

**Scottish Enterprise
Commercialisation
Programme Review**

**Working Paper 7:
Economic Impact
Appraisal (2008-2018) –
Grossed Results**

Scottish Enterprise

1 Economic Impact

This working paper summaries the key economic potential impacts arising from the Scottish Enterprise Commercialisation Programme in the future (2008-2018), with a particular focus on turnover, GVA and employment arising from the full 1,300 companies who have participated in the commercialisation programme.

1.1 Approach to Assessing Economic Impact

The economic impact calculations are based on best practice guidance in Economic Impact Assessment developed by Scottish Enterprise¹. It uses the approach as well as the standard question set² for assessing economic impact. This includes:

- collecting key impact variables
- adjusting the impact variables for additionality
- adjusting for optimism bias
- grossing the results from 100 companies to 1,300
- adjusting for business failure and acquisition
- conducting a cost benefit analysis of the results

1.1.1 Collecting key impact variables

The key impact variables collected to understand the impact of Scottish Enterprise intervention covers turnover, employment and GVA.

Projected turnover was collected from the companies for key periods over the next 10 years, as was employment (2008, 2009, 2011, 2013, 2018). GVA was developed by subtracting the cost of bought in goods and services (excluding employee costs) on an annual basis projected over the next 10 years from the annual turnover level in each of the key data collection years (or annual estimated cost of bought in goods and services where the company was pre turnover). In all cases the intervening years were assumed to be the same as for the last full year for which data was collected (in effect a flat profile between milestone years)³. This approach is validated by the Centre for Technology Development paper on employment growth in new firms⁴. This paper evaluated growth patterns of new firms over a 10 year period and grouped firms into four categories:

- Early growth and plateau (73% of firms)
- Continuous growth (0.3% of the firms)
- Growth setback (17%)
- Delayed growth (10%)

The implication is that most firms do not grow on a continuous basis. Our assessment works on spikes of growth rather than continual growth providing a more cautious estimate of impact and fitting the evidenced growth patterns of firms.

¹ Scottish Enterprise (2008) *Additionality and Economic Impact Assessment Guidance Note, A Summary Guide to Assessing the Additional Benefit, or Additionality of and Economic Development Project or Programme*, Appraisal and Evaluation Team

² Scottish Enterprise (2008) *Additionality & Economic Impact Assessment Guidance Note: Appendix 2: Standard Questions and Standard Reporting Outputs*, Appraisal and Evaluation

³ While the intervening years are held constant – they are adjusted for business failure and company acquisition, therefore the data in the tables vary slightly on a year to year basis

⁴ Stam,E, Gibcus,P, Telussa,J and Gamsey,E (2008) *Employment Growth of New Firms*, Centre for Technology Management, University of Cambridge

1.1.2 Gross to net adjustments (Additionality)

In order to understand the full impact of the commercialisation programme there is a need to assess the additionality of the intervention. In effect what has happened that would not have happened anyway.

The additional benefit of an intervention is the difference between the reference case (what has happened anyway) and the intervention case (the position when the intervention has been implemented).

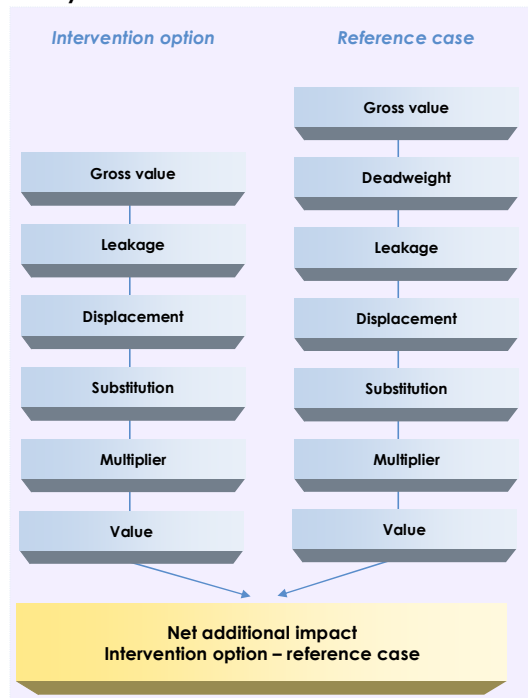
In order to fully understand this there is a need to move all results from gross to net. This adjusts for

- deadweight – what would have happened anyway
- leakage – the extent to which the benefits are lost to Scotland
- displacement – the extent to which the benefits are coming at the expense of other Scottish based businesses
- substitution – the extent to which one activity is simply substituted for another
- multipliers – the positive downstream effects created through spending on supplies and the wider wages generated from these downstream effects

This process is illustrated in the diagram 1.1 below.

