



Fourth Edition 2014



Table 4.10: Substitution		
Level	Substitution	Substitution effect
None	No substitution takes place	0%
Low	There are expected to be some substitution effects, although relatively limited	25%
Medium	About half of the activity would be substituted	50%
High	A high level of substitution is expected to arise	75%
Total	All of the activity would be affected by substitution	100%

4.4.7 Key question - substitution

The key question in relation to substitution is as follows:

Will the intervention/option result in a firm substituting one activity or input for a similar one to take advantage of public funding? If yes, where and by how much?

4.5 Economic multiplier effects

4.5.1 Definition

Multiplier Effects

Further economic activity (jobs, expenditure or income) associated with additional local income and local supplier purchases.

4.5.2 Types of economic multiplier

The economic impact (jobs, expenditure or income) of an intervention is multiplied because of knock-on effects within the local economy. Two types of multiplier can be identified:

- a **supply linkage multiplier** (sometimes referred to as an indirect multiplier) due to purchases made as a result of the intervention and further purchases associated with linked firms along the supply chain.
- an **income multiplier** (also referred to as a consumption or induced multiplier) associated with local expenditure as a result of those who derive incomes from the direct and supply linkage impacts of the intervention.

A number of impact studies have also identified a longer-term development multiplier associated with the retention of expenditure and population in an area.

Many appraisals use a combined or composite multiplier. Thus, for example, if at the regional level the supply linkage multiplier was 1.1 and the income multiplier 1.2, the composite multiplier would be 1.32 (i.e. 1.1×1.2). Applying the multiplier gives an estimate of the total direct and multiplier effects. For example, say an intervention created 100 jobs, then the total direct and multiplier effects would be 132, if the composite multiplier were 1.32. The multiplier effects alone would be 32 (i.e. 100×0.32).

4.5.3 *Factors influencing the scale of multiplier effects*

The scale of the multiplier effects will be influenced in particular by:

- supply linkage multiplier: the extent of supply chain linkages in area of analysis. These linkages vary substantially by sector and area;
- income multiplier: the proportion of additional income spent within area of analysis.

4.5.4 *Approaches to estimating multiplier effects*

There are a number of ways in which multipliers can be estimated, including:

- Surveys of businesses and employees: businesses can be asked about the local content of the purchases they make and this information can be used to calculate the local supply linkage multiplier effects, assuming that the proportion of expenditure net of non-recoverable indirect taxes incurred on local goods and services is similar throughout the supply chain. If the purchases made at a particular point in the supply chain is x per annum and a proportion S is spent on local inputs the effects down the remainder of the chain is estimated as: $x(1+S+S^2+S^3+\dots+S^n)$ or $x.1/(1-S)$. In addition, estimates can be calculated of the income multiplier using data on local consumption patterns in the local economy. If the total net direct and supply multiplier increase in local business turnover is E , a proportion m of this turnover is paid on average in net local incomes, and a proportion q of net local incomes is on average spent on the products of local businesses, then the total impact on turnover, including induced effects, may be estimated as $E(1+mq+m^2q^2+m^3q^3+\dots+m^nq^n)$ or $E.1/(1-mq)$.
- Again the assumption is that behaviour is similar at each point in the supply chain.
- Previous research/evaluations: a number of previous studies have assessed the scale of multiplier effects- see, for example, research by Oxford Economics (2012) into the economic impact of the UK film industry.
- Economic models: various commercial and academic organisations have developed models of the national economy and of local economies. For example, one such model is LM3. These can be used to assess the scale of multiplier effects resulting from a particular investment or change in the level of employment.
- Input-output tables: these tables provide estimates of supply linkages between sectors and can be used to estimate the supply linkage or indirect multiplier effects.

4.5.5 *Evidence from evaluations and research*

The scale of income and supply linkage multiplier effects vary according to the mix of economic activity that exists in an area and the type of intervention that is being undertaken. The Scottish Government provides information on multiplier effects for individual Scottish industries, which demonstrates the extent of the difference between various sectors. For example, the composite employment multiplier effect at the Scottish level for the refined petroleum and nuclear fuel industry is 13.41, compared to a composite multiplier of 1.47 for other service activities. Construction has a composite multiplier of 2.19, while retail distribution is 1.31 and Research and Development is 1.46. Further data from the Input-Output tables can be accessed via the following link:

<http://www.scotland.gov.uk/Topics/Statistics/Browse/Economy/Input-Output>.

