

Reconciling Practice with Theory in the Micro-Evaluation of Regional Policy

Colin Wren

Economics, Business School

3rd Floor, Ridley Building

University of Newcastle upon Tyne,

Newcastle upon Tyne, NE1 7RU, UK

Abstract: This paper seeks to reconcile evaluative practice with theory, focusing on the micro-evaluation of UK regional industrial policy. Two issues are examined: the measurement of the pecuniary external effects, including displacement and linkages; and the concept of ‘additionality’, which is central to the industrial survey approach. It argues that current evaluative practice is at odds with theory, but while Cost-Benefit Analysis simplifies the measurement of the external effects, it has other features that may limit its appeal. On ‘additionality’, the paper traces its evolution, and shows that it is a multi-dimensional concept. It argues that in practice the use of ‘additionality’ is deficient as it ignores the firm’s private funds and all forms of deadweight transfers.

Key words: Evaluation; regional policy; external effects; Cost-Benefit Analysis; and ‘additionality’.

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1: Introduction

Evaluation is of interest as it is an important tool in the allocation of scarce resources. It not only helps determine the nature of programmes and ensures efficiency or ‘value for money’ in public expenditure, but it serves to support other objectives, such as the accountability of public bodies (Batterbury, 2006). A striking feature of evaluation is the ‘gap’ that exists between the practice and the theory of evaluation, as given by the extensive literature on appraisal and Cost-Benefit Analysis (e.g. Boardman *et al*, 2006). It reflects the development of these as independent exercises, although it is not unique to Economics, as Cullis and Jones (1998) point to a similar ‘gap’ between the practice and theory of taxation. In practice, evaluation is often empirically-driven, but theory is important in providing a foundation and framework, and informing on what needs to be done.¹ It can also help to clear up some of the misunderstandings and misconceptions that characterise current practice.

This paper examines the evaluation of regional industrial policies, focusing on those evaluations carried out at the microeconomic level – i.e., micro-evaluation – and drawing on the evaluation and economic appraisal literatures. Taylor (2002) reviews the methodological approaches that have been used to evaluate UK regional policy, and shows that for the past 20 years it has mainly been evaluated using micro-based approaches (Nicol, 1982, reviews earlier macro-methods at the European level). There are good reasons for this, including a smaller level of expenditure that is applied at a sub-regional scale in spatially-fragmented areas, for which aggregate data are difficult to obtain. The main method is the industrial survey approach, in which the responses of the managers of firms to carefully-constructed questionnaire surveys are used to attribute the policy effect (e.g., King 1990).²

Central to the survey approach is the concept of ‘additionality’, which is the extent to which policy induces a change for the better in a supported project, either in scale, location or timing (Lenihan, 1999). It is increasingly used in European regional policy evaluation (e.g., Florio, 2006), but as if to indicate the ‘gap’ between practice

and theory, it neither features in Cost-Benefit Analysis - or Economics more generally - nor in the US policy evaluation literature. This discrepancy is puzzling and non-trivial, as 'additionality' is recommended practice in the Central Government 'Green Book' on evaluation (HM Treasury, 2003a, Annex 1), while some UK agencies have issued extensive guidelines, e.g., English Partnerships (2004). More fundamentally, Swales (1997) and Honohan (1998) both argue for a different approach to evaluation, based on Cost-Benefit Analysis. It potentially offers a sounder basis for the evaluation of regional policy in terms of its final impact and contribution to social welfare.

The purpose of this paper is to explore the relationship between the practice and theory in the micro-evaluation of regional policy. At a general level, it seeks to demonstrate how an evaluation based on Cost-Benefit Analysis would proceed and how it differs from current practice (section 3). At a more specific level, it considers the theoretical foundations for 'additionality', and shows that in current useage it does not guarantee 'value for money' (section 4). Before this, a simple model of evaluation is outlined, which is based on evaluation practice (section 2), while conclusions are drawn in section 5. The evidence is based on the UK regional policy experience, but the arguments are applicable to other countries and to other instruments.

2: The 'Logic Model' of Evaluation

Evaluation is "[t]he systematic and objective assessment of an on-going or completed project, programme or policy, its design, implementation and results" (DAC, 2002, p. 22). Figure 1 postulates a 'logic model', drawn from evaluation practice, which shows a chain of cause-and-effect for a single intervention, running from the *input* to *output*, to *outcome* and to *impact*. It both offers a useful framework and draws attention to the terminology, over which there is confusion in the literature (QAG, 2003).³

In essence, the *input* is the intervention, which is measured in either financial or opportunity cost terms. Via a set of activities, which can be viewed as a production process, this generates the *output*. However, the key issue is that not all of the output produced may be attributable to the intervention, as it might have occurred in some form, location or timeframe in its absence. In principle, it is possible to identify (but not to observe) the counter-factual output that would have occurred in the absence of the public support – known as the without-policy or without-subsidy position – and

this is shown in Figure 1. The difference between this and the observed output is the *outcome*, which is that part of the observed output due to the intervention.

The *outcome* is the short-run effect occurring in the market directly affected by the intervention, whereas the *impact* is the longer-run economy-wide effect across all markets, including the direct market. It is the impact that is ultimately of interest in determining whether an intervention has improved social welfare, and hence if it is worthwhile (for which the outcome might give an important clue). In addition to the outcome, the impact takes account of the following kinds of external effect:⁴

- *Displacement*: Effects occurring elsewhere in the direct markets (input and output markets) from the displacement of activity;
- *Linkage*: Effects in related markets, occurring ‘vertically’ in production (backwards or forwards) or ‘horizontally’ in consumption;
- *Feedback*: Longer-run effects in the direct market arising from the linkage effects and broader macroeconomic feedback effects; and
- *Multiplier*: Effects in subsequent periods from increased factor incomes.

The ‘logic model’ suggests two kinds of evaluation. The first focuses on the *outcome* and is a ‘bottom-up’ approach using micro data and techniques, such as the industrial survey. The second examines the *impact* and is a ‘top-down’ aggregate-level method, such as for a region. The model is important in drawing attention to the several issues that bedevil evaluation practice. One is the reconciliation of the results from the micro and macro approaches, i.e., the *outcome* and *impact*, and the other is the difficulty in micro-evaluation of moving from *output* to *outcome*. These are now explored.

