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Turnbull, Jennifer and Richmond, Kenny (2013) *Scotland's business innovation performance 2008-10*. Fraser of Allander Economic Commentary, 37 (2). pp. 65-75. ISSN 2046-5378

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Scotland's business innovation performance 2008-10

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Abstract

This paper examines Scotland's innovation performance relative the UK, using the latest 2011 UK Innovation Survey. The analysis shows that Scotland has a smaller proportion of businesses that are 'innovation active' than the UK average and lies in the bottom quartile compared to other European countries. The data highlight some key differences between Scotland and UK innovation performance in areas such as markets, motivation for innovation and investment. The analysis helps identify some areas where further research should focus.

Introduction

This paper examines the published Scottish results of the latest UK Innovation Survey, which was undertaken in 2011 for the period 2008 to 2010. The latest results show that Scotland has a smaller proportion of businesses that are 'innovation active' than the UK average and lies in the bottom quartile compared to other European countries. Although it is not possible to directly compare the survey results over time due to definitional changes in the main innovation measures, Scotland also had smaller proportions of innovation active businesses than some other economies in earlier surveys.

As well as innovation activity, the data highlight a number of other differences between Scotland's business performance and that of the UK as a whole. For example, differences in the location of firms' markets, the rationale for innovation and expenditure on innovation are particularly apparent.

Recognising that innovative companies are drivers of productivity and competitiveness, a key question arising from the analysis is the reasons for Scotland's differing performance. A potential explanation is the size and structure of the Scottish business base compared to the UK as a whole. However, a number of evidence gaps have been identified which would have to be addressed to achieve a better understanding of Scotland's performance.

Innovation and Economic Growth

There are many different theories and models of economic growth but they are consistent in identifying the role that innovation plays as a driver of growth, with empirical research showing that innovationⁱ is a core condition for both business competitiveness and the wider growth of the economyⁱⁱ.

The positive effects of innovation on productivity, employment and turnover have been widely reported. For example, the 2010 Annual Innovation Report estimated that innovation accounted for 63 per cent of annual labour productivity growth in the UK between 2000 and 2008ⁱⁱⁱ. NESTA research suggests that innovation is a key source of growth for the UK's highest growth firms and that innovative firms grow twice as fast, both in employment and sales, as firms that fail to innovate^{iv}.

Innovation is considered to be an essential component of improving Scotland's competitiveness and economic performance. In 2007, the Scottish Government's Economic Strategy noted that Scotland's average GDP growth rate had lagged the UK and comparable small European economies for 30 years. Recognising the contribution that innovation makes to growth, this prompted the development of a strategic framework for innovation in Scotland that set out the Scottish Government's approach to support innovation to improve Scotland's capacity to stimulate and support greater demand for innovation^v. More recently, the refreshed Scottish Government Economic Strategy (2011) reaffirmed the importance of innovation in boosting economic growth^{vi vii}.

The UK Innovation Survey

The main official data source for measuring innovation is the biennial UK Innovation Survey. The survey provides a consistent set of results across the UK, enabling analysis of Scotland's performance

benchmarked against the UK and the other UK government office regions. The data ultimately feeds into the Community Innovation Survey (CIS), which allows Europe's innovation progress to be monitored and Scotland to be compared with other European countries.

The UK Innovation Survey is conducted every two years by the Office for National Statistics (ONS) on behalf of the Department for Business, Innovation & Skills (BIS)^{viii}. It is a voluntary survey of a sample of UK businesses with 10 or more employees.

Scotland's Innovation Performance

This paper is based on an analysis of UK Innovation Survey 2011 data^{ix}. It outlines the headline Scottish results, which cover the three-year period from 2008 to 2010. The 2011 UK Innovation Survey was the third survey run on a biennial cycle. Prior to 2007, surveys were undertaken every four years.

The survey was funded and developed by the Department of Business, Innovation and Skills (BIS) and administered by the Office for National Statistics (ONS) with assistance from the Northern Ireland Department of Enterprise, Trade and Investment (DETI). It sampled more than 28,000 private sector enterprises across the UK with 10 or more employees^x, including more than 1,000 in Scotland. Response rates for Scotland and the UK are shown in table 1 below:

Table 1: 2011 Survey Response Rates, Scotland & UK

	Number Surveyed	Responses Received	Response Rate
UK	28,079	14,342	51.1%
Scotland	2,179	1,093	50.2%

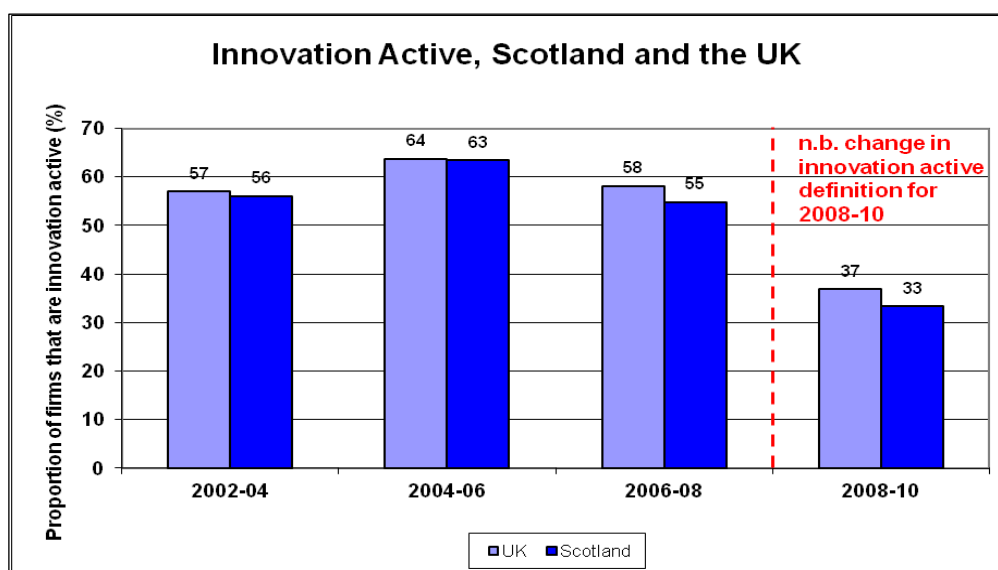
Source: BIS, UK Innovation Survey 2011 Statistical Annex

