

INNOVATION & PRODUCTIVITY 1
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BUSINESS AND ECONOMY

SUMMARY

- The South West region has relatively low levels of productivity compared to other parts of the UK. Raising productivity is key to the long term growth and prosperity of the region. Innovation is the main driver of long run economic growth and prosperity. Understanding innovation is therefore a key requirement for understanding the growth process, and for designing policies to support that process.
- This bulletin examines the innovation performance of firms in the South West, comparing this with that of firms in the South East of England, the strongest performing UK region in terms of innovation. It seeks to explain the differences in innovation performance between the South West and the South East, and investigates the implications of these differences for business performance within the region. It then presents the results of simulations of the potential impact of improvements in innovation performance for the South West economy as a whole.
- Evidence from the *UK Innovation Survey* suggests that, looking at a broad sample of enterprises within the South West, the region's firms are less likely to be engaged in most types of innovation activity, less likely to introduce actual innovations, derive a smaller share of revenues from innovative products, and are less likely to report various benefits of innovation than their counterparts in the South East or in the UK as a whole.
- To a large extent, however, these differences in innovation performance can be explained by regional variation in the characteristics of firms that determine innovation performance (size, industry, scope of product markets, skills, etc.). After controlling for these characteristics, there is little evidence of systematic under-performance among South West firms with respect to innovation activities, outputs or impacts.
- The main exception concerns the importance of innovative products to the revenues of South West firms. Firms in the South West derive a significantly smaller share of their total revenues from innovative products (and particularly from marginal as opposed to novel innovations) than do otherwise similar firms in the South East.
- Many aspects of innovation activity are significantly related to improved business performance – higher productivity and faster growth of employment, productivity and output. More innovative firms tend to perform better than otherwise similar, but less innovative, firms in terms of these basic performance measures.
- We report the results of three simulations looking at the impact of improvements to innovation performance in those areas where South West firms significantly underperform relative to similar firms in the South East of England (i.e. turnover from innovative products). The results suggest that closing this innovation gap would have a small, but nevertheless noticeable, impact on employment, productivity and output in the South West over the longer term.

OUR PARTNERSHIPS



INTRODUCTION

Innovation plays a central role in supporting economic growth and increasing economic prosperity. This bulletin looks at the innovation performance of firms in the South West. It examines the extent to which firms in the region are less innovative than are firms in other parts of the UK, seeks to identify the determinants of any under-performance by South West firms, and investigates the implications of such under-performance for business performance (productivity and growth). It then presents the results of simulations that examine the potential impact on the South West economy of improvements in innovation performance among the region's firms.

The South West is one of the top performing UK regions in terms of R&D expenditures by business. Broader evidence on innovation from the *UK Innovation Survey* suggests that the region's firms are less likely to be engaged in most types of innovation activity, less likely to introduce actual innovations, derive a smaller share of revenues from innovative products, and are less likely to report various benefits of innovation than are their counterparts in the South East or in the UK as a whole. To a large extent, however, these differences in innovation performance can be explained by regional variation in the characteristics of firms that determine their innovation performance. The main exception concerns the importance of innovative products to the revenues of South West firms.

Many aspects of innovation activity are significantly related to improved business performance – higher productivity and faster growth of employment, productivity and output. More innovative firms tend to perform better than otherwise similar, but less innovative, firms in terms of these basic performance measures. We report the results of three simulations looking at the impact of improvements to innovation performance in those areas where South West firms significantly underperform relative to similar firms in the South East of England (turnover from innovative products). The results suggest that closing this innovation gap would have a small, but nevertheless noticeable, impact on employment, productivity and output in the South West over the longer term.

INNOVATION, PRODUCTIVITY & GROWTH

Innovation is central to the process of long run economic growth, and so to the future prosperity of all economies. Growth in economic output and income results either from increased resource inputs (in terms of quantity or quality) or from increased productivity of resources (higher output per unit of resource input). One of the main findings of decades of research into economic growth is that most growth in advanced economies is due to improved productivity, rather than merely to growth of resource inputs. And innovation is a key driver of long term growth in productivity. Understanding innovation is therefore a key requirement for understanding the growth process and for designing policies to support that process.

Until fairly recently, there has been a dearth of data with which to analyse innovation within the UK regions and the contribution of innovation to regional economic performance. This situation has improved following the introduction of major firm-level innovation surveys in the UK and other European countries. These surveys follow general guidelines on the measurement of innovation set out in the OECD's 'Oslo Manual'¹. Innovation is defined to cover a broad range of activities, including the introduction of new or significantly improved products (product innovation); or processes (process innovation); various forms of investment in innovation activities (R&D, capital goods, software, design activities, training, marketing, etc.); and various types of managerial and organisational changes.

¹ OECD (2005).

