, passim.

2) Civil Appropiation Accounts, passim.

3) Information supplied by the Department of Employment and Productivity.

5:(4) SUMMARY: D OF I POLICY COSTS (ECONOMY)

Amalgamation of the results of the last three sections yields estimates of the total cost of D of I policy from the economy viewpoint:

Table XI

Total Cost of D of I Policy (Economy)

£000 (1960 prices)

1st Period		2nd Period	
1960-61	8822.7	1963-64	40217.9
1961-62	12511.1	1964-65	55609.9
1962-63	8081.0	1965-66	38900.8

5:(5) BENEFIT/COST RATIOS: D OF I (ECONOMY)

On the basis of the estimates of benefits (chapter 4) and costs (this chapter), final B/C ratios may be presented for D of I policy from the economy viewpoint over the "basic" time horizon of six years:

Table XII

Benefit/Cost Ratios: D of I Policy (Economy)

1st Period	λ=1	λ=.75	λ=.25	2nd Period	λ=1	λ=.75	λ=.25
8%	.03	2.73	6.96	8%	.02	1.35	3.08
12%	.03	2.53	6.46	12%	.02	1.24	2.82
16%	.02	2.35	6.02	16%	.02	1.15	2.60

CHAPTER 6

DISTRIBUTION OF INDUSTRY POLICY: GOVERNMENT VIEWPOINT

From the point of view of the national government the B/C ratio for D of I policy is estimated for both expenditure periods, 1960-1963 and 1963-1966, on the basis of the following model:

$$B/C_{di,g} = \sum_{r=1}^{n} \sum_{t=1}^{m} \frac{\Delta T+\Delta S+\Delta D}{(1+i)^t} \Big/ \sum_{r=1}^{n} \sum_{t=1}^{m} \frac{\Delta G+\Delta L}{(1+i)^t} \qquad (1)$$

where ΔT = increased tax revenue (direct and indirect) resulting from the policy
ΔS = savings in unemployment compensation and supplementary benefits as a result of job creation under the policy
ΔD = exchequer revenue from loan and construction activities under the policy
ΔL = government subsidies paid under the policy
ΔG, r, i, t = as defined previously.

The model defines benefits in terms of increased Exchequer revenues resulting from D of I policy and costs in terms of all Exchequer costs associated with the policy. Costs now include, not merely real resource costs incurred by government, but subsidies paid under the policy and omitted from consideration when the analysis was undertaken from the point of view of the economy. Only one item (ΔD) requires to be explained. This represents revenues from the sale of factory property on deferred terms in "development districts," rents collected on government-owned factories, loan principle repayments and loan interest payments.

6:(1) BENEFITS OF D OF I POLICY (GOVERNMENT)

6:(1a) Increased Tax Revenue (ΔT)

Increased tax revenue resulting from the policy derives from the benefit items estimated in chapter 4. Thus:

$$T_t = t_1(\Delta Y\beta)_t + t_2(\Delta Z\beta)_t + t_3(\Delta I\beta+\Delta E+\Delta X\beta)_t \qquad (2)$$

where t_1 = average rate of tax on labor earnings
t_2 = average rate of tax on profit
t_3 = combined average rate of tax on the earnings and profit components of $\Delta I\beta$, ΔE and $\Delta X\beta$.
ΔY, ΔZ, ΔI, ΔE, β = as defined previously.

Since $\Delta I = 0$, $\Delta E = 0$ and $\Delta X = 0$ (see chapter 4), it is necessary only to estimate $t_1(\Delta Y\beta)$ and $t_2(\Delta Z\beta)$. These are taken in turn.

i) Increased Tax Revenue resulting from increased earnings ($t_1(\Delta Y\beta)$)

Included in increased tax revenues attaching to earnings are revenues from direct income tax, national insurance contributions and indirect taxes on expenditure. In order to estimate these quantities, two assumptions are required:

a) the average recipient of a job under D of I policy is a man with a wife and two children to support.

b) 50% of indirect taxes would have been paid even if the recipient had remained unemployed.

The first assumption seems effectively to cover the spectrum of job recipients running from single individuals to large-family supporters. Both assumptions are in line with those made by Needleman and Scott.[1] Account is taken in

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[1] Needleman and Scott, "Regional Problems," op. cit., p. 167.

the calculations of tax and insurance contributions which would have been collected on jobs which would have materialized in other regions in the absence of the policy.[1]

Data: Information on tax and national insurance contributions by income bracket are provided in published form.[2] These totals for relevant income brackets, averaged over the years 1960-1969, deflated to real terms and corrected for the 50% adjustment for indirect tax are shown in Appendix 9. Use of the mean annual figure for tax and national insurance contributions is justified on the grounds that there appears to be little fluctuation in the annual deflated values in all income brackets and that information is lacking for certain relevant income brackets in certain years.

The data of Appendix 9 are applied to data on job creations as used in chapter 4. They are then multiplied by β, the income multiplier. This assumes that the employment multiplier is the same size as the income multiplier. It is unlikely that in practice employment will expand in direct proportion to income unless the employed work force is operating at maximum capacity prior to the income injection and there are no scale effects in output expansion. However, the

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[1]These jobs are taken to include those which migrants would have found had they migrated from depressed regions in the absence of the policy.

[2]Central Statistical Office, Economic Trends, "The Incidence of Taxes and Social Benefits," occasionally, London, HMSO.

assumption of equiproportionality is common and will be used here.[1] It also places D of I policy in a favourable light.

Results: Results are displayed under three assumptions as to the number of net job creations resulting from the policy. In line with the practice adopted earlier, these assume that 100%, 75% and 25% of jobs moving from the congested South East and Midlands regions would have been created in the absence of the policy, viz., $\lambda = 1$, $\lambda .75$, $\lambda = .25$. Results are presented in table I:

Table I

Increased Tax from Labor Earnings and National Insurance Contributions resulting from D of I Policy

£000 (1960 prices)

1st Period	$\lambda=1$	$\lambda=.75$	$\lambda=.25$
1960-61	253.0	743.8	1725.2
1961-62	15.4	1171.2	3474.6
1962-63	164.2	1939.2	5442.0
1963-64	774.4	2893.6	7114.8
1964-65	1402.0	3659.8	8161.2
1965-66	354.0	3170.4	11234.4
2nd Period			
1963-64	275.4	745.8	1683.0
1964-65	-93.0	1683.4	5247.6
1965-66	1457.4	3653.6	13353.6
1966-67	4134.0	8769.0	18038.4
1967-68	4632.4	9619.2	21814.2
1968-69	-245.2	7070.4	21701.4

[1] For example, "while not strictly correct ... we do no great violence to the facts if we assume that the employment multiplier equals the investment multiplier," A.L. Hansen, A Guide to Keynes (New York, McGraw-Hill Inc., 1953), p. 87.

ii) Increased Tax Revenue from Increased Profit ($t_2(\Delta Z\beta)$)

In this section the standard rate of tax on company profit is applied to estimated profits resulting from the policy.[1]

Data: Profits data appear in chapter 4. So far as the tax rate on profit (t_2) is concerned, it is necessary to account for the variety of different taxes applying to profit during the period under review.[2] The following rates represent combined results for the rate of tax on distributed and non-distributed profit, assuming as in the computation of discount rates for the analysis, a dividend pay-out ratio of 50% where applicable (post 1964-1965):

Up to and including 1963-1964:	
Combined income and profits tax rate	53.75%
1964-1965:	
Combined income and profits tax rate	56.25%
1965-1966 - 1967-1968:	
Combined corporation and withholding tax rate	60.625%
1968-1969:	
Combined corporation and withholding tax rate	61.875%

A delay of one year on the collection of profits taxes is incorporated in the analysis.[3]

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[1]Differential tax allowances on investment cannot be taken into account.

[2]These, along with rates, are displayed in chapter 3.

[3]This practice is normal; see, for example, A.M. Alfred, "Investment in the Development Districts of the UK: Tax and Discounted Cash Flow," Journal of Accounting Research, Vol. 2, No. 2 (Autumn 1964), pp. 172-182.

Results: Results are again presented under the assumptions of $\lambda = 1$, $\lambda = .75$, $\lambda = .25$.

Table II

Increased Tax from Profit Resulting from D of I Policy

£000

1st Period	λ=1	λ=.75	λ=.25
1961-62	2.3	329.0	883.1
1962-63	6.3	719.5	1882.9
1963-64	10.1	1123.6	2931.7
1964-65	13.3	1406.6	3643.4
1965-66	20.7	1722.0	4290.9
2nd Period			
1964-65	5.7	357.5	861.1
1965-66	18.4	1198.2	2857.2
1966-67	46.3	2916.6	6897.9
1967-68	67.8	3990.2	9258.5
1968-69	89.3	4723.0	10595.4

iii) Summary (ΔT)

Combination of the results of the two previous sections yields composite estimates for increased tax revenue (ΔT) resulting from the policy:

Table III

Estimated Increases in Tax Revenue

£000 (1960 prices)

1st Period	λ=1	λ=.75	λ=.25
1960-61	253.0	743.8	1725.2
1961-62	17.7	1500.2	4357.7
1962-63	170.5	2658.7	7324.9
1963-64	784.5	4017.2	10046.5
1964-65	1415.3	5066.4	11804.9
1965-66	374.7	4892.4	15525.3
2nd Period			
1963-64	275.4	745.8	1683.0
1964-65	-87.3	2040.9	6108.7
1965-66	1475.8	4851.8	16210.8
1966-67	4180.3	11685.6	24936.3
1967-68	4700.2	13609.4	31072.7
1968-69	-155.9	11793.4	32296.8

6:(1b) Savings in Unemployment Benefits (ΔS)

In addition to extra tax revenue received by the government, savings are made in social benefit payments as a result of creating jobs for the otherwise unemployed. These savings comprise unemployment compensation and supplementary benefits (until 1967, national assistance), the latter being designed to compensate in cases of severe hardship for the inadequacy of the former. Annual per capita benefits are applied to jobs which without the policy, it is estimated, would not have been created. Use is again made of the assumption that the income multiplier equals the employment multiplier. Thus:

$$\Delta S_t = \frac{S_{1t} + S_{2t}}{T_{ut}} \left(\lambda J_{(rh)t} + J_{(ro)t}\right) \beta \qquad (3)$$

where S_{1t} = total national unemployment compensation in year t
S_{2t} = total national supplementary benefits paid to the unemployed in year t
T_{ut} = average quarterly total number receiving benefit in year t
$J_{(rh)t}$ = jobs from other regions in Britain existing in each region r in year t as a result of the policy
$J_{(ro)t}$ = jobs from abroad in each region r in year t
λ, β = as defined previously.

Data: Data on the first three items in the above expression are shown as published in Appendix 10. Data on the remaining items are as used in earlier chapters.

Results: On the usual assumption as to the value of λ for jobs originating in the congested South East and Midlands, results are shown in table IV:

Table IV

Estimated Unemployment Benefits Saved

£000 (1960 prices)

1st Period	λ=1	λ=.75	λ=.25
1960-61	626.4	1843.4	4277.4
1961-62	1623.8	4395.2	9941.0
1962-63	2963.6	7851.0	17557.8
1963-64	2676.2	7030.4	15138.8
1964-65	3712.2	9693.0	21654.6
1965-66	4416.0	11532.6	25765.8
2nd Period			
1963-64	877.4	1841.0	3768.8
1964-65	3277.2	7111.2	14779.2
1965-66	7893.8	17530.4	36804.0
1966-67	12658.2	26849.4	55231.4
1967-68	13095.0	29286.2	61668.8
1968-69	15938.0	35725.4	75300.2

6:(1c) Exchequer Revenue from Loan and Construction Activities ($\triangle D$)

Under D of I policy the Board of Trade makes loans to industrialists on which the annual repayments of principal and payments of interest represent Exchequer income (D_1). In addition, the Board builds factories on its own estates for sale on deferred terms (D_2) or rental (D_3). The item $\triangle D$ may thus be written:

$$\triangle D_t = D_{1t} + D_{2t} + D_{3t} \qquad (4)$$

Estimation of each component is undertaken in turn. In what follows, heavy reliance is placed on information provided in the Seventh Report of the Estimates Committee which examined the operation of D of I policy in the first period under

review.[1] This information is treated as being substantially valid for the second period as well.

i) Exchequer Income from Loans (D_1)

Small loans were generally repaid within three to six years while the government worked on the assumption of securing full repayment in eight to ten years.[2] In this analysis an average loan repayment period of eight years is adopted as reasonable. Thus it is assumed that one-eighth of total cumulative loans were repaid each year.

Interest on loans averaged 5½ - 6%, 1960-1963.[3] In 1964-1965 the rate was still 5 - 5½%.[4] Interest waivers, exercised at the discretion of the Board of Trade Advisory Committee on loans and grants and operative from one to three years, were estimated to reduce the effective rate of interest by 1%.[5] A rate of 5% would, therefore, seem to be a reasonable average for use in this analysis.

Results: Final results for estimated Exchequer income from loans are provided in table V:

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[1] Seventh Report, passim.

[2] Ibid., p. 15.

[3] Ibid., p. 59.

[4] Local Employment Acts: Accounts, 1964-65, p. 16.

[5] Seventh Report, op. cit., p. 81.

Table V

Estimated Exchequer Income from Loans

£000

1st Period		2nd Period	
1960-61	805.7	1963-64	1309.4
1961-62	3295.0	1964-65	3023.2
1962-63	5726.1	1965-66	4713.7
1963-64	6123.9	1966-67	4971.8
1964-65	5890.3	1967-68	4780.9
1965-66	5656.7	1968-69	4590.1

Source: Loan data from Civil Appropiation Accounts, Class VI, Vote 4 1960/1-1961/2; Class IV, Vote 3 thereafter.

Note: Loan repayments are assumed to occur at year's end.

ii) Exchequer Income from Sale of Factories on Deferred Terms (D_2)

This item comprises both a purchase price payment schedule and interest on the declining balance of the sum owed. Amortized sale payments were based on twenty-one year leases.[1] Interest charged was the government credit rate in Scotland with an additional ½% elsewhere.[2] Average figures for these rates are taken as 5½% and 6% respectively.

It is assumed that sales were arranged at the time of building completion. It is also assumed that sales were made at cost price.[3] As data on cost of completions are unavailable for all years under review, they are imputed where necessary from the cost (per square foot) of factory buildings approved.

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[1] Local Employment Acts, Annual Report, 1960-1961, p. 5.

[2] Seventh Report, op. cit., p. 15.

[3] Factories sold 1960-1962 were all sold at roughly cost price, ibid., p. 69.

During the period 1960-1966, average approval cost was £3.7 per square foot.[1] This figure is applied to square footage of completions.

Finally, as data on completions are not divided between factories for sale and factories for rental, it is necessary to make an estimate of the breakdown. Mean proportions for all years 1960-1961 - 1965-1966 in terms of square footage approved are used.[2] Averages were 20.5% for sale; 79.5% for rental.

Results: Results are given in table VI:

Table VI

Exchequer Income from Sale of Factories on Deferred Terms

£000

1st Period		2nd Period	
1960-61	170	1963-64	142
1961-62	271	1964-65	190
1962-63	362	1965-66	212
1963-64	393	1966-67	294
1964-65	378	1967-68	286
1965-66	369	1968-69	278

Source: Completions data from Local Employment Acts: Annual Reports, 1960-1961 - 1965-1966.

