

# ECONOMICS

**BIS** | Department for Business  
Innovation & Skills

**BIS ECONOMICS PAPER NO. 18**

**INDUSTRIAL STRATEGY:  
UK SECTOR ANALYSIS**

SEPTEMBER 2012

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# Foreword

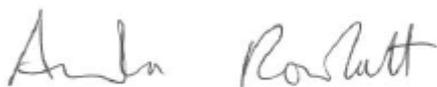
The UK is experiencing unprecedented economic developments. The economy has suffered as banks, governments and households seek to rebuild balance sheets after a period of unsustainable borrowing. Developments in the Eurozone and elsewhere depress business confidence and act as a brake on exports, investment and growth.

In these unprecedented circumstances, it is important to take stock of where future growth is likely to come from, and how this may be best achieved in these tight fiscal times.

This analytical paper reviews a range of evidence on which sectors could make the greater contribution to future economic growth and employment in the UK, and then considers in which Government action could add most value. These include parts of:

- *Advanced manufacturing*, including aerospace, automotive and life sciences.
- *Knowledge intensive traded services*, including professional and business services, the information economy and traded aspects of higher and further education.
- *Enabling sectors*, such as energy and construction.

This paper is not intended to provide an evaluation of past UK industrial strategies, although an understanding of why these succeeded or not will be essential in developing the new strategic approach. We will need to base the new strategies on robust analysis. We will collaborate with analysts from across Government as sectors are influenced by a wide range of departmental policies and produce further economics papers as strategies for specific sectors are developed.



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# 1. Introduction

British businesses are calling for greater clarity from the Government on its long term approach to supporting business. This is needed to build confidence to encourage investment in difficult economic times. Hence, our approach to industrial strategy is designed to provide the clarity needed, and is based on several key principles:

- A focus on the long term to build sustainable growth – making enduring decisions, allowing sufficient time for policies to work, and creating long-lasting structures to support stable delivery.
- A continuing commitment to open and competitive markets as a means to stimulate innovation and growth.
- Identifying where the UK can have greatest success in capturing high value opportunities based on its key strengths and capabilities, and putting the weight of Government behind these areas to enhance them.
- Building a collaborative but challenging strategic partnership with industry to ensure appropriate government intervention which delivers the desired market outcomes.

We are clear that our approach is not about quick solutions and we are also aware that it is not risk free. Nevertheless, a sector-based approach continues to have an important policy role as a tool in the government's industrial strategy. This analytical paper assesses the current state of UK sectors, and explains the basis for the Government's new sector approach as part of its industrial strategy.

## Why sectors matter

Horizontal policies, such as setting the legal and regulatory frameworks in which businesses across the economy operate, form the bedrock of industrial strategy. Within this framework, it is crucial to take into account sector-specific effects. More broadly, there are several key reasons why a sector approach is a necessary tool of economic policy, notably:

- (i) ***Economic conditions vary across sectors and sector considerations give key insights into how to design and deliver policy.*** For example, enabling sectors such as information and communication technology (ICT) and electronics potentially offer widespread gains as the technologies they generate often drive innovation and productivity across the whole economy, or provide the solutions for end users that differentiate them in the market. For example, the emergence of the internet has led to rapid take-up of online banking which at the same time as offering consumers greater convenience enables retail banks to lower the costs of managing customer accounts. A range of other factors - such as sources of competitive advantage, tradeability of inputs/outputs, and different challenges in routes to market - vary by sector, as will the appropriate policy response.

- (ii) ***As with private sector activity, Government interventions to support industry carry a significant risk they will not fully achieve their objectives.*** This can arise due to the potential for unintended consequences, or because insufficient account is taken of diversity in the economy. A sector lens is therefore critical to minimising the risks of government failure. In some cases sector insights may lead to policy adjustments – for example, as sectoral variations in pay are used to inform the level at which the national minimum wage is set and ensure low wage sectors remain competitive. In other cases, a sector lens may be used to introduce specific derogations. For example, the forthcoming package for energy intensive users seeks to ensure their competitiveness whilst meeting demanding emission reductions.
- (iii) ***The Government may need specific contributions from particular sectors to achieve its economic policy goals.*** For example, the climate change targets the Government has agreed cannot be delivered without a major contribution from the construction industry, given that a high proportion of carbon emissions arise from buildings and how they are used.<sup>1</sup> This point also applies to other cases, notably in the delivery of various aspects of public services. For example, the roll out of broadband in rural areas is important to the overall provision of ICT and the social inclusion agenda.
- (iv) ***Businesses often organise themselves in sectors, as evidenced by the range of sector specific trade bodies.*** This structure arises partly because many businesses face common market conditions relating to the products or services they provide, share similar concerns and have strong vertical and horizontal links with common channels to market. This means that sectors are an essential tool for interaction between business and government, no matter whether the appropriate policy response is national or sector specific. A sector engagement strategy can enable Government to act as a facilitator in bringing sectors together to solve mutual problems, such as around common supplier development issues.
- (v) ***A strong Government dialogue with business sectors and sector leaders can also have a significant impact on global investment decisions and help drive confidence in the UK as a sustainable location to access global markets.*** A notable case would be where Foreign Direct Inward Investors can see that the UK is aligning its policies – such as in technology, skills, tax and regulation – to support growth in particular sectors. For example, dialogue between government and General Motors was a key factor in the car manufacturer's decision to invest £125m to build the next generation Astra at their plant at Ellesmere Port, securing car production at the site until 2020.

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<sup>1</sup> BIS (2010) *Estimating the amount of carbon dioxide emissions which the construction industry can influence*. Supporting material for the Low Carbon Construction Innovation and Growth Team (IGT) <http://www.bis.gov.uk/assets/biscore/business-sectors/docs/e/10-1316-estimating-co2-emissions-supporting-low-carbon-igt-report>

- (vi) ***A sector-based approach cuts across all Government departments to varying degrees and many government levers are either sector-specific or have a strong sector dimension.*** Procurement policy, for example, is particularly important in healthcare and rail, and regulation in food and drink and professional business services. In addition, a number of policy issues only apply to specific sectors – for example public concern associated with Genetic Modification will apply more acutely in the chemicals industry and agriculture. Specific sector knowledge can also help target horizontal policies more effectively. It is therefore important for government to have a rigorous understanding of sectors and promote a growth-based policy culture across government.
- (vii) ***A sector-based approach plays into wider policy goals.*** It can promote a greater measure of diversity in economic activity, which may secure an enhanced resilience to economic shocks; though McKinsey have argued that the competitiveness of sectors matters more than the sector mix in promoting growth.<sup>2</sup> A sector-based approach also has important spatial impacts as interventions to support, for example, the chemicals industry which is heavily clustered in the North East and North West, will have an effect on local communities. Such effects may be most acute where a sector is dominated by firms based in an Assisted Area.

There are, of course, risks associated with a sector-based approach, most obviously concerning regulatory capture, a possible bias towards incumbent firms and technologies, and possible curbs on competition which can follow. It is also clear that even when we identify weaknesses in sector performance, there are choices to be made about how the government might intervene, or indeed whether it may be able to intervene at all in a cost-effective way.

## Links with horizontal policy

We define horizontal policy as those policies which address economy-wide market failures and provide the resources and economic environment in which all businesses and individuals can operate effectively. Policies range from direct investment in human capital and coordination through to legal and regulatory frameworks. In reality, however, few policies are purely horizontal. For example, BIS has a number of policies which support adult skills, some of which are horizontal, whilst others have greater degrees of sector application as depicted in Box 1 below.

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<sup>2</sup> McKinsey Global Institute (2010) *How to compete and grow: A sector guide to policy*, p.23  
[http://www.mckinsey.com/insights/mgi/research/productivity\\_competitiveness\\_and\\_growth/how\\_to\\_compete\\_and\\_grow](http://www.mckinsey.com/insights/mgi/research/productivity_competitiveness_and_growth/how_to_compete_and_grow)



## UK and international experience

In the UK, the balance between horizontal and sector level interventions has shifted over time.<sup>4</sup> Prior to 1979 there was greater emphasis on sectoral interventions which sought to build national champions and promote industrial consolidation; strategic sectors were nationalised; and there was an emphasis on technology push, with Government supporting certain technology solutions on grounds that they offered "greater market potential". It seems that industrial policies prior to 1979 were often ineffective at improving the long-term viability of the UK's industrial base.<sup>5</sup> Post 1979, some continuity remained, such as in support for the aerospace industry, but there was more use of horizontal instruments to encourage foreign investment, promote competition and liberalise markets.

At the European and international level, horizontal and sector level interventions to address market failures and improve competitiveness, including both supply and demand side measures, are applied in varying degrees by different countries. It is clear that there is no single prescription, and there are many variants of targeted policies. They include policies to: foster clusters, support innovation activity, build links between education providers and industry to strengthen market signals on industry skill demand, attract foreign direct investment, and ensure access to finance. Inevitably there is a high degree of variance, however, in their use and impact.

The policy mix will always differ between countries due to structural and institutional differences, and for reasons such as culture, budgetary constraints and stage of economic development. Hence France has focused on prioritising key sectors through clear national and sector level visions; Finland has focused on building enablers, particularly in the ICT sector; whilst Singapore has historically used more direct government intervention to spur growth. A distinctive feature of the East Asian approach, especially in Korea and Taiwan, has been the focus on exports both as an objective and as the criterion which determined whether companies would receive support from the state. In Japan, the authorities encouraged established companies to co-operate in pre-competitive research and to compete fiercely against one another in the market, as opposed to creating a single national champion.<sup>6</sup>

There is, however, a lack of international consensus on the proper role of government in industrial strategy, which also stems from the mixed nature of the empirical evidence. Simple comparisons of national economic performance do not identify clear differences between those countries with active industrial policies, and those without (Rodrik 2007).<sup>7</sup> In this respect, there is an important role for more robust evaluation, monitoring, reviews, and sunset clauses, including at sector level, which allow the impact of government action to be identified more effectively.

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<sup>4</sup> Owen, G. (2012) *Industrial Policy in Europe since the Second World War: What has been learnt?* ECIPE Occasional Paper No 1/2012, Department of Management, London School of Economics <http://www.ecipe.org/publications/industrial-policy-europe-second-world-war-what-has-been-learnt/>

<sup>5</sup> Ibid.

<sup>6</sup> Ibid

<sup>7</sup> Rodrik, D. (2007) *Normalising Industrial Policy*. Paper for the Commission on Growth and Development. Harvard University, September 2007. [http://www.hks.harvard.edu/fs/drodrik/Research%20papers/Industrial%20Policy%20Growth%20Commission\\_.pdf](http://www.hks.harvard.edu/fs/drodrik/Research%20papers/Industrial%20Policy%20Growth%20Commission_.pdf)

## 2. Sector Performance

The UK economy comprises a wide range of different sectors whose activities, and those of the firms within them, have evolved significantly over time. The changes have been driven by supply-side forces such as technological progress, demand-side forces such as rising incomes or changing consumer tastes and preferences, and in some cases a combination of both pressures – for example where new markets spring from the development of entirely new technologies.