Analysis of the results of innovation surveys suggests strong links between various types of innovation activity and firm performance, including increased market share, faster revenue growth, reduced costs, increased profitability and productivity². Innovation is also a major factor in the growth of output and productivity in regional and national economies. The literature on technology spillovers also suggests that engagement in innovation activities (like R&D) contributes to a firms’ ability to exploit the knowledge generated by others’ innovations (“absorptive capacity”). This is because some knowledge is ‘tacit’ (not easily codified in manuals and textbooks), and is hard to acquire without direct engagement in knowledge-creation. By engaging in R&D and other innovation activities, a firm acquires the tacit knowledge that allows it to understand and assimilate the discoveries of others. This suggests that innovation activities have two roles: to stimulate innovation itself and to facilitate the imitation of others’ discoveries³.

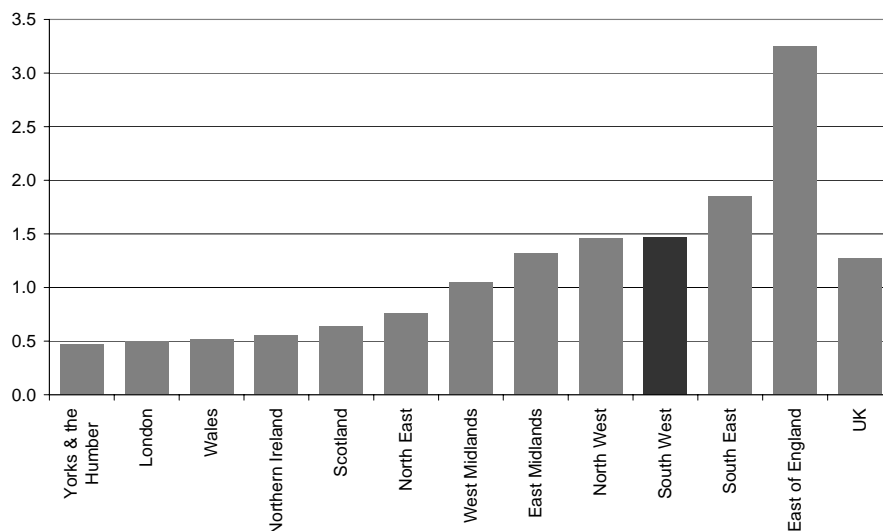
INNOVATION IN THE SOUTH WEST

Research & Development

The South West is one of the top performing UK regions in terms of R&D expenditure by business. Business R&D spending amounted to around 1.5% of South West England GVA in 2006 (Figure 1), above the equivalent figures for England (1.4%) and the UK as a whole (1.3%). The South West was the third best performing UK region by this measure behind the East of England and the South East.

Figure 1: Business R&D Expenditure

% of regional GVA



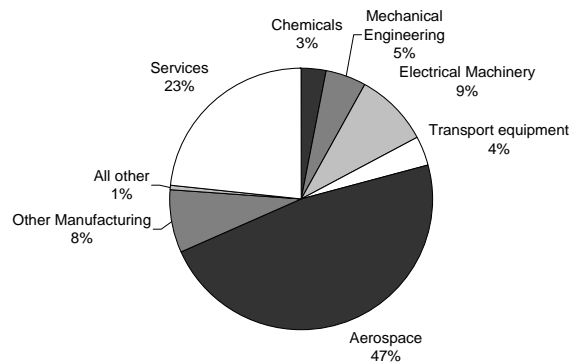
Source: National Statistics

R&D expenditure is known to be strongly influenced by industry structure. The South West benefits, in particular, from the region’s strong Aerospace presence. According to ONS data, Aerospace accounted for almost half of all business R&D in the South West during 2005 (Figure 2), but the sector makes up less than 2% of regional GVA. This implies that expenditures on R&D by the South West’s Aerospace sector amounts to around 30% of the sector’s GVA. Excluding Aerospace, South West R&D expenditure falls to around 0.7% of GVA – although this is still high in comparison to many UK regions.

² E.g. Crepon et al (1998); Loof et al (2000, 2001); Roper et al (2002); Griffith et al (2006a).

³ e.g. Abramovitz (1986); Cohen & Levinthal (1989); Griffith et al (2006b).

Figure 2: Business R&D Expenditure
% of regional GVA



Source: National Statistics, *Research & Development in UK Businesses 2005*; *Business Monitor MA14*

Business R&D in the South West has been growing relatively quickly during recent years. R&D expenditure by firms in the region increased at around 5.8% a year, on average, during 1999-2006, compared to 3.4% annual growth in R&D expenditure for the UK as a whole.

Evidence from Innovation Surveys

R&D expenditures or other standard measures of innovation such as patent registrations, tend to focus attention on scientific and technical innovation activities within manufacturing sectors. Thus, data from the ONS suggest that manufacturing, which makes up only around 12% of the UK economy in terms of output, accounted for around 77% of total business R&D expenditure in the UK during 2005. On the other hand Services, with 80% of total economic activity, contributed only 22% of business R&D, most of which was concentrated in technology-intensive (and 'knowledge intensive') services such as telecommunications and computing.