As an example of evidence from econometric studies, Oxford Economics recently produced a set of output multiplier estimates at the UK level, using data from the ONS Annual Business Survey and their own detailed econometric model of the UK economy (see Table 4.11). In using data from secondary sources such as the Scottish Input-Output tables or from econometric studies, care should be taken to consider the spatial level at which the multipliers relate to. As noted in Section 2, the size of the multiplier effects is likely to be greater the larger the area over which the benefits of an intervention are being assessed.

Table 4.11: Output multipliers (UK, 2011)	
Sector	Composite output multiplier
Electricity production and distribution	2.8
Construction	2.7
Iron and steel	2.2
Motor vehicles	2.1
Sports goods and toys	2.3
Machine tools	2.0
Hotels, catering, pubs etc	2.2
Computer services	1.9
Legal activities	1.8
Education	1.8
Economy average	2.2

Source: ONS, Oxford Economics (2012)

Table 4.12 below is based on the extensive evidence generated by a number of studies including the Evaluation of the Enterprise Zone Experiment. It provides composite income and supply linkage multiplier estimates that are appropriate for four types of property related activity, namely B1 Office, B2/B8 (general industrial/warehousing), Recreation and Retailing. The estimates are provided for the local area and regional level. At the local level the range is between 1.21 and 1.38. At the regional level the range is between 1.38 and 1.56. Generally speaking retailing projects generate the lowest combined income and supply linkage effects.

Table 4.12: Composite multiplier effect by type of area: site related problems but active private sector		
Intervention type	Local area	Region
B1 Office	1.29	1.44
B2/B8	1.29	1.44
Recreation	1.38	1.56
Retailing	1.21	1.38

Source: Based on Rhodes et al, (1994) and Enterprise Zone research (HMSO, 1995).

For specific sectors and interventions, multiplier values can be higher than those shown in the table. For example, The Toyota Impact Study identified a composite employment multiplier at the level of Derbyshire, Nottinghamshire, Leicestershire, Staffordshire and the West Midlands of 1.6. Research by the then Dti into broadband projects identified multiplier effects ranging between two to four times the direct effect.

Sub-regional and regional multipliers for a range of intervention types are set out within the BIS/CEA additionality guidance (see Table 4.13). At the sub-regional level, an overall

average composite multiplier of 1.25 is identified, while at the regional level the overall average is 1.45.

Table 4.13: Composite multipliers by type of intervention – BIS/CEA guidance		
	Sub-regional (mean)	Regional (mean)
All observations	1.25	1.45
Business development & competitiveness	1.25	1.51
Regeneration through physical infrastructure	1.33	1.40
People and skills	1.66	1.36

Note 1: a more detailed breakdown by project type is contained within the BIS/CEA guidance

Note 2: Care should be taken in applying the sub-regional estimate under the people and skills theme, as this is based on fewer than 10 observations. In addition, the BIS/CEA average multiplier benchmark for people and skills is lower at the regional level than the sub-regional level. This reflects that the averages calculated for each spatial level were not based entirely on the same set of projects. In reality, in relation to a given project you would expect the multiplier to be higher at the regional level compared to the sub-regional level.

4.5.6 Ready reckoners

The ready reckoner values below express general ranges at the very local (neighbourhood) level, and the regional level. The following range of multiplier effects can be used:

Table 4.14: Multiplier effects			
Level	Multiplier	Composite multiplier (Neighbourhood level)	Composite multiplier (Regional level)
Low	Limited local supply linkages and induced or income effects	1.05	1.3
Medium	Average linkages. The majority of interventions will be in this category	1.1	1.5
High	Strong local supply linkages and income or induced effects	1.15	1.7

Source: Based upon the, then, DETR (October 2000)

4.5.7 Key question – multipliers

The following key question needs to be answered in relation to multiplier effects:

How many, if any, additional outputs and outcomes will occur through purchases along local supply chains, employee spending rounds and longer term effects as a result of the intervention/option?