2.1 *The Link between Outcomes and Impacts*

In context of European Union Cohesion policy, Bradley *et al* (2005) argue that the evaluation challenge is to reconcile the results from the macro- and micro-approaches. This is difficult, as the two approaches use different methodologies with respect to the methods of data collection, techniques for data analysis and tools on which to base the judgement (Tavistock Institute with GHK and IRS, 2003). More fundamentally, the approaches are undertaken according to different objectives, which for the outcomes and impacts are known as the *specific* and *global objectives* respectively (see Figure 1

and EC, 2000). In general, the two kinds of objective should be consistent, so that the achievement of the specific objective should lead naturally to the accomplishment of the global objective. In practice, there may be several instruments in support of the same global objective, each with their own specific objective.⁵

The nature of the specific and global objectives makes the comparison of the results from micro and macro-evaluation approaches difficult to reconcile. It requires knowledge of the external effects identified above, and time lags involved, but which ultimately may be unbridgeable due to the ‘aggregation problem’. Many micro-evaluations do not even consider the external effects, in which case it is a matter of deductive belief that with the passage of time a positive outcome will lead naturally to a positive impact. Even where reconciliation is not the aim, Baslé (2006) argues that it is useful to collect information on the external effects, as it not only indicates how policy works, but it helps confer plausibility on the evaluation results.

An interesting feature of the UK regional policy evaluation is that both the micro and macroeconomic approaches have tended to evaluate policy in terms of the specific objective of job creation (see King (1990) for a ‘bottom-up’ micro study and Gillespie *et al* (2001) on the ‘top-down’). There have been very few UK evaluations undertaken relative to the global objective of reducing regional disparities. A reason for this might be because the global objective is closely tied to political objectives, and varying between administrations, whereas the grant objective has been essentially unchanged since the grants were introduced in the early 1970s.

2.2 *The Link between Outputs and Outcomes*

The more usual ‘black-box’ in evaluation is the link between the inputs and outputs. This can be viewed as a production process, which is realised in two states – the with- and without-policy positions – and which together determine the outcome (Figure 1). The positivist tradition of Economics may reveal little about the processes by which the policy effect comes about, not least because the processes are complex. However, the exploration of ‘additionality’ through interview may reveal how the behaviour of agents is changed by policy, and hence help open the ‘black-box’.

‘Additionality’ is “the extent to which an activity is undertaken on a larger scale, takes place at all, or earlier, or within a geographical area of policy concern, as a result of public intervention” (HM Treasury, 1997, p. 96). It reveals how much of

the observed output is attributable to the intervention. ‘Additionality’ may arise from the *inputs* or *activities*, and this point is taken up below. Under other interpretations it is sometimes used to refer to competitor firms and agents in related markets, although this is a misuse of the term.⁶ A final point is that ‘additionality’ is used in UK and EU micro-evaluations, but it is little mentioned in US evaluations, if at all, reflecting the fact that it does not feature in the Economics literature on appraisal.

3: The External Effects

The external effects, which are identified above, form the link between the outcomes and impacts, but are rarely measured in micro-evaluations. This section demonstrates how the effects are measured in Cost-Benefit Analysis. Two kinds of external effects are considered, occurring the direct markets (output and input) and in related markets. Multiplier effects are considered elsewhere, such as in Armstrong and Taylor (2000). Throughout, outputs and inputs are each homogeneous and the policy is large, so it shifts market supply and demand curves. Both features are reasonable for regional interventions.⁷ The goods are marketed, and, with the exception of the labour market, there are no price distortions, on which more is said below.

3.1 Displacement in the Output Market

Figure 2 shows how displacement is measured by Cost-Benefit Analysis and how this differs from current evaluative practice.⁸ It shows the market in which the extra goods or services are produced as a result of the intervention, where the initial demand and supply curves are D and S and the initial equilibrium is at position a . The intervention shifts the supply curve to S' , causing the market price to fall from p_o to p_n . This leads to displacement, as the lower price reduces the willingness-to-supply of producers not subject to the intervention, causing a movement down the initial supply curve S from a to e . While the horizontal shift in the supply curve is dc , the increase in aggregate output in the direct market is only fc , so that df represent the displacement of output.

Current evaluation practice measures the benefit (i.e., increased sales) as the gross revenue less that that is displaced, equal to $bcfg$ to Figure 2.⁹ However, Cost-Benefit Analysis differs from this, as suppliers bear costs in producing the displaced

output that are now avoided, so it deducts the value of this producer surplus. This is the area $p_o p_n ea$ in Figure 2, which not only includes the displaced units, but the units that continue to be produced by other suppliers but at a lower price. However, the analysis does not stop there, as the reduction in price makes consumers better-off, and their increased surplus is the area $p_o p_n ba$. Assuming that producers and consumers are treated the same, the direct benefit of the intervention is equal to the area $abcde$. It is unambiguously greater than that measured in practice, i.e., $bcfg$.

It suggests two differences between evaluation practice and theory. Not only does practice ignore the cost of producing the displaced output, but it fails to take account of the effect on consumers. Of course, it could be argued that the benefit to consumers is inconsequential and best ignored, but it arises from the price fall, which is the transmission mechanism for the displaced output, so that it is difficult to include one while ignoring the other. The difference in the measurement of the direct benefit between evaluation practice and theory is smaller the more elastic is demand, but only when demand is perfectly elastic does practice record the same effect as theory, since in this case there is no price change and hence no displacement effect. This requires knowledge of the elasticities of demand and supply.¹⁰

3.2 *Input Markets*

Similar considerations apply when valuing the cost of the intervention in each input market. Increased factor demand may induce higher input prices and impact on factor demand elsewhere, and this is the source of displacement in the input market. Again, to illustrate the divergence between practice and theory, the micro-evaluations of the regional policy employment effect typically make an adjustment based on the output market, but ignore displacement in the labour market from a higher wage.¹¹

The labour market is of interest given that regional policy tends to be applied in the areas of relatively high unemployment, where activity rates and gross domestic product are low. Several extra considerations apply: First, individuals filling the new jobs might otherwise be unemployed, so they are not a resource cost, and this is the main *economic* rationale for job creation schemes in areas of high unemployment. It might be thought that there is no wage effect in these areas, but Gillespie *et al* (2001) find a large displacement effect for regional grants in Scotland. Second, Cost-Benefit Analysis supposes a frictionless world, in which individuals move instantaneously

and costlessly between jobs, so that there are no adjustment costs. However, this may be implausible for regional policy where labour is geographically immobile.

3.3 *Linkage Effects*

Linkage effects occur through the price mechanism and may be *forwards* [*backwards*] if the project sells [buys] its output [inputs] to [from] other producers, or *sideways* if it is consumed either with or instead of other goods and services, i.e., complements or substitutes. The intervention affects these other markets by shifting the demand and / or supply curves and potentially changing the prices in the other markets. However, the general rule in Cost-Benefit Analysis is that the *effects in related markets can be ignored except insofar as they have feedback effects in the direct market* (Sugden and Williams, 1978). These feedback effects are measured in the direct market, so that for the purpose of measurement the related markets can be ignored.¹²

This is an important result, which means that the measurement of the impact is greatly simplified using Cost-Benefit Analysis. Broadly, the reasoning is that when an intervention changes a price in a related market it makes some agents better-off (e.g., consumers from a lower price) but other agents worse-off (i.e., producers), and these transfers effectively cancel, save for the feedback effect in the direct market. It means the long-run effect (after the feedback has occurred) will be smaller than the short-run effect, as the demand curve pivots inwards about position *a* in Figure 2.