While sectors are a simple and coherent way of looking at the economy, and a useful tool for policy development, they cannot always capture the importance of particular activities, such as those based around emerging sectors or technologies (see Box 2 below). For example, low carbon, renewable and environmental goods and services cannot be easily identified in the data as it has no specific sector classification and cuts across a range of sectors. This can lead to such activities being undervalued.<sup>8</sup>

### Box 2: Industrial Classification Systems and their Limitations

Sectors are commonly defined using the Standard Industrial Classification (SIC) system which is overseen by the UN and other cross-country statistics bodies such as Eurostat. This has the advantage of providing a relatively clear and consistent set of definitions which can be applied across all countries. The process of standardisation, however, has a drawback in that official statistics may not accurately reflect economic activity in certain sectors. This can happen for a number of reasons, including:

- Sectors evolve over time (e.g. due to technological progress) and official statistics are generally slow to keep pace
- Sectors may emerge around new technologies which cut across and underpin many different industries (e.g. industrial biotechnology)
- Industry may not recognise sectors as currently defined by SIC codes, thus firms may not always correctly self-report which sectors they are active in
- Business models of firms may have changed in response to trends such as globalisation (e.g. merger of manufacturing and services activities)
- New industries are emerging within established sectors of the economy which are not captured by the SIC codes (e.g. cyber-security)
- It is also important to note that for historical reasons sector classifications (SIC) are not the same as the categories used in trade data (SITC, HS), or for technologies.

<sup>8</sup> The Low Carbon Sector accounts for an estimated £117bn of turnover and 900,000 jobs. BIS (2010) *Low Carbon and Environmental Goods and Services Report for 2009/10*. Prepared by K-Matrix for the Department for Business, Innovation and Skills and published in July 2011.

<http://www.bis.gov.uk/assets/biscore/business-sectors/docs/11-992x-low-carbon-and-environmental-goods-and-services-2009-10>

## Output and Employment

In common with other developed economies, there has been a marked shift in the structure of the UK economy away from manufacturing and towards services, in particular, to knowledge intensive services such as finance, professional services and ICT. In 2011, knowledge intensive industries accounted for around a third of UK output and a quarter of total employment.<sup>9</sup> By comparison manufacturing contributed just over a tenth to UK output and slightly less to employment. Table 2.1 provides a more detailed breakdown of the contribution of different sectors to the UK economy.

**Table 2.1 UK GVA and Employment by Sector (2011)**

		Output (GVA)		Employment	
		£m	% Share	Thou.	% Share
Low-Med Tech Manuf.	Food, Beverages & Tobacco	27,771	2.0%	399	1.3%
	Metal, plastic and non-metal mineral products	28,005	2.0%	584	1.9%
	Other Manufacturing	21,046	1.5%	566	1.8%
	Shipbuilding	1,246	0.1%	32	0.1%
Med-High Tech Manuf.	Chemicals	16,926	1.2%	119	0.4%
	ICT & Precision Instruments	8,393	0.6%	138	0.4%
	Automotive	6,955	0.5%	133	0.4%
	Aerospace	5,610	0.4%	112	0.4%
	Machinery, Electrical & Transport Equipment	22,748	1.7%	412	1.3%
	Pharmaceuticals	10,023	0.7%	38	0.1%
Other Production	Agriculture, Forestry & Fishing	9,122	0.7%	409	1.3%
	Mining & Quarrying	39,646	2.9%	61	0.2%
	Utilities	37,762	2.7%	327	1.0%
	Construction	91,681	6.7%	2,036	6.5%
Knowledge Services	Communications	23,028	1.7%	227	0.7%
	Digital, Creative & Information Services	61,821	4.5%	1,174	3.7%
	Financial Services	128,830	9.4%	1,116	3.6%
	Business Services	97,528	7.1%	2,235	7.1%
	Research & Development	4,290	0.3%	125	0.4%
	Education	89,676	6.5%	2,722	8.7%
Other Services	Hotels & Restaurants	39,601	2.9%	1,990	6.3%
	Retail	71,016	5.2%	3,070	9.8%
	Transport, Storage & Distribution	149,580	10.9%	3,183	10.1%
	Real Estate	98,091	7.1%	417	1.3%
	Administrative & Support Services	65,509	4.8%	2,432	7.8%
	Public Admin & Defence	67,915	4.9%	1,654	5.3%
	Health & Social Care	106,766	7.8%	4,079	13.0%
	Community, Social and Personal services	42,814	3.1%	1,591	5.1%
	<b>Whole Economy</b>	<b>1,373,399</b>		<b>31,378</b>	

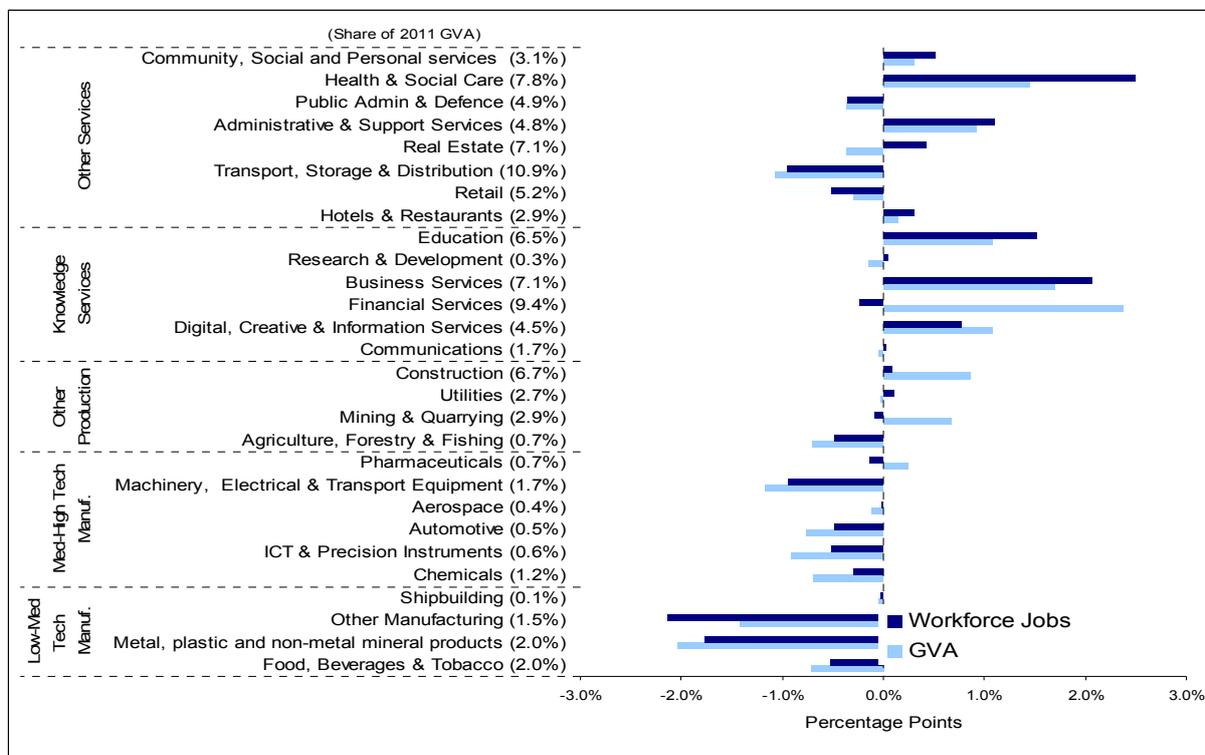
Source: BIS analysis of ONS data.

The extent to which the structure of the UK economy has changed over time is illustrated in Figure 2.1 overleaf. This shift has been driven by the more rapid growth of service sectors, rather than a contraction in manufacturing output, and can be attributed to factors such as:

<sup>9</sup> These are defined here as med-high tech manufacturing plus knowledge services.

- The rapid pace of globalisation and technological progress, particularly in manufacturing, where increased low-wage competition and technological improvements have together led to continuing falls in global prices of manufactured goods relative to services, driving down their share of GDP.<sup>10</sup>
- A growing global middle class, particularly in emerging economies which has broadened the UK's export market across services, such as creative industries and professional business services, and manufacturing.
- A steadily ageing population which is driving rising demand for health and social care – a third of UK health spending is on those aged over 65.
- Increased government investment in the green agenda which has fostered growth in the low carbon technologies, renewable energy and environmental goods and services, as well as investment in public services and construction.

**Figure 2.1: Change in Share of UK GVA and Employment (1997-2011)**



Source: BIS analysis of ONS data.

Government intervention through regulation and taxes, as well as investments in infrastructure also influences how the structure of the economy and particular sectors evolve. For example, the Government's green agenda has fostered demand for environmental goods and services, which is expected to grow at 5% a year over the next five years.<sup>11</sup>

<sup>10</sup> This is commonly known in the economic literature as the 'Baumol Effect'.

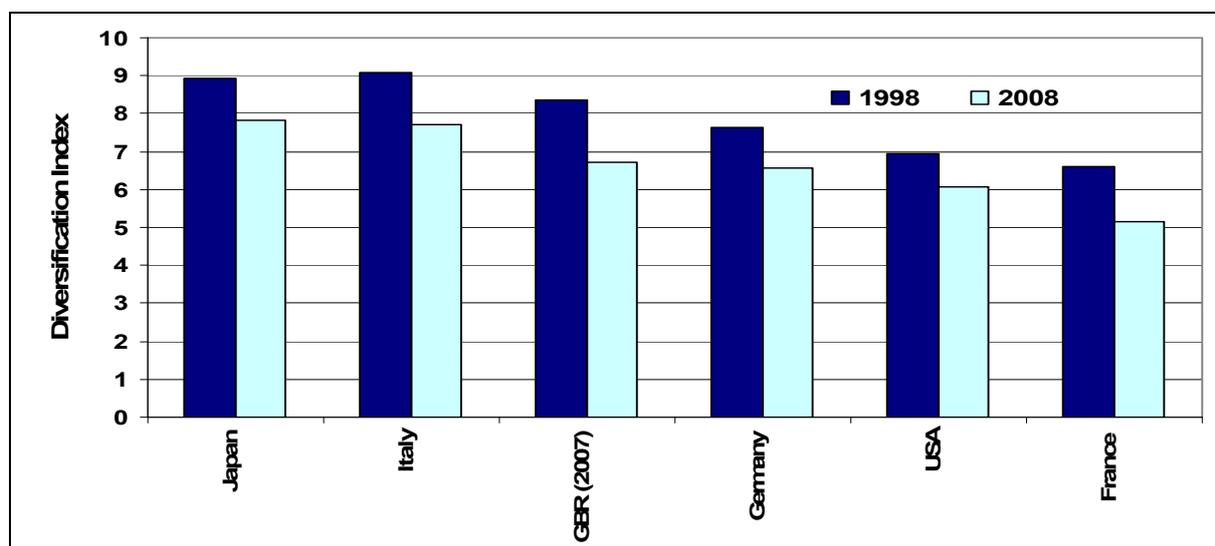
<sup>11</sup> BIS (2010) *Low Carbon and Environmental Goods and Services Report for 2009/10*. Prepared by K-Matrix for the Department for Business, Innovation and Skills and published in July 2011. <http://www.bis.gov.uk/assets/biscore/business-sectors/docs/11-992x-low-carbon-and-environmental-goods-and-services-2009-10>

Government is also a significant procurer of goods and services in its own right, accounting for around 15% of demand across sectors. Within this, it accounts for a disproportionate share of demand in certain sectors such as education (60%) and precision instruments (29%).<sup>12</sup>

It is important to note that this analysis does not capture the importance of those sectors which enable and stimulate growth indirectly. For example, transport investments can induce positive productivity benefits through agglomeration economies, increasing the scale and efficiency of spatial economic interactions. Similarly industries which deliver improvements in resource efficiency may enhance productive capacity across sectors.