Note: Instalment payments are assumed to occur at year's end.

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[1] Local Employment Acts: Annual Report, 1965-1966, p. 2.

[2] Ibid., passim. While approvals will not equal completions each year, differences should be evened out over a span of years as used here.

iii) Exchequer Income from Factory Rentals (D_3)

The average proportion of total square footage of factory completions designed for rental is estimated as 79.5% as indicated in the last section. Rental income is assessed on the basis of the following average charges per square foot: 4s in England, 3s in Wales and Scotland.[1]

Results: Results are shown in table VII:

Table VII

Exchequer Income from Factory Rentals

£000

1st Period		2nd Period	
1960-61	272	1963-64	230
1961-62	393	1964-65	208
1962-63	292	1965-66	203
1963-64	292	1966-67	203
1964-65	292	1967-68	203
1965-66	292	1968-69	203

iv) Summary (▲D)

Summarizing the results for each component of ▲D yields the composite totals of table VIII:

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[1] Seventh Report, op. cit., p. 15. The Scottish figure is given as a range 2/3d - 3/6d, here approximated as 3s.

Table VIII

Exchequer Income from Loan and Construction Activities

£000

1st Period		2nd Period	
1960-61	1248	1963-64	1681
1961-62	3959	1964-65	3241
1962-63	6380	1965-66	5129
1963-64	6809	1966-67	5469
1964-65	6560	1967-68	5270
1965-66	6318	1968-69	5071

6:(2) COSTS OF D OF I POLICY (GOVERNMENT)

6:(2a) Real Government Expenditure (▲G)

This item is identical to the corresponding item, ▲G, in chapter 5. Results are summarized in table IX, page 139.

6:(2b) Subsidies Paid under D of I Policy (▲L)

Financial assistance by the Board of Trade under the Local Employment Acts and by the Ministry of Labour under the Key Worker and Nucleus Labor Force Schemes (which comprise a part of D of I policy) is shown in table IX. Loans are included with grants.[1]

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[1]There is a cost to government in accelerated depreciation to the extent that company tax payments, though in total no different to the amount which would have been paid under a system of conventional depreciation, are delayed. This item cannot, however, be quantified.

Table IX

Financial Assistance under D of I Policy

£000

	1960-1	1961-2	1962-3	1963-4	1964-5	1965-6
Loans	4604.2	20144.8	12628.1	7482.4	14075.9	8980.3
General Grants	30.1	695.5	2486.8	1384.2	1847.0	2868.2
Building Grants	125.5	1015.5	1724.3	1369.5	5352.9	9666.1
Labor Subsidies	14.3	6.2	2.5	5.4	20.0	23.4
Miscellaneous	-	-	-	3160.4	4831.8	741.9
Total	4774.1	21861.0	16841.7	13401.9	26154.6	22279.9

Sources:

1) Civil Appropiation Accounts, Class VI, Vote 4, 1960/1-1961/2; Class IV, Vote 3, thereafter.

2) Information supplied by the Department of Employment and Productivity.

Note: Miscellaneous grants and loans were paid to undertakings in declining regions in order to maintain them in existence as employers. There was also a small grant in aid 1964-1965 to the North East Development Council.

6:(3) BENEFITS AND COSTS OF D OF I POLICY (GOVERNMENT)

Summarizing the results of this chapter yields the following totals for benefits and costs, all deflated to 1960 prices:

Table X

Benefits and Costs of D of I Policy (Government)

£000 (1960 prices)

	Benefits			Costs
1st Period	λ=1	λ=.75	λ=.25	
1960-61	2127.4	3835.2	7250.6	13584.0
1961-62	5485.2	9739.1	18142.4	33730.0
1962-63	9119.1	16494.7	30867.7	23876.9
1963-64	9730.5	17317.4	31455.1	
1964-65	11010.9	20642.8	39342.9	
1965-66	10204.6	21838.9	46705.0	
2nd Period				
1963-64	2700.7	4134.7	6999.7	52554.3
1964-65	6258.1	12220.3	23956.1	79053.0
1965-66	13764.6	26777.2	57409.8	57980.1
1966-67	21343.4	43039.9	84672.6	
1967-68	21981.1	47081.5	96927.4	
1968-69	19644.2	51380.9	111459.1	

Discounting and converting to B/C ratios, final results for the "basic" periods emerge. It is emphasized that these results depend inevitably on the special assumptions made in this chapter.

Table XI

Benefit/Cost Ratios: D of I Policy (Government)

1st Period	λ=1	λ=.75	λ=.25
8%	.58	1.08	2.09
12%	.54	1.01	1.94
16%	.51	.95	1.82
2nd Period			
8%	.38	.81	1.67
12%	.35	.74	1.53
16%	.33	.69	1.41

Note: These results abstract from the impact of accelerated depreciation on government accounts.

CHAPTER 7

MIGRATION POLICY: ECONOMY AND GOVERNMENT VIEWPOINTS

In this chapter migration policy is analyzed from the points of view of both the economy as a whole and the government. Due to the relative brevity of the required analyses both may be included in the same chapter. The point of view of the economy is covered first.

7:(1) MIGRATION POLICY (ECONOMY)

From the point of view of the economy as a whole the B/C ratio for labor migration policy is estimated for both expenditure periods 1960-1963 and 1963-1966 on the basis of the following model:

$$B/C_{mig,e} = \sum_{r=1}^{n} \sum_{t=1}^{m} \frac{(\Delta Y+\Delta Z)\beta}{(1+i)^t} \Big/ \sum_{r=1}^{n} \sum_{t=1}^{m} \frac{\Delta G+\Delta M}{(1+i)^t} \qquad (1)$$

where ΔY = labor income resulting from jobs secured as a result of subsidized labor migration
ΔZ = change in profit due to migration policy
β = multiplier
ΔG = real public expenditure due to migration policy[1]
ΔM = private costs of migration
i = discount rate
r = 1 ... n regions
t = 1 ... m years over which costs and benefits run.

As in the case of D of I policy, benefits and costs are defined as effects net of those quantities which without the policy would have emerged anyway.

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[1] As in the case of D of I policy, this phrase is used throughout as an abbreviation for real resource costs incurred as a result of public expenditure under the policy.

7:(1a) Benefits of Migration Policy (Economy)

i) Increased Labor Income (ΔY)

Increased labor income comprises earnings attaching to jobs which migrants under the Ministry of Labour's Resettlement Transfer Scheme (RTS) secured after moving. Since it is required that subsidized workers be unemployed (or be about to become unemployed) without foreseeable prospect of obtaining regular employment in their home area, no deduction is necessary for earnings foregone at home on the part of the workers themselves.[1] It is, however, possible that members of workers' families might have been employed in the home region.

So far as the wife is concerned, her differential income resulting from migration (W_e) could be expressed as:

$$W_e = P_1\left[P_{2(ra)}P_{3(ra)}\ (E_{(ra)}) - P_{2(rr)}P_{3(rr)}\ (E_{(rr)})\right] \qquad (2)$$

where P_1 = probability of the assisted migrant having a wife
P_2 = probability of the wife being in the labor force
P_3 = probability of the wife being employed
ra = home region
rr = receiving region
E_r = female earnings in region r.

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[1] Even if in the longer period an unemployed worker would have found work, it may be assumed, ceteris paribus, that he replaced another worker so that no net change in income would have occurred.

While t-tests reveal significant differences in female participation and unemployment rates between certain depressed regions and other regions (see Appendix 11), consideration of the impact of migration on the earnings of wives is omitted on the following grounds:

a) It is unlikely that many assisted migrants would have working wives. If wives were in employment it is probable that families would not migrate. 1

b) D of I policy is thereby cast in a relatively favourable light. 2

So far as the differential earnings of offspring are concerned, it is assumed that they are negligible. For the basic analysis (time horizon, six years) this would seem reasonable. During that time only a proportion of migrant offspring would enter the labor force. More generally, the assumption again places D of I policy in a relatively favourable light.

Even though earnings may thus be taken to attach to male migrant jobs alone, an earnings adjustment factor is required since earnings data relate to male, adult manual workers only. While few assisted migrants would be expected to be in the administrative, technical and clerical (ATC) grade of the work force, a proportion would be expected to be juveniles.

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[1] This is not to say, of course, that wives who did not work in the home region might not go to work in the receiving region. This exception may perhaps be safely overlooked.

[2] It is also true that female earnings data disaggregated by regions are not available.

Moreover, a number of assisted migrants may be expected to have moved even in the absence of RTS. Thus a second adjustment factor is required.

The following expression summarizes the components of ΔY:

$$Y_{mig,e} = \sum_{r=1}^{n} \sum_{t=1}^{t} p(1-f) \left(E_{(rr)t} J_{(rr)t}\right) \qquad (3)$$

where p = earnings adjustment factor
$1-f$ = proportion of migrants who would not have moved without RTS assistance
$E_{(rr)t}$ = earnings attaching to migrant jobs in receiving regions in year t
$J_{(rr)t}$ = jobs held by migrants in receiving regions in year t. [1]

The items, $E_{(rr)t} J_{(rr)t}$, p and 1-f are measured in turn.

a) Earnings of assisted migrants in receiving regions $\left(E_{(rr)t} J_{(rr)t}\right)$

Money earnings data are as used with respect to D of I policy and are to be found in table VII, chapter 4. Figures for assisted migration are not available by destination and origin for all years under review. They have been provided, however, for the years 1965-1966 and 1966-1967. Averages of the destination/origin proportions for these years are used to estimate destination/origin probabilities for all years. These are shown in Appendix 12. Moreover, since

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[1] This model makes the assumption that assisted migrants do not displace other workers in jobs in receiving regions. Since a condition of subsidization is that no suitable local labor is available in receiving regions, this seems reasonable.

numbers of assisted migrants under RTS are hidden in composite totals for all migrant labor schemes 1960-1961 and 1961-1962, it is necessary to estimate numbers for those years.[1] The basis of estimation used is the mean proportion of total assisted migrants represented by RTS migrants 1962-1963 - 1965-1966. The inevitable bias involved in the above two estimating procedures is recognized.

Results: Estimated total numbers of migrants under RTS by receiving region are shown in table I:

Table I

Assisted Migrant Totals by Receiving Regions (RTS)

	N	Y,H	SE	SW	W	MID.	NW	SCOT.	TOTAL
1960-61	128	286	1075	126	42	1020	224	459	3360
1961-62	86	197	773	88	22	776	135	373	2450
1962-63	93	174	625	67	17	540	130	197	1843
1963-64	238	417	1285	125	27	1221	264	417	3994
1964-65	149	313	1092	105	41	1145	257	518	3620
1965-66	110	368	1357	224	83	1241	275	355	4013

Source: estimated from information supplied by the Department of Employment and Productivity.

Note: Midlands regions compressed for comparability. London and SE, Eastern and Southern regions compressed into South East for comparability.

Total estimated earnings ($E_{(rr)t}\ J_{(rr)t}$) of assisted migrants are shown in table II. These figures are before application of the earnings adjustment and total migration adjustment factors.

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[1] The other labor subsidy schemes are the Key Worker Scheme (KWS) and Nucleus Labor Force Scheme (NLS) as explained in chapter 1.

Table II

Estimated Migrant Earnings Before Adjustment

£000

1st Period		2nd Period	
1960-61	2556.6	1963-64	3524.0
1961-62	4662.1	1964-65	7255.5
1962-63	6369.0	1965-66	11903.0
1963-64	6747.3	1966-67	12369.0
1964-65	7292.6	1967-68	12863.6
1965-66	7829.6	1968-69	14316.1

Note: These figures represent accumulations over time, assuming that a job found in year $t<6$ remains in existence through year $t=6$.

b) Earnings adjustment factor (p)

As subsidized migrants would be unlikely in the great majority of cases to be either female or members of the ATC grade of the labor force, these categories are omitted from computation of the adjustment factor for migrant earnings. The factor (p) is accordingly defined as a weighted average of adult and juvenile (under 21) male manual earnings:

$$p = \sum_{g=1}^{2} K_g X_g \qquad (4)$$

where K_g = national average proportionate relationship of average weekly earnings in job category g to male adult manual earnings
X_g = national average proportion of job creations in category g
g = male manual adult or juvenile categories.

As in the case of the earnings adjustment factor for D of I policy, the model assumes that jobs are divided between

job categories in accordance with national average proportions (X_g). All data used are as previously used in the computation of the earnings adjustment factor for D of I policy.

Result: The earnings adjustment factor (p) for migration is estimated to be 0.95.

c) Proportion of migrants who would not have moved without RTS (1-f)

Information on an exact value for (1-f) is not available. The procedure adopted, therefore, is to determine a reasonable minimum value for the proportion of assisted migrants who would not have moved without a subsidy. This places D of I policy in a relatively favourable light. It also throws into relief the large size of returns on migration policy and avoids the necessity of using a range of values for (1-f).

The proportion (1-f) is estimated on the basis of the average proportion of total inter-regional unemployed migrants (1960-1966) receiving assistance.[1] An estimated rate of regional out-migration among the unemployed has already been established (2.5%).[2] Application of this proportion to the

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[1]The proportion (1-f) of intra-regional assisted migrants may be taken to be on balance roughly equal to the proportion for inter-regional assisted migrants. On the one hand, the average subsidy of nearly £100 would represent a higher proportion of total movement cost for intra-regional migrants. Thus, the incentive to move on assistance would be higher for them than for inter-regional migrants. On the other hand, the total cost of movement would be lower, exerting a greater incentive to move unassisted.

[2]See chapter 5, section (1c).

sum of the average annual unemployment totals (1960-1966) yields an estimate of total inter-regional migration among the unemployed (1960-1966). Combined use of the data of table 1 (this chapter) and Appendix 12 gives an estimate of total assisted inter-regional migration over the period. From these two totals may be derived an average estimate of the proportion of total unemployed migrants receiving assistance. This proportion is .255 derived as follows:

a)Total annual average unemployed 1960-66 (000s) = 2274

b)Estimated unemployed migrants (2.5% of (a)) = 56.9

c)Estimated assisted inter-regional migrants (000s) = 14.5

(c) as % (b) = (1-f) = 25.5%. [1]

While this proportion need not of itself indicate the exact proportion of assisted unemployed migrants who would not have moved without the subsidy, it is considered to be the best estimate available. To place D of I policy in a favourable light it is rounded down to .25. This implies an autonomous migration factor (f) of .75.

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[1]a) Local Employment Acts 1960 and 1963: Annual Reports, op. cit., Appendix 1.
b) Information supplied by the Department of Employment and Productivity.

d) Summary (▲Y)

Adjusted labor earnings accruing to migrants under RTS may now be presented:

Table 1II

Estimated Migrant Earnings Adjusted

£000

1st Period		2nd Period	
1960-61	607.2	1963-64	837.0
1961-62	1107.3	1964-65	1723.2
1962-63	1512.7	1965-66	2824.0
1963-64	1602.5	1966-67	2937.7
1964-65	1732.0	1967-68	3055.1
1965-66	1859.5	1968-69	3400.1

ii) Change in Profit Resulting from Migration Policy (▲Z)

As migrant labor fills job vacancies in expanding regions, so the output ceiling of the economy expands. Migrant labor appropiates as earnings a proportion of the incremental product, the remainder going to profit. The change in profit corresponding to the change in labor income estimated in the last section is defined, following previous practice, as .27 (▲Y). This reflects the average relation of gross trading profit to labor income during the relevant period.[1]

iii) Multiplier (β)

The same factor as was previously used is also employed here, viz. $\beta = 1.5$. Again the multiplier is assumed to be

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[1] See chapter 4, pp. 91-92.

instantaneously operative.

iv) Summary of Migration Benefits

Final results for migration benefits involve adjustment of labor earnings for both profit (.27 (▲Y)) and the multiplier effect (1.5). Thus the figures of table III are adjusted by a combined profit/multiplier factor of 1.905. They are also deflated to 1960 prices.