3.4 *Overview of CBA Approach*

Cost-Benefit Analysis is often advocated for the appraisal and evaluation of industrial policy (Swales, 1997; Honohan, 1998). It is based on measuring *surpluses* rather than gross *effects* (e.g., number of jobs or level of sales). Potentially, it offers a sounder basis for the evaluation of regional policy in terms of improvements to social welfare, and it is useful in drawing attention to the role of prices and wages as the transmission mechanisms in the economy. It also has advantages in relation to the external effects, which are either ignored or crudely calculated in many existing micro-evaluations, but are important in determining the impact. The worked example of displacement shows it is likely to yield different results, but while it has advantages, it also has drawbacks that may limit its appeal, which briefly are as follows:

- It requires knowledge of the surpluses, profits or rents earned by agents;
- The effects must be measured for both producers and consumers to ensure consistency of the approach, which otherwise is undermined;
- It requires knowledge of the demand curve in both short and long run; and
- It may involve the calculation of economic prices, e.g., shadow wage rate.

These informational requirements make Cost-Benefit Analysis *difficult* and *costly* to implement, so that it is usually applied to large infrastructure investments (see Florio, 2006). To apply it to other aspects of regional policy, such as grants, a simplification is desirable. One approach is simply to assume that price changes are small, in which case there is no displacement or indirect effects, and except for the multiplier effects, the outcome is essentially the impact. Another approach is a stripped-down form of Cost-Benefit Analysis, known as the Effects Method (see DAC 1992). This involves identifying the change in income accruing to each agent in an accounting framework. Under reasonable assumptions this gives the same result as Cost-Benefit Analysis. As a final point, Cost-Benefit Analysis has an aspect that may make it *undesirable*. This is because it assumes away adjustment costs (i.e., displaced workers costlessly and instantaneously transfers to the new activities promoted by the intervention), but this ignores search and training, and that the new job opportunities may occur in different parts of the country. Adjustment costs and equity considerations have traditionally been important rationales for regional policy interventions.

4: ‘Additionality’

It remains to consider the link between the outputs and the outcomes in Figure 1. The focus is on the survey approach, of which the main concern is ‘additionality’. This is the extent to which an intervention changes a project, either in scale, location or timing. The section begins by tracing the development of ‘additionality’, and the different ways it has been used in practice. Subsequently, it is reconciled with theory, but focusing on the scale dimension only.

4.1 ‘Additionality’ in Practice

The micro-evaluation of regional policy originally reflected dissatisfaction with the macro-methods in opening-up the ‘black-box’ of evaluation. According to Marquand (1980), further macroeconomic evaluative work did “not appear a particularly fruitful route to follow”, while microeconomic studies were necessary to determine the merits of particular instruments (para. 165). The appeal of ‘additionality’ to the Government is easily understood, as it helps to ensure ‘value for money’ in its public expenditure. However, it is in much the same way that a firm would ensure ‘value for money’ in its advertising expenditure, and it is a misconception of social welfare. This is because it implies that any loss to the Government is automatically a loss to society as a whole.¹³

4.1.1 Evolution of ‘Additionality’

Employment cost-effectiveness was an important concern in early UK regional policy efforts, with the 1960 Local Employment Act requiring the Board of Trade to pay attention to “the relationship between the expenditure involved and the employment likely to be provided” (see Wren, 1996a). However, the direct job link was dropped in the mid-1960s, and it only reappeared in the 1980s when the cost-effectiveness of the policy was called into question, since when ‘additionality’ has been a key concern. The first application of ‘additionality’ (known to the author) was an evaluation of the Small Firms Employment Subsidy (SFES) (Department of Employment, 1978). This was an experimental special employment measure for manufacturing firms with less than 50 employees locate in the regional policy designated Assisted Areas only.¹⁴ It was time limited, so that important evaluative concern was whether the firms brought jobs forward in time to take advantage of the grant. The managers of firms were asked to put the jobs into one of three mutually-exclusive categories:

- The jobs would have been created when they were;
- The jobs would not have been created but for the subsidy; and
- The jobs were brought forward in time to take advantage of the subsidy.

The SFES evaluation did not explicitly use the term ‘additionality’, but it revealed it to be a multi-dimensional concept.¹⁵ The first dimension is whether a project would have gone ahead or not in the absence of support (a binary variable), and, conditional on this, the second dimension is in what form the project would have gone ahead in

terms of its scale, timing or location. The subsequent evolution of 'additionality' in UK regional policy evaluations is shown in Table 1. Numerous studies on the role of incentives in the investment decisions of firms were conducted in the early 1980s (see Begg and McDowall, 1987), but Table 1 shows that they failed to recognise the multi-dimensional nature of 'additionality', combining the two dimensions into a single scale. However, this makes the responses difficult to interpret, e.g., the intervention was "important to implementation but not crucial".

The early studies probed the role of the incentives in investment appraisal, but in fact they revealed little about the effects of the grants. This was because the firms tended to include the automatic grants in investment appraisal, which were certain, even though discretionary grants proved to be more effective.¹⁶ Investment managers were asked about the influence of the incentives on the investment decision, with close-ended alternatives. Table 1 shows that these varied from a simple three-point scale in McDowall and Begg (1981) to a four-point scale in Herron (1981) and a five-point scale in McGreevy and Thomson (1983). Perhaps the most sophisticated of the investment-decision studies was Allen *et al* (1986), carried out in 1984. This asked respondents to rank the effect of grants on the investment decision, but ranging from "0 = no influence to 3 = turning 'no go' into 'go'" (p. 68).

Not all studies treated 'additionality' as one-dimensional in nature. The SFES evaluation realised a project could be changed in timing, while McDowall and Begg (1981) also probed this issue. They found that about half of the 95 projects surveyed would have been significantly modified in timing or scale, but that of the remainder, 14% said the aid was "necessary" and the other 35% found it "not necessary". PIEDA (1986) separately probed the issue of scale (according to a 4-point scale) and location. In the latter case, for firms indicating they had undertaken an appraisal of alternative locations, they asked if the grant influenced their decision, and 40 of the 55 managers responded positively. However, it was the study of Robinson *et al* (1987) that brought these different aspects together in a single study. This allowed for the possibility that a project may be changed in timing, scale or location, and which formed the basis for subsequent Government evaluations (King, 1990; PACEC, 1993; and AEP, 2000).