Innovation takes place via a number of business practices such as resources allocated to innovation and introducing new or improved products and processes^{xi}. The definition of 'innovation active' used in the 2011 survey follows that adopted by Eurostat:

- Introduction of a new or significantly improved product (goods or service) or process;
- Engagement in innovation projects not yet complete or abandoned;
- New and significantly improved forms of organisation, business structures or practices and marketing concepts or strategies.

The measure of 'broader innovation' includes all of the above plus activities such as internal research and development, training, and the acquisition of external knowledge or machinery and equipment linked to innovation activities.

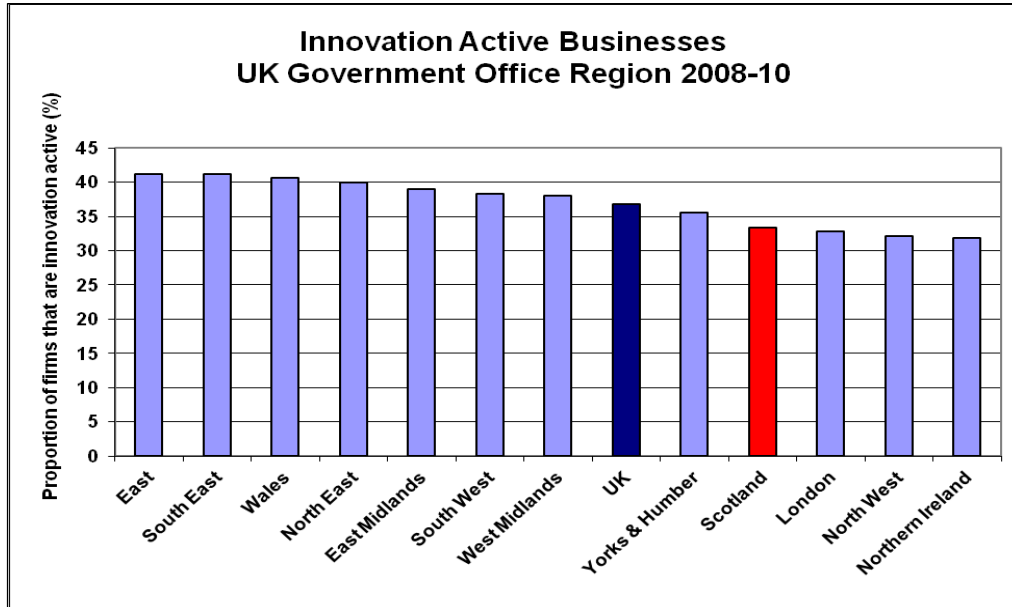
Figure 1: Innovation Active Businesses, Scotland and the UK, 2002-2010



Source: UK Innovation Survey 2011

Scotland lies in the third quartile of the 12 UK regions (figure 2) and the bottom quartile of other European countries (Figure 3) for innovation activity.

Figure 2: Innovation Active Businesses in UK Government Office Regions

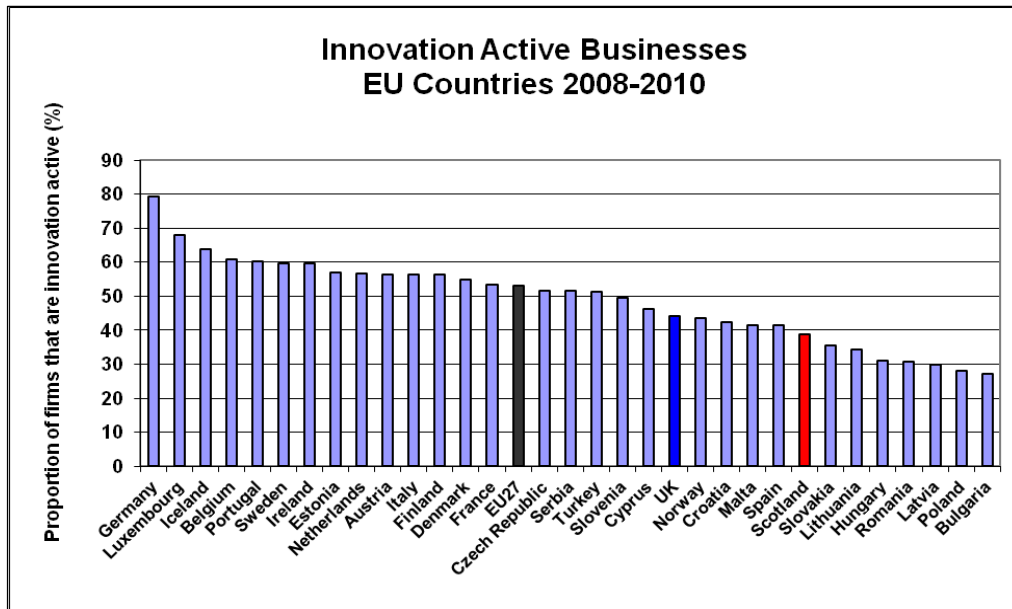


Source: UK Innovation Survey 2011

UK Innovation Survey 2008-10 Results

Changes in the definition of innovation active for the 2011 survey mean that it is not possible to compare the survey results over time^{xii}. However, relative to the UK average, Scotland still has a smaller proportion of businesses (33%) that are innovation active than the UK as a whole (37%), as figure 1 shows.