Scientific and technical R&D are clearly important sources of new products and technologies underlying economic growth. However, firms' innovation activities are much broader than R&D and patenting, and also include less formal, and ongoing, improvements to products, processes, organisation and marketing. Innovation of these types is especially important within service sector activities, which dominate modern economies. Services may do relatively little formal R&D, and may not register patents or other Intellectual Property (IP), but they do develop new products and new ways of delivering those products. This means that broader measures of innovation are needed to identify the extent and nature of innovation within the wider economy, including the service economy.

Evidence on levels of innovation, more broadly defined, can be obtained from the *UK Innovation Survey*. The survey provides evidence on the practices and resources used by businesses in their innovation efforts; the outputs of those efforts in terms of new products, processes, and wider innovations; and the impacts of innovations on various aspects of business performance. These include both product and process innovations, as well as wider innovations in, for example, marketing and business organisation. The analysis presented here is largely based on the 2005 survey, which was carried out by ONS on behalf of the then Department for Trade

& Industry, and provides data on various types of innovation activities, efforts and achievements within UK businesses during the period 2002 – 2004⁴.

According to the UK Innovation Survey, the majority of UK businesses engage in some kind of innovation activity (Table 1). 57 per cent of all enterprises surveyed were identified as being 'innovation active'. Around 25 per cent of businesses reported having introduced a product innovation between 2002 and 2004, while 16 per cent reported introducing a process innovation. Around 54 per cent of firms had devoted financial resources to innovation-related activities during this period. A third of firms introduced some wider innovation, in the form of changes to their marketing, organisational structure or corporate strategy, or the introduction of 'advanced management techniques'. All types of innovation activity were found to be significantly more common among larger businesses than among small firms.

Table 1: Innovation Activity by UK Businesses, 2002-2004

Enterprises engaging in innovation activities (%)	Size of enterprise: employees			
	10-49	50-249	250+	All 10+
Product Innovation ¹	23	33	39	25
Goods	14	24	28	16
Services	17	18	23	17
Process Innovation ²	14	21	31	16
Ongoing or abandoned activities	9	14	21	10
Innovation-related expenditure	52	64	68	54
Wider innovation ³	30	45	58	33
ALL Innovation Active ⁴	55	67	72	57

Notes:

1. New or significantly improved products
2. New or significantly improved processes
3. Marketing strategy, organisational structure, corporate strategy, advanced management techniques
4. Any of above

Source: ONS UK Innovation Survey, 2005

A simple analysis of the proportion of firms that were innovation active in each of the UK regions shows little geographical variation in innovation (Table 2). The shares of firms engaging in some form of innovation activity ranges from around 55 per cent in the East of England to 60 per cent in the South East. The share of firms engaged in innovation within the South West is in line with the UK and England averages, at 57 per cent. The South West ranks 4th among the UK regions in terms of the share of its firms engaged in some form of innovation activity, and matches the UK as a whole in terms of all major types of innovation activity.

⁴ DTI (2006).

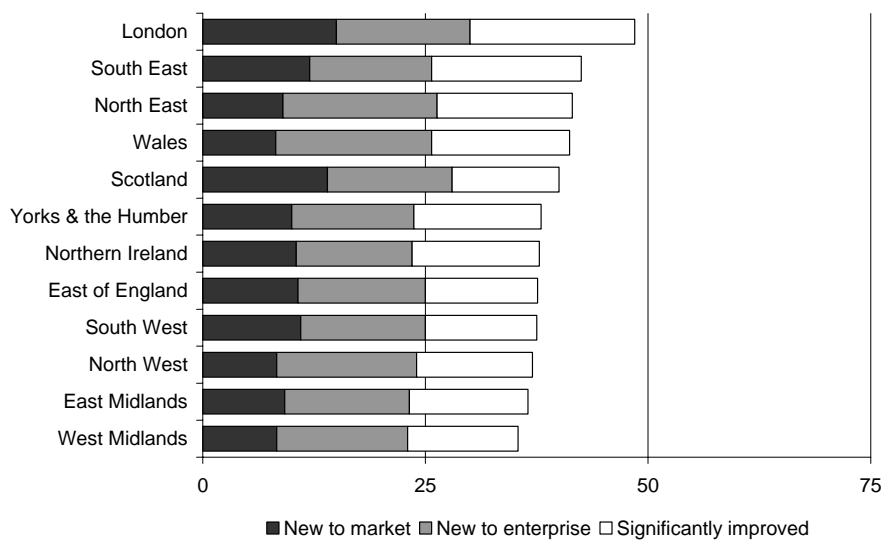
Table 2: Innovation Activity in the UK Regions, 2002-2004

	Innovation Active	of which: Product Innovator	Process Innovator	Wider Innovation	Broader Innovation
North East	57	25	16	30	60
North West	58	24	15	33	62
Yorks & the Humber	58	25	15	32	62
East Midlands	57	27	16	33	60
West Midlands	55	24	16	30	58
East	55	26	17	33	60
London	57	27	17	37	61
South East	60	28	16	36	64
South West	57	25	16	33	61
Wales	57	24	16	30	60
Scotland	56	22	16	32	60
Northern Ireland	56	21	19	26	59
UK	57	25	16	33	61
SW Rank	4	5	4	3	4

