ECONOMICS

BIS | Department for Business Innovation & Skills

BIS ECONOMICS PAPER NO. 9

Economic Growth

NOVEMBER 2010

BIS | Department for Business Innovation & Skills

BIS ECONOMICS PAPER NO. 9

Economic Growth

NOVEMBER 2010

Contents

Contents ..... **i**

List of Tables and Figures ..... **iii**

Acknowledgements ..... **v**

Foreword ..... **vi**

The Framework for Economic Growth **1**

Introduction 1

Unbalanced growth: UK growth in perspective 2

The Context for Future Growth – Sectoral Opportunities and Challenges 12

Changing Global Demand 15

The Government's approach - Four Pillars for Growth 29

Providing the Stability Business Needs **37**

Making Markets More Dynamic **41**

Promoting Open and Dynamic Markets 41

FDI and Growth 44

Better Regulation 48

Corporate Governance 61

Effective Government that Supports Investment and Growth **66**

Competitive Tax Environment 66

Access to Finance 68

Infrastructure 76

Science and Innovation 80

Enterprise 92

Supporting Individuals to Fulfil their Potential **98**

Benefits System and Active Labour Market Policies on Employment.....99

Labour Market Regulation.....103

Education and Skills.....106

Migration.....115

References.....119

BIS Economics Papers.....135

List of Tables and Figures

Tables

Table 1: Key Economic Variables Compared 3
Table 2: Average Annual Contributions to UK GDP Growth Measured in Constant Prices 4
Table 3: Forecast Global Supply of Skilled and Unskilled Workers (millions) 13
Table 4: Growth in Global Demand 19
Table 5: Relative Productivity in Selected Sectors for the UK versus France, Germany and the US (UK = 100, 2004) 24
Table 6: UK R&D Intensity as a Percentage of Value Added by Sector 27
Table 7: UK International Ranking 55
Table 8: Private and Social Rates of Return to R&D 84
Table 9: Percentage of Firms Reporting Significant Barriers to Export Markets, by Growth Objective and Innovation Status 97
Table 10: World Bank Doing Business – Ease of Employing Workers in the UK 105
Table 11: Total Immigration, Emigration and Net Migration by Citizenship, 2009 (000s) 117
Table 12: Qualifications Held by Those in Employment and Nationality 117
Table 13: Gross Value Added (GVA), non-EU Migrant Employment Shares and Estimated GVA per Person Employed by Fastest Growing Sectors, 2008 118

Figures

Figure 1: Business Investment as Share of GDP in Current Prices 6
Figure 2: Change in the Share of UK Employment and GVA (1998-2007) 9
Figure 3: Sectoral Contribution to Real GVA Growth in UK and EU Economies (2000 – 2007) 10
Figure 4: Natural Resource and Product use 12
Figure 5: Change in Expenditure Following a 10% Increase in Income in High Income Economies 16
Figure 6: The Environmental Kuznets Curve 17
Figure 7: Change in Demographic Profile 18
Figure 8: Change in Expenditure Following a 10% Increase in Income in Lower Income Economies 20
Figure 9: UK and Emerging Market Revealed Comparative Advantage, Selected Sectors (2008) 22
Figure 10: UK and G7 Revealed Comparative Advantage, Selected Sectors (2008) 23
Figure 11: Distribution of Graduates from Higher and Further Education by Subject 25
Figure 12: UK Revealed Technological Advantage (2002-2006) 28
Figure 13: Contribution to GVA growth (1997-2007) 31
Figure 14: International Comparisons of Productivity (UK = 100) 32
Figure 15: Competition Regime Performance Index 47
Figure 16: Main Barriers to Business Success 53
Figure 17: Cross Country Patterns of Regulatory Management Strategies in 2005 56
Figure 18: Changing Pattern of UK Share Ownership 64
Figure 19: Statutory Corporate Tax Rates 67

Figure 20: New Financing for Corporates 70
Figure 21: International Comparison of Early Stage Venture Capital Investments 72
Figure 22: Transport Infrastructure Investment as a % of GDP 77
Figure 23: 2010/11 Global Competitiveness Index – Assessment of General Infrastructure Quality in G8 countries 79
Figure 24: Simple Linear Model of Science and Innovation 81
Figure 25: The Innovation Process and Publicly Funded Research 82
Figure 26: R&D Intensity in a Selection of Countries 86
Figure 27: UK Investment – Tangibles and Intangibles (1990-2008) 89
Figure 28: Technology Balance of Payments 90
Figure 29: UK Total Early Stage Entrepreneurial activity – Proportion of the Working-age Population Involved in Starting or Running a New Business 92
Figure 30: International Early Stage Entrepreneurial Activity 93
Figure 31: The Co-movement Between Growth in GDP and Employment Since the 1970s in UK 98
Figure 32: Average Annual Percentage Changes in Employment and GDP 2008-2009 99
Figure 33: The Proportion of the Working Age Population Claiming Out of Work Benefits 100
Figure 34: Strictness of Employment Regulation 2008 104
Figure 35: Links Between Individual and Parental Earnings Across OECD Countries 108
Figure 36: Participation in Higher Education at 19 by Prior Attainment and Ethnicity 109
Figure 37: Percentage of Population Aged 25-64 with Below Upper Secondary, Upper Secondary and Tertiary Education (2008) 111
Figure 38: HE Participation Rates by Socio-Economic Class 114

Boxes

Box 1: Growth and Well-being 2
Box 2: How the recession has impacted upon growth prospects 7
Box 3: The role of high growth firms in driving growth 33
Box 4: Empirical evidence on the overall impact of environmental regulation on growth 54
Box 5: Case study: Using a mix of instruments to tackle waste 60
Box 6: Green Investment Bank 75
Box 7: Innovation and Intangible Investment 88
Box 8: Equity and growth 107

Acknowledgements

This paper was developed by the Economic and Policy Analysis team in BIS.