Adjusting for Additionality

Diagram 1.1



The adjustments made to each of these factors are based on information supplied by the individual companies and therefore vary on a company by company basis. However, to provide some context to these variables we have provided the average values for each for reference.

Deadweight was calculated by asking the company how different their turnover and employment would have been without the Scottish Enterprise support. This was asked for key periods over the next 10 years (2008, 2009, 2011, 2013 and 2018) providing a full 10 year impact assessment. Date for intervening years was assumed to be the same as for the last full year for which data was asked.

Displacement was applied consistently to employment, turnover and GVA based on the location of the companies direct competitors (and adjusted based on the growth of the market they operate in) at the point of survey. For the Commercialisation Programme the average displacement amounted to 4% in 2007. This means that most companies are suggesting that they have virtually no competitors in Scotland and that they are operating in markets that have been either improving moderately or strongly over the last three years. This value was held constant over the 10 years of the economic appraisal.

Leakage was estimated at 0% for turnover and GVA. At present Scottish Enterprise practice is to assume that if turnover and GVA are generated within Scotland then they are retained within Scotland. This assumption has therefore been used in the impact assessment. This value was held constant over the 10 years of the economic appraisal.

Substitution was assessed by asking the companies about the extent to which they have replaced one activity with another (or employees for another) to benefit from public sector assistance. No company suggested they did either of these things leading to average substitution values of 0% for turnover, GVA and employment. This value was held constant over the 10 years of the economic appraisal.

Multiplier values were sourced from the Scottish Input Output multiplier tables based on the full 4 digit Standard Industrial Classification code of the company. These were matched with Type 2 input output multipliers for Output (in the case of turnover), GVA and employment. These were held constant over the 10 years of the economic appraisal.

1.1.3 *Adjusting for Optimism Bias*

As the appraisal is a forward looking exercise and relies on company projections of growth – in terms of employment, turnover and cost of bought in goods and services it is appropriate to adjust the figure for over optimism.

There is a demonstrated, systematic, tendency for appraisers to be overly optimistic. This is not just a public sector phenomenon, but also applies to the private sector. As our future impact data is based on the views of the company owner, it is appropriate to adjust for over optimism. This avoids the potential for projections to over count benefits and undercount costs.

There is no standard approach to assessing optimism bias. Scottish Enterprise have however, developed an approach to adjusting company projections for over optimism using the Department of Business, Enterprise and Regulatory Reform Value Added Calculator⁵. By inputting company specific data into the calculator it is possible to assess the growth patterns in relation to the top performing UK and European companies in the same or similar sectors. If a company is projecting impacts above the sectoral average for the top performers it is fair to say that they are being over optimistic and are adjusted down accordingly.

In this appraisal we use an approach similar to the one outlined above that calculates projected GVA per head (based on GVA and employment) for each of the individual companies. Where the GVA per head is above the BERR Value Added Calculator sectoral average in any year, the figure is reduced by an appropriate amount to bring it in line with the average. Where the value lies below the average GVA per head for the sector, based on the BERR database, it is assumed to be within an acceptable standard and not adjusted down in any way. These downward adjustments are applied to turnover and GVA to develop more realistic estimates of impact.

⁵ http://www.innovation.gov.uk/value_added/default.asp?quicklink=calculator

This approach means that employment is not adjusted in any way – even where companies have shown that their turnover values are over optimistic. Our assessment of employment projections is that they are actually conservative across the company base. In effect they are predicting substantial growth, but not increasing employment in line with this. Therefore it is assumed that there is less over optimism in the employment estimates and as a result they are not adjusted down in any way.

1.1.4 *Grossing from 100 companies to 1,300*

The impacts are grossed from the 100 companies surveyed to the 1,300 companies who have engaged with the commercialisation programme between 2004 and 2008. Rather than simply apply a consistent factor of 13 (1,300 divided by 100), which would likely over count impacts, an approach was developed that grossed impacts up based on the number of interventions accessed by each of the companies and the potential impact in each group.

As this information was available for the 100 surveyed companies and then the 1,300 programme companies this provided a mechanism for taking account of the variation in impact (and the low number of 1 intervention companies in the final 100 surveyed firms) depending on the number of interventions accessed. The process followed four stages including:

- Stage 1 – the surveyed firms were split into seven bands based on the number of interventions, as were the 1,300 programme participants
- Stage 2 – the proportion of companies in each band of the surveyed firms citing no impact was analysed (in each projected milestone year – in effect 2008, 2009, 2011, 2013 and 2018⁶)
- Stage 3 – the proportion of the surveyed firms citing no impact was applied to the whole population for each band giving a more accurate count of companies where there was likely to be impact
- Stage 4 – the number of companies in the population likely to be citing impact was divided by the number of firms in each band to arrive at a cautious grossing factor

The grossing factors were calculated for each year on this basis for milestone years (2008, 2009, 2011, 2013 and 2015) and applied to the net GVA, turnover and employment impacts to arrive at a grossed impact figure which are presented in this report.