Source: UK Innovation Survey, 2005

Figure 3: Average revenue share of innovative products

% of total revenue, Product innovators only



Source: UK Innovation Survey, 2005

Firms in the South West, on average, derive relatively low shares of revenue from innovative products (Figure 3). Overall, new or significantly improved products contributed to around 37 per cent of total revenue for South West firms, the 4th lowest share among the UK regions. South West firms do, however, perform somewhat better in terms of revenues from new products (ranked 6th) and, particularly, from ‘novel’ (new to market) product innovations (ranked 4th). The region’s firms derive a relatively low share of revenue from ‘significantly improved’ products (ranked 10th). In all cases, the importance of product innovations, by this measure, is substantially lower for South West firms than is the case for best performing regions – London and the South East.

Table 3 provides an overview of various aspects of innovation activity and performance comparing firms in the South West of England with the UK and South East, the region with the strongest innovation performance overall. This evidence suggests that, looking at a broad sample of enterprises within the South West, the region’s firms are less likely to be engaged in most types of innovation activity, less likely to introduce actual innovations, derive a smaller share of revenues from innovative products, and are less likely to report various benefits of

innovation than are their counterparts in the South East or in the UK as a whole. Previous research has indicated that innovation activities tend to be strongly clustered at the level of individual firms – i.e. firms that engage in one type of activity tend also to engage in other innovation efforts. The results in Table 3 therefore suggest a general pattern of weaker engagement in innovation among South West businesses than in the South East or UK. Thus, while the aggregate data on business R&D suggests a high level of innovation investment among South West firms, this is largely accounted for by the extremely high level of R&D within the region's Aerospace sector. Looking at the South West economy as a whole, and at broader measures of innovation, the region's innovation performance does not match that for the UK as a whole, and is substantially weaker than that of the South East.

Table 3: Summary of Innovation by South West Firms
Enterprises reporting innovation activities, outputs & impacts

	SW vs UK	SW vs SE
Activities		
Some innovation activity	+	-
Total Innovation Expenditure	-	-
In-House R&D	-	-
External R&D	-	-
Machinery etc.	-	-
External Knowledge	-	-
Training	-	-
Design	-	-
Marketing	+	-
Outputs		
Product Innovation	-	-
Process Innovation	-	-
Novel Product (new to market)	+	-
Novel Process (new to industry)	+	+
% of Turnover from significantly improved products	-	-
% of Turnover from new to enterprise products	-	-
% of Turnover from new to market products	+	-
% of Turnover from all product innovations	-	-
Corporate Strategy	-	-
Advanced Management Techniques	-	-
Organisational Structure	-	-
Marketing Innovation	-	-
Impacts		
Increased product range	-	-
Expanded markets	-	-
Improved product quality	+	-
Improved flexibility of production	-	-
Increased production capacity	-	-
Reduced unit costs	-	+
Reduced environmental impact or improved health & safety	-	+
Regulatory compliance	+	-
Increased value added	+	-

Source: UK Innovation Survey, 2005

Note: + (-) refers to a statistically significant positive (negative) effect, those in bold are significant at the 1% level or less, others at the 5% level or less.

Drivers of Innovation Performance

The UK Innovation Survey also provides evidence on the drivers of innovation activity, and of innovation outputs, at the level of the individual firm. Econometric analysis of the survey data has shown that a firm's decision to invest in innovation is related to a number of firm characteristics, including its size, industry, the scope and nature of the markets in which it operates (local, national or international; whether sales are primarily to business, public sector or final consumers), the extent to which the firm accesses information from external sources (other firms, research institutions, etc.) and cooperates on innovation activities, the receipt of public support for innovation, and the firm's ability to protect the results of its innovation efforts⁵. We can use the UK Innovation Survey to investigate the extent to which these factors account for the innovation performance of South West firms, and whether there is any evidence of

⁵ Many of the results presented here are based on those in Bahkshi, McVittie & Simmie (2008). See that report for further details on data, methods and results.

systematic ‘under-performance’ by the region’s firms after accounting for the other determinants of innovation.

Table 4 shows some of the major determinants of innovation that have been identified in the research literature using innovation survey data. The literature has found a strong link between firm size and innovation: larger firms are more likely to engage in innovation activities and to produce innovation outputs (product or process innovations and wider forms of innovation). The scope and nature of firms’ product markets is also strongly related to their innovation performance. Firms are significantly more likely to be innovation active if they sell in export markets, and less likely to innovate if they are confined to local markets. They are also more likely to innovate if they sell primarily to other organisations, whether businesses or public institutions, than if they sell mainly to final consumers. An extensive literature has identified ‘human capital’ (workforce skills), and particularly higher education, as a key resource for both undertaking innovation within the firm itself, and for exploiting innovation carried out by other firms. Firms that access a variety of external sources of information (clients and suppliers, research institutions, etc.) and those that collaborate with other firms in their innovation efforts, also have significantly better innovation performance. The nature of the product that the firm produces (and consequently the industry to which it belongs) also significantly influences its innovation activities and outputs.