Figure 3: Innovation Active Businesses in EU Countries



Source: Community Innovation Survey 2011^{xiii}

Scottish versus UK Performance

Compared to the UK average, the performance of Scotland’s businesses lagged that of the UK’s for all the main survey indicators over the period 2008-10.

Overall, if Scotland's innovation activity rate was to match that of the UK then Scotland would need an additional 500 innovation active companies:

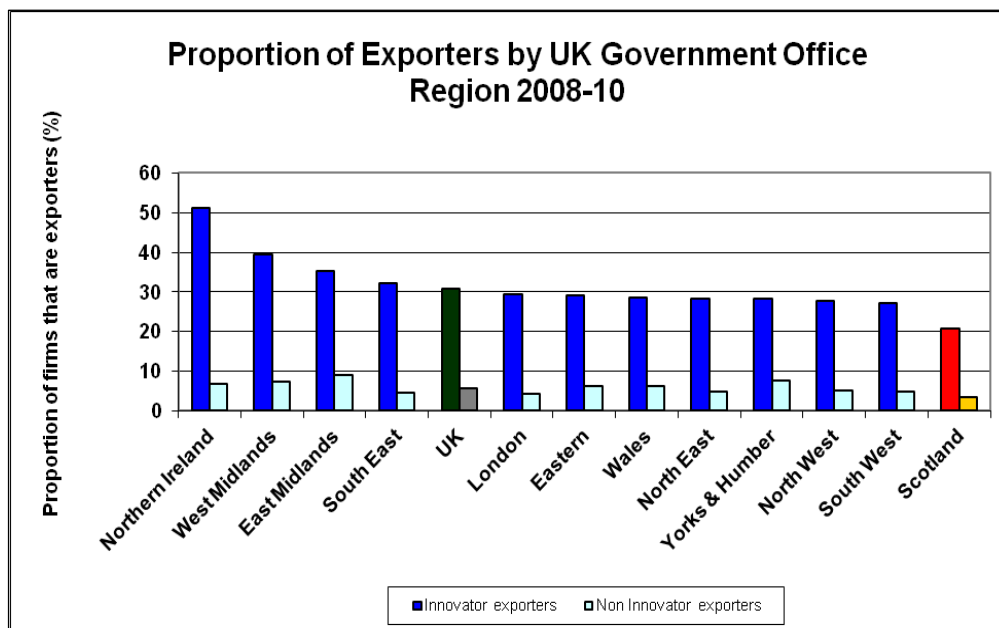
- Scotland % innovation active firms 33.3
- UK % innovation active firms 36.8
- Scotland 10+ companies* 3,665
- Number of Scottish 10+ employee innovation active companies 4,500
- Number of 10+ companies if Scotland = UK 5,000
- Number of **additional 10+ employee companies** to match UK rate **500**

Markets, Innovation and Exporting

An important theme arising from this and previous Innovation surveys is the tendency for Scottish firms to trade in local and domestic rather than international markets. A higher proportion of Scottish firms have local markets: 78.9% of Scottish businesses have markets within approximately 100 miles of the business (compared to 67.5% of UK businesses). Scotland also has a lower proportion of firms that are overseas exporters than other UK regions.

Wider research has highlighted the link between innovation and exporting^{xiv}, with innovating companies more likely to sell overseas. The UK Innovation survey confirms this as in all UK regions a higher proportion of exporters are innovators than non-innovators. However, compared to other regions Scotland has the lowest proportion of exporters that are innovators (figure 4)^{xv}.

Figure 4: Proportion of exporters by UK Region 2008-10



Source: UK Innovation Survey 2011

A key question is what is driving these results? Does Scotland have fewer innovators because it has fewer exporters, or are there fewer exporters because there are fewer innovators?

Table 2: Proportion of exporting firms, Scotland and the UK

Measure	Value
Proportion of Scottish firms that are exporters (%)	9.4
Proportion of UK firms that are exporters (%)	15.3
Scottish proportion of UK exporters (%)	4.9
Scottish proportion of UK export value (%)	7.8
Average export value of Scottish innovators (£m)	9,399
Average export value of UK innovators (£m)	5,871

Source: UK Innovation Survey 2011

The Innovation Survey suggests that the average value of exports per company tends to be higher in Scotland than the UK. This may be related to the types of exports to which the data refer. For example, if exports are from relatively high value sectors and a relatively small number of companies account for a large proportion of exports, then this would increase the average export value per firms. However, further research would be required to try and identify for the reasons this. The published export details from the UK Innovation Survey are provided in table 2.

Differences in Motivation for Innovation

The results show quite a large divergence between Scotland and the UK in businesses' motivation for innovation. The emphasis for businesses in Scotland is on updating products, cost reduction, reducing environmental impact and meeting regulatory requirements, as shown in Table 3 below. A much lower proportion of businesses in Scotland are innovating to increase their ranges of goods or services.