We are grateful for the contributions received from many colleagues across the Department for Business, Innovation and Skills and more widely within Government including: HMT, DWP, DfE, Defra, DECC, Home Office, GEO, UKTI, DfT,

Foreword

Returning the economy to a path of long term sustainable growth is a central theme of this Government. While the measures in June's emergency budget will contribute to building business confidence by putting the public finances on a sustainable footing, maximising long term growth requires a broader cross-government approach.

This paper, in conjunction with the sub-national analytical paper, sets out the evidence underpinning the Government's new approach to growth, including the four pillars for growth. It considers a wide range of policy areas which can impact on growth, assesses UK performance in these areas, and outlines some of the key policy challenges. I am particularly grateful for assistance from colleagues in other departments in developing this analysis.

As well as emphasising the continuing importance of areas such as skills, science and research and entrepreneurship on growth prospects, I believe this analysis also emphasises the important role policies in areas as diverse as planning, environmental policy, housing and pre-16 schooling can have in driving growth, along with the need for policy decisions in these areas to recognise their potential growth impacts.

In producing and making public this paper, the Government is demonstrating its continued commitment to both ensuring that policy making is underpinned by strong evidence and analysis, and that the process is as transparent as possible. In this spirit, we continue to welcome any comments you may have on the analysis set out in this paper.

Ken Warwick

Chief Economic Adviser and Director General Economics, BIS

The Framework for Economic Growth

Introduction

The restoration of economic growth has become paramount as the UK recovers from the longest and deepest recession of the post-war period, and government faces the challenge of reducing public debt.

Economic growth – the long term expansion of the potential of the economy to supply and consume goods and services – is fundamental to increasing social welfare, supporting both individuals' purchases of goods and services, and the provision of government services.[1]

Over the long term, growth can also lead to greater social inclusion and personal development, better use of economic, technological and environmental resources, and the increased sophistication of economic and social institutions. However, growth also has to be sustainable if the government is to deliver its long term economic, social and environmental objectives – which go beyond just increasing GDP, which is only one measure of wellbeing (See Box 1).

This chapter starts by considering recent UK growth performance. We note that whilst headline growth appears to have been respectable, it has also been unbalanced according to a range of both macroeconomic and microeconomic measures. Subsequent chapters review the importance of various policy areas in driving growth. Following the four pillars set out in the new growth framework, we examine the UK's recent performance in these areas and the policy challenges that it faces going forward.

The analysis paper for the Local Growth Paper reviews in more detail the role policies at a local level can play in influencing both local and therefore national growth prospects. A summary version of this paper can be found at http://www.berr.gov.uk/Policies/economics-statistics/economics.

1 Strictly speaking the statistical definition of growth relates to the increase in real per capita GDP or some other measure of aggregate income. However economists focus on the sustainable long run growth of GDP or 'potential output' in order to strip out short run fluctuations around the trend.

Box 1: Growth and Well-being

Economic growth in terms of GDP per head is the most commonly used measure of changes in living standards. This is because it has the advantage of being an objective, internationally accepted measure, with well established standards and frameworks for measurement – thus allowing for comparisons to be made across regions, countries and time.

However, as a measure of output or production, GDP is only a proxy for living standards and not designed to be a measure for welfare. Well-being depends on a range of dimensions which are not captured by GDP. The 2009 Stiglitz, Sen and Fitoussi report examined this issue in depth and made a number of recommendations for improving the way in which countries around the world measure economic performance and social progress. These recommendations were centred on three key areas:

- Improving existing measures of economic performance; by seeking to improve the measurement of changes in quality of goods and services and capturing the value of government services.

- Placing greater emphasis on measuring well being; by focusing on income and consumption measures rather than production, considering these in conjunction with information about wealth and giving more prominence to the distribution of income. In addition, more work is needed on improving measures of subjective well-being.

- Improving the measurement of sustainability; especially through the development of environmental stock indicators and indicators of proximity to dangerous levels of environmental damage.

The Government is committed to developing broader indicators of well-being. As highlighted in the June 2010 Budget, work is currently underway (led by the Office for National Statistics and the Cabinet Office) to review how the recommendations from the Stiglitz, Sen and Fitoussi report could be adopted by the UK and how they should affect the sustainability and well-being indicators collected by Defra.