Table 4: Innovation Drivers

	Direction of innovation impact	Prevalence:	
		SW vs. UK	SW vs. SE
Firm Size	+	-	-
Confined to Local Market	-	+	+
Exporters	+	-	-
Sales Mainly to Business	+	-	-
Sales Mainly to Public Sector	+	+	+
Science & Engineering Graduates	+	+	-
Other Graduates	+	-	-
Industry Structure		-	-
Use of External Information Sources	+	+	-
Information from suppliers or customers	+	+	-
Information from external research institutions	+	-	-
Cooperation on Innovation	+	-	-

Source: UK Innovation Survey, 2005

Note: + (-) refers to a statistically significant positive (negative) effect, those in bold are significant at the 1% level or less, others at the 5% level or less.

Evidence from the UK Innovation Survey suggests that firms in the South West are disadvantaged with regard to most of these determinants of innovation compared with those in the South East, and in many cases with those in other parts of the UK. The South West has more small firms, and average firm size is lower. South West firms are also more likely to be confined to local markets and less likely to export, than are those either nationally or in the South East. The South West has higher levels of graduate employment than has the UK as a whole, but lower graduate employment than the South East. Despite the strong presence of the Aerospace sector noted above, the South West has larger shares of less innovative industries than do other parts of the UK. Firms in the South West are more likely to use external information sources, and in particular to derive information from suppliers and customers, than are their counterparts nationally (although, again, firms in the South East are even more so). They are, however, less likely to access information from external research institutions, and less likely to engage in collaborative innovation.

How do these features influence the level of innovation activities within the South West? Table 5 (over) reports the results of detailed econometric analysis of the UK Innovation Survey data. The results suggest that, in almost all cases, the apparently weak innovation performance of the

South West’s firms can be explained by the determinants of innovation listed in Table 4. Thus, although innovation activities are less prevalent in the South West than in the UK as a whole or the South East (Table 3), in many cases these differences are not statistically significant, and in others the ‘South West’ effect vanishes once account has been taken of other determinants of innovation. If the region’s firms have weaker innovation performance than those in the South East, this is primarily because they are smaller, less export focused, and in industries with relatively low levels of innovation, etc., rather than because they are located in the South West of England.

Table 5: Innovation Performance of South West firms – Econometric Results

	South West location		Firm Size	Scope of Market	Graduate Employment	External Knowledge / Collaboration	Policy Support
	Unconditional	Conditional					
Activities							
Some innovation activity	-	0	+	+	+		+
In-House R&D	-	0	+	+	+		+
External R&D	-	0	+	+	+		+
Machinery etc.	0	0	+	+	0		+
External Knowledge	-	0	+	+	+		+
Training	0	0	+	+	+		+
Design	-	0	+	+	+		+
Marketing	0	0	+	+	+		+
Outputs							
Product Innovation	-	0	+	+	+	+	+
Process Innovation	-	0	+	+	+	+	+
Novel Product (new to market)	-	0	+	+	+	+	+
Novel Process (new to industry)	0	0	+	+	+	+	+
% of Turnover from significantly improved products	-	-	-	+	+	+	+
% of Turnover from new to enterprise products	0	-	-	+	+	0	+
% of Turnover from new to market products	0	0	-	+	+	+	+
% of Turnover from all product innovations	0	0	+	+	+	+	+
Corporate Strategy	-	-	+	+	+	+	+
Advanced Management Techniques	0	+	+	+	+	+	+
Organisational Structure	-	0	+	+	+	+	+
Marketing Innovation	-	0	+	+	+	+	+
Impacts							
Increased product range	-	0	+	+	+	+	+
Expanded markets	0	0	+	+	+	+	+
Improved product quality	0	0	+	+	+	+	+
Improved flexibility of production	-	0	+	+	+	+	+
Increased production capacity	0	0	+	0	+	+	+
Reduced unit costs	0	0	+	+	+	+	+
Reduced environmental impact/ health & safety	0	0	+	0	+	+	+
Regulatory compliance	0	0	+	0	0	+	+
Increased value added	0	0	+	+	+	+	+

Source: Author’s Analysis of UK Innovation Survey Data

Notes: + (-) refers to a statistically significant positive (negative) effect, those in bold are significant at the 1% level or less, others at the 5% level or less. 0 denotes that there is no statistically significant relationship in the data. Conditional results control for the drivers of innovation performance identified in Table 4, unconditional results do not include those control variables.

The results in Table 5 imply ‘under-performance’ by South West firms only with respect to a narrow range of innovation behaviours and results (the SW columns, and particularly in the ‘conditional’ column, contain mainly 0s). Thus, we identified above that firms in the South West derive a relatively small share of revenues from innovative products, and the results in Table 5 imply that this is not fully explained by various determinants of innovation performance (size, etc.). This suggests that South West firms derive less of their revenues from innovative

products than do otherwise similar firms in the South East. Similarly, South West firms appear less likely to introduce corporate strategy innovations, but more likely to adopt ‘advanced management techniques’⁶.