In part these sectoral shifts reflect increasing sectoral specialisation across all the advanced economies whereby a small number of sectors account for a relatively large share of GDP. OECD analysis suggests that compared to its major competitors, the UK's sectoral diversity is roughly the same as Germany's, and marginally higher than both the USA and France, as shown in Figure 2.2.<sup>13</sup>

**Figure 2.2: Sectoral Diversification, Selected Countries (1998, 2008)**



Source: OECD STAN database

Note: The diversification index is an application of the concentration index used in the competition literature. A value below 4 indicates that a country is specialised while a value above 10 indicates that the country is diversified.<sup>14</sup>

This pattern of increased specialisation raises issues at national and regional level. A more diversified economy is less vulnerable to sector specific shocks; but equally, it is important to recognise that regional specialisation, such as clusters, can generate powerful positive spillover benefits. These arise from the spatial concentration and the agglomeration of activities which allow for greater labour market pooling and knowledge sharing.

<sup>12</sup> BIS analysis of ONS Supply and Use tables.

<sup>13</sup> The OECD looked at a range of metrics employed in the competition literature such as concentration ratios, the Herfindahl Index etc. These all produced broadly similar results.

<sup>14</sup> More information can be found at: [http://www.oecd-ilibrary.org/sites/sti\\_scoreboard-2011-en/06/04/index.html?contentType=/ns/Book,/ns/StatisticalPublication&itemId=/content/book/sti\\_scoreboard-2011-en&containerItemId=/content/serial/20725345&accessItemIds=&mimeType=text/html](http://www.oecd-ilibrary.org/sites/sti_scoreboard-2011-en/06/04/index.html?contentType=/ns/Book,/ns/StatisticalPublication&itemId=/content/book/sti_scoreboard-2011-en&containerItemId=/content/serial/20725345&accessItemIds=&mimeType=text/html)

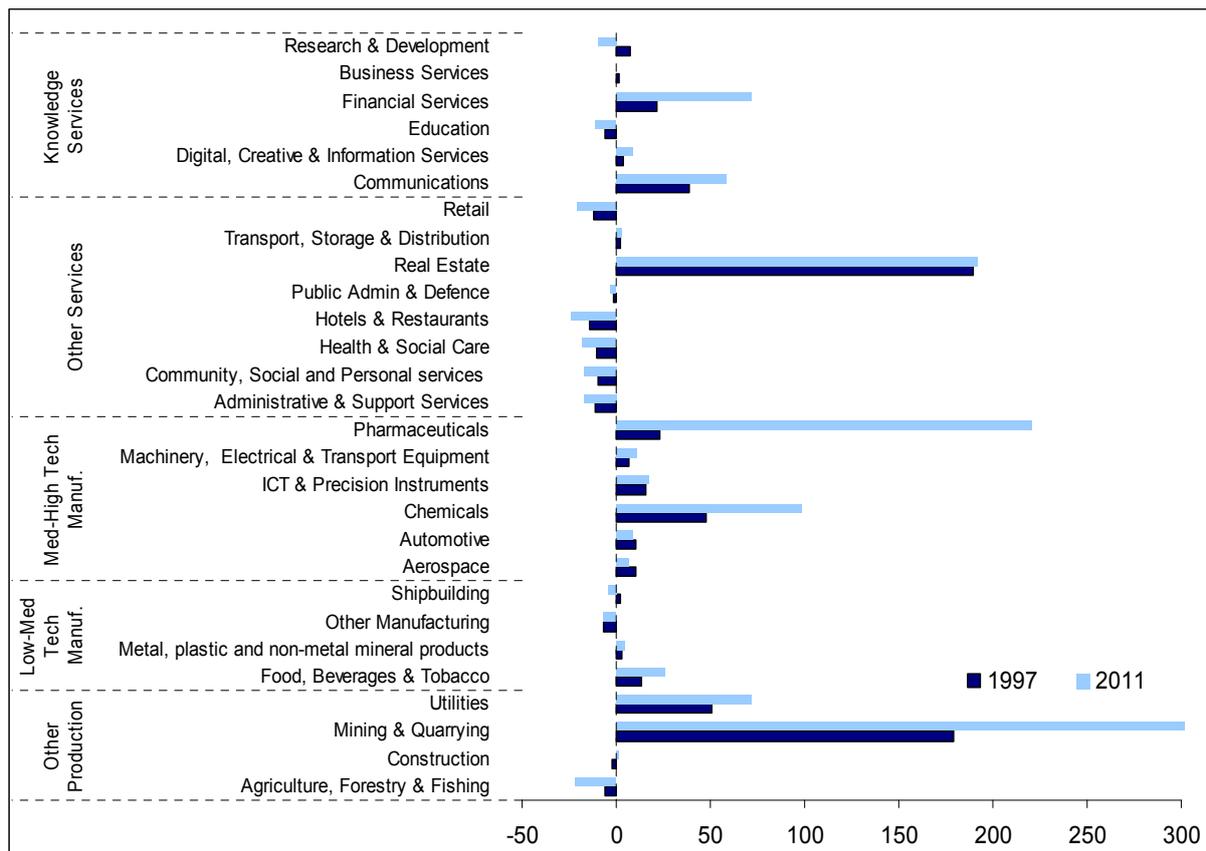
## Productivity

A starting point for most comparisons of performance across firms and sectors is to look at their relative productivity. The two main measures commonly used are: average labour productivity (ALP); and total factor productivity (TFP).<sup>15</sup>

In general, manufacturing sectors have higher labour productivity than services, although there are significant problems in measuring service sector productivity, with the notable exceptions of financial services and communications. The latter two sectors, along with pharmaceuticals, chemicals and mining and quarrying have seen the largest increases in labour productivity since 1997.

There are, of course, limitations in cross-sector productivity analysis. One can think of overall productivity in terms of *economy* (how cheaply one can purchase inputs), *efficiency* (the amount of output produced per unit of inputs) and *effectiveness* (the extent to which outputs match customers' needs and hence willingness to pay). While gross value added (GVA) captures all of these factors, it is also affected by the characteristics of the sectors themselves – for example, some sectors are inherently more profitable than others.

**Figure 2.3: UK GVA per worker relative to whole economy (1997, 2011)**



Source: BIS Analysis of ONS Data.

<sup>15</sup> ALP is a measure of the value of output generated per employee or hour worked; whilst TFP is a measure of the additional value of output generated after accounting for changes in the raw inputs used (materials, capital, labour etc). In principle, TFP is a better measure of 'true' productivity performance as it controls for a number of factors which also influence sector output, such as capital intensity. However, estimating TFP is difficult and the results are sensitive to the assumptions used.

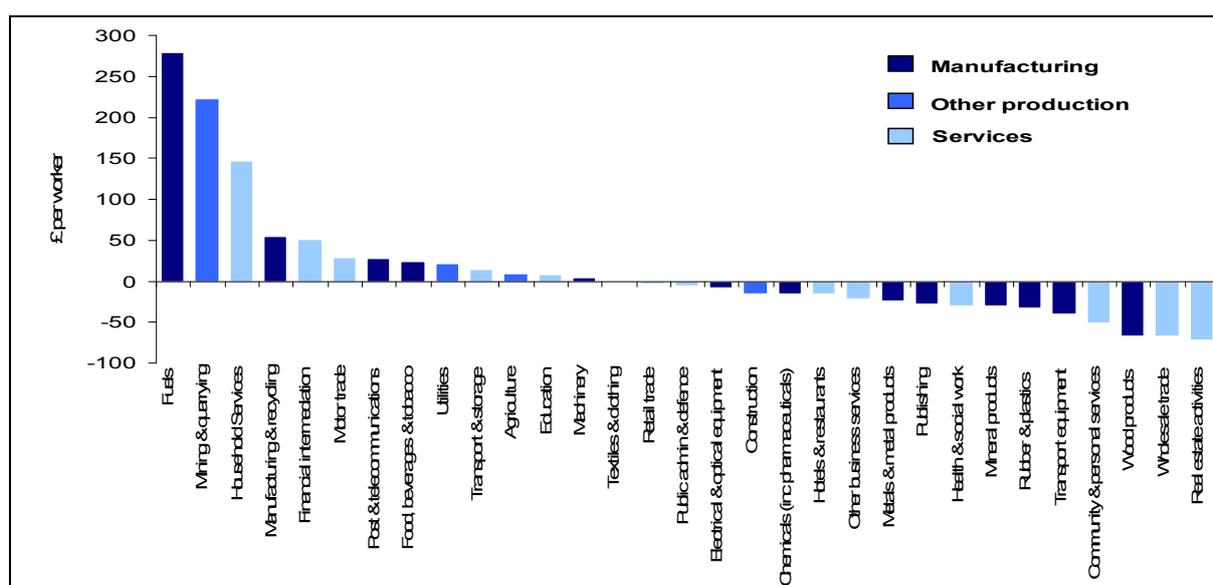
## International Comparisons of Sector Productivity Performance

Although productivity comparisons across different sectors can provide a useful picture of differences within the economy, what ultimately matters is how the productivity of UK firms and sectors compares to their competitors in other countries.<sup>16</sup>

When benchmarked against other countries, the UK tends to perform well in terms of both ALP<sup>17</sup> and TFP in innovative, highly skilled sectors such as financial services, publishing and R&D. The data also show a comparatively strong performance in both utilities and construction.<sup>18</sup> By contrast, the UK performs less well for a range of sectors including mechanical engineering, electrical machinery / components and precision instruments. Perhaps surprisingly, labour productivity in the business services sector is lower than in all three of our major competitors, although the evidence for total factor productivity shows the reverse, implying that the explanation is lower capital intensity.<sup>19</sup>

Using Germany as a benchmark, Figure 2.4 shows that the UK has a productivity advantage in sectors such as financial intermediation, communications, mining and food but lags behind Germany in a number of manufacturing activities.

**Figure 2.4: UK Labour Productivity Relative to Germany (2007)**



Source: BIS Analysis of EUKLEMS Data.

Note: The productivity gap between the UK and Germany is defined in absolute terms and equal to the difference in Gross Value Added per Worker (£ per worker) between the two countries. High positive values indicate that the UK is more productive than Germany in that particular sector while greater negative values indicate that Germany is more productive than the UK.

<sup>16</sup> When making these comparisons, it should be noted that structural and accounting issues, such as what measures of inflation to use (to convert data into real terms), and the appropriate exchange rate (to produce figures on a common currency basis) can have a large impact on the final results.

<sup>17</sup> ALP is defined here as Gross Value Added (GVA) per hour worked.

<sup>18</sup> BERR (2008) *Cross Country Productivity Performance at the Sector Level* BERR Occasional Paper

No 1 <http://www.bis.gov.uk/files/file44507.pdf>

<sup>19</sup> Ibid

## Exports

The UK currently accounts for around 3.4% of global exports of goods and services, of which around two thirds are goods – in particular machinery, electrical equipment and vehicles (aerospace and transport equipment). On the services side, business and financial services, including insurance, account for over a fifth of total UK exports.