An important feature of the Government-funded regional policy evaluations is that they sought to systematically quantify 'additionality', e.g., measure the period by which a project is brought forward or the amount by which it is increased in scale (see Table 1). This allows the different components to be combined into a single measure

of job effect, while the evaluations also applied a discount rate for the value of time, so that the jobs were expressed in present value years or as discounted job lifetimes (Wren, 2005b). These evaluations are interesting, although difficult to interpret and use, as comparable measures are not adopted elsewhere.

4.1.2 Qualitative Results for 'Additionality'

A comparison of the 'additionality' of UK regional grants is made in Table 2 for those studies that treat it as multi-dimensional. The first column gives results for automatic grants (available at fixed rates), and the other columns for selective assistance, where the grant rate is discretionary. In the first two columns there may be some difficulty with the question on location, which inflates the 'abandoned altogether' response (see table note), while the attraction of foreign-owned plants was increasingly important in the late 1980s and 1990s, increasing the 'another location' response.

Overall, Table 2 shows that, according to respondents, around 80 per cent of projects would have gone ahead in some fashion without the public support, but that about 20 per cent of projects would have been abandoned altogether. The latter are known as 'wholly additional projects'. Of the projects going ahead, about 20 per cent would have gone ahead in an unchanged form (which is greater for automatic grants), and these are referred to as 'wholly non-additional' projects. The grant associated with these projects is referred to as 'deadweight expenditure', although it is a misuse of the term, as it is a transfer. The welfare loss is associated with the excess burden of the taxation used to finance the intervention, and not the grant itself.

Inspection of the responses in Table 2 for the projects that went ahead, but in a changed form offers reasonably consistent findings across the studies and over time. It is reassuring in the sense that if there are biases associated with the survey approach then at least they appear to be consistent, which may help validate comparison across studies. However, there are several ways in which the exploration of 'additionality' is deficient in these studies, as follows:

- The measures of 'additionality' are qualitative rather than quantitative, so that it is not known if a project was brought forward in time by five years or just a month, say, and likewise for the scale.

- ‘Additionality’ explores whether the supported projects are changed in timing, scale or location, but there are other ways in which projects may be changed, e.g. quality, time duration or activity, which are unexplored.
- ‘Additionality’ can arise from changes that are induced at different stages of the production process, involving either the inputs and / or activities (Booth di Giovanni, 2004, and Figure 1), but again this aspect is little explored.¹⁷

4.2 ‘Additionality’ and Theory

‘Additionality’ features strongly as a concept in UK micro-evaluation, and to a lesser extent in EU Cohesion policy, but it is absent from US evaluations. No doubt this is because ‘additionality’ fails to appear in the literature on Cost-Benefit Analysis or in economic appraisal. As such, we may ask whether ‘additionality’ has any force at all in Economics? ‘Additionality’ is multi-dimensional, and it is useful to focus on these two aspects. The first is ‘wholly non-additional’ expenditure (where the intervention has no effect), and the second is where the intervention is ‘additional’.

4.2.1 ‘Wholly non-additional’ expenditure

Wholly non-additional expenditure is when public support leads to an observed output that is identical to the output that would have occurred in the counter-factual position (in scale, timing and location), so that there is a zero outcome in Figure 1. This is at odds with the marginalist tradition of Economics, where successive increments in an intervention (e.g., the grant rate) should lead to successively greater effects. Figure 1 suggests wholly non-additional assistance can arise in either of two ways:

- The level of total *inputs / funds* committed is unchanged by the intervention.
- The *activities* are different but an identical output is produced.

The reason why ‘additionality’ (or anything similar) does not feature in the literature on Cost-Benefit Analysis is that it is project appraisal by the public sector *and* where the project is implemented by this sector, so that ‘additionality’ simply does not arise. The issue that is addressed in appraisal is whether there are better projects that could be implemented, or even none at all. Nevertheless, it is possible to identify the idea of

‘non-additionality’ occurring in other areas of Economics in relation to the inputs (finance) and the activities, although not identified as such.

First, in the literature on inter-governmental grants it is entirely feasible that a proportionate matching grant will have no effect (see Cullis and Jones, 1998). This is shown in Figure 3(a) where a grant towards good x leads to a movement from a to b , but with no increase in the output of x , as the grant is diverted towards y , reflecting the agent’s preferences or indifference curves, IC . Second, in the literature on public goods, Brennan and Pincus (1983) show that the outcome may be unaffected by the Government when individuals adjust their private behaviour. This is shown in Figure 3(b). Whatever output of x produced by the Government (say at a on the production possibility curve, ppc), individuals undertake private provision to locate at b . The output of x is unchanged by the public sector, so there is a zero outcome, even though the private activities are changed.

The above cases relate to the literature on public sector economics, but other explanations for ‘non-additionality’ arise when grant assistance towards investment is considered. These explanations are on the funding side, as follows:

- *Lump sum grants*: It is not tied to any activity of the firm, and since incentives are unchanged the firm implements the without-subsidy project.
- *Indivisibilities*: Even when the grants are proportionate there may have no effect on firm behaviour if the investment is fixed in scale. An increase in the grant rate simply increases the proportion of investment that is funded from public sources. It perhaps explains the poor performance of UK automatic regional grants, which funded large fixed-scale investments (Wren, 1996a).
- *Moral hazard*: Industrial support is a principal-agent relationship, so the firm can be viewed as undertaking investment on behalf of the Government in return for assistance. If the Government does not monitor the investment the firm decreases its private funds *ex post* to implement the without-subsidy scale, as its opportunity cost of funds is unchanged (Wren, 2003). Indeed, the firm can falsely submit a larger project scale *ex ante* and cut its private funds *ex post* to get the whole project funded by the public sector.

These give theoretical support for the observed phenomenon of wholly non-additional assistance. These explanations focus on the funding side, but similar considerations apply to the activities, e.g., foreign-owned plants that are not changed in location.

4.2.2 'Additional' expenditure

The second dimension of 'additionality' relates to projects that are changed in some way by Government support. This can occur in many ways, but interest here is in projects that are changed in scale, focusing on the employment effect.¹⁸ First of all, we can derive an expression for 'additionality' in relation to the investment scale. For this, let F and A denote the respective private and public funds committed to a project, where superscripts * and ^W indicate the with- and without-subsidy positions. Then, we can define an 'additionality coefficient' d (≥ -1), as follows:

$$(1) \quad 1 + d = \frac{(F^* + A) - F^W}{A},$$

where $F^* + A$ is the with-subsidy project scale and F^W is the without-subsidy scale. When $d > 0$, private funds increase between the with and without-subsidy positions (i.e., $F^* > F^W$), but when $d < 0$ they decrease, such that the assistance is 'wholly non-additional' when $d = -1$. In this case, $F^* + A = F^W$, so there is no increase in project scale, and assistance simply substitutes for the private funds (Wren, 1996b).