INNOVATION & BUSINESS PERFORMANCE

How do these various aspects of innovation performance influence business performance? The UK Innovation Survey includes some basic information that can be used to investigate the impact of innovation on aspects of business performance: turnover per worker (a rough measure of productivity⁷), and growth of employment, output and ‘productivity’. Table 6 summarises the results of this analysis in qualitative terms⁸. The table shows where there are significant (positive or negative) impacts from location in the South West and from various innovation activities and outputs on turnover per worker, employment growth and productivity growth.

Table 6: Innovation and business performance
Results of Econometric Analysis of Innovation Survey data

	Turnover per worker	Employment Growth	Productivity Growth
South West Location	-	0	-
Activities			
In-House R&D	0	0	0
External R&D	+	0	0
Machinery etc.	0	0	0
External Knowledge	0	+	0
Training	0	0	0
Design	+	0	0
Marketing	+	0	0
Outputs			
Product Innovation	+	+	+
Process Innovation	+	0	0
Novel Product (new to market)	0	+	+
Novel Process (new to industry)	+	+	+
% of Turnover from significantly improved products	0	+	+
% of Turnover from new to enterprise products	0	+	+
% of Turnover from new to market products	+	+	+
Wider Innovation	+	+	+

Source: Author’s Analysis of UK Innovation Survey Data

Notes: + (-) refers to a statistically significant positive (negative) effect, those in bold are significant at the 1% level or less, others at the 5% level or less. 0 denotes that there is no statistically significant relationship in the data.

South West Location

The analysis indicates relatively low levels of turnover per worker (our proxy for productivity) among South West businesses, even after allowing for other determinants of productivity such as industry structure, firm size, and graduate employment. This is in accord with other firm-level evidence on productivity in the South West based on other sources⁹. Our analysis also

⁶ Knowledge management systems, Investors in People, etc.

⁷ Standard measures of productivity are based on Gross Value Added (GVA) rather than on turnover or gross output. In broad terms, GVA is equal to turnover less purchases of goods and services by the firm. Higher turnover per worker could, therefore, reflect either higher productivity (GVA per worker) or higher purchases.

⁸ See Bahkshi, McVittie & Simmie, 2008 for further quantitative results.

⁹ UWE/University of Bath (2005)

suggests significantly lower levels of productivity growth among South West firms during the period 2002-2004, again after allowing for other determinants of productivity growth. There was, however, no evidence of any statistically-significant South West deficit in firm-level employment growth over this period.

Innovation Activities

In general, there is only limited evidence of positive effects from innovation activities on business performance during the time period considered. Thus, statistically significant (at the 10% level or less) positive productivity impacts were found only for engagement in external R&D, design activities and marketing activities, and none of the activities had a positive impact on productivity growth. Employment growth was found to be significantly positively related only to the acquisition of external knowledge for innovation.

It is worth noting that since the survey relates to the period 2002-2004, the growth information relates to only a short time frame and is, therefore, unlikely to be representative of the ultimate impact of innovation on business growth. In particular, innovation is an investment process which may take a long time to bear fruit, so that there are lengthy lags between a firm conducting innovation activities, those activities yielding marketable new products, new production processes, etc., and those innovations resulting in improvements in business performance. Thus, to the extent that it is driven by innovation, firm level differences in growth performance may reflect the effects of activities conducted before 2002 rather than those reported on within the Innovation Survey. Evidence from other studies has, however, shown that firms tend to engage in innovation activities on a persistent basis, so that innovation activities reported as having been undertaken during 2002-2004 may serve as an (admittedly imperfect) proxy for activities undertaken prior to that period.

Innovation Outputs

Given the time required to develop and implement innovations (whether product, process or wider), we might expect to find stronger links between innovation outputs and business performance, than between innovation activities and performance. This is generally confirmed by the data, which suggests a significant positive relationships between most measures of innovation output and business performance. Thus, businesses introducing new products, processes and wider innovations are more productive and grow faster than those that do not (after allowing for other determinants of business performance). Firms that introduce novel products and processes generally perform better than those introducing less significant innovations. And firms with high shares of revenue from innovative products outperform those where innovative products make a smaller contribution to revenues.

INNOVATION & PRODUCTIVITY: SCENARIOS

This section considers the implications of increases in innovation activity within South West firms for regional employment, productivity and output.

The analysis presented above suggests that, while South West firms are less strongly engaged in innovation activities, and are less likely to innovate, than are firms in the South East of England, the strongest performing UK region in terms of innovation, these differences are primarily due to the characteristics of South West businesses (relatively small size, industry structure, concentration on local markets and relatively low levels of exporting, etc.) rather than indicating poor innovation performance by the region's firms, per se. In most respects, the innovation performance of South West firms appears to be similar (not statistically different from) that of similar firms in the South East.

We might take this to imply that there is less scope for improving the innovation performance of South West firms than the raw innovation survey data might suggest. A companion bulletin looks at this issue in greater detail, by looking at barriers to innovation faced by South West firms, their access to knowledge networks, and receipt of public policy support for innovation activities.