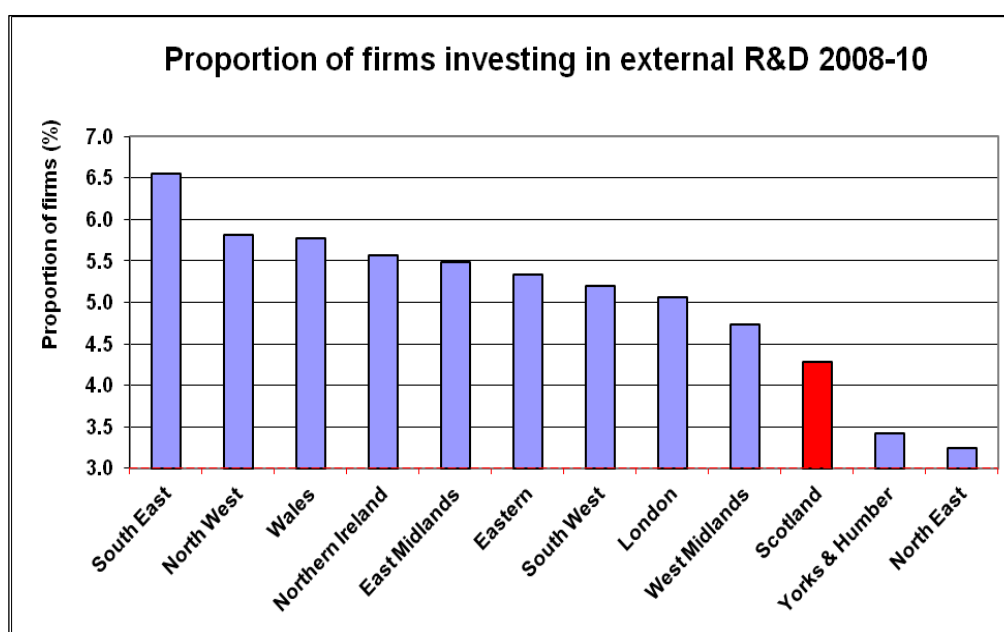
Table 3: Motivation for Innovation, Scotland relative to the UK

Motivation for Innovation	Scotland Relative to UK = 100
Increasing range of goods or services	82
Entering new market	98
Increasing market share	97
Improving quality of goods or services	100
Improving flexibility for producing goods or services	101
Increasing capacity for producing goods or services	100
Increasing value added	96
Reducing costs per unit produced or provided	120
Improving health and safety	104
Reducing environmental impact	115
Replacing outdated products or processes	112
Meet regulatory requirements (including standards)	115

Source: UK Innovation Survey 2011

The key question is why is there such divergence in some of the motivating factors? Potentially, this could be related to the more local nature of Scottish firms' customer base (i.e. less need to cater for differing customer needs in overseas markets). Again, this is an evidence gap that needs to be explored.

Figure 5: Proportion of firms investing in external R&D by UK Region 2008-10



Source: UK Innovation Survey 2011

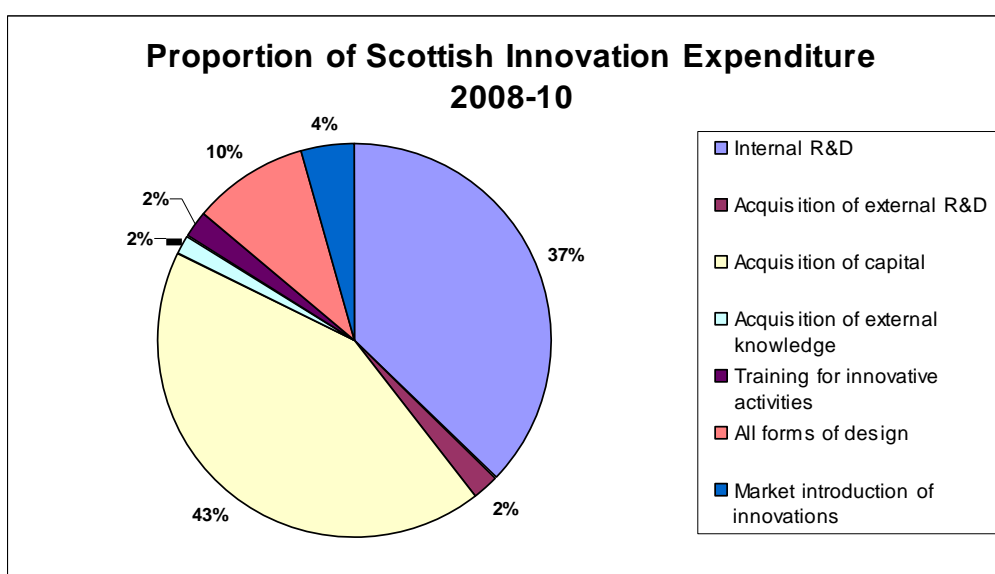
Differences in Innovation R&D Investment

The third main difference between the Scottish and UK results is in investment in innovation. Generally, compared to the UK, a smaller proportion of Scottish companies invest in external R&D (4.3% of Scottish companies compared to 5.2% of companies in the UK over the survey period) (Figure 5).

Considering the distribution of innovation expenditure from the Innovation Survey results, the differences are even greater. Only 2.3% of Scottish expenditure was on external R&D compared to 23.8% of UK expenditure. A greater proportion of Scottish innovation expenditure is invested in machinery, equipment and software (capital) than the UK average (42.7% of expenditure in Scotland compared to 30.3% in the UK). Figure 6 shows that 80% of Scottish expenditure was on internal R&D and acquiring capital over the survey period compared to 64% for the UK.