An expression for d can be derived from an optimising problem.¹⁹ Assuming a homogeneous production function of degree n (< 1) and exogenous grant rate g , then:

$$(2) \quad d = \frac{(1-g)}{g} \left[1 - (1-g)^{\frac{n}{1-n}} \right].$$

Since $n > 0$ the 'additionality coefficient' decreases with the grant rate, but whether d is positive or not (i.e., private funds increase or not) depends on the parameter values. This can be explored by considering some values for these. When $n = 1/2$, then $d = 1 - g > 0$, so private funds increase above the without-subsidy level. However, when $n = 2/3$, then $d = (1 - g)(1 - 2g)$, so that private funds fall below the without-subsidy level when the grant rate is sufficiently high, i.e., $d < 0$ when $g > 1/2$.

These suggest that when n and g are sufficiently large, the firm implements a larger project scale but that it cuts back its private funds. In this case, the assistance is ‘additional’ (a larger scale is implemented), but that the Government wholly funds the extra investment *and* also makes a contribution to firm profits. It suggests the concept of ‘additionality’ is deficient, and that it cannot guarantee ‘value for money’. This is because it focuses on the scale and ignores what is happening to the firm’s private funds, but it is this that is relevant to determining ‘deadweight’ spending.

As a second point, it is possible to derive a relationship between the labour demand (L^*) and the funds committed to a project. For this, consider the relationship between the project inputs and the funds as follows: $w L^* + q I^* = F^* + A$, where I is project capital costs at a unit price q and the w is the wage rate. Then, assuming fixed factor proportions, $I^* = \gamma L^*$, the following can be derived straightforwardly,

$$(3) \quad L^* = \frac{F^* + A}{w + \gamma q}.$$

Combining (1) and (3) gives:

$$(4) \quad L^* = \frac{F^w + (1 + d)A}{w + \gamma q}.$$

The employment effectiveness of assistance is $\Delta L^* / \Delta A = (1 + d) / (w + \gamma q)$. This does not just depend on the ‘additionality coefficient’ d , but a range of other factors, such as factor prices, production technology parameters and the grant rate. There are several implications. First, it suggests the regression estimates from (4) of the form, $L^* = \alpha + \beta A$ are unable to disentangle ‘additionality’ from the other components.²⁰ Second, the estimates of effectiveness will vary across firms, and will not just depend on ‘additionality’, but on the characteristics of the firms themselves, e.g., wage rate, price of capital goods and the state of technology.

5: Conclusions

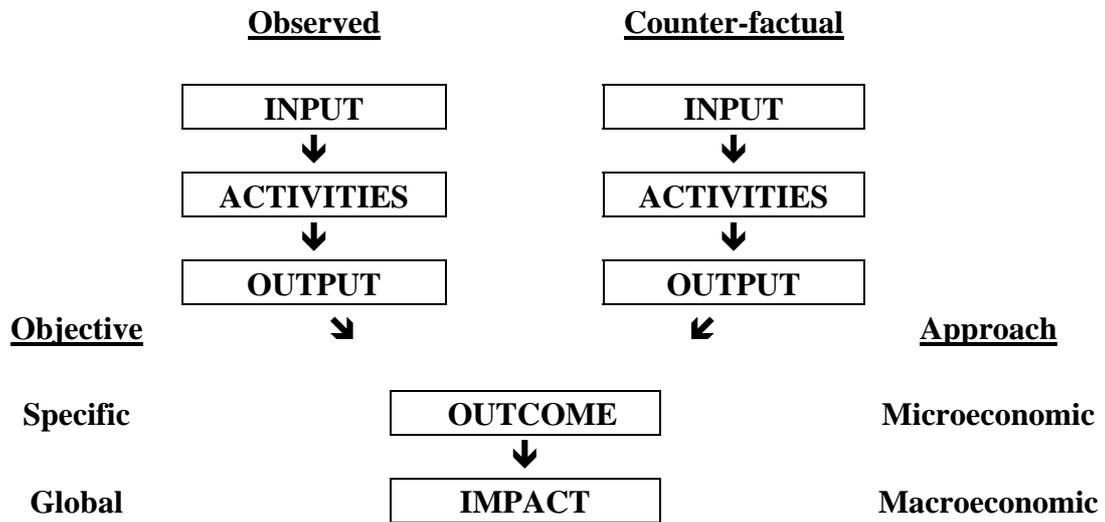
This paper seeks to reconcile evaluative practice with theory, focusing on the micro-evaluation of regional policy. It focuses on two important issues: the external effects,

which link the outcomes and impacts; and ‘additionality’, which links the outputs and outcomes, and which is the central to the industrial survey approach.

In relation to the first of these, the paper explores the application of Cost-Benefit Analysis to the measurement of the direct and external effects (displacement and linkage effects), and shows that it can potentially simplify the measurement of the impact, which is ultimately of interest. However, it means that the evaluation is based on agent *surpluses* rather than (gross) *effects*, which poses a number of problems, and ultimately it may embody assumptions that are undesirable to the practitioner. On the second issue of ‘additionality’, the paper argues that it is a two-dimensional concept, where the first dimension is whether a project would otherwise have gone ahead or not, and the second dimension is in what form. ‘Wholly non-additional’ policy occurs in funding or activities, and the paper shows that it has a good foundation in theory, even though it is absent from the economic appraisal literature. Further, as currently used in evaluations ‘additionality’ is deficient, as fails to capture the ‘incentive’ effect on the private funds of firms. Ultimately, this is the source of deadweight transfers, where the firm reduces its private funds with the incidence of public support.