**Table 2.2: UK Exports by Category of Goods and Services (2010)**

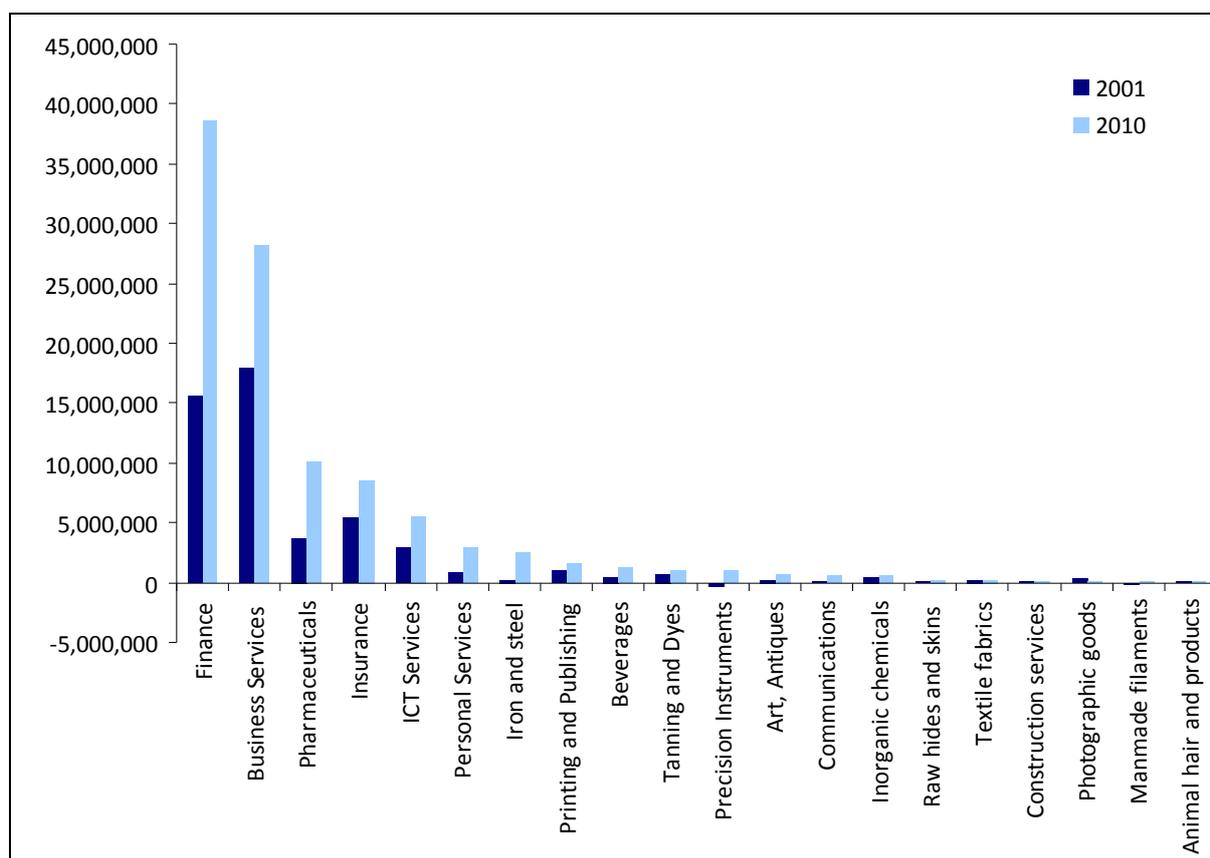
Category	UK Exports (\$ Thou.)	Share of UK Exports	UK Share of World Exports
Machinery / Electrical Products	89,470,424	13.9%	2.4%
Other business services	75,200,000	11.7%	8.0%
Mineral Products	52,831,664	8.2%	2.0%
Financial services	47,580,000	7.4%	17.9%
Transport Equipment	40,369,063	6.3%	3.1%
Chemicals / Related Industries	38,519,810	6.0%	4.0%
Transport	31,670,000	4.9%	4.0%
Travel	30,580,000	4.7%	3.2%
Metals / Metal Products	25,462,838	3.9%	2.3%
Stone / Glass / Ceramics	19,635,854	3.0%	3.5%
Foodstuffs	16,263,135	2.5%	3.7%
Precision Instruments	16,167,529	2.5%	3.1%
Royalties and licence fees	14,280,000	2.2%	5.8%
Plastics / Rubbers	14,139,428	2.2%	2.2%
Aerospace	13,605,778	2.1%	6.0%
Computer and information services	11,630,000	1.8%	5.4%
Insurance	10,380,000	1.6%	12.3%
Textiles	9,986,894	1.5%	1.5%
Wood / Wood Products	9,345,568	1.4%	2.5%
Other	8,194,058	1.3%	2.7%
Communications	7,470,000	1.2%	8.9%
Animal / Animal Products	5,910,168	0.9%	2.2%
Miscellaneous Manufacturing	5,330,702	0.8%	1.8%
Personal, cultural and recreational services	3,950,000	0.6%	9.2%
Vegetable Products	3,892,748	0.6%	0.9%
Government services n.i.e.	3,420,000	0.5%	3.3%
Construction	2,580,000	0.4%	2.7%
Footwear / Headgear	1,485,788	0.2%	1.3%
Raw Hides / Skins / Leather / Furs	1,255,318	0.2%	1.4%
<b>Total</b>	<b>643,476,666</b>	<b>100.00%</b>	<b>3.4%</b>

Source: ITC Trade Database.

Note: Trade data are collected on a product basis rather than a sector basis – hence it is not possible to directly compare them.

Export values and world export shares do not, of themselves, give a picture of the net contribution of exports from a particular sector to the economy. The chart below details the UK's largest net export sectors. It reinforces the importance to the UK of financial and business services whose net exports have grown substantially over the last decade.<sup>20</sup> It is striking that net exports in financial and business services are larger than the next fifteen categories combined, although it is necessary to take into account the way sectors are classified.<sup>21</sup>

**Figure 2.5: UK Net Exports, Selected Sectors (2001, 2010, \$bn)**



Source: ITC Trade Database.

Note: Net exports are defined as total exports less total imports in that sector.

Looking at sector performance over time, the UK has consistently been a net exporter across all categories of commercial services since 2001, with net exports from these categories nearly doubling by 2010.<sup>22</sup> The UK has also consistently been a net exporter of manufacturing products such as beverages, tobacco, shipbuilding, pharmaceuticals and miscellaneous chemical products (such as dyes, soaps, explosives, and photographic materials).

<sup>20</sup> Indeed given the limitations of services exports data these results may understate the magnitude of the UK's net exports of business and financial services.

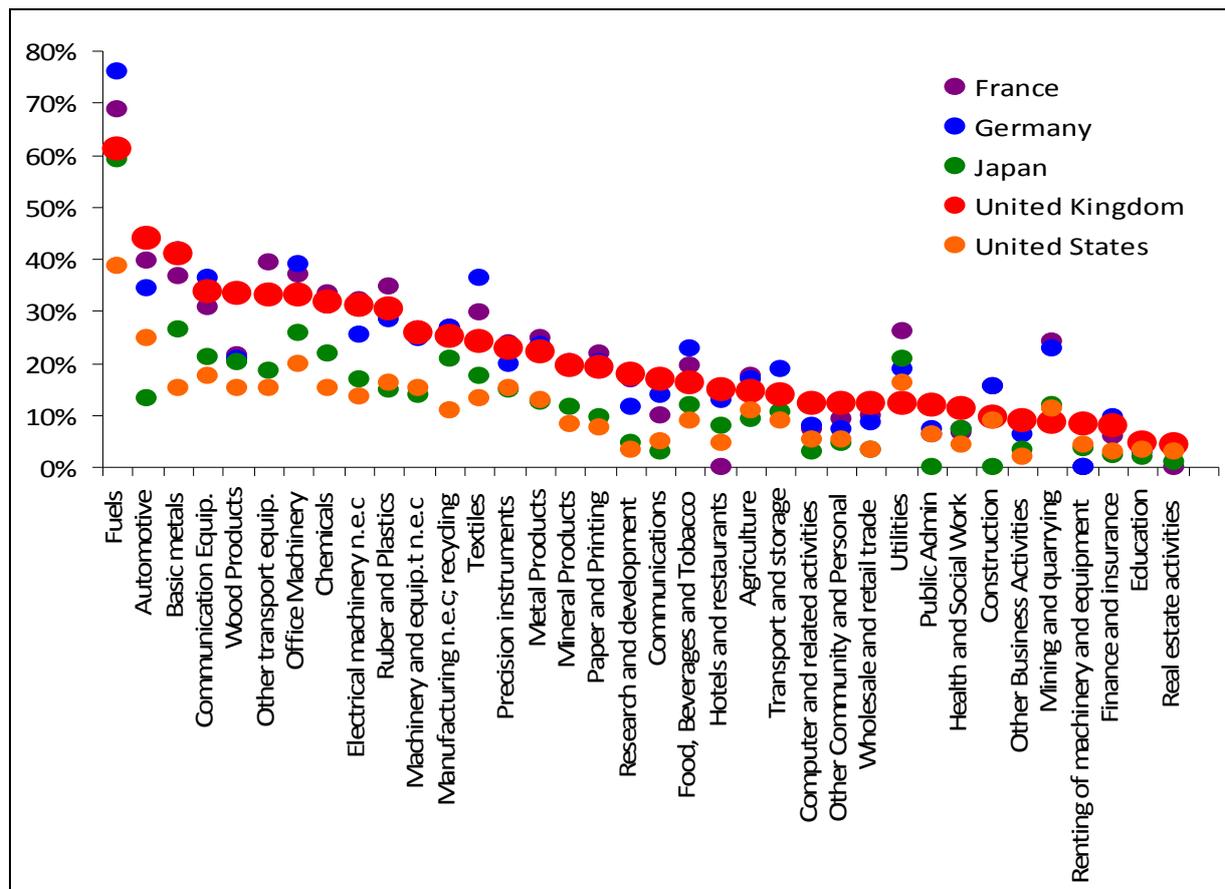
<sup>21</sup> For example, 'business services' includes a range of different activities which could be separated out.

<sup>22</sup> This excludes travel, transport and government services.

Perhaps surprisingly, the UK's net export performance in a number of textile sectors such as man-made fibres and coated fabrics has been relatively strong or improving over the last decade. The UK's deficit in a number of other manufacturing sectors such as automotive and metal products has also been shrinking over this period.

This variation in net export performance by sector is in part related to differing import content of exports across particular sectors (sector imports of intermediate goods and services as a share of its total output); however, Figure 2.6 below shows, the import content of UK exports appears to be high in comparison with major competitors, across a whole range of sectors.

**Figure 2.6: Import Intensity of Exports by Sector, Selected Countries (Mid 2000)**



Source: OECD Globalisation Database.

## Revealed Comparative Advantage and Export Specialisation (RCA)

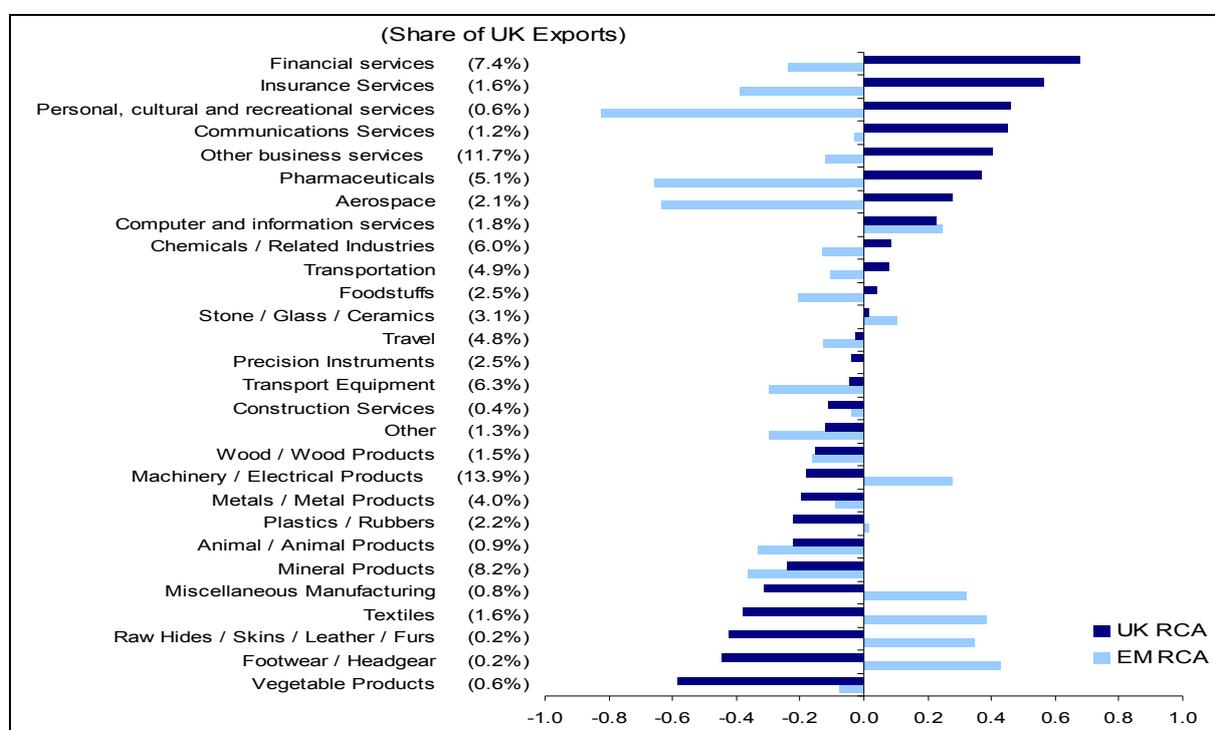
Revealed comparative advantage (RCA) indicates the relative specialisation of countries in particular sectors in global markets.<sup>23</sup> A positive RCA indicates a sector has a disproportionate share by international standards in a country's exports. It is important to recognise that RCAs are essentially backward-looking. They will change over time, usually only slowly, though accelerated by shocks such as the financial crisis. Moreover, specific areas can change substantially as, for example, India has radically improved its performance in ICT services in the last 20 years.