The grossing factor was assumed to be the same as the last milestone year in any intervening years (in effect the grossing factor in 2012 for example, was assumed to be the same as for the last milestone year which was 2011).

1.1.5 *Adjusting for business failure and acquisition*

Once the final grossed net impact figures are adjusted for optimism there are two further adjustments that need to be made to the figures to avoid presenting overly optimistic estimates of impact. These adjustments are made to the expected GVA, turnover and employment and cover:

- adjustment for business failure
- adjustment for potential company acquisition

Each year is adjusted for business failure. This is based on the Department for Business, Enterprise and Regulatory Reform (BERR) 1 and 3 year survival rates⁷ that suggests that

⁶ The values are calculated in each year as the deadweight value changes in each year changing the proportion of companies citing impact

⁷ <http://stats.berr.gov.uk/ed/survival/>

each year 10% of businesses in existence at the beginning of the year will fail by the end of the year with the average net value for either turnover, GVA or employment subtracted in each year to account for this.

The model also adjusts for potential company acquisition. In this case companies that are successful may make themselves a target for larger companies either interested in their technology or their market. A report on High Growth Firms in the UK produced by the Department for Business, Enterprise and Regulatory Reform⁸ suggested that around 30% of the firms in their study population had been acquired. Further research evidence⁹ was then used to look at the status of acquired Scottish companies, which suggested that for every 3 companies acquired, one will retain some degree of status and function that could contribute to economic growth, the others remaining only as a shell company or cost centre.

1.1.6 Cost Benefit Analysis

Once the results were grossed up final grossed net results were imported into the Scottish Enterprise cost benefit calculator.

Total costs committed to the 22 projects that make up the commercialisation programme were collected from the Scottish Enterprise finance team for the period 2004-2008. Data was then added to the cost benefit calculator to provide consistent discounted and non discounted values.

For the Commercialisation programme the base year was 2004, representing year zero for the evaluation. It needs to be recognised that some of the projects within the Commercialisation programme pre date this period, but for consistency of evaluation any costs and benefits associated with activities have been excluded. All impact figures have been collected at 2007 prices.

This process can be summarised in Table 1.1 below.

Appraisal Period GVA Additionality Adjustments for Milestone Years

Table 1.1

	2008 (Year 4)	2009 (Year 5)	2011 (Year 7)	2013 (Year 9)	2018 (Year 14)
	Gross value	Gross value	Gross value	Gross value	Gross value
Optimism Bias	34%	51%	59%	60%	71%
	Optimism bias adjusted gross impact	Optimism bias adjusted gross impact	Optimism bias adjusted gross impact	Optimism bias adjusted gross impact	Optimism bias adjusted gross impact
Deadweight	76%	77%	90%	93%	95%
Displacement	4%	4%	4%	4%	4%
Substitution	0%	0%	0%	0%	0%
Leakage	0%	0%	0%	0%	0%
Multipliers	1.68	1.68	1.68	1.68	1.68
	Net Impact	Net Impact	Net Impact	Net Impact	Net Impact
Failures	0%	2%	13%	16%	30%
Acquisitions	0%	4%	26%	32%	61%
	Adjusted net total	Adjusted net total	Adjusted net total	Adjusted net total	Adjusted net total
Discount 3.5%	0.8714	0.8420	0.7860	0.7337	0.6178
	Net Impact NPV	Net Impact NPV	Net Impact NPV	Net Impact NPV	Net Impact NPV

⁸ BERR (2008) *High Growth Firms in the UK: Lessons from an Analysis of Comparative Performance*, Department for Business, Enterprise and Regulatory Reform

⁹ Training and Employment Research Unit (2005) *Corporate Headquarters in Scotland, their Nature and Contribution to Scotland's Economic Development*, Scottish Enterprise

1.2 Turnover Impacts

It is appropriate to consider the generation of company benefits. This is measured as the net increase in turnover accruing as a direct result of the programme and represents a key measure of company growth.

The net turnover impact accruing over the period 2008-2018, amounts to **£875.5 million** (£678.8 million NPV) This could rise to **£1,359.7 million** (£1,130.3 million NPV) if the benefits realised to date are also included.