The analysis does show some areas in which South West firms are less engaged with innovation than the South East. In particular, the evidence suggests that firms located in the South West derive a smaller share of their total revenues from innovative products than do otherwise similar firms located in the South East.

Here we look at three scenarios which consider the implications of stronger innovation performance by South West firms. First, close the unconditional gap between South West and South East performance.¹⁰ Note that this would imply that South West firms outperform those in the South East, once account is taken of other characteristics influencing innovation performance. Second, we examine the implications of closing the conditional gap between South West and South East performance with respect to the shares of revenue obtained from innovative products. Third, we focus on the financial & business services industries as an area where South West firms perform relatively poorly compared to those located in the South East. We consider the impact of closing the innovation gap between South West and South East financial and business services firms.

We look at the impact of these scenarios relative to our baseline projections for the South West economy¹¹. Those projections are for growth in GVA within the South West economy at an average annual rate of 5.8 per cent (in nominal terms) during the period to 2015. Employment is projected to grow at 1.6 per cent a year during the same period. This implies productivity growth at around 4.2 per cent a year in nominal terms over the period.¹²

Scenario 1: The share of revenues from innovative products among South West firms rises to match that for the South East of England (Table 7).

Table 7: Revenue shares for innovative products under scenario 1

	SW	SE	Change
Significantly improved products	3.6	5.3	1.7
New to enterprise products	3.1	3.9	0.9
New to market products	2.8	3.1	0.3

The rise in revenue shares for innovative products is associated with increases to productivity (revenue per worker), growth of employment and growth of productivity. We assume that GVA per worker grows to match the growth in revenue per worker. The resulting performance improvements for South West firms are, therefore, as follows: productivity increases immediately by 0.2% and then grows at a marginally (0.06%) faster annual rate than in the baseline; employment rises by 0.2% per year above the baseline; and total output rises at 0.25% a year above the baseline growth rate. Applying these performance improvements among South West firms across the economy as a whole, the result is significantly to raise employment, productivity and output relative to that in the baseline projections. Total South West GVA rises by around 1.3% above baseline by 2015 – adding around £1.9 billion to the

¹⁰ 'Conditional' results control for the drivers of innovation identified in Table 4 (firm size, etc.). 'Unconditional' results do not include these controls. Closing the 'unconditional' gap means that South West firms perform like their South East equivalents despite differences in firm characteristics that we would expect to reduce innovation performance in the South West.

¹¹ Our most recent published projections are reported in BEM, *South West Economy Projections: Autumn 2008*. The simulations result in impacts relative to the baseline projections and are independent of those baseline projections.

¹² These are trend growth forecasts and do not include the effect of the current recession.

total output of the South West economy (in nominal prices, i.e. not adjusting for inflation). This is made up of a 0.7% increase in employment (or around 19,000 additional jobs), and a 0.6% rise in productivity (GVA per job).

Scenario 2: The share of revenues from innovative products among South West firms rises to match that for *equivalent* firms in the South East

(i.e. after allowing for differences in firm size etc. between the regions, and for the impact of firm-level characteristics on innovation). The resulting increases in revenue shares to innovative products are shown in Table 8. The share of revenue for ‘new to market’ innovations is not changed, since there is no significant difference between the South West and South East for this measure of innovation.

Table 8: Revenue shares for innovative products under Scenario 2

	SW Base	SW Change	SW scen. 2
Significantly improved products	3.6	1.2	4.8
New to enterprise products	3.1	0.7	3.7
New to market products	2.8	0.0	2.8

The impact of this scenario on individual firms is to raise productivity immediately by around 0.15% and to raise productivity growth by around 0.03% per year thereafter. The employment growth rate among affected firms also rises by around 0.1% a year. Growing the private sector of the South West economy according to these impacts implies that total South West GVA increases by around £1 billion, or 0.7%, by 2015. This is made up of a 0.4% increase in employment (equivalent to an additional 10,700 jobs) and a 0.3% increase in productivity.

Scenario 3: The share of revenues from innovative products within Financial & Business Services firms in the South West increases to match that for *equivalent* firms in the South East.

The resulting increases in revenue shares are shown in Table 9. As with Scenario 2, the share of revenue for ‘new to market’ innovations is not changed, since there is no significant difference between the South West and South East for this measure of innovation.

Table 9: Revenue shares for innovative products under Scenario 3

Financial & Business Services firms only

	SW Base	SW Change	SW scen. 2
Significantly improved products	4.5	2.6	7.0
New to enterprise products	3.2	1.5	4.7
New to market products	4.4	0.0	4.4

The impact of this scenario is to raise the productivity of Financial & Business Services firms in the South West and to raise their productivity, employment and output growth rates. Among these firms, productivity increases immediately by around 0.28% and then by 0.07% a year above the baseline productivity growth rate. Employment growth also accelerates, with the annual growth rate increasing by around 0.24%. Applying these results across the Financial & Business Services sectors in the South West results in a £1.1 billion boost to output (GVA) in the South West economy by 2015, an increase of around 0.7% over projected GVA under the baseline projection. Employment expands by around 7,000 jobs by 2015, an increase of around 0.3% over the baseline. Aggregate South West productivity (GVA per job) rises by 0.4% over the baseline. Table 10 provides a summary of the long run impacts of the three scenarios outlined above.