<sup>23</sup> RCA is calculated by comparing a given sector's share of a country's exports with that sector's share in global exports.

Against our major competitors – France, Germany and the USA – we find that all four countries are more or less equally specialised in aerospace, chemicals and pharmaceuticals. The UK is more specialised in finance, business, communications and personal services while our leading competitors are more specialised in transport equipment, and precision instruments.

Figure 2.7 shows sector RCAs for the UK and leading emerging economies – China, Hong Kong, India, Indonesia, Malaysia, Singapore and Thailand. Low wage economies tend to specialise in relatively high volume / low technology manufacturing sectors (e.g. clothing, machinery and equipment), while the UK is relatively specialised in knowledge intensive sectors such as business services and pharmaceuticals. This suggests the UK should be well placed in the near term to weather some of the competition from emerging economies, though in time emerging economies could become more competitive in knowledge intensive sectors.

**Figure 2.7: UK versus Emerging Markets Export Specialisation (2010)**



Source: BIS Calculations based on ITC Data.

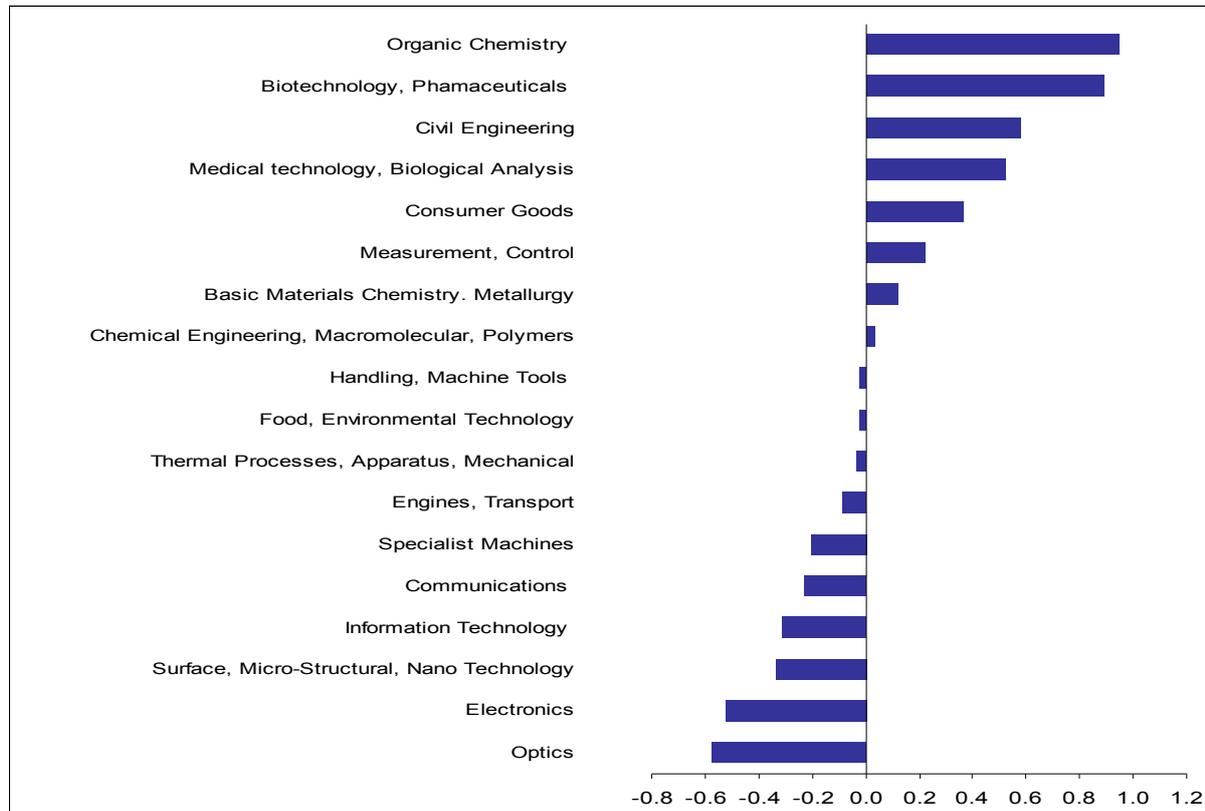
It is important to note that the emerging market’s relative export specialisation is sensitive to the inclusion of certain countries. For example, excluding India from the calculation eliminates the emerging market’s comparative advantage in computer and information services. Similarly, excluding China significantly alters the results for certain low to medium skill manufacturing sectors, such as textiles.

### Revealed Technological Advantage

An alternative approach is to look at which technologies the UK appears to specialise in relative to its competitors. Revealed Technological Advantage (RTA) is an analogous concept to Revealed Comparative Advantage, and uses patent data to identify what types of technology a country focused on. On this basis the UK appears to be:

- Relatively specialised in organic chemistry, biotechnology / pharmaceuticals, civil engineering and medical technology;
- Less specialised in optics, electronics and nano-technology and information technology.

**Figure 2.8: UK Revealed Technological Advantage (2000-2010)**



Source: BIS calculations using WIPO data.

These results appear to support the UK's observed strength in chemicals and pharmaceuticals, but contradict our weaker performance in terms of RCA and R&D intensity in sectors such as medical and precision Instruments. One possibility is that this result reflects the UK's historically weak record in commercialising its research.<sup>24</sup> It is, however, also likely to reflect the UK's unique international position among major R&D performers, which shows up in the patent data. International firms perform R&D in the UK and export its results, while many UK based innovators organise their inventive activities in a global context. The results for IT also need to be seen in the context of a more restrictive patent regime for EU countries.<sup>25</sup>

<sup>24</sup> These were discussed in the Lambert Review of Business-University Collaboration for HM Treasury (2003) [http://www.hm-treasury.gov.uk/d/lambert\\_review\\_final\\_450.pdf](http://www.hm-treasury.gov.uk/d/lambert_review_final_450.pdf)

<sup>25</sup> For example, EU countries do not permit patents for software, while the US and Japan do, this is likely to distort the patenting comparisons for the ICT sector.

### 3. Maximising long-term sectoral growth

The role of a sector-based approach is to enable firms in different sectors to exploit fully the underpinning economic conditions in a way which generates maximum economic value, addressing any sector specific market or regulatory failures which are preventing them from doing so. In developing the Government's new approach to sectors we have considered the following:

- the size and opportunity for future growth;
- the barriers to growth and scope for government action.

#### The size and opportunity for future growth

A key principle underpinning the Government's sector approach is to back those sectors which are likely to have prospects for success in the future, in terms of generating increased value added and employment in the UK economy. In this respect, it is important to consider the key economic, social and wider drivers of growth and their relevance to sector potential over the next decade. The main drivers are likely to be:

- rising incomes and changes in patterns of demand;
- changing business practices and new technology;
- increasing demand for environmental products, processes and standards; and
- demographic and lifestyle changes.

#### Rising incomes and changes in patterns of demand<sup>26</sup>

Looking ahead, there is likely to be continued long term growth in per capita incomes which will affect sector prospects, with economic weight shifting towards some of the emerging economies.

- During the 1980s and 1990s the growth in annual real per capita global GDP was over 3%; over the 2000s this fell to 2.8% pa but it is estimated to have been almost 4% in 2010.<sup>27</sup>

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<sup>26</sup> BIS (2010) *Economic Growth* BIS Economics paper No 9.

<http://www.bis.gov.uk/assets/biscore/economics-and-statistics/docs/e/10-1213-economic-growth>

<sup>27</sup> UNCTAD (2011), *UNCTAD Handbook of Statistics* 2011 Edition

<http://archive.unctad.org/Templates/webflyer.asp?docid=16171&intItemID=5772&lang=1&mode=downloads>

- In 2011, advanced economies made up 51% of global GDP and 62% of exports. However, the share of advanced economies in world GDP is likely to decline – the IMF project future growth rates for advanced countries to rise over the next 5 years by a little under 2% while for emerging economies the rise is forecast to be around 5%.<sup>28</sup>
- Such continuing growth will have an impact on the composition of demand both in the UK and in export markets. It is, for example, likely that expenditure will tend to increase disproportionately in the recreation, medical care, transport and communications sectors.
- Also, within sectors, it will tend to move towards the higher quality, branded, luxury end of the market and to where ‘experience’ is important. This includes foreign travel, where the number of international arrivals rose from 277m in 1980 to 983m in 2011, and is forecast to rise at over 3% pa to 2030.<sup>29</sup>

#### Advanced manufacturing

The UK **aerospace** sector is well placed to take advantage of the increased demand for air travel and rising demand for new aircraft as a result of rising per capita income. The sector has significant economies of scale and is therefore highly concentrated. It is, however, open to international competition and strong global brands are important. Airbus, Rolls Royce and Bombardier are key players in the global market and the UK has a strong reputation. The industry is closely linked to universities and the research infrastructure, including through the Advanced Manufacturing Research Centre, which helps facilitate commercialisation of new ideas, products and technologies.

Increased trade has accompanied rising growth. In recent years the growth in world trade has accelerated, and strong growth is likely to continue in the mid to long term with higher growth rates in emerging economies and possibilities for further EU trade liberalisation.

- From 2000 to 2010 global trade as a share of global GDP increased from 42% to 60%. This increase is in part driven by the growth in developing and transition economies whose share of world trade has risen substantially.
- Exports from advanced countries are expected to rise by 4.7% in 2013 and by 7.2% in emerging economies; the same pattern is expected in imports with figures of 4.1% and 8.1% respectively.
- Growth in emerging economies is likely to lead to an increase in export opportunities for UK businesses. For example, car ownership in China is

<sup>28</sup> IMF (2012) *World Economic Outlook: Growth resuming, dangers remain* April 2012 Edition <http://www.imf.org/external/pubs/ft/weo/2012/01/pdf/text.pdf>

<sup>29</sup> UNWTO (2012) *Tourism Highlights* 2012 Edition <http://mkt.unwto.org/en/publication/unwto-tourism-highlights-2012-edition>

expected to overtake that in the US by 2030; together China and India are expected to account for a third of all car ownership by 2050.<sup>30</sup>

- Tastes and preferences in emerging economies are likely to shift toward increased spending on services such as recreation, healthcare, transport and communications, creating further opportunities for business.<sup>31</sup>
- There are also further opportunities for growth by completing the EU single market, particularly in services where ongoing national differences in regulation can hamper greater cross-country trade and investment. A recent study estimates that if all remaining barriers to trade in the EU are eliminated, after 10 years of implementation UK national income could be around 7% higher than it would otherwise have been.<sup>32</sup>

#### UK Automotive Industry

The UK **automotive** industry has a significant opportunity as increased incomes lead to increased spending on transport. Exports currently represent around 50% of its total sales. Environmental drivers, which will be part of the growing emerging economies' demand, will also lead to innovative changes to motor vehicles in terms of lower emissions from combustion engines and non-fossil fuel alternatives. This is an innovative sector with around £1.3bn of R&D spend in 2010.