Table IV

Estimated Benefits of Migration Policy

£000 (1960 prices)

1st Period		2nd Period	
1960-61	1156.7	1963-64	1468.2
1961-62	2048.0	1964-65	2944.1
1962-63	2703.3	1965-66	4609.9
1963-64	2811.0	1966-67	4609.8
1964-65	2959.2	1967-68	4668.1
1965-66	3035.4	1968-69	4933.1

7:(1b) Costs of Migration Policy (Economy)

i) Real Government Expenditure (▲G)

Government expenditure on real resources in respect of migration policy may be divided into three components corresponding to previous categories G_1, G_2 and G_3. Thus:

$$\blacktriangle G_{mig,e} = G_1 + G_2 + G_3 \qquad (5)$$

where G_1 = administrative cost of the policy

G_2 = additional public overhead expenditure directed to receiving regions in order to accommodate migrants

G_3 = scale effect costs of social overhead and current goods provision.

The item G_2 may be seen as relating chiefly to the provision of housing accommodation for in-migrants when available accommodation already existed in leaving regions. It is unlikely, however, that the modest scale of migration under RTS would itself have led to additional housing construction in receiving regions. It is more likely that in-migrants would merely swell the numbers of people in congested regions seeking scarce accommodation. The same general reasoning would also seem to apply to other forms of social overhead capital. Thus it may be assumed that $G_2=0$.

Even though the amount of migration under RTS was greater than the amount predicted to have been forestalled by D of I policy, the same conclusion for G_3 as was reached with respect to D of I policy seems applicable; that migration was low enough not to activate scale effects on public goods provision.[1] Hence only G_1 requires to be estimated in the calculation of ΔG.

Data: Precise data on the administrative cost of migration policy are lacking. Estimates are made by allocating to RTS a proportion of aggregate Ministry of Labour administrative cost based on a mean relation for each expenditure period of RTS subsidies to gross total Ministry

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[1] See pages 130-137.

of Labour expenditures less aggregate administrative cost. This prorating procedure adopts for the first expenditure period a relation of 1.6%; for the second period a relation of 2.0%.[1] All data are displayed in Appendix 13.

Results: Results are as follows:

Table V

Estimated Administrative Cost of Migration Policy

£000

1st Period		2nd Period	
1960-61	294.4	1963-64	403.6
1961-62	297.4	1964-65	426.8
1962-63	303.8	1965-66	447.3

Source: calculated from Civil Appropiation Accounts, Class VI, Vote 8 1960/1-1961/2; Class IV, Vote 6 thereafter.

ii) Private Cost of Moving (ΔM)

In addition to government expenditure on the policy is the cost facing the individual and his family of moving from one location to another. This element of cost would naturally vary with the distance of the move, the size of the family, the amount of its belongings and the mode of transfer. Any estimation problem arising from such variation is not

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[1] Combined subsidy expenditures on all labor transfer schemes show a clear break between 1962-1963 and 1963-1964, adoption of different prorating proportions for each period (a higher one in the second period) reflecting this break: Department of Employment and Productivity information, passim.

encountered as estimates are used of total cost for all families combined. Total cost is adjusted as necessary for the autonomous migration factor (f) of .75.

Data: Total subsidies paid to migrants under RTS are used as approximations to the likely cost of movement. Details of payments available were provided in chapter 1.[1] Since subsidies are not necessarily designed to cover all removal expenses, results may understate the true cost of movement. However, the discrepancy is hopefully not serious.

Separate data for subsidies paid under RTS are not provided before 1963-1964, details being combined in a composite figure covering all labor movement schemes. Estimates for the first period 1960-1963 are based on the proportion of total expenditure on all schemes represented by RTS 1963-1964 (99%).[2]

Results: On the assumption that 75% of private migrant costs would have been incurred without the policy, estimated private transfer costs are as follows:

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[1] See page 12.

[2] After 1963-1964 there was a marked increase in expenditure on other labor transfer schemes so that use of a mean proportion 1963/64 - 1965/66 would not be appropiate.

Table VI

Estimated Private Costs of Migration

£000

1st Period		2nd Period	
1960-61	33.7	1963-64	63.4
1961-62	42.9	1964-65	83.5
1962-63	46.8	1965-66	85.8

Source: information on RTS subsidies supplied by the Department of Employment and Productivity.

iii) Summary of Migration Costs

The combined estimates of ▲G and ▲M may now be shown, as deflated to 1960 prices:

Table VII

Total Costs of Migration Policy

£000 (1960 prices)

1st Period		2nd Period	
1960-61	328.1	1963-64	430.0
1961-62	330.4	1964-65	457.7
1962-63	328.9	1965-66	456.8

7:(ic) Benefits and Costs of Migration Policy (Economy)

Combined results for benefits and costs are now displayed, after discounting, as B/C ratios:

Table VIII

Benefit-Cost Ratios: Migration Policy (Economy)

1st Period		2nd Period	
8%	12.93	8%	14.93
12%	12.14	12%	13.99
16%	11.44	16%	13.15

7:(2) MIGRATION POLICY (GOVERNMENT)

From the point of view of the government, the B/C ratio for migration policy is estimated on the basis of the following model:

$$B/C_{mig,g} = \sum_{r=1}^{n} \sum_{t=1}^{m} \frac{\Delta T+\Delta S}{(1+i)^t} \Big/ \sum_{r=1}^{n} \sum_{t=1}^{m} \frac{\Delta G+\Delta L}{(1+i)^t} \qquad (6)$$

where ΔT = increased tax revenue and national insurance contributions as a result of job creation through migration subsidization
ΔS = savings in unemployment benefits
ΔG = real government expenditure associated with migration policy
ΔL = subsidies paid under migration policy
r,i,t = as defined previously.

7:(2a) Benefits of Migration Policy (Government)

i) Increased Exchequer Income (ΔT)

As in the case of D of I policy, this item covers increased direct and indirect taxes and national insurance contributions resulting from jobs which, without the policy, would not have materialized. This definition encompasses tax revenues from increased labor earnings as well as from increased profit. Both forms of factor income are to be viewed as after application of the multiplier. Thus:

$$\Delta T_t = t_1(\Delta Y\beta)_t + t_2(\Delta Z\beta)_t \qquad (7)$$

where all items are as defined previously.

Data: All the same assumptions and data sources as regards the tax-national insurance rate on earnings (t_1) and the tax rate on profits (t_2) are used as in chapter 6. Data for ($\Delta Y\beta$) and ($\Delta Z\beta$) are as used in section 1 of this chapter.

Results: Table IX displays results, again assuming a lag of one year on the collection of tax on profits:

Table IX

Estimated Increases in Exchequer Income

£000 (1960 prices)

1st Period		2nd Period	
1960-61	152.2	1963-64	212.1
1961-62	397.6	1964-65	597.4
1962-63	632.1	1965-66	1087.8
1963-64	710.0	1966-67	1320.6
1964-65	749.0	1967-68	1366.9
1965-66	832.4	1968-69	1485.5

ii) Savings in Unemployment Benefits (ΔS)

As men find work through migration, so the government secures savings of unemployment benefits; both unemployment compensation and supplementary benefits for the unemployed. Total savings are estimated as follows:

$$\Delta S_t = \frac{S_{1t} + S_{2t}}{T_{ut}} (J_{(rr)t}) \beta \qquad (8)$$

where S_{1t} = total national unemployment compensation in year t
S_{2t} = total national supplementary benefits paid to the unemployed in year t
T_{ut} = average quarterly total number receiving benefit in year t
$J_{(rr)t}$ = jobs held by migrants in receiving regions in year t
β = multiplier.1

Data: Data on per capita benefits ($S_{1t}+S_{2t}/T_{ut}$) are as used in chapter 6. Data on migrant jobs established are as used in this chapter, table I.

Results: Table X displays results for benefit savings:

Table X

Estimated Unemployment Benefits Saved

£000 (1960 prices)

1st Period		2nd Period	
1960-61	335.2	1963-64	380.6
1961-62	643.1	1964-65	934.7
1962-63	977.2	1965-66	1658.9
1963-64	729.4	1966-67	2029.3
1964-65	939.5	1967-68	1873.6
1965-66	1091.9	1968-69	2171.8

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[1] This procedure makes the assumption that the negative multiplier effects on jobs as a result of withdrawing benefits are offset by the spending of the government savings in another field.

7:(2b) Costs of Migration Policy (Government)

i) Real Government Expenditure (ΔG)

The sole item to be included under this heading is the estimated administrative cost of the policy. This is taken from this chapter, table V.

ii) Subsidies Paid under Migration Policy (ΔL)

Total subsidies to migrant labor are as given in table XI. Estimates for the first period are derived, as before, on the basis of the proportion of total expenditure on all labor subsidy schemes represented by RTS 1963-1964.[1]

Table XI

Total Subsidies Paid under RTS

£000

1st Period		2nd Period	
1960-61	134.6	1963-64	253.6
1961-62	171.5	1964-65	333.9
1962-63	187.0	1965-66	343.1

Source: information supplied by the Department of Employment and Productivity.

7:(1c) Benefits and Costs of Migration Policy (Government)

Combined results for section 2 of this chapter are summarized in table XII:

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[1] See page 170.

Table XII

Benefits and Costs of Migration Policy (Government)

£000 (1960 prices)

1st Period	Benefits	Costs
1960-61	487.4	425.0
1961-62	1040.7	450.0
1962-63	1609.4	455.1
1963-64	1439.4	
1964-65	1688.5	
1965-66	1924.2	
2nd Period		
1963-64	592.7	605.2
1964-65	1532.1	682.2
1965-66	2746.7	677.3
1966-67	3349.9	
1967-68	3240.5	
1968-69	3657.3	

Discounting and converting to B/C ratios, the following final results are obtained:

Table XIII

Benefit/Cost Ratios: Migration Policy (Government)

1st Period		2nd Period	
8%	5.30	8%	6.55
12%	4.95	12%	6.08
16%	4.65	16%	5.68

CHAPTER 8

RESULTS AND IMPLICATIONS

Results of the analysis naturally depend heavily on the assumptions it has been necessary to make throughout. In addition to the array of estimating benchmarks used, the most important working assumptions have been:

i) Changes in government expenditure do not represent net injections or withdrawals in the income creation process. It is assumed that expenditures would have been incurred elsewhere in the economy on some other government purpose had they not been made with respect to the policies in question. Savings arising are also assumed to be spent elsewhere.
ii) The multiplier is constant over time and types of income injection.
iii) Regional earnings figures reflect regional productivity differences and not cost of living differences.

It is also emphasized that results reflect the placement of D of I policy in a favourable light vis-a-vis migration policy (given all the other conditions of the analysis).

This chapter proceeds by discussing the measurable efficiency results from the economy and government points of view, first for D of I policy and second for migration policy. It then, in the last section, derives implications as to the parameters of the policy-makers' objective function.

8:(1) D OF I POLICY: EFFICIENCY RESULTS

Table I brings together the D of I policy results from chapters 4 and 5 as well as results for the extension of the time horizon from the basic six years (t=6) to ten and fifteen years:

Table I

B/C Ratios: D of I Policy

1st Period	Economy			Government		
$\lambda = 1$	8%	12%	16%	8%	12%	16%
t= 6	.02	.03	.02	.58	.54	.51
t=10	.05	.05	.04	.93	.82	.74
t=15	.08	.06	.05	1.24	1.03	.88
$\lambda = .75$						
t= 6	2.73	2.53	2.35	1.08	1.01	.95
t=10	4.73	4.11	3.62	1.85	1.62	1.44
t=15	6.51	5.31	4.43	2.53	2.08	1.75
$\lambda = .25$						
t= 6	6.96	6.46	6.02	2.09	1.94	1.82
t=10	11.88	10.35	9.12	3.72	3.25	2.86
t=15	16.24	13.28	11.12	5.17	4.23	3.54
2nd Period						
$\lambda = 1$						
t= 6	.02	.02	.02	.38	.35	.33
t=10	.04	.03	.03	.63	.55	.49
t=15	.05	.04	.04	.86	.70	.59
$\lambda = .75$						
t= 6	1.35	1.24	1.15	.81	.74	.69
t=10	2.37	2.05	1.79	1.47	1.27	1.10
t=15	3.27	2.66	2.20	2.05	1.66	1.37
$\lambda = .25$						
t= 6	3.08	2.82	2.60	1.67	1.53	1.41
t=10	5.57	4.79	4.17	3.11	2.67	2.32
t=15	7.77	6.28	5.18	4.38	3.53	2.91

8:(1a) Economy Viewpoint

During the first period, results varied from the very low when $\lambda = 1$ to the relatively high when $\lambda = .25$. Intuition suggests that $\lambda \geq .75$, a value given credence by the finding that $\Delta I = 0$. Taking $\lambda = .75$ then places D of I policy in a favourable light and results ranged, depending on both the time horizon and the discount rate, from 2.4 to 6.5. At the intermediate discount rate (i=12%) with a time horizon of the length usually adopted in investment analyses (t=10-15), the range may be narrowed to 4.1 - 5.3, say 4.0 - 5.0. In these terms D of I policy appeared, during the first period, to be comfortably profitable. Nonetheless, it is emphasized that profitability depended on the non-materialization in the absence of the policy of a proportion of jobs originating in congested regions ($\lambda < 1$).

Looked at another way it may be said that, providing $\lambda \leq .75$, the policy was profitable within six years at any of the three discount rates. Or, given the shortest time horizon of t=6, the break-even value for λ appears to have been around $\lambda = .90$, whatever the discount rate. Thus, so long as at least 10% of relocated jobs from the South East and Midlands could not have materialized in the absence of the policy, the policy appeared during the first period to have been, from a measurable efficiency point of view, successful within six years.

During the second period all B/C ratios were roughly half the value of those in the first period, the intermediate range (at i=12%, λ=.75 with t=10 and 15) being 2.1 - 2.7. The large increases in expenditure, chiefly on infrastructure development, during this period accounted for the fall in profitability. At λ = .75 the policy was still profitable within six years whatever the discount rate, but the break-even value for λ, given that t=6, was reduced to around .80. A requirement of λ = .80 could well have been unattainable.

The results for both periods may be compared with estimates from other work. The National Economic Development Council (NEDC), comparing initial capital assistance (1960-1962) with extra output from extra employment created, estimate the rate of return on D of I policy "to be very high - at least 100%."[1] As full details on which this figure is based are not revealed, it is hard to say whether inflows were seen as having been discounted or not. Moreover, the comparison is conceptually irregular to the extent that cost (including transfer payments) represents government cost while benefits (measured in terms of incremental output) represent economy benefits. The result, therefore, is not strictly comparable with either the economy or government ratios of this analysis.

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[1] NEDC, Conditions Favourable to Faster Growth, op. cit., p. 19.