Unbalanced growth: UK growth in perspective

Macroeconomic performance

At first sight, the recent performance of the UK economy appears respectable, both historically and internationally. As Table 1 shows, the UK saw average annual GDP growth of 2.3% between 1990 and 2008 – placing it third in the G7, behind only the US and Canada. The UK also made significant progress in closing the productivity gap with Germany, and narrowing the gaps with both France and the US.[2] This was particularly impressive given that the UK had a

2 See below for factor contributions to international productivity differences.

relatively low unemployment rate in the years before the recession; the unemployment rate between 1990 and 2008 averaged 6.6% per annum – behind only the US and Japan.[3]

Table 1: Key Economic Variables Compared

	UK	US	Japan	Germany	G7
Average annual GDP growth, %					
1990 - 2008	2.3	2.8	1.4	1.9	2.2
'90 - '99	2.2	3.2	1.5	2.3	2.5
'00 - '08	2.4	2.3	1.4	1.5	2.0
Average annual unemployment rate, %					
1990 – 2008	6.6	5.5	3.8	8.3	6.3
'90 - '99	8.0	5.8	3.1	7.8	6.5
'00 - '08	5.1	5.1	4.6	8.7	6.0
Average annual output per worker growth, %					
1992 - 2008	1.9	1.7	1.1	1.3	1.5
'92 - '99	2.4	2.2	0.5	2.0	1.9
'00 - '08	1.5	1.3	1.6	0.7	1.2

Source: ONS National Accounts, OECD National Accounts database, ONS International Comparisons of Productivity

However, growth had been increasingly driven by the accumulation of unsustainable levels of private sector debt and rising public sector debt, while the contributions of business investment and net trade both declined significantly. In particular:

Household consumption became an ever more important driver of domestic growth, growing faster than UK output in both 1990-99 and 1999-2008,[4] particularly during the second period. The average annual contribution of household consumption to overall growth increased by around 0.3 percentage points between the two periods.

3 OECD harmonised unemployment rate.
4 As measured by Gross Value Added, GVA.

Table 2: Average Annual Contributions to UK GDP Growth Measured in Constant Prices

	1990-2008	By Decade	
		1990-1999	2000-2008
GDP growth (%)	2.32	2.24	2.42
Main contributions (percentage points):			
Household consumption	1.54	1.43	1.67
Govt consumption & investment	0.49	0.33	0.66
Business Investment	0.31	0.33	0.30
Net Trade	-0.11	0.01	-0.23

Source: BIS calculations from ONS National Accounts statistics[5]

The growth in the importance of household consumption in the UK economy was reflected in a number of other key indicators. For example:

- The household saving ratio fell from an average 9.2% during 1990-99 to an average 4% during 2000-08, hitting a post-1959 low of 2% in 2008.

- Gross household debt rose from 66% of GDP in 1990-99 to 88% during 2000-08, peaking at more than 100% of GDP in 2007. The US and Italy saw similar large increases, but household indebtedness rose much more slowly in the rest of the G7, and actually fell in Japan.[6]

- Having been clear net lenders during 1990-99, UK households became net borrowers during 2000-08 (in contrast to households in France, German, Italy, and Japan, who were net lenders, although the pattern for households in the US was similar).[7]

UK growth was increasingly driven by government activity. Unlike household consumption, government activity (defined as government consumption and investment combined) grew more slowly than output during 1990-99,[8] with the former growing by 14%, while the latter grew by around 25%. However, government activity increased by 29% during 1999-08, while output rose 24%. By contrast in the US, France, Germany, and Japan, the growth in government activity trailed output growth during 1999-08.[9]

5 In the ONS chained volume statistics for GDP, there are small differences between the GDP totals and the sum of the main components for those years prior to the reference year. These differences are due to the chained volume methodology. The differences are larger between the Gross Fixed Capital Consumption totals and the sum of its components for the early and mid 1990s.
6 The earlier period only covers 1995-99 for France and Italy, and 1991-99 for Germany.
7 Data for Japan relates to 2000-07, not 2000-08, as in the case of the other countries.
8 As measured by Gross Value Added, GVA.
9 A comparison was not possible in the case of Italy, due to missing data.

One area where this greater government activity can be seen is in the labour market:

- Public sector employment grew by 11% to 5.8 million between 1999 and 2008, while private sector employment grew 8.4%.

- Excluding the impact of RBS and Lloyds in 2009 public sector employment grew by another 78,000 to just under 6 million, while private sector employment fell by around 700,000.[10]

The average annual contribution of government activity to UK GDP growth increased from 0.3 percentage points in 1990-99 to 0.7 percentage points in the later period, becoming the second most important driver of growth. The recession accelerated this trend, with government activity one of the two expenditure categories making a positive contribution to growth in 2009.

In contrast, business investment as a share of GDP has fallen.[11] Looking at average shares for 1990-99 and 2000-08 respectively, the share of total business investment in UK GDP in the first period was 11.7%, less than Japan (16.3%), but more than the US, Canada, and France.[12] Over the second period, however, business investment comprised, on average, just 10.5% cent of the UK economy, less than in the US, Canada, Japan, Germany, and France.[13] Japan was the only other G7 country to see business investment's share fall between 1990-99 and 2000-08.[14]

10 In December 2008 the ONS reclassified employees of RBS and Lloyds-TSB from the private to the public sector, leading to an overall increase in public sector employment of 292,000 and a fall in private sector employment of 900,000.