### Changing business practices and new technology

Technological changes and changes in business practices will also create new growth opportunities and challenges:

- New business practices, enabled through increased use of ICT and improvements in logistics, have permitted greater outsourcing where individual components are designed and built in different parts of the world prior to final assembly.
- Also technology improvements can increase efficiency, beyond outsourcing and increased specialisation. For example, by developing more efficient processes/ production, and higher quality or better tailored products to capture higher value added elements. Embedding the new technologies and exploiting the new product opportunities presented can lead to significant growth.

<sup>30</sup> Goldman Sachs (2007) *BRICs and Beyond* <http://www.goldmansachs.com/our-thinking/topics/brics/brics-and-beyond-book-pdfs/brics-full-book.pdf> ; Goldman Sachs (2003) *Dreaming with the BRICs: The Path to 2050*. Goldman Sachs Economics Paper No99. <http://www.goldmansachs.com/our-thinking/topics/brics/brics-reports-pdfs/brics-dream.pdf>

<sup>31</sup> Cox, M.W and Alm, R. (2010) "Opportunity Knocks: Selling Our Services to the World" Federal Reserve Bank of Dallas, 2007 Annual Report <http://www.dallasfed.org/assets/documents/fed/annual/2007/ar07.pdf>

<sup>32</sup> BIS (2011) *The economic consequences for the UK and the EU of completing the Single Market*. BIS Economics Paper No 11. <http://www.bis.gov.uk/assets/biscore/economics-and-statistics/docs/e/11-517-economic-consequences-of-completing-single-market.pdf>

- Such changes have an impact on skill requirements as increasing global trade will put pressure on lower skill activities. UK prospects will be stronger in higher skilled activities, for example in R&D, design and marketing where increased capital investment has been tied to more automation requiring skilled technicians; and where non-routine human interaction is required.
- The rapid increase in demand for new technologies in communication and leisure, coupled with ever shortening product lifecycles, provide significant opportunities for UK businesses.

#### **Knowledge-intensive traded services**

The rapid changes and global take-up seen in **ICT** offer significant opportunities to the UK. The UK computer software industry is estimated to be worth £9.2bn and is currently the second largest market by value in the EU and accounts for 5% of the worldwide market. The UK IT services market was estimated to be £25.2bn in 2009 and accounts for 21% and 7.2% of the EU and the global market respectively. The UK ICT industry - including software and IT services, cyber security and telecoms - has a strong reputation for innovative technology and design as well as high-end security activities. This is backed by strong research and science capability which ensures UK companies stay at the front of this highly versatile sector, contributing to over 7% of UK GVA. ICT is also at the heart of most modern products and processes and is often a driver of new innovation. Software enabled electronics embedded in product and processes are now increasingly the differentiator technology in both services and goods. Many studies have also made clear the link between effective ICT use and productivity improvements; and how links between ICT and the Internet have led to the creation of new markets, unimagined 5 years ago, such as the apps market or online gaming – both industries experiencing exponential growth.

### **Increasing demand for environmental products, processes and standards**

Rising incomes are also associated with increased demand for environmental amenities as concern about the environment increases and domestic and international policies are introduced. This development is coupled with the general move of richer countries towards cleaner service activities. The broader increase in environmental awareness seen in the UK and globally in the last few decades reinforces this shift.

In addition, increasing global demand is leading to strains on suppliers of some raw materials, such as those found in high-tech, defence and green technologies, contributing to price and supply pressures and increasing the incentive to invest in resource efficiency measures.<sup>33</sup>

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<sup>33</sup> Defra (2012) *Resource Security Action Plan: Making the most of Valuable Materials*  
<http://www.defra.gov.uk/publications/files/pb13719-resource-security-action-plan.pdf>

### Enabling sectors

The trend towards tougher environmental standards and the likely increase in international agreements will drive demand for low carbon goods and services, including green **energy** generation. Global renewable energy is forecast to grow by 4-5% pa to 2015 and in the UK by 6-7% pa.<sup>34</sup> New technologies are key to meeting new green demand, and UK venture capital investment in cleantech, including green energy, was around £400m in 2011, the third largest in the world. New export opportunities are likely to appear with an international transition to greener economies. UK renewable energy exports are around 13% of total sales of goods and services.<sup>35</sup> The cost of renewable electricity, its timing with respect to carbon reduction targets and its potential limits on meeting demand is likely, however, to drive some continuing use of fossil fuels including gas-fired generation and, linked with that, increase the potential role for Carbon Capture and Storage (CCS) both in the UK and globally. Worldwide up to \$40 billion has been committed by governments to support CCS projects and, if CCS opportunities develop as anticipated, benefits for UK-based firms have been estimated to be up to £6.5 billion a year by the late 2020s.<sup>36</sup> Nuclear power will also have a role to play in some countries as a low carbon option. Estimated turnover of the civil nuclear power and decommissioning sector in 2009/10 was £4.2bn, with per annum growth over the next 3 years of 2.4%. Increasing concern about the environment is also a key driver of low carbon **construction**, and the trend to tougher environmental standards and possible developments in international agreements, is likely to further stimulate demand for low carbon building products.

### Demographic and lifestyle changes

The UK is forecast to see a significant increase in the proportion of older people in the population which will change patterns of demand. ONS projections indicate that between 2010 and 2030, the number of people aged over 60 will increase from around 14 million to nearly 20 million, an increase of over 40%.<sup>37</sup>

- In commons with other advanced economies, over this period the ratio of the working to pensionable age population in the UK is projected to fall further from around 3.1 to 2.7. This demographic change is due both to declining fertility rates, and increasing life expectancy.
- As the population ages, there will be an increased demand for healthcare – both in terms of drugs and care (e.g. assisted living). Studies also suggest that an ageing population could increase the consumption of goods and services such as housing and energy.<sup>38</sup> Growing awareness of health and

<sup>34</sup> BIS (2012) *Low Carbon Environmental Goods and Services: Report for 2010/11*. Prepared by K-Matrix for the Department for Business, Innovation and Skills and published in July 2012.

<http://www.bis.gov.uk/policies/business-sectors/green-economy/market-intelligence/market-data>

<sup>35</sup> Ibid

<sup>36</sup> DECC (2012) *Learning by doing – launching the CCS Commercialisation Programme*

<http://www.decc.gov.uk/assets/decc/11/cutting-emissions/carbon-capture-storage/4900-ccs-roadmap-ccs-commercialisation-programme.pdf>

<sup>37</sup> ONS (2010) 2010-based National Population Projections

<http://www.ons.gov.uk/ons/rel/npp/national-population-projections/2010-based-projections/rep-2010-based-npp.html>

<sup>38</sup> UN (2007) *Chapter 4: Economic consequences of population ageing* in World Economic and Social Survey 2007 <http://www.un.org/en/development/desa/news/policy/wess-2007.shtml>

wellbeing issues is also likely to have a significant impact on the demand for health-related goods and services.

#### Life sciences

The sector comprises pharmaceuticals, medical technology and medical biotechnology. In the future, the sector is likely to benefit from the disproportionate increase in demand due to rising incomes and an ageing population, leading to commercial applications in food, agricultural and pharmaceuticals sectors. The UK pharmaceutical industry currently has a positive net trade position of £7bn and is one of the UK's top exporters. It is the 4<sup>th</sup> largest pharmaceutical sector in the world and GlaxoSmithKline and AstraZeneca are the 2<sup>nd</sup> and 4<sup>th</sup> largest companies globally based on market share of global sales. It also has a strong R&D base, with research spending of £4.6bn in 2010.

## Barriers to growth and scope for government action

In the past, the existence of particular market failures – such as the spillover effects associated with innovation – has been used to justify government intervention to preserve or develop specific industries especially manufacturing, and more particularly infant industries. The underlying argument for supporting these industries has been that information and innovation related market failures were particularly acute in these areas.<sup>39</sup>

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<sup>39</sup> The economic literature on industrial policy sets out the various market-failure arguments for supporting particular sectors of the economy. See for example:  
 Aghion, P. *et al.* (2012) *Industrial Policy and Competition*  
[http://scholar.harvard.edu/aghion/files/industrial\\_policy\\_and\\_competition.pdf](http://scholar.harvard.edu/aghion/files/industrial_policy_and_competition.pdf)  
 Aiginger, K. and Sieber, S. (2005) *Towards a renewed industrial policy in Europe*  
[http://karl.aiginger.wifo.ac.at/fileadmin/files\\_aiginger/publications/2005/CR\\_chapter1.pdf](http://karl.aiginger.wifo.ac.at/fileadmin/files_aiginger/publications/2005/CR_chapter1.pdf)  
 Aiginger, K. (2007) *Industrial Policy: A Dying Breed or a Re-Emerging Phoenix*. Journal of Industry Competition and Trade Vol 7:p297-323  
[http://karl.aiginger.wifo.ac.at/fileadmin/files\\_aiginger/publications/2007/aiginger\\_fin.pdf](http://karl.aiginger.wifo.ac.at/fileadmin/files_aiginger/publications/2007/aiginger_fin.pdf);  
 Navarro, L. (2003) *Industrial Policy in the economic literature: recent theoretical developments and implications for EU policy*. European Commission Enterprise Paper No12  
<http://www.hadjarian.info/Strategic-Management/bahrami.pdf>;  
 Owen, G. (2010) *Industrial Policy in Europe since the Second World War: What has been learnt?* ECIPE Occasional Paper No 1/2012, Department of Management, London School of Economics  
<http://www.ecipe.org/publications/industrial-policy-europe-second-world-war-what-has-been-learnt/>;  
 Pack, H. and Saggi, K. (2006); *The case for industrial policy: a critical survey*  
<https://openknowledge.worldbank.org/bitstream/handle/10986/8782/wps3839.pdf?sequence=1>  
 Rodrik, D. (2008) *Normalising Industrial Policy*  
[http://www.hks.harvard.edu/fs/drodrik/Research%20papers/Industrial%20Policy%20\\_Growth%20Commission\\_.pdf](http://www.hks.harvard.edu/fs/drodrik/Research%20papers/Industrial%20Policy%20_Growth%20Commission_.pdf);  
 Rodrik, D. (2004) *Industrial Policy for the Twenty-First Century Working Paper*  
<http://www.hks.harvard.edu/fs/drodrik/Research%20papers/UNIDOSep.pdf>  
 United Nations (2007) *Rethinking industrial policy* Discussion Paper No183;  
[http://unctad.org/en/docs/osgdp20072\\_en.pdf](http://unctad.org/en/docs/osgdp20072_en.pdf);  
 Weiss, J. (2011) *Industrial Policy in the Twenty-First Century United Nations Working Paper No 2011/55* [http://www.wider.unu.edu/publications/working-papers/2011/en\\_GB/wp2011-055/](http://www.wider.unu.edu/publications/working-papers/2011/en_GB/wp2011-055/)

In reality, the economic arguments previously used to justify government support in a relatively limited number of industries can hold true in some other sectors of the economy, which share similar economic characteristics, and thus market failures. Such common features might relate to industry structure, the activities and/or behaviours of firms active in the sector (e.g. R&D or production), or the relative use of inputs in production (e.g. labour or knowledge). For example:

- Industries where the main inputs relate to technological and non-technological innovation (e.g. R&D spend, knowledge, skills and training and intangible investments) are more likely to experience innovation and knowledge related market failures such as R&D spillovers and poaching (e.g. aerospace, pharmaceuticals and professional business services).
- Industries which are labour intensive may be especially affected by market failures in the labour market such as barriers to labour participation and mobility (e.g. wholesale and retail distribution, food and accommodation activities, hotels and restaurants).
- Infrastructure industries characterised by natural monopolies stemming from high-up front capital investment costs may be associated with competition concerns, in particular market power and the abuse of dominance (e.g. utilities, post and telecommunications and transport infrastructure).
- Industries which are intensive in the use of natural resources (e.g. land, raw materials, energy) or generate environmental impacts as part of the production process are more likely to be associated with negative environmental externalities such as pollution as well as be more prone to fluctuations in the price of energy and raw materials (e.g. energy intensive industries).
- Industries which involve the provision of public goods or where procurement or regulation are key drivers of innovation and growth may be more likely to experience regulatory or government failure (e.g. construction activity, defence, education, health and social care).