This is broadly consistent with the latest Business R&D statistics (BERD 2011)^{xvi}. Figure 7 shows that Scotland was below the UK average for business R&D expenditure as a proportion of GDP in 2011 (ranked in eighth place out of 12 UK regions).

Figure 6: Distribution of Innovation Expenditure in Scotland, 2008-10



Source: UK Innovation Survey 2011

Overview

Generally, comparing Scotland and the UK, Scotland has:

- Persistently performed below the UK average for innovation activity;
- A smaller proportion of exporters, although Scottish exports tend to have a higher value;
- More businesses whose innovation focus is to reduce costs, reduce their environmental impact and meet regulatory requirements than on increasing their range of goods and services;
- Lower levels of business investment in innovation and spends a greater proportion of total innovation expenditure on machinery, equipment and software.

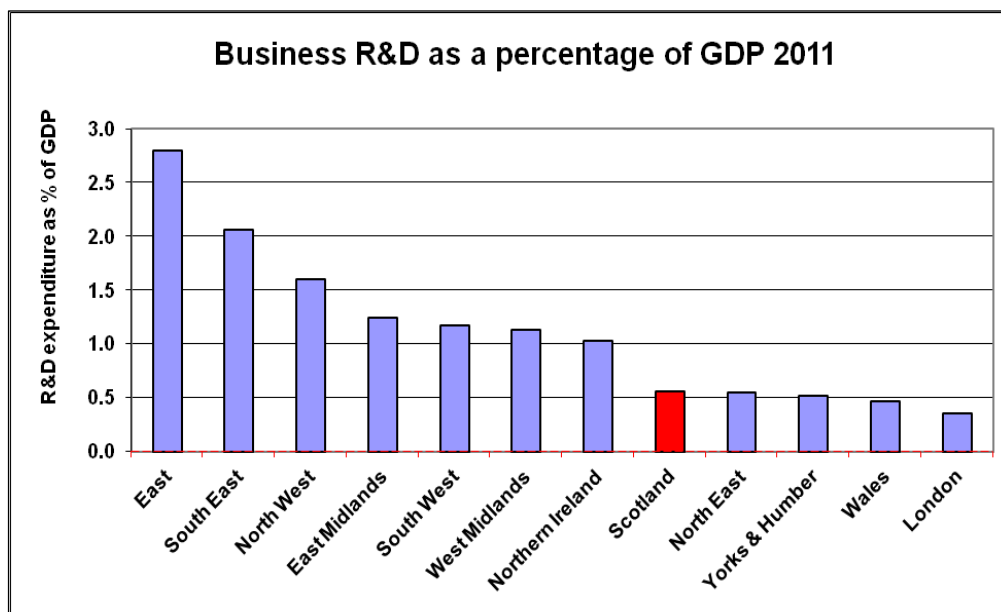
Explaining Scotland's Performance

Business Size Structure

Analysis of the data that are currently available helps to throw some light on Scotland's innovation performance. At the UK level, the data suggest that innovation performance varies by firm size and research undertaken by Scottish Enterprise indicates that performance also varies by firm size in Scotland.

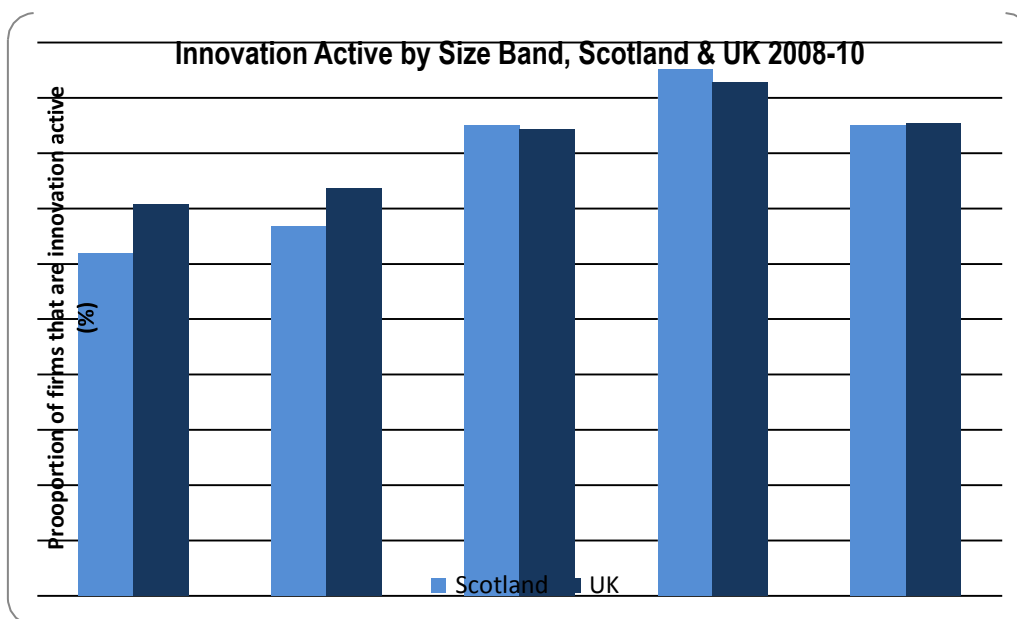
Across the UK and in Scotland the proportion of firms that are innovation active increases as the size of the firm increases. As smaller businesses account for a majority of the UK's business base^{xvii}, this has the effect of reducing the overall proportion of innovation active businesses, as figure 8 illustrates.