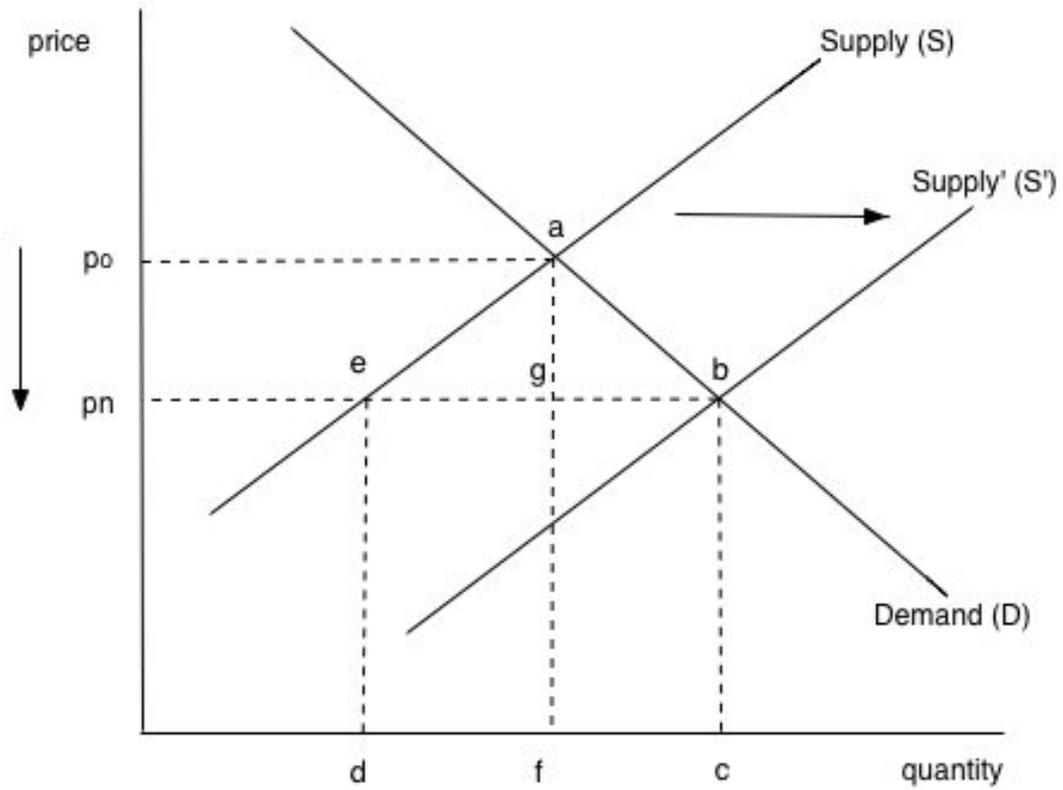
Finally, cost-benefit analysis is often advocated in relation to evaluation (but poorly understood, as it is often used to mean the measurement of the benefits and the costs), but where it is properly used it is primarily in appraisal.²¹ In fact, current UK micro-evaluative practice, in relation to regional policy and other support measures, occupies something of a halfway house between pragmatism and theory. Some agents are included in the evaluations but others ignored (i.e., producers but not consumers); the opportunity costs are usually ignored in both output and input markets, e.g., cost of producing the displaced output or the resource cost of supplying labour; while the studies on the job effect tend to measure the jobs lost from the displacement of output, but ignore the effects occurring in labour markets. Hopefully, this paper has served to inform on some of the misunderstandings and misconceptions in current practice, and to indicate the role that theory can play.

Figure 1: The ‘Logic Model’ of Evaluation



Note: Development of diagram in EC (2000).

Figure 2: Displacement in the Output Market



Source: Compiled by author.

Table 1: The Evolution of ‘Additionality’

Single dimension
Dichotomous Department of Employment (1978): went ahead or not.
Polychotomous McDowall and Begg (1981): 3-point scale (crucial, important or unimportant). Herron (1981): 4-point scale (crucial, considerable, some or none). McGreevy & Thomson (1983): 5-point scale (from unchanged to cancelled).
Multi-dimensional
Qualitative Department of Employment (1978): changed in timing. McDowall and Begg (1981): changed in timing or scale. PIEDA (1986): changed in location and 4-point scale for went ahead or not. Robinson <i>et al</i> (1987): changed in timing, scale or location.
Quantitative King (1990), PACEC (1993) and AEP (2000).

Source: Compiled by author.

Table 2: Results on Regional Policy ‘Additionality’

Period:	Automatic	Selective assistance			
	1985	1985	1980-84	1985-88	1991-95
Column:	(1)	(2)	(3)	(4)	(5)
Abandoned Altogether	20.8*	40.5*	21.5	25.5	13.5
Gone Ahead	73.0	38.4	73.1	68.4	82.5
<i>Of which:</i>					
Unchanged	39.6	13.4	22.1	15.1	19.3
Later in time	19.4	13.5	16.8	29.2	24.0
Smaller scale	13.2	9.6	14.8	13.2	12.9
Another location	0.8*	1.9*	19.4	10.9	26.3
(Outside UK)	-	-	(13.4)	(9.0)	(18.1)
(Inside UK)	-	-	(6.0)	(1.9)	(8.2)
Other**	6.2	21.1	5.4	6.1	4.1
Number of sample firms	129	52	149	212	165

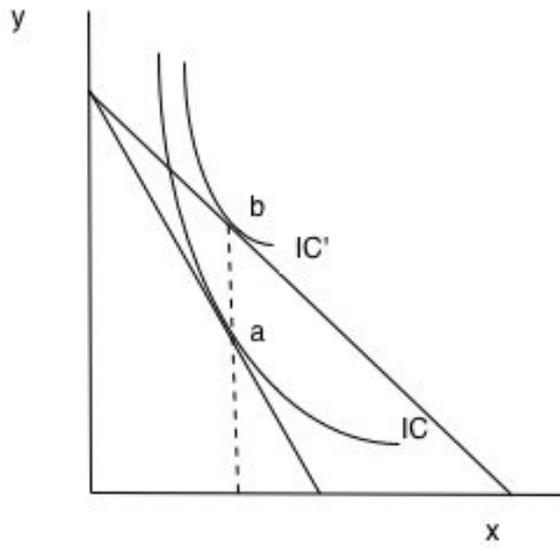
Sources: (1) and (2): Robinson *et al*, 1987; (3): King, 1990; (4): PACEC, 1993; and (5): AEP, 2000.

Notes: Percentage of firms responding to question on what would have occurred in the absence of regional grants, given alternatives shown.

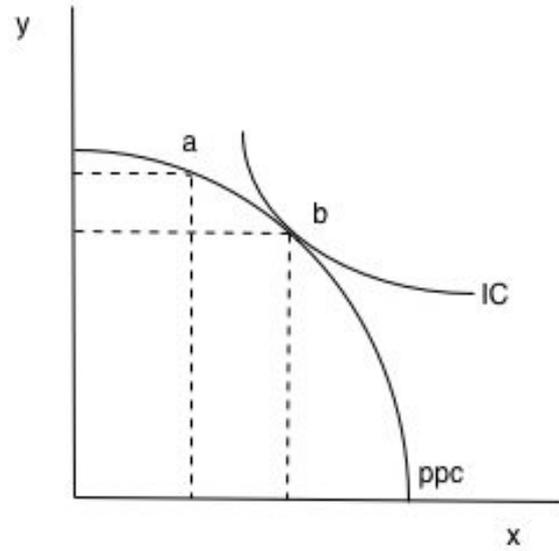
*These firms were given the alternative of ‘another establishment in the same company’, so that they may have given ‘abandoned altogether’ as the response for a different location.