Determining the scope for government action has two key elements. First, the nature and scale of barriers constraining growth in UK sectors. This will depend on an assessment of market and government failures affecting the sectors and covers, for example, issues around information provision, underinvestment in innovation and skills, and coordination failures and regulatory/policy uncertainty which can increase the risks attached to investment decisions. Second, the effectiveness of government levers in tackling the identified barriers, which will depend on the availability of levers, whether government has the information to act appropriately, and whether action can be done in a timely manner.

Dialogue with industry and departmental sector teams has highlighted common issues suggesting that horizontal policy instruments might generally be the most appropriate policy response. The issues include: a need for government certainty over the medium term to encourage investment; generic concerns about the availability of particular skills such as STEM or access to necessary skill sets to

enable SMEs to grow; and access to finance – either for growth capital or for R&D and broader innovative activity.

It is clear, however, that there are circumstances where particular barriers are felt more acutely by individual sectors, for example: information failures increasing the risk premium attached to investment in capital intensive sectors such as aerospace, defence and life-sciences, due to long product development; market failures affecting the provision of highly selective skills sets, such as high-end IT and electronics specialists; and government uncertainty, for example over the long-term regulatory framework which can discourage or defer investment decisions such as in civil nuclear and offshore wind. In addition, sector policy also needs to consider the significance of cross-sectoral and spatial impacts.

### Cross-sectoral impacts

All sectors of the UK economy are, to some degree, directly or indirectly connected. This is because in many instances the outputs of one sector are used by others, either as an input of production or an enabler of economic activity. These include new ideas, knowledge, technology, infrastructure, products or business services. At the firm-level, these linkages manifest themselves in the form of customer supplier relationships. Some large primes may have supply chains comprising several thousands of firms active in a large number of sectors.<sup>40</sup>

**Table 3.1: Interconnections between different sectors**

Output producing industry	% of output used by other manufacturing and services sectors as inputs
Low-medium technology manufacturing	53%
Medium-high technology manufacturing	41%
Other production industries	39%
Knowledge service industries	33%
Other service industries	53%

*Source: Supply Use Tables, 2009. Interpretation: 53% of total output produced by low-medium technology manufacturing industries is used as inputs of production by other sectors of the economy in the manufacture of other goods and services. The remaining 47% is consumed by households*

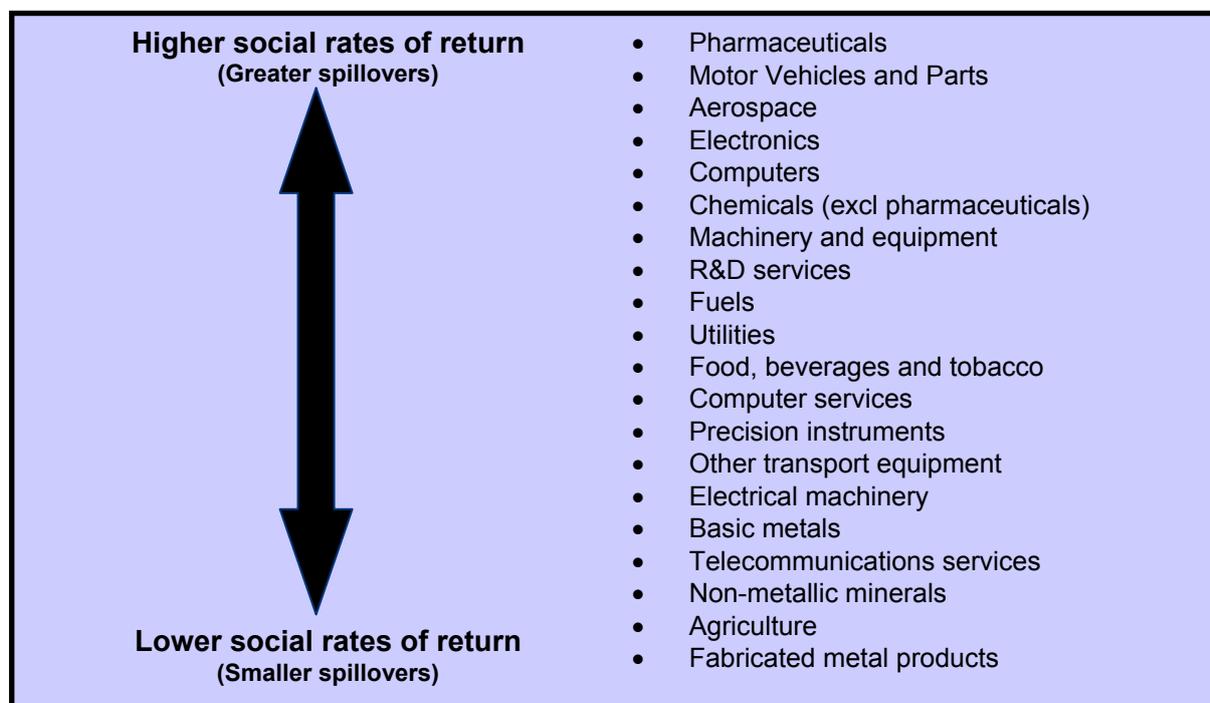
The interdependencies which exist between different sectors of the economy mean that barriers to the provision of goods and services in one particular sector may hamper economic activity in other sectors of the economy. It thus follows that a co-ordinated or ‘systems’ approach to intervention across several sectors may sometimes be more appropriate and effective in unlocking the growth potential of a particular sector, particularly those which rely on other parts of the economy to produce and deliver essential goods and services.

In assessing the differences in R&D spillovers between sectors Oxford Economic Forecasting considered a range of criteria: technological closeness with other end-

<sup>40</sup> Some of the large primes include BAE Systems, Rolls Royce and Nissan.

user industries; linkages with a wide-range of input and end-user industries; R&D spend in industry; quality of work force; degree of competitiveness; and exposure to international trade and foreign direct investment. An initial ranking of sectors based on their potential to generate R&D spillovers was then constructed (see Figure 3.1).

**Figure 3.1: Ability of different sectors to deliver R&D spillovers**



Source: Based on Oxford Economic Forecasting (2006).<sup>41</sup>

## Spatial impacts

The geographical distribution of employment in sectors can vary considerably.<sup>42</sup> In sectors such as retail, construction, health and social care and education employment is relatively even spread across the country, reflecting the fact that these sectors tend to be situated close to the local population which they serve.

By contrast employment in certain advanced manufacturing and knowledge intensive service industries are concentrated in certain geographical locations.<sup>43</sup> For example, employment in the aerospace tends to be concentrated in the South West (Bristol),

<sup>41</sup> Oxford Economic Forecasting (2006) *R&D Spillovers – Literature review and sector ranking* Unpublished paper.

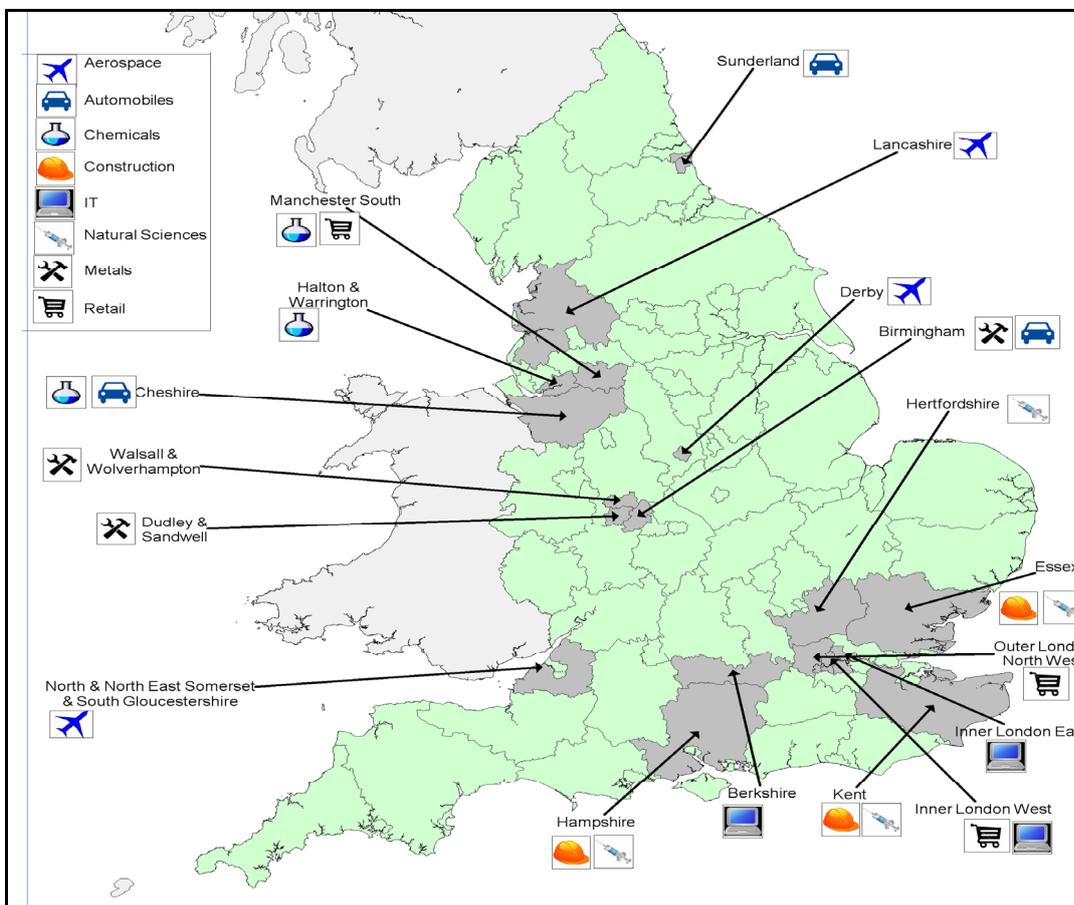
<sup>42</sup> ONS (2012) *The Geographical Concentration of Industries*  
[http://www.ons.gov.uk/ons/dcp171766\\_272232.pdf](http://www.ons.gov.uk/ons/dcp171766_272232.pdf)

<sup>43</sup> Geographical concentration may reflect industrial clustering (a large number of small firms) or industrial concentration (a small number of very large firms). Firms may concentrate to exploit the benefits of agglomeration and clustering such as easy access to labour, inputs and suppliers, and also knowledge spillovers. BIS (2010) *Understanding local growth* BIS Economics Paper No 7  
<http://www.bis.gov.uk/assets/biscore/economics-and-statistics/docs/u/10-1226-understanding-local-growth>

Lancashire and Derby, while the London area accounts for a large proportion of total employment in the financial services and professional business services sectors.