If sunk costs are considered of £130 million (£117.9 million NPV) and matched with all realised and potential benefits this would amount to a potential benefit to cost ratio of 1: 9.59, or £9.59 return for every £1 invested in the Commercialisation programme by Scottish Enterprise. Full details are included in Table 1.2 below

Turnover Impacts of the Commercialisation Programme **Table 1.2**

Year	Costs	Net Present Value (Discounted Costs)	Turnover Impact	Net Present Value (Discounted Turnover)
2004-2007	£64,419,301	£60,688,432	£484,108,482	£451,404,624
2008	£65,622,146	£57,185,909	£122,966,552	£107,158,246
2009	n/a	n/a	£163,694,747	£137,826,584
2010	n/a	n/a	£152,682,608	£124,207,400
2011	n/a	n/a	£70,392,526	£55,327,889
2012	n/a	n/a	£57,928,388	£43,991,487
2013	n/a	n/a	£81,277,474	£59,635,800
2014	n/a	n/a	£64,428,815	£45,674,799
2015	n/a	n/a	£47,580,156	£32,589,824
2016	n/a	n/a	£30,731,497	£20,337,591
2017	n/a	n/a	£13,882,838	£8,876,744
2018	n/a	n/a	£69,983,888	£43,234,772
Total (including to date)	£130,041,447	£117,874,341	£1,359,657,969	£1,130,265,761
Total (excluding to date)	£65,622,146	£57,185,909	£875,549,487	£678,861,136
Benefit to Cost Ratio (including to date)				1: 9.59

1.3 Employment impacts

While turnover captures one element of business growth, it is also appropriate to consider the generation of employment effects within the businesses. This is also measured as the net increase or maintenance of employment as a direct result of the programme and represents another key measure of company growth.

The employment impacts need to be considered on an annual basis, as they cover both safeguarded and created jobs and cannot therefore simply be aggregated. Over the period 2008-2018 the total potential number of jobs either safeguarded or created by the Commercialisation Programme in milestone years could amount to:

- 2,702 net jobs in 2008
- 3,068 net jobs in 2009
- 1,325 net jobs in 2011
- 1,491 net jobs in 2013
- 962 net jobs in 2018

This is a substantial and growing level of employment and suggests that the Commercialisation programme has helped to create and safeguard a number of jobs across the Scottish economy. Full details are outlined in Table 1.3 below.

Employment Impacts of the Programme for Milestone years **Table 1.3**

Year	Jobs
2008	2,702
2009	3,068
2011	1,325
2013	1,491
2018	962

Note Employment declines over time as companies become less reliant on Scottish Enterprise support and Deadweight increases. The gross employment figures continue on an upward curve.

1.4 GVA Impacts

An estimate of 'impact' is the ultimate effect of the project on the economy, or in this case its contribution towards economic growth. This is measured as the net increase in gross value added (GVA) accruing as a direct result of the programme.

The potential net GVA impact accruing over the period 2008-2018, could amount to **£300.8 million** (£254.8 million NPV). This could rise to **£183.2 million** (£145.5 million NPV) if the benefits realised to date are also included.

If sunk costs are considered of £130 million (£117.9 million NPV) and matched with all realised and potential benefits this would amount to a potential benefit to cost ratio of 1: 2.16. This could amount to a £2.16 return for every £1 invested in the Commercialisation programme by Scottish Enterprise. Full details are included in Table 1.4 below.

GVA Impacts of the Commercialisation Programme **Table 1.4**

Year	Costs	Net Present Value (Discounted Costs)	GVA Impact	Net Present Value (Discounted GVA)
2004-2007	£64,419,301	£60,688,432	£117,601,149	£109,291,061
2008	£65,622,146	£57,185,909	£28,200,707	£24,575,287
2009	n/a	n/a	£43,147,007	£36,328,622
2010	n/a	n/a	£40,177,366	£32,684,313
2011	n/a	n/a	£13,583,496	£10,676,505
2012	n/a	n/a	£10,765,749	£8,175,634
2013	n/a	n/a	£15,980,731	£11,725,557
2014	n/a	n/a	£12,387,984	£8,782,075
2015	n/a	n/a	£8,795,236	£6,024,259
2016	n/a	n/a	£5,202,489	£3,442,920
2017	n/a	n/a	£1,609,741	£1,029,275
2018	n/a	n/a	£28,200,707	£24,575,287
Total (including to date)	£130,041,447	£117,874,341	£300,808,413	£254,809,253
Total (excluding to date)	£65,622,146	£57,185,909	£183,207,264	£145,518,192
Benefit to Cost Ratio (including to date)				1: 2.16

1.5 Conclusions

The net additional benefit generated by the commercialisation programme over the period 2004-2018 amounts to:

- Net turnover impact of £1,359.7 million (£1,130.3 million NPV)
- A potential peak of 3,068 net jobs in 2009
- Net GVA impact of £183.2 million (£145.5 million NPV)