Table 10: Summary of simulation results

	Impact by 2015 (% increase over base)		
	Scenario 1	Scenario 2	Scenario 3
Employment	0.7	0.4	0.3
Productivity	0.6	0.3	0.4
Output	1.3	0.7	0.7

The results reported above also include some indirect effects of improved innovation performance among South West firms. The expansion in output by more innovative firms will support additional activity in other firms within the region which supply to those firms, and in those that produce consumer goods for which local demand increases following increases to household incomes. At the same time, constraints on the supply of inputs to production (particularly labour) mean that the expansion in employment among more innovative firms may raise wages for other firms, restricting the overall growth in output and employment. The above results include these effects on the assumption that all firms (or all firms within the F&B sector for scenario 3) enjoy equal improvements in productivity, employment and output. In scenarios 1 and 2, the general improvement in performance with private businesses means that growth in one sector is not at the expense of others. There are, however, constraints on labour supply at the level of the whole South West economy, and these restrict employment growth at least in the short term. This affects the structure of production in the region since the cost implications depend on how labour intensive production is, which varies substantially between sectors. Over time, however, higher wages encourage increased in-migration into the region removing these employment constraints.

In scenario 3, the improved performance of the financial and business services sector results in an expansion of output and employment in this sector (secured in the model through reduced costs, increased competitiveness and expanded exports to the rest of the UK and overseas). Higher output and incomes result in expanded demand for other South West products (the standard multiplier effects). At the same time, higher labour demand in Financial & Business services results in increased wages in the short term, with adverse implications for costs, competitiveness and activity in other parts of the regional economy. As above, these labour supply constraints are relaxed over time through increased in-migration.

Our results do not capture the potential impacts of knowledge spillovers within the South West economy. Increased innovation activities by innovating firms will raise the stock of useful knowledge in the economy as a whole, generating benefits for South West firms beyond those that directly result from increased innovation activities. To the extent that these spillovers are localised within the South West, the impact of this will be to improve economic performance – further increasing productivity, enhancing competitiveness and expanding output and employment. Empirical evidence suggests that these knowledge spillovers are significant, but most research has been at larger geographical scales (e.g. for spillovers within and between countries) and provides little information on the extent to which we might expect spillovers to be contained within the South West, and the potential economic benefits from these.

CONCLUSIONS

Innovation is the main driver of long run economic growth and prosperity. Understanding innovation is therefore a key requirement for understanding the growth process and for designing policies to support that process.

This bulletin examines the innovation performance of firms in the South West, comparing this with that of firms in the South East of England, the strongest performing UK region in terms of innovation. It seeks to explain the differences in innovation performance between the South West and the South East, and investigates the implications of these differences for business performance within the region. It then presents the results of simulations of the potential impact of improvements in innovation performance for the South West economy as a whole.

The South West is one of the top performing UK regions in terms of R&D expenditures by business. R&D in the South West is strongly concentrated within a single industry – Aerospace – which accounts for almost half of all business R&D in the region during 2005.

A wider view of innovation activities, outputs (product and process innovations) and their determinants can be obtained from the *UK Innovation Survey*. Evidence from this survey suggests that, looking at a broad sample of enterprises within the South West, the region's firms are less likely to be engaged in most types of innovation activity, less likely to introduce actual innovations, derive a smaller share of revenues from innovative products, and are less likely to report various benefits of innovation than are their counterparts in the South East or in the UK as a whole.

To a large extent, however, these differences in innovation performance can be explained by regional variation in the characteristics of firms that determine their innovation performance (size, industry, scope of product markets, skills, etc.). Evidence from the UK Innovation Survey suggests that firms in the South West are disadvantaged with regard to most of these determinants of innovation compared with those in the South East, and in many cases with those in other parts of the UK. After controlling for these characteristics, there is little evidence of systematic under-performance among South West firms with respect to innovation activities, outputs or impacts.

The main exception concerns the importance of innovative products to the revenues of South West firms. Firms in the South West derive a significantly smaller share of their total revenues from innovative products (and particularly from marginal as opposed to novel innovations) than do otherwise similar firms in the South East.

Many aspects of innovation activity are significantly related to improved business performance – higher productivity and faster growth of employment, productivity and output. More innovative firms tend to perform better than otherwise similar, but less innovative, firms in terms of these basic performance measures.

We report the results of 3 simulations looking at the impact of improvements to innovation performance in those areas where South West firms significantly underperform relative to similar firms in the South East of England (turnover from innovative products). The results suggest that closing this innovation gap would have a small, but nevertheless noticeable, impact on employment, productivity and output in the South West over the longer term.

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