Nonetheless, it may be pointed out that, from the point of view of the economy, a return of 100% during the first period appeared to require that λ be around .80 given that t=6; or that if λ = .75 a time period of 4/5 years be allowed (depending on i). During the second period, if λ = .75 it appeared to be necessary that t=8-14 (depending on i) or, given that t=6, the requirement was that λ = .45 - .55 (depending on i).

These results suggest a degree of optimism in the NEDC estimate. Indeed, if transfer payments were added to real expenditures and contrasted with incremental flows of output (the NEDC procedure), requirements for a return of 100% would be even more stringent.

Analyzing the period 1960-1963 so far as the policy is concerned, Needleman and Scott put the gain in output to the economy as a whole at £2,500 per job created (over five years, discounting at 6%).[1] This figure excludes an estimate of change in profit, relating merely to incremental labor income (taken to be £621 per annum). Nor is a multiplier effect included. Using the nearest equivalent data of this thesis (t=6, i=8%), results, as in table II, fall well short of the figure of £2,500, even when incremental profit and the multiplier are included:

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[1]Needleman and Scott, "Regional Problems," op. cit., p. 167.

Table II

Net Economy Gains per Job Created

£

	$\lambda = 1$	$\lambda = .75$	$\lambda = .25$
1st Period	-302	537	1851
2nd Period	-804	286	1711

Note: Even though the time horizon and discount rate used do not coincide exactly with those of Needleman and Scott, their use is regarded as justified on the grounds that the effect of an additional year of gains (discounted at 8%) outweighs the short-fall in gains resulting from discounting over five years at 8% instead of 6%. Thus, the results of this table are slightly overstated in comparison with the results of Needleman and Scott, a fact strengthening the conclusion that Needleman and Scott exaggerate the benefits of D of I policy.

The reason why Needleman and Scott, as well as NEDC, provide more optimistic results than this analysis is that in neither study do the authors take account of:

i) the fact that a proportion $(1-\delta)$ of relocated development would have occurred in outlying districts even in the absence of the policy;
ii) the fact that a proportion (λ) of relocated jobs from congested regions would have materialized in congested regions in the absence of the policy;
iii) infrastructure investment associated with D of I policy.

The conclusion of this section is that, from the economy viewpoint, D of I policy, though profitable in both periods on the generous assumptions used as to the value of λ, does not appear to have been as efficient as might commonly have been supposed. This observation carries large implications for the likely profitability of the policy in the post-1966 period when expenditure was increased dramatically.

8:(1b) Government Viewpoint

The overall range of ratios from the government point of view is less wide than from the point of view of the economy for the reasons that:

i) Government benefits include the revenues from rents and and factory sales which bear no direct relation to the values of λ.
ii) Government appropiates only a proportion of the increased output measured from the point of view of the economy.
iii) Government incurs higher total costs (including subsidies) than the economy.

The first period intermediate range (λ = .75, i=12% with t=10 and 15) was 1.6 - 2.1, rather less than half the value of the return in the comparable economy range. The break-even time horizon at λ = .75 was almost exactly six years whatever the discount rate so that the break-even value for λ, given that t=6, fell to around .75 whatever the discount rate.

During the second period all B/C ratios were lower than during the first period. They ranged from around 67% of first period returns when λ = 1 to 75% - 85% when λ = .25. At the intermediate value of λ = .75 B/C ratios were some 73-80% of first period ratios. The implication of these results is that the relative burden on the Exchequer of escalating policy during the second period was less than the burden on the economy as a whole. While the return on expenditure was still higher from the economy's than from the government's point of view, the Treasury incurred a fall, at intermediate ratios (when λ = .75, i=12%) of only 20-25% on previous returns as against the fall incurred by the economy of around 50%.

At λ = .75 the Exchequer would not now appear to break even for 7-9 years depending on the interest rate. In order to break even at the intermediate rate of i=12% with t=6, it would be necessary that λ = .60; at t=10 and 15 the requirements would be λ = .85 and .90 - .95 respectively.

As in the case of the economy results, returns for the two periods from the government point of view may be compared with equivalent estimates. For a return of 100% as propounded by NEDC,[1] it would appear to have been necessary in the first period that $\lambda \leq .25$, $t \geq 6$ and $i \leq 12\%$ since, for i=12% and t=6, a B/C ratio of virtually 2 is secured only with λ = .25, which is very low. During the second period the requirement at i=12% would have been λ = .25 and t=8 or λ = .75 and t=19-20. Even at i=8% the requirement for the low λ = .25 would have been t=7. It is clear that a 100% return is likely to have been less easily achieved than NEDC seemed to assume.

Needleman and Scott, analyzing the return on expenditure 1960-1963 from the government's point of view, gauge the Exchequer gain to be £900 per job created (discounted at i=6% over t=5).[2] Using the nearest equivalent data of this thesis (i=8%, t=6) estimated Exchequer net benefits per job created

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[1] NEDC, Conditions Favourable to Faster Growth, op. cit., p. 19.

[2] Needleman and Scott, "Regional Problems," op. cit., p. 167.

are as follows:

Table III

Exchequer Net Gains per Job Created

£

	$\lambda = 1$	$\lambda = .75$	$\lambda = .25$
1st Period	-312	63	806
2nd Period	-715	-219	772

By comparison with other estimates, these results for government appear to be unfavourable, just as for the economy as a whole.[1]

The conclusion of this section is that, while profitable from the government viewpoint, the policy appeared to be much less profitable than from the point of view of the economy. The relative fall in efficiency during the second period, however, was not as marked as for the economy as a whole. Again, results indicate that the policy was less successful than suggested elsewhere.

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[1] In the explanation of the discrepancy between the results of this thesis and of other studies, the three factors identified with respect to economy results still obtain here (see page 182). There is also now, however, a fourth factor, viz., that cost, though ultimately returnable in the case of loans and factories built for sale or rental, is not fully recovered within the short time horizons used. NEDC does not explicitly specify a time horizon but implies one of zero length by working with a net cost figure after deduction of all recoverable costs undiscounted. Needleman and Scott adopt the inconsistent practice of discounting benefits over a five year period while also working with a figure for non-returnable cost which emerges after deduction from total cost of recoverable cost undiscounted. By contrast, this thesis recognizes that a) returnable cost is not fully recovered within the time periods adopted and that b) cost recovered is worth less the later the date at which it is recovered.

8:(2) MIGRATION POLICY: EFFICIENCY RESULTS

Measurable efficiency returns for migration policy are displayed in table IV. It is emphasized that in addition to such intangible factors as psychological stress on the part of the migrant, political tension, personal inconvenience in congested prosperous areas and community debilitation in depressed regions, the results do not encompass the . . . effects on infrastructure expenditure which could result if migration policy were conducted on the same level of expenditure as D of I policy. Since a U-shaped cost curve implies diseconomies as regional population density falls below or rises above a certain range of size, the additional cost associated with an expanded migration program could be heavy. This study has examined scale effects only within the framework of migration policy as it was actually implemented. It is also emphasized that results reflect an autonomous migration factor (f) of 75%.

Table IV

B/C Ratios: Migration Policy

	Economy			Government		
1st Period	8%	12%	16%	8%	12%	16%
t= 6	12.93	12.14	11.44	5.30	4.95	4.65
t=10	20.40	18.05	16.16	8.88	7.79	6.92
t=15	27.02	22.52	19.21	12.06	9.94	8.38
2nd Period						
t= 6	14.93	13.99	13.15	6.55	6.08	5.68
t=10	23.86	21.06	18.80	11.12	9.71	8.57
t=15	31.78	26.40	22.45	15.17	12.44	10.44

8:(2a) Economy Viewpoint

For the first period, the policy displayed high returns at all values of t and i. At the intermediate value of i=12% with t=10 and 15, the range was 18.05 - 22.52, say 18 - 23. Linear extrapolation indicates that profitability would have been achieved with t=1 at all interest rates. Alternatively, it would be necessary to raise the autonomous migration factor (f) to around 98% (depending on i) in order just to have broken even over the shortest time horizon of t=6.

From the point of view of the economy, excluding the case of $\lambda = 1$, migration policy ratios varied from 1.7 ($\lambda = .25$, t=15, i=8%) to 4.9 ($\lambda = .75$, t=6, i=16%) times higher than D of I policy ratios. At the intermediate values of $\lambda = .75$ and i=12% with t=10 and 15, the range was 4.2 - 4.4, say 4, times higher than D of I policy ratios during the first period.

During the second period returns were a little higher for migration policy than in the first period, the effectiveness of migration subsidies apparently rising by a small degree. In approximate terms the results may be taken as equalling those of the first period so that the same previous conclusions as to break-even points apply. Now, however, migration returns rose to 4.1 ($\lambda = .25$, t=15, i=8%) to 11.7 ($\lambda = .75$, t=6, i=16%) times higher than those for D of I policy. For $\lambda = .75$, i=12% and t=10 and 15 the returns were approximately 10 times higher.

Thus, the relative attractiveness of migration policy (in measurable efficiency terms) rather more than doubled during the second period.

8:(2b) Government Viewpoint

Again, during the first period the policy appeared to be profitable at all discount rates over even the shortest time horizon. But returns were less than half those accruing to the economy as a whole (7.8 - 9.9 at i=12%, t=10 and 15), representing 43-44% of equivalent economy returns, the reasons being that the government naturally appropiates only a part (roughly 50%) of the total gain in output and also incurs higher costs (due to subsidies). It was now the case that a minimum break-even requirement of t=2 obtained or, alternatively, that the autonomous migration factor (f) would have been required to be around 95% (depending on i) for the policy just to have broken even with t=6. In comparison with D of I policy (government viewpoint) returns ranged, excluding $\lambda = 1$, from 2.3 ($\lambda = .25$, t=15, i=8%) to 4.9 ($\lambda = .75$, t=6, i=16%), say 2-5, times higher, and at $\lambda = .75$, i=12%, t=10 and 15, were around 5 times higher. These differentials were approximately the same as under the economy viewpoint during the first period.

During the second period results were marginally higher in line with the slight improvement under the economy viewpoint. As a proportion of economy returns, ratios were for all intents

and purposes the same as in the first period. The same break-even conclusions also apply as for the first period. Excluding $\lambda = 1$, returns ranged from 3.5 ($\lambda = .25$, t=15, i=8%) to 8.2 ($\lambda = .75$, t=6, i=16%) times higher than those on D of I policy (government viewpoint), an improvement in line with developments from the economy viewpoint. At the intermediate values of $\lambda = .75$ and i=12% with t=10 and 15 returns were approximately 7.5 times higher than the ratios for D of I policy, a factor somewhat lower than the difference of 10 from the economy viewpoint. The relative attractiveness of migration policy (in measurable efficiency terms) was, therefore, less than doubled during the second period. Hence the improved relative attractiveness of migration policy during the second period was more marked for the economy as a whole (where the policy difference factor was more than doubled) than for the government. In measurable efficiency terms it follows that the Treasury had less to lose than the economy by concentrating policy escalation on D of I rather than migration policy.[1]

The conclusion of this section is that migration policy, even from the government point of view in the first period when returns were lowest, appears on the assumptions of this analysis

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[1]This conclusion is fully consistent with that of the last section in which it was found that the Treasury lost less than the economy from the escalation of D of I policy.

to have been highly profitable. Taking only measurable efficiency factors into account, it was clearly, at the level of implementation adopted, a great deal more profitable than D of I policy from both points of view in both periods.[1] From both points of view results changed in similar fashion between the two periods. However, relative to the measurable efficiency return on D of I policy, the return on migration policy was less attractive from the government than from the economy viewpoint during the second period (having been equally attractive during the first period).

8:(3) OBJECTIVE FUNCTION

Estimates for parameters of the policy-makers' ex post objective function derive from substitution of total economy benefits adjusted for differences in policy costs in the model of chapter 2.[2] Results are shown in table V. What the results

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[1]It is emphasized again that in addition to the several non-efficiency factors militating against migration policy, this conclusion does not reflect the additional infrastructure costs which would, doubtless, have attached to migration policy had it been pursued on an expanded scale.

[2]Benefits from the government viewpoint cannot be used to derive the function as the model requires specification of the distribution of benefits between different population groups and the distribution of government resources between these groups is not something which can be determined within the framework of this analysis.

mean is that, in the decision to devote resources to D of I policy in preference to migration policy, weights of the following order were implicitly attached to income created for the groups shown. If weights are biassed, it is downwards, due to the placement of D of I policy in a favourable light relative to migration policy.

Table V

Estimated Group Income Weights

1st Period	8%		12%		16%	
	λ=.75	λ=.25	λ=.75	λ=.25	λ=.75	λ=.25
t= 6						
Group 1	5.29	1.98	5.38	2.02	5.47	2.04
Group 3	0.16	0.81	0.15	0.80	0.13	0.79
t=10						
Group 1	4.80	1.82	4.90	1.86	4.98	1.89
Group 3	0.27	0.84	0.24	0.84	0.22	0.82
t=15						
Group 1	4.61	1.76	4.73	1.80	4.83	1.84
Group 3	0.30	0.85	0.28	0.85	0.25	0.84
2nd Period						
t= 6						
Group 1	12.67	5.44	12.83	5.53	13.01	5.66
Group 3	-1.27	0.13	-1.30	0.12	-1.33	0.09
t=10						
Group 1	11.48	4.78	11.75	4.90	11.90	5.03
Group 3	-1.03	0.27	-1.09	0.24	-1.12	0.22
t=15						
Group 1	10.97	4.54	11.22	4.68	11.61	4.83
Group 3	-0.94	0.31	-0.99	0.28	-1.06	0.25

Note: The extremely high results for λ = 1 are not reported. As $\lambda \longrightarrow 1$, weights $\longrightarrow$ 1000.

8:(3a) Weights for Group 1

For population from depressed regions remaining there, the total weight spans a range during the first period of 1.8 - 5.5 with sub-ranges of 4.6 - 5.5 (λ = .75) and 1.8 - 2.0 (λ = .25).

For the intermediate values of λ = .75, i=12% and t=10 and 15, the range is 4.7 - 4.9. During the second period, the total range is estimated to rise to 4.5 - 13.0 with sub-ranges of 11.0 - 13.0 (λ = .75) and 4.5 - 5.7 (λ = .25). Now the intermediate range is 11.2 - 11.8. Such values contrast sharply with the assigned weight of unity for income for population from prosperous regions in prosperous regions (group 2) and emphasize the significance attached to the intangible benefits of D of I policy.[1]

These results indicate that the weight for group 1 income rather more than doubled during the second period, an increase which is in line with the greater concern for the regional problem evinced in the increased expenditure on D of I policy during the second period. The results also suggest that, since the efficiency component of weights is given as unity and since it comprises less than half the estimated value of the above weights, the combined intangible factors of equity and balance may be said to have been more significant in policy decisions than measurable efficiency.[2] Finally, the higher is λ the higher the estimated weight because the less profitable is D of I policy and the higher would have to be

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[1] For the assignment of unity to the weight for group 2 income, see page 30.

[2] For the condition that the efficiency component equals unity, see ibid.

its relative intangible advantages in order to explain its preferential implementation.[1]

8:(3b) Weights for Group 3

For population from depressed regions in prosperous regions (after migration), the relative importance of additional income covers a total range of 0.13 - 0.85 during the first period with sub-ranges of 0.13 - 0.30 (λ = .75), 0.79 - 0.85 (λ = .25) and of 0.24 - 0.28 (λ = .75, i=12%, t=10 and 15). During the second period, the total range becomes -1.33 - 0.31 with sub-ranges of -0.94 - -1.33 (λ = .75), 0.09 - 0.31 (λ = .25) and -0.99 - -1.09 (λ = .75, i=12%, t=10 and 15).