Developing policies to address these market failures (or not) can therefore have important spatial implications. As the OECD notes, even ‘spatially-blind’ policies are unlikely to be spatially neutral.<sup>44</sup> While the growth of certain sectors – such as retail and construction – will be felt across the country, in other cases, the direct impact of sector performance will be more location specific (see Figure 3.2). Hence, interventions to support, for example, the automotive industry which is a significant part of local economies in both the North East and the West Midlands, and which may account for a large share of total employment in the area, will have an important effect on local communities. Such effects may be most acute where a sector is dominated by firms based in an Assisted Area.

**Figure 3.2: Geographical location of selected sectors, 2009**



Source: ONS analysis of NOMIS data

<sup>44</sup> OECD (2011), *Regional Outlook* [http://www.oecd-ilibrary.org/urban-rural-and-regional-development/oecd-regional-outlook-2011\\_9789264120983-en](http://www.oecd-ilibrary.org/urban-rural-and-regional-development/oecd-regional-outlook-2011_9789264120983-en)

## 4. A new sector focus

The Government recognises that in a mature economy such as the UK it is important to continue to work with stakeholders to improve business competitiveness in a wide range of sectors. Moreover, it is important to engage with sectors in ways that recognise the links between sectors, and do not miss those opportunities that may develop in sectors in the future. That said, there is a need to ensure that the Government's resource delivers its full growth potential.

BIS analysts have considered a wide range of evidence, notably: sector size; the impact of a sector across the economy through supply chain or enabler effects, competitiveness indicators such as comparative advantage; societal drivers of future demand; and, importantly, where there is greatest scope for the Government to work with sectors to support business competitiveness and growth.

In addition, the issue of sector focus has also been explored through a 'crowd sourcing' exercise with responses from a wide range of stakeholders.

### A spectrum of support

Given variations in market conditions by sector discussed earlier, and the need for government to engage across the economy, it is clear that government intervention should operate on a spectrum – from a more horizontal approach with certain sectors to one where the Government is involved with the sector in shaping its development. This approach is illustrated in Table 4.1.

**Table 4.1: Spectrum of support for different sectors**

Light touch	Action	Sustained dialogue	Strategic Partnership
Government sets the environment through horizontal policies (e.g. tax, IPR, skills)			
	Government takes action to respond to specific issues (e.g. tourism in 2012)		
		Sustained dialogue and action e.g. sector councils, joint strategies	
			Strategic long term partnership

The drivers and barriers to growth are also likely to vary from one geographical area to another meaning that government intervention may need to be tailored to reflect particular features of the local market.<sup>45</sup> The government has a wide range of policy

<sup>45</sup> BIS (2010) *Understanding local growth* BIS Economics Paper No 7  
<http://www.bis.gov.uk/assets/biscore/economics-and-statistics/docs/u/10-1226-understanding-local-growth>

levers which it can deploy – including the use of taxation, resource spend, procurement, regulation, skills development and innovation support. These policies interact with each other to correct market failures and outcomes by altering the risks, costs and rewards associated with particular forms of economic behaviour by firms and individuals.

There are, however, risks attached to government action which need to be managed. In some sectors of the economy, the policy landscape may be highly complex with a significant number of horizontal and sector-specific policies working together to achieve desired market outcomes. There are risks that changes to the policy landscape in a particular sector may lead to unanticipated changes in economic behaviour by firms and individuals which result in inferior market outcomes. For example:

- New policy interventions could have a negative impact on competition, reducing incentives for firms to innovate and become more productive. Government must therefore ensure when considering new policies that they do not disproportionately favour particular types of companies unless there is a strong economic rationale for doing so. Otherwise, some companies may be able to gain an advantage over rival firms, distorting competition in the sector, and lowering long-term growth.
- New policy interventions which place additional restrictions on the activities and behaviours of firms in one sector could result in resources being diverted to other sectors of the economy where they may generate less economic value. In extreme circumstances, valuable resources may be taken out of the country altogether, resulting in a loss to the UK economy.<sup>46</sup>

Industrial policies are no different from other areas of policy, such as health and education, in facing these risks which can arise for the following reasons: lack of knowledge amongst policy makers about the barriers that prevent the achievement of policy objectives; the incentives on recipients of support to “game” the government; and the risk that recipients act in their own self-interest rather than society at large.

All these risks need to be managed: Rodrik (2007) argues that institutional design and experimentation are vital to the successful implementation of all policies, including industrial policies. In particular, successful policies are likely to emphasise strategic collaboration and co-ordination between the private sector and the government to uncover significant bottlenecks to growth, design the most effective interventions, and learn from any mistakes made.

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<sup>46</sup> This risk exists because many of the key firms in the UK are active in a number of sectors and are internationally mobile.

## Strategic partnerships with key sectors

Within a spectrum approach, the Government is committed to building and maintaining strategic partnerships with key sectors. This will give particular focus to developing business competitiveness in sectors covering the following areas:

- advanced manufacturing, particularly aerospace, automotive and life sciences;
- knowledge-intensive traded services, particularly professional/business services, the information economy and traded aspects of higher and further education; and
- enabling industries such as energy and construction.

These are all sectors where societal drivers indicate there is likely to be significant increasing domestic and global demand; where UK business has the potential knowledge and skills to exploit new market opportunities (i.e. the UK has a comparative advantage in global markets in virtually all these areas); and where a sector-based approach has a clear role.

### Advanced manufacturing

The UK has a strong comparative advantage in the *aerospace and automotive* industries which, because of their highly innovative nature, are a major source of knowledge and innovation spillovers. The UK aerospace industry is the biggest in Europe and second largest in the world, whilst the UK has some of Europe's most productive car plants. There is high and increasing demand for new aircraft and luxury cars from rising incomes in emerging economies, whilst environmental drivers are leading to innovative changes to reduce emissions and noise from combustion engines, the redesign of aircraft wings, and innovation to accommodate non fossil fuel alternatives in the auto market. Studies show that both industries generate significant pull through of demand for key goods and services from other parts of the economy.<sup>47</sup> Moreover, the potential for the Government to have an impact is high through its procurement policy and in addressing innovation market failures, which are particularly high in the aerospace sector. Both industries also have very important local economy and rebalancing effects.

*Life sciences* generate significant welfare gains from increased health and longevity. Ageing populations and lifestyle changes are likely to generate a significant increase in demand for personal and healthcare products. In addition, it will lead to important applications in the food and drink industries. Pharmaceuticals represents one of the UK's top manufacturing exports and a sector where we have a strong comparative advantage, with a positive trade balance of nearly £7bn. There are significant market

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<sup>47</sup> Oxford Economics Forecasting, 2006. *R&D Spillovers – Literature review and sector ranking* Unpublished paper.

failures due to the inability of firms to capture all the returns to their investments, and access to finance is also an acute problem for many academic spin-outs and young companies. The Government has a significant role as procurer of goods and services via the National Health Service. There is therefore a clear case for a strategic partnership with government.

## Knowledge-intensive traded services

*The information economy* is a large enabling sector also underpinning growth across a large part of the economy. It has seen rapid growth in the past which is likely to continue, as technology advances reduce prices, and rising incomes increase demand for these income elastic products and services. The UK has a strong comparative advantage, including from its strong innovative capability and a quality science base. The sector provides important services to other sectors, such as design inputs to manufacturing, and it is also instrumental in developing new products (e.g. films, software) and novel ways of distributing content. Government therefore has a key role in addressing innovation market failures.

*Professional and business services* are a source of UK comparative advantage and the sector has in the past made a very significant contribution to UK growth. Going forward, this sector is likely to benefit as other industries restructure and outsource activities and rising incomes increase demand for more sophisticated goods. Innovation surveys suggest that this sector has a high proportion of innovation active firms.<sup>48</sup> They provide a significant input to other sectors with very little output going to end users and therefore offer a channel for transmitting efficiency gains and spillovers to a wider group of industries. The Government has an important role in trying to remove barriers to growth, for example at EU level.

*Higher and further education* are clearly sectors where government influence is particularly high. They are a key enabler of economic activity in providing skilled individuals across the economy. They also present significant and interesting export opportunities – the UK has the second highest share of foreign students in tertiary education. It has been estimated that education exports amount to around £14 billion per year.<sup>49</sup>

## Enabling sectors

In *energy*, emerging technologies will feature highly to meet the Government's decarbonisation goals. Supported by good capabilities and a strong research base, the UK has potential to become a market leader in some of these areas. The sectors are also potential growth areas with significant increased demand likely to come from societal challenges of population growth and tighter environmental standards. Any

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<sup>48</sup> DTI (2007) *Business Services and Globalisation* DTI Economics Paper No 19  
<http://www.bis.gov.uk/files/file37006.pdf>

<sup>49</sup> BIS (2011) *Estimating the value to the UK of Education Exports* BIS Research Paper No 46  
<http://www.bis.gov.uk/assets/biscore/higher-education/docs/e/11-980-estimating-value-of-education-exports.pdf>

increase in demand is likely to pull through demand for goods and services from a wide range of other sectors of the economy. The energy market sectors are heavily driven by regulation and in some cases government is driving market demand. The potential for government to have an impact is therefore very high – for example, through procurement policy, measures to reduce market uncertainty, and demonstration projects. Clearly these enabling sectors are areas where a strategic partnership with government is likely to be highly beneficial to the growth agenda.

The *construction* sector is highly diverse with a range of discrete sub-sectors. It delivered around £69 billion GVA to the UK economy in 2010 employing around 2.5 million workers, and as such is a key contributor to UK growth. It is also critical to the achievement of UK climate change targets. The UK has a comparative advantage in certain construction services, primarily engineering, architecture and activities associated with low-carbon built environment solutions. This advantage will be important in benefiting from opportunities driven by technological change, increasing environmental awareness and emerging economies. Construction is heavily influenced by direct and indirect levers from the public sector, which procures around 40% of the industry's output, and commitments to renew and expand national infrastructure are therefore significant to the sector.

## Conclusions

This paper has assessed the current state of UK sectors and explains the analytical basis for the Government's new sector based approach. The main findings are:

- (i) Sectors matter for a wide range of reasons, in particular, they:
  - Provide information and insight in how to deliver policy, potentially reducing the risk of “government failure”;
  - Are instrumental in delivering government policies, such as climate change mitigation;
  - Act as a conduit for gathering the views of large numbers of firms and support the transition to a more growth and business focused policy culture in government.
- (ii) Analysis of historic data on sector performance and future drivers of growth suggest that the following broad sectors will continue to be important to the UK economy in the years ahead:
  - Advanced manufacturing is an area of current UK strength, e.g. aerospace and automotive, where rising incomes and environmental drivers are likely to increased demand for more energy efficient products.
  - Knowledge intensive traded services, such as business services, are income elastic and likely to see strong growth as technology reduces

prices. The UK has a strong comparative advantage and these services also provide important inputs into other parts of the economy.

- Enabling industries such as energy and construction have a major impact on other sectors, and their growth is likely to be heavily influenced by societal challenges such as tighter environmental standards. These sectors are heavily influenced by regulation.

(iii) Our analysis suggests that market and government failures are likely to vary in intensity between sectors which justifies a more sector based approach. This approach involves targeting resource across a spectrum of interventions:

- Where sectors are less affected by market failures, government will continue to set the business environment through horizontal policies;
- In sectors where market failures are more prevalent, and barriers to growth are high, the Government will act to address specific issues, or establish a long-term partnership with the sector to support its development.

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