

ECONOMICS

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BIS ECONOMICS PAPER NO. 19

Benchmarking UK Competitiveness
in the Global Economy

OCTOBER 2012

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Foreword

The UK faces a range of challenges as it seeks to return to sustained growth following the recent financial crisis and the deepest recession since the 2nd World War. Moreover, the UK's long term prospects will continue to be affected by ongoing fundamental shifts in the global economy, driven in part by increasing competition from rapidly industrialising economies and the associated development of global value chains.

Such changes have profound implications for what a developed economy such as the UK will need to do to compete successfully. International competitiveness is a key driver of future economic performance and remains an important policy objective. Lord Heseltine's independent review of UK competitiveness and ability to deliver growth will be published later this month to complement and inform the government's industrial strategy.

To help inform the work by Lord Heseltine and his team, this paper provides a comprehensive review of the latest international data on the UK's relative economic performance and more broadly on a number of competitiveness indicators. To this end it expands and updates wherever possible the benchmarking study of March 2006 published in DTI Economics Paper 17 and the review of productivity and competitiveness indicators published by BERR in 2008.

Of course, measuring competitiveness is not a straightforward task. This is because competitiveness is the outcome of a complex mix of inter-related factors and international data is not always comparable. As a result, there is no one metric by which a country's relative competitiveness in the global economy can be judged. In addition, the only internationally comparable data available on a number of measures still pre-dates much of the global slowdown.

To overcome these challenges this report explores the most recent research on UK productivity and export performance – two commonly used outcome based measures of competitiveness - and examines in detail the underlying drivers of UK competitiveness. Only by better understanding the outcomes and drivers of our relative competitiveness will we become more effective at developing and monitoring strategies and policies across the public and private sectors aimed at maintaining or improving our performance.

I am very grateful to all the analysts who contributed to this publication and to everyone who provided helpful comments on earlier drafts.



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Executive Summary

Historically the UK economy has performed relatively well in comparison to its major competitors. However, during the last decade growth was increasingly driven by household consumption and government activity while the contributions of business investment and net trade both declined significantly. Now, like other developed economies across the world, the UK economy is struggling to return to a sustained growth path following the recent financial crisis and the deepest recession since the 2nd World War.

The recovery process will be challenging due to high levels of public indebtedness. It will be a challenge to stimulate the business environment that enhances firms' capabilities and enables businesses to grow and retains UK's competitiveness.

The most recent Global Competitiveness Report by the World Economic Forum (WEF) ranks the UK as the 8th most competitive country in which to conduct business, continuing its historical strong performance. The UK is well regarded for its high quality science and research base, high-level skills, openness to international trade and effectiveness of its regulatory and competition regimes and flexible labour market. As a result the UK remains a magnet for inward investment, second only to the USA.

However, the UK's long term prospects need to be considered within the context of significant and fundamental changes in the level and pattern of both global demand and global supply, the latter involving technological change, increasing competition from rapidly developing economies and the associated development of global value chains. Such changes have profound implications for how a developed economy such as the UK must develop its productive capabilities in order to compete successfully, particularly at a sectoral level.

UK industrial structure and performance

The UK economy comprises a wide range of different sectors whose activities, and those of the firms within them, have evolved over time. In common with other advanced economies, there has been a marked shift in the structure of the UK economy away from manufacturing towards services, in particular to knowledge intensive services such as finance, professional and business services and Information and Communication Technologies (ICT).

Moreover, with the emergence of global value chains, larger firms have increasingly focused on those functions and activities where they have a key competitive advantage with other functions sub-contracted out to smaller firms with specialist skills and knowledge. This trend has helped sustain and grow the Small and Medium Enterprise (SME) sector in the UK. The number of SMEs in the UK has almost doubled over the last 30 years and is currently estimated at around 4.5 million. However, the evidence by NESTA (2010) shows that despite having a relatively high proportion of firms which grow or contract rapidly, almost 30% of UK firms experienced static or very low growth over a three year period.

In part, recent sectoral shifts in the UK reflect increased specialisation across advanced economies. Compared to its major competitors, the UK's sectoral diversity is similar to Germany but marginally greater than both the USA and France.

However, as we experience increased globalisation of value chains and rapid growth of emerging economies such as China and India, the UK will need to continue to shift into higher value activities and seize current and forthcoming market opportunities.

Continuous investment in innovation, enhanced skills among its workforce and supporting business environment will be key to consolidating and enhancing the competitiveness of UK businesses in key sectors and markets at home and overseas.

What is competitiveness and why it matters

Competitiveness is widely considered to be a major determinant of a country's relative economic performance and remains a core theme of the policy debate. Despite this, competitiveness is not a concept which can easily be applied and is difficult to measure, as the factors which are thought to underpin it are numerous and highly inter-related.

For a nation, the OECD¹ defines competitiveness as: *“the degree to which it can, under free and fair market conditions, produce goods and services which meet the test of international markets, while simultaneously maintaining and expanding the real incomes of its people over the long term.”*

For a firm, competitiveness is the ability to produce better than other firms the right goods or services of right quality, at the right price and the right time. It means meeting customer's needs more effectively and more efficiently than other firms.²

To benchmark UK's relative competitiveness against its major competitors, in this paper we explicitly distinguish between **driver based measures** – such as skills, innovation, infrastructure and business environment - which focus on the factors thought to underpin competitiveness, and **outcome based measures** – notably country's productivity and export performance - which reflect the results of firms in different countries competing in the global market.

Both measures are subject to a number of conceptual and measurement issues and as a result need to be treated with caution. The overall approach taken is to look for common trends and patterns in the latest data and use these to triangulate areas where the UK appears to be relatively competitive (or uncompetitive) in particular sectors or activities.

¹ OECD (1992), *Technology and the Economy: the Key Relationships*, OECD, Paris.

² HM Government (1994) *Competitiveness. Helping Business to Win White Paper*.

Benchmarking UK competitiveness

UK Productivity Performance

The impact of the financial crisis notwithstanding, the UK economy has grown strongly since 1997, outpacing the rest of the G7 with the exception of Canada in terms of growth in GDP per capita. This strong performance was not driven by a significant increase in hours worked, but rather a sustained period of faster labour productivity growth relative to our peers.

As a result, the UK's long lived productivity gap with France and Germany in terms of output per worker has effectively disappeared. However, UK output per hour worked was still 24% behind the USA, 19% behind Germany and 18% behind France in 2010. On this basis, on average UK worker would have to work 10 hours to produce the same output a worker in the USA could produce in 8 hours.

In general, the UK productivity gap in terms of GDP per hour worked is apparent across most sectors rather than the result of the UK having an unfavourable mix of sectors compared to other major economies.

Rapid productivity growth in the UK over recent years appears to have been due to a mixture of 'catch' up with leading economies where the UK lags behind, such as in transport equipment, machinery & equipment, and extending our lead in others, including financial intermediation.

After the recession of 2008, productivity performance across sectors has been diverse, but in general manufacturing has performed better than services. Furthermore, just under half of sectors experienced little or zero absolute productivity growth after the recession. This appears to have been caused by the relatively modest decline in UK employment relative to the large falls in output; which is a central puzzle of the UK's more recent performance. It is possible that sectoral labour productivity measures may also have been affected by a decline in underlying or structural productivity, but there is little concrete evidence for this as yet.

UK Export Performance

Exports are a useful benchmark because they directly result from competition between firms from different countries in global markets. In common with most other advanced economies the UK's share of global export markets has declined over the last thirty years.

This decline has predominantly been in terms of goods exports, with the UK's share of financial and commercial services exports actually rising. The UK is the 10th largest exporter of goods but 2nd largest exporter of services. A similar pattern is observed for net exports, which show that the UK is the largest net exporter of business and financial services in the advanced economies.

Measures of Revealed Comparative Advantage - which indicate the relative specialisation of countries in particular sectors in global markets - reinforce the story of strong UK service exports, but also identify a number of other high tech high value added sectors such as aerospace, pharmaceuticals and chemicals, in which the UK

appears to be relatively competitive. Conversely, although the UK has a number of areas of relative specialisation in areas such as specialist textiles and engines and turbines – it tends to be weaker across other manufacturing sectors.

In general, these broad patterns have been relatively stable over the last few decades suggesting that the UK's competitive strengths are rooted in specific characteristics of our business environment. However, as the experience of ICT services shows, these competitive advantages can be rapidly eroded by new entrants to international markets.

Drivers of competitiveness

A number of different factors underpin the growth and productivity performance of UK firms and sectors and will therefore help explain why a productivity gap with our main competitors persists.

Business Environment

The UK ranked 8th in the WEF Global Competitiveness Report and 7th in the World Bank's Ease of Doing Business Ranking. A high ranking means the regulatory environment is judged conducive to the starting and operation of a local firm. Typically, the UK performs worse than Germany and the US, but is ahead of France, Italy and Japan.

In general, the UK business environment is seen as supportive of economic growth and competitiveness. The UK has a well functioning competition regime, one of the most flexible labour markets in the advanced economies and highly supportive political and institutional environments among the developed countries.

However, the UK underperforms other major economies in terms of skills, innovation and infrastructure.

Skills

Despite improvements, particularly in tertiary education, gaps in skills remain at the intermediate and basic levels, including in maths, literacy and science. The UK spends proportionately more on primary education than its competitors but proportionately less on tertiary education. UK industry also appears to be relatively less skills intensive and employ fewer graduates in professional and technical occupations than its major competitors.

In addition, although the UK management schools are perceived to be excellent with a ranking of second in the world, the evidence shows that UK underperforms in terms of the quality of its management and leadership skills compared to key competitors. Evidence also shows that family owned and run firms tend to have lower management scores than firms with other management structures.

Innovation

In contrast to its major competitors, UK has a number of strengths in technology and innovation: it has a strong science base and scores highly in collaboration between education institutions and businesses. UK has also been successful at exploiting growth opportunities from ICT capital and investment in intangibles such as software and brands has been strong, in part explained by the predominance of service sectors in the UK.

However, the UK performs relatively poorly in investment in traditional forms of innovation such as Research and Development (R&D). UK's performance in R&D intensity³ is ranked as second lowest among the G7 countries.

Infrastructure

Investment in physical capital and infrastructure is an essential determinant of economic growth and is undertaken to improve technology, productive efficiency and future capacity. However, according to a number of studies the UK lags behind the G7 countries in terms of the quality and the level of investment in physical infrastructure. According to the World Economic Forum, against the G7, the UK has improved its position over the last three years to now rank 3rd among G7 countries.

Trade and investment

UK competitiveness is also driven by opening the economy up to increasing international trade and investment. Imports from foreign suppliers can help strengthen competition and spur innovation in the domestic market. Inward investment can also play an important role, stimulation productivity through the international transfer of skills, technology, knowledge and innovation. Openness to international trade and investment also enables the UK to reap the benefits from increased specialisation in those goods and services where the UK has particular strengths and also economies of scale from the accompanying increase in the size of the market.⁴

Finally, there are also a number of wider factors which while not direct drivers of competitiveness, nevertheless can clearly help to support it. These factors can include international fragmentation of the production process and regionalisation of supply chains, benefits driven from agglomerations as well as linkages between different sectors of the economy and existence of high growth firms in certain sectors.

³ R&D intensity is defined as a proportion of R&D expenditure to Gross Domestic Product.

⁴ See BIS Economics Paper No.13 and DTI Economics Paper No.10.

Conclusion

The global economy continues to undergo significant and fundamental change. Many developed economies, including the UK, are over-indebted and struggling to return to growth following the financial crisis of 2008. In addition, substantial shifts in manufacturing and increasing pressure on environmental sustainability are not temporary departures from past trends but the result of a restructuring of global economic activity.

The combination of these factors has heightened interest in how nations, their industries and firms currently compare in terms of their relative international competitiveness and their sources of present and possible future competitive advantage.

This interest was underlined in the UK in March this year when the Chancellor and the Secretary of State for Business asked Lord Heseltine to undertake an independent review of UK competitiveness to complement and inform the government's industrial strategy.

Historically, the UK has performed reasonably well in terms of economic growth and in productivity against many other major economies. However, competitiveness is both difficult to conceptualise and to measure. It results from a complex mix of inter-related factors resulting in a range of comparative measures of performance in terms of inputs to and outputs from the competitive process. On some measures, including on direct inward investment and the science and research base, the UK scores well. On others, including skills, infrastructure and trade in goods, much less so. How our absolute and relative international performance on a number of these measures has been affected by the recession remains unclear.

To address this gap and in part to inform Lord Heseltine's review, this paper has therefore sought to expand, refresh and update wherever possible the Department's previous international benchmarking reviews from March 2006⁵ and 2008⁶ using the latest published data on competitiveness indicators. However, much of the published and internationally comparable data continues to pre-date the global slowdown and it may yet be sometime before its full impact on the relative performance of the UK economy across the full range of competitiveness measures can be determined.

⁵ *'UK Productivity and Competitiveness Indicators'*, DTI Economics Paper No. 17, March 2006.

⁶ *'The 2008 Productivity and Competitiveness Indicators'*, BERR, 2008.

1. Introduction

The aim of the paper is to provide a comprehensive review of the latest international data benchmarking the UK's relative economic performance against its major competitors. The paper explores the most recent research on UK productivity and export performance and examines in detail the underlying drivers of UK competitiveness.

Given high level of complexity around the measurement and definition of competitiveness and disagreement among economic scholars over the legitimacy of competitiveness as a policy objective, in this chapter we provide a reader with a definition of competitiveness and a short discussion why competitiveness matters.

The remaining chapters of the paper are structured as follows:

Chapter 2 sets out background analysis on the UK's industrial structure and recent performance of the UK economy. It outlines past and ongoing trends responsible for the recent sectoral shift and sector performance. The chapter also sets out inter-linkages between sectors and highlights regional and firm level performance in the UK to provide a reader with a broad overview of the UK's sectors before assessing UK's competitiveness at a country and sector level in the following chapter.

Chapter 3 focuses on benchmarking UK competitiveness against its major competitors. To do that, it analyses in detail both UK productivity performance and export performance – two commonly used measures to assess country's competitive position. The chapter also highlights a number of conceptual and measurement issues to ensure accurate interpretation of the data and analysis provided.

Chapter 4 examines the main drivers of UK competitiveness and identifies some key challenges to them. Drawing on the latest available evidence, the chapter analyses drivers grouped under four main areas: skills, innovation, infrastructure and business environment.

What is competitiveness?

Competitiveness is widely considered to be a major determinant of a country's relative economic performance and remains a core theme of the policy debate. Despite this, competitiveness is not a concept which can easily be applied and is difficult to measure, as the factors which are thought to underpin it are numerous and highly inter-related.

For a nation, the OECD⁷ defines competitiveness as: *“the degree to which it can, under free and fair market conditions, produce goods and services which meet the test of international markets, while simultaneously maintaining and expanding the real incomes of its people over the long term.”*

⁷ OECD (1992) *Technology and the Economy: the Key Relationships*, OECD, Paris.

For a firm, competitiveness is the ability to produce better than other firms the right goods or services of right quality, at the right price and the right time. It means meeting customer's needs more effectively and more efficiently than other firms.⁸

Does national competitiveness matter?

Competitiveness cannot be measured directly but can be inferred from the market outcomes which result from it. All other things equal, we would expect to see a more competitive economy to generate faster economic growth and higher employment.

A sustained improvement in UK's competitiveness will require among other things further improvement in long-term productivity. By continually improving the efficiency with which a country can combine its resources to produce goods and services people want to buy, a more productive economy produces more with less.

In the long run, higher rates of UK productivity growth are essential to sustaining high and raising rates of economic growth, improving the standards of living and maintaining and increasing UK's position as a dynamic, open and thriving economy.

However, there is some degree of disagreement among economic scholars over the legitimacy of competitiveness as a policy objective. According to Krugman (1994) setting national competitiveness as a policy objective can potentially distort policy towards protectionism and failed industrial policies. This criticism has its roots in the observation that countries do not compete against each other for market share in the same way as firms. For example, advanced economies trade significantly with each other in the same types of goods, suggesting that these exchanges are not a zero sum game in the same way that firms winning or losing market share is.

The counter argument to this is that in one sense governments do compete with each other to foster the right environment for businesses to locate, invest and grow. In a dynamic economy in which firms have the opportunity to locate in a number of places in the world, the relative attractiveness of a country's business environment does matter. More broadly, many of the drivers of competitiveness are also strongly associated with the drivers of growth and prosperity.

Thus despite its drawbacks and potential misinterpretation overall competitiveness is an important driver of UK economic performance and remains an important UK policy objective.

The different levels of competitiveness

The competitiveness of UK companies in the global economy may be influenced by factors at the firm, sector and economy level.

At the firm-level, competitiveness may be improved as a result of action by individual businesses to become more efficient, adopt new technologies and practices or

⁸ HM Government (1994) *Competitiveness. Helping Business to Win White Paper*.

increase their absorptive capacity – their ability to identify and make effective use of knowledge and ideas from external sources.⁹

The competitiveness of UK firms may also be improved at the sectoral level. For example, in some industries, firm behaviour may be influenced by sector-specific regulatory frameworks and infrastructures. If these structures or infrastructures are changed in a way which enables firms to become more productive or innovative, this can lead to increased competitiveness.

At the economy-level, the wider business environment as well as macroeconomic and fiscal policy can also contribute to UK competitiveness. For example, stable economic conditions are crucial to providing firms with the confidence they need to make key business decisions such as new capital investment which may have a longer-term impact on productivity and competitiveness (e.g. capital investment).

Maintaining UK competitiveness in the global economy

Competition in the global economy is dynamic. This reflects the process of ‘productive churn’ whereby more efficient or innovative firms either enter the market or increase their market share forcing out weaker performing businesses. It may also be affected by government efforts to provide their firms with the support needed to compete effectively in the global economy. The different rates at which firms and governments raise their game, moving into higher value activities and industries may lead to changes in the relative competitiveness of the UK in the global economy over time.

To achieve long-term sustainable economic growth and employment, the UK must continue to ensure that it is internationally competitive in those sectors which offer the greater growth opportunities in the future. Future economic growth will be influenced by a variety of economic, social and wider factors. These include:

- rising incomes and changes in patterns of demand in both developed countries and emerging markets;
- changing business practices and new technologies;
- increasing demand for environmental products, processes and standards; *and*
- demographic and lifestyle changes.

⁹ See Business Economics Paper No.13 for further discussion.

2. UK Industrial Structure and Performance

Summary

The UK economy comprises a wide range of different sectors whose activities, and those of firms within them, have evolved over time. In common with other advanced economies, there has been a marked shift in the structure of the UK economy away from manufacturing towards services, in particular to knowledge intensive services such as finance, professional and business services and ICT. In 2011, knowledge intensive industries accounted for around a third of UK output and quarter of UK employment. By comparison, manufacturing contributed around a tenth to UK output and slightly less to employment in the same year.

The recent performance of the UK sectors can be attributed to the following trends:

- i. Increased government consumption and investment in health and education;
- ii. Increased consumer spending on consumer durables and leisure activities;
- iii. Increased investment and trade in knowledge intensive services;
- iv. A construction boom driven by rapidly rising property prices.

Moreover, with the emergence of global value chains, larger firms have focused on those functions and activities where they have a key competitive advantage with other functions sub-contracted out to smaller firms with specialist skills and knowledge. This growing trend has helped sustain and grow the SME sector in the UK which has almost doubled in number over the last 30 years. However, the evidence also shows that over a three year period around 30% of UK firms experienced static or very low growth.

In part, recent sectoral shifts in the UK reflect a story of increased specialisation across all advanced economies. Compared to its major competitors, the UK's sectoral diversity is similar to Germany but marginally greater than both the USA and France.

Increased specialisation can have implications at a national and regional level. A more diversified economy is less vulnerable to sector specific shocks, however, regional specialisation, such as clusters, can generate powerful spillover benefits. Analysis show that the geographical distribution of employment and output in sectors can vary considerably across the UK. Economic activity in sectors such as retail, construction, health and social care and education is relatively evenly spread across the country. By contrast, certain manufacturing and knowledge intensive industries tend to be concentrated in some geographical locations.

All sectors of the UK economy are to some degree directly or indirectly connected. Often the outputs of one sector are used by others, either as an input of production or an enabler of economic activity (*enabling effects*). At a firm level, these linkages manifest themselves in the form of customer supplier relationships (*supply chain effects*). Moreover, some sectors can be a source of knowledge and innovation spillovers which unintentionally benefit other sectors of the economy (*spillover effects*).

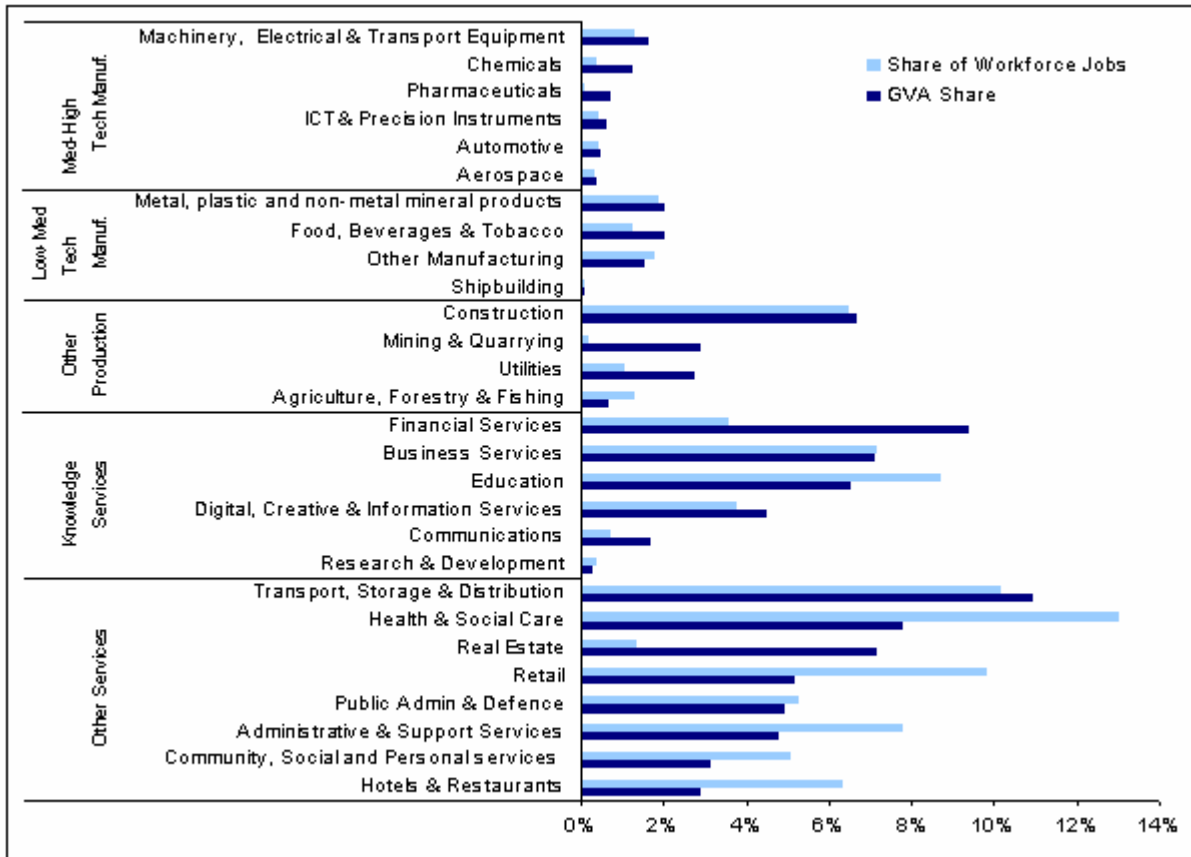
This chapter provides an overview on the UK’s industrial structure and recent performance of the UK economy. It outlines past and ongoing trends responsible for the recent sectoral shift and sector performance. The chapter also sets out inter-linkages between sectors and highlights regional and firm level performance in the UK to provide a reader with a broad overview of the UK’s economy and its sectors before assessing their competitiveness in chapter 2.

The current structure of the UK economy

Output and employment at a sector level

The UK economy comprises a wide range of different sectors whose activities, and those of firms within them, have evolved over time. In common with other advanced economies, there has been a marked shift in the structure of the UK economy away from manufacturing towards services, in particular to knowledge intensive services such as finance, professional and business services and ICT. In 2011, knowledge intensive services accounted for roughly a third of UK output and a quarter of total employment. By comparison, manufacturing contributed around a tenth to UK output and slightly less to employment in the same year (Figure 1 below).

Figure 1: Share of Sectors in Total UK GVA and Employment (2011)



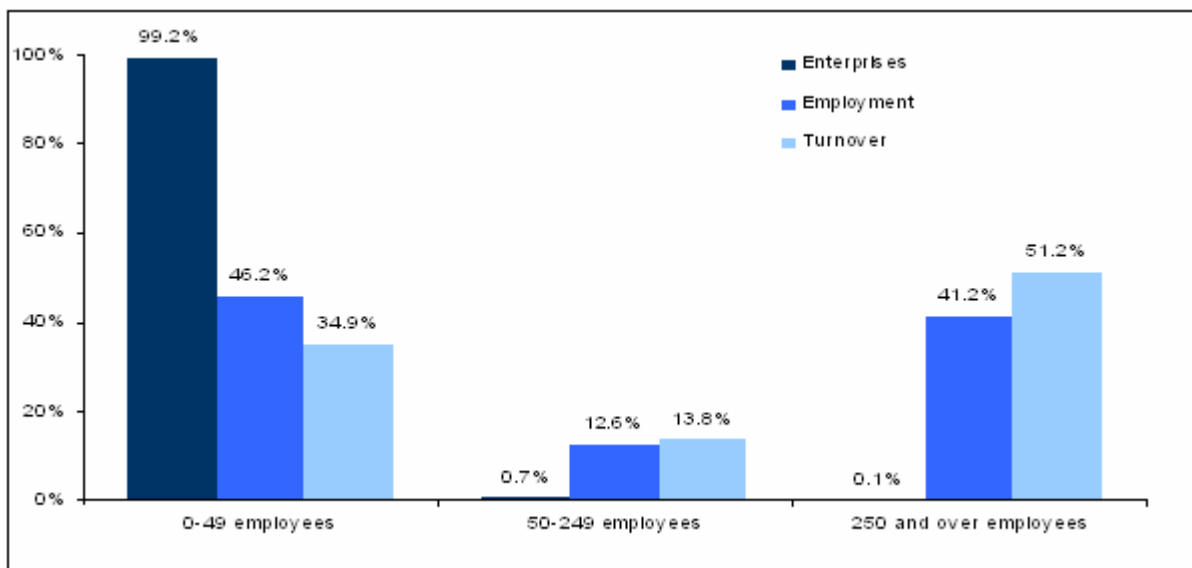
Source: BIS analysis of ONS data

However, official statistics are likely to greatly underestimate the contribution of manufacturing to the UK economy for two key reasons. First, the boundary between manufacturing and services has become increasingly blurred in recent years, with many manufacturing firms now offering associated services with the sale of their product.¹⁰ Second, manufacturing is also an enabler, underpinning economic activity in other sectors of the economy either through knowledge and innovation spillovers or supply chain effects. Inter-linkages between sectors in the UK economy are discussed in greater detail later in this chapter.

Economic contribution at a firm level

There were an estimated 4.5 million private sector businesses in the UK at the start of 2011.¹¹ Small and medium-sized enterprises (SMEs) - those with 0-249 employees - together accounted for 99.9% of all private sector businesses, almost 60% of employment (13.8 million) and almost half of turnover (£1,500 billion) – see Figure 2. SMEs also accounted for almost half (48.3%) of annual Gross Value Added.¹²

Figure 2: Share of Businesses, Employment and Turnover by Employee Size (2011)



Source: BIS Population Estimates for the UK and Regions 2011

The number of SMEs employers present in different sectors of the economy varies. As Figure 3 shows, nearly half are in just three sectors - the wholesale and retail

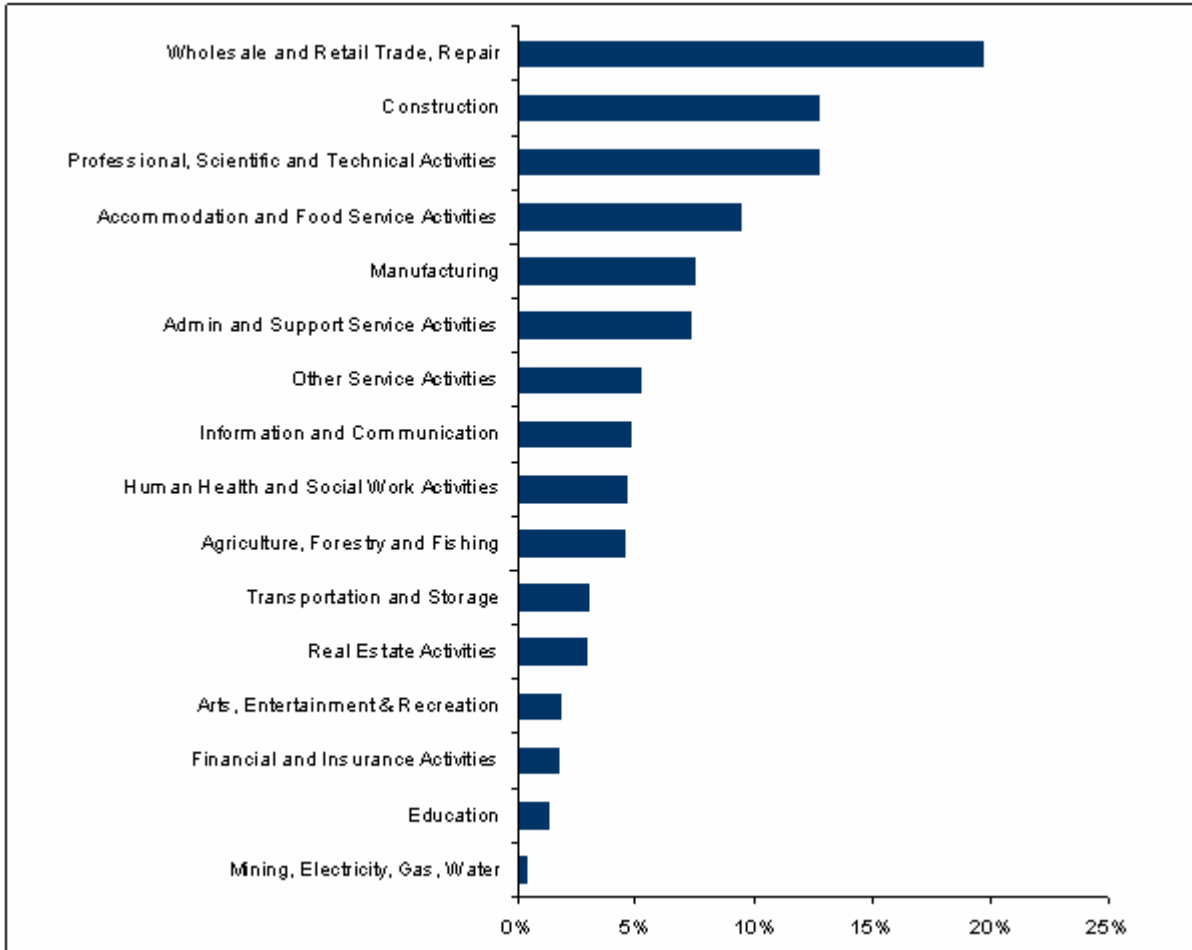
¹⁰ Work Foundation (2010) *More than making things: a new future for manufacturing in a services economy*. http://www.theworkfoundation.com/assets/docs/publications/284_more%20than%20making%20things.pdf

¹¹ BIS National Statistics, *Small and Medium-sized Enterprise Statistics for the UK 2009*.

¹² ONS Annual Business Survey 2009.

trade and repair sector (19.8%), the professional, scientific and technical activities sector (12.7%) and construction (12.7%).

Figure 3: UK SME Employers by Industry Sector (2011)



Source: BIS analysis of ONS data

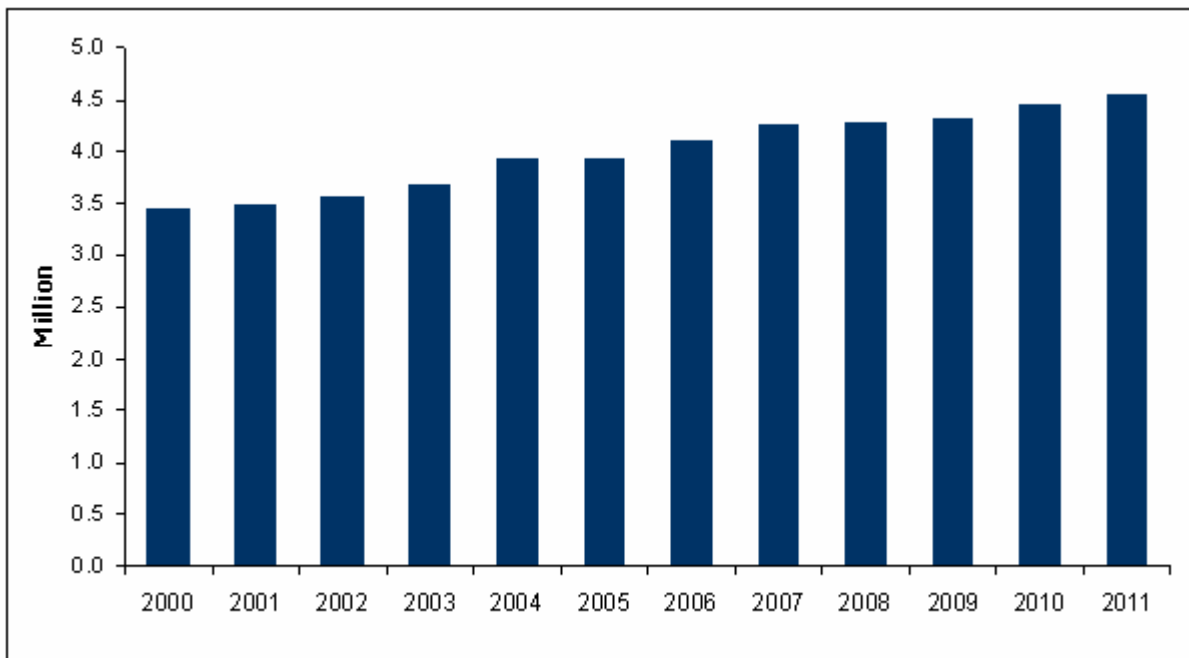
With the emergence of global value chains, larger firms have focused on those functions and activities where they have a key competitive advantage with other functions sub-contracted out to smaller firms with specialist skills, knowledge and expertise. This growing trend has helped sustain and grow the SME sector in the UK and will continue to do so in future years.¹³

The estimated number of private sector enterprises in the UK has increased in each of the last eleven years, reaching 4.54 million private sector enterprises in the UK at the start of 2011. This is an increase of almost 1.1 million (31%) since the start of 2000, when there were an estimated 3.47 million private sector enterprises (Figure 4).

¹³ BIS Economics Paper No.5 (2010) *Internationalisation of Innovative and High Growth SMEs*. <http://www.bis.gov.uk/assets/biscore/economics-and-statistics/docs/10-804-bis-economics-paper-05.pdf>

However, the evidence by NESTA (2010) shows that despite having a relatively high proportion of firms which grow or contract rapidly, almost 30% of UK firms experienced static or very low growth over a three year period. This is more than in the USA (10%) and the average for major European countries (14%).¹⁴ For further discussion on the degree of competition in the UK economy see chapter 4.

Figure 4: Number of Private Sector Enterprises in the UK (2000–2011)



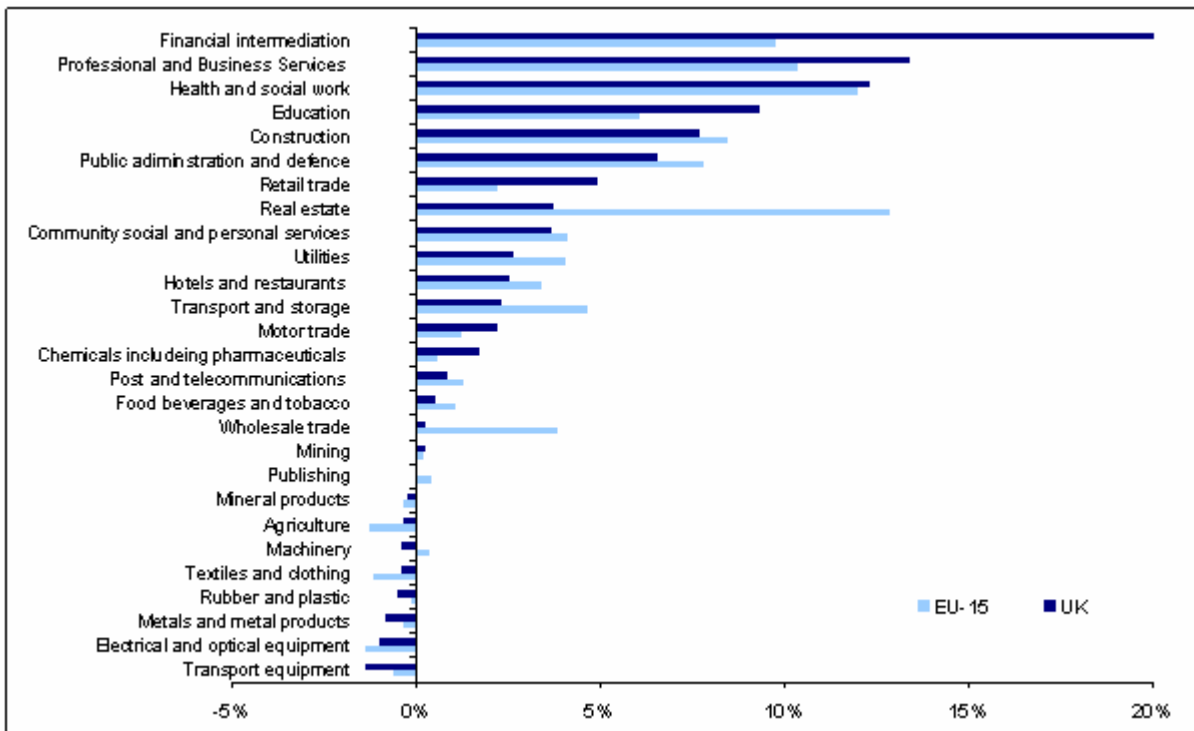
Source: BIS Population Estimates for the UK and Regions 2011

¹⁴ These results should be treated with caution as they are highly sensitive to the banding used to define the distribution.

Recent sectoral shifts

Over the period 2000 to 2009, UK Gross Value Added (GVA) grew by around 43% in nominal terms. Figure 5 below shows that that this was largely driven by growth in the knowledge-intensive services sectors, health, education and construction.

Figure 5: Sector Contribution to Nominal Growth¹⁵ (PPP, 2000-2009)



Sources: ONS UK National Accounts and Eurostat EU-15 National Accounts

The recent performance of UK sectors can be attributed to a wide-ranging number of recent and ongoing demand and supply factors including:

- Increased government consumption and investment in health and education¹⁶
- Increased consumer spending on consumer durables and leisure activities
- Increased investment and trade in knowledge intensive services
- A construction boom driven by rapidly rising property prices
- A decline in the average price of manufactured goods relative to services.¹⁷

¹⁵ Note: This analysis does not capture the importance of those sectors which enable and stimulate growth indirectly (e.g. transport investments that lead to agglomeration benefits, or those that improve productive capacity through delivering resource efficiency).

¹⁶ Institute for Fiscal Studies (2009) *A Survey of Public Spending in the UK*.

<http://www.ifs.org.uk/bns/bn43.pdf>

¹⁷ BERR (2008) *Globalisation and the changing economy*. <http://www.berr.gov.uk/files/file44332.pdf>

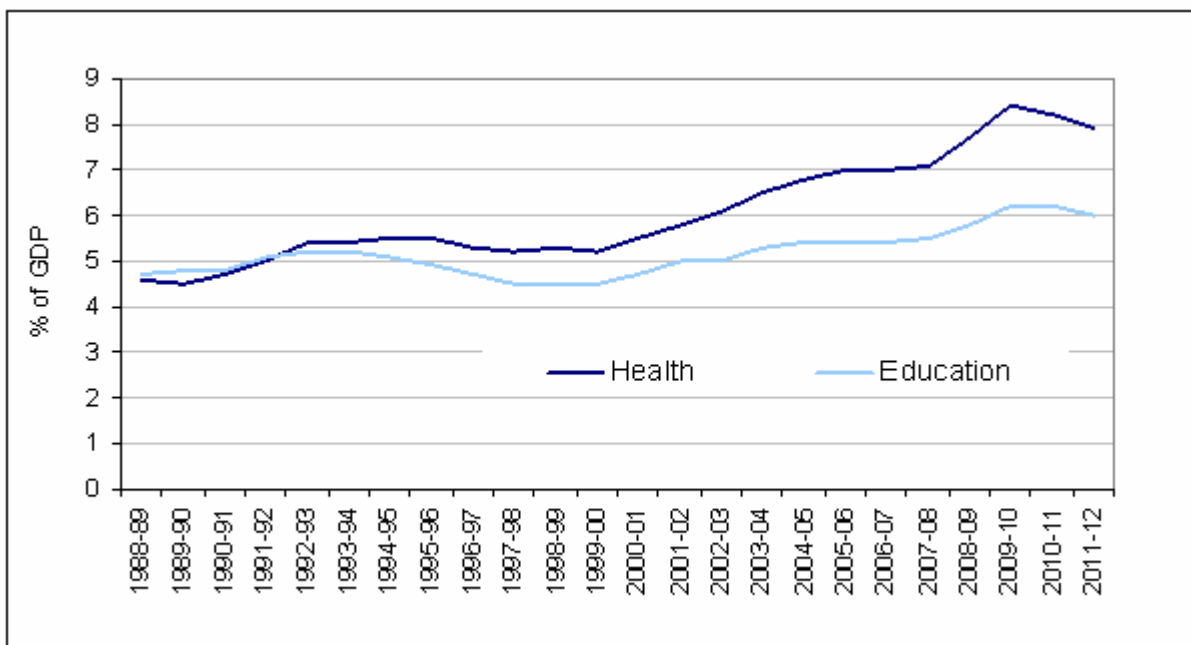
These are each discussed below.

Increased government consumption and investment in health and education

Government is 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%).¹⁸

Government spending on health and education increased since the 1990s (Figure 6 below). Over the period 1997 to 2008 real annual growth in spending on health and education more than doubled to 6.3% and 4.3% respectively before falling back slightly to 4.3% and 2.9% between 2008 and 2011.¹⁹

Figure 6: Public Sector Expenditure on Health and Education (1988-2012)



Source: HM Treasury (2012) Public Expenditure Statistical Analyses (2012) Table 4.4
http://www.hm-treasury.gov.uk/d/pesa_complete_2012.pdf

Increased consumer spending on consumer durables and leisure activities

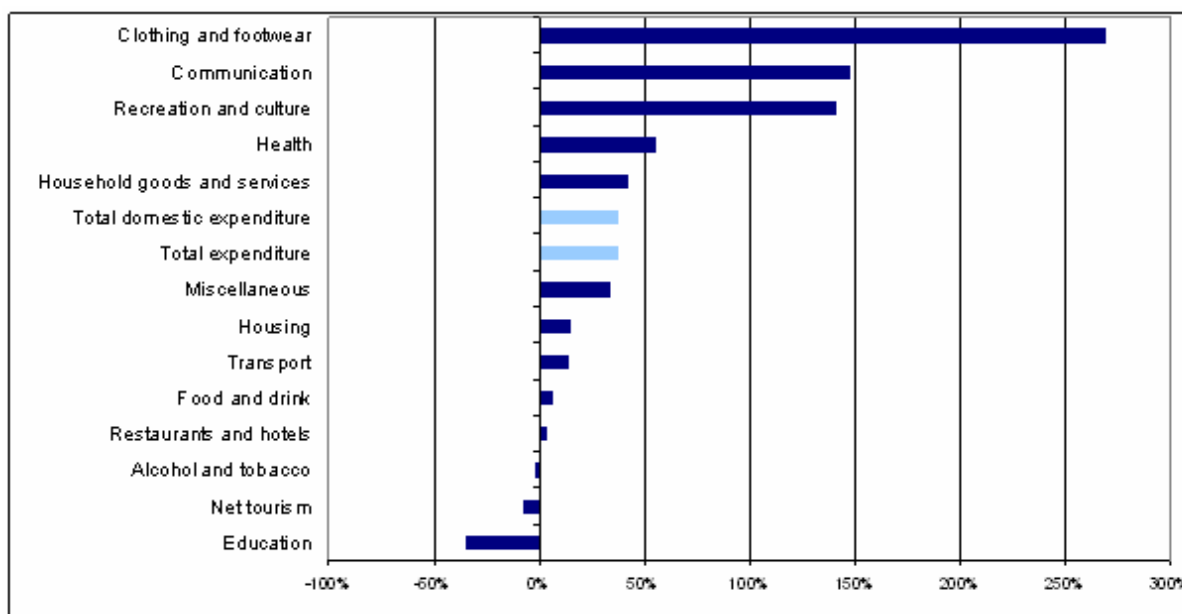
Consumer spending accounts for around 60% of total aggregate demand. Over the period 1997-2011, final consumption expenditure by UK households rose by around 37% to £862 billion. This was financed by various factors including higher real disposable incomes, rising property prices, a lower rate of saving and increased private debt. Note that this includes effects of any increasing number of households as well as increasing expenditure from those households.

¹⁸ BIS analysis of ONS Supply and Use Tables.

¹⁹ Institute for Fiscal Studies (2009) *A survey of public spending in the UK*.
<http://www.ifs.org.uk/bns/bn43.pdf>

Figure 7 below shows the recent change in consumption patterns. Clothing experienced the greatest increase in consumer spending, rising by 269% over the period. Communication increased by 148%, due the rapidly expanding market in mobile phone equipment and services. Consumer spending on recreation and culture grew by 141% reflecting the increasing importance consumers attached to leisure. Expenditure on education, net tourism and to a lesser extent alcohol and tobacco fell over the period in real terms.

Figure 7: Real Growth in UK Consumer Spending by Category (1997-2011)



Source: Reproduced from Work Foundation (2012). Notes: Consumption measured in 2008 prices.

Increased investment and trade in knowledge intensive services

Over the period 2000-2009, knowledge intensive services including finance, professional business services and ICT grew by 40.8% in nominal terms, contributing 13.4% of total UK growth over this period.

This growth can be attributed in large part to the increase in investment in intangible assets such as R&D, software and skills.²⁰ Over the period 1997-2008, intangible investment has roughly doubled from £9bn to £17bn in the UK financial services sector and £15bn to £37bn in the business services sector.²¹

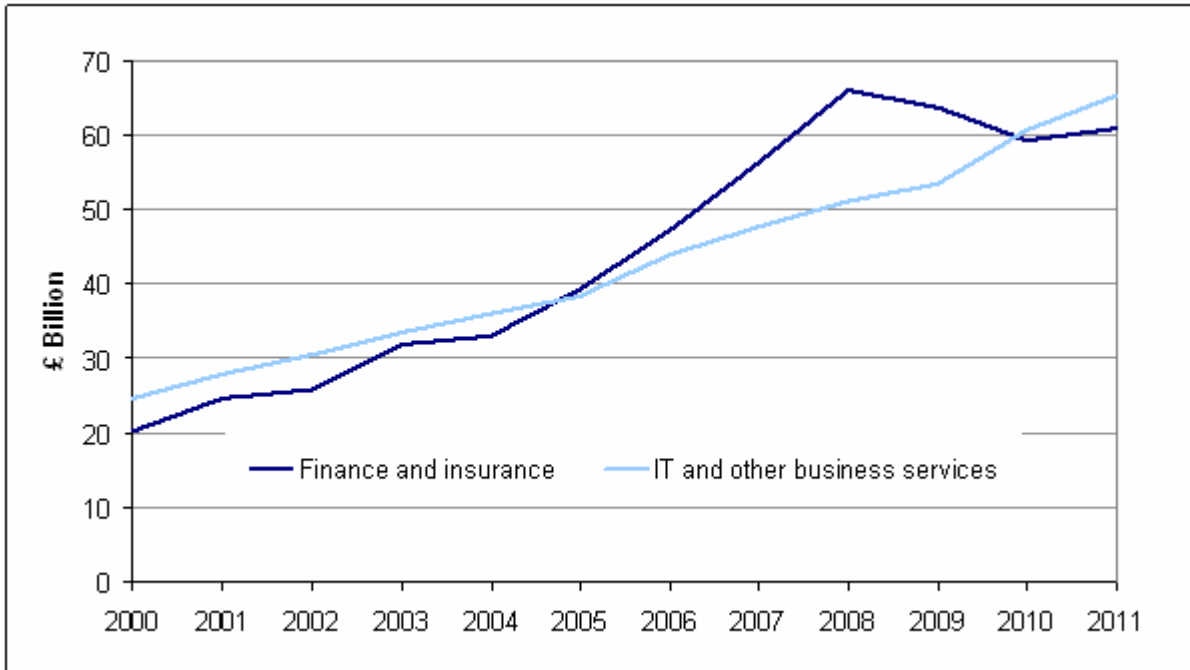
This investment enabled the UK to maintain its continued strong comparative advantage in knowledge intensive services and take advantage of new export market opportunities arising from the improvements in information and communication technology which have taken place over the last ten years (e.g. the emergence of digital technologies and super-fast broadband) and increased export demand as a

²⁰ Work Foundation (2010) *Britain's Quiet Success Story: Business Services in the Knowledge Economy*.
[http://www.theworkfoundation.com/assets/docs/publications/287_Britains%20quiet%20success%20story_9%20May_FINAL%20\(2\).pdf](http://www.theworkfoundation.com/assets/docs/publications/287_Britains%20quiet%20success%20story_9%20May_FINAL%20(2).pdf)

²¹ NESTA (2011) *Driving economic growth: innovation, knowledge spending and productivity growth in the UK* http://www.nesta.org.uk/library/documents/Driving_Ecc_Growth_Web_v4.pdf

result of rising incomes in emerging economies. Figure 8 illustrates the rapid growth in UK exports of financial services and IT and other business service over the period 2000-2011.

Figure 8: Increase in UK Exports of Selected Knowledge Intensive Services (2000-2011)

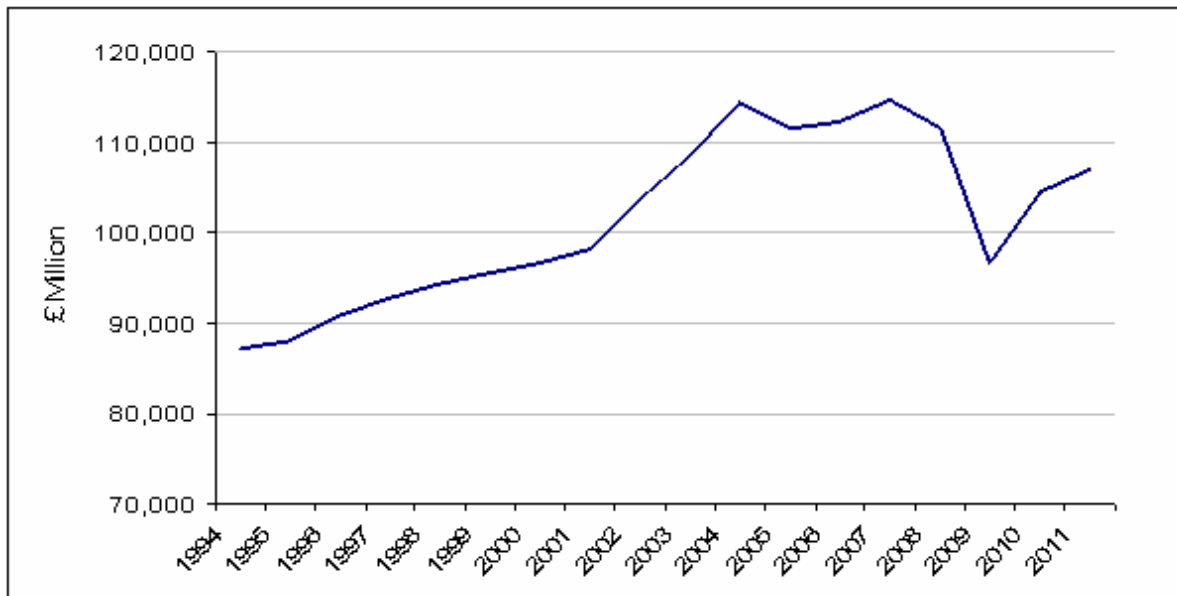


Source: ONS Pink Book, 2011 Edition

A construction boom driven by rapidly rising property prices

Between the mid-1990s and the end of 2007 real house prices increased more than two-and-a-half-fold, one of the sharpest rises in the OECD, driven by strong income growth, falling real interest rates, and a rise in mortgage lending including buy-to-let lending.

The rapid rise in property prices, coupled with increased government investment in health and education, help fuel a growth in construction output particularly in new private housing and public infrastructure (Figure 9).

Figure 9: Volume of Construction Output in Great Britain (1994-2011)

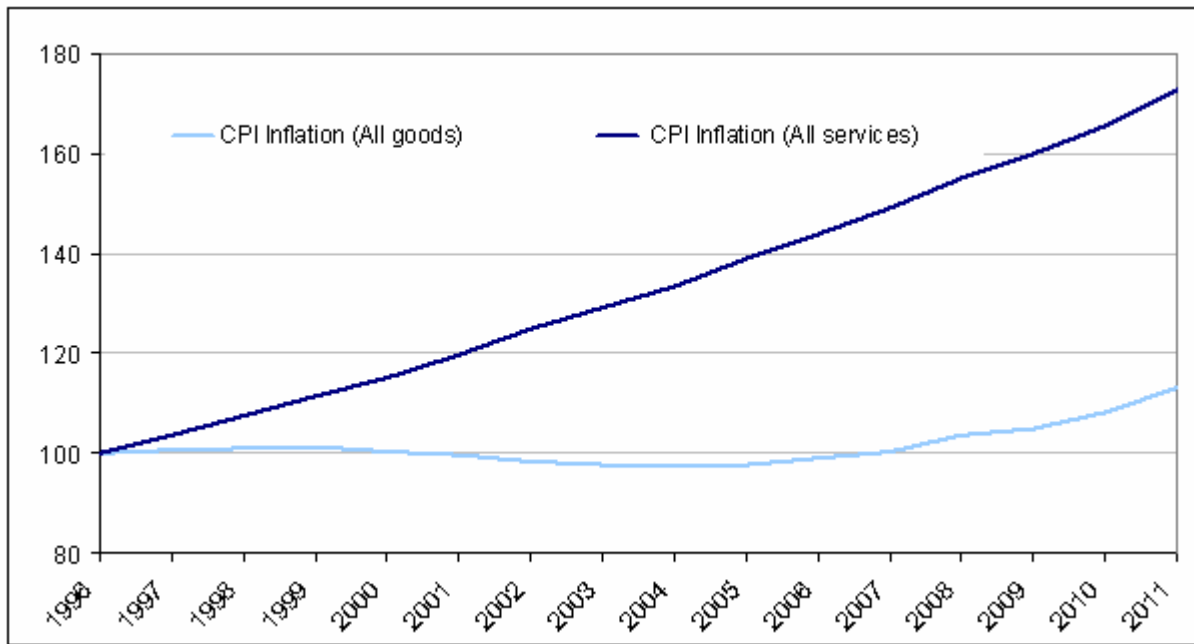
Source: ONS: Output in the Construction Industry series. Notes: Output measures in 2005 constant prices. The figures for 'construction' are made up of SIC (2007) codes 41 - Construction of Buildings, 42 - Civil Engineering and 43 - Specialised construction services. Broadly these relate to the old SIC (2005) 45 - construction contracting. A wider definition of the construction sector is possible which would include output for construction services and construction products, but for practical purposes the figures quoted here are for construction contracting only.

Decline in the average price of manufactured goods relative to services

The structural shift towards services also reflects the continued decline in the average price of manufactured goods compared to services (Figure 10). The steady decline in the average relative price of manufactured goods can be attributed to global improvements in manufacturing productivity driven by improvements in ICT and related investment and increased international competition driven by the greater involvement of low-wage economies in manufacturing rather than tradeable services.²²

²² This is commonly known as the 'Baumol Effect', whereby the greater scope for physical investment and the application of technology in many manufacturing sectors compared to services, increases relative productivity in the manufacturing sectors and in a competitive economy thus drives down relative prices. See also BERR (2008) *Globalisation and the changing economy* <http://www.bis.gov.uk/files/file44332.pdf>

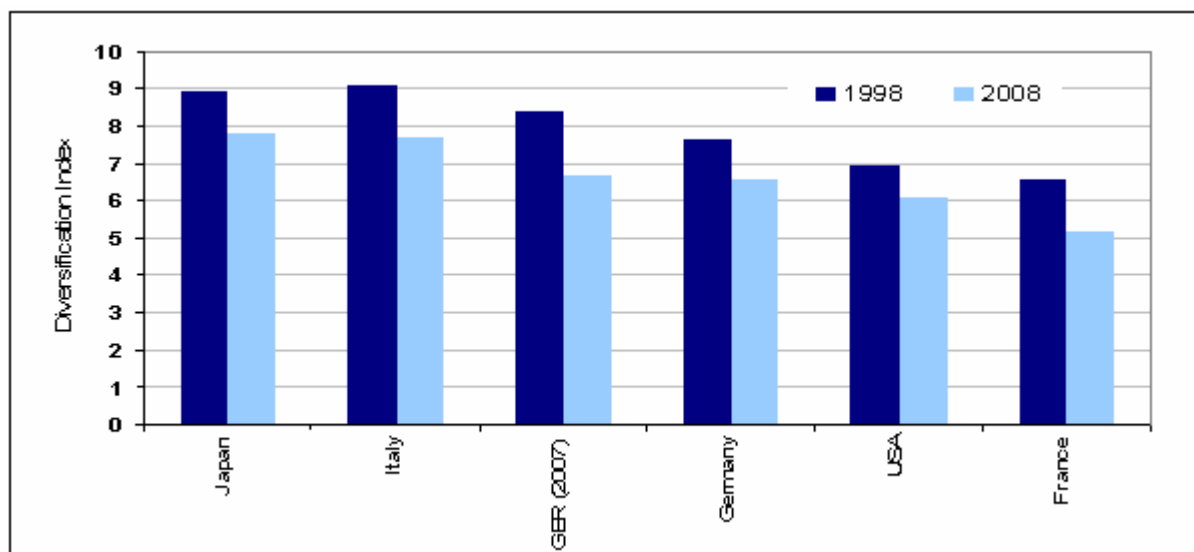
Figure 10: Changes in the Relative Price of Manufactured Goods and Services (1996-2011) (1996=100)



Source: ONS Consumer Price Indices, May 2012

In part, recent sectoral shifts reflect a story of increased specialisation across all the advanced economies. OECD analysis of the share of GDP accounted for by the largest sectors in each of the advanced economies suggests that economies generally have become less diversified in sector terms since 1998. 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 – see Figure 11.²³

Figure 11: Degree of Sectoral Diversification, Selected Countries (1998, 2008)



Source: STI Scoreboard 2011, based on OECD STAN Database. Notes: This is Hannah-Kay index, calculated for theta equal 2.

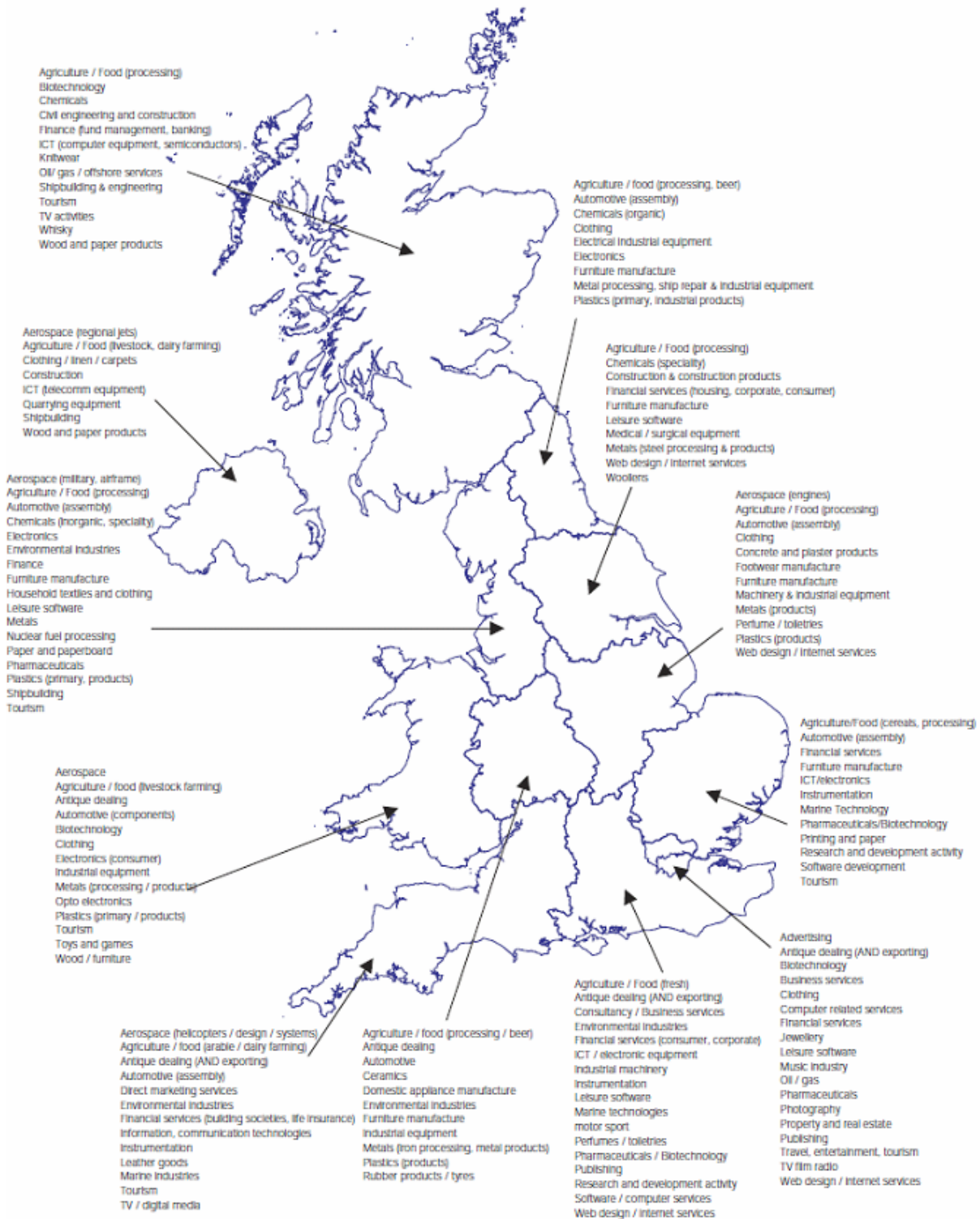
²³ The OECD looked at a range of metrics employed in the competition literature such as concentration ratios, the Herfindahl Index etc. These all produced broadly similar results.

This pattern of increased specialisation can have implications 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 / agglomeration of activities which allow for greater labour market pooling, knowledge sharing etc.

Analysis shows that certain manufacturing and knowledge intensive industries tend to be concentrated in some geographical locations (see Figure 12). For example, employment in the aerospace tends to be concentrated in the South West (Bristol), Lancashire and Derby, while the London area accounts for a large proportion of total employment in the financial services and professional business services sectors.²⁴

²⁴ 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>

Figure 12: Geographical Location of Selected UK Sectors (2000)



Source: DTI (2000) Business Clusters in the UK: A First Assessment
<http://webarchive.nationalarchives.gov.uk/http://www.dti.gov.uk/clusters/map/>

Inter-linkages between sectors

All sectors of the UK economy are to varying degrees directly or indirectly connected to one another. These linkages stem from the following three effects:

- *Enabling effects: The outputs of some sectors enable economic activity in other sectors of the economy*
- *Supply chain effects: There are widespread supply chain effects whereby economic activity in one generates demand for goods and services produced by other sectors*
- *Spillover effects: Some sectors are a source of knowledge and innovation spillovers which unintentionally benefit other sectors of the economy.*

Enabling effects

Some sectors of the economy provide key materials, technologies and services which are crucial to the successful design, manufacture and delivery of goods and services produced by other sectors. Table 1 below sets out how much of the output produced by particular manufacturing and services sectors is used by other sectors of the economy.

Table 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% consists of final consumption, gross fixed capital formation and exports.

Sectors such as Information and Communication Technology (ICT) industrial biotechnology and advanced materials (e.g. nano-materials and composites) provide innovative materials and technologies which enable advanced manufacturing industries such as automotive, Life Sciences and food and drink to develop new higher value products and adopt more efficient methods of production. For example, light-weight materials are an increasing feature of aircraft components and engines which enable aircraft manufacturers to design more fuel-efficient aircraft which meets more stringent environmental standards.

Sectors such as the Digital and Creative Industries and Professional Business Services, R&D, and ICT industries provide the necessary consultancy services needed by other sectors to design and deliver new products to their customers and solve the complex technical and logistic problems which may be hampering business competitiveness. For example, design engineering is enabling car manufacturers to redesign specific features of their vehicles so that are more user-friendly for older and disabled drivers.²⁵

More broadly, some sectors such construction, energy, transport and telecommunication) provide the wider economy with the crucial physical infrastructure it needs to develop, produce and transport goods and services to its customers as efficiently and quickly as possible.

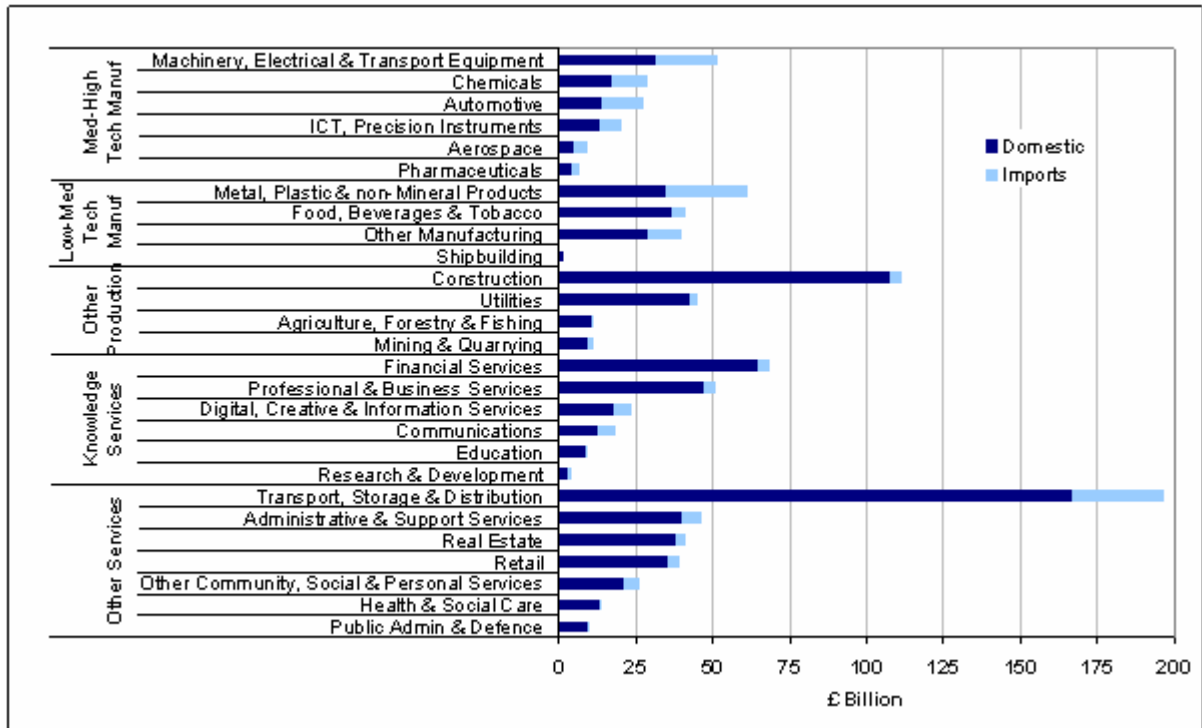
Supply-chain effects

Many sectors are also linked by supply chain effects. Supply chains are a network of firms involved in the production and delivery of a specific product and may cut across a wide-ranging number of manufacturing and services sectors. For example, in the automotive sector, the assembly of a particular vehicle will involve the procurement of products from manufacturing industries such as the chemicals, rubber and plastics, electronics, textiles, metals and non-metals sectors. It may also entail the procurement of relevant services such as design engineering consultancy services.

Total spending by one sector on goods and services produced by another sector is referred to as intermediate consumption. Figure 13 sets out which sectors are the main sources of intermediate consumption of goods and services produced elsewhere in the economy. It shows that the transport, storage and distribution and construction are key source of pull through demand for goods and services produced by other sectors. These together accounted for around a third of total domestic intermediate consumption in 2005.

²⁵ Deloitte (2009) *Innovation that matters. How innovation is currently supported in an ageing society.*

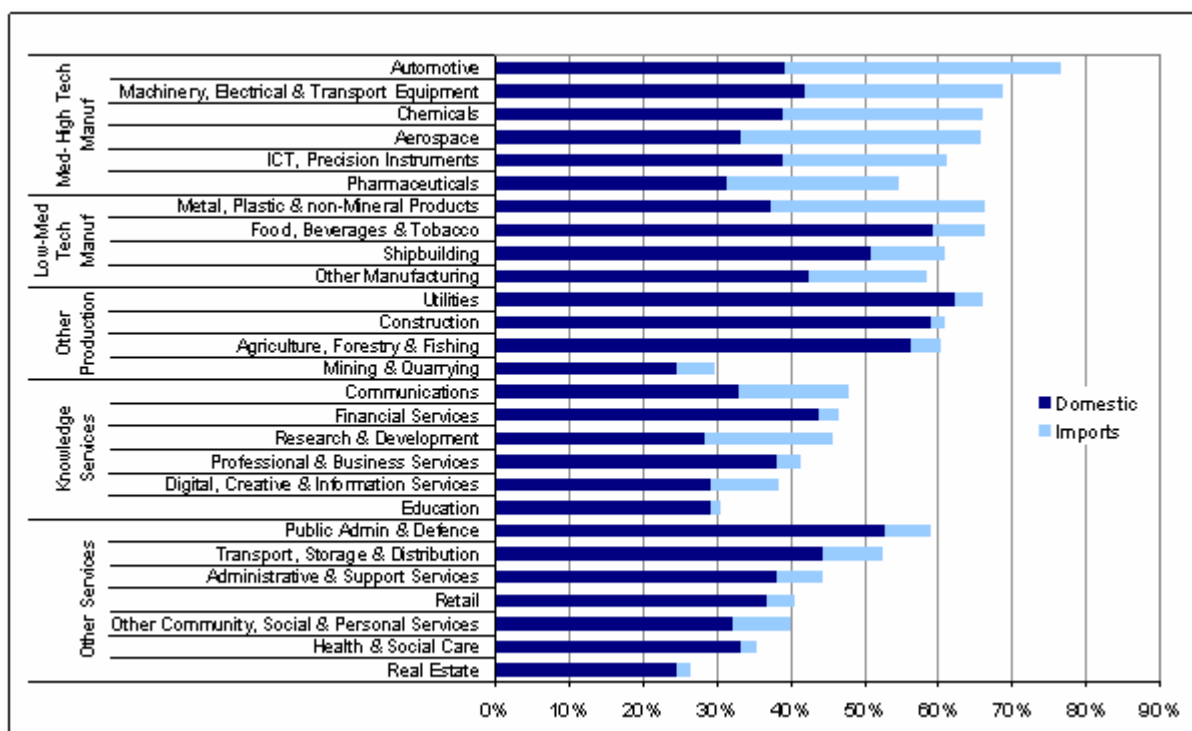
Figure 13: Share of Sectors in Total Intermediate Consumption (2005)



Source: BIS analysis of ONS supply use data

A key issue for future sector growth is the whether this demand is met by domestic suppliers or imports. For much of manufacturing and services, much of the demand for goods and services is sourced domestically (Figure 14). However, for higher-tech manufacturing and certain knowledge services – most notably R&D – a high proportion is from imports.

This reflects the greater influence of globalisation where certain activities in the value chain have been geographically moved to locations where they can be produced most cheaply. It may also suggest the greatest scope for the UK to re-capture some of the value which may have been lost abroad, for example by improving key capability.

Figure 14: Source of Intermediate Consumption (2005)


Source: BIS analysis of ONS supply use data

Spillover effects

The economic activity of firms in one sector may give rise to spillover benefits to firms in other sectors of the economy as well as consumers more generally in the economy. Two key categories of spillover are²⁶:

- *Knowledge-based spillovers* – the creation of new ideas and knowledge which is used by another, without compensation, to help develop similar or new products, processes or technologies
- *Market spillovers* – the development of new products, processes or technologies that have an impact on market forces resulting in knock-on benefits to businesses and consumers.

The knowledge and market-based spillovers from a particular sector will be more likely and greater if the following circumstances hold:

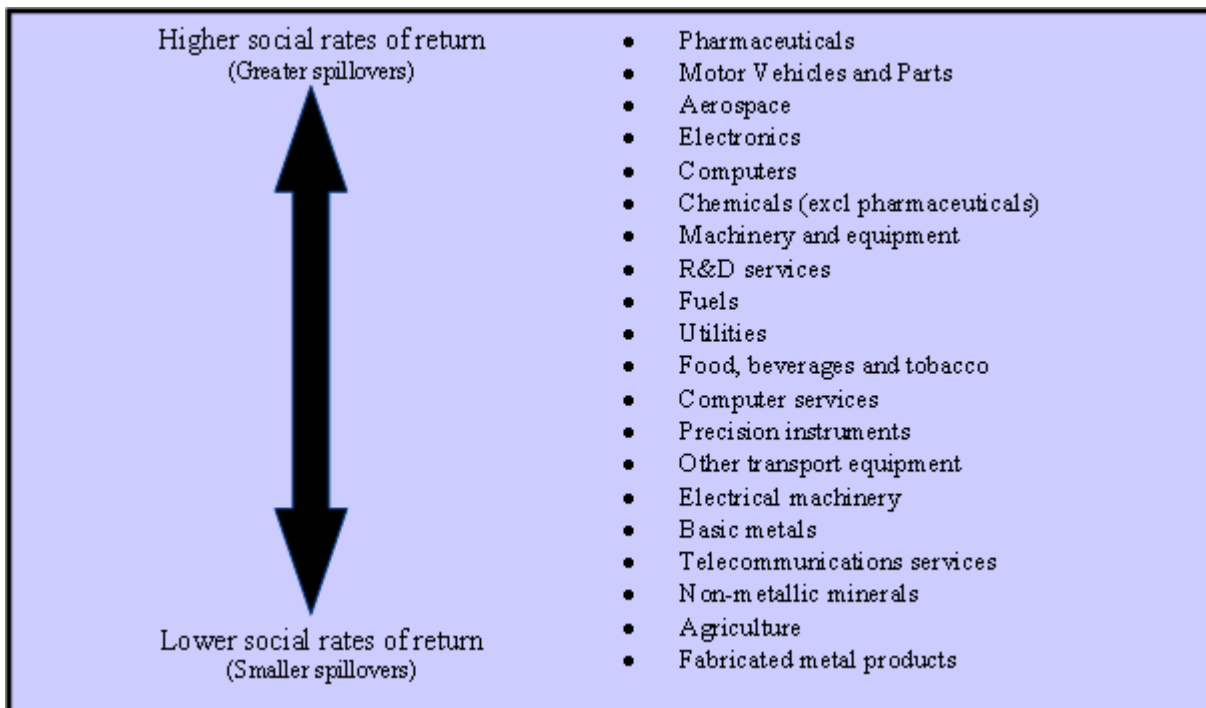
- *Firms are active in highly innovative, knowledge-based industries*
- *The market in which innovation will be used is highly competitive*

²⁶ Jaffe, A.B. (1996) *Economic Analysis of Research Spillovers: Implications for the Advanced Technology Program* <http://www.atp.nist.gov/eao/gcr708.htm>

- *Firms in the industry have the absorptive capacity (e.g. relevant skills) to exploit new ideas and technologies facilitated by the project*
- New ideas and technologies are leading-edge and have wide-ranging applications in a number of different sectors.

Oxford Economic Forecasting considered a range of criteria: technological closeness with other end-user industries; linkages with 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. They then came up with an initial ranking of sectors in terms of their potential to generate R&D spillovers (see Figure 15).

Figure 15: Ability of Different Sectors to Deliver R&D Spillovers



Source: Based on Oxford Economics Forecasting (2006)

3. Benchmarking UK Competitiveness

Summary

Thanks to rapid productivity growth since the 1980s, the UK has been closing the productivity gap with its major competitors, however since the 2000s the rate of progress has slowed. This is reflected in measures of both labour productivity and Total Factor Productivity (TFP).

In general, the productivity gap is driven by poor productivity across most sectors, rather than the UK having an unfavourable sector mix, if anything, the UK's sector mix has served to reduce the productivity gap.

At the sector level, the data points to strengths in financial intermediation, communications and business services, as well as mining. Rapid productivity growth in the UK appears to be a mixture of 'catch up' where the UK lags behind and extending our lead in sectors where we are considered to be relatively strong. Limitations in the data mean that sector level productivity comparisons should be treated with a degree of caution however.

While the value of the UK exports has substantially increased over the last thirty years, the UK's share of global export markets has declined in common with most advanced economies. This decline has predominantly been in terms of goods exports, with the UK's share of financial and commercial services exports actually rising.

Adjusting for relative economic size however, the UK accounts for a disproportionate share of world service exports, and performs better than the USA for most areas of manufacturing, (although it tends to be behind France and Germany). A similar pattern is observed for net exports.

Measures of revealed comparative advantage reinforce the story of strong UK service exports, but also identify a number of other high tech high value added sectors such as aerospace, pharmaceuticals and chemicals in which the UK appears to be relatively competitive. Conversely, although the UK has a number of areas of relative specialisation, in areas such as specialist textiles and engines and turbines – it tends to be weak across manufacturing sectors.

In general, these broad patterns have been relatively stable over the last few decades suggesting that the UK's competitive strengths are rooted in particular characteristics of our business environment. However, as the experience of ICT services shows, these competitive advantages can be rapidly eroded by new entrants into international markets.

Identifying where a country's competitive advantage lies has also become more difficult due to the rise of intra-industry trade (trade in similar products between countries). This suggests that rather than thinking of competitiveness in terms of particular industries, countries are increasingly specialising in particular tasks or activities.

This chapter benchmarks UK competitiveness against its major competitors. To do that, it analyses in detail both UK productivity performance and export performance – two commonly used measures to assess country's competitive position. In this section we also highlight a number of conceptual and measurement issues to ensure accurate interpretation of the data and analysis provided.

Competitiveness when considered at the level of countries is not a straightforward concept. Given this, it is unsurprising that there is no one metric by which a country's relative competitiveness in the global economy can be judged.

In this paper we explicitly distinguish between **driver based measures** which focus on the factors thought to underpin competitiveness and **outcome based measures** which reflect the results of firms in different countries competing in the global market.

The rationale for this is while driver based measures are a key piece of evidence in thinking about competitiveness; they ultimately rely on making judgements about the relative importance of different aspects of the business environment. As such, they are more useful in terms of thinking about what makes a particular country competitive, as opposed to providing a benchmark for determining how competitive it is.

For our purposes the two main forms of outcome based measures are:

Productivity Performance – The efficiency with which an economy can transform inputs (materials, labour, capital etc) in products that people want to buy

Export Performance – How well an economy's goods and services sell in global markets in the face of competition from its peers

As discussed in more detail below, neither of these types of measures are ideal. Both are subject to a number of conceptual and measurement issues and as a result need to be treated with caution. The overall approach taken is to look for common trends and patterns in the data and use these to triangulate areas where the UK appears to be relatively competitive (or uncompetitive) in particular sectors or activities.

UK Productivity Performance

The starting point for most economists when thinking about competitiveness is to look at how productive different countries and sectors are. Productivity measures the ratio of output per unit of input in the production process, or put another way it captures how efficiently firms can combine various inputs (labour, capital, technology etc) to produce goods and services that people want to buy. Thus growth in productivity reflects an increase in the volume of output produced without a corresponding increase in inputs.

There are a number of different measures of productivity, whose suitability depends on the purpose of the analysis and the availability of data. But in general they can be grouped into:

Labour Productivity – Output per worker or per hour worked

Total Factor Productivity – Output over and above that accounted for by raw inputs

Average **Labour Productivity** is the most commonly used metric for productivity, measuring the average level of output per worker or hour worked. It is influenced by a number of factors such as firms' capital intensity and the skill levels of their workforce. It also reflects firms' production technology and efficiency with which these inputs are used (TFP).

Total Factor Productivity (TFP) represents the growth in output over and above that accounted for by increases in inputs. In this sense it reflects the efficiency with which labour, capital and raw materials are combined in the production process – through better use of innovation, organisational structures and technology.

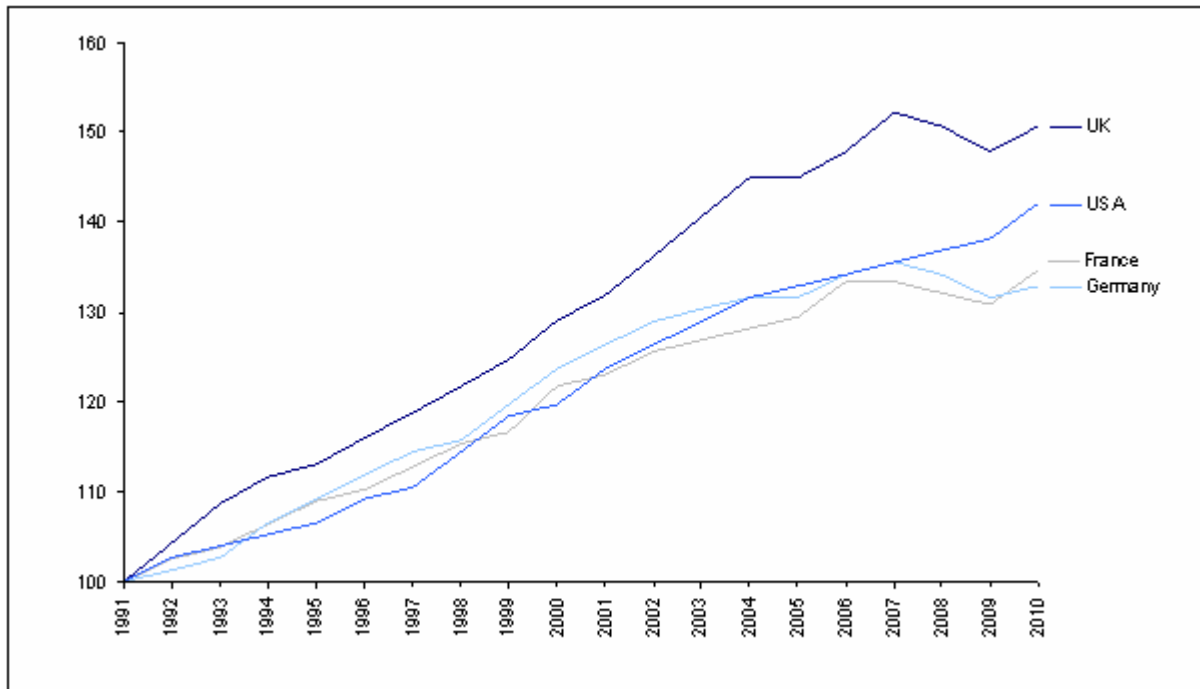
Although TFP is a better measure of what economists think of as productivity, it is technically much more difficult to estimate and requires substantially more data. By contrast, data on labour productivity is more readily available both over time and across countries. That said, as we discuss in more detail below, even labour productivity becomes more difficult to estimate when we attempt to move from the whole economy level, to a more detailed sector level comparison.

Aggregate Productivity Performance

The impact of the financial crisis notwithstanding, the UK economy has grown strongly since 1997, outpacing the rest of the G7 with the exception of Canada in terms of growth in GDP per capita. This strong performance was not driven by a significant increase in hours worked, but rather a sustained period of faster labour productivity growth relative to our peers.²⁷

²⁷ Corry, Valero and Van Reenen (2012).

Figure 16: Relative Change in GDP per Hour Worked over time (1991=100)



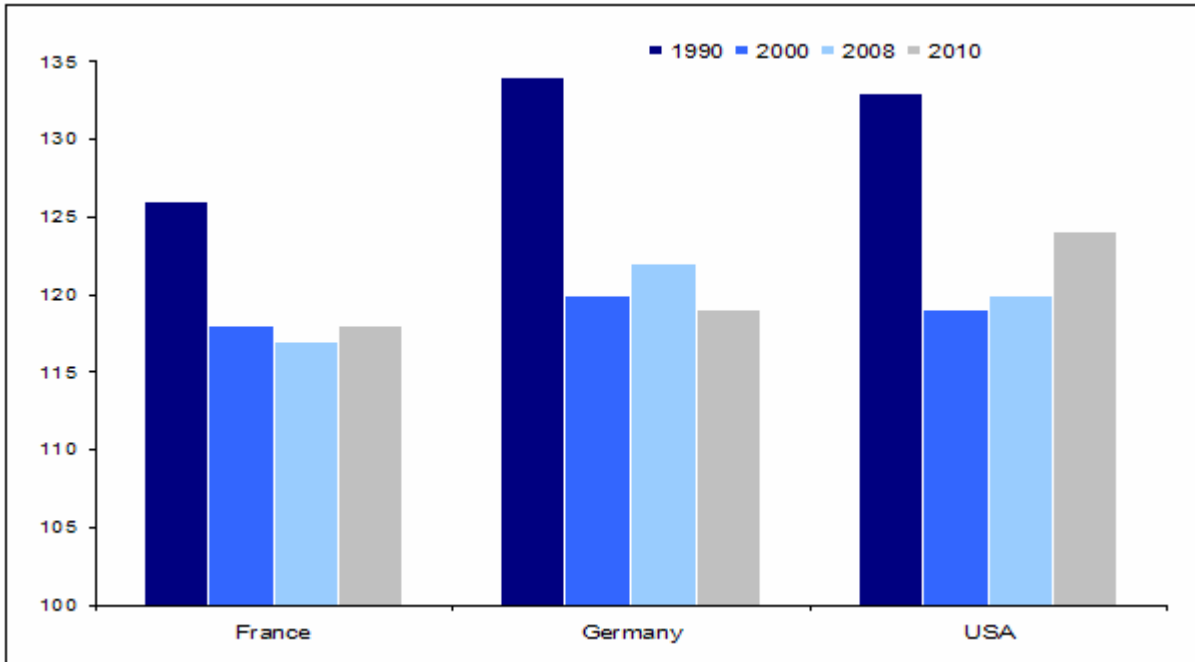
Source: ONS International Comparisons of Labour Productivity

Following the wave of reforms in the 1980s, UK productivity grew strongly relative to other economies and the UK began to close the productivity gap against its peers.²⁸ However, towards the 2000s, this rate of improvement slowed. After the 2008 recession, productivity in the USA began to pull away from the UK, France and Germany, due to a combination of slower cuts in employment in European countries and relatively stronger output performance in the USA.

Figure 17 shows that in 2010, UK output per hour was still 24% behind the USA, 19% behind Germany and 18% behind France. On this basis, an average UK worker would have to work 10 hours to produce the same output a worker in the USA could produce in 8 hours. By contrast, on a per worker basis, the gap with France and Germany has effectively disappeared, although the gap with the USA is still 35%.

²⁸ DTI (2003) *UK competitiveness: moving to the next stage*.

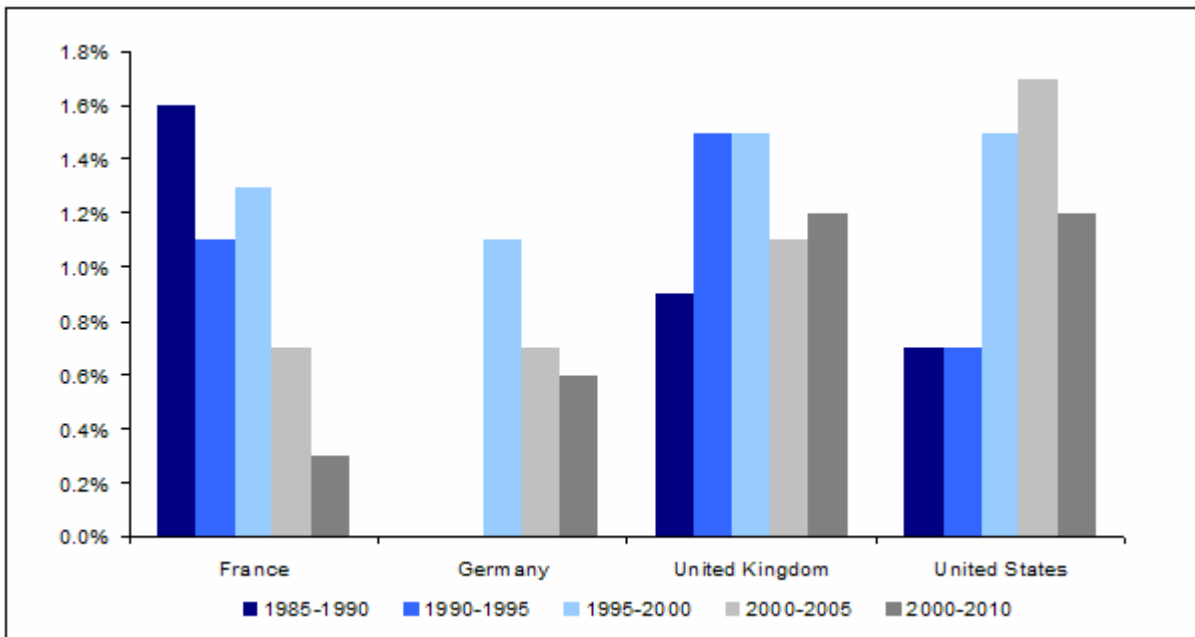
Figure 17: GDP per Hour Worked Relative to UK (UK =100)



Source: ONS International Comparisons of Labour Productivity

We find a similar picture in terms of growth in total factor productivity, with the UK on average out performing the rest of the G7 since 1985. As Figure 18 shows, rapid TFP growth in the 1990s has been followed a slight slowdown between 2000 and 2005. By contrast, productivity growth in both France and Germany was on a downward trend over this period, while the USA experienced a dramatic increase in productivity from the mid-1990s onwards.

Figure 18: Growth in Total Factor Productivity



Source: OECD Productivity Database. Notes: Data not available for Germany prior to 1995 due to the impact of reunification, data for 2005-2010 not yet available for the UK so this period is excluded.

Sector Level Productivity Performance

Although aggregate productivity comparisons provide a useful measure of overall performance, they cannot tell us which sectors are driving this. Following Griffith et al (2003a) we use data from EUKLEMS to decompose the productivity gap between the UK and its major competitors into two main components:

- Sector Productivity Effect
- Sector Mix Effect

The **sector productivity effect** reflects differences in productivity between the same sectors across countries. For example, when comparing the UK to the USA it measures the proportion of the productivity gap which would be closed if UK labour productivity across all sectors rose to that of the USA (holding the distribution of employment constant).

The **sector mix effect** reflects the impact of differences between countries in the distribution of employment across sectors. This is the proportion of the gap which arises because employment in the comparator country is more concentrated in sectors with a higher labour productivity.

Decomposing productivity

More formally, average labour productivity P is equal to aggregate output Y divided by total hours worked L . This is equal to the sum of labour productivity for each sector P_i weighted by that sector's share of total hours worked S_i .

$$\text{Productivity } (P) = \left(\frac{Y}{L} \right) = \sum_i \left(\frac{Y_i}{L_i} \right) \left(\frac{L_i}{L} \right) = \sum_i P_i S_i$$

Given this, we can decompose the labour productivity gap between into the sector productivity effect and sector mix effect by means of the following (using the UK – USA gap as an example).

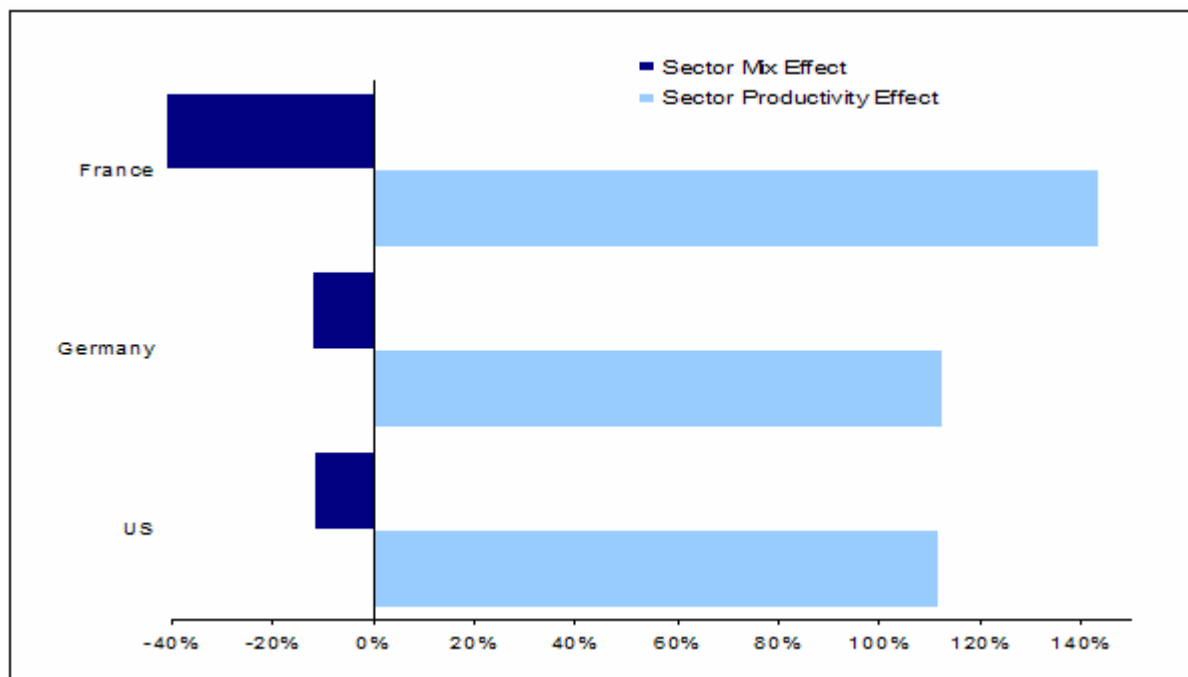
$$\begin{aligned} P^{USA} - P^{UK} &= \sum_i P_i^{USA} S_i^{USA} - \sum_i P_i^{UK} S_i^{UK} \\ P^{USA} - P^{UK} &= \sum_i (P_i^{USA} - P_i^{UK}) S_i^{UK} + \sum_i P_i^{US} (S_i^{USA} - S_i^{UK}) \\ P^{USA} - P^{UK} &= \sum_i (P_i^{USA} - P_i^{UK}) S_i^{UK} + \sum_i (P_i^{USA} - P^{USA}) (S_i^{USA} - S_i^{UK}) \end{aligned}$$

Dividing through by the size of the overall productivity gap we can rewrite the above to decompose the sum of individual sectors' contributions to the productivity gap in terms of the sector productivity and sector mix effects.

$$\sum_i \frac{(P_i^{USA} S_i^{USA} - P_i^{UK} S_i^{UK})}{(P^{USA} - P^{UK})} = \underbrace{\sum_i \frac{(P_i^{USA} - P_i^{UK}) S_i^{UK}}{(P^{USA} - P^{UK})}}_{\text{Sector Productivity}} + \underbrace{\sum_i \frac{(P_i^{USA} - P^{USA}) (S_i^{USA} - S_i^{UK})}{(P^{USA} - P^{UK})}}_{\text{Sector Mix}}$$

Figure 19 below, plots the decomposition of the labour productivity gap (output per hour worked) between the UK and France, Germany and the USA; giving the share of the UK's labour productivity shortfall attributed to the two effects.²⁹ It shows that higher sector productivity in these economies accounts for the entirety of their lead over the UK. Indeed, the UK's favourable sector mix went some way towards reducing the gap, particularly against France.

Figure 19: Decomposition of UK Labour Productivity Gap with Selected Countries (2007)



Source: BIS calculations based on EUKLEMS database. Notes: Labour productivity is Gross Value Added per hour worked. GVA is calculated in real terms and then converted into a common currency using sector specific purchasing power parities (PPPs).

Analysing the factors behind these differences, France's labour productivity advantage over the UK emerges because of its strong performance in non-market (public) services, the bulk of manufacturing and real-estate. Germany and the USA display smaller sector mix effects, indicating that while their sector mix is less favourable compared to the UK, the difference is smaller than for France.

Using the USA as a benchmark, Figure 20 shows the contribution of each sector to the productivity gap (measured by the sum of its sector productivity and sector mix effects). It shows that the contributions to the UK – USA productivity gap varied widely across sectors, with a small number of sectors having a disproportionately large impact.

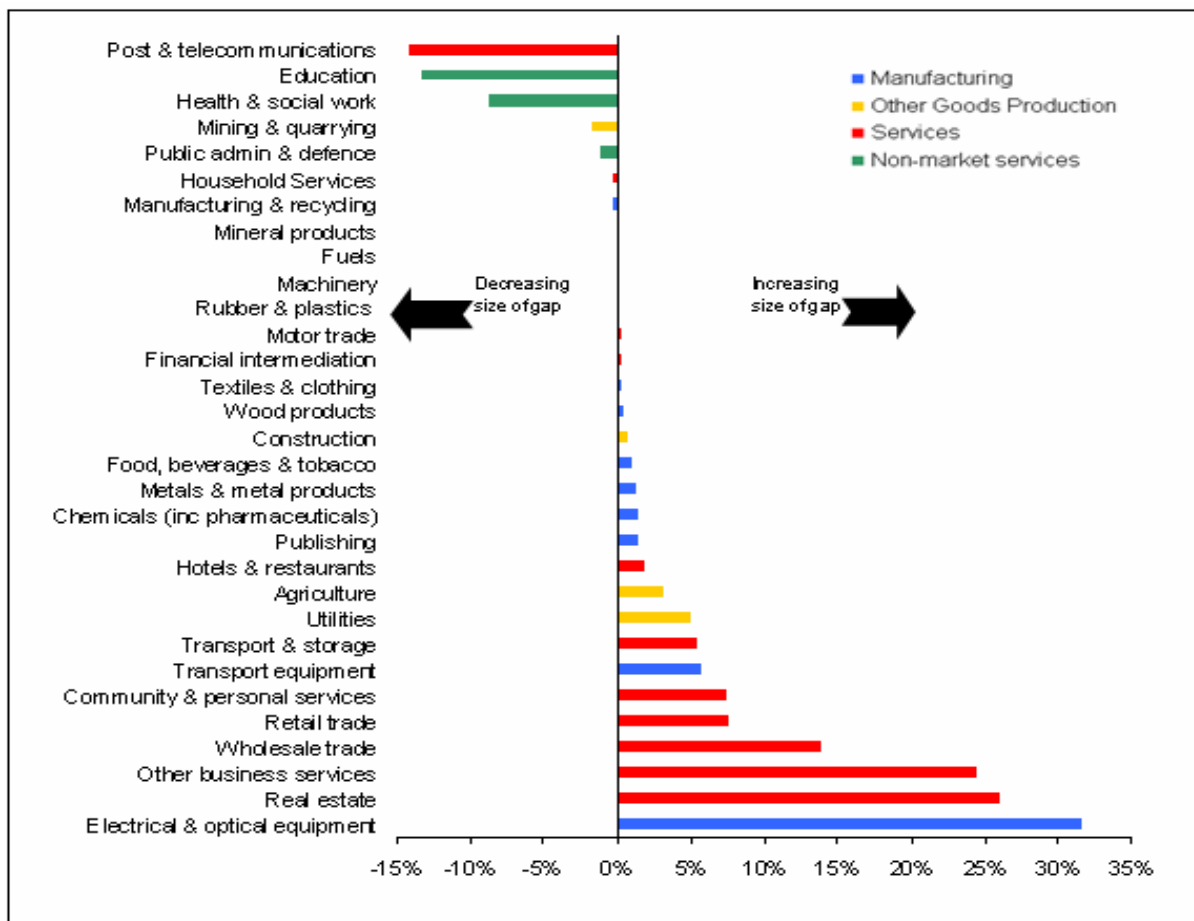
The three largest contributors to the UK-USA productivity gap are electrical and optical equipment (32%), real estate (26%) and other business services (24%). This is mainly due to higher productivity levels in the USA (the sector productivity effect)

²⁹ In this context a positive value indicates that the effect contributes negatively to the level of UK labour productivity as it adds to the gap.

rather than a more favourable employment share (the sector mix effect). The USA also leads the UK across the bulk of the manufacturing and service sectors.

On the positive side, the UK performs well in areas such as communications services, mining, education and social care.³⁰ Performing the analysis relative to France and Germany a similar pattern emerges in terms of mining and communications services, with the motor trade, transport services, financial intermediation, and business services sectors also helping to close the productivity gap.

Figure 20: Sector Contributions to UK – USA Labour Productivity Gap (2007)



Source: BIS calculations based on EUKLEMS database. Notes: Labour productivity is Gross Value Added per hour worked. GVA calculated in real terms and then converted into a common currency using sector specific Purchasing Power Parities (PPPs).

The relatively weak performance of UK business services is at least partially due to the inclusion of administration and support services in this category, which probably outweighs the UK's specialisation and corresponding strong performance in high skill, professional business services. Overall, the UK non-market (public) sector acted to reduce the productivity gap by 23%, although this can be attributed to the structural differences between the USA and UK education and health sectors and the difficulty in measuring public sector output.

³⁰ Note: There are a number of well-established difficulties with measuring public sector output.

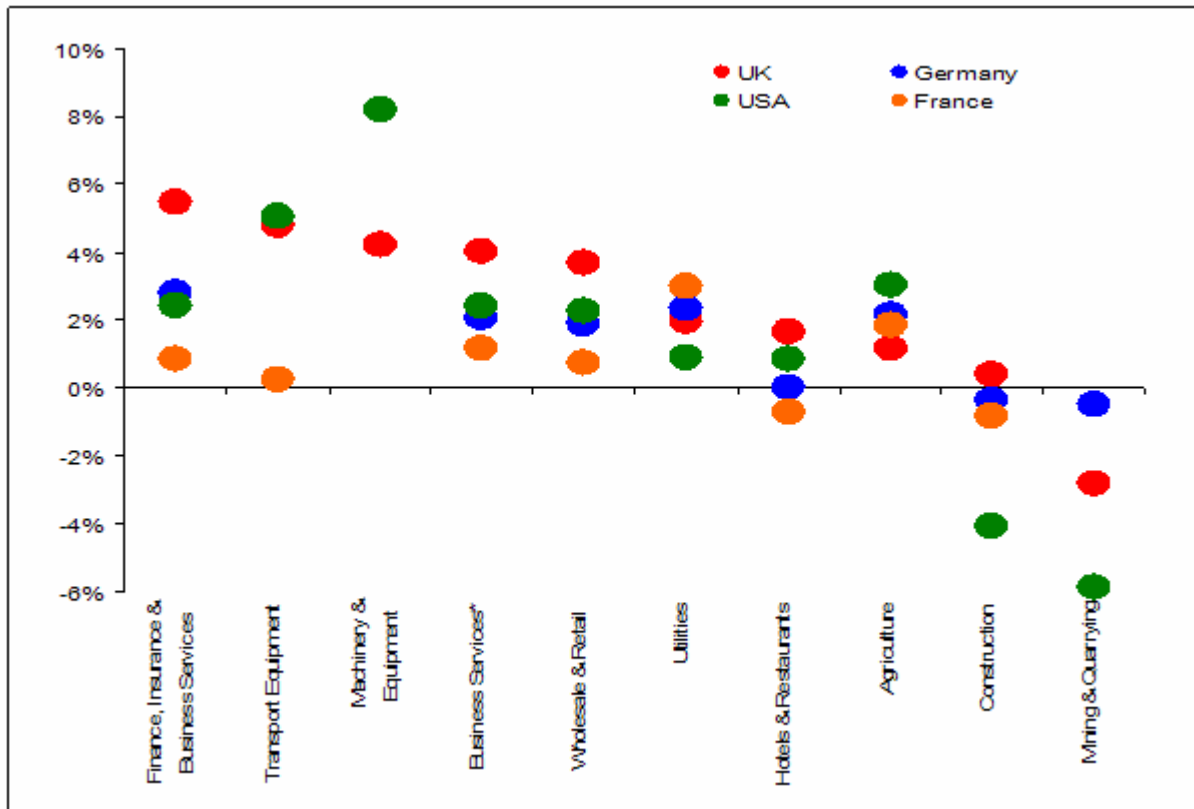
Figure 20 also highlights some of the major issues associated with analysing productivity at a sector level. The figures for real estate depend on imputed rents, which are prone to significant measurement issues. The structure of the housing market in terms of its regulation and its composition, particularly the size of the rental market, affects the comparability of the figures for real estate across countries.³¹

Comparing productivity *growth* across sectors helps circumvent some of the problems in analysing productivity levels, by stripping out country-specific and sector-specific effects; such as differences in capital intensity, or resource endowments.

According to OECD data (Figure 21) the average rate of labour productivity growth across most sectors was higher in the UK than our peers. This is consistent with the findings of Corry et al (2011) who discuss the strength of UK performance at a sector level between 1997 and 2007. However, the analysis is limited by the small number of sectors available for comparison.

Generally the sectors with the strongest growth rates aligned with UK strengths in services (e.g. financial intermediation), suggesting they are examples of the UK extending its lead rather than ‘productivity catch-up’. UK sectors which have not had a strong productivity record displayed signs of catch-up (e.g. transport equipment, machinery & equipment) but the picture was more mixed in other sectors (e.g. utilities and agriculture).

Figure 21: Labour Productivity Growth, Selected Countries (2000-2007)

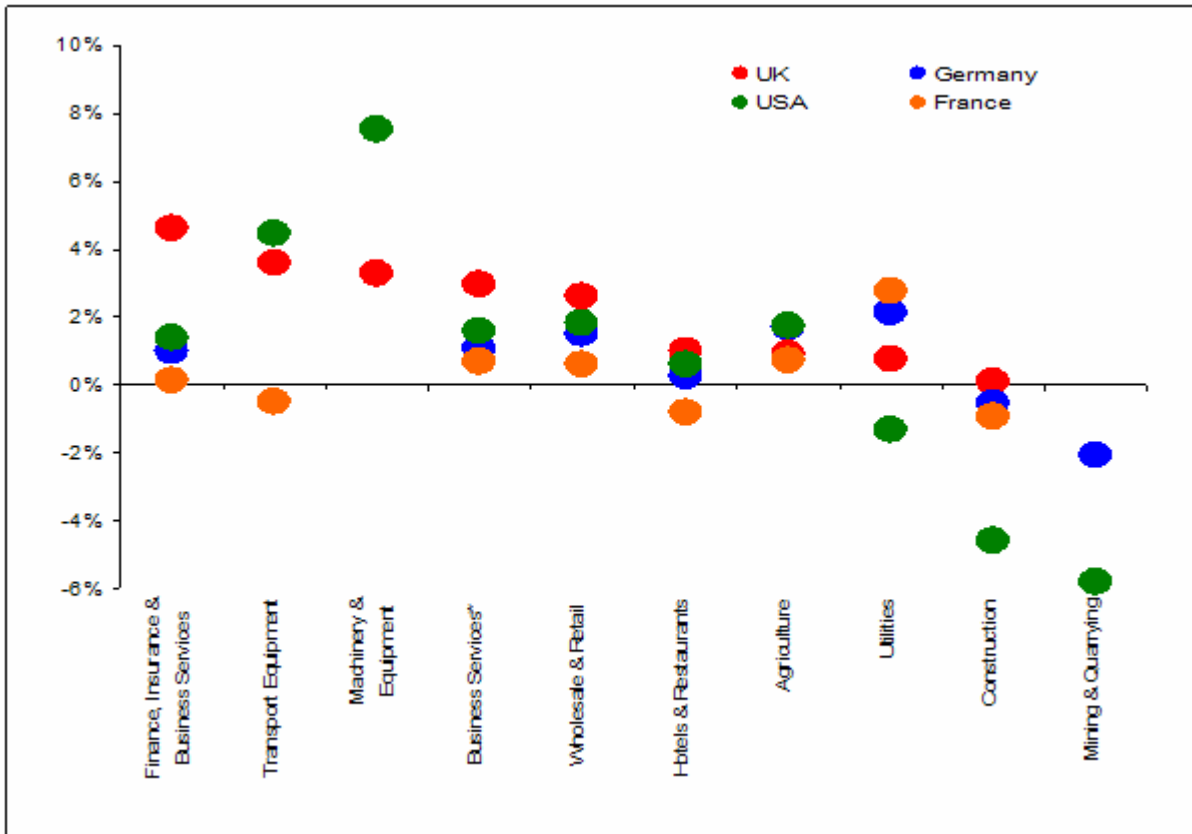


Source: OECD Productivity Database

³¹ Eurostat (2010).

Similar to labour productivity, TFP growth in the UK financial and business services sector was far ahead of its peers. The UK also compares favourably in wholesale & retail, hotels & restaurants, and construction.³² Again, historically poorer performing UK sectors displayed a more mixed picture in terms of catch-up.

Figure 22: Total Factor Productivity Growth, Selected Countries (2000-2007)



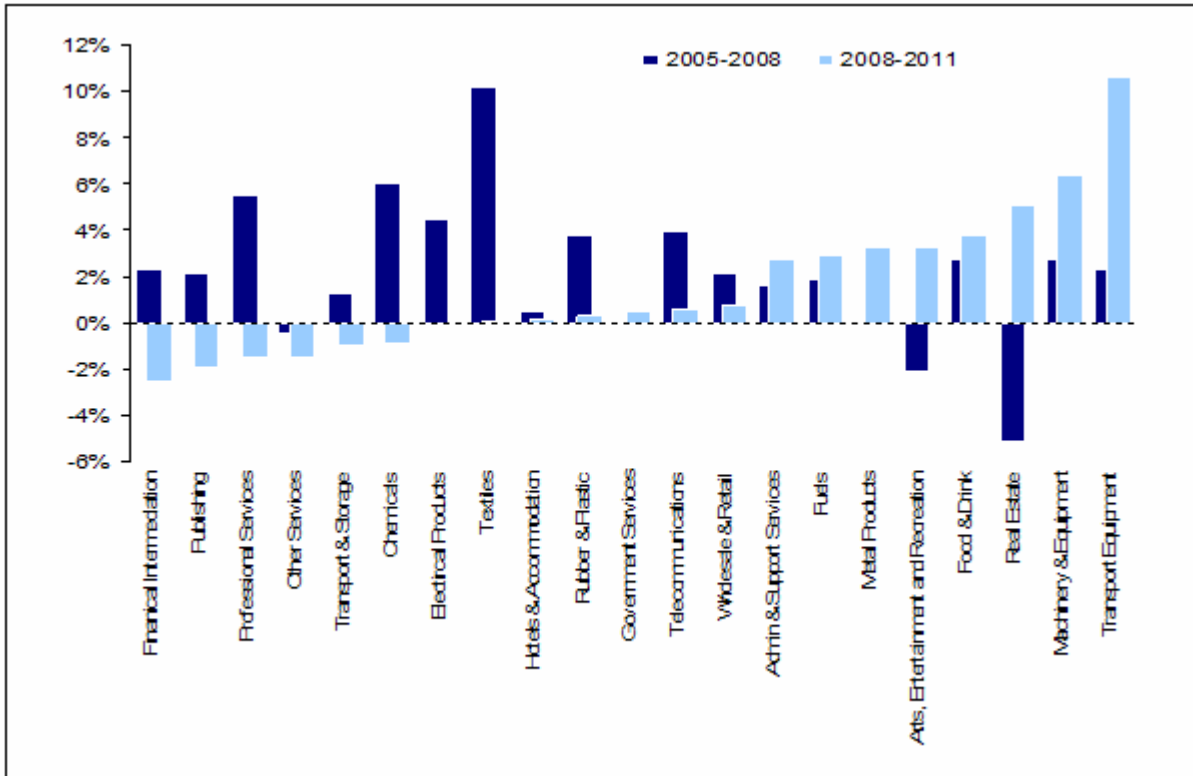
Source: OECD Productivity Database

Internationally comparable sector level productivity data are not yet available for the post recession period; however the ONS provides an analysis of recent changes in UK sector labour productivity. As Figure 23 shows, post the 2008 recession productivity performance across sectors has been diverse, but in general manufacturing has performed better than services.

Furthermore, the sectors which did well before the recession generally did significantly worse afterwards. Certain sectors with low average productivity growth before the recession also experienced resurgent growth afterwards (e.g. metal products and transport equipment).

³² These are sectors where the UK has had a poor record in productivity levels, so these results suggest this could have been due to relatively lower capital intensity. However it is also the case that measuring productivity for these sectors is particularly difficult.

Figure 23: Average UK Labour Productivity Growth (2005-2011)



Source: ONS Productivity Statistics

Just under half of sectors experienced little or zero absolute productivity growth after the recession. This appears to have been caused by the relatively modest declines in UK employment relative to the large falls in output; which is a central puzzle of the UK's post-recession performance. It is possible that sectoral labour productivity measures may also have been affected by a decline in underlying or structural productivity, but there is little concrete evidence for this as yet.

Firm Level Productivity Performance

On average, small and medium enterprises tend to have lower levels of average labour productivity than larger firms.³³ This is because large numbers of SMEs tend to be found in more labour intensive sectors such as hotels and restaurants, retail and other services. Only a relatively small proportion SMEs are in highly innovative, capital intensive industries such as pharmaceuticals and electronics. Small firms in the UK are more productive than large firms in two sectors, namely wholesale, retail and repair; and business services.

However the latest available evidence shows that productivity growth by UK SMEs has surpassed larger firms, although the average productivity levels for SMEs still lies below larger firms.³⁴ Between 2000 and 2005 SMEs reached higher productivity growth than the industry average by 4.8 percentage points. This result also again masks significant differences across sectors. For example, some manufacturing

³³ BIS Economics Paper No.5 (2010).

³⁴ <http://www.berr.gov.uk/aboutus/corporate/performance/annual-spending/page52279.html> – BERR Annual Report and Accounts 2008-09 – Annex A.2.

sectors are well suited to large firms which can raise productivity by exploiting potential economies of scale. Other sectors are more suited to smaller firms perhaps because they serve more niche end-user markets.

Although the average level of productivity for SMEs is lower than larger firms, there is evidence that high growth SMEs tend to have higher productivity than other firms of similar size and sector.³⁵ High growth is also associated with innovation and exporting, which in turn have been shown to be associated with higher absorptive capacity.

This sub-set of SMEs plays a vital role in raising productivity growth in the UK economy, contributing to higher levels of productivity in three ways: by spurring innovation, by encouraging the process known as 'productive churn', and by stimulating stronger competition:

- *They are a major source of innovation, specialising in the development and commercialisation of new niche ideas, technologies and products. These can be used by other firms bringing about further rounds of innovation and other spillover benefits such as higher productivity.*
- *They promote productivity through the process of 'productive churn' whereby the entry and growth of new firms and the increased innovation and productivity of existing firms serve to drive out the least productive and innovative firms, thereby raising the level of productivity at the sectoral and national level.*
- *They also drive productivity growth by increasing competition. This occurs as the entry of new firms with new ideas creates a stronger incentive for existing firms to engage in new product or service development and to improve their efficiency and quality.*

Although in principle productivity is the most appropriate metric to benchmark competitiveness across countries, it does suffer from a number of significant measurement issues which need to be borne in mind when interpreting the results. These include:

- Limitations of labour productivity versus total factor productivity
- Sector composition / aggregation issues
- Choice of deflators and exchange rates.

Technical challenges in the measurement of productivity are discussed in the Annex.

³⁵ BERR Economics paper No.3 (2008).

UK Export Performance

When thinking about how well the UK competes in the global economy, a natural line of reasoning is to think about our relative export performance. Exports are a useful benchmark because they directly result from competition between firms from different countries in global markets. If one country has better institutions, or a more attractive business environment, we would expect this to be at least partly reflected in the ability of its firms to secure a proportionately larger share of global demand.³⁶

That said, a clear limitation of export performance as a benchmark of competitiveness is that it only relates to internationally traded activities and sectors. Although technology improvements in ICT and logistics have facilitated much greater cross-border trade in goods, as well as more recently in services,³⁷ many goods and services can still only be delivered locally.

This section focuses on the UK's trade performance from the perspective of how well firms in particular sectors compete in global markets, rather than the UK's trade performance per se. As such it concentrates on metrics such as export market share, net exports and revealed comparative advantage. It should also be noted that imports are also an important driver of UK competitiveness, a discussion of which can be found in chapter 4. A more wide ranging analytical discussion of UK trade policy and performance can be found in BIS (2012a) and BIS (2011).

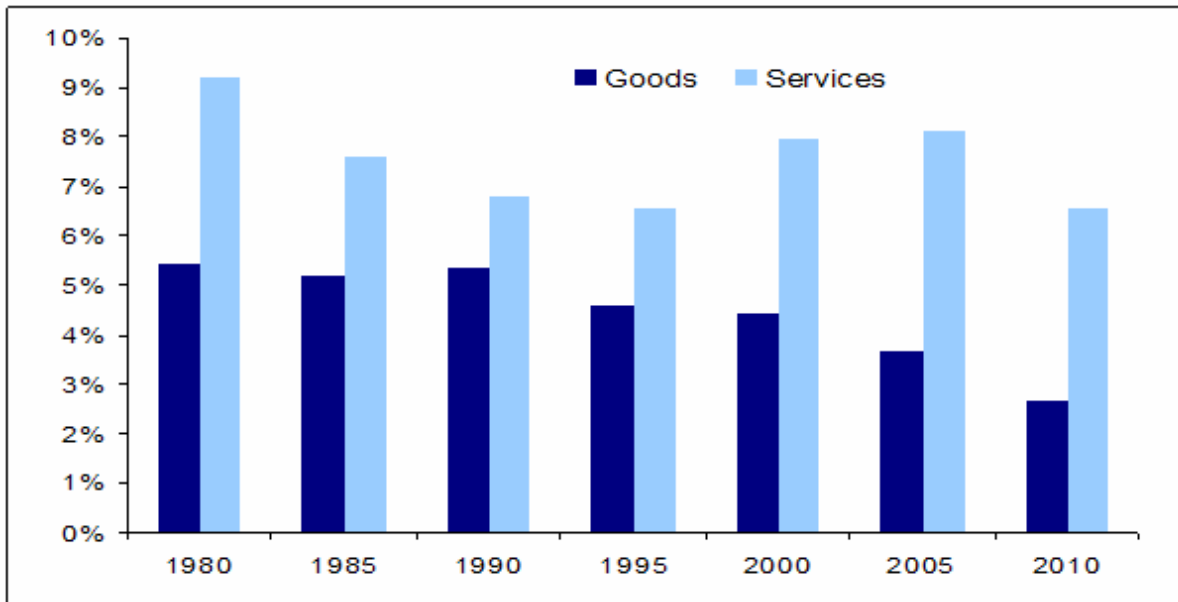
Aggregate UK Export Performance

Over the last thirty years the UK's share of global export markets has declined from just over 6% in 1980, to around 3.3% in 2010. This represents a continuation of a longer run trend for UK goods exports, but for services the picture is more mixed, with the UK's share of global service exports improving significantly from the late 1990s up until the financial crisis in 2008.

³⁶ For a discussion of this see Levchenko (2007), Nunn (2007).

³⁷ Blinder (2007) estimated that as much as 26-29% of all USA jobs (roughly 33m-38m) could potentially be off-shored, where the activity is neither location specific, nor requiring face to face personal contact with the customers.

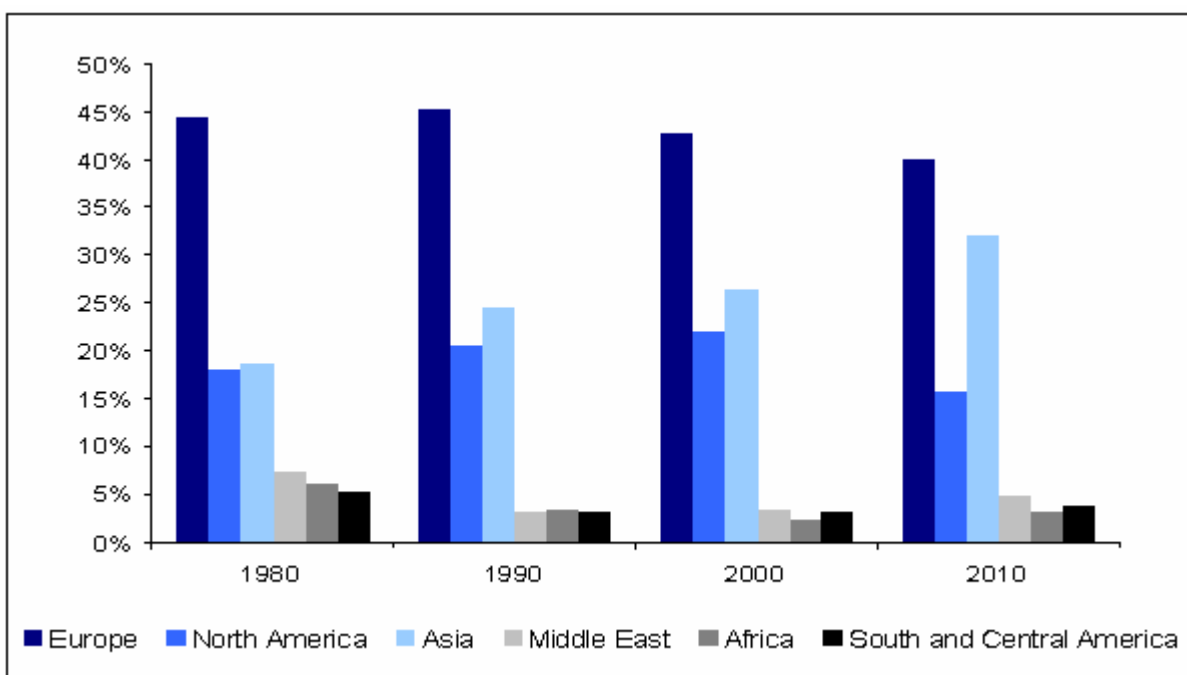
Figure 24: UK Share of Global Exports (1980-2010)



Source: BIS calculations based on World Trade Organisation (WTO) data

To some extent this simply reflects the effects of globalisation, with emerging economies such as China and India becoming much more integrated into the global economy in recent years. World trade has increased more than sevenfold since the 1980s and within this the share of emerging economies more than quadrupled over the same period. As the chart below shows this has largely been a story of increasing trade share for the Asian economies, matched by declines in the shares of the advanced economies of Europe and North America. By contrast the trade shares of the Middles-East, Central and Southern America, and Africa remained fairly static.

Figure 25: Share of Global Trade (Exports + Imports) by Region (1980-2010)



Source: BIS calculations based on World Trade Organisation (WTO) data

Comparing the UK against the other G7 economies, all of whom have experienced a decline in export share over the last thirty years, we find that UK export share has declined by more, with the exception of France. In common with the majority of other G7 countries, the bulk of this fall was concentrated in the period 2000-2010.

Table 2: Percentage Change in Global Export Share, Selected Countries (1980-2010)

Period	Canada	France	Germany	Italy	Japan	UK	USA
1980-1990	0.3%	0.1%	2.0%	1.1%	1.5%	-0.4%	1.4%
1990-2000	0.5%	-1.5%	-3.3%	-1.4%	-0.8%	-0.6%	0.8%
2000-2010	-1.6%	-1.6%	-0.1%	-0.9%	-2.1%	-1.7%	-3.8%
1980-2010	-0.7%	-3.1%	-1.4%	-1.1%	-1.4%	-2.6%	-1.7%

Source: BIS calculations based on World Trade Organisation (WTO) data

The deterioration in the UK's share of world exports coincided with a shift towards persistent deficits in terms of its net trade in goods and services. In common with the USA (and to a lesser extent France and Italy) the UK has consistently been a net importer of goods since the 1980s, but a net exporter of services. This stands in contrast to Germany and Japan whose experience has been the reverse.

Export Share and Net Exports at the Sector Level

Although aggregate data provides a useful overall picture of the UK's relative export performance, these high level figures mask wide variation in the pattern of countries' exports across different sectors.³⁸

The analysis below looks at UK trade in goods and services by broad sector. In the case of goods we use the 2-digit Harmonised System (HS) classification, supplemented by insights from data at the 4-digit level.³⁹ For services, due to data limitations the analysis is confined to the top level categories set out in the IMF Balance of Payments Manual (BPM5).

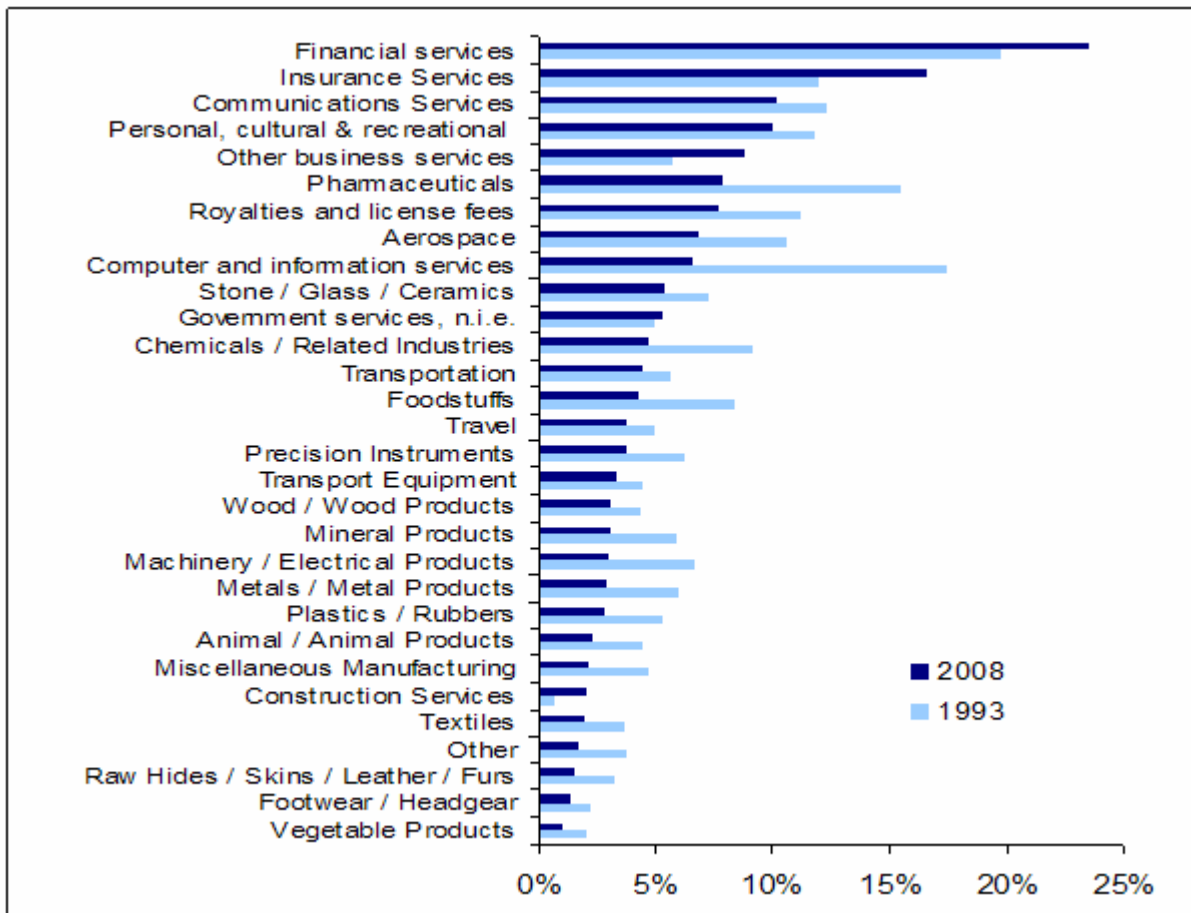
Starting with how the UK's share of global exports by sector has varied over time, we can see from Figure 26 below that between 1993 and 2008 the UK's export share declined across all categories, with the exception of financial, insurance and communications services. Following the financial crisis, the UK's share of financial services exports has also declined, albeit slightly. Looking at the UK's major competitors we find that over the same period:

³⁸ By sector we refer to different classifications of goods and services, rather than an industrial classification per se.

³⁹ There are a number of different trade classification systems, the Harmonized Commodity Description and Coding System (HS) is maintained by the World Customs Organisation.

- France saw a big increase in its share of aerospace exports and communication services
- Germany saw increases in its export share across a range of categories, including aerospace, misc. manufacturing, wood products, transport equipment (though perhaps surprisingly its shares of machinery, equipment and metal products actually declined)
- The USA saw big increases in its export share of financial / insurance services as well as personal services and stone / glass / ceramics.

Figure 26: UK Share of Global Exports by Sector (1993, 2008)



Source: BIS calculations based on UNCOMTRADE and IMF data, as reported. Notes: 2008 selected as the end year to avoid results being distorted by the impact of the financial crisis

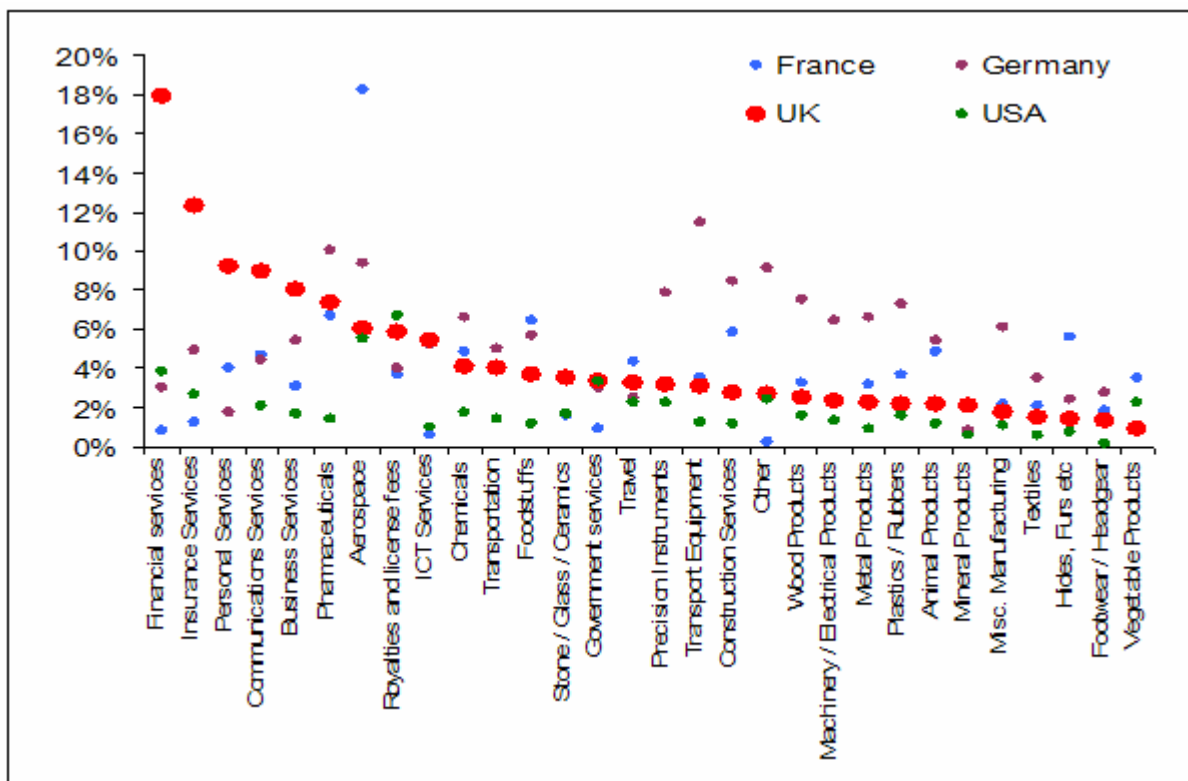
When comparing world export shares across countries it is important to bear in mind their relative economic size. Figure 27 plots the share of global exports for each sector accounted for by the UK, France, Germany and USA, adjusted for their GDP.⁴⁰ It shows that:

⁴⁰ The export shares of France, Germany and USA are adjusted according to their relative GDP measured in US Dollars (current prices). Thus for example, France's export share is divided by 1.1, Germany by 1.5 and the USA by 6.4.

- The UK commands a disproportionately large share of exports in financial, personal, communications and business services
- The UK's adjusted share of exports is greater than that of the USA across most manufacturing sectors, and significantly greater in most services
- Germany and France perform strongly across a range of manufacturing exports, but more poorly across most services.

In part, these results reflect the fact that the UK is relatively open to international trade, whereas by comparison the USA is a very large, more inward looking economy. Similarly, Germany has transformed itself into an export driven manufacturing powerhouse, hence its strong performance in sectors such as machinery, electrical and transport equipment. Finally, France's significant share of global aerospace exports most likely results from its role as the co-ordinating hub for the final stages of airbus assembly and production – which emphasises the importance of thinking about trade in value added terms.

Figure 27: Share of Global Exports by Sector, Selected Countries – Weighted by Size of Economy (2010)



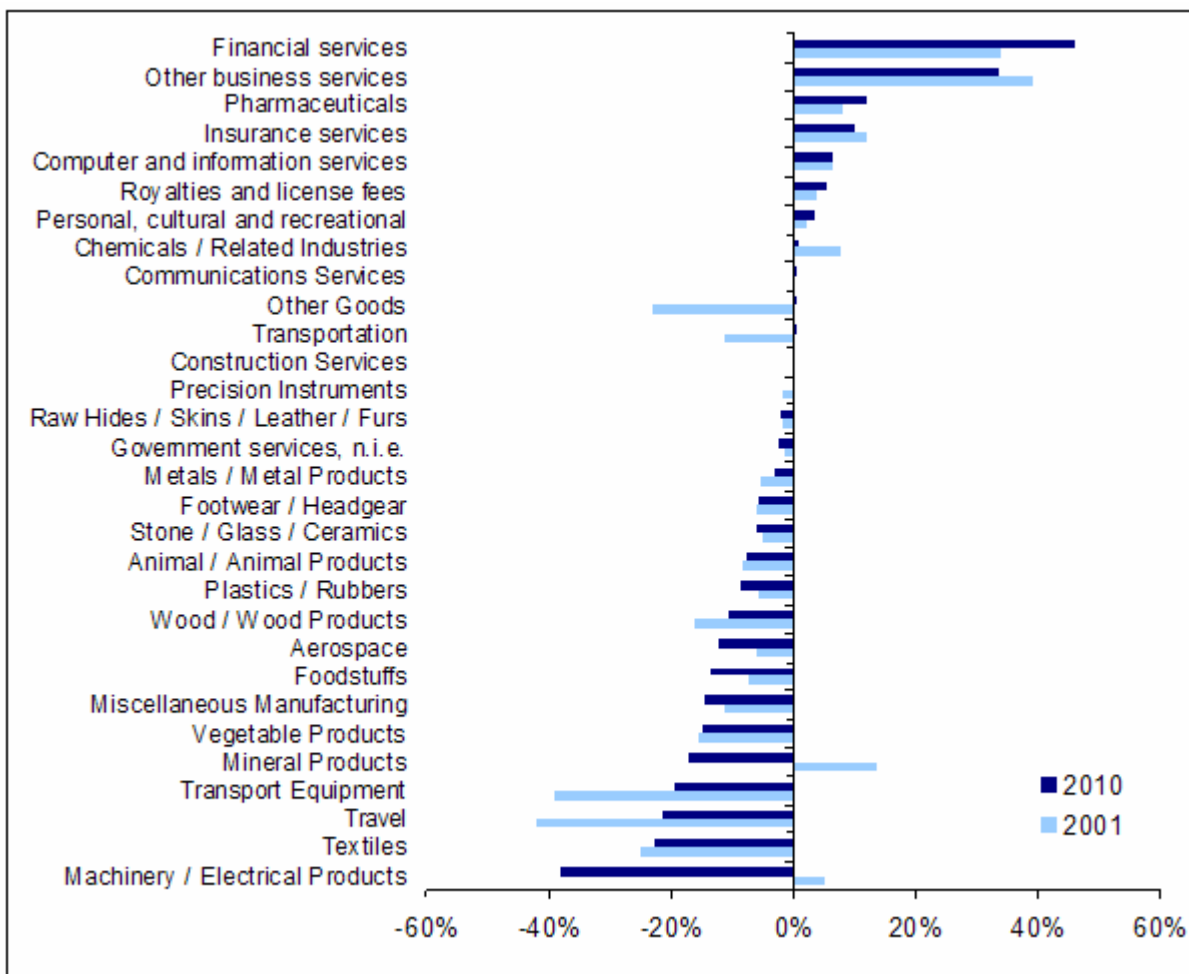
Source: BIS calculations based on International Trade Centre data and IMF World Economic Outlook data. Notes: Export share calculated as share of global exports in that product / service category, adjusted for relative size of economy measured in US Dollars (current prices).

Although export shares give an indication of the proportion of the world market accounted for by a particular country, they do not tell us whether these sectors are a 'net earner' for them in terms of their balance of payments. The increase in intra-industry trade, driven partly by the globalisation of supply chains over the last twenty years, means that it is not uncommon for countries to simultaneously be a significant importer and exporter of the same types of products.

To address this we briefly look at the UK's net export performance across different sectors. Figure 28 plots the UK's net exports by broad category for 2001 and 2010. It shows that with a couple of exceptions, the broad pattern of UK net exports has not significantly changed over the last decade. In particular, the UK has been a major net exporter of financial and business services for the last decade, exporting more in these two categories than the next fifteen largest sectors combined. Indeed, for most of the last decade the UK has been the largest net exporter of financial and business services in the OECD.

In addition to being a major net exporter of all types of commercial services, the UK is also consistently a net exporter in a number of goods sectors, including beverages & tobacco, chemicals, pharmaceuticals, printing & publishing, shipbuilding and certain specialist textiles. The UK's net exports of technical apparatus, precision instruments and optics have moved from a significant deficit in 2001 to a surplus in recent years. The UK is also a net exporter of iron and steel; however this may be due to the role of the London Metals Exchange and hence more associated with re-exporting than actual production.

Figure 28: UK Net Exports by Sector as a Share of Total Net Exports (2001, 2010)



Source: BIS calculations based on International Trade Centre data. Notes: Percentage shares multiplied through by -1 to account for the fact that total UK net exports are negative.

UK Export Performance at a Firm Level

Trade is a powerful driver of productivity growth through a dynamic process of market competition, as it enables exporters to grow and gain market share, while causing weaker firms to shrink. Exporting also has significant positive effects on productivity, innovation and R&D activity of the exporting firms. These effects occur through multiple mechanisms:

- Exporting stimulates productivity growth through scale economies, through learning from exporting and exposure to new ideas, and through re-allocation of resources across products to focus on the firm's comparative advantage;
- Exporting stimulates innovation and R&D through exposure to new ideas and competitors, through increasing the returns to investment in R&D, and through increased revenues, which increase the internal financial resources available to the firm for such investment.

Despite the potential benefits of exporting to firms themselves, only around 20% of all UK SMEs export which is slightly under the EU average of 25%.⁴¹ The proportion of UK firms exporting increases with size from 16% of zero-employee businesses to 40% of medium-sized businesses (50-249 employees)⁴² – see Figure 29.

The majority of UK SMEs do not export mainly because their product is not suitable for export. Of those not exporting and with no plans to do so (74% of all SME employers), 39% said that this was because they did not have a product suitable to export, 34% said that it was not part of their business plan and 16% said they had sufficient business in the UK already.⁴³

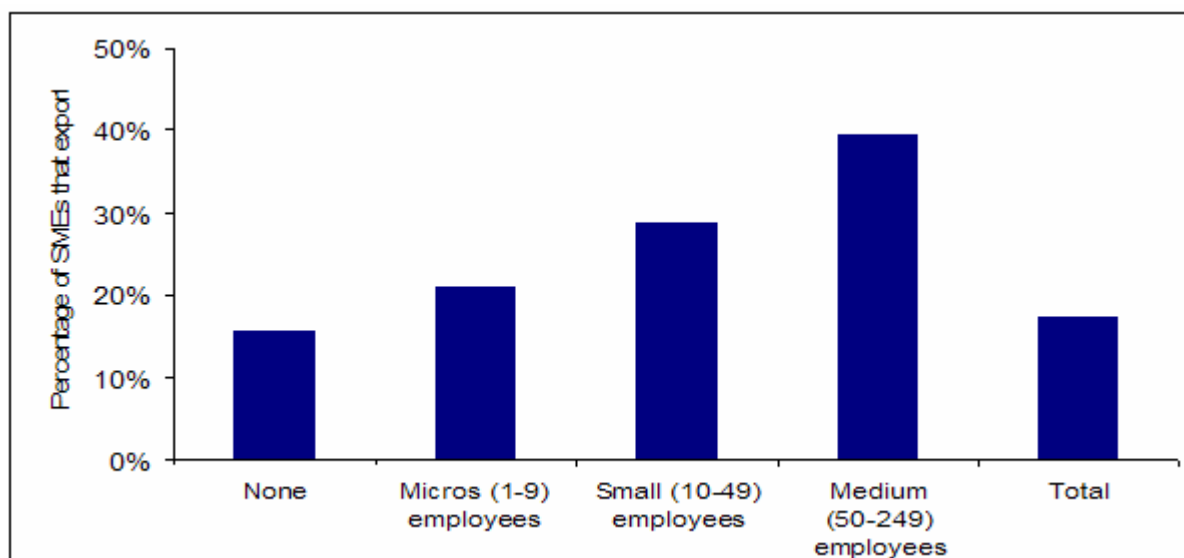
There is evidence that SMEs appear to have an accidental approach to exporting, with 58% of firms surveyed by the British Chambers of Commerce cited being approached by a customer as a reason for exporting, and 19% were approached by an agent or distributor. Only 4% of those SME employers not already exporting planned to do so in the next 12 months.⁴⁴

⁴¹ BIS 2011 (May).

⁴² BIS Small Business Survey (2010).

⁴³ Ibid.

⁴⁴ Ibid.

Figure 29: Proportion of UK SMEs that Export, by Size (2010)

Source: BIS Small Business Survey (2010)

There is a substantial body of quantitative evidence for the UK demonstrating that innovative firms are much more likely to export. Of the sub-group of Intellectual Property (IP) active SMEs, 62% were internationalised in 2005, that is, that they reported turnover from overseas activity.⁴⁵ This is comparable to the proportion of R&D active firms in the manufacturing sector in the fifth UK Community Innovative Survey which export (60.1%) although the proportion of R&D active non-manufacturing firms which export is lower (47.6%).⁴⁶

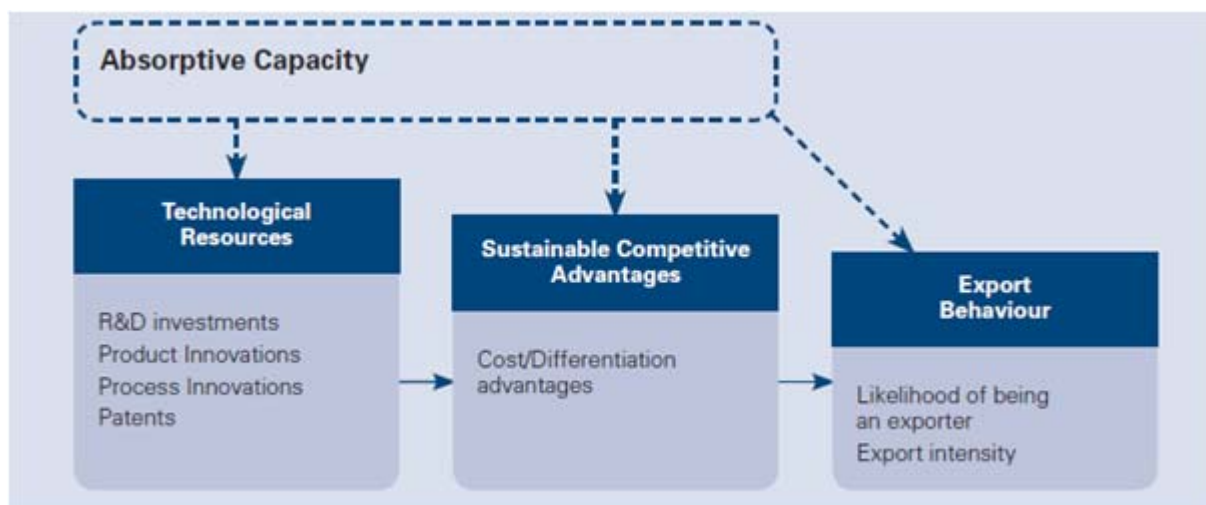
The relationship between exporting and innovation is illustrated in Figure 30. Where investment in R&D, innovations and patents confer sustainable competitive advantages on the firm, such as first mover advantages, or cost advantages to the firm through changes to the production process or other process innovations in the firm, the firm is more likely to become an exporter.

This suggests that competitive advantages arising from innovation, R&D and patents can enable firms to overcome some of the barriers to exporting. However, this is conditional on the firm having a sufficient level of absorptive capacity – its ability to absorb and use different types of knowledge and resources to address the issues encountered.

⁴⁵ Rogers and Helmers (2008) *Intellectual Property and UKTI Passport Firms*. Report for UKTI and UK IP Office March 2008.

⁴⁶ Harris and Li (2009) *Study of the Relationship between Exporting and Foreign Direct Investment*. Economic Journal, Vol. 117 (517):F134-F161.

Figure 30: Relationship between Technological Resources and Export Behaviour



Source: Harris, R., Li, Q.C. Internationalisation Evidence Review. Final Report submitted to Scottish Enterprise. May 2009.

UK exporters have higher absorptive capacity than establishments which do not export, are significantly more likely to engage in continuous R&D, and have higher R&D spending per employee (R&D intensity). However, research⁴⁷ has found that many UK SMEs may lack absorptive capacity to deal with change and take advantage of market opportunities.

Many studies, including studies of the UK have shown that exporting firms support stronger employment growth and higher wages. This stronger employment performance is underpinned by their higher productivity, stronger financial performance, and greater probability of survival. Evidence for other countries (including the USA and Belgium) suggests a similar positive association between exporting and employment growth.⁴⁸

The exact mechanisms for this association are complex. On the one hand, firms who operate in international markets face new and potentially more intense competitive pressures – incentivising them to become more productive. Set against this it is also often argued that it is the most productive and innovative firms who are most likely to seek out new markets overseas.

⁴⁷ Bessant et al (2005) *A Review of the literature addressing the role of External Knowledge and Expertise at key stages of Business Growth and Development*.

⁴⁸ BIS 2011 (May).

Revealed Comparative Advantage

An alternative commonly used metric of relative export competitiveness is revealed comparative advantage (RCA). This provides an indication of the relative specialisation of countries in particular sectors or products, by comparing a given sector's share of that country's exports with its share in global exports. For our purposes, a positive RCA value means that compared to the rest of a world a sector represents a disproportionately large share of a country's overall exports.⁴⁹ Conversely, a negative RCA value implies that a sector represents an unusually small proportion of a country's exports.⁵⁰

Comparative advantage can provide an indication of where a country performs relatively well in international markets.⁵¹ Although it is often taken as a measure of competitiveness, it is more accurate to think of it as a measure of *export specialisation*. In this sense it is a natural counterpart to the analysis contained in Figure 27, in that it identifies patterns in the distribution of a country's exports, independent of their size. Figure 31 below plots the UK's revealed comparative advantage against global export growth during 2001-2010.⁵² It shows that the UK appears to be specialised in a number of fast growing export markets, such as ICT services and pharmaceuticals, as well as moderate growth area such as aerospace, financial services, business services and communications.

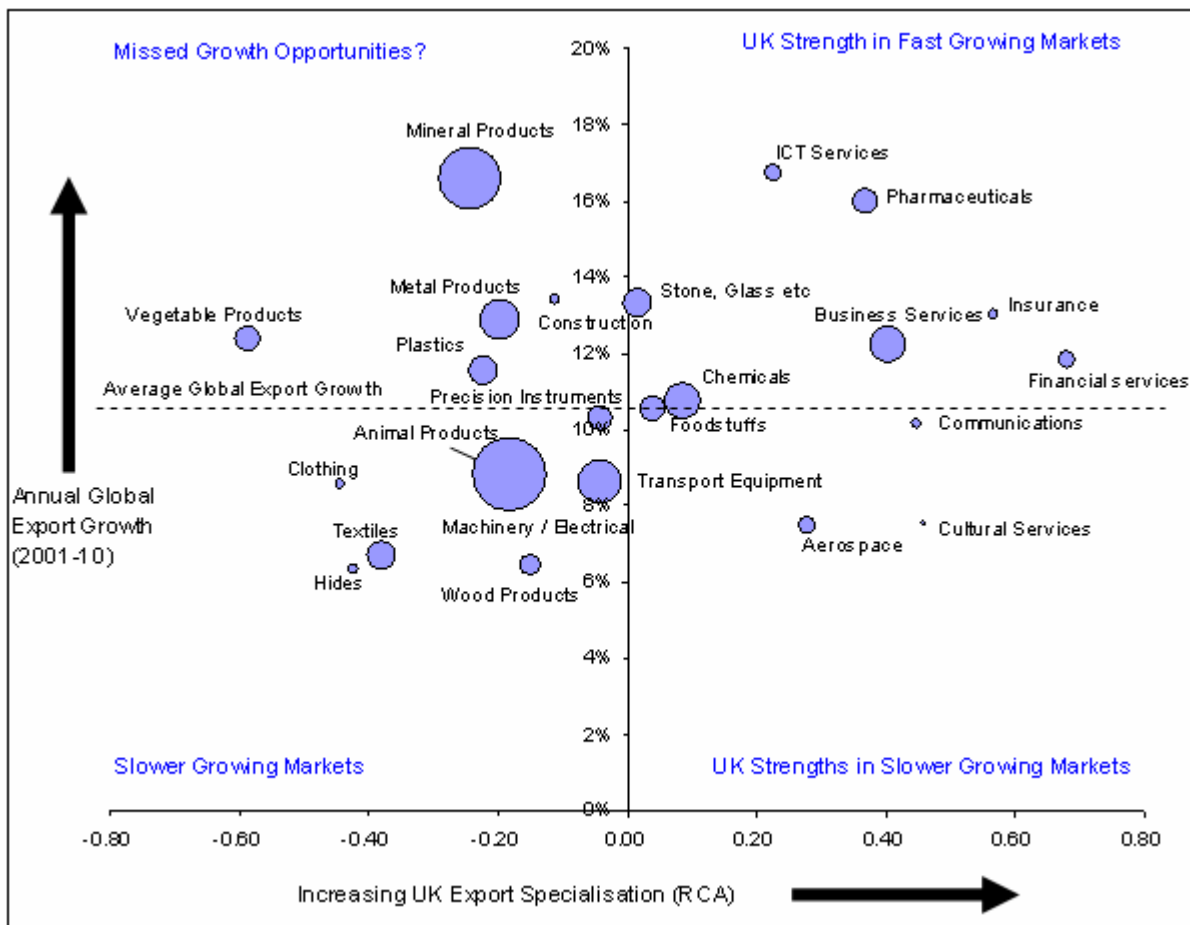
⁴⁹ Strictly speaking the standard Balassa-Samuelson RCA returns values between zero and infinity, in this note we normalise values around zero for clarity of explanation.

⁵⁰ Please note that there a number of potential sources of comparative advantage including availability of human and physical capital, endowment in natural resources, the quality of institutions as well as import tariff policies.

⁵¹ Kowalski (2011) also finds that Revealed Comparative Advantage is a strong predictor of trade patterns, in particular North-South and South-South Trade.

⁵² The size of the bubbles indicates the size of the world exports in specific sectors. Sectors located in the top right corner are those where global exports are growing fast and where the UK has a positive RCA. Conversely, sectors located in the bottom left of the chart are those where global exports are experiencing low growth and where the UK has a negative RCA.

Figure 31: UK Symmetric Revealed Comparative Advantage Plotted Against Global Export Growth (2001-2010)



Source: BIS calculations based on International Trade Centre data

These high level figures mask significant variation within particular categories. While the UK has a negative RCA in machinery and equipment overall, it is highly competitive in certain sub-sectors such as engines and turbines (within machinery and equipment) and publishing (within wood and paper products).⁵³

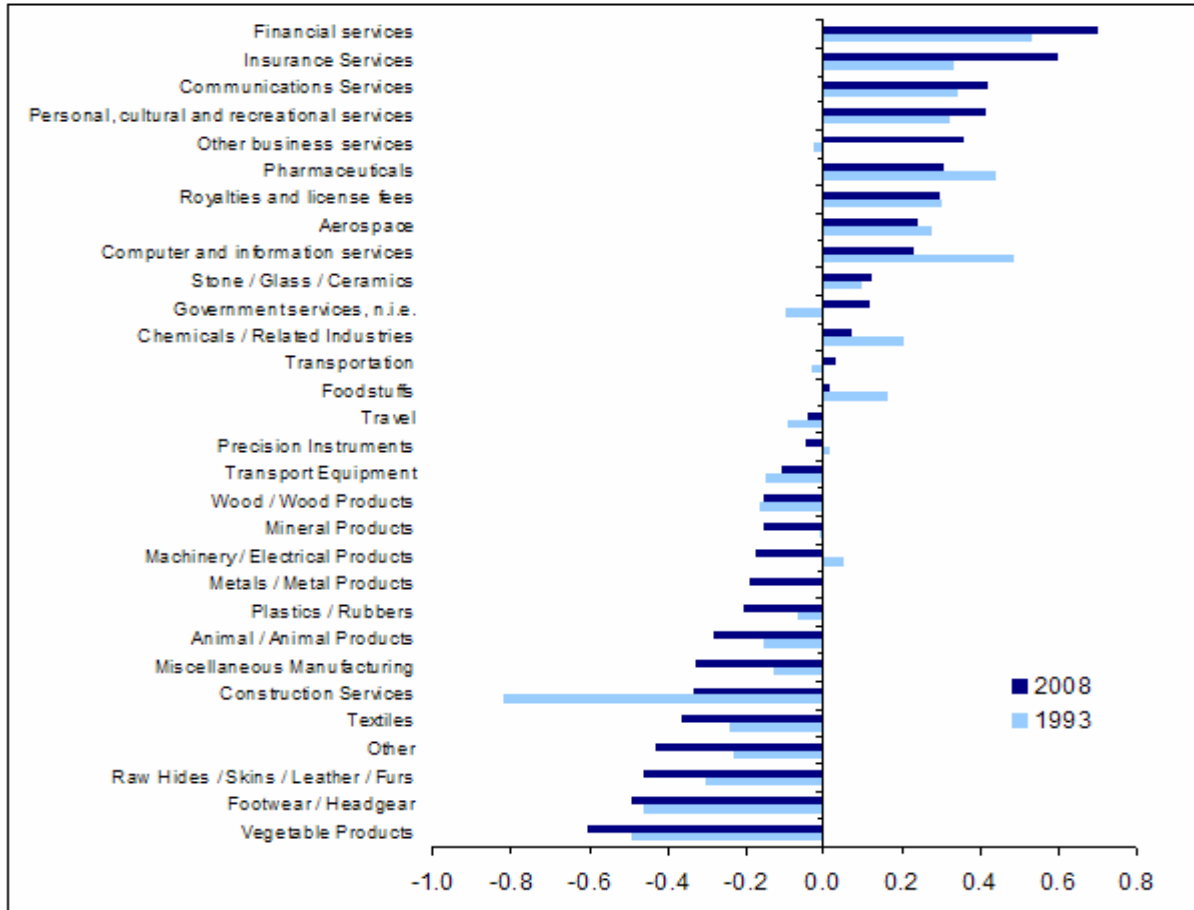
In general, as Figure 32 illustrates, the broad pattern of the UK’s comparative advantage does not appear to have changed significantly over time. Thus, those goods and services in which the UK had a comparative advantage in 1993 tend to be the same as it has a comparative advantage today, and vice versa. That said, we also observe that:

- The UK has kept or extended its comparative advantage in areas such as commercial services and pharmaceuticals
- The UK’s comparative disadvantage across the majority of manufactures has worsened

⁵³ The UK also performs well in sectors such as antiques and precious metals / stones, mainly due to the presence of auction houses and the London Metal’s Exchange.

- The main exceptions to this are ICT services in which the UK's comparative advantage has roughly halved since 1993 and construction services where the reverse has happened.

Figure 32: UK Symmetric Revealed Comparative Advantage⁵⁴ (1993, 2008)



Source: BIS calculations based on UNCOMTRADE and IMF data

Thinking about future global competition, we follow OECD analysis and compare the UK's comparative advantage to that of the leading emerging economies. Figure 33 plots the UK's comparative advantage against the emerging economies taken together as a group.⁵⁵ Figure 34 then expands on this analysis by providing an indication of the range of RCA values observed for these economies (the shaded green area). The red dots indicate the UK's RCA for each category of goods / services, the shaded green area indicates the range covered by the maximum and minimum values for the emerging economies, and the thick green line the (un-weighted) average RCA for the emerging economies as a whole.

⁵⁴ A positive RCA value means that compared to the rest of a world a sector represents a disproportionately large share of a country's overall exports. Strictly speaking the standard Balassa-Samuelson RCA returns values between zero and infinity, in this note we normalise values around zero for clarity of explanation.

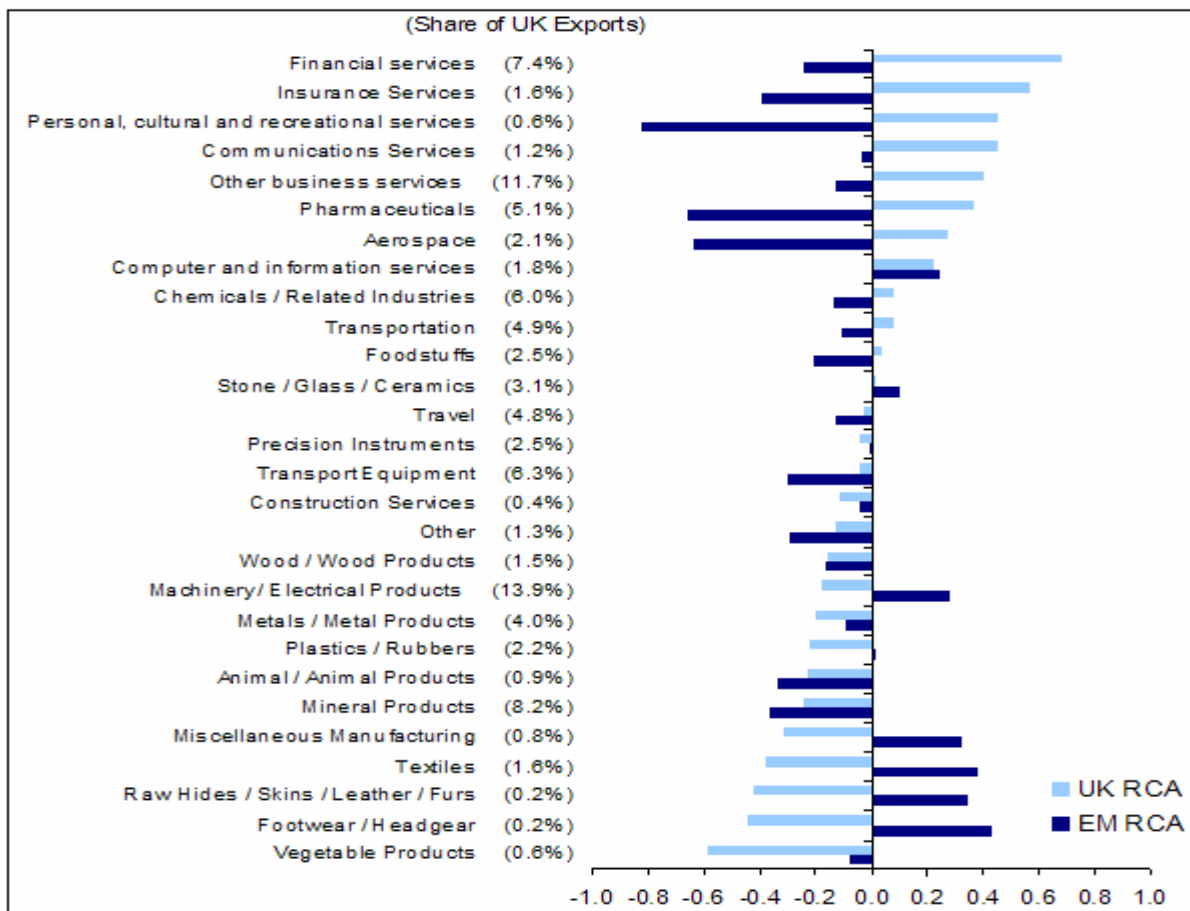
⁵⁵ For our purposes these were taken to be China, Hong Kong, India, Indonesia, Malaysia, the Philippines, Singapore and Thailand.

The analysis is consistent with other empirical studies and suggests that low wage economies tend to specialise in manufacturing sectors that are relatively high volume / low technology which make intensive use of unskilled labour (e.g. clothing and the manufacture of many types of machinery and equipment), but have a limited presence in more high-tech sectors such as communications, aerospace and pharmaceuticals.

Conversely, the UK is relatively specialised (has positive RCAs) in knowledge intensive sectors such as finance, business services and pharmaceuticals, but is relatively weaker in the higher volume, low skill intensity sectors such as textiles, metal products and machinery.

This suggests that in principle, for now the UK should be well placed to weather competition from emerging economies as they are essentially competing in different sectors in global markets. However, the experience of ICT services provides a note of caution – with the UK’s comparative advantage being heavily eroded by India’s rapid expansion into this sector since the 1990s.⁵⁶

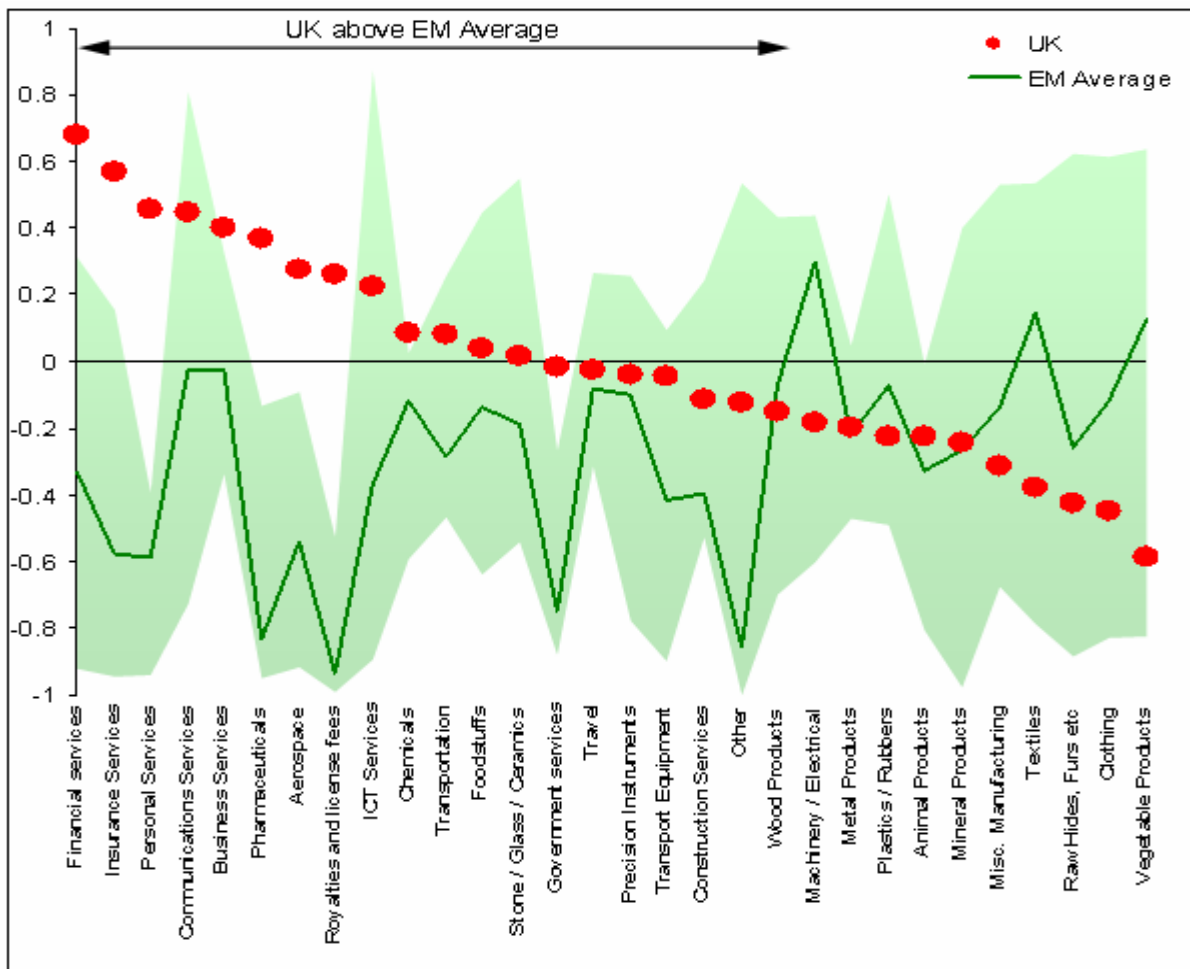
Figure 33: UK and Emerging Market Symmetric Revealed Comparative Advantage (2010)



Source: BIS calculations based on International Trade Centre data

⁵⁶ It could be argued that India has tended to specialise in the lower skill end of ICT services, however concrete evidence on this is relatively limited.

Figure 34: UK Symmetric Revealed Comparative Advantage Relative to the Major Emerging Economies (2010)



Source: BIS calculations based on International Trade Centre data. Notes: ‘EM average’ is the median value across EM countries.

In thinking about the UK’s competitive strengths at least for the medium term we therefore need to put them in the context of where other relatively high-wage, developed economies are also likely to be competing.⁵⁷

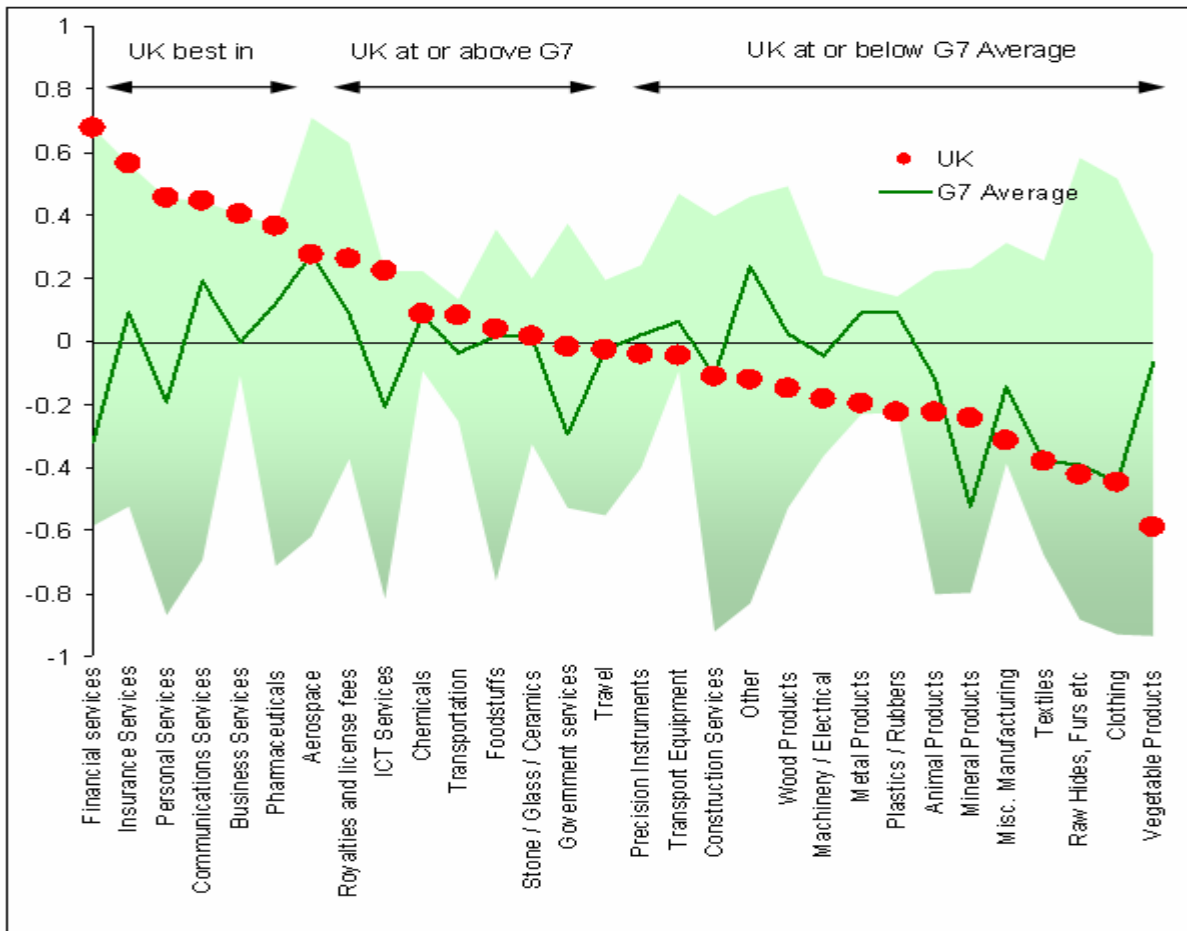
Figure 35 plots the UK’s comparative advantage against the range of values for the G7 economies. The red dots indicate the UK’s RCA for each category of goods / services, the shaded green area indicates the range covered by the maximum and minimum values for the G7, and the thick green line the (un-weighted) average RCA for the G7 as a whole.

What is immediately striking about these results is the wide range of RCA values observed for what would normally be considered to be a relatively similar group of economies. Looking at the UK’s relative performance we find that:

⁵⁷ In the longer term it is likely that emerging economies will carve out areas of specialisation in more high skill / high technology activities.

- The UK has the highest RCA in the G7 across the range of financial, commercial and information services as well as pharmaceuticals
- The UK's RCA is at or above the G7 average in areas such as aerospace, chemicals, food and beverages
- The UK's RCA is at or below the G7 average across the majority of manufacturing sectors as well as primary product sectors such as agriculture and minerals.

Figure 35: UK Symmetric Revealed Comparative Advantage Relative to G7 Countries (2010)



Source: BIS calculations based on International Trade Centre data. Notes: 'G7 average' is the median value across G7 countries.

Export shares and comparative advantage are popular tools for analysing international competitiveness as they have the advantage of being calculated from readily available data. However, these measures are subject to a number of limitations, including:

- Aggregation effects
- The basis used for comparison
- Exchange rate effects
- Trade distortions.

These challenges are discussed in the Annex with more detail.

Intra-Industry Trade and Competitiveness

The analysis in this section has so far followed a relatively traditional approach to thinking about competitiveness, focusing on where UK exports perform relatively favourably compared to the rest of the world. However, recent developments in trade theory and data have shown that such measures do not tell the whole story.

The emergence of intra-industry trade, where countries simultaneously export and import from the same sector, has made interpreting trade data more difficult. To give an illustration of the scale of the issue, OECD estimates that the index of intra-industry trade, which manufactures the extent of two-way exchange of goods within standard industrial classifications, was on average over 70% for many advanced economies.⁵⁸ The trade literature has identified three main drivers of intra-industry trade:⁵⁹

- Trade resulting from international division of production
- Trade in horizontally differentiated products
- Trade in vertically differentiated products.

Perhaps the most commonly discussed form of intra-industry trade is that which has resulted from the globalisation of supply chains, which has allowed greater **international division of production**. Over the last few decades, improvements in ICT and logistics have made it possible to split out and separate different production activities, with individual components of a final product now often designed, manufactured and assembled in different parts of the world.

This has allowed firms to take advantage of the huge increase in the supply of cheap labour from emerging economies; shifting low skill production activities overseas, while keeping other activities (such as R&D, design and marketing) onshore. As a result of this, many business (and indeed countries) are becoming

⁵⁸ OECD (2010). For 1997-2008 the average index for the UK in manufactures was over 80%.

⁵⁹ Fontagne et al (2005).

more specialised in particular activities in the value chain – focusing on where they get most of the value added.⁶⁰

The increasing trade in intermediate products makes it more difficult to accurately measure the scale of trade because the same product or its components may be moved from country to country several times before the final product is assembled and shipped for sale. Thus gross trade data will overstate the true level of exports from a country, particularly if that country is heavily involved in the process of trade (the final assembly of imported components).

A result of increased specialisation by businesses has led to the fragmentation of supply chains across countries which also makes it difficult to determine where the value added is actually created, and hence where a country's comparative advantage lies. For example, PCIC (2007) examine the supply chain of the Apple i-Pod. They estimate that Apple captured \$80 of the \$190 value added within the product. By contrast, China, the country in which the product was actually assembled captured a minimal share.

A second driver of intra-industry trade has been **horizontally differentiation between products**. That is, trade in different varieties of the same product. This typically occurs between relatively rich countries with a similar level of development and close geographical proximity. Fontagne et al (2005) estimate that this type of trade accounted for 11% of world trade in 2002.

A classical comparative advantage based approach cannot explain this type of trade as it focuses on the benefits from specialisation – which would seem to rule out two countries selling each other similar products. However the 'New Trade Theory' pioneered by Paul Krugman and others provides an explanation for this in terms of consumers love of variety, and the benefits to firms of exploiting economies of scale.

The classic example of this is trade in automobiles, which on the surface of it are relatively similar products which fulfill the same function. However, while a Lexus and a Mercedes (for example) may be relatively similar, their individual design characteristics clearly distinguish them in the minds of consumers – which explains how Germany exports Mercedes to Japan while also importing the Lexus from Japan.

The upshot of this is that a significant proportion of world trade is not just dependent on resource endowments or other forms of comparative advantage, but also on the ability of firms to differentiate their products in the eyes of consumers. Given that trade data cannot capture these minor differences between varieties we observe trade in the same products between countries.

Thirdly, recent evidence has highlighted the importance of trade in **vertically differentiated products**, that is varieties of the same product which can be distinguished in terms of quality. Fontagne et al (2007) argue that countries do not specialise in sectors per se, but rather in varieties of product distinguished by their position on the 'quality ladder'.

⁶⁰ See BERR (2009) for a more detailed discussion of the theory and evidence.

For example, it is often argued that the advanced economies have responded to the intergration of the emerging economies into global trade by moving up the quality ladder into more sophisticated products or parts of the value chain. Thus while China exported 4,898 out of around 5,000 products traded in 2004 compared to Germany's 4,932, a different picture emerges when unit prices are examined. For instance, on average, Japanese unit values are 1.4 times higher than for Brazil, 1.9 times higher than for India, and 2.9 times higher than for China, for the same products, shipped to the same markets, within the same year. So although countries might appear to be exporting the same products, the price data indicates they are not shipping the same varieties of these products.⁶¹

The evidence for the UK suggests that this type of trade is particularly important, potentially accounting for half of British intra-industry trade.⁶² Forthcoming BIS analysis suggests that the UK is strong in relatively upmarket products, which account for the largest share of UK goods exports and have been growing more rapidly than exports of low or mid quality products.⁶³

Performing a similar analysis by technology content we find that UK goods exports are relatively concentrated in medium to high tech products, which have been growing more rapidly than low tech and primary product exports. Interestingly the share of high tech products in UK exports is one of the highest in the G7, just behind the USA and well above France, Germany and Japan.

Summing up, the UK appears to have a comparative advantage in a range of relatively knowledge intensive goods and services, be they final products or particular parts of the value chain. Where it competes with other countries in the same market, the evidence suggests that we tend to specialise in higher quality varieties. However, the UK is facing increasing competition, particularly from emerging economies seeking to move up the value chain.

⁶¹ Fontagne et al (2007).

⁶² Greenaway et al (1995).

⁶³ *The UK's Comparative Advantage*, BIS (forthcoming).

4. Drivers of Competitiveness

Summary

Drivers of competitiveness are a very useful tool in explaining differences in economic development across countries. Their complex and inter-related nature means that they cannot be assessed in isolation; success is driven by getting the right combination of factors.

In terms of published competitiveness rankings, the UK has improved its position relative to its major competitors in recent years. The UK ranks 8th in the WEF Global Competitiveness Report and 7th in the World Bank's Ease of Doing Business Ranking, and 18th in the IMD Competitiveness Yearbook. Typically, the UK performs worse than Germany and the US, but is ahead of France, Italy and Japan.

Skills

A particular strength is the UK's high share of graduates in the working population. UK weaknesses include the weak uptake of basic skills, relatively poor management quality and lower skill intensity due to low growth in high skill jobs.

Innovation

Although the UK achieves a middling business perception ranking for innovation, it actually earns more as a share of GDP from its technology exports than its peers. This is supported by the strength of the UK's world class research base and effective university-industry collaboration. UK expenditure on R&D is relatively low, however, the UK performs well on other measures of innovation such as intangible investment.

Infrastructure

Overall, businesses perceive the quality of UK infrastructure to be amongst the best in the G7, albeit with a number of weaknesses, including the relatively poor quality of transport infrastructure. To maintain a high quality of UK infrastructure, some analysts believe that significant long-term investment will be required.

Business Environment

In general, the UK business environment is seen as supportive of economic growth and competitiveness. The UK has a well functioning competition regime and one of the most flexible labour markets in the advanced economies. UK strengths also include its efficient legal framework, the availability of financial services and its economic openness. The main perceived weaknesses relate to the burden of government regulation and taxes, high public debt and soundness of banks.

It is important to note however, that in an increasingly interconnected world, UK competitiveness is also dependent on that of its major trading partners – as a result of rising intra-industry trade. Other wider factors include the role of cities in advanced economies as hubs of service production.

An alternative way of thinking about relative competitiveness across countries is to examine how well they perform in terms of the various factors which are thought to drive competitiveness. Drawing on the latest available evidence, in this chapter we examine the main drivers of UK competitiveness and identify some key challenges to them. These can be broken down in a number of ways,⁶⁴ but for the purposes of this paper we group them into the following:

- Skills
- Innovation
- Infrastructure
- Institutional and political environment
- Macroeconomic environment and financial markets development
- Competition and economic openness
- Labour market.

The first three of these deals with how much the UK invests in human capital, knowledge and ‘enabling’ physical capital relative to its peers. The remaining four are related to the broader business environment within which firms can invest and grow. This chapter compares UK performance against its major competitors using a range of indicators under these headings.

In terms of metrics, UK performance can be benchmarked against its peers in a number of different ways. For example, you can compare inputs (e.g. expenditure per student), the outputs from these inputs (e.g. number of graduates) and the resulting outcomes (e.g. skills intensity of the workforce). All of these measures come with a variety of data availability and limitations in terms of the quality and comparability of the figures, which need to be borne in mind.

It is important to note that the ‘quality’ of performance under particular drivers is as important as the quantity. For example some countries might have a larger road network, or spend more on it, but this does not tell you how effective it is at moving people and goods around the economy. Performing well in one driver alone is not enough; success is driven by getting the right combination of factors and their interaction with the economic, social and political environment. This highlights the need to apply a balanced qualitative and quantitative view – more is not always good.

Furthermore, it is always important to bear in mind that ultimately an economy’s competitiveness derives from the how people, businesses and government interact with one another through its markets and institutions (as well as with overseas markets and institutions).

⁶⁴ For example, the World Economic Forum Global Competitiveness Report looks at twelve ‘pillars’ of competitiveness, which in turn are grouped under ‘Basic Requirements’, ‘Efficiency Enhancers’ and ‘Innovation and Sophistication Factors’.

As a result, while the high level approach taken in this section tends to focus on the institutional and business environment (and hence by extension the role of Government), this should not be taken as understating the importance of the behaviour of individuals and businesses in driving competitiveness. However, given the huge variation across different sectors of the economy, a more comprehensive analysis of competitiveness drivers at the levels of individuals or firms is beyond the scope of this paper.

International Competitiveness Rankings

In our assessment of the UK's performance we will often use the data from the international competitiveness rankings. By offering a consistent means for international comparison, these rankings are a useful way of gaining a general understanding of the relative strengths and weaknesses of a country against its competitors, especially on issues which are more qualitative in their nature.

In most instances, the rankings are based on the analysis of the business opinion surveys and publicly held economic data. Typically, countries are indexed against a detailed set of indicators to produce an overall ranking. This can then be used as an indicator of international performance in terms of competitiveness drivers, in their detailed component parts.

Broadly speaking the rankings presented in the paper can be divided into two groups: rankings measuring overall competitiveness of a country (World Economic Forum (WEF) Global Competitiveness Report and Institute for Management Development (IMD) World Competitiveness Yearbook) and subject specific rankings which look only at some aspects of countries' competitiveness (e.g. World Bank Doing Business Report, OECD Product Market Regulation Index). The rankings in the first group have a much broader scope and rely to a greater extent on the survey data. The second category encompasses measures which are more narrowly defined, and typically are based on the analysis of the hard data and the experts' views on the quality of regulations and institutions.

However, these studies are not without their flaws. Specifically, they cannot be viewed as all encompassing measures of international competitiveness and suffer from the sometimes subjective nature of their methodologies. They are useful when combined with other data but should not be considered in isolation, particularly when they disagree over the same issue. Furthermore, it is unwise to analyse small or occasionally volatile changes in rankings year on year instead of general trends.

Skills

Why are skills important for UK competitiveness?

Skills cover a wide range of competencies gained through formal education, training and experience. These include basic skills such as literacy and numeracy, generic skills such as problem solving or communication, and specialist skills required for a specific occupation or job.

There is no ideal measure of skill levels, but the most commonly used metrics are qualifications (although it is possible to have skills without qualifications). On the job

training in the workplace is a vital source of development and career progression, but is often not formally recognised.

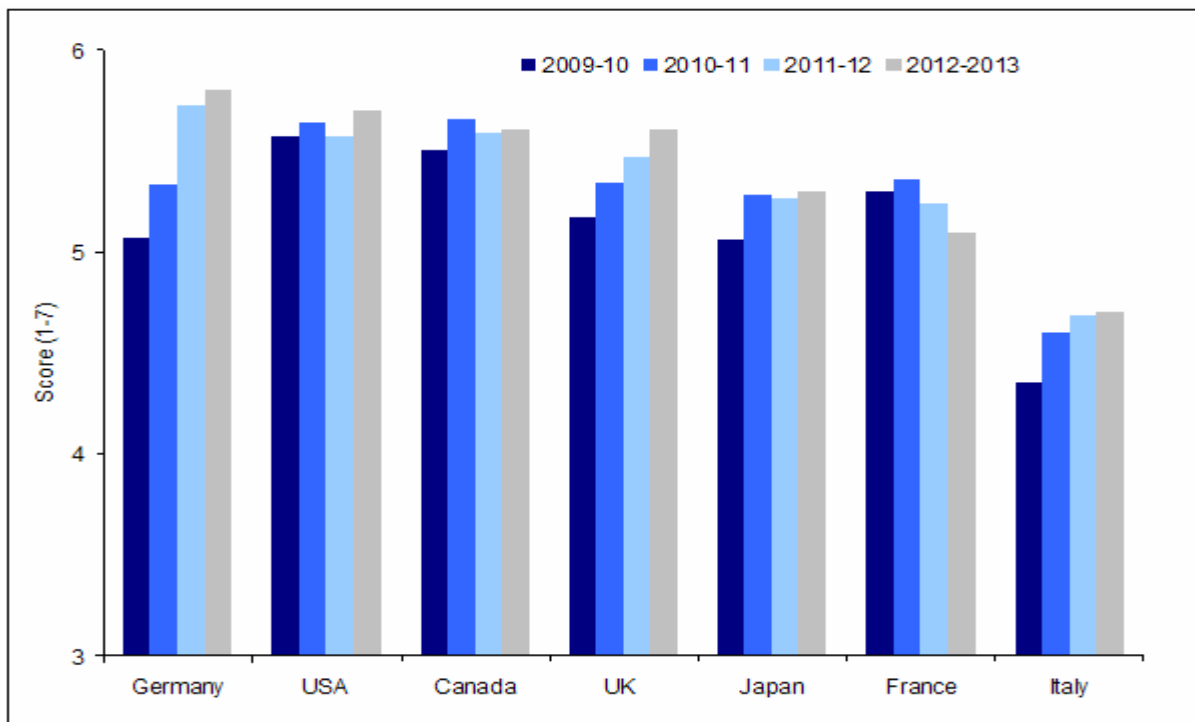
Skills contribute to competitiveness in a number of ways. Skilled workers are more able to obtain jobs, carry out complex tasks, work more effectively and produce higher value added products. In addition they are better at adopting new technologies and adapting to changing conditions and requirements. Skilled labour is also a key input to the innovation process in terms of generating, absorbing and applying new knowledge.⁶⁵

How does the UK perform?

Business Perception Surveys

Survey data from the WEF Global Competitiveness Report (2012) provide a useful overview of business opinion, which complements other empirical data. In the fifth pillar of ‘higher education and training’ the UK performs relatively well across the board, with a few areas of weakness. The UK has improved its score every year for the past four years, although a small gap persists between the UK, the USA, Canada and Germany. By contrast the Institute of Management Development (IMD) (2012) World Competitiveness Yearbook ranks UK education second in the G7, behind only Canada.

Figure 36: Higher Education and Training Pillar – Global Competitiveness Report



Source: World Economic Forum, Global Competitiveness Report (2012)

⁶⁵ In the endogenous growth literature, increasing an economy’s stock of ‘human capital’ by raising the skill level of the labour force is a key driver of growth. See BIS (2009, 2011d) for a more general discussion of the links between skills, productivity and growth.

The perceived quality of the UK education system is moderate, achieving a ranking of 27th, out of 142 countries (according to the WEF), complemented by high primary and secondary enrolment rates. However, the IMD survey ranks the UK as third lowest among G7 countries in terms of how well the education system meets the needs of a competitive economy.

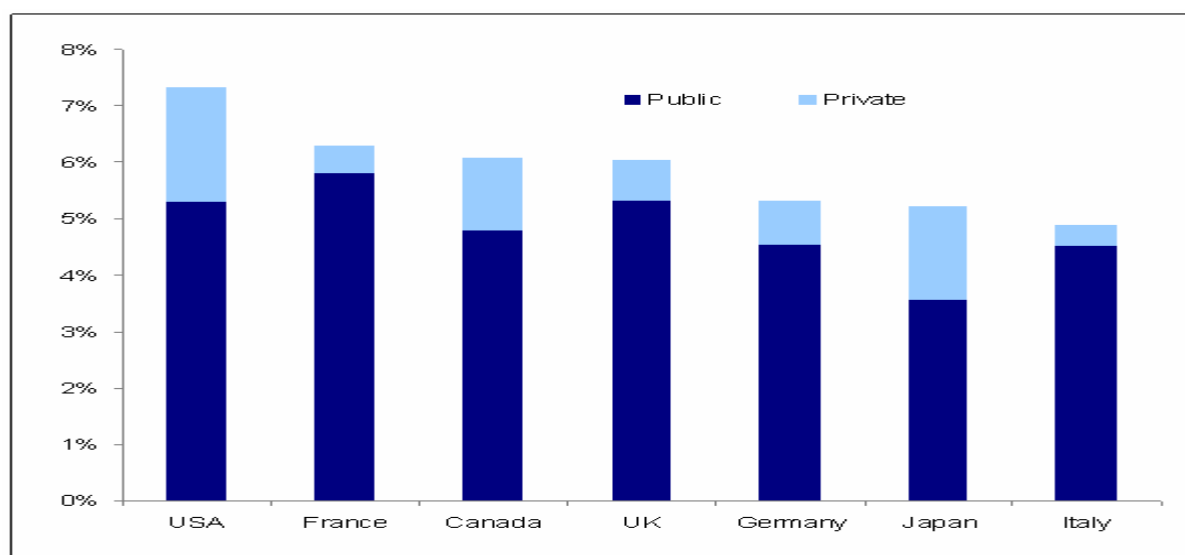
The WEF survey also shows that UK management schools are perceived to be the very best in the world, with a ranking of first overall. However, other evidence suggests their good quality does not necessarily feed through to high quality UK managers. Indeed, Bloom and van Reenen (2006) find a persistent UK-USA gap in management practices, which is also reflected in the relatively low IMD scores for UK management practices.

By contrast, the perceived quality of basic maths and science education is relatively low. The UK is ranked 42nd overall, just below Albania but above Germany and the USA. This raises an issue with our basic skills and how easily the UK workforce can acquire the skills needed in a skilled working environment.

Expenditure on Education

Total UK education expenditure is amongst the highest in the G7 and has grown at the fastest rate in the G7 since 2001. In fact, the IMD placed the UK at the top of the G7 for educational expenditure as a percentage of GDP in 2010. However, the UK spends proportionately less on tertiary education, despite relatively strong performance against its competitors. The proportion of total UK education spending on secondary education was amongst the highest in the G7 in 2009 and spending on primary education was the highest.

Figure 37: Public and Net-Private Expenditure on Education (% of GDP, 2009)



Source: OECD Education at a Glance (2012). Notes: The apparently small proportion of private expenditure on education as a proportion of the UK total is due to the fact that the data on private expenditure on education are presented net of an adjustment for public subsidies attributable to educational institutions (which are instead included under public expenditure). For more detail see the footnotes to Tables B2.3 and B3.2a and related methodological notes to Education at a Glance (2012). The share of public expenditure on education will increase from AY2012/13 as a result of the HE reforms; fee loans are classed as public expenditure by the OECD and will increase from this year up to maximum fees of £9,000p.a.

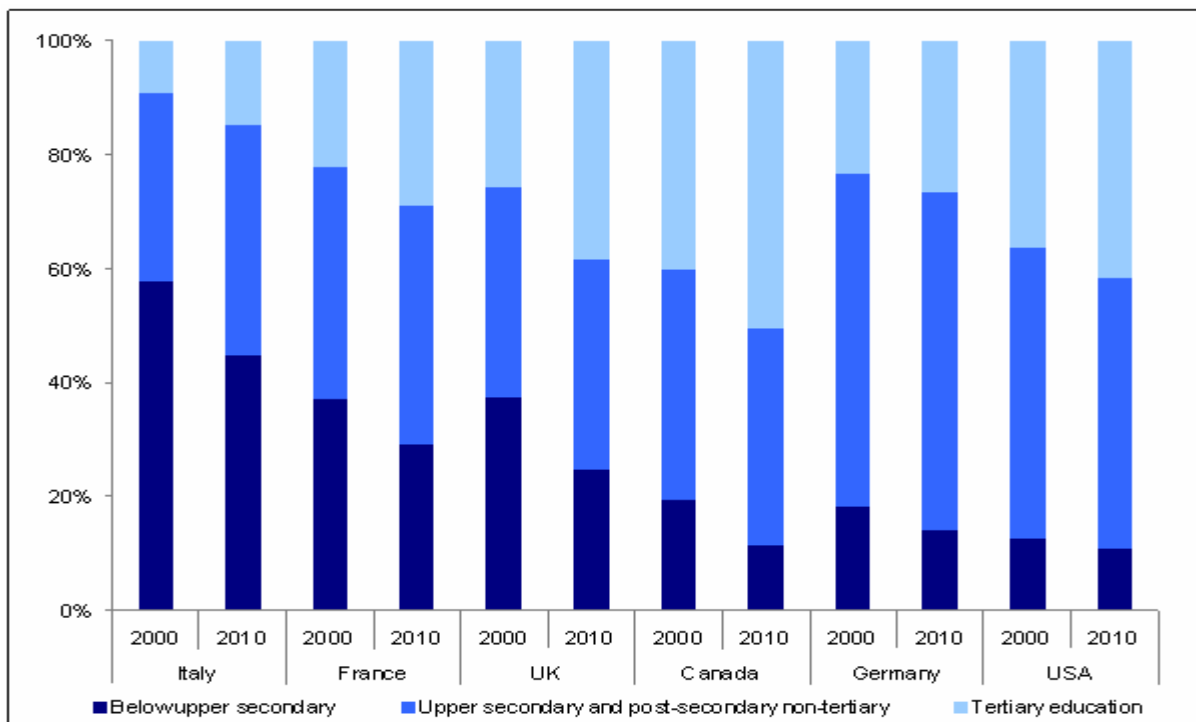
Educational Attainment

Between 2000 and 2010 the UK achieved the second highest growth rate in tertiary education graduates in the G7, a trend which has broadly continued since the 1980s.⁶⁶ The UK has a higher number of tertiary education graduates than its European competitors, reflected by the 38% of adults having achieved tertiary level qualifications in 2010, as shown in Figure 38. However, the UK is still led by Canada and the USA in terms of tertiary graduates.

That said, the IMD survey indicates that the UK falls down in the G7 rankings to fourth in terms of the extent UK university level education meets the requirements of a competitive economy. That shows that although the number of UK graduates has risen, the overall standard of graduates from a business perspective might not have improved.

There remain some gaps in performance at lower and intermediate educational levels in the UK. Around 25% of people in the UK aged 25-64 have only below upper secondary school education. In Germany, 59% of 25-64 year olds were educated to upper secondary level, which represents the highest figure in the G6, compared to 37% in the UK.

Figure 38: Educational Attainment (Aged 25-64)



Source: OECD – Education at a Glance 2012

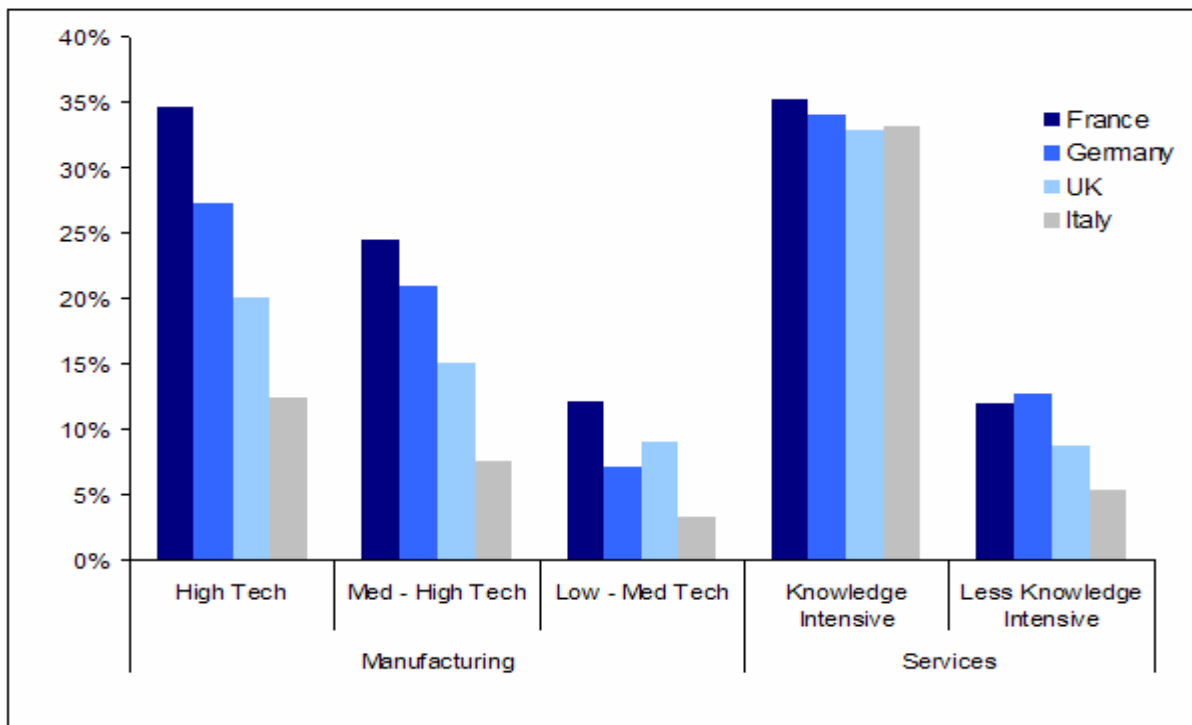
⁶⁶ Specifically, since 1980 the proportion of the UK population with a tertiary qualification has increased by 11%. See *Education at a Glance* (2012).

Despite the (recent) decline in the proportion of the UK workforce without basic qualifications, which we consider to be a proxy for basic skills, UK workers are still not as well equipped at basic literacy and numeracy as their OECD counterparts. Hanushek and Woessmann (2009) find that the UK performs slightly below the G7 average for Maths and Science and slightly above it for basic literacy. This placed the UK below Japan, Canada and Germany.

Skills Intensity of the Workforce

Figure 39 shows the proportion of persons employed who hold tertiary level education in different sectors. This can be used as a proxy for the knowledge intensity of individual sectors. As the chart shows, UK manufacturing appears to be relatively less skill intensive, but the UK compares more favourably in services. The fact that fewer graduates are employed in professional and technical occupations in the UK than its main competitors is largely driven by relatively low growth in high skill jobs.

Figure 39: Persons Employed as Professionals or Technicians with Tertiary Level Education, as a Percentage of Total Employment (2008)



Source: Eurostat

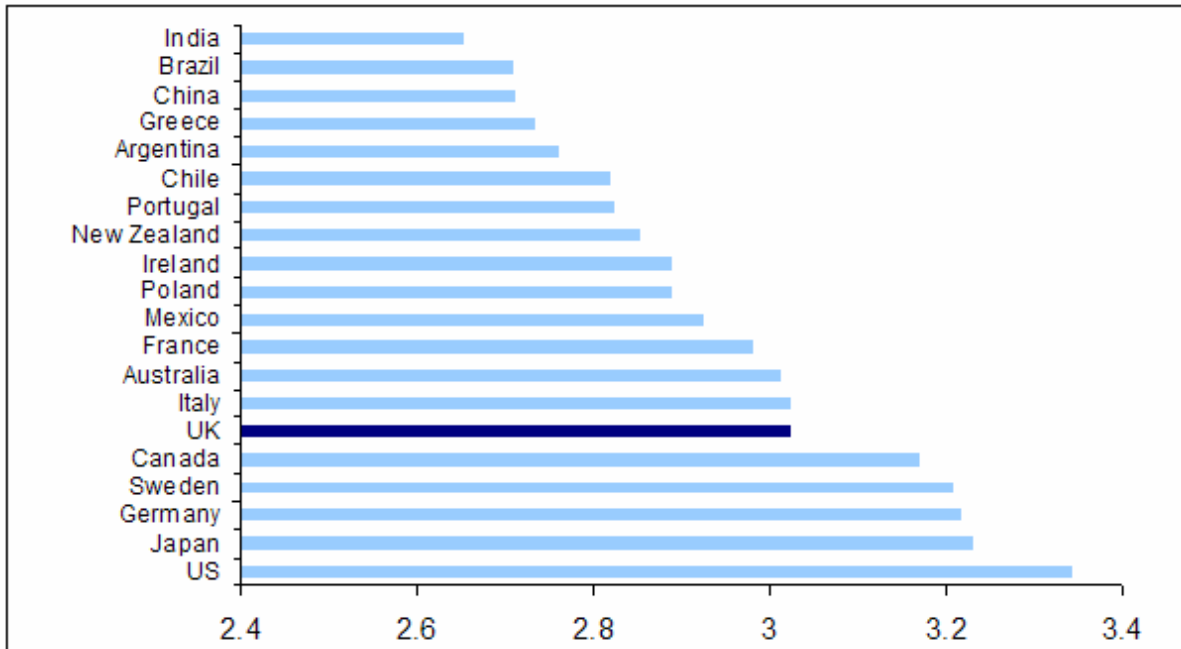
Management and leadership skills

Management capability is correlated with measures of firm performance including labour productivity and sales growth. Latest findings by Mckinsey and the Centre for Economic Performance at London School of Economics⁶⁷ suggest that the UK has a deficit in management quality, and this deficit is likely to be a key factor explaining the

⁶⁷ Rebecca Homkes (2010/2011) *Enhancing management quality: the potential for productivity growth after the recession.*

persistent productivity gap with other countries such as the USA and Germany.⁶⁸ Figure 40 shows that the UK is ranked in the middle across countries studied.

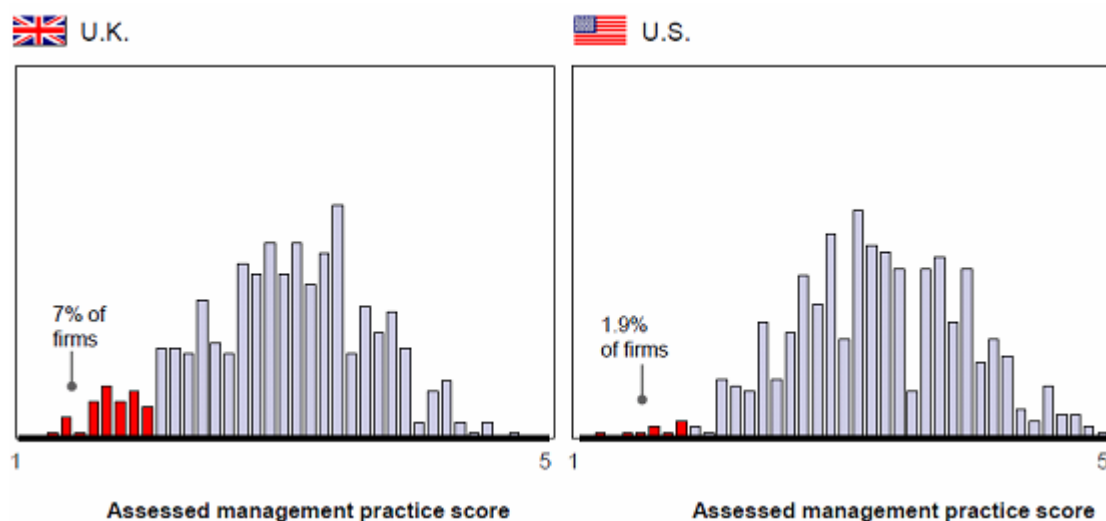
Figure 40: Management Score among Selected Countries



Source: McKinsey / LSE

According to the research, a persistent ‘tail’ of underperforming firms drags the management score of certain countries down. While this tail is largely absent in the USA (1.9% of firms), it is evident in the UK (7% of firms) and especially pronounced in developing countries such as Brazil and India.

Figure 41: Distribution of Management Practice Score in the USA and UK



Source: McKinsey / LSE

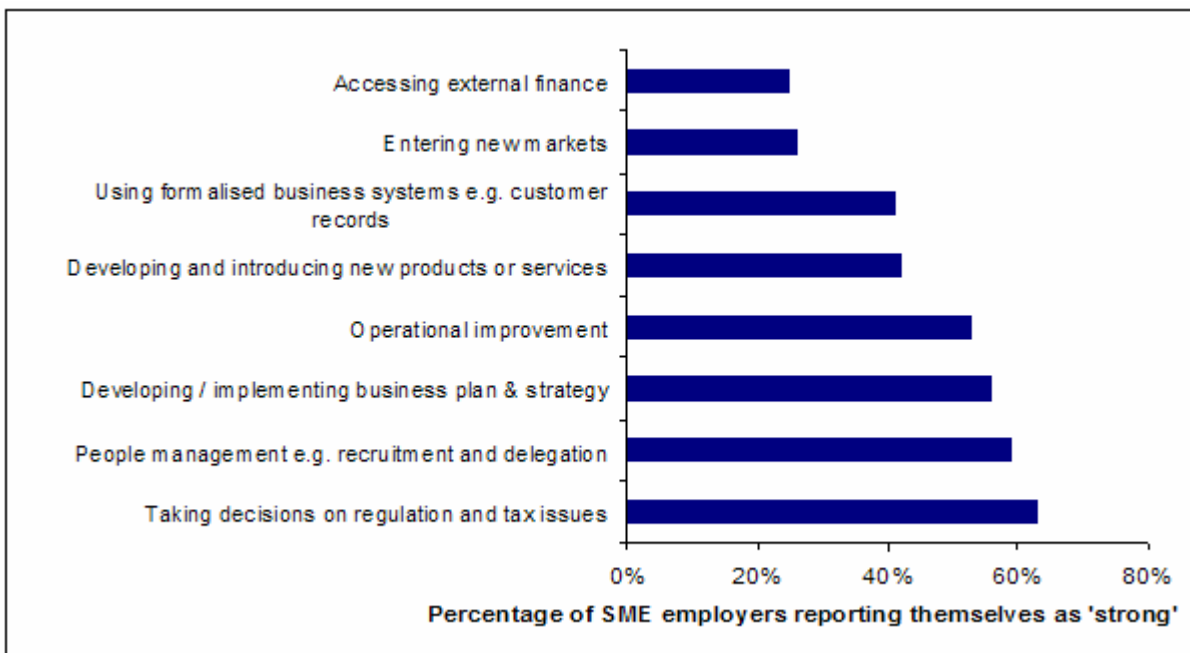
⁶⁸ Comparing GDP per hour in 2009, UK is 12% less productive than USA and also lags behind France and Germany.

Evidence also shows that family owned and run firms tend to have lower management scores than firms with other management structures.⁶⁹

Research⁷⁰ for BIS found that for UK businesses the greatest constraint for improving management is an inadequate supply of managerial human capital, followed by inadequate worker skills and informational barriers – not knowing what changes to make (which were of greatest issue for smaller businesses).⁷¹ There is evidence that owner-managers tend not to fully recognise the importance of leadership and management skills, particularly their crucial significance to growing businesses.⁷²

However, this is not consistent with the perception SME employers have of their management skills. When asked, SME employers were more likely to rate their strengths as being in taking decisions on regulations and tax issues (63%), people management (59%), and less likely to feel their strengths lay in entering new markets (26%) or ability to access external finance (25%) – see Figure 42.

Figure 42: Perception of whether the Business is Strong at Selected Business Activities



Source: BIS Small Business Survey (2010)

⁶⁹ See for example BIS (2011e) *Growth review: Mid-sized businesses evidence base*.

⁷⁰ Bloom et al 'Constraints on Developing UK Management Practices', November 2011. <http://www.bis.gov.uk/assets/biscore/economics-and-statistics/docs/c/11-1377-constraints-on-developing-uk-management-practices>

⁷¹ Research only included businesses with at least 100 employees.

⁷² Source: McKinsey / LSE.

Innovation

Why is innovation important for UK competitiveness?

Innovation relates to the creation and application of new knowledge. Although it is commonly thought of in terms of the invention of new technologies, innovation also encompasses the application of new organisational structures and business process. In the literature, innovation is commonly classified into four main types:⁷³

- Product Innovation – improvement in the characteristics of a good or service
- Process Innovation – improvement in production methods
- Marketing Innovation – adoption of new marketing methods e.g. promotion, packaging
- Organisational Innovation – improvements to how a business is managed or organised.

The importance of innovation for competitiveness lies in its central role in driving economic growth.⁷⁴ Innovations generate new products, and provide ways of producing them more efficiently, leading to improvements in productivity.

There is a wide array of robust empirical evidence on the link between R&D, productivity and output growth at the aggregate and firm level. Guellec and de la Potterie (2004) find that the long run elasticity of productivity with respect to business R&D is 13%, compared to 17% for public research and 45% for foreign R&D.

More importantly, Nadiri (1993) indicates that the benefits of investment in R&D extend beyond the firm or organisation which carries it out. While rates of return to investment in R&D for firms, industries and countries are found to be in the region of 20% and 30%, the spillovers from R&D generated social rates of return over and above this in the region of 50%.⁷⁵

Spillovers from R&D can also be captured by other countries if there is sufficient *absorptive capacity*. Absorptive capacity takes the form of knowledge and experience in a technological area, which enables new technology to be understood and re-deployed in other contexts.⁷⁶ Guellec and de la Potterie (2004) find evidence of absorptive capacity from domestic R&D increasing the impact of foreign R&D.

⁷³ As defined by OECD & Eurostat (2005).

⁷⁴ See Aghion and Howitt (2009) for an overview of neoclassical endogenous growth models, which consider technological progress as the main driver of economic growth.

⁷⁵ See Nadiri (1993), Salter et al (2000) and Welcome Trust (2008) for more comprehensive surveys.

⁷⁶ See Griffith et al (2003b).

How does the UK perform?

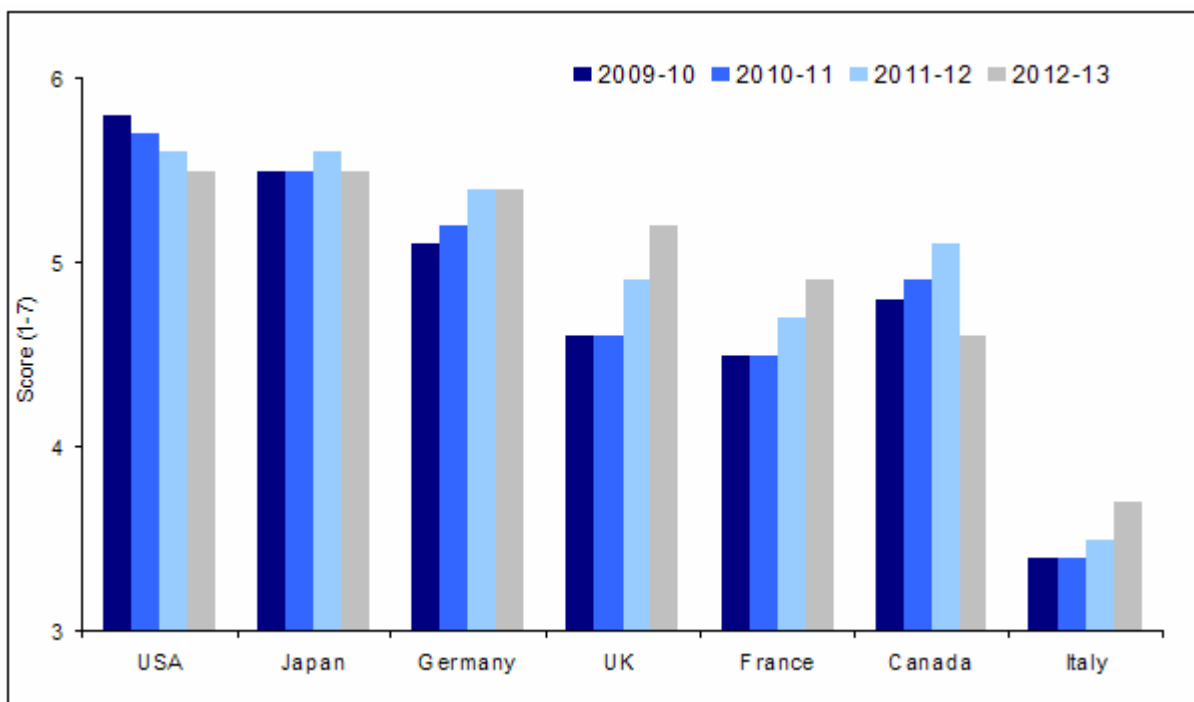
Business Perception Surveys

The World Economic Forum ranks business perceptions about countries' innovation capability in its 'innovation pillar'. As can be seen in Figure 43, over the last four years, the UK has been consistently outperformed by the USA, Japan and Germany, but remains ahead of France. Equally, the latest IMD survey data finds the same general pattern for the G7.

The WEF Global Competitiveness Report breaks the innovation pillar down into seven different elements. The report suggests that the UK has a particular strength in its world class research base, reflected by its rank of third out of 142 countries for the quality of its scientific research institutions; better than all of its G7 peers. Although, in the IMD data, the UK does not perform quite as well, achieving a rank 13th from 59 countries.

Another notable UK strength is university-industry collaboration, in which the UK achieves the highest score in the G7 according to the World Economic Forum. This is perhaps reflected by the relative attractiveness of the UK for scientists and researchers (7th out of 59), as shown by IMD data.

Figure 43: Innovation Pillar – Global Competitiveness Report



Source: World Economic Forum, Global Competitiveness Reports (2012-13)

Set against this, areas of weakness in the survey include company spending on R&D, Government procurement and the availability of scientists and engineers (despite recent increases in Science Technology Engineering and Maths (STEM) skills). With regard to company spending on R&D, the UK achieves a rank of twelfth internationally and is bettered by the USA, Germany and Japan. However, as

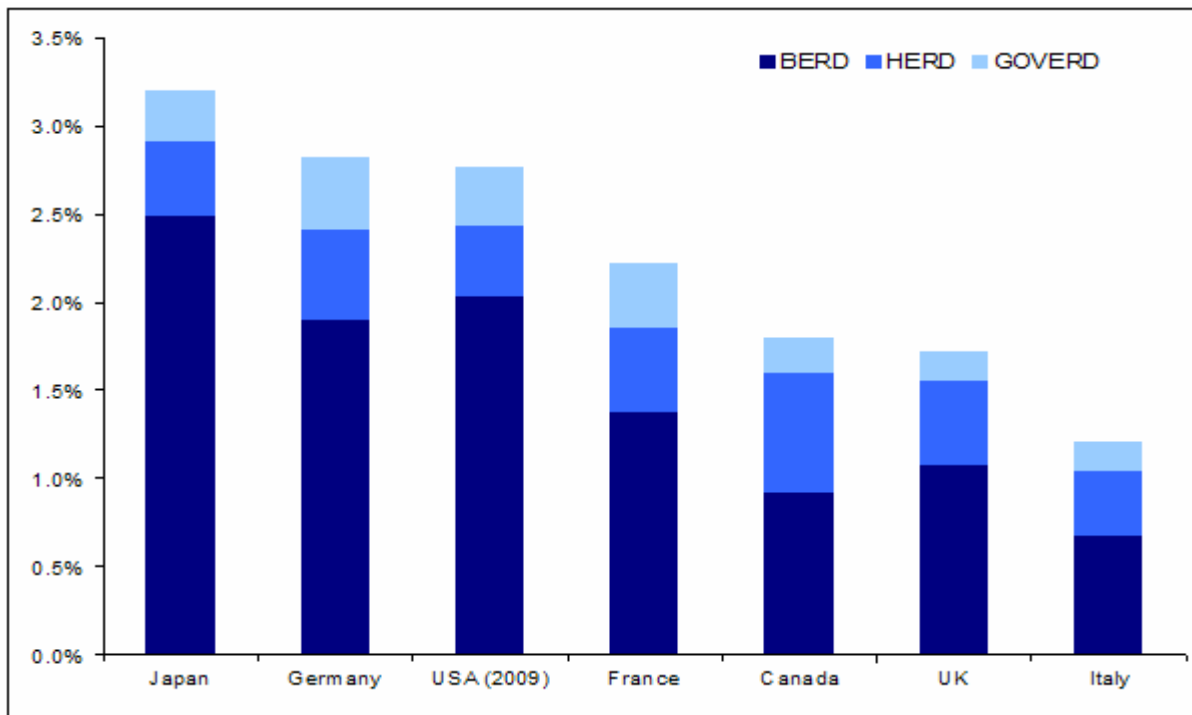
discussed below, part of this arises due to the UK's sector mix being less R&D intensive than its peers⁷⁷ since much of UK innovation expenditure is in activities other than just R&D, such as intangibles. Business perception of the extent to which Government fosters innovation in the country, is also relatively poor compared to the G7.

Expenditure on Innovation

The UK spends relatively little on pure R&D relative to its peers. Gross Expenditure on R&D (GERD) was 1.8% in 2010, placing the UK sixth amongst the G7. Only Higher Education Expenditure on R&D (HERD) shows signs of strength, with the UK ranking third in the G7.

One explanation for this poor performance may be the UK's industrial structure. Research by Abramovsky et al (2004) suggests that about half of the difference in R&D intensity between the UK and Germany is due to the smaller UK share of value-added in R&D-intensive sectors, in particular motor vehicles. This is consistent with DIUS (2008), which showed that differences between the UK and other countries are to a large extent the result of such 'industry-mix' effects.

Figure 44: Gross Domestic Expenditure on R&D as a Proportion of GDP (2010)

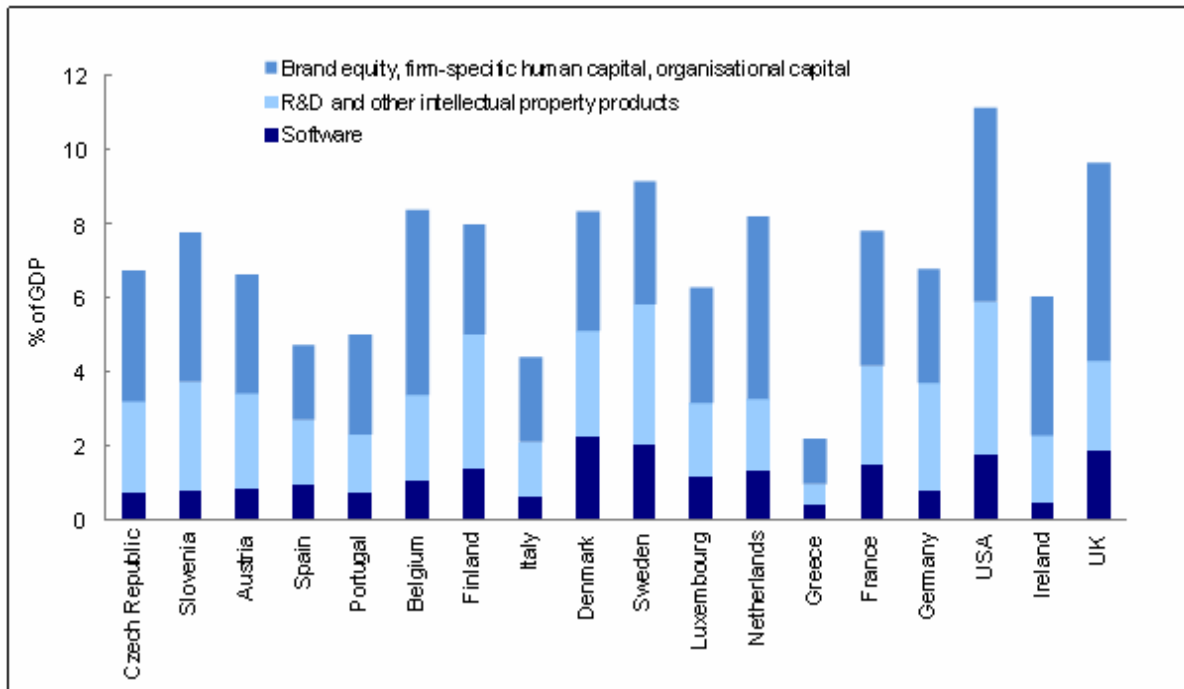


Source: OECD Main Science and Technology Indicators (2010). Notes: Business expenditure on R&D (BERD) covers R&D activities carried out in the business sector by performing firms and institutions, regardless of the origin of funding. It includes both publicly and privately funded R&D; Higher Education expenditure on R&D (HERD) includes R&D activities carried out by universities, colleges of technology and other institutions of post-secondary education. It includes both publicly and privately funded R&D; Government expenditure on R&D (GOVERD) includes expenditure on R&D performed in the government sector.

⁷⁷ OECD (2005).

R&D expenditure is only part of the picture however. To assess how innovative the UK economy is, it is important to look beyond R&D figures at a broader definition of innovation. Although there are issues around the comparability of the data, Figure 45 shows that although investment in ‘traditional innovation’ (e.g. R&D, design and copyrighting) in the UK is relatively lower than in other leading economies, investment on other knowledge assets such as skills, organisation, branding and software is higher.

Figure 45: Investment in Intangible Assets (% of GDP, 2009)



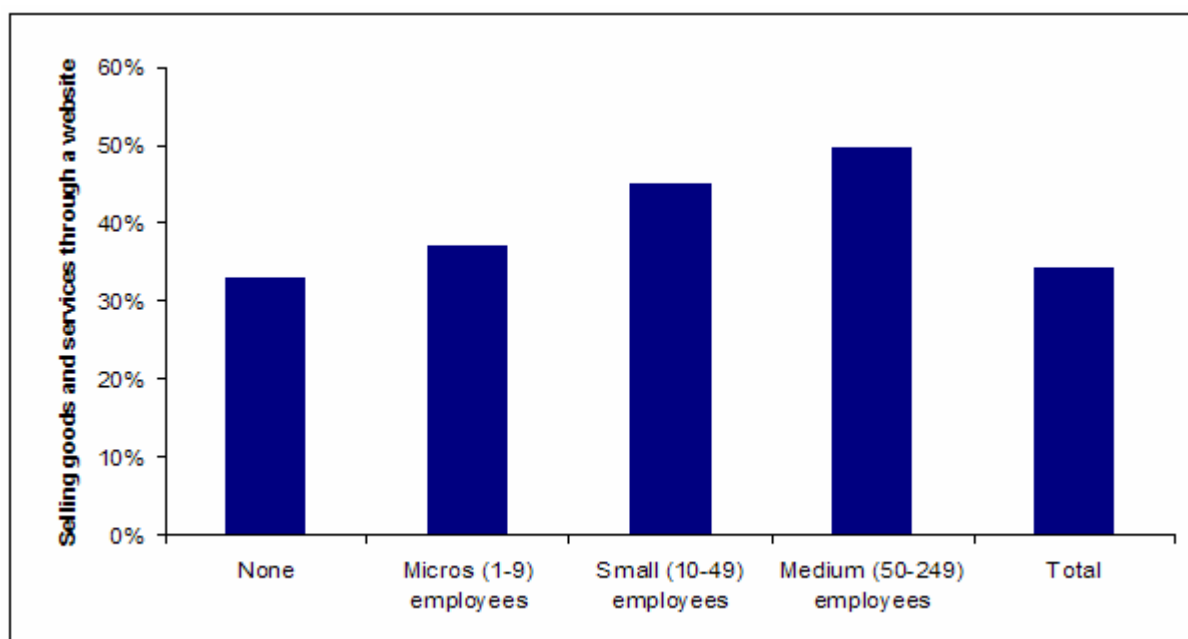
Source: Corrado, C., J. Haskel, C. Jona-Lasinio and M. Iommi (2012), “Intangible capital and growth in advanced economies: Measurement methods and comparative results”, Imperial College Business School Discussion Papers, No. 2012/06.

While evidence shows that UK performs well in investment in intangible innovation such as software, research shows that at the same time many UK SMEs are not fully exploiting the benefits of the web throughout their business strategy to improve their business processes and increase their productivity and profitability.

Whilst an estimated 3.6 million of UK SMEs do use the internet around 0.9 million of these report that they are not using the web to facilitate the sale of goods and services. Around the same number of SMEs are without broadband internet. The proportion of firms using a website to sell their goods or services increases with size from 33% of zero-employee businesses to 50% of medium-sized businesses (50-249 employees)⁷⁸ – see Figure 46.

⁷⁸ BIS Small Business Survey (2010).

Figure 46: Proportion of UK SMEs that sell Goods and Services through a Website, by Size



Source: BIS Small Business Survey (2010)

In addition, whilst there have been annual increases in the number of UK SMEs which have a website, UK SMEs are still much less likely to have a website than large firms. UK SMEs also make a smaller proportion of their sales using a website.⁷⁹

In terms of SME employers, whilst the picture is more positive with over 90% of SME employers 'on-line', and two-thirds having a website to promote their goods and services, more needs to be done to encourage effective use of the web.⁸⁰ For instance, more than 7 out of 10 SMEs miss out on online traffic by failing to get their websites configured properly for search engines. Three-quarters of businesses have no web analytical software in place to track website visits.

Academic Output and Earnings from Innovation

The comparison of innovation outcomes across countries can be problematic. The breadth and scale of the innovation infrastructure makes it challenging to observe all the relevant areas, particularly given the lack of comparable data across countries. Generally, the most widely used measures include indicators for the research base and technology flows, which we use below.

In terms of number of citations, the UK research base is second in the world after the USA. Between 2006 and 2010 the UK produced the highest number of articles per unit of GERD expenditure and the highest number of citations per researcher, making it the most productive in the world (BIS, 2011b). That said, the UK research base has

⁷⁹ ONS E-commerce surveys 2004-2009 for firms with 10+ employees only. Detailed data available in the December 2010 ONS Economic and Labour Market Review.

⁸⁰ BIS Small Business Survey (2010).

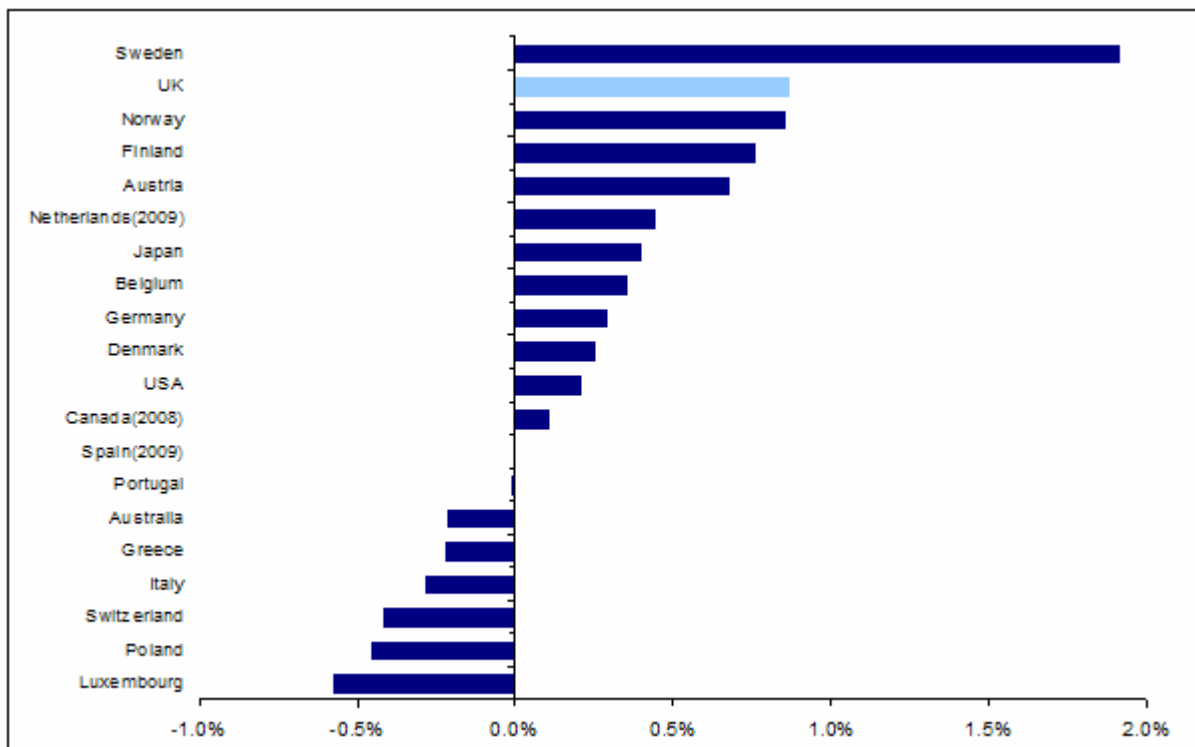
a language advantage over its competitors because the publication of articles in English broadens their audience relative to other languages.

There is also evidence to suggest that this feeds through into patent applications. IMD data display that the UK ranks third in the G7 for its 683 patents in force per 100,000 residents in 2010. This puts the UK behind France and far behind Japan, which has 1,112 patents in force per 100,000 residents.

The UK is relatively open to inward technology flows, bolstered by the strength of its research base and international research collaboration. Strong international linkages in business and education place the UK at the top of the G7 for technological receipts (OECD data). This reflects both the attractiveness of the UK as a destination for technological investment and the strength of UK absorptive capacity.

Despite large technological receipts, the UK remains a big net exporter of technology. OECD data suggest that the UK earns a considerable surplus on the technology balance of payments of around 1% of GDP. This puts it well ahead of other G7 countries such as Japan, Germany and the USA whose surplus on their ‘technology balance of payments’ is less than 0.5% of GDP.

Figure 47: Technology Balance of Payments (% of GDP) 2010⁸¹



Source: OECD Main Science and Technology Indicators

⁸¹ Note: Technology balance of payments includes: licence fees, patents, purchases and royalties paid, know-how, research and technical assistance. Unlike research and development (R&D) expenditure, these are payments for production ready technologies.

Infrastructure

Why is infrastructure important for UK competitiveness?

Modern and efficient infrastructure networks enable products, resources, people and information to move freely around the economy to where they are needed most. Good infrastructure allows businesses to access larger markets for goods, services and labour at reduced costs. This feeds through into greater competition, specialisation, innovation, investment and trade – helping to raise productivity over and above the costs of funding such improvements.⁸²

Making cross-country comparisons of infrastructure can be challenging because infrastructure is not easily measured in a comparable and objective way. For this reason, we rely primarily on the business perception surveys of the WEF and IMD which are generally narrowly focussed on a few specific areas. It is also important to consider the quality of the infrastructure as well as the quantity of spending on it. For instance, a well developed infrastructure might be receiving substantial investment with only a limited impact on its quality and therefore a limited impact on a country's competitiveness.

How does the UK perform?

Business Perception Surveys

The WEF Global Competitiveness Report 2012-13 ranks the UK sixth out of 142 countries for its general infrastructure quality. Against the G7, the UK has improved its position over the last three years to now rank third, as shown in Figure 48. However, the gaps in terms of scores between the top 6 economies are small, so the differences in rankings should not be over-interpreted.

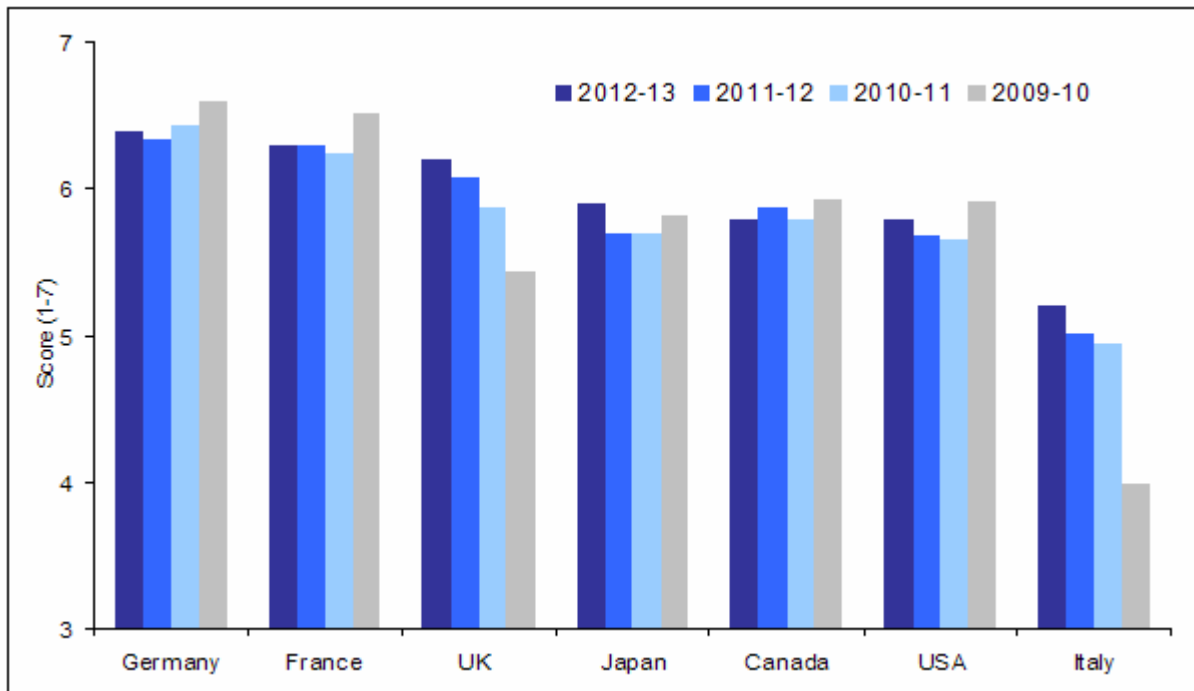
By contrast, the World Bank Logistics and Performance Index (2012), ranked the UK sixth out of the G7 for transport related infrastructure. The UK was also perceived to perform slightly worse in the IMD measure of both basic and technological infrastructure, achieving ranks of 20th and 15th out of the 59 countries surveyed respectively.

Within the infrastructure pillar, the areas which hampered UK performance were concentrated within transport infrastructure. The quality of roads (sixth in the G7), airports (third in the G7) and rail system (fifth in the G7) were areas of weaker performance. As noted in the OECD survey of the UK (2009), 'airport and road congestion and continuing problems with the rail system constrain productivity'.

⁸² Barro (1990) observes that infrastructure investment can lead to growth in the long run through its impact on raising the return to private investment, provided it outweighs the increased taxation required to finance any such infrastructure spending.

As for utilities and communications, the UK achieved scores in line with G7 competitors in the measures for quality of electricity supply, fixed telephone lines per 100 population and mobile telephone subscriptions (according to the WEF). IMD data highlights a UK weakness in telecommunications, in which investment was 0.37% of GDP in 2009, placing the UK 28th out of the 59 countries surveyed and fourth in the G7 (the USA is omitted in the data).

Figure 48: Infrastructure Pillar – Global Competitiveness Report

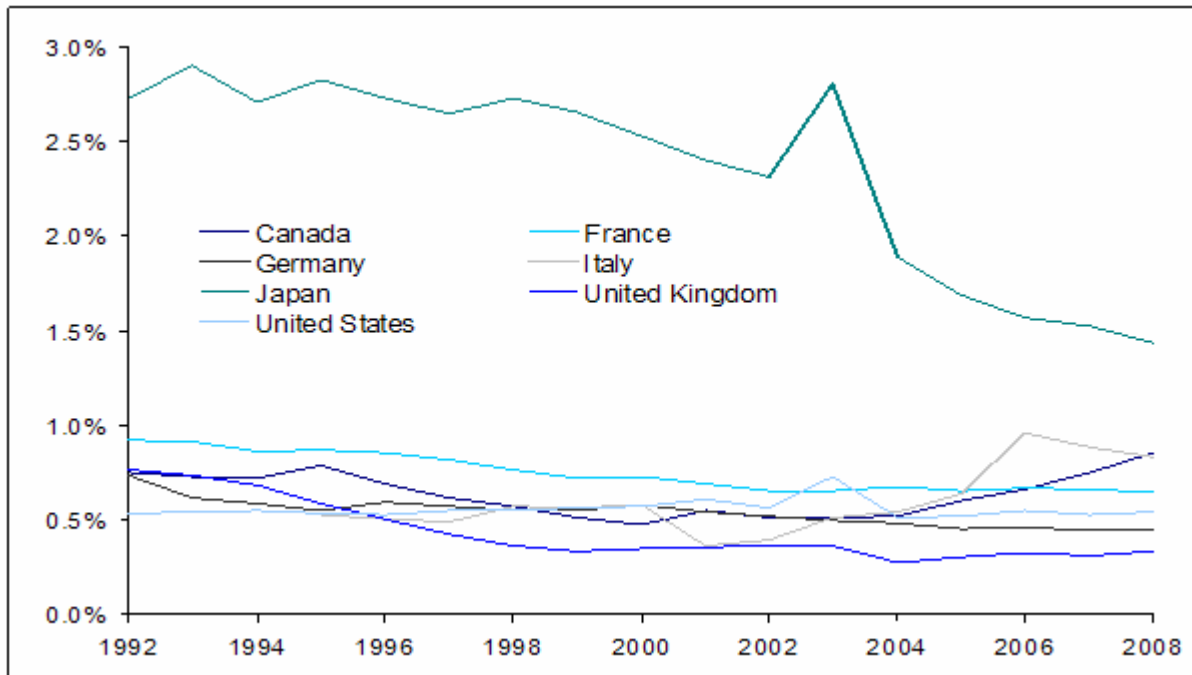


Source: World Economic Forum, Global Competitiveness Report 2012-2013

Infrastructure Spending

Crafts (2009) highlights a shortfall in road infrastructure spending and notes that to maintain the UK’s well developed transport infrastructure, significant investment will be required in the long run. As shown in Figure 49, the UK has suffered from long-standing under-investment in its road network relative to its peers. Indeed between 1992 and 2008, it fell from 0.8% of GDP to 0.3% of GDP, placing the UK at the bottom of the G7.⁸³

⁸³ Although, some care has to be taken in interpreting figures for public infrastructure investment because it is only an input rather than a measure of quality or how well the infrastructure meets requirements.

Figure 49: Road Network Gross Investment Spending as a % of GDP


Source: BIS calculations from International Transport Forum data

Crafts (2009) and Kamps (2005) argue that it is important to target the growth maximising level of investment in infrastructure. At low levels of infrastructure stock, additional investment has a limited impact on growth. In fact, the greatest gains occur in moving from a less developed infrastructure to a well connected infrastructure. However, beyond a certain point, investment yields diminishing returns.

Having calculated an 'optimal' growth maximising figure for public capital, Kamps (2005) compares 2001 actual figures for investment in public capital to GDP and projects them forwards to the long-run. The results suggest a shortfall in the UK's investment in public capital in the long-run of 16.6% of GDP. He argues that without significant investment to maintain existing infrastructure, the shortfall will dampen long-run growth prospects.

Institutional and Political Environment

Why is institutional and political environment important?

The institutional and political environment has a strong bearing on a country's ability to develop a stable and competitive economy. It determines the legal, administrative and business framework within which individuals and businesses operate, and hence influences almost all areas of business activity (e.g. investment decisions, organization of production processes, innovation).

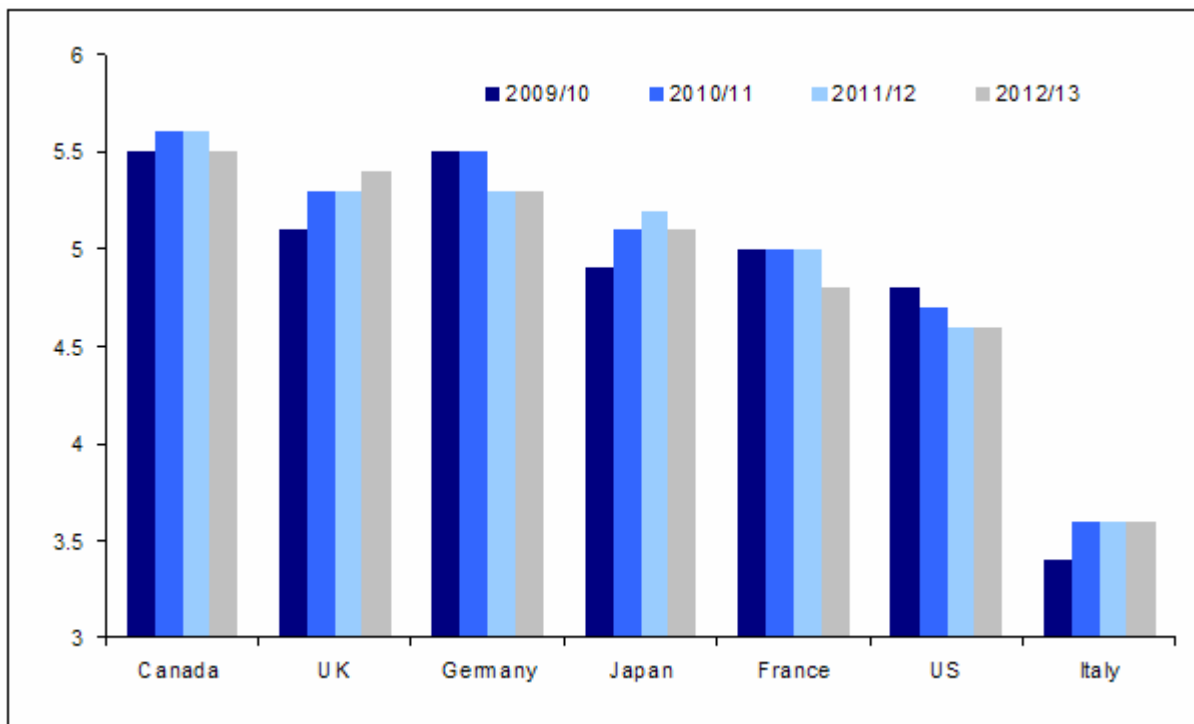
However, it is difficult to quantify and compare the quality of institutions across countries. In most instances, the political and institutional regime is assessed using a wide range of criteria covering areas such as legal framework, government bureaucracy and regulatory burden on business. This allows for a comprehensive evaluation of how well institutions support economic activity. The main weakness of this approach is that the choice of the criteria used and the weightings attached to each factor may substantially influence the final outcome.

How does the UK perform?

Business perception surveys

The results from the WEF Global Competitiveness Report indicate that the UK has one of the most supportive political and institutional environments. Overall, the UK comes second among G7 countries, after Canada. The more detailed analysis shows that the UK strengths are in property rights and intellectual property rights protection, judicial independence and efficiency of the legal framework. Areas of weaknesses include the burden of government regulation, the wastefulness of government spending and public trust of politicians.

Figure 50: Global Competitiveness Report – Institutional Framework



Source: World Economic Forum, Global Competitiveness Reports 2009/10-2012/13

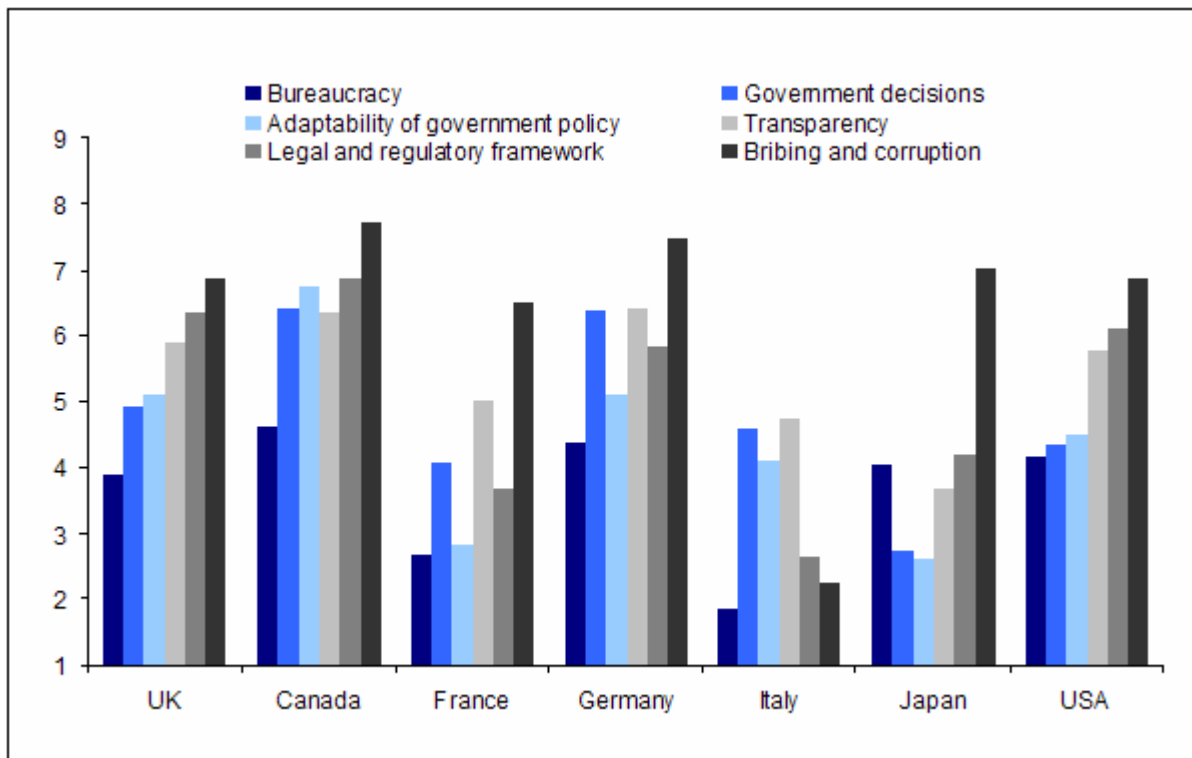
A slightly less positive picture is painted by the Institute of Management Development (IMD) World Competitiveness Yearbook.⁸⁴ The analysis of the indicators related to the institutional environment shows that, compared to the G7, the UK is typically behind Germany and Canada, but ranks slightly higher than the USA and has a clear

⁸⁴ It is important to note that difference between the results may arise both due to a different methodology and a different scope of the indicators.

advantage over France and Italy. In absolute terms, the UK receives the lowest scores in the measures of the impacts of government bureaucracy on business activity, adaptability of government policies and implementation of government decisions.

Finally, according to the World Bank Doing Business Ranking 2013, the UK institutions and regulations provide effective protection of investors and ensure appropriate enforcement of contracts. Overall, the UK comes 7th (second among the G7 countries) on the Ease of Doing Business Ranking, which suggests that it has one of the most business friendly regulation systems.

Figure 51: Selected IMD Indicators of Government Efficiency



Source: IMD, World Competitiveness Yearbook, 2012

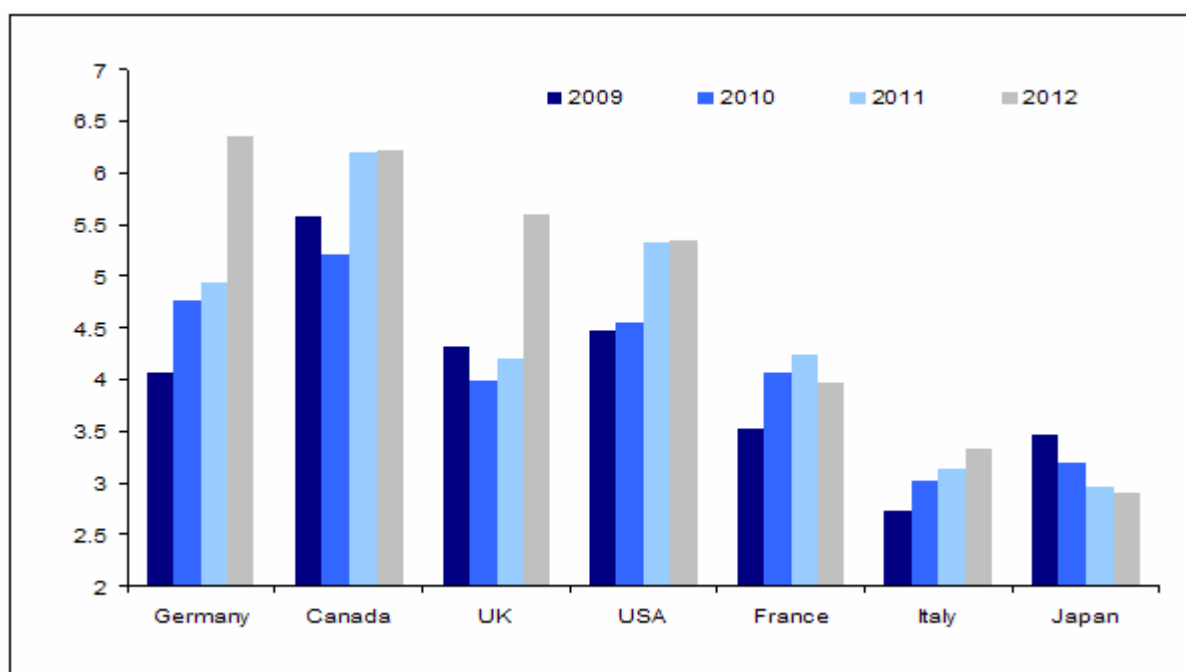
Taxation

One area of the institutional framework which is especially important to competitiveness and productivity is the taxation system. There is a wide consensus in the economic literature that taxes influence business decision making, which can harm productivity. For example, a CEPII (2008) study finds that corporation tax has a negative effect on productivity at the firm level, except for small and young companies with relatively low profitability.

The headline corporation tax rate in the UK is the lowest amongst the G7. However, over the last decade, the competitiveness of UK corporation tax, compared to other countries, has deteriorated.

It is important to note that the headline corporation tax rate is not the only indication of the real tax burden faced by companies. The structure and implementation of corporation tax also plays an important role in determining the effective rate of tax paid. According to the IMD Global Competitiveness Yearbook, the real corporate taxes in the UK discouraged entrepreneurial activity to a lesser extent than in the USA, Italy and Japan, but the UK is far below the best performing countries such as Singapore or Ireland. A stark improvement in the UK's score in 2012 is likely to reflect a reduction of the main rate of corporation tax to 26% from April 2011.

Figure 52: Real Corporate Taxes and Entrepreneurial Activity



Source: IMD, World Competitiveness Yearbook, 2012

Macroeconomic environment and financial markets development

Why is macroeconomic stability and financial markets development important?

Macroeconomic stability allows individuals and business to plan with confidence. Though in and of itself it cannot increase productivity, a stable macroeconomic environment supports better allocation of resources, encourages greater flexibility at the firm level and may lead to increased levels and quality of investment.⁸⁵

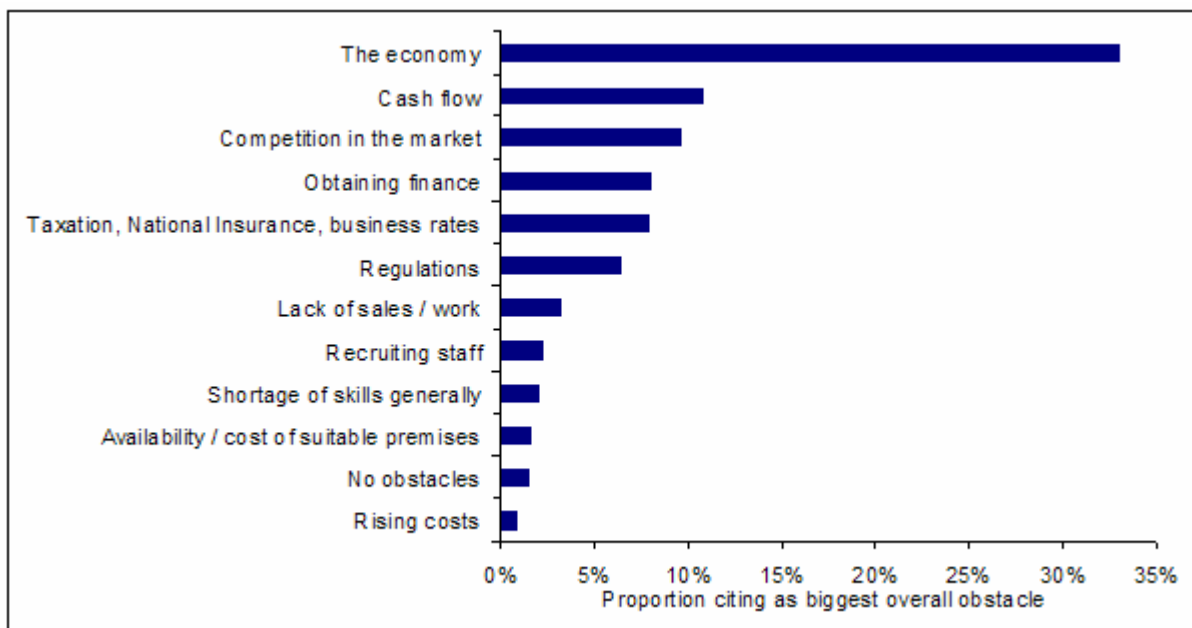
⁸⁵ See BIS Economics Paper No.9 for more detailed discussion of impacts of macroeconomic stability on growth and productivity <http://www.bis.gov.uk/assets/biscore/economics-and-statistics/docs/e/10-1213-economic-growth.pdf>

Conversely, macroeconomic volatility can have an adverse effect on growth and investment, as firms are more hesitant to invest if future economic conditions are uncertain.

In the case of the financial system, its quality and sophistication plays an important role in facilitating economic growth and has a strong bearing on countries' economic performance. A well-developed financial system supports a better allocation of resources and ensures stable flows of funds from savers to those who have a shortage of funds. For example, it channels resources to investment projects and entrepreneurial activities which have the highest expected rate of return. That said, it is important to note that an adequate risk assessment and appropriate regulation are also essential parts of a sound financial system.

The macroeconomic environment and financial markets together with the institutional and political framework can affect perceptions and businesses ability to grow. According to the Small Business Survey (2010) the biggest overall obstacles to business success as identified by SME employers were the economy (33%), cash flow (10.9%) and competition (9.6%) – see Figure 53.

Figure 53: Main Obstacle to the Success of the Business



Source: BIS Small Business Survey (2010)

How does the UK perform?

Business surveys indicators

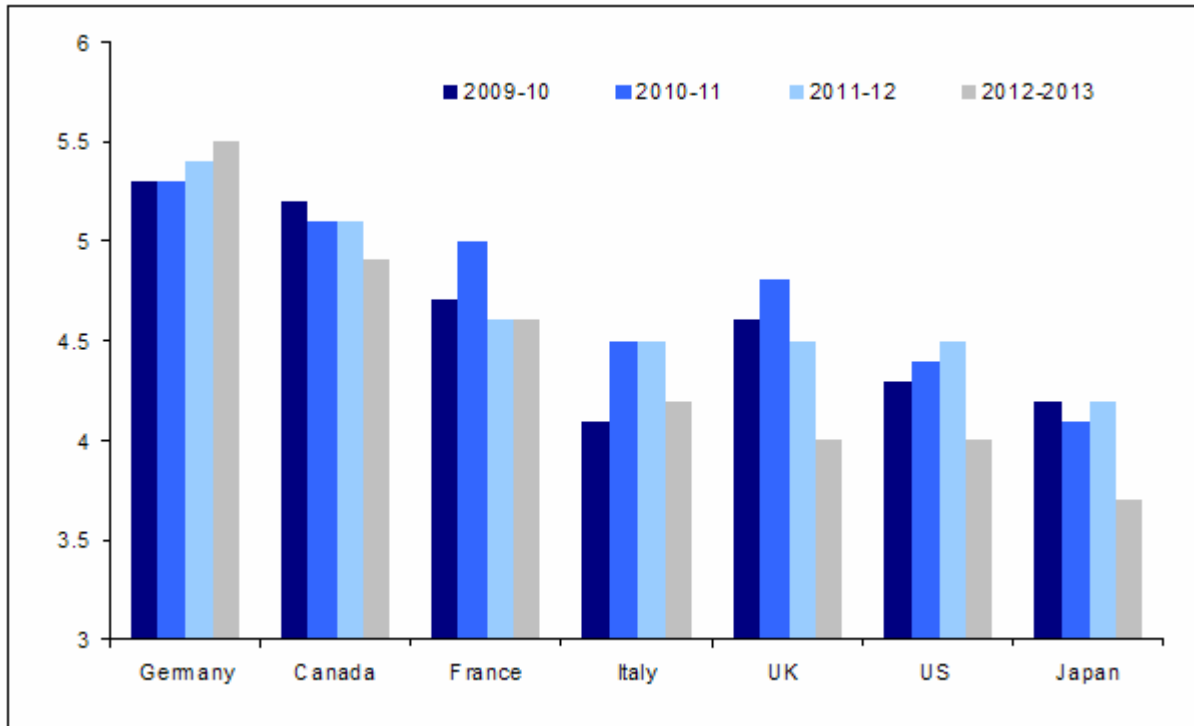
According to the WEF Global Competitiveness Report, the UK macroeconomic environment ranks 110th. Compared to the G7, only USA and Japan received a lower score (see Figure 54).

In the same report, an examination of the individual indicators finds that UK performs best at measures of country credit rating and annual change of inflation. High government budget balance and debt, and insufficient gross national savings appear

to be the main concern. Overall UK performance has deteriorated on almost all measures over the last four years.

The IMD World Competitiveness Report argues that the UK economy is not sufficiently diversified, and has relatively low resilience to economic cycles. On the positive side, the UK exchange rate is seen as fairly supportive to the competitiveness of enterprises.

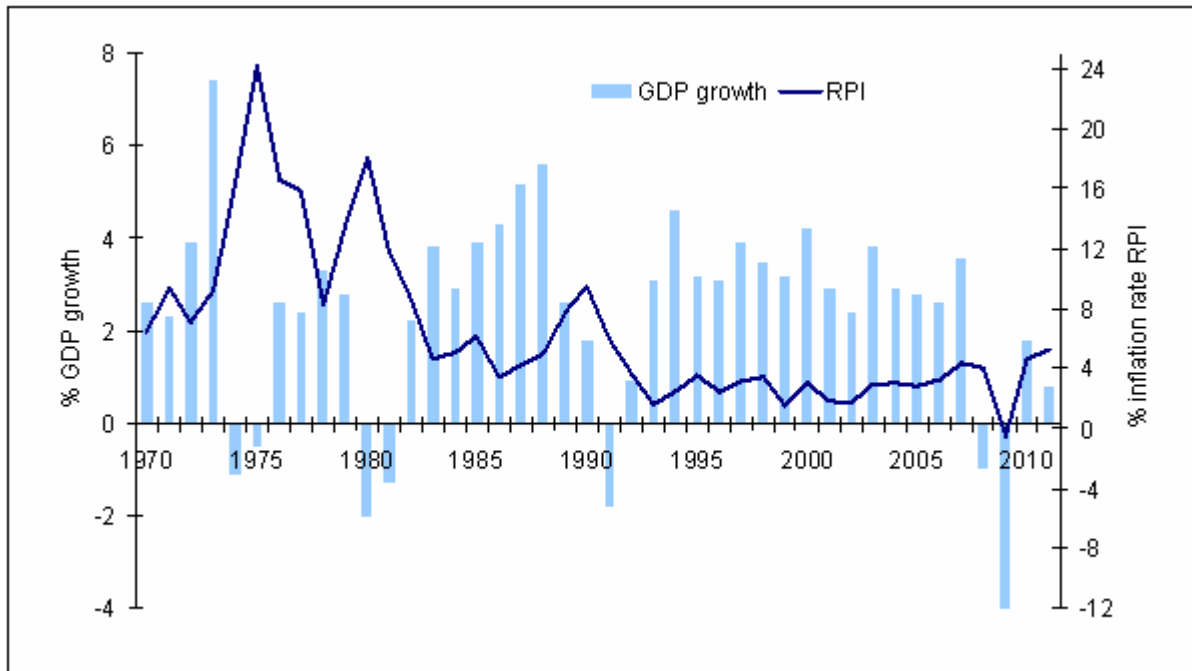
Figure 54: Global Competitiveness Report – Macroeconomic environment



Source: World Economic Forum, Global Competitiveness Reports 2009/10-2012/13

Output and price volatility

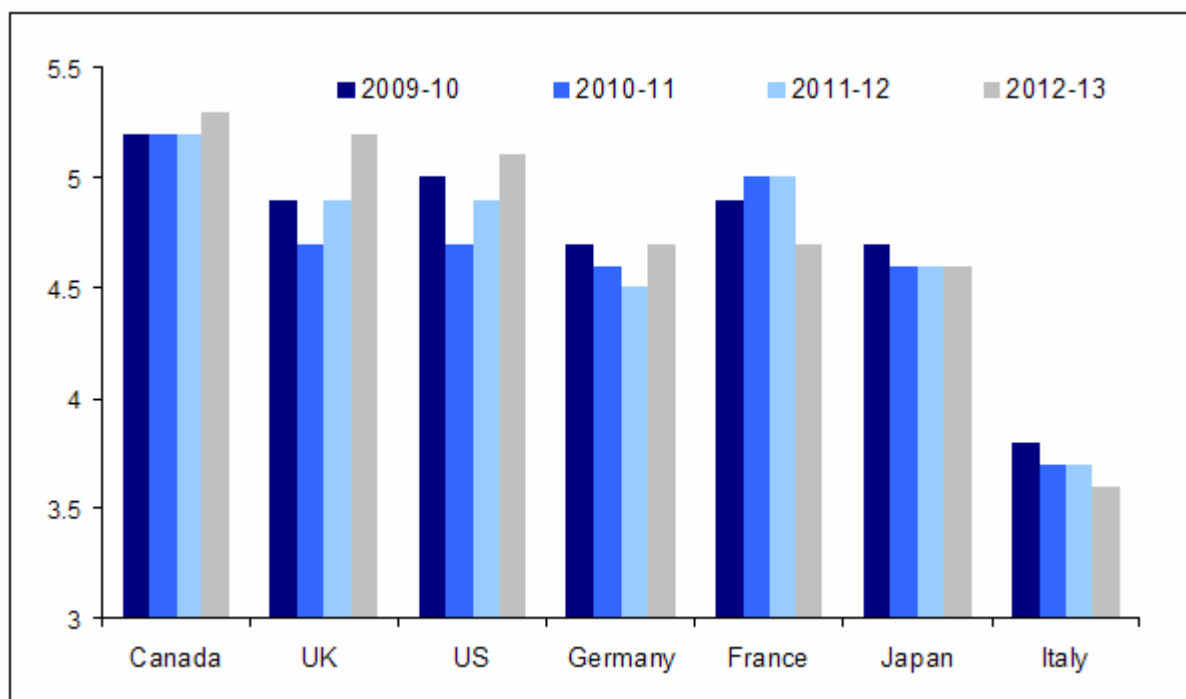
The UK has a mixed record in terms of macroeconomic stability. In the 1970s and 1980s, the UK experienced high volatility in output and prices. The situation improved in the late 1990s and throughout the 2000s, but the financial crisis in 2008 has led to deterioration of macroeconomic conditions and greater volatility over the recent years.

Figure 55: UK GDP Growth and Inflation (1970-2011)


Source: ONS

Financial markets development

The UK has a well-developed financial system, although the recent economic crisis has exposed a number of weaknesses and led to worsening of credit conditions for businesses. The financial market development indicator presented in the WEF Global Competitiveness Report suggests that the UK compares relatively well in terms of availability and affordability of financial services, legal rights and financing through local equity markets. It does much worse on the measure of ease of access to loans (48th position) and soundness of banks (97th position). Overall, the assessment of the financial system in the UK improved over the recent years, after a steep decline in the aftermath of the financial crisis.

Figure 56: Global Competitiveness Report – Financial Markets development

Source: World Economic Forum, Global Competitiveness Reports 2009/10-2012/13

Competition and economic openness

Why is competition and economic openness important?

There is a strong link between competition and competitiveness. The theoretical and empirical literature suggests that competition enhances the efficient allocation of resources in the economy, and therefore, has a positive effect on productivity, growth and investment. Competitive pressures also benefit consumers as they help to keep prices low, and drive firms to innovate and improve their products.⁸⁶

Competitive pressures do not refer only to domestic competition. Foreign direct investment, exports and import competition are also important drivers of economic prosperity. This occurs through a number of channels, including – further enhanced competition, returns to scale and specialisation arising from having access to larger markets, and dissemination of knowledge and innovation (BIS, 2011c). For example, the OECD (2003) research suggests that an increase of 10% in trade exposure is associated with a 4% increase in output per worker.

⁸⁶ For a more detailed discussion on the impacts of enhanced competition on growth, investment and productivity please see the BIS Economics Paper No. 9 (2010a) *Economic Growth and Government response to consultation on the reform of the competition regime* *Growth, Competition and the Competition regime*, BIS, March 2012.

Ensuring healthy competition requires a well-functioning competition regime. The role of the Government is to ensure that markets operate effectively by setting the rules which address market failures and promote competition. Monitoring and enforcement are also an integral part of competition policy and they have a crucial impact on the effectiveness of the competition regime.

How does the UK perform?

Measuring the degree of competition is difficult. There are many ways of doing it and it is important to use a range of approaches to have a full picture. The evidence presented in the section draws on a number of different measures to provide an indication of how well the UK performs.

Business Survey Indicators

The UK competition regime is considered to be one of the most effective in the world. The Global Competition Review awarded the Competition Commission its highest rating of 5 stars and the Office of Fair Trading with 4.5 stars. In a different assessment, based on the survey of experts compiled by KPMG (DTI, 2007), the UK ranks third after the USA and Germany, with the gap between the German and the UK system narrowing compared to 2003/04 data.

A similar picture is painted by the survey of businesses presented in the IMD World Competitiveness Year Book. According to the ranking, competition legislation in the UK is less effective in preventing unfair competition than in Canada, but the UK scores just below Germany and is ahead of other G7 countries. In terms of the measures which capture the impacts of subsidies and state ownership on competition, the UK has substantially improved its position over recent years and is now ranked 22nd (subsidies) and 12th (state ownership). Denmark, Switzerland and Finland lead on most of the competition indicators presented in the Yearbook.

OECD Measures of Product Market Regulation

The OECD produces a range of measures of product market regulation.⁸⁷ At the aggregate level, the UK has the least restrictive product market regulations among the OECD countries, with the level of anti-competitive restrictions considerably better than in Germany, Italy or France. A more detailed analysis shows that the UK has the lowest barriers to entrepreneurship, but scores relatively worse at the measure of the degree of state control, which has deteriorated since 1998.

⁸⁷ The indicator covers areas such as public control and price controls, legal and administrative barriers to entry, and barriers to trade and investment. Please note that barriers to trade and investment are discussed in more detail in the trade openness section. The indicators are based on qualitative information, but not on opinion surveys. For a detailed description of the indicator please see: [http://search.oecd.org/officialdocuments/displaydocumentpdf/?doclanguage=en&cote=eco/wkp\(2005\)6](http://search.oecd.org/officialdocuments/displaydocumentpdf/?doclanguage=en&cote=eco/wkp(2005)6)

Intensity of competition

As mentioned above, analysis of the degree of competition in the economy can be challenging. Empirical studies typically use measures of profit margins and concentration ratios as indicators of market power.⁸⁸ However, these measures have their limitations and should be interpreted with caution. For example, an industry may show low overall concentration but nonetheless consist of markets which could be highly concentrated.⁸⁹

The latest data available suggests that the UK has the lowest price-cost margin among G7 economies,⁹⁰ even though the differences between countries are relatively small. As for concentration ratios, analysis conducted by the ONS (2006) shows that for around half of the 123 industries examined, the top 5 companies contributed less than 30% of industry GVA and total output at current basic prices. The highest concentration ratios were found in electricity, gas and water supply, mining and quarrying and transport and communications.⁹¹

To have a full picture of the degree of competition it is also very important to look at the dynamics of business growth. The continual exit and entry of firms, which is known as churn, is crucial to the growth of the economy. High levels of churn are thought to speed up the process of reallocation of resources and indicate a competitive environment, where successful firms can expand rapidly and the worse performing ones are forced out of the market (NIESR, 2006).

A recent analysis of the micro-level firm data suggests that the proportion of medium and high-growth companies in Europe is smaller than in the USA, with European companies more likely to stay the same size.⁹² The UK results show that, despite having a relatively high proportion of firms which grow or contract rapidly, almost 30% of UK companies' growth was stagnant. This is more than in the USA (10%) and the average for major European countries (14%).

However, the authors note that the extremity of the spike in UK firms with little or no growth is partly an artefact of the banding used to define the distribution. A slight widening of the central band results in the UK looking much more like the rest of Europe. That is, it has a relatively high proportion of firms who are either only growing slightly, stagnant or shrinking slightly.

⁸⁸ Price cost margin is a measure of profitability. The larger the cost margin, the larger the difference between price and marginal cost. Concentration ratio refers to combined output/employment share of a given number of firms in the market – 0% concentration ratio means perfect competition, and 100% indicates monopoly.

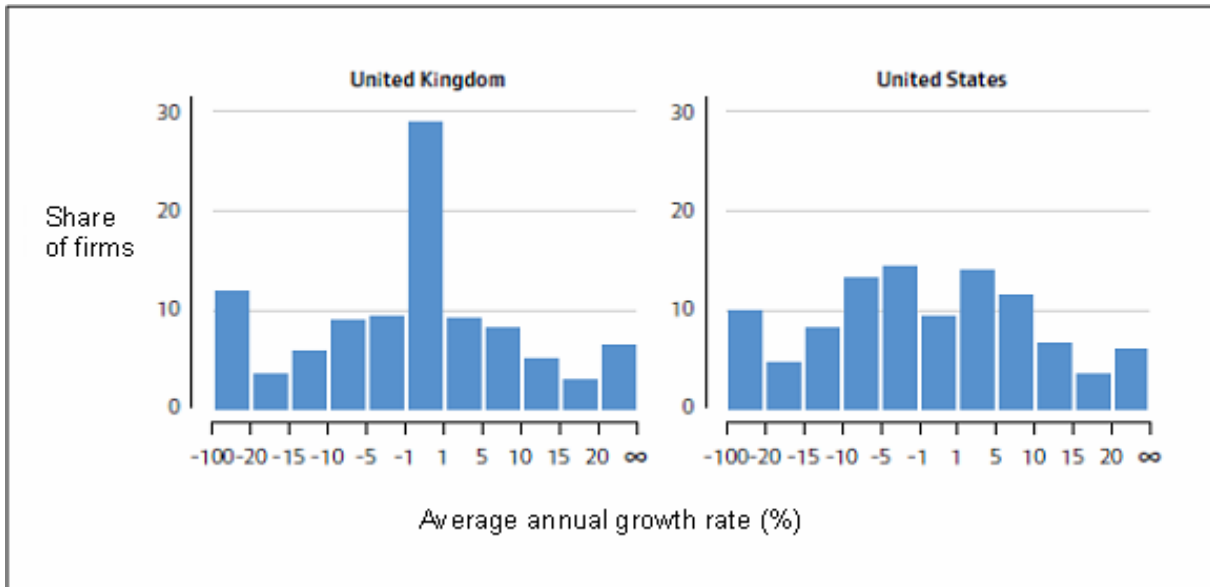
⁸⁹ For a more detailed discussion of issues around empirical measurement of competition intensity see http://www.oft.gov.uk/shared_of/reports/comp_policy/oft749a.pdf

⁹⁰ BIS calculation based on OECD STAN data 2007. The data for Canada is not available.

⁹¹ Please note that comparable international data is not available.

⁹² NESTA (2010).

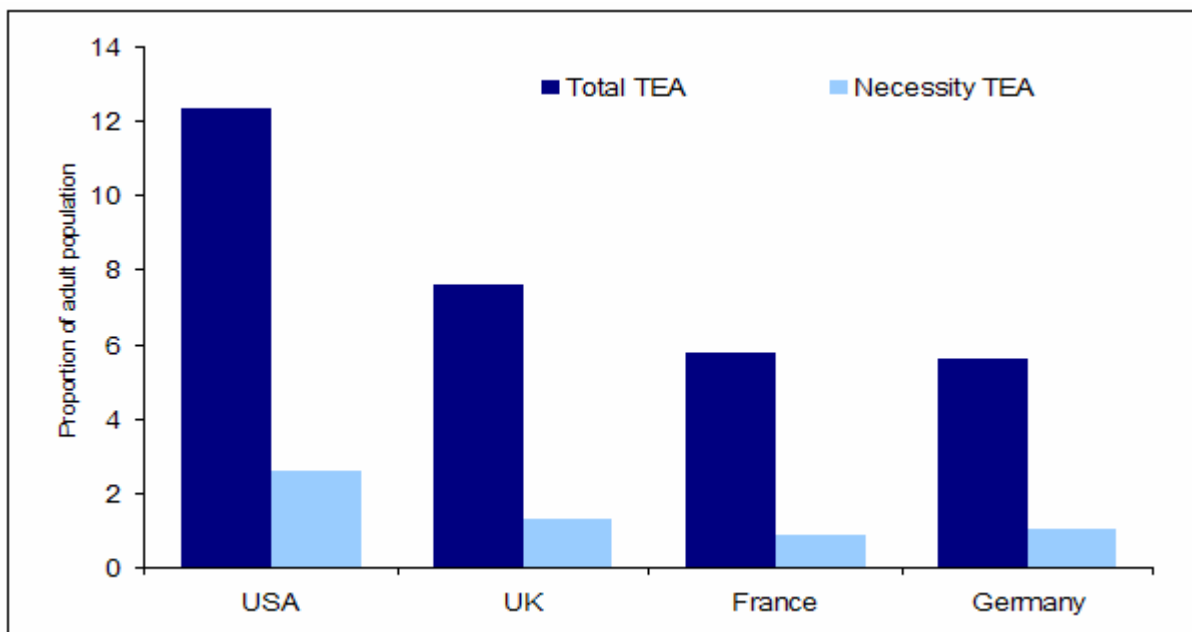
Figure 57: Distribution of Firm Growth



Source: NESTA (2010). Notes: Firms with ten or more employees.

The evidence shows that early-stage entrepreneurial activity driven by market opportunity is more prevalent in the UK.⁹³ Early-stage entrepreneurial activity can be split into opportunity (where entrepreneurs exploit the potential for new market creation) or necessity (there are no better alternatives for work). Data shows that only about 1 in 6 start-ups in the UK, France and Germany were driven by necessity in 2011, whilst in the US, it was slightly higher at about 1 in 5 – see Figure 58.

Figure 58: Necessity Entrepreneurship in USA, UK, France and Germany (2011)



Source: GEM UK Report (2011) Note: TEA (Total Entrepreneurial Activity) – proportion of working age population involved in starting or running a business (under 42 months old).

⁹³ GEM UK Report 2011.

Trade and investment barriers

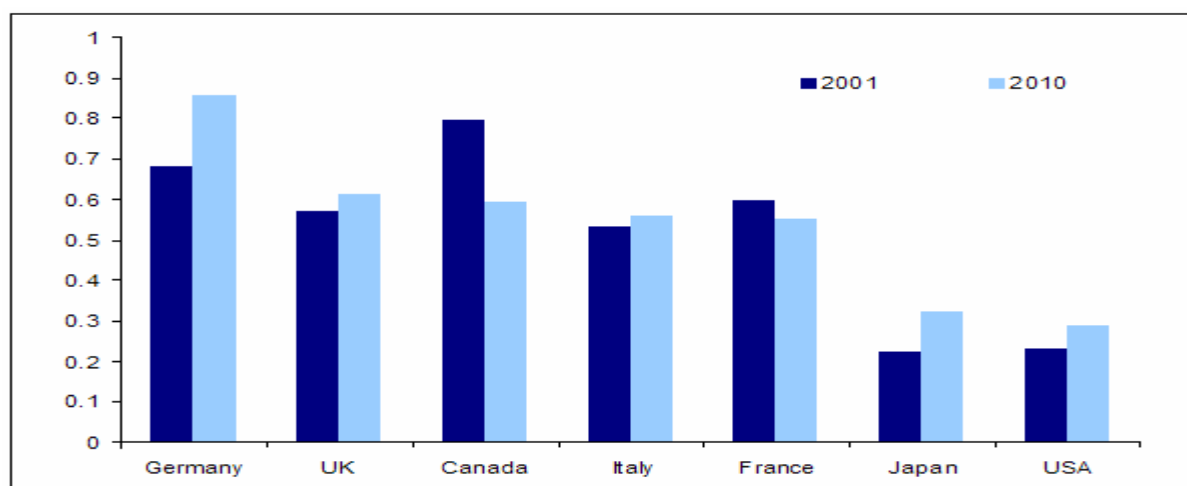
The UK has relatively low barriers to trade and investment. As a member of the European Union its import tariffs are set at the EU level. These, according to the overall trade restrictiveness index (OTRI) produced by the World Bank,⁹⁴ are among the lowest in the world. As for foreign direct investment (FDI), the UK appears to be less restrictive than the OECD average, but lags behind many EU countries including Germany, France and Italy (OECD, 2010b). The detailed analysis of the indicator shows that the main barriers to investment are associated with equity and operational restrictions.⁹⁵ Analysis by sector suggests that the highest barriers to FDI in the UK are in fishing, transport and media.

Trade and investment flows

Trade and investment data indicates that the UK is closely integrated with the global economy. The total stock of FDI in the UK in relation to GDP is the highest among G7 countries. Furthermore, UK companies have over £1 trillion of investments abroad which, when accounting for the size of the economy, is more than for any other major economy.

The UK is also open to trade in goods and services. UK total trade as a share of GDP increased from 57% in 2001 to 61% in 2010.⁹⁶ This is less than for small open economies such as Belgium or Ireland, but more than for other G7 countries with exception of Germany, which has the largest trade to GDP ratio among large developed economies.

Figure 59: Total Trade as Percentage of GDP – G7 countries



Source: UNCTAD

⁹⁴ The data on the World Bank overall trade restrictiveness index can be found at: <http://econ.worldbank.org/WBSITE/EXTERNAL/EXTDEC/EXTRESEARCH/0,,contentMDK:22574446~pagePK:64214825~piPK:64214943~theSitePK:469382,00.html>

⁹⁵ Equity restrictions measure refers to restrictions on foreign ownership; operational restrictions refer to restrictions which could affect the potential operations of foreign investors e.g. establishment of branches, acquisition of land or capital repatriation.

⁹⁶ BIS calculations based on UNCTAD trade data.

Labour Market

Why is the labour market important?

The competitiveness of an economy crucially depends on the quality and performance of its labour market. A well functioning labour market enables rapid and effective allocation of workers to their most efficient use at a minimum social and economic cost.

How does the UK perform?

Business Surveys Indicators

The survey data in the WEF Global Competitiveness Report indicates that UK employment regulation is perceived as significantly better than in other major European economies, and on a par with the USA and Canada. The assessment presented in the IMD World Competitiveness Yearbook is slightly less favourable. Compared to the G7, the UK ranks 4th in terms of the impacts of labour regulations on business activity, 5th for working motivation and attracting and retaining talent, and 6th in terms of the impacts of unemployment regulations on incentives to look for work. On a positive note, the UK immigration laws are seen as less restrictive than in the USA and Germany, despite the fact that the UK's score has deteriorated over the last couple of years.

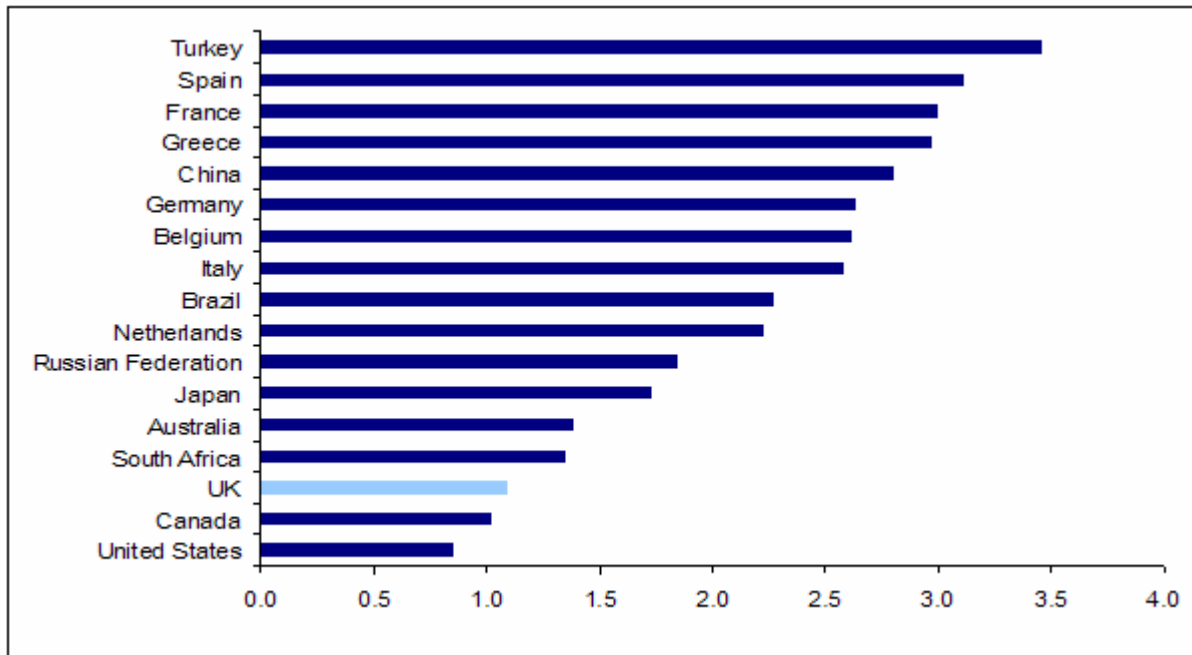
OECD Employment Protection Indicator

The OECD's employment protection indicator assesses the strictness of employment protection. It covers three main areas: protection of permanent workers, regulation on temporary forms of employment and specific requirements for collective dismissal. On this basis, the UK has one of the most lightly regulated labour markets compared to other developed countries, with only the USA and Canada having less overall regulation (Figure 60).

Labour market outcomes

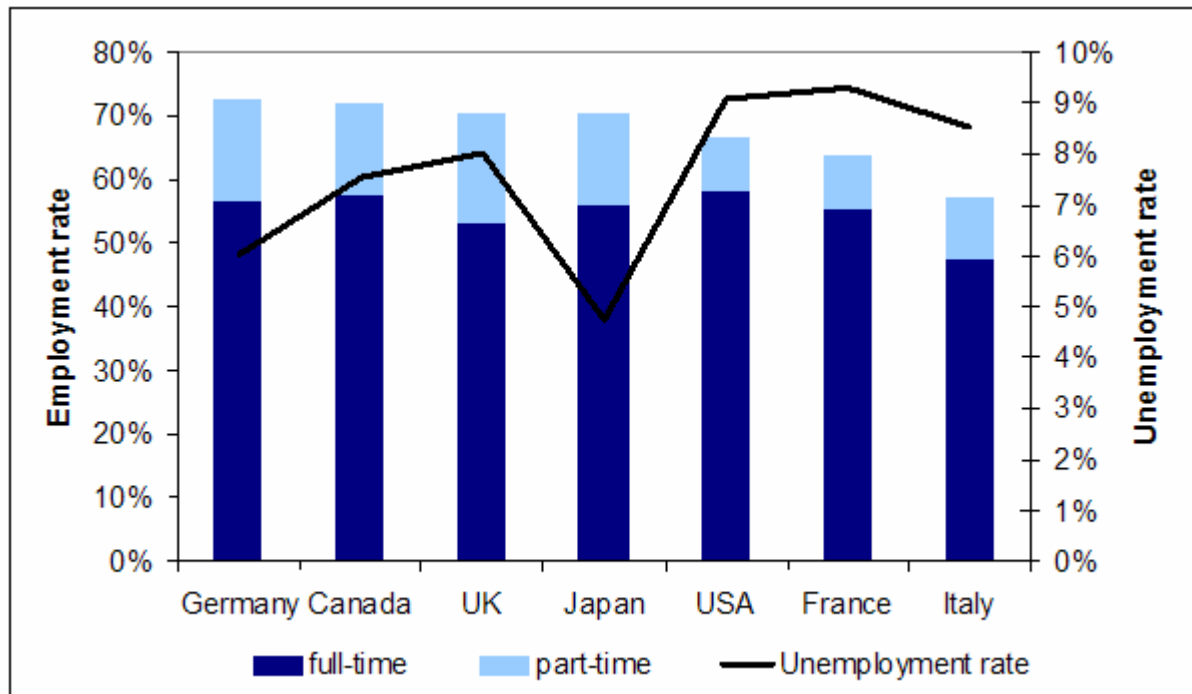
In terms of the labour market outcomes, the UK performs strongly compared to other OECD countries. Employment rates are typically amongst the highest in the world and have proved resilient during and since the recession, despite the large fall in output. Labour force participation (the proportion of the working age population who are either in work, or actively seeking work) is also relatively high compared to other advanced economies (Figure 61). This results from the UK's relatively light and even employment regulation and dynamic labour market, which offers a wide and diverse range of employment opportunities, not just in terms of jobs, but also the types and patterns of work.

Figure 60: OECD - Employment Protection Indicator (2008)



Source: OECD

Figure 61: Labour Market Statistics – G7 countries (2011)



Source: OECD

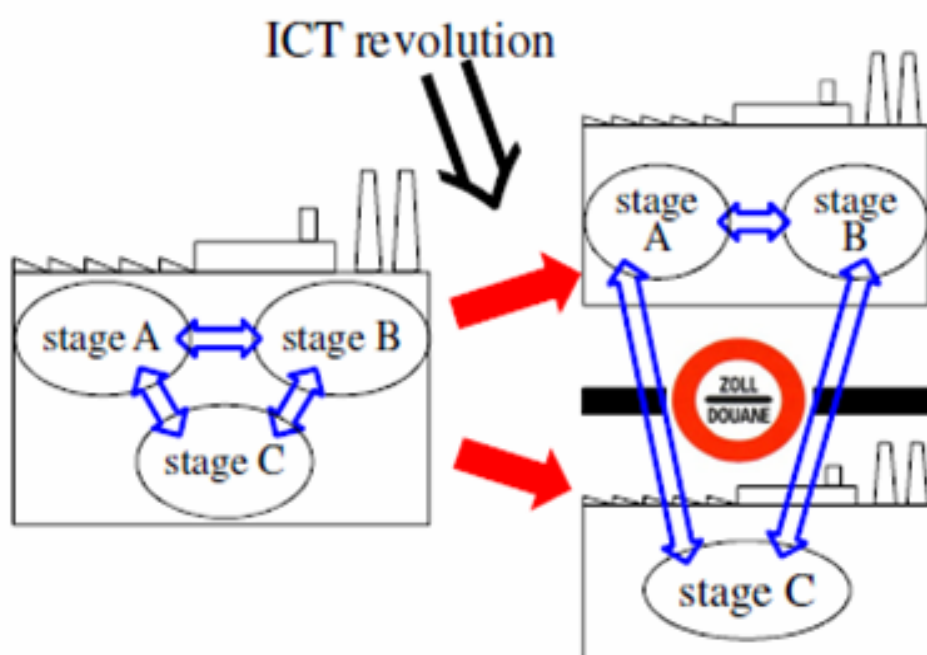
Wider issues

International fragmentation of the production process and regional supply chains

The emergence of intra-industry trade (trade within industries) and international fragmentation of the production process has important implications for the patterns of competitiveness. Trade data suggests that the process of producing goods, from raw materials to finished products has increasingly been 'sliced' and a growing share of world trade accounts for intermediate products, which are then re-exported as parts of the final products.

Baldwin (2012) describes this transformation as '2nd unbundling'. According to him technological advances, especially in information and communications technologies, made it possible to offshore and disperse many activities involved in the production of manufacturing goods .

Figure 62: Schematic Illustration of the 2nd Unbundling



Source: Baldwin, R. et al (2012)

As a result, the competitiveness of the final products depends on the competitiveness of the domestic stages of production as well as the competitiveness of the imported stages. According to the WIOD trade database, which combines national input-output tables with trade statistics,⁹⁷ the share of value added created abroad accounted for 17.1 % of total UK exports in 2009 (24.6% of manufacturing exports). This is a

⁹⁷ More information about the World Input Output Database can be found at: <http://www.wiod.org/>.

smaller share compared to France (27.8%) and Germany (26.2%) but it is certainly not negligible and illustrates the importance of openness of imports in making UK exports more competitive.⁹⁸

The straightforward implication of this is that the drivers of competitiveness are not bound within the borders of a country – there are substantial advantages of being part of a wider region with many competitive suppliers. In case of the UK, this means that the competitiveness of firms located in Europe, where most of the UK's imports originate, has direct impact on the competitiveness of the UK economy.⁹⁹

Agglomeration benefits

Successful clusters of activity, or 'agglomerations' such as silicon valley or the city of London, are an important aspect of a country's competitiveness. A wide breadth of economic literature suggests that there are strong productivity advantages of agglomerations. These can be realised through knowledge externalities and spillovers, labour market pooling and better availability of intermediate inputs.

Globalisation and the shift in the UK's comparative advantage towards more innovative activity have increased the importance of successful agglomerations and city regions for the UK's economic performance. According to Graham (2007), external economies of scale from localisation and urbanisation economies are much bigger in services. He estimates that elasticities of productivity with respect to agglomerations are 0.24 for banking, finance and insurance and 0.22 both for business services and for transport, storage and communications. This compares to only 0.07 for manufacturing and construction sectors.

London is a prime example of a successful agglomeration. The UK capital is one of the biggest and most dynamic urban areas in the world. According to the international ranking of city competitiveness produced by the Economist Intelligence Unit (2012), London is the second most attractive city in the world. It ranks higher than the other major European cities including Paris (4th), Frankfurt (11th) and Brussels (34th), with only New York receiving a higher overall score.

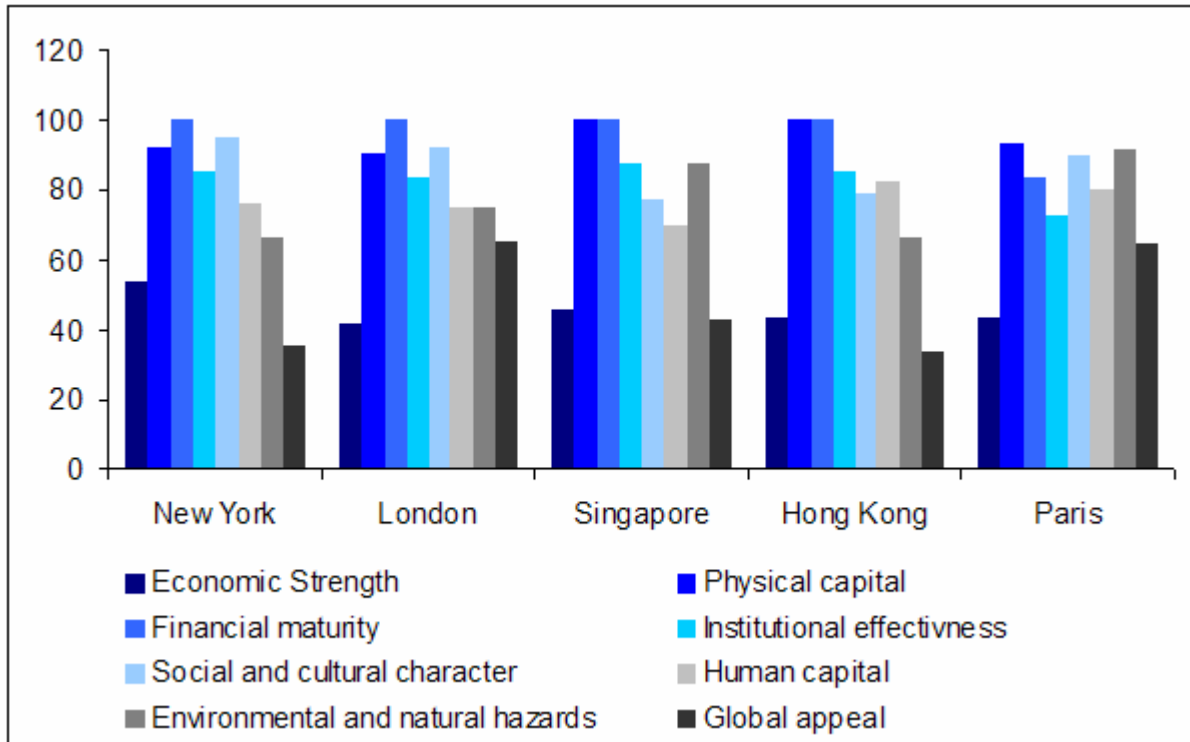
A detailed breakdown of the overall ranking suggests that London's strengths include financial maturity (1st), social and cultural character (5th) and global appeal (1st). It ranks relatively lower in terms of economic strength (29th), physical capital (26th) and environment and natural hazards (32nd).¹⁰⁰

⁹⁸ Stehrer, R. et al (2012).

⁹⁹ Baldwin, R. et al (2012).

¹⁰⁰ Birmingham - the only other UK city included in the ranking – is placed at the 37th position, which puts it above some major world agglomerations including Beijing (39th), Barcelona (41st) and Rome (50th).

Figure 63: City Competitiveness Index Scores by Category (Top 5 Cities)



Source: The Economist Intelligence Unit 2012

Other successful city regions and agglomerations in the UK, which developed new high-values sectors and are increasingly integrated with the global economy, include Oxfordshire and Berkshire high-tech clusters, Birmingham, Manchester or Edinburgh.

However, UK cities and their economic performance are not without problems. The analysis conducted by Leunig and Overman (2008) suggests that many successful cities in the UK are too small. According to the study, the planning system is constraining city sizes below its optimal level, which has a negative impact on wages and the standard of living. Another important issue is related to the quality of the transport infrastructure. Both theoretical and empirical literature suggests that agglomeration benefits may be foregone if transport infrastructure is inadequate. Crafts (2012) argues that improving transport infrastructure in the UK would strengthen the resilience of UK cities in the face of international competition. In a different study, Rice et al (2006) estimated that a reduction in all journey times in the UK by 10% would lead to a productivity increase of 1.12%.

Annex

Technical Challenges in the Measurement of Productivity

Although in principle productivity is the most appropriate metric to benchmark competitiveness across countries, it does suffer from a number of significant measurement issues which need to be borne in mind when interpreting the results. These include:

- Limitations of labour productivity versus total factor productivity
- Sector composition / aggregation issues
- Choice of deflators and exchange rates.

Starting with the **distinction between labour productivity and total factor productivity (TFP)** – Labour productivity captures the amount of output produced per unit of labour input. As such it is affected by a number of factors, the most immediate of which is labour quality. In general we would expect a more skilled worker to have a higher productivity than a less skilled one, for a given number of hours worked.

Alongside this, the capital and technology workers have access to also affects their productivity – particularly where it is complementary with skilled labour. For example, a highly automated factory might only require a handful of workers. This distinction is important because the firms' investment in that capital and technology is also a cost or input into the production process. Thus, by focusing solely on workers as the primary input, labour productivity can give a distorted picture of how efficient firms are at production overall.

By contrast, Total Factor Productivity does attempt to control for these differences. Typically TFP is estimated as the residual of output which cannot be explained by the quantities of other inputs. For example, in a simple growth accounting framework, Output Y , is taken as a combination of Capital K , Labour L and Total Factor Productivity A .

$$Y = AK^{\alpha}L^{\beta}$$

In this context A represents the combination of production technology and efficiency, which cannot be captured by other measurable inputs. More complex formulations attempt to distinguish between different types of capital (e.g. tangible versus intangible investment) and account for differences in the quality of labour (e.g. skills or 'human capital').

In the above equation, Total Factor Productivity cannot be measured directly, only estimated as a residual once other values have been taken into account. As such the exact formulation of the equation used and the econometric techniques applied to estimate it can have a significant impact on the final results.¹⁰¹

A second issue is that **sectors describe a broad array of activities which are not strictly comparable** either within themselves or across countries. For example, the Real Estate sector in Germany is very different to that of the UK due to the greater prevalence of renting as opposed to home ownership. Although these activities are often carried out by the same firms, they are very different.

Related to this, Inklaar and Timmer (2008) argue that the degree of vertical integration within sectors can bias certain types of productivity measures.¹⁰² In this case, countries with a more vertically integrated approach to production may appear to have higher Total Factor Productivity than economies which make greater use of outsourcing – even if their final output is the same.¹⁰³

Thirdly, estimating productivity at the sector level across countries necessarily requires making **assumptions about the appropriate deflators and exchange rates** to use to convert figures for nominal output into real values in a common currency.

Although readily available, market exchange rates are not an appropriate conversion factor as they can deviate from relative prices for extended periods of time, and are strongly influenced by short run capital movements unconnected to productivity or competitiveness. Indeed in the case of non-traded goods and services there is no reason to suspect that exchange rates accurately reflect relative prices at all.

In principle, the use of Purchasing Power Parities (PPP), which calculates the relative cost of the same bundle of goods and services in different countries circumvents this problem. However, deriving sector specific PPPs is highly challenging as explicit price data are not always available. Timmer, Ypma and van Ark (2007) show that sector PPPs can vary significantly depending on the estimation method used, and argue that no single approach is ideal for all sectors.

This problem is compounded by the issue of how to convert nominal valued added into real values. Best practice when calculating real value added would be to separately deflate the prices of both final output and the intermediate inputs used to produce it (Double Deflation). However this is highly data intensive and introduces an additional source of potential error into the calculations, which leads some studies to only deflate final output (Single Deflation).

¹⁰¹ A common critique is that Total Factor Productivity should be more properly thought of as a measure of our ignorance rather than as a meaningful measure of efficiency and technology.

¹⁰² Modern production methods typically involve a large number of intermediate inputs. A vertically integrated firm produces more of these internally, rather than purchasing them from other suppliers.

¹⁰³ This arises because in the second country the use of intermediate inputs appears to be higher as it will be explicitly captured by transactions in firms' supply chains. By contrast the movements of intermediate inputs within a vertically integrated firm cannot be identified.

The drawback to the single deflator approach is that it can overestimate valued added for countries or sectors which have access to cheaper intermediate inputs than their international competitors for the same level of final output.¹⁰⁴

Limitations of Export Data as a Measure of Competitiveness

Export shares and comparative advantage are popular tools for analysing international competitiveness as they have the advantage of being calculated from readily available data. However, these measures are subject to a number of limitations, including:

- Aggregation effects
- The basis used for comparison
- Exchange rate effects
- Trade distortions.

These challenges are discussed below with more detail.¹⁰⁵

Firstly, the **level of aggregation in the data** has important implications for the results. Trade data classifications have developed over time, and as a result reflect historical patterns of trade as much as they do current trade patterns. As a result the coverage of different trade codes in terms of their share of world trade is far from equal.

This can be seen in the coverage of certain categories, for example in the Harmonised System there are twenty four 2-digit codes associated with basic commodities such as animal, vegetable and food products, which account for just 6% of global exports. By contrast, manufacturing of machinery and equipment, which accounts for a third of global exports is covered by only nine 2-digit codes (one of which on its own is over 10% of global exports).

The implication of this is that for a given level of aggregation certain trade classifications are far more detailed than others, and as a result we would expect to see much greater variation in countries' relative export shares in such categories. Conversely, for more broadly defined categories we would expect to see much less variation in relative export shares. Thus a given measure for trade categories with

¹⁰⁴ In this case the price gain from lower intermediate input prices is incorrectly reflected as real valued added.

¹⁰⁵ See also a study by OECD '*Limitations of Export Data as a Measure of Competitiveness*' <http://www.oecd.org/trade/valueadded>

widely different degrees of coverage may not be strictly comparable in quantitative terms.¹⁰⁶

Secondly, most trade based measures of competitiveness are relative in nature and are as a result **influenced by the basis used for comparison**. For example, due to data limitations it is common practice to calculate Revealed Comparative Advantage (RCA) relative to a small group of countries, or only with regard to goods exports as opposed to both goods and services.

Such differences can have a profound impact on the results as they change the denominator in the calculation. By way of illustration, studies which evaluate UK revealed comparative advantage only with regard to goods typically find that precision instruments appear to be an area of relative UK advantage. However when this calculation is performed relative to total exports (goods plus services) this result largely disappears.

Thirdly, **trade data are affected by fluctuations in exchange rates**. In principle, over the long run exchange rates should move to reflect differences in relative prices (and hence competitiveness) across countries. In practice, exchange rates are influenced by a host of factors, such as short run international capital movements, which are unconnected to competitiveness.

Exchange rate fluctuations from year to year can be substantial. Looking at movements in the Dollar-Sterling exchange rate since 1975, the average year on year change was +/- 7.3%, with one in three years having a movement of 10% or more.¹⁰⁷ As a result RCA values can vary substantially from year to year on the basis of these changes alone.¹⁰⁸ Fourthly, **trade barriers and industrial support policies distort the pattern of trade**. A number of countries directly or indirectly support certain export sectors, this can be through subsidies or erecting trade barriers to foreign competition. These serve to shift countries' exports away from their underlying competitiveness and hence distort trade based measures.

¹⁰⁶ That said, comparing an RCA for two different countries for the same trade code would provide a ranking of their relative export competitiveness for that particular range of goods or services, for example.

¹⁰⁷ BIS calculations using Bank of England data. Figures are percentage change year on year in the average exchange rates for each year.

¹⁰⁸ In practice sophisticated exporters can manage this risk through currency hedging absorbing the costs / benefits of currency movements elsewhere in their business.

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