The negative results indicate that, at several parameter values, additional income for group 3 was regarded as a positive disadvantage. Even when the weights are not negative they are less than unity indicating the overriding importance of balance in policy decisions. Given, presumably, a positive equity premium for group 3 income, and given the value of the efficiency component as unity, it follows that the disadvantage of population imbalance associated with migration outweighed the equity advantage. The weights are lower in the second than

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[1] For .75$>\lambda>$.25, the weight would rise by roughly 0.6 points (first period) and 1.4 points (second period), for every .10 increase in λ, the increase falling the longer the time horizon and the lower the discount rate.

in the first period, reflecting the proportionately greater expenditure increase on D of I policy than on migration policy and the implied determination to attach to the relative intangible disadvantages of migration policy a higher minimum value than in the first period.[1]

8:(3c) Equity and Balance Premiums

By setting $g_1 = g_2$ and $-h_1 = h_3$ in addition to $g_2=h_2=0$ in the model of chapter 2, it is possible to solve precisely for equity and balance premiums.[2] Results for the ranges referred to in the discussion above are shown in table VI:

Table VI

Equity (g_1) and Balance (h_1) Premiums

	1st Period		2nd Period	
	Equity	Balance	Equity	Balance
Total range	0.30-1.80	0.46-2.67	1.42-4.84	2.12-7.17
$\lambda = .75$	1.45-1.80	2.16-2.67	4.01-4.84	5.96-7.17
$\lambda = .25$	0.30-0.41	0.46-0.63	1.42-1.87	2.12-2.79
$\lambda=.75$, i=12%, t=10 and 15	1.50-1.57	2.23-2.33	4.11-4.33	6.11-6.42

Notes:

1) $h_3 = -h_1$

2) Bounds for total range are:
high ($\lambda = .75$, i=16%, t=6)
low ($\lambda = .25$, i= 8%, t=15)

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[1] For $.75>\lambda>.25$, the weight would fall by roughly 0.12 points (first period) and 0.26 points (second period) for every .10 increase in λ, the fall decreasing the longer the time horizon and the lower the discount rate.

[2] The implications of constraints are discussed in chapter 2, page 30.

These results show that the equity consideration received consistently about two-thirds the weight of the balance factor, this conclusion applying in both periods.

Results for the absolute values of g_1 and h_1 in the second period were over double those of the first period. This is an indication of the willingness among decision-makers to attach considerably higher importance to intangible factors during the second period. To the extent also that the equity premium exceeds unity, (as it does with the exception of the unlikely value of $\lambda = .25$ in the first period), equity would appear to have been a more important factor than measurable efficiency. Thus, it may be concluded that the implicit ranking of objectives was as follows: inter-regional population balance, equity in inter-regional income distribution and efficiency.

8:(3d) Intangible Advantages of D of I Policy

By reference to the difference in total benefits for the two policies (with migration benefits adjusted upwards for the difference in costs) estimated absolute values may be placed on the intangible factors favouring D of I policy over migration policy. If D of I policy, though less profitable on tangible efficiency terms, was preferred to migration policy (as was the case), its relative intangible advantages must have been sufficient to convert its return into at least

equality with that of migration policy. The intangible advantages covered by the estimates below are:

1) avoidance of congestion costs (including differential scale effect costs of public service provision);

2) avoidance of community debilitation in depressed regions;

3) avoidance of locational preference costs faced by those who would have had to move under migration policy;

4) avoidance of political tension arising from the foregoing factors;

5) a higher division of benefits in favour of high unemployment population groups (see chapter 2, models (6a) and (7a)).

Results are displayed in table VII for the total ($\lambda = .25$, i=16%, t=6 - $\lambda = .75$, i=8%, t=15) and intermediate ($\lambda = .75$, i=12%, t=10 and 15) ranges:

Table VII

Imputed Intangible Cost Savings of D of I Policy

£m

	1st Period	2nd Period
Total range	139-560	1236-3564
Intermediate range	369-455	2298-2869

Notes:

1) To be consistent with the remainder of this section, these results relate to the economy viewpoint.

2) Figures computed as $B'_{mig} - B_{di}$ where B'_{mig} = migration benefits adjusted for the difference in policy costs (see chapter 2, page 26).

These figures denote, by any standards, a high value imputed in policy decisions to the additional intangible advantages of devoting resources to D of I policy in preference to migration policy. As anticipated, implicit expectations as to the intangible cost savings involved in the decision were higher in the second than in the first period. Since the relative attractiveness of D of I policy in measurable efficiency (tangible) terms fell during the second period, its implied relative intangible advantages over migration policy must have risen.

8:(3e) Structural Adjustments

The foregoing results in respect of the objective function were all based on fixed values for the distribution of policy benefits between groups (Δw_i). In this section the effect on results of variations in these values is explored.

If a national multiplier of 1.5 is retained, the initial injection resulting from policy implementation must remain as 67% of total final benefits. Adjustments, however, may be made to the distribution of subsequent round benefits (the residual 33% of total final benefits). Original results reflected a residual division of 20% in the same regions as the initial injection and 13% in other regions.[1] In this section results are shown for a 25% - 8% split either way. Thus, if 25% of total benefits are assumed to go to the same regions as the initial injection, 5% go to the other regions and vice versa. This procedure expands the feasible range of benefits as shown in Appendix 14.

Results for the weight for group 1 are not greatly affected by the change in assumptions, there being never more than 2 points difference to the top of the total range (second period) as compared with original results. Differences at the bottom of the total range are under 1 point and the greatest difference at intermediate values is only 1.6 points (second period). While the proportionate change is larger for the weight for group 3, the total range extension in absolute

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[1] See chapter 2, expressions (6a) and (7a).

terms is little greater than in the case of group 1, i.e., just under 3 points as the maximum difference (at the bottom of the total range, second period). Intermediate differences are at most 2.6 points.

Values for the balance premium display lower variations than for the group 3 weight and values for the equity premium display scarcely any variation at all. The relationship of the equity to the balance premium now varies between 45% and 79% (depending on whether migration policy has high or low multiplier effects in prosperous regions). But equity remains less important than balance. It may be concluded that the alteration of assumptions as regards Δw_i does not, within reasonable bounds, lead to marked instability in results.

8:(4) SUMMARY

This chapter has shown that on the optimistic assumption of $\lambda = .75$, D of I policy appeared to have been profitable in both periods from both points of view. The return to the government, however, varied from somewhat under to somewhat over half the return to the economy as a whole in the two periods respectively. Moreover, the return in the second period, from both points of view, was lower than the return in the first period; roughly 50% lower (economy) and 75% lower (government). From neither point of view and in neither period did the policy appear to be as profitable as indicated in other studies.

Migration policy, on the pessimistic assumption that f = .75, appeared to be highly profitable in both periods from both points of view. Again, the return to government was approximately half the return to the economy as a whole. However, the second period return represented an improvement, albeit very slight, on the first period return.

As regards the estimated parameters of the objective function, it is clear that, on the assumptions used previously, efficiency was outweighed in policy decisions by equity and balance considerations. Moreover, balance appeared to be a more important consideration than equity, and all weights increased markedly during the second period. The estimated absolute values attached implicitly to the intangible factors associated with the regional program appeared high, particularly during the second period. Reasonable variations in the distribution of policy benefits between population groups did not appear to lead to any significant change in results.

CHAPTER 9

CONCLUSIONS

This thesis set out with two aims: i) to estimate tangible money or efficiency returns for D of I and migration policies from the economy and government points of view, and ii) to estimate the parameters of the policy-makers' objective function as implied in regional policy decisions. Both exercises were related to the two periods 1960-1963 and 1963-1966.

So far as the efficiency of D of I policy was concerned, the following conclusions have emerged:

1) Even though profitability fell by roughly half during the second period when expenditure increased substantially, D of I policy was, at intermediate parameter values ($\lambda = .75$, i=12%, t=10 and 15), profitable in both periods from the economy viewpoint. The B/C ratio was around 4 - 5 in the first period and 2.0 - 2.7 in the second period. It is to be noted, however, that profitability was contingent on a proportion of jobs which originated in congested regions failing to materialize in the absence of the policy ($\lambda<1$). At no time, moreover, did the policy appear to be as efficient as other studies had suggested. When outlays were even higher than in the second period, after 1966, it may be expected that returns were still lower.

2) From the government point of view, D of I policy was naturally less profitable, the B/C ratios in the intermediate range falling to around 1.6 - 2.1 (first period) and 1.3 - 1.7 (second period). While, however, the government secured less of a gain than the economy from the policy, the additional burden of policy escalation during the second period fell relatively less heavily on the Treasury than on the economy as a whole.

So far as the returns to migration policy were concerned, the following conclusions have emerged:

1) In terms of measured efficiency factors alone, migration policy was highly profitable at the level of implementation adopted in both periods from the economy viewpoint. Returns were, to all intents and purposes, the same in both periods. Assuming an autonomous migration factor (f) of .75, B/C ratios spanned an intermediate range over the two periods of 18 - 26.

2) From the government viewpoint, returns to migration policy were slightly under half those from the economy viewpoint (8 - 12 in the intermediate range). The increase in the relative attractiveness of migration policy during the second period was less marked for the government than for the economy as a whole.

As regards the parameters of the policy-makers' objective function, weights have been estimated as attaching implicitly to income created for different population groups. These reflect the relative importance of the three objectives of the regional program (increases in net national income or efficiency, equity in inter-regional income distribution and population balance throughout the country). Weights comprise a base value of unity relating to the tangible efficiency contribution of income created and premiums for equity and balance contributions. Estimated values for these latter premiums have also been derived. Finally, estimated absolute money values for the intangible advantages of D of I policy over migration policy have been provided.

Summary conclusions at intermediate parameter values are that objectives were ranked in the order of balance, equity and efficiency, and that imputed values for the relative advantages of D of I policy over migration policy were high. All estimates were higher during the second than the first period. Detailed conclusions are as follows:

1) The weight attaching to income for the population from depressed regions in depressed regions (group 1) was estimated to be 4.7 - 4.9 and 11.2 - 11.8 in the intermediate range of the two periods respectively.[1] These values were

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[1]The approximate doubling in value in the second period connects directly with the approximate halving of the efficiency return to D of I policy in the second period (the return to migration policy remaining more or less constant).

shown to imply that the combined intangible factors of equity and balance were revealed in regional policy decisions to be more significant than measurable efficiency.

2) Additional income for the population from depressed regions in prosperous regions (group 3) appeared to be regarded at several parameter values as a positive disadvantage (negative weights). At all parameter values weights were less than unity. In the intermediate range, values were 0.2 - 0.3 and -1.0 - -1.1 in the two periods respectively. These results were shown to imply that balance outweighed the equity factor in the ranking of policy objectives.

3) Solution of specific values for the equity and balance premiums supported this conclusion, the equity premium displaying a consistent relationship of 68% to the balance premium. In the intermediate range, the equity premium was 1.5 - 1.6 and 4.1 - 4.3 in the two periods respectively. The balance premium was 2.2 - 2.3 and 6.1 - 6.4 in the two periods respectively. From these results it was also concluded that equity was revealed to be a more important factor than measurable efficiency. Thus, objectives appeared to be ranked in the order of balance, equity and efficiency.

4) So far as absolute values for the intangible advantages of D of I policy over migration policy were concerned, high imputed quantities emerged (assuming migration policy to be expanded to the expenditure level of D of I policy). In the

intermediate range, policy decisions implied values (£000) of £369-455 (first period) and £2298-2869 (second period).

The intangible equity or balance advantages of D of I policy over migration policy covered by these estimates and implied in the weights derived for income created for the different population groups are: avoidance of congestion costs, avoidance of community debilitation in depressed regions, avoidance of locational preference costs, avoidance of political tension and a higher division of benefits in favour of high unemployment population groups.

Sensitivity analysis revealed that none of the above results on the objective function were greatly altered by feasible changes in the distribution of policy benefits between policy groups. It is, however, emphasized that results clearly depend on the assumptions chosen as appropiate for the analysis.

It has been said that, "policy to cure the regional imbalance has been widely debated in recent years, usually without any knowledge of relevant magnitudes."[1] For a fully informed assessment of policy, it would seem necessary that those magnitudes comprise information on the efficiency aspects of alternative policies as well as on the weights attached by decision-makers to the different

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[1]Archibald, "Regional Multiplier Effects," op. cit., p. 24.

objectives of policy. It is such information which this thesis has attempted to provide.

While results relate to past periods, they retain salient implications for present policy. Thus, to the extent that diminishing returns have been established at the margin of policy implementation for D of I policy, it may be expected that, with higher levels of expenditure than in the period 1960-1966, measurable efficiency returns for D of I policy are presently lower than estimated in this study. Moreover, to the extent that expenditure on D of I policy relative to migration policy is higher than during the period 1960-1966, weights attaching to income for group 1 may also be taken to be higher. Similarly, weights for income for group 3 may be taken to be lower. This suggests that implicit values for the equity and balance premiums are likely to be higher and that the imputed intangible advantages of D of I policy over migration policy are higher.

In light of these implications it may be considered that fewer resources should be devoted to D of I policy and more to migration policy. On the other hand, it may be considered that still more resources should be channeled into D of I policy. This last opinion would derive from the judgment that the policy's relative intangible advantages are higher than presently imputed in policy decisions. Estimates of measurable policy returns and of parameters of the policy-

makers' objective function assist in the making of such judgments. The purpose of this thesis, however, has not been to make the judgments; merely to provide the facts.

APPENDIX 1

ESTIMATED JOB CREATIONS UNDER D OF I POLICY

Table I:

Estimated Job Creations - Unpublished (1) and Calculated (2) Regional Proportions of Development District Totals, 1960-64, 1964-65, 1965-66

	A1960-M1964		A1964-M1965		A1965-M1966	
	(1)	(2)	(1)	(2)	(1)	(2)
North East	40.6	42.1	63.3	56.4	55.4	59.4
Merseyside	43.0	41.9	25.3	31.6	32.7	31.1
Devon, Cornwall	5.2	5.8	3.7	4.5	3.7	2.6
Other (ODDs)	11.2	10.2	7.7	7.5	8.2	6.9
Total	100.0	100.0	100.0	100.0	100.0	100.0

I^2 (adjusted for small sample bias) = 0.939 (not significant at the 5% level of significance)

Sources:

1) Local Employment Acts 1960 and 1963: Annual Reports (Cols. 2).
2) Local Employment Acts 1960 and 1963: Progress Reports (Cols. 1).

Note: A and M = April and March respectively.

Using the above column (2) proportions for 1960-64 and unpublished data for 1964-65 and 1965-66, the following estimates of job creations in "development districts" emerge:

Table II:

Estimated Job Creations in Development Districts

	(a) 1960-1	(b) 1961-2	(c) 1962-3	(d) 1963-4	(e) 1964-5	(f) 1965-6
North East	2,606	3,596	10,690	17,528	23,255	24,299
Merseyside	21,816	365	9,424	2,609	9,314	14,350
Devon, Cornwall	2,636	656	286	535	1,376	1,614
Other (ODDs)	3,242	3,483	-	1,628	2,812	3,579
Total	30,300	8,100	20,400	22,300	35,757	43,842

Sources:

1) Local Employment Acts 1960 and 1963: Annual Reports (cols. a-d).
2) Local Employment Acts 1960 and 1963: Progress Reports (cols. e and f).