Figure 7: Business R&D as a percentage of GDP by UK Region 2011



Source: BERD

Figure 8: Proportion of UK Innovation Active Firms by Size band 2008-10



Source: ONS^{xviii}

It is worth noting that the two top performing UK regions for innovation activity (the East and South East of England) have a lower proportion of small businesses in their business base than the UK average (10-49 employee businesses account for less than 8% of their business bases compared to the UK average of 8.7%). Scotland, on the other hand, has more than 10% of its business base that is small, and having a larger proportion of small businesses that are less likely to be innovation active could have a negative impact on Scotland's overall performance.

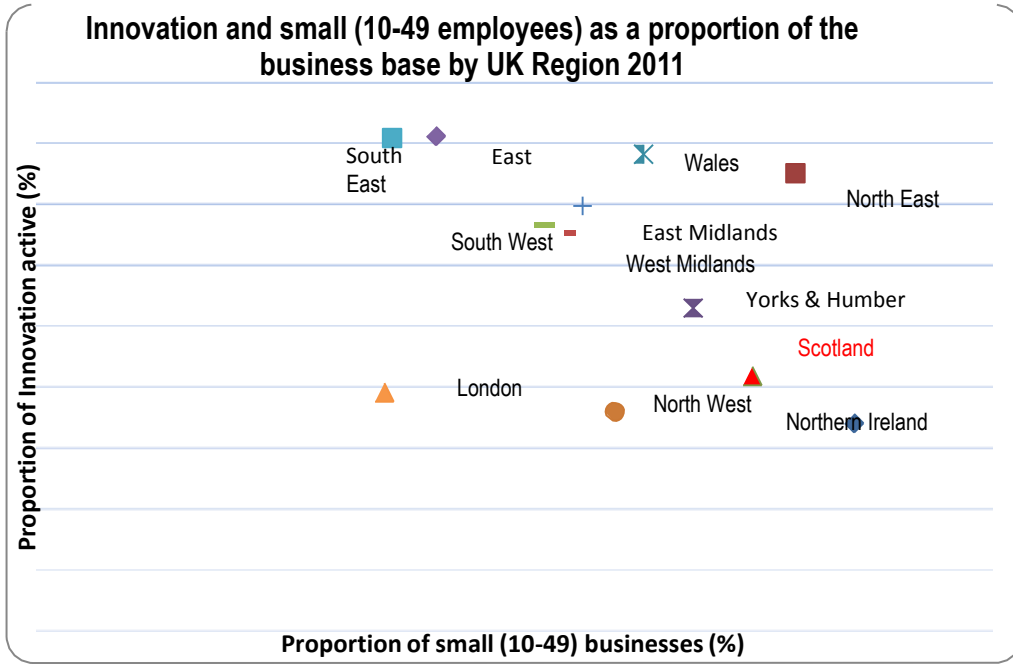
Figure 9 illustrates a tendency for regions which have a higher proportion of small businesses to have lower proportions of innovation active firms overall (for example, Northern Ireland, Scotland and Yorkshire). Conversely, regions with a lower proportion of small business tend to have a higher proportion of innovation activity overall (such as the East and South East of England). Nevertheless, it is notable that London also has a lower than UK average proportion of small businesses but is one of the lowest

performing regions for overall innovation activity. This suggests that factors other than business size are also important, such as the sector makeup of the business base.

Sectoral Innovation

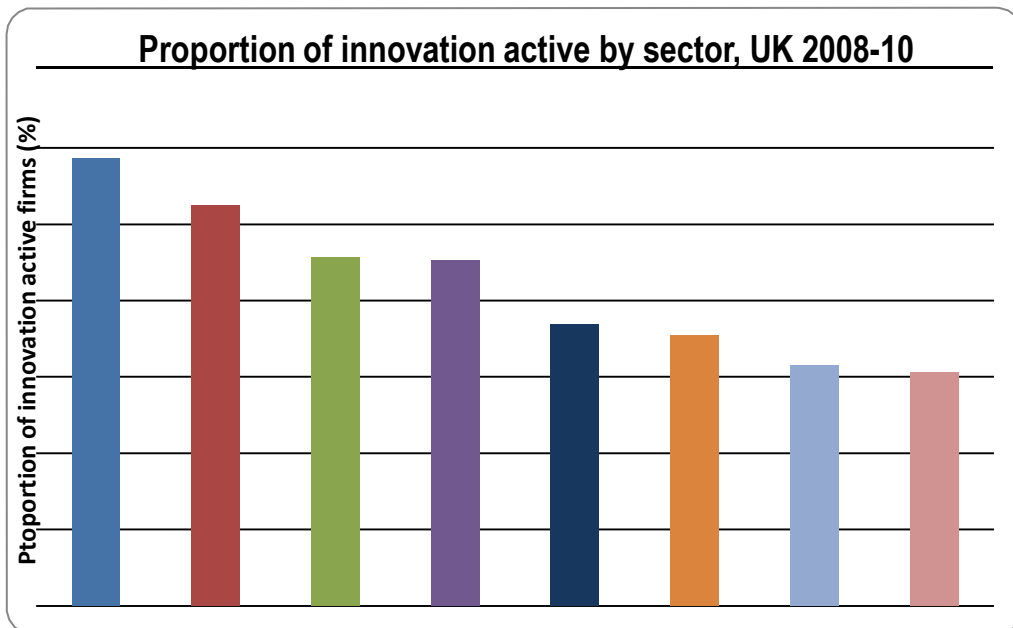
At a UK level, innovation performance varies by sector. Engineering-based manufacturing, the primary sector (mining & quarrying), knowledge intensive services and ‘other manufacturing’ have above average proportions of firms that are innovation active; retail & distribution, other services and construction have lower proportions of innovation active firms, as Figure 10 shows.