** Columns (1) and (2) includes the not known or not stated cases, whereas for other columns it is some combination of effects.

Figure 3: 'Non-Additivity' in Economics



(a) Public matching grant for x



(b) Public provision of x

References

- AEP (2000), *Evaluation of Regional Selective Assistance 1991-1995*, Arup Economics and Planning, London.
- Allen, K., Begg, H., McDowall, S. and Walker, G. (1986), *Regional Incentives and the Investment Decision of the Firm*, Department of Trade and Industry, HMSO, London.
- Armstrong, H. and Taylor, J. (2000), *Regional Economics and Policy*, Blackwell, Oxford.
- Batterbury, S. C. E. (2006), 'Principles and Purposes of European Union Cohesion Policy Evaluation', *Regional Studies*, 40.2, 179-88.
- Baslé, M. (2006), 'Strengths and Weaknesses of European Union Policy Evaluation Methods: Ex-post Evaluation of Objective 2, 1994-99', *Regional Studies*, 40.2, 225-36.
- Begg, H. M. and McDowall, S. (1987), 'The Effect of Regional Investment Incentives on Company Decisions', *Regional Studies*, 21.2, 459-70.
- Boardman, A. E., Greenberg, D. H., Vining, A. R. and Weimer, D. L. (2006), *Cost-Benefit Analysis: Concepts and Practice*, Pearson Prentice Hall, New Jersey.
- Booth di Giovanni, H. (2004), 'Concepts of 'Additionality' and Applications to Surveys', *DTI Evaluation Methodology Workshop*, Department of Trade and Industry, London, 24th June..
- Bradley, J., Mitze, T., Morgenroth, E. and Untiedt, G. (2005), *An Integrated Micro-Macro Approach to the Evaluation of Large-scale Public Investment Programmes: The case of EU Structural Funds*, Working Paper, GEFRA, Muenster.
- Brennan, G. and Pincus, J. M. (1983), 'Government Expenditure Growth and Resource Allocation: The Nebulous Connection', *Oxford Economic Papers*, 35.3, 351-65.
- Cullis, J. and Jones, P. (1998), *Public Finance and Public Choice*, Oxford University Press, Oxford.
- DAC (1992), *Development Assistance Manual: DAC Principles for Effective Aid*, Development Assistance Committee, OECD, Paris.

- DAC (2002), *Glossary of Key Terms in Evaluation and Results-Based Management*, Working Party on Aid Evaluation, Development Assistance Committee, Organisation for Economic Cooperation and Development, Paris.
- Department of Employment (1978), *Small Firms Employment Subsidy – An Evaluation of its Effectiveness*, Department of Employment Gazette, London, May.
- EC (2000), ‘Indicators for Monitoring and Evaluation: An Indicative Methodology’, *Methodological Working Papers no.3*, Directorate-General XVI, Regional Policy and Cohesion, European Commission, Brussels.
- English Partnerships (2004), *Additionality Guide: A Standard Approach to Assessing the Additional Impact of Projects*, English Partnerships, September.
- Florio, M. (2006), ‘Cost-Benefit Analysis and the European Union Cohesion Fund: On the Social Cost of Capital and Labour’, *Regional Studies*, 40.2, 211-24.
- Gillespie, G., McGregor, P., Swales, J. K. and Yin, Y. P. (2001), ‘The Displacement and Multiplier Effects of Regional Selective Assistance: A Computable General Equilibrium Analysis’, *Regional Studies*, 35, 125-39.
- Herron, F. (1981), ‘Post Industry Act (1972) – Industrial Movement into, and Expansion in, the Assisted Areas of Great Britain: Some Survey Findings’, *Government Economic Service Working Paper No. 46*, Department of Industry, HMSO, London.
- HM Treasury (1997), *Appraisal and Evaluation in Central Government (The Green Book)*, HM Treasury, London.
- HM Treasury (2003a), *The Green Book: Appraisal and Evaluation in Central Government*, HM Treasury, London.
- HM Treasury (2003b), *A Modern Regional Policy for the United Kingdom*, HM Treasury, Department of Trade and Industry and Office of the Deputy Prime Minister, London, March.
- Holden D. R. and Swales, J. K. (1995), ‘The Additionality, Displacement and Substitution Effects of Factor Subsidies’, *Scottish Journal of Political Economy*, 42.2, 113-26.
- Honohan, P. (1998), *Key Issues of Cost-Benefit Methodology for Irish Industrial Policy*, General Research Series, Economic and Social Research Institute, Dublin.
- House of Commons (2005), *Annual Report on the 1982 Industrial Development Act*, House of Commons, HC207, Session 2005-06, The Stationery Office, London.

- King, J. (1990), *Regional Selective Assistance, 1980-84: An Evaluation by DTI, IDS and WOID*, HMSO, London.
- KPMG (1999), *An Evaluation of the Small Firms Loan Guarantee Scheme*, KPMG Management Consulting, London.
- Lenihan, H. (1999), 'An Evaluation of a Regional Development Agency's Grants in Terms of Deadweight and Displacement', *Environment and Planning C: Government and Policy*, 17.3, 303-18.
- Lenihan, H. and Hart, M. (2004), 'Additionality and Public Sector Support to Irish Industry: Some Methodological Issues', *European Conference on Good Practice in Research Evaluation and Indicators*, Galway, 24th May.
- Marquand, J. (1980), Measuring the Effects and Costs of Regional Incentives, *Government Economic Service Working Paper No. 32*, Department of Industry, HMSO, London.
- McDowall, S. and Begg, H. M. (1981), 'Industrial Performance and Prospects in Areas Affected by Oil Development', *ESU Research Paper No. 3*, Scottish Economic Planning Department, HMSO, Edinburgh.
- McGreevy, T. E. and Thomson, A. W. J. (1983), 'Regional Policy and Company Investment Behaviour', *Regional Studies*, 17, 347-58.
- Nicol, W. R. (1982), 'Estimating the Effects of Regional Policy: A Critique of European Experience', *Regional Studies*, 16.3, 199-210.
- OECD (2007), *Handbook for Prior Assessment of Local Development Strategies*, Organization for Economic Cooperation and Development, Paris, forthcoming.
- PACEC (1993), *Regional Selective Assistance, 1985-88: An Evaluation by PA Cambridge Economic Consultants*, PA Cambridge Economic Consultants, HMSO, London.
- PIEDA (1986), *Industry's Early Reaction to the New Regional Development Grant*, PIEDA, Edinburgh.
- QAG (2003), *Quality at Entry in FY02 (QEA5): A QAG Assessment*, Quality Assurance Group, World Bank, Washington, DC.
- Robinson, F., Wren, C. and Goddard, J. (1987), *Economic Development Policies: An Evaluative Study of the Newcastle Metropolitan Region*, Clarendon Press, Oxford.
- Schofield, J. A. (1987), *Cost-Benefit Analysis in Urban and Regional Planning*, Unwin Hyman, London.