Note: Unpublished totals from which cols. (e) and (f) derive did not coincide exactly with published totals as given in the text, table I. Unpublished totals were, therefore, reconciled with published totals before disaggregated estimates were made.

It is necessary to allocate to definable regions the jobs estimated in table II to be created in ODDs. As there is no information available for total assistance to ODDs by separate regional breakdown, the spread is estimated on the basis of square footage of construction approved under IDC control. Results appear in table III:

Table III:

Estimated Job Creation Spread Over Other Development Districts

	1960-1	1961-2	1962-3	1963-4	1964-5	1965-6
Yorkshire	32	35	-	391	309	394
Midlands	97	104	-	-	-	-
London, SE	778	836	-	-	-	-
Southern	195	209	-	-	-	-
North (excl. NE)	1,589	1,707	-	960	1,772	1,933
North West (excl. Merseyside)	551	592	-	277	731	1,252
Total	3,242	3,483	-	1,628	2,812	3,579

Source: Calculated from Local Employment Acts 1960 and 1963: Annual Reports, 1960-1966, table II.

Notes:

1) Data for North (excl. North East) and North West (excl. Merseyside) are not available in all years. Estimates are based on total job creations for the two areas (derived as a residual sum) divided in accordance with proportions of square footage of IDC approvals in the North and North West.

2) Data for 1960-1 are not available. Estimates are based on 1961-2 proportions.

APPENDIX 2

EFFECTIVENESS OF D OF I POLICY IN PROMOTING INDUSTRIAL MOVEMENT (DATA)

	(a) Establishment Moves to Depressed Regions M	(b) IDC Refusals F	(c) Total Government Expenditure L (£m)	(d) Moves to DDs: in employment M_e (000)
1960	46	169	8.6	17.1
1961	66	117	11.8	20.6
1962	70	88	32.8	38.7
1963	73	150	23.9	14.7
1964	105	193	19.7	16.1
1965	115	207	35.1	15.1

Sources:

(a) Howard, The Movement of the Manufacturing Industry in the U.K., Appendix E, p. 43.

(b) Board of Trade Journal, Vol. 195, No. 3727 (23 August 1968), table I, p. 551.

(c) Seventh Report of the Estimates Committee, op. cit., p. 166; and Civil Appropiation Accounts, Vote for Promotion of Local Employment 1960-1961 to 1965-1966.

(d) Howard, op. cit., Appendix E, p. 43.

APPENDIX 3

EARNINGS ADJUSTMENT FACTORS

Factors for D of I policy

	North	SW	Wales	NW	Scot.	Yorks	SE	Mid.
1960	.832	.845	.933	.825	.807	.840	.816	.853
1961	.887	.883	.879	.859	.693	.820	.806	.789
1962	.842	.761	.825	.767	.897	.869	.876	.831
1963	.814	.702	.911	.942	.876	.835	.832	.828
1964	.803	.928	.770	.806	.770	.867	.824	.812
1965	.847	.826	.773	.919	.851	.827		
1966	.889	.792	.766	.827	.783	.818	(Not required as no jobs created)	
1967	.870	.735	.826	.741	.814	.758		
1968	.885	.784	.898	.840	.797	.871		
a) Weighted Averages (over time)								
1960-66	.844	.821	.891	.832	.793	.841	.817	.822
1963-68	.835	.837	.791	.862	.822	.836	-	-
b) National Weighted Averages								
1960-66			.824					
1963-68			.831					

For sources and notes, see over.

Sources:

1) Ministry of Labour Gazette, Operatives and ATC Workers in Manufacturing Industries (January and July).

2) Ibid., Percentage Age Distributions of Employees (June or September).

3) Ibid., Average Earnings of Administrative, Technical and Clerical Employees by Industry Group (October).

4) Ibid., Average Weekly Earnings (April and October).

5) Information supplied by the Ministry of Technology.

Notes:

1) Weights are respectively in (a) annual cumulative job creations by region (chapter IV, table II), and in (b) regional cumulative total job creations during each complete period (chapter IV, table II).

2) The earnings adjustment factor for migration policy is defined on the basis of the constant proportion of juvenile manual to adult manual earnings (.46) and employment (.10) (see text, chapter VII).

APPENDIX 4

ASSISTANCE BY INDUSTRY AND LOCALIZATION COEFFICIENTS

Industry	Localization Coefficient 1951	% Total Assistance 1960-61/1965-66
Motor	.40	.32
Engineering and Metal	.37	.33
Textiles and Clothing	.61	.06
Boat Building	.34	.03
Mining, Quarrying, Construction	.36	.02
Food, Drink and Tobacco	.25	.04

Sources:

1) Local Employment Acts: Annual Reports, passim.

2) P. Sargent Florence, Post-War Investment, Location and Size of Plant (Cambridge, University Press, 1962), pp. 38-43.

Note: The table includes only industries for which both location coefficients and assistance were available.

APPENDIX 5

EFFECT OF D OF I POLICY ON PRIVATE CAPITAL FORMATION

PART A: Gross Private Investment Function Tests

Details of the tests employed to determine whether or not D of I policy exerted any net effect on the rate of private capital formation are relegated to this appendix. The tests are designed to yield estimates for the value of ΔI, given that results may be negative, zero or positive depending on the balance of conflicting investment influences in the control and incentive measures of D of I policy.[1]

Methods of Estimation: In an attempt to assess the impact of the possible conflicting forces, two tests are employed, a direct and indirect test.

(a) The direct test is used to begin with. It comprises the insertion of variables representing separately IDC control and investment incentives into the gross private investment function. Significant coefficients on these added variables would provide an indication of the impact of the policy in its negative and positive aspects. The test is direct in the sense that it seeks the explicit effect of policy measures rather than having reliance on indirect inference as to their importance.[2]

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[1] See pages 99-100.

[2] It is not necessary to make an explicit test of the extent to which relocation removed the constraints on development and hence on investment. The test results of the impact of controls and incentives are to be understood as being after the relocation effect, if any, has been taken into account.

As the investment function may assume a variety of a priori forms, the procedure adopted is to find the most satisfactory specifications and to use them as the basis of the test. It is postulated that:

$$I_t = f(Y_{t-n}-Y_{t-n-1}, T_{t-n}, B_{t-n}, C_{t-n}, K_{t-n}, R_{t-n}, E_{1t}, E_{2t}) \quad (1)$$

where I = gross private investment
Y = output
T = profit
B = rate of interest
C = capacity utilization
K = capital stock
R = index of IDC control
E_1 = government expenditure on loans and grants
E_2 = index of impact of tax allowances on the supply price of capital
n = periods of one year

The model embraces all three of the usual investment specifications: the accelerator, capacity and capital stock adjustment models. The change in output in some previous period operates as an expectations variable, as does capacity utilization in the same previous period. The latter, however, may also operate as a measure of the need for a change in capital stock, given expectations as to coming requirements. It is in this sense that capital stock in a previous period may also be important.

In addition to the above variables the model incorporates profit as it may represent either a measure of liquidity or of expectations, or both. The rate of interest is included as a proxy for the cost of capital funds. It may also reflect the state of the economy which would influence capital formation.

Remaining variables are policy variables appended to the model to discover whether or not they make a significant contribution to the explanation of investment behavior.

(b) In light of the measurement weaknesses in the direct approach,[1] an indirect test is used to seek confirmation of the results revealed by the direct test. The indirect approach comprises a test for structural change in the investment function (exclusive of policy measures) as between the periods before and after the introduction of policy measures. The periods thus contrasted are

pre 1960 - 1960 and later

pre 1963 - 1963 and later.

The implicit assumption made here is that, to all intents and purposes, there was no policy before 1960.[2] The slight bias resulting from this assumption is fully recognized.

Structural change, of course, may be attributable to omitted factors other than the policy measures in question. For example, political conditions might have altered affecting the climate of expectations, or other quantifiable independent variables might have been omitted from the tested function. These problems, however, are not regarded as being serious. The change from a Conservative to a Labour government in 1964 might have had some minor effect, but no more, and likely independent

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[1] See pages 221-222.

[2] Evidence to support this assumption has been provided in Chapter 1, p.

variables omitted from the function are omitted only after scrutiny for significance. Even so, the strength of the test lies essentially in its negativity. Indication of the lack of structural change may be taken as evidence of the lack of significant impact of the policy measures introduced in 1960 and 1963.

The test employed is due to Chow.[1] It examines whether two sub-sets of observations belong to the same regression model, viz., the regression model of the total set. There are two cases, both of which are used in this thesis:

(i) when $M > P$

where M = observations in one of the two sub-sets
P = parameters in the regression (P-1 slope coefficients + 1 intercept).

The ratio is taken of the residual sum of squares (adjusted for degrees of freedom) from the regression model of the total set (RSS_n), less the sum of the residual sum of squares (adjusted for degrees of freedom) of each sub-set (RSS_1+RSS_2) to the latter sum.

$$F = \left[RSS_n - (RSS_1+RSS_2)\right]/P \Big/ (RSS_1+RSS_2)/N + M - 2P \qquad (2)$$

where N = number of observations in the sub-set not having M observations.

(ii) when $M \leq P$

$$F = \left[RSS_n - RSS_1\right]/P \Big/ RSS_1/N + M - P \qquad (3)$$

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[1] G.C. Chow, "Tests of Equality Between Sets of Coefficients in Two Linear Regressions," Econometrica, Vol. 28, No. 3 (July 1960), pp. 591-605.

Both ratios are distributed as F under the null hypothesis that

$$B_1 = B_2 = B$$

where B_1 = row vector of coefficients from one sub-set
B_2 = row vector of coefficients from the other sub-set
B = row vector of coefficients from the total set.

In both cases (i) and (ii) it is concluded that structural change has occured if $F > F(P, N+M-2P)$.

Data: All data employed are shown in this appendix, Part B. Annual data are used, running where possible from 1954 to 1965 inclusive, although several regressions are fitted for slightly shorter periods as a consequence of curtailments in some of the series employed.[1] Investment data comprise data for gross manufacturing investment rather than gross private investment, the former being expected to be more sensitive to policy changes than the latter. Both GDP and manufacturing output data were used separately to represent Y. T is represented by retained earnings of manufacturing companies, that is, gross income after interest, dividends and tax, but before depreciation.[2] The rate of interest is measured by a weighted annual average of Bank rate, the weights being monthly levels of Bank rate.

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[1] Use of a Chow test revealed structural change in the investment function as between the pre- and post-1954 periods. Hence 1954 is used as the starting date for fitting an investment function relevant to the period under review.

[2] The figures for T are deflated to constant prices by use of the price index of fixed assets following the procedure in: R. Eisner; "A Distributed Lag Investment Function," Econometrica, Vol. 28, No. 1 (January 1960), p. 4.

The rate of capacity utilization is measured by use of a quarterly index for manufacturing industry constructed on the basis of the Wharton School's "peak interpolation" method.[1] Annual estimates of capacity utilization are derived by straight averaging over quarters. The series runs only from 1956-1967 so that regressions using this variable are necessarily curtailed.

An explicit index of capital stock, while available for the manufacturing sector, is not used due to its high collinearity over time with the investment series. Their common increasing time trend would obscure any meaningful causation which might have existed. Instead, the possible influence of capital stock in previous periods is taken into account in the context of a capital stock adjustment model which may be shown to be equivalent to the normal distributed lag accelerator model of investment. On this basis there is

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[1]The index is Index No. 3 provided by G. Briscoe, P. O'Brien, D.J. Smyth, "The Measurement of Capacity Utilization in the United Kingdom," Manchester School, Vol. 38, No. 2 (June 1970), p. 110.

no need to use the index on capital stock.

As a measure of the application of IDC control, data on refusals could not be used as they extend back only so far as 1960. In their place was used the ratio of approvals in the prosperous and congested regions of the West Midlands and South East to total approvals (measured in terms of square footage approved). The lower the ratio, the more rigorously, it may be assumed, was the policy of control implemented.

If the capital stock adjustment model is of the following form:

$$I_t = a + bkY_{t-n} - bK_{t-1} \ldots \quad (1)$$

where b = reaction coefficient
k = accelerator
Y = output
I = investment
K = capital stock

Then

$$I_{t-1} = a + bk(Y_{t-n-1}) - b(K_{t-2}) \ldots \quad (2)$$

and

$$I_t - I_{t-1} = bk(Y_{t-n} - Y_{t-n-1}) - b(K_{t-1} - K_{t-2}) \ldots \quad (3)$$

so that

$$I_t = bk(Y_{t-n} - Y_{t-n-1}) - b(I_{t-1}) + I_{t-1} \ldots \quad (4)$$

$$= bk(Y_{t-n} - Y_{t-n-1}) + (1-b)I_{t-1} \ldots \quad (5)$$

This formulation may be seen to be equivalent to the normal distributed lag accelerator model using a Koyck lag structure, such that the partial accelerator coefficients decrease in a geometric progression. Thus, if

$$I_t = x_1(Y_{t-n} - Y_{t-n-1}) + x_2(Y_{t-n-1} - Y_{t-n-2}) + x_3(Y_{t-n-2} - Y_{t-n-3}) \ldots \quad (6)$$

and $x_i = x_1 f^{i-1}$ where $0<f<1$, it follows, after multiplying by f, lagging (6) by one period and substracting the result from (6), that

$$I_t = x_1(Y_{t-n} - Y_{t-n-1}) + fI_{t-1} \ldots \quad (7)$$

Then, (7) is equivalent to (5) with bk = x and (1-b) = f.

Item E_1 embraces loans in period t and grants in period t+1 (to account for the usual delay of approximately one year in the payment of investment grants). Computation of the index measuring E_2 is shown in this Appendix, Part C. Since these policy variables may not reflect exactly the impact of policy measures, the indirect test is also used.

Results: Results are presented in turn for the direct and indirect tests:

(a) Direct Test:

Three specifications of the investment function, excluding policy variables, provided a reasonable fit to the data, gauged in terms of the proportion of variance explained (R^2) and both significance and sign expectations as regards the estimated coefficients (b_i). These were:

(1) $I_t = -2267.35+30.69(C_{t-1})+0.39(T_{t-1})$ $\quad R^2$ .964 1957-65
(8.02) (5.65) DW 2.58°

(2) $I_t = -3653.50+49.09(C_{t-1})+13.27(C_t-C_{t-1})$ $\quad R^2$ .876 1957-65
(6.33) (2.23) DW 1.34/

(3) $I_t = +205.60+0.16(Y_{t-1}-Y_{t-2})+0.69(I_{t-1})$ $\quad R^2$ .901 1954-65
(3.52) (5.15) DW 1.48°

where Y = GDP
° = no autocorrelation at the 5% level
/ = autocorrelation test inconclusive at the 5% level
t-values in parentheses.

The interest rate variable (B) proved to be either insignificant or, if significant, of the wrong sign whenever it was included

in any regression.[1]

Of the three models displayed, model 3 was not chosen for use in the direct test, the bias associated with lagged endogenous variables rendering it inappropiate. The possible auto-correlation in the residuals of model 2 was not regarded as sufficient to rule out the model since autocorrelation may result from omitted variables and insertion of the policy variables could remove it.[2]

The results of incorporating the policy variables in models 1 and 2 are shown in Table I.