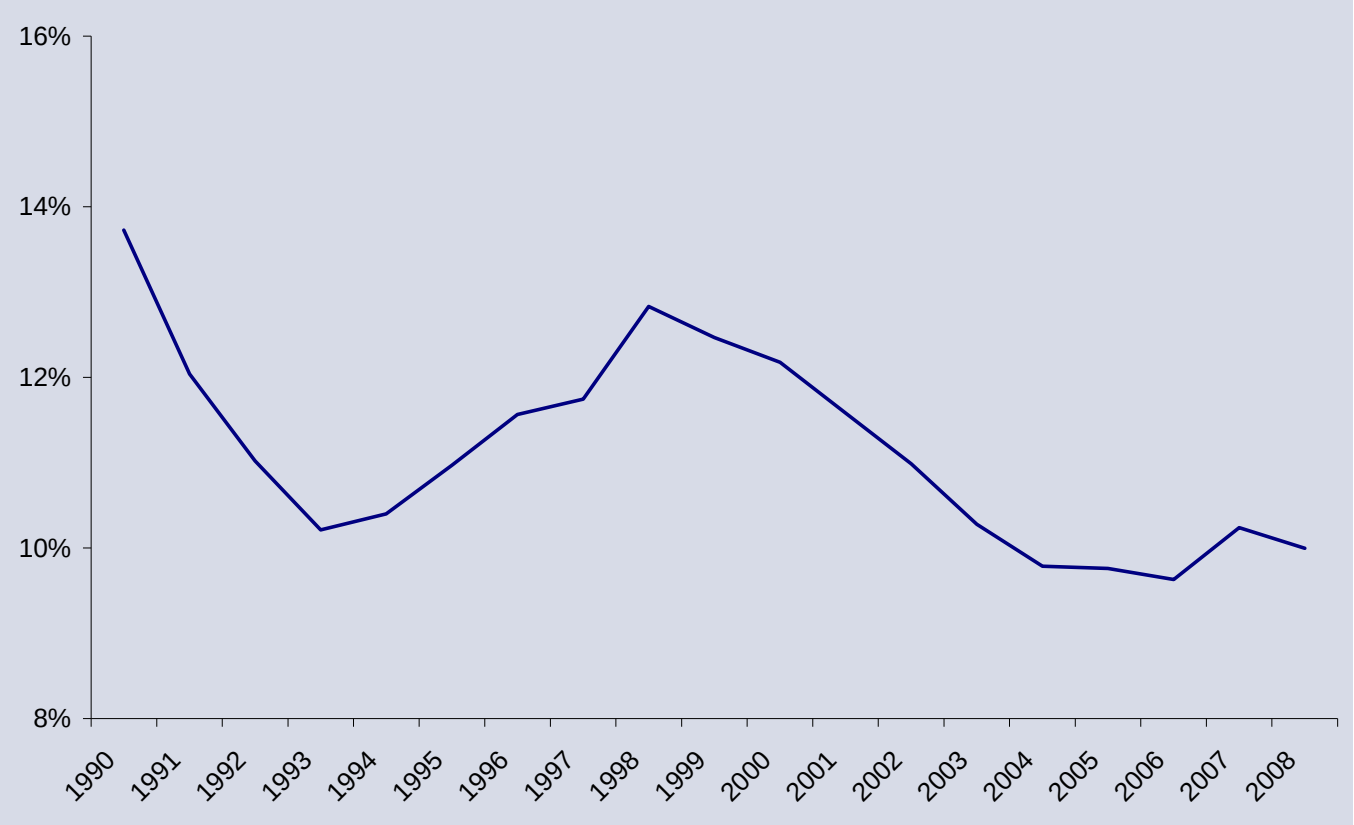
11 Business investment, on a National Accounts basis, covers business capital expenditure on vehicles, plant and machinery, new building work and leased assets. Some capital expenditure on intangible assets is included, such as on software, but most intangible investment is excluded.

12 German and Italian data unavailable. Business investment's average share in German GDP in the period 1991-99 was 12.6%, above its average share in the UK for the same period.

13 Italian data unavailable.

14 Comparisons were not possible in the cases of Germany (as data not available prior to 1991) and Italy.

Figure 1: Business Investment as Share of GDP in Current Prices



Source: BIS calculations from ONS National Accounts data

The relative contribution of business investment to GDP growth has declined in recent years. On average, one-seventh of annual GDP growth over 1990-99 was attributable to business investment; however during 2000-08 this fell to around one-eighth. As a result, while during the 1990s the contribution of business investment to GDP growth among G7 countries was greater only in the US and Canada, since 2000 the UK has ranked below the US, France, Canada, Germany and Japan; where business investment accounted for almost a third of GDP growth.

It should be noted that although the share of business investment in GDP and its contribution to domestic growth have both fallen, this says nothing about the *quality* of business investment. Nor does it fully capture other forms of investment such as intangible investment,[15] which have an important role to play in growth (and for which the evidence suggests that the UK compares more favourably to other countries).[16]

And net trade was more of a drag on domestic GDP growth. On average, net trade made a neutral contribution to annual GDP growth in 1990-99, but worsening net trade led to a

15 Intangible investment encompasses: computerised information (software and databases), innovation-related assets (including research and development in natural and social science, mineral exploration and design) and 'economic competences' such as brand-building, firm-provided training and management consulting.