Figure 9: Proportion of Innovation Active Small Firms by UK Region 2011



Source: UK Business: Activity, Size and Location 2011, UK Innovation Survey 2011

Figure 10: Proportion of Innovation Active Firms by Sector 2008-10



Source: UK Innovation Survey 2011

Scotland tends to have a lower proportion of its business base in sectors where innovation activity is high (at the UK level), so its business structure may explain part of the innovation difference with the UK as a whole.

Table 4 details the proportion of firms in Scotland's business base compared to the UK, for the five highest and lowest innovation active performing sectors. This highlights the extent to which Scotland, compared to the UK, has relatively more businesses within its business base that are in sectors that are less likely to be innovation active, and the extent to which it has a lower proportion of businesses in some of the sectors that are more likely to be innovation active.

Table 4: Business Base and Sector Innovation Performance

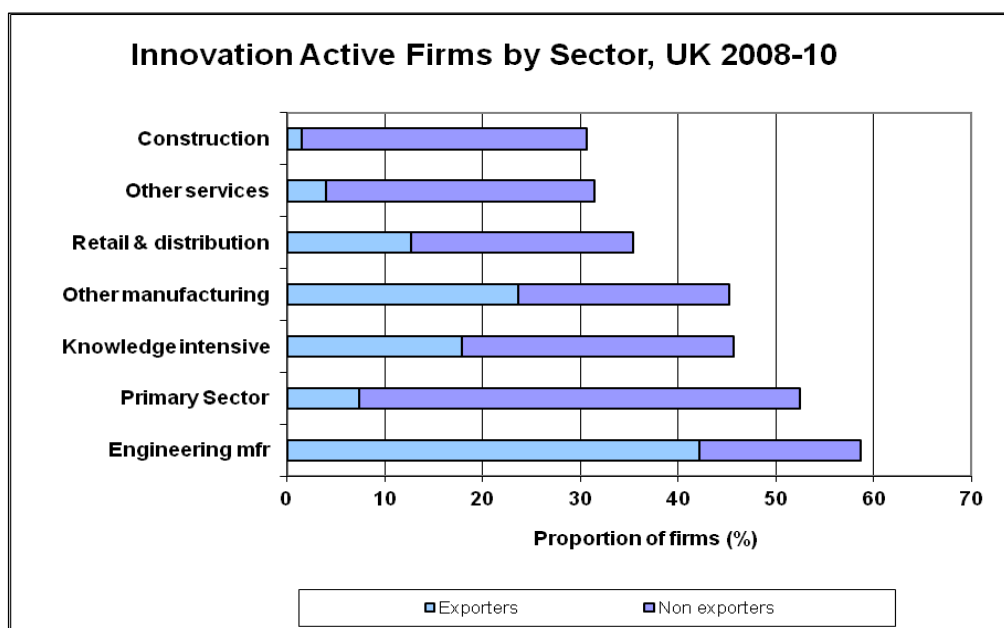
Five highest innovation active sectors	% innovation active firms by sector in UK	Proportion of firms in Scotland's business base relative to UK = 100
Electrical and optical equipment	61.6	77
Telecommunications	59.0	60
Research & experimental development	56.3	106
Electricity, gas & water supply	55.9	100
Computer and related activities/ICT	54.0	57
Five lowest innovation active sectors		
Construction	30.6	129
Transport	28.5	116
Retail Trade	28.5	107
Hotels & restaurants	28.4	145
Renting of machinery, equipment etc.	26.0	132

Source: UK Innovation Survey 2011

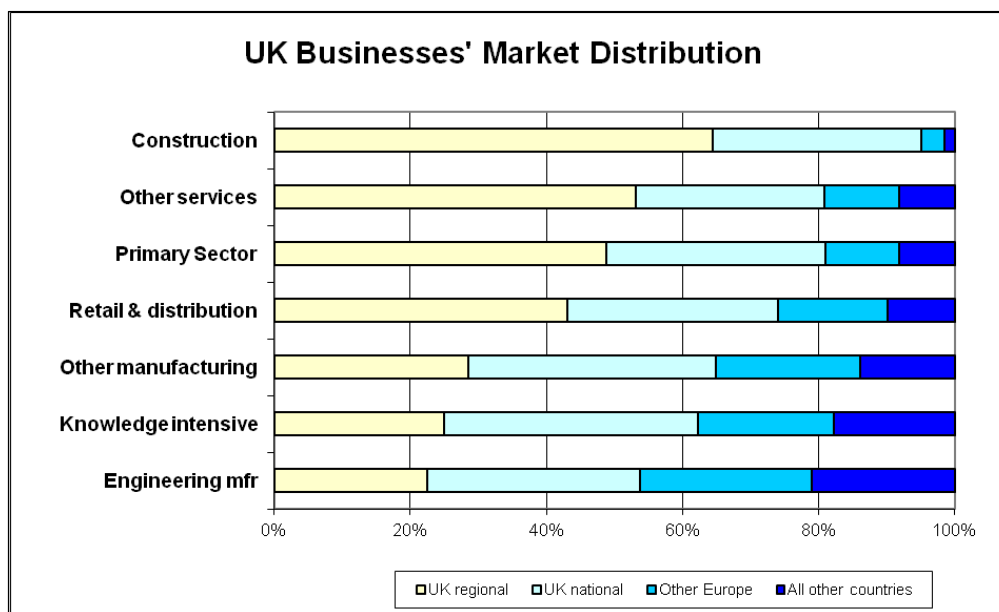
Innovation and exporting

As outlined above, the latest results show that Scotland has a lower proportion of firms that are overseas exporters than other UK regions, and data for the UK suggest strong links between innovation activity and exporting by sector. Figure 11 highlights that a large proportion of innovation active companies in engineering-based and other manufacturing companies are exporters; and figure 12 highlights the extent to which engineering-based manufacturing, other manufacturing and knowledge intensive sectors' markets are focused outside the UK.