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[1]This finding is consistent with that of other studies in which the interest rate effect has been found to be swamped by other effects, e.g., D.J. Smyth and G. Briscoe, "Investment Plans and Realizations in UK Manufacturing," Economica, Vol. 36, No. 143 (August 1969), pp. 277-295.

[2]It is possible that equations other than the three identified could, in terms of explained variance, coefficient significance and signs, provide satisfactory explanations of investment with the policy variables included but not with the policy variables excluded. Experiments involving various permutations of variables, however, did not reveal any such equations.

Table I

Determinants of Manufacturing Investment 1957-1965

1) Constant	C_{t-1}	T_{t-1}	R_t	R_{t-1}	E_{1t}	E_{2t}		
a) -2810.12	+28.94*	+0.67*		+140.54	-2.44+	+452.96+	R^2	.986
	(6.27)	(4.62)		(0.52)	(1.39)	(0.85)	DW	2.47o
b) -2985.96	+30.09*	+0.54*	-357.66+		-2.28+	+780.47+	R^2	.991
	(8.07)	(4.03)	(1.36)		(1.65)	(1.98)	DW	2.99o
c) -2308.39	+30.95*	+0.40*	+33.93				R^2	.964
	(6.64)	(4.09)	(0.13)				DW	2.45o
d) -2766.45	+27.02*	+0.52*				+743.16+	R^2	.977
	(6.80)	(5.43)				(1.70)	DW	2.40o
e) -2437.52	+31.32*	+0.45*		+209.07			R^2	.968
	(7.79)	(4.53)		(0.79)			DW	2.31o
f) -2405.41	+30.76*	+0.57*			-2.71+		R^2	.977
	(9.13)	(4.59)			(1.65)		DW	2.39o

2) Constant	C_{t-1}	$C_t - C_{t-1}$	R_t	R_{t-1}	E_{1t}	E_{2t}		
a) -3021.89	+44.61*	+12.32		-492.24+	-0.28+	-59.39	R^2	.916
	(2.55)	(1.00)		(0.77)	(0.06)	(0.04)	DW	1.62o
b) -3498.94	+47.71*	+8.13	-910.18+		-1.63+	+245.19+	R^2	.953
	(3.69)	(0.91)	(1.86)		(0.44)	(0.25)	DW	2.60o

It is not necessary to show further results for model 2. Policy variables never reach significance and $C_t - C_{t-1}$ retains significance in only one instance.

* = significant at the 5% level at least
\+ = wrong sign
o = no autocorrelation at the 5% level
t-values in parentheses.

Autocorrelation disappears from model 2 when the policy variables are added but the model degenerates, $C_t - C_{t-1}$ losing significance. It is also seen that significance is never achieved for a policy variable and in several cases the sign is contrary to theoretical expectation. On the basis, therefore, of the test employed here it is not possible to conclude that the measures taken as regards control and inducement had any significant impact on manufacturing investment during the periods under review. As manufacturing is expected to be more sensitive than total private investment, it follows that no significant impact was likely to have occurred in respect of private investment as a whole.

(b) Indirect Test:

All three investment models were subjected to the indirect test. This was considered to be justified in the case of model 3 on account of the fact that minor bias in the coefficients would not prejudice the outcome of a test comparing residuals. Inclusion of model 3, moreover, allowed the test to be conducted over a slightly more extended period. The results are displayed in table II.

Table II:

Results of Chow Tests for Structural Change

	F(P, N+M - 2P)	1960 - POLICY BREAK - 1963	
Model 1	9.28	3.04	0.81
Model 2	9.28	2.94	0.80
Model 3	4.76	3.76	1.02

No structural change is revealed in the comparison between the sub-periods pre-1960 and 1960-1965, nor in the comparison between sub-periods pre-1963 and 1963-1965. In the case of every model, the test comes closer to revealing change with respect to 1960. Absence of apparent structural change in the investment functions does not say that the policy measures had no effect on investment during the period under review. However, it is concluded that, if there did occur some effect, it was sufficiently minor as not to warrant inclusion in an analysis of this kind. The results of the indirect test confirm those of the direct test. No value for ΔI is, therefore, included in the analysis.

PART B: Gross Private Investment Function Tests (data)

	(1) I	(2) Y_m	(3) Y_g	(4) T	(5) B	(6) C	(7) R	(8) E_1	(9) E_2
1952	713	81.2	19497	518	3.8				
1953	693	86.6	20396	593	3.8		.309		
1954	732	93.5	21163	728	3.2		.288		
1955	792	99.5	21895	797	4.3		.318		
1956	925	99.1	22257	767	5.4	95.42	.323		
1957	978	101.3	22682	780	5.5	94.99	.234	2.1	1.00
1958	922	100.0	22740	824	5.3	91.25	.316	3.0	1.00
1959	871	106.0	23702	954	4.0	94.66	.341	4.8	1.00
1960	1016	114.6	24888	1007	5.8	99.36	.310	21.9	1.00
1961	1195	114.8	25732	975	5.6	96.28	.241	16.8	1.00
1962	1098	115.3	25920	970	4.9	93.55	.266	10.2	1.00
1963	964	120.0	27034	1135	4.0	94.13	.253	21.3	0.94
1964	1078	129.5	28601	1126	5.0	98.51	.195	21.5	0.94
1965	1176	133.8	29231	1108	6.4	99.28	.176	31.2	0.94

where I = Investment (£m., 1958 prices)
Y_m = Manufacturing Output (1958 = 100)
Y_g = GDP (£m., 1958 prices)
T = Profit (£m., 1958 prices)
B = Bank Rate (annual averages)
C = Capacity (annual averages)
R = IDC Control (000 square feet)
E_1 = Incentives (£m.)
E_2 = Incentives (1958 = 100).

Sources:

(1) CSO, National Income and Expenditure, London, HMSO (1959), table 50, p. 52; (1966), table 58, p. 71.

(2) CSO, Annual Abstract of Statistics, London, HMSO (1961), table 155, p. 133; (1967), table 156, p. 136.

(3) National Income and Expenditure, op. cit. (1966), table 14, pp. 16-17.

(4) CSO, Statistics on Incomes, Prices and Productivity, London, HMSO (1959), table 55, p. 68; (1967), table 58, p. 71.

(5) Calculated from Annual Abstract of Statistics, op. cit. (1960), table 333, p. 279; (1969), table 365, p. 335.

(6) Calculated from Briscoe et al., op. cit., index $w/_t$, p. 110.

(7) Local Employment Acts 1960 and 1963, Annual Report 1965, op. cit., Appendix 4, table 1, p. 14; information supplied by the Board of Trade.

(8) Seventh Report of the Estimates Committee, op. cit., p. 166; Civil Appropiation Accounts, Vote for Promotion of Local Employment 1960-1961 to 1965-1966.

(9) This Appendix, part C.

Note: 1965 Index Number of IDC control relates to April 1965-March 1966, not the calendar year 1965.

PART C: Impact of "Development District" Tax Allowances on the Supply Price of Capital (E_2)

Before 1963 investment in "development districts" received no special depreciation allowances against tax. From 1963, assuming a plant life of fifteen years and a cost of capital rate of 8%,[1] the present value of initial (10%) and annual (20%) depreciation allowances available outside "development districts" on plant and machinery investment is calculated, as a proportion of investment cost, to be as follows:

1963	1964	1965
44.80	46.38	33.34

These figures vary with the changing tax rate on corporate profits: 53.75% (1963), 56.25% (1964), 40% (1965). The comparable value for "free depreciation" in "development districts" is calculated to be:

1963	1964	1965
48.38	50.63	36.00

Assuming that of total industrial investment undertaken, plant and machinery investment represents 75% and building 25%,[2] the ratio of total investment allowances outside to those inside "development districts" is established. This gives the index E_2:

1960	1961	1962	1963	1964	1965
1.00	1.00	1.00	0.94	0.94	0.96

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[1] The latter figure derives from the work of A.J. Merrett and A. Sykes, op. cit., p. 38.

[2] Proportions used by P.A. Bird and A.P. Thirlwall, "The Incentive to Invest in the New Development Areas," District Bank Review, No. 75 (September 1967), pp. 3-23.

APPENDIX 6

EFFECT OF D OF I POLICY IN AVOIDING DEFLATION

PART A: Phillips Curve Test

Determination of the effect of D of I policy on the aggregate Phillips Curve is relegated to this appendix. The test is designed to show whether D of I policy, to the extent that it narrowed the dispersion of regional unemployment rates, exerted any dampening influence on the rate of income inflation. If it did, it may be concluded that the policy prevented some loss of economic growth which might have had to be incurred in order to avoid further inflation.

Method of Estimation: The procedure is to insert a measure of regional unemployment rate dispersion into the conventional equations of the aggregate Phillips Curve to determine whether dispersion operated as a significant factor shifting the position of the curve. Thus, the following function is tested under different lag structures, functional forms and with alternating variable omissions:

$$\dot{W}/_{W} \text{ or } \dot{E}/_{E} = f(\dot{P}/_{P}, \dot{\bar{u}}, \dot{\bar{u}}/_{\bar{u}}, v) \qquad (1)$$

where: $\dot{W}/_{W}$ = proportionate change in the index of wage rates
$\dot{E}/_{E}$ = proportionate change in hourly earnings
$\dot{P}/_{P}$ = proportionate change in the index of retail prices
$\bar{u}$ = aggregate average unemployment rate
$\dot{\bar{u}}/_{\bar{u}}$ = proportionate rate of change of the unemployment rate
v = coefficient of variation of regional unemployment rates weighted by the proportion of the total national labor force which is in region r.

The function is tested over the period 1960 to 1969, there being an extension of the period beyond 1966 to account for the fact that the benefits of D of I policy are estimated over three years after the incurrence of expenditure.

In order to avoid the simultaneous equation bias associated with the undoubted interdependency between $\dot{W}/_W$ or $\dot{E}/_E$ and $\dot{P}/_P$ the two-stage least squares method is employed in testing the function. To this end, it is postulated that:

$$\dot{P}/_P = f(\dot{W}/_W \text{ or } \dot{E}/_E, \bar{u}, \dot{I}/_I, \dot{X}/_X) \qquad (2)$$

where $\dot{W}/_W$, $\dot{E}/_E$ and $\bar{u}$ are as defined previously

$\dot{I}/_I$ = proportionate change in the index of import prices

$\dot{X}/_X$ = proportionate change in productivity (GDP ÷ employees in employment) 1

The fitted reduced form equation of function 2 representing the first stage of the two-stage procedure varies in accordance with the independent variable to be omitted from the fitted structural form equation for function 1 at the second stage.

Data: In order to augment the number of observations available for the period, all rate of change variables are overlapping annual changes such that

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[1] When certain variables are omitted from function 1, the system is over-identified. Also, when no variables are omitted it is over-identified. The method of two-stage least squares has been shown to be equally applicable to over-identified as to just-identified equations of multiple equation models. See, for example, W.C. Merrill and K.A. Fox, Economic Statistics (New York, John Wiley & Sons, 1970), pp. 558-563.

$$\dot{W}/_{W} = \frac{W_t - W_{t-1}}{W_{t-1}} \quad \text{and} \quad \dot{E}/_{E} = \frac{E_t - E_{t-1}}{E_{t-1}}$$

where t = April or October
$t-1$ = previous April or October

and corresponding variables ($\dot{P}/_{P}$, $\dot{\bar{u}}/_{\bar{u}}$, $\dot{I}/_{I}$, and $\dot{X}/_{X}$) are equivalently defined.

The unemployment variable ($\bar{u}$) is defined as the average rate for April-March and October-September. The dispersion variable (v) is computed as the coefficient of variation of regional unemployment rates with deviations from the national average weighted by the proportion of total employees in region r. This is to account for the likelihood that the larger the region, the greater its effect on the overall rate of increase of income. Thus

$$v = \sigma/\bar{u}$$

where $\sigma = \sqrt{\Sigma fr(u_r - \bar{u})^2/N}$

fr = proportion of the total labour force (by mid-year estimates) in region r.

As the regions for which unemployment data were given varied over the period under review, it was necessary to effect adjustments before computing v. Classification changes occurred with respect to the regions covering Yorkshire and Midlands. Thus these areas were compressed into one, a consolidated unemployment rate being derived by use of information on total numbers of unemployed and total labor force in each sub-part of the compressed region. As the regional proportion of total employees varied so marginally over the period 1960-1969, a general average was used for

each year. Where index numbers were used for the above series it was necessary to splice together indices with different base dates in order to secure a consistent index over the whole period under review. All data used are displayed in this Appendix, Part B.

Results: In preliminary single-stage investigations function 1 was tested under non-lagged and lagged (one period) structures, in linear and non-linear ($\bar{u}^{-1}$) form with respect to $\bar{u}$ and with different permutations of variable inclusions. The findings which emerged from the experiments were that:

(a) in terms of the total number of variables which were significant and hence also in terms of R^2, the unlagged form was uniformly superior to the lagged.

(b) combinations of lagged $\dot{P}/_P$ with other variables unlagged and of unlagged $\dot{P}/_P$ with other variables lagged failed to improve on the pure, unlagged form.

(c) non-linearity in $\bar{u}$ allowed no effective improvement in results.

(d) $\dot{E}/_E$ proved to yield consistently better results than $\dot{W}/_W$. Two-stage results in table I are accordingly reported for $\dot{E}/_E$, unlagged and both linear and non-linear in $\bar{u}$.

The results indicate that what Archibald called the "intruder" variable ($\dot{\bar{u}}/\bar{u}$) cannot be banished from the function without markedly reducing the proportion of explained variance.[1]

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[1]Archibald, "The Phillips Curve . . .," op. cit., p. 129.

Table I:

Phillips Curve Coefficients Estimated by Two-Stage Least Squares

	Constant	$\dot{P}/P$	$\bar{u}$	$\dot{\bar{u}}/\bar{u}$	$\bar{u}^{-1}$	v	
(1)	+6.24	+1.03*	-1.23	-0.06*		-0.05+	R^2 .813
		(1.87)	(0.98)	(4.24)		(0.19)	DW 1.58°
(2)	-1.30	+1.43*		-0.05*		+0.18	R^2 .801
		(3.76)		(5.11)		(1.66)	DW 1.47°
(3)	+4.84	+1.19*	-1.19*	-0.04*			R^2 .819
		(3.01)	(2.33)	(4.55)			DW 1.31/
(4)	-9.72	+1.36*	+0.85+			+0.59*	R^2 .529
		(3.25)	(0.74)			(2.87)	DW 1.21/
(5)	+2.19	+0.91		-0.06*	+5.27	-0.09+	R^2 .819
		(1.58)		(4.48)	(1.19)	(0.37)	DW 1.66°
(6)	+1.70	+0.85*		-0.05*	+3.63		R^2 .778
		(2.13)		(6.37)	(1.76)		DW 1.30°
(7)	-8.72	+2.22*			-7.33+	+0.69*	R^2 .574
		(3.64)			(1.70)	(3.32)	DW 1.13/
(8)	+19.12		-2.94*	-0.07*		-0.40+*	R^2 .767
			(3.50)	(6.06)		(2.15)	DW 1.46°
(9)	+9.53		-1.34*	-0.05*			R^2 .695
			(2.15)	(5.64)			DW 0.95/

* = significant at the 5% level at least
\+ = wrong sign
° = no autocorrelation at the 5% level
/ = autocorrelation test inconclusive at the 5% level
t-values in brackets.