16 Measuring intangible investment is difficult, but there is research to suggest that UK intangible investment has increased as a proportion of overall output (See Box 7) - rising from around 6% of output in the 1970s to 13% in 2004, in which time some £130.8bn was invested in intangibles. By 2004, spending on intangible investment was more than 1.2 times the spending on tangible investment, up from 0.4 times the spending on tangible investment back in 1970.

negative annual contribution on average during the 2000-08 period. The UK is not unique in this (Canada, France, and Italy all saw net trade drag down GDP growth more in 2000-08 than in 1990-99), but the US, Japan and Germany all saw net trade make a more positive contribution to growth in 2000-08 compared with 1990-99 (though still a negative contribution in the case of the US).

Box 2: How the recession has impacted upon growth prospects

The impact of the recession on the UK (and most other developed countries) is likely to persist for some time, and although recovery has begun, uncertainty remains about its strength and durability.

As discussed in the next chapter, evidence from past sharp economic downturns linked to banking crises in developed countries, show permanent losses of potential output and slow recovery of growth. This results from declines in the capital stock due to drastic and persistent falls in business investment, and in the stock of human capital due to the atrophy of skills resulting from lengthy unemployment. The recovery of investment tends to be slower than after 'normal' recessions because of stagnant credit growth.[17]

In the longer term, productivity can be strengthened by recession as a result of the reallocation of resources towards more productive uses, the stimulation of innovation and enterprise across a broad range of activities, and improvements in human capital through increased flows into further education and training.

Business investment fell over six successive quarters in this recession – a total of 26.5%, the largest cumulative fall since 1965. Although it will eventually recover, the pace of recovery will depend on growth in demand, uncertainty about future prospects, and the availability and cost of suitable sources of finance. Once demand recovers, physical investment may still not fully recover to pre-recession levels, as the cost of capital is likely to be higher than it was over the previous business cycle (when risk was under-priced), and because of the long term trend towards the increased importance of intangible investment.

Unemployment has risen less than expected for a range of reasons – low interest rates, low company indebtedness going into the recession, greater flexibility by employers and staff (e.g. shorter hours and wage restraint, and a large increase in part time and 'second-choice' employment). Some of these increased flexibility effects are likely to unwind in the recovery, slowing the rate of growth of employment. The recession has also seen increased demand for further and higher education, which should provide a larger pool of skilled workers during the recovery.

The impact of the downturn on innovation appears to have been more mixed, though all the data is not yet available. While Research and Development activities of large firms tends not to be affected,[18] there is evidence that tighter cash-flow has had an impact on R&D by small

17 IMF (2010a), OECD (2009a).

18 UK real business expenditure on R&D has been on a strong upward trend over the past 20 years, and does not appear to respond to changes in GDP growth.

Box 2: How the recession has impacted upon growth prospects

firms.[19] Broader types of innovation activity (e.g. improving customer service, developing ideas for new products, corporate restructuring) could actually increase as firms seek to develop the innovative new products and processes needed for survival and growth. There is some evidence that these wider innovation activities accelerate during recessions when the opportunity costs of doing so are lower.[20]

Deep recessions can have a lasting impact on enterprise. Overall, rates of business formation tend to fall in recessions, due to lower demand, and problems with late payment and finance. Recessions also encourage new firm formation as higher long term unemployment leads to increased transition from unemployment to self-employment. In the 1989-1992 recession the stock of SMEs fell from about 3.8m in 1990 to 3.5m in 1992, with slower trend growth over the 1990s relative to the 1980s.

There is limited data on skill acquisition over the business cycle; however it suggests that formal education such as college enrolments increases during recessions,[21] as does to some extent on and off-the-job training.[22] Skills shortages can make a recession deeper and longer, e.g. over the 1970s and 1980s, skill shortages are thought to have slowed down recovery by pushing up wages.[23]

The impact of recession on competition is not clear, because it is difficult to measure and because there are forces working in opposite directions – weaker demand increases competition, but firm exit (e.g. from closures) reduces it. Overall, this 'churn' does not appear to vary greatly with the business cycle, although this result varies by sector. In principle both short and long term impacts on competition are possible, for example if regulation is less stringent when firms are struggling (short term), or bank merger policy is relaxed to manage systemic risks (long term).

Microeconomic performance

Microeconomic performance, in terms of the UK's strengths and weaknesses in policy areas such as skills, innovation, enterprise and access to finance are discussed in more detail in later chapters.

For example, we present evidence that the UK has a relatively strong performance on higher education even though other countries continue to make ambitious investments at this level. The position for intermediate skills however is weaker and a relatively high proportion of working age individuals in the UK have below upper secondary levels of qualifications.