- Smith, J. (2004), 'Evaluating Economic Development Policies: Theory and Practice', in *Evaluating Local Economic and Employment Development: How to Assess What Works Among Programmes and Policies*, Local Economic and Employment Development, Organization of Economic Cooperation and Development, Paris.
- Sugden, R. and Williams, A. (1978), *The Principles of Practical Cost-Benefit Analysis*, Martin Robertson, Oxford.
- Swales, J. K. (1997), 'A Cost-Benefit Approach to the Evaluation of Regional Selective Assistance', *Fiscal Studies*, 18.1, 73-85.
- Tavistock Institute with GHK and IRS (2003), *The Evaluation of Socio-Economic Development: The Guide*, Tavistock Institute, London.
- Taylor, J. (2002), 'The Evaluation of UK Regional Policy: How Much Progress has been Made?', in B. Johansson, C. Karlsson and R. Stough (eds), *Regional Policies and Comparative Advantage*, Edward Elgar, Cheltenham.
- Wren, C. (1994), 'The Build-up and Duration of Subsidy-Induced Employment: Evidence from UK Regional Policy', *Journal of Regional Science*, 1994, 34.3, 387-410.
- Wren, C. (1996a), *Industrial Subsidies: The UK Experience*, Macmillan Press.
- Wren, C. (1996b), 'Fund Substitution and the Incentive Effect of Public Investment Subsidies', *Scottish Journal of Political Economy*, 43.4, 534-48.
- Wren, C. (1996c), 'Reply to Subsidies, 'Additionality' and Financial Constraints', *Journal of Regional Science*, 1996, 36.3, 501-8.
- Wren, C. (2003), 'Investment Scale as a Signal in Industrial Assistance Schemes with Employment Objectives', *Economica*, 70, 331-52.
- Wren, C. (2005a), 'Understanding the Metrics Used by International Development Agencies and Government Departments to Assess the Impact of International Economic Development Support', *Report to Scottish Development International*, Glasgow, March.
- Wren, C. (2005b), 'Regional Grants: Are They Worth It?', *Fiscal Studies*, 2005, 26.2, 245-75.
- Wren, C. and Jones, J. (2007), 'Grants and the Location of Foreign Direct Investment: Evidence from the UK Regions' in M. Farschi, O. Janne and P. McCann (eds), *Technological Change and Mature Industrial Regions: Firms, Knowledge, and Policy*, Edward Elgar, Cheltenham, forthcoming.

Endnotes

¹ This is not to say that all evaluation is atheoretical, as some macro-based approaches rely heavily on theory, but not the literature on economic appraisal.

² This approach has biases, on which there is little evidence (Smith, 2004), but which are not our focus. Lenihan (1999) tackles the issue of strategic bias, but in addition there are sampling, hypothetical, starting-point and information bias (Wren, 2005a).

³ The *outcomes* are sometimes referred to as the results, while the UK HM Treasury (1997, updated in 2003a) ‘Green Book’ conflates *outputs* and *outcomes*, referring to these as outputs and to the *impacts* as outcomes. Even at the World Bank, QAG notes confusion over outputs and outcomes (QAG, 2003, p. 12).

⁴ These are pecuniary external effects, which differ from the technological external effects, or externalities, which alter the conditions under which goods and services are consumed or produced. Externalities are outside the paper’s scope, but are relevant to regional policy interventions (e.g., improvements in infrastructure).

⁵ It can be illustrated in the case of regional policy in England. The global objective of regional policy is to “make sustainable improvements in the economic performance of all English regions and over the long term reduce the persistent gap in growth rates between the regions” (HM Treasury, 2003b). The specific objective of the grants is to “encourage sound projects, which would improve employment opportunities in the Assisted Areas” (House of Commons, 2005).

⁶ The terms ‘displacement’ and ‘linkage’ effects are best reserved for these.

⁷ If firms engage in non-price competition (e.g., product quality or branding) then this requires a generalisation of the analysis. Where interventions are small there are no price effects, and Cost-Benefit Analysis coincides with current evaluative practice. Preferences are quasi-linear, so that Hicksian and Marshallian demands coincide.

⁸ Holden and Swales (1995) give the only other known analysis of displacement.

⁹ In fact, it is smaller than this, as the displaced output is at the old and higher price.

¹⁰ The first reveals by how much the demand price falls in response to the shift in the supply curve, and the second by how much existing suppliers will respond to this.

¹¹ For example, King (1990) makes an adjustment for the job displacement effect of regional policy of 27% based on the displacement of output, but ignoring the effect in the labour market that occurs through a wage effect.

¹² Space constraints prevent a formal analysis, but which can be found in Chapter 10 of Sugden and Williams (1978), or in Chapter 4 of Schofield (1987).

¹³ In the language of social choice theory it views the Government as a dictator. Thus, a ‘wholly non-additional’ subsidy payment to a firm, which does not change the firm behaviour, is viewed as a deadweight welfare loss, but in fact it is a transfer, as while the Government is worse-off the firm is better-off, on which more is said below.

¹⁴ It paid a fixed weekly lump sum amount in respect of each employee for a period of up to six months, and operated for nine months up to the end of March 1978. The evaluation involved just 110 respondent firms.

¹⁵ Allen *et al* (1986) refer to “additional investment”, hinting at the origin of the term, but it was not until the mid-1980s that ‘additionality’ was coined.

¹⁶ Of those firms carrying out formal investment appraisal, Allen *et al* (1986) find that about 80 per cent included automatic incentives, but which was only 40 per cent for discretionary grants. In general, around two-thirds of firms carried out appraisal.

¹⁷ An exception is the evaluation of the Small Firms Loan Guarantee Scheme (KPMG, 1999), where three kinds of ‘finance additionality’ are distinguished: those firms who had no other source of funds; and those who could have either fully- or part-funded it from elsewhere. For the 13.4% of projects that would have gone ahead unchanged in column (2) of Table 2, Robinson *et al* (1987) find that virtually all of these projects would have used external rather than internal finance.

¹⁸ Wren and Jones (2007) consider the issue of grants and industrial location.

¹⁹ This is taken from Wren (1996c), where further explanation can be found.

²⁰ Contrary to this, Lenihan and Hart (2004) report attempts to regress ‘wholly non-additional’ projects on various firm characteristics for Irish assistance schemes.

²¹ Notable exceptions are the International Finance Corporation (IFC) of the World Bank and the Development Assistance Committee (DAC) of the OECD, which have sophisticated procedures for evaluation.