Although this is contrary to Archibald's results, it is consistent with those of Cowling and Metcalf who investigated a regional Phillips Curve over a similar but not identical

period using, as is done here, $\dot{E}/_E$ as the dependent variable.[1] Similarly, $\dot{\bar{u}}/_u$ would appear to be something of a substitute for $\bar{u}$ as it is in the work of Cowling and Metcalf.[2]

In line with a finding common to numerous other studies, $\dot{P}/_P$ plays a consistently significant role as an independent variable.[3] The main conclusion, however, to be drawn from the results is that while there is ample evidence of the existence of an aggregate Phillips relation during the period 1960-1969, the dispersion of regional unemployment rates cannot be said to have been of any importance.

The significance of $\bar{u}$ and $\bar{u}^{-1}$ in four of the equations in which they appear testifies to the likely existence of the Phillips relation. In four of the six equations in which v occurs it displays either non-significance or a sign contrary to theoretical expectations, or both. In the two equations (4) and (7) in which it is significant with the correct sign, a significant Phillips Curve is lost. And when $\bar{u}$ is omitted so that v picks up most of its effect (equation (2)), the coefficient on the latter, though having the correct sign, is still not significant.

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[1] K. Cowling and D. Metcalf, "Wage-Unemployment Relationships: A Regional Analysis for the UK 1960-1965," Bulletin of the Oxford University Institute of Economics and Statistics, Vol. 29, No. 29 (February 1967), pp. 31-40.

[2] Ibid.

[3] See, for example, Archibald, "The Phillips Curve . . .," passim; and A.P. Thirlwall, "Demand Disequilibrium in the Labour Market and Wage Rate Inflation in the UK," Yorkshire Bulletin of Economic and Social Research, Vol. 21, No. 1 (May 1969), pp. 66-76.

While there remains some collinearity between $\bar{u}$ and v as evidenced by the variability of coefficients when one or the other is omitted from the function, it is not regarded as preventing the above conclusions being drawn. This is because when v is given maximum chance to display significance, viz., when $\bar{u}$ is omitted in equation (2), the result confirms that derived from the other equations; the spread of regional unemployment rates does not appear to have exerted a significant impact on the rate of earnings inflation. In light of this finding no value for item ΔE is included in the estimates of policy benefits.

PART B: Phillips Curve Test (data)

	(1) $\dot{E}/E$	(2) $\dot{W}/W$	(3) $\dot{U}/U$	(4) $\dot{I}/I$	(5) $\dot{X}/X$	(6) $\dot{P}/P$	(7) $\bar{u}$	(8) v
059-060	.0835	.0290	-.211	-	.015	.018	1.75	.189
A60-A61	.0709	.0339	-.167	-.009	.027	.027	1.56	.169
060-061	.0688	.0439	.067	-.029	.047	.039	1.49	.164
A61-A62	.0517	.0362	.333	-.019	-.010	.057	1.58	.164
061-062	.0425	.0372	.375	-	-.001	.029	1.89	.155
A62-A63	.0416	.0389	.350	.010	.013	.021	2.41	.151
062-063	.0420	.0290	-.045	.040	.032	.023	2.60	.160
A63-A64	.0701	.0411	-.333	.039	.067	.020	2.15	.185
063-064	.0794	.0535	-.286	.019	.042	.041	1.80	.196
A64-A65	.0791	.0417	-.167	.009	.036	.056	1.55	.197
064-065	.0977	.0458	-.067	-	.033	.048	1.43	.190
A65-A66	.0963	.0290	-.133	.028	.014	.036	1.36	.183
065-066	.0590	.0418	.357	.009	.019	.038	1.33	.183
A66-A67	.0229	.0496	.846	-.018	.034	.030	1.80	.138
066-067	.0482	.0511	.263	.019	.030	.020	2.33	.121
A67-A68	.0794	.0754	.042	.130	.030	.044	2.42	.124
067-068	.0712	.0523	-	.118	.028	.056	2.45	.128
A68-A69	.0701	.0505	-.040	.025	.093	.055	2.43	.134
068-069	.0774	.0538	.042	.049	.014	.054	2.42	.139

Sources:

(1) Ministry of Labour Gazette, Earnings Surveys for April and October (twice yearly).

(2) CSO, Monthly Digest of Statistics, London, HMSO, Index Numbers of Basic Weekly Wage Rates (monthly).

(3) Ibid., Registered Unemployment for G.B. (monthly).

(4) Ibid., Index Numbers of Import Unit Values (monthly).

(5) Statistics of Incomes, Prices, Employment and Productivity, table A.1 (monthly); Monthly Digest of Statistics, Working Population (June).

(6) Ibid., Index of Retail Prices (monthly).

(7) Ibid., Registered Unemployment for G.B. (monthly).

(8) Ibid.; also derived from Ministry of Labour Gazette Regional Unemployment Tables (monthly).

Note: $\dot{X}/X$ relates to first and third quarters rather than April (A) and October (O).

APPENDIX 7

PUBLIC OVERHEAD INVESTMENT AS PART OF D OF I POLICY (DATA)

	1962-63			1964-65	
	H and E/ R and T (£ per capita)	Density (persons per acre)		H and E/ R and T (£ per capita)	Density (persons per acre)
North	9.63	0.69	North	12.69	0.69
E,WR	9.65	1.67	Y,H	13.96	1.34
NM	8.06	0.92	EM	15.48	1.07
E	11.35	0.83	EA	17.60	0.49
L,SE	7.13	4.18	SE	15.23	2.48
South	12.36	1.18	SW	13.28	0.61
SW	9.38	0.59	Wales	21.67	0.52
Wales	10.56	0.52	WM	16.46	1.53
Mid.	12.84	1.52	NW	13.01	3.38
NW	10.51	3.37	Scot.	24.47	0.27
Scot.	16.30	0.27			
	1963-64			1965-66	
North	11.49	0.69	North	14.20	0.69
Y,H	10.69	1.33	Y,H	16.94	1.35
EM	13.45	1.06	EM	15.47	1.09
EA/SE	12.39	1.84	EA	18.82	0.50
SW	11.19	0.60	SE	17.94	2.50
Wales	14.49	0.52	SW	16.43	0.61
WM	14.42	1.52	Wales	19.24	0.52
NW	12.32	3.36	WM	20.24	1.55
Scot.	22.48	0.27	NW	14.37	3.40
			Scot.	28.65	0.27

For sources and notes, see over.

Sources:

Investment: 1962-63, Abstract of Regional Statistics (ARS) (1965), table 17, p. 25.

1963-64, National Plan, pp. 98-99.

1964-65, ARS (1966), table 19, p. 29.

1965-66, ARS (1967), table 22, p. 30.

Population: ARS (1965), table 1, pp. 6-7; (1966), table 1, pp. 6-7; (1967), table 1, pp. 6-7.

RGO, Registrar General's Statistical Review of England and Wales, London, HMSO, selected references.

Acreage: ARS (1965), table 1, pp. 6-7; (1966), table 1, pp. 6-7.

Notes:

1) H and E = investment in housing and environment; R and T = investment in roads and transport.

2) Differences in regional definition after 1962-63 reflect the administrative switch to new standard regions (NSRs) in 1963, e.g., Yorkshire region = E,WR (before 1963), Y,H (after 1963).

3) The two NSRs of East Anglia and the South East were combined in 1963-64.

APPENDIX 8

MIGRATION FORESTALLED BY D OF I POLICY

PART A: Outmigration Propensity of the Unemployed (ϕr) (Data)

$$\phi_r = 2\left[1 - B(x) + B(2x)\right]$$ where B = percentage unemployment rate
$x = \phi_r/2$.

		North	Y,H	NW	SW	Wales
Outmigration rate to other GB regions of economically active workforce (annual average 1961-1966)	(A)	.013	.010	.008	.015	.012
% Unemployment rate (annual average 1961-1966)	(B)	.034	.014	.022	.017	.029

Sources:

(A) calculated from annual average workforce (ARS (1969), table 9, p. 13) and annual average economically active migrants to other regions of GB (Census of Population 1966, Migration Tables, table 6, pp. 180-202).

(B) calculated from ARS (1969), table 9, p. 13, table 13, p. 19.

PART B: Population Density and Public Investment (Data)

Per Capita Public Construction (£)

(density data as in Appendix 7)

1962-63		1963-64		1964-65		1965-66	
North	16.9	North	16.9	North	19.3		21.2
E,WR	14.9	Y,H	15.2	Y,H	21.1		24.0
NM	12.3	EM	16.8	EM	21.1		20.4
E	17.3	EA/SE	16.6	EA	24.6		27.3
L,SE	14.0	SW	14.9	SE	21.7		24.6
South	20.8	Wales	18.4	SW	19.3		22.4
SW	15.3	WM	18.3	Wales	24.8		27.9
Wales	16.1	NW	16.3	WM	22.6		26.7
Mid.	17.7	Scot.	27.4	NW	19.2		21.0
NW	15.8			Scot.	32.5		37.6
Scot.	23.1						

Sources: as for investment data, Appendix 7.

Note: data exclude expenditure on factory construction under D of I policy as this is taken into account separately under ΔG in the cost-benefit analysis.

APPENDIX 9

TAX AND NATIONAL INSURANCE CONTRIBUTIONS FOR FAMILY WITH TWO CHILDREN

(£p.a.)	Income Range (1960 prices)				
	559-675	676-815	816-987	988-1195	1196-1447
1961	106.8	129.6	158.0	202.5	220.9
1962	95.8	120.8	145.7	187.3	211.1
1963	109.9	125.3	153.9	174.9	221.4
1964	112.0	130.4	144.2	186.3	215.2
1965	100.3	116.5	151.7	174.8	229.6
1966	121.4	151.0	149.9	193.6	236.4
1967	119.1	134.0	152.0	187.5	224.0
1968	131.3	108.1	150.8	166.8	232.3
Annual Average	107.3	123.6	152.0	184.2	223.9

Sources:

1) "The Incidence of Taxes and Social Benefits," Economic Trends, No. 124 (February 1964), pp. xiii-xv; No. 154 (August 1966), pp. xiv-xv; No. 172 (February 1968), pp. xxviii-xxix; No. 184 (February 1969), p. xxiii; No. 196 (February 1970), p. xxix.

Notes:

1) 1960 data not available.

2) 50% indirect taxes assumed to have been paid even when the head of the family is, as here, unemployed.

APPENDIX 10

ESTIMATED PER CAPITA UNEMPLOYMENT BENEFITS

	(a) Total Unemployment Benefit Paid (£m)	(b) National Assistance for Unemployed (£m)	(c) Persons Receiving Benefit (000s)	(a+b)/c Average Benefit per person unemployed (£)
1960-61	33.8	23.0	213	266
1961-62	41.2	22.4	209	304
1962-63	69.7	32.2	281	363
1963-64	70.5	37.0	390	276
1964-65	50.0	30.4	220	365
1965-66	55.2	28.2	188	444
1966-67	85.4	32.2	208	565
1967-68	130.2	65.1	361	541
1968-69	137.4	79.0	331	654

Sources:

1) Monthly Digest of Statistics, (May 1969), Supplementary table B, pp. 8-9.

2) Annual Abstract of Statistics, (1969), table 50, p. 56.

Note:

1) Column (c) taken as average of quarterly data, year t (Quarter 2) - year t+1 (Quarter 1) inclusive.

APPENDIX 11

INTER-REGIONAL DIFFERENCES IN FEMALE PARTICIPATION RATES AND FEMALE UNEMPLOYMENT RATES 1960-1967

1) Female Participation Rates:

Comparison of Wales and West Midlands Regions

	Wales	(%)	WM	
1960	.262		.418	
1961	.264		.419	
1962	.272		.424	
1963	.275		.420	
1964	.285		.433	
1965	.294		.431	
1966	.299		.436	t = 17.7
1967	.288		.421	significant difference at
Mean	.280		.525	99% level of confidence

Source:

1) ARS (1965), table 6, pp. 10-11; (1969), table 11, p. 17.

2) Female Unemployment Rates:

Comparison of Scotland and South East Regions

	Scotland	(%)	SE	
1960	.028		.007	
1961	.025		.007	
1962	.028		.008	
1963	.034		.009	
1964	.028		.006	
1965	.023		.005	
1966	.020		.005	t = 13.0
1967	.026		.007	significant difference at
1968	.022		.006	99% level of confidence
Mean	.026		.006	

Source:

1) ARS (1969), table 13, p. 19.

APPENDIX 12

DESTINATION/ORIGIN PROBABILITIES OF MIGRANTS UNDER RESETTLEMENT TRANSFER SCHEME (RTS)

(Average Proportions 1965-1966 and 1966-1967)

To \ From	North	Y,H	L,SE	SW	Wales	Mid.	NW	Scot.
North	10.5	4.6	3.4	0.5	0.4	2.5	2.9	1.8
Y,H	14.9	38.6	2.8	3.2	4.7	10.6	3.4	6.2
L,SE	35.9	23.2	72.8	42.9	32.4	28.2	23.2	24.8
SW	1.5	2.6	2.2	33.5	16.7	12.8	2.9	1.2
Wales	0.3	1.2	1.3	2.6	18.6	4.0	0.7	-
Mid.	29.5	22.2	11.7	10.2	14.4	32.5	14.4	38.2
NW	5.4	6.9	4.5	6.3	12.7	5.4	51.3	3.3
Scot.	2.0	0.7	1.3	0.8	0.1	4.0	1.2	24.5
	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: calculated from information supplied by the Department of Employment and Productivity.

APPENDIX 13

ESTIMATED ADMINISTRATIVE COST OF MIGRATION POLICY (RTS)

	(a) Ministry of Labour Admin'n. Cost £000	(b) Ministry of Labour Expend're less (a) £000	(c) Estimated RTS Expend're £000	(d) (c) as % of (b)	(e) Period Average	(f) Estimated Admin've. Cost of RTS (a) x (e) £000
1960-1	18398	8921	131	1.5	1.6	294.4
1961-2	18589	10231	166	1.6		297.4
1962-3	18988	10908	181	1.7		303.8
1963-4	20180	13172	254	1.9	2.0	403.6
1964-5	21344	15013	334	2.2		426.8
1965-6	22367	17516	343	2.0		447.3

Sources:

1) Columns (a) and (b): Civil Appropiation Accounts, Class VI, Vote 8 1960/1-1961/2, Class IV, Vote 6 thereafter.

2) Column (c): estimated from information supplied by the Department of Employment and Productivity.

APPENDIX 14

STRUCTURAL ADJUSTMENTS IN THE OBJECTIVE FUNCTION

Group Distribution of Policy Benefits

	1st Period	2nd Period
Total Range		
Group 1 weight	1.72-6.16	4.36-15.05
Group 3 weight	-0.93-0.91	-4.24- 0.60
Equity premium	0.27-1.85	1.05- 5.04
Balance premium	0.40-3.55	1.88- 9.65
Intermediate Range		
Group 1 weight	4.52-5.51	10.67-13.37
Group 3 weight	-0.69-0.57	-0.15-_3.61
Equity premium	1.97-3.10	3.70- 4.47
Balance premium	1.35-1.62	5.41- 8.49

Note: 25% - 8% division of subsequent round benefits in original regions and other regions.

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