Figure 11: Proportion of Innovation Active Exporters and Non Exporters by Sector 2008-10



Source: UK Innovation Survey 2011

Figure 12: Distribution of Firms Markets by Industry Sector 2008-10

Source: UK Innovation Survey 2011

Evidence gaps and further research

Overall these findings raise questions such as:

- What are Scotland's most innovative sectors? Are they the same ones as for the UK as a whole?
- What is the impact of business size on Scotland's innovation performance?
- Does Scotland's business / industrial structure help explain its innovation investment activity/levels?
- Does Scotland's industrial structure help explain differences in the motivation for innovation compared to the UK?
- How do Scotland's sectors perform relative to those of other UK regions?
- What Scottish sectors are both innovators and exporters?
- Why are Scotland's exports of higher value? Could this be due to industry structure, given the importance of high value add sectors such as whisky and chemicals in Scotland?

Clearly, there are a number of evidence gaps and further analysis of the Innovation Survey data is planned to answer these questions.

Scottish Enterprise and Innovation

To stimulate innovation, Scottish Enterprise works with companies to help them become more competitive, successful in international markets and achieve additional revenues. Its approach to company innovation is well developed through its Innovation Support, SMART and R&D grant programmes^{xix}.

Working collaboratively with partners, Scottish Enterprise is taking forward a number of other actions to boost Scotland's innovation performance. This includes ensuring its knowledge transfer, innovation and commercialisation activity is aligned with that of the Scottish Government, the Scottish Funding Council, and Highlands and Islands Enterprise. This will see the development of sector-based Innovation Centres to improve links and knowledge exchange between universities and businesses, particularly SMEs. Scottish Enterprise's 'Team Scotland' approach also focuses on maximising the potential offered by the current programmes supported by the European Union. In addition, SE is exploring how Scotland can better utilise high levels of public procurement from bodies such as the NHS to help stimulate more demand-driven company development

By improving Scotland's innovation performance, we can make a considerable difference to the long term growth of our economy since innovative companies and sectors are key drivers of productivity and competitiveness and economic growth.

Summary/Conclusions

Innovation is a key driver of economic growth with innovative firms growing faster than non-innovators; however, analysis of the latest data shows that Scotland is underperforming relative to the UK as a whole and to other European countries.

The data highlight some key differences between Scotland and UK innovation performance in areas such as markets, motivation for innovation and investment.

Analysis of the data that are currently available by firm size and sector for the UK helps to throw some light on Scotland's performance.

However, further research and analysis is required to gain a better understanding of Scotland's innovation performance. This analysis has helped to identify some of the areas where further research should focus.

ⁱ In the form of performance improvements in products, processes, services and systems

ⁱⁱ [BIS, Economics Paper 15: Innovation and Research Strategy for Growth](#)

ⁱⁱⁱ [BIS, Annual Innovation Report 2010](#)

^{iv} [NESTA, Business Growth and Innovation](#)

^v [Scottish Government, Innovation for Scotland 2009](#)

^{vi} [Scottish Government Economic Strategy 2011](#)

^{vii} [National Performance Indicators](#)

^{viii} [ONS, UK Innovation Survey](#)

^{ix} [BIS, UK Innovation Survey 2011, Statistical Annex](#)

^x Survey covered a representative sample of businesses with 10 or more employees in sections B-N of the Standard Industrial Classification 2007 and excluded public sector and membership organisations.

^{xi} [Economic & Labour Market Review, Vol 4, No 3 March 2010: First findings from the UK Innovation Survey 2009](#)

^{xii} Previous surveys defined innovation activity as enterprises engaged in the introduction of a new or significantly improved product (goods or service) or process; incomplete or abandoned innovation projects; or expenditure on internal R&D, training, acquisition of external knowledge or machinery and equipment linked to innovation activities while broader innovators were firms that had introduced new and significantly improved forms of organisation, business structures or practices.

^{xiii} Figures from Eurostat from the Community Innovation Survey are based on a smaller sectoral coverage than the UK Innovation Survey, therefore, differ from the UK figures. However, the definition of Innovation active is now comparable

^{xiv} See for example <http://enterpriseresearch.ac.uk/research-themes/research-theme-5-sme-innovation-exporting-and-growth/>

^{xv} This could be due to the high numbers non-responses to the export survey question in the Innovation Survey, so exporting activity is underestimated. However, as the results for all regions of the UK were also affected by non-responses Scotland's relative position remains the same. The Scottish Small Business Survey suggests that around 22% of small businesses (10-49 employees) and 37% of mediums sized businesses (50-249 employees) export, higher than the figure suggested by the UK Innovation survey

^{xvi} [Scottish Government, BERD 2011](#)

^{xvii} 90% of firms in sectors covered by the survey had less than 10 employees and 10% had more than 10 employees. Firms in the small (10-49 employees size band) accounted for 9% of firms, therefore, only 1% of firms had 50 or more employees.

^{xviii} This work contains statistical data from ONS which is Crown Copyright. The use of the ONS statistical data in this work does not imply the endorsement of the ONS in relation to the interpretation or analysis of the statistical data. This work uses research datasets which may not exactly reproduce National Statistics aggregates

^{xix} <http://www.scottish-enterprise.com/grow-your-business/innovation.aspx>