19 Results for other countries are mixed. There is evidence both for and against and against the pro-cyclicality of R&D investment e.g. Saint Paul (1993), and that cyclicality varies by type of R&D, e.g. Guellec and Loannides (1997).
20 The 1930s saw the fastest efficiency improvements in America's history amid large-scale restructuring, Field (2003).
21 Dellas and Sakellaris (1996); DeJong and Ingram (2001), Clark (2002).
22 Sepulveda (2004) found that it had a standard deviation more than ten times that of output.
23 Blake et al (2000).

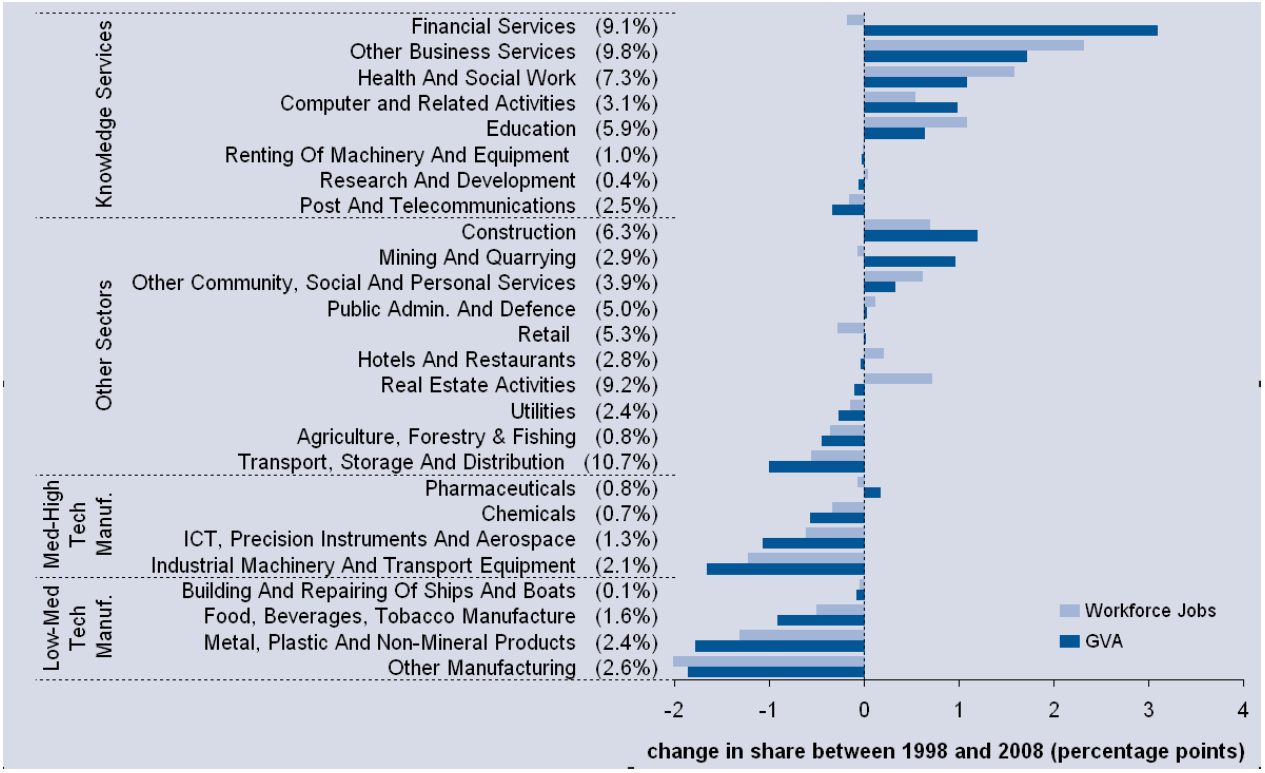
Regarding innovation, we see that the UK has a strong reputation for world class research, ranking second only to the US in terms of most influential publications. However, we are below average in terms of measures such as R&D intensity and the extent to which we commercialise our discoveries.

In terms of entrepreneurial activity, the UK currently outperforms several G7 countries including Germany and France, but we still trail the US and many other international competitors indicating there is scope for improvement.

Sectoral performance

A similar story can be observed at a sectoral level. Figure 2 shows the broad-based shift in the structure of the UK economy from manufacturing to knowledge based services.

Figure 2: Change in the Share of UK Employment and GVA (1998-2007)



Source: ONS Blue Book

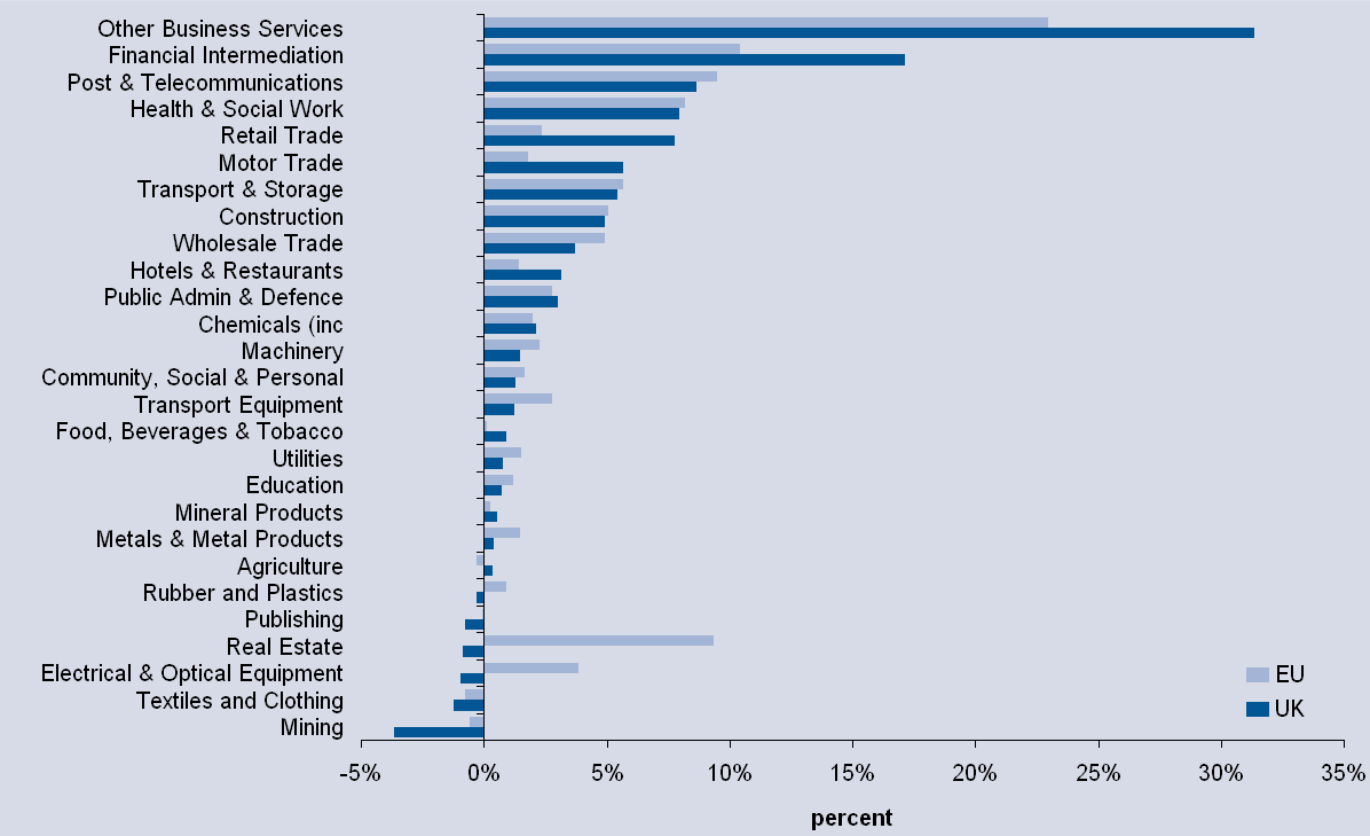
As we discuss below, the rapid pace of globalisation and technological progress over the last few decades has been a major driver behind these changes. In particular, increased low-wage competition alongside technology driven improvements in productivity (both of which have been more concentrated in manufacturing), have led to continuing falls in global prices of manufactured goods relative to services, driving down their share of GDP.[24]

While the shift from manufacturing into services has been common to most advanced economies, as Figure 3 below illustrates, the UK stands out in having a disproportionately large

24 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.

contribution to output growth in recent years coming from the Financial and Business Services sectors.

Figure 3: Sectoral Contribution to Real GVA Growth in UK and EU Economies (2000 – 2007)



Source: EU KLEMS Database, EU Countries: AUT, BEL, DNK, ESP, FIN, FRA, GER, ITA, NLD & UK.
Note: Figures calculated as share of growth in real GVA which can be attributed to each sector based on growth in GVA (Volumes) by sector

Regional balance

The question of regional balance is covered in detail in the analysis for the Local Growth Paper. But the broad picture is again one of unbalanced growth, with London and its surrounding regions growing on average over half a percentage point quicker than the rest of England since 1989,[25] a continuation of a forty year trend. As a consequence, workers and firms earn 46% more in London and the surrounding regions than the rest of England.[26]

Environmental balance

It is also important that growth is environmentally balanced and sustainable. The environment plays an important role in the economy, as a direct input into production and through the many services it provides.

25 ONS Regional Accounts.
26 BIS calculations from ONS Regional Accounts. These differences in headline earnings do not reflect possible changes in regional prices which would impact upon real incomes.

Environmental resources such as minerals and fossil fuels directly facilitate the production of goods and services. A wide number of economic sectors depend on natural resources. Healthy ecosystems and biodiversity are also critical for primary sectors such as agriculture, forestry and fisheries. However, natural capital also provides other services that enable economic activity, such as sequestering carbon, filtering air and water pollution, enabling soil formation and protecting against flood risk.

A 'green economy' is defined as one where economic value and growth is generated while managing all natural assets sustainably. With many key natural resources and ecosystems services scarce or under pressure, achieving sustained economic growth will require absolute decoupling of the production of goods and services from their environmental impacts.[27]

Overall, the empirical evidence suggests that the UK is achieving absolute decoupling for many air pollutants and carbon emissions.

Total UK emissions of the basket of six greenhouse gases covered by the Kyoto Protocol have fallen by 22% from 1990 to 2008 (including allowance for EU ETS); driven predominantly by a 28.1% reduction in emissions from business and industrial processing. In contrast, emissions from transport, which accounted for nearly a quarter of total UK emissions in 2008, have risen by 3.8% between 1990 and 2008. This trend has started to reverse in the recent years with a 3.6% fall in emissions from transport between 2005 and 2008.[28]

Given that for much of the period 1990-2008 the UK has experienced strong economic growth, it can be argued that there have been significant improvements in emissions intensity across the economy. In total, emissions per unit of output in 2008 were 47.0% below the level in 1990. However, it should be noted that this data does not take into account emissions related to trade and the issue of carbon leakage.

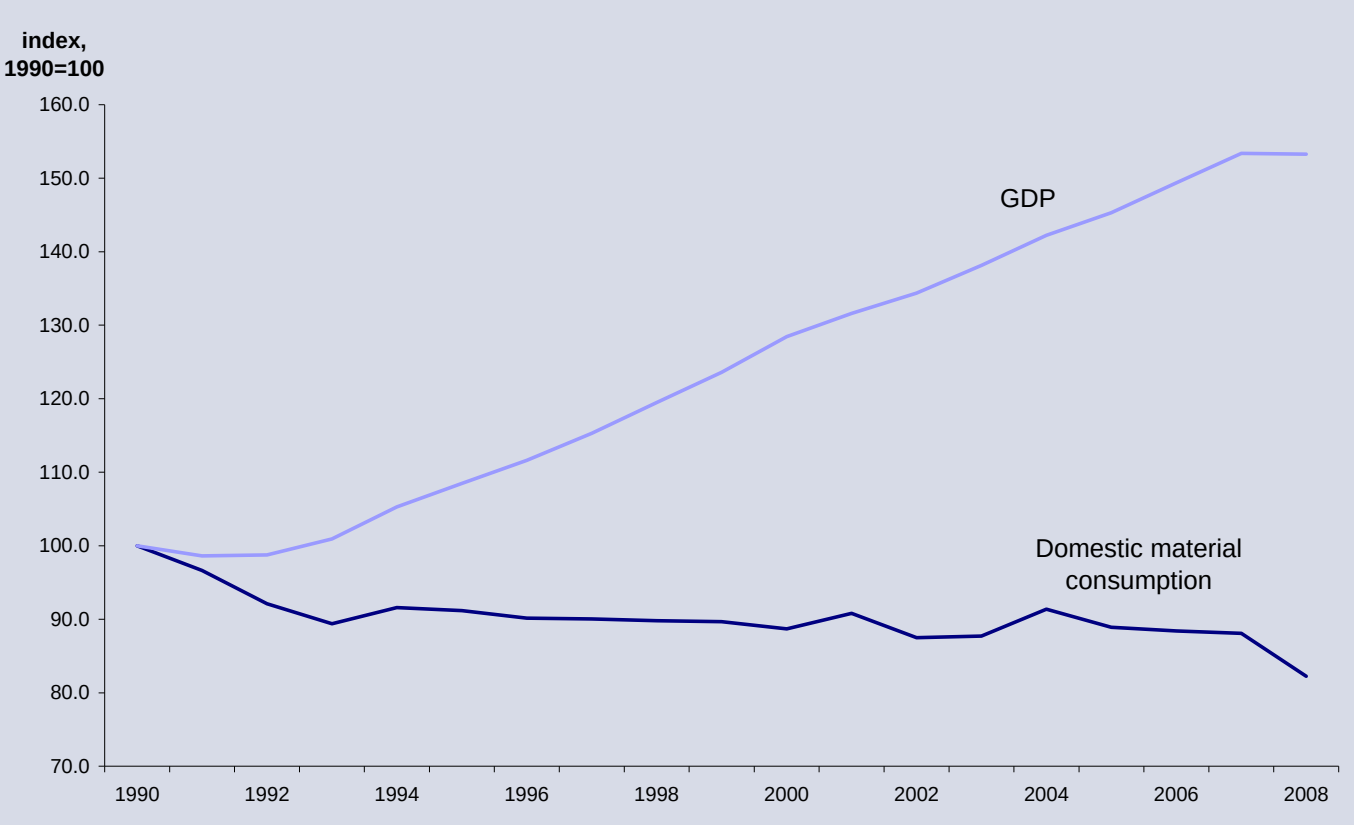
Estimates of material flows also suggest that UK material productivity has increased.[29] Between 2007 and 2008, the quantity of natural resources used by the UK economy, known as domestic material consumption, fell by 67 million tonnes (9.9%) to 613 million tonnes. This is the largest fall since records began in 1970. If follows 10 years where resource use has remained broadly unchanged. This means that, with rising levels of economic activity, UK material productivity has been increasing.

27 Absolute decoupling means stable or declining environmental resource use even as GDP is rising

28 Statistics based on final user apportionment of emissions. See DECC (2010).

29 Produced by the ONS, they record the total mass (total tonnes) of natural resources and products that are used by the economy, either directly in the production and distribution of products and services, or indirectly through the movement of materials which are displaced in order for production to take place.

Figure 4: Natural Resource and Product use



Source: ONS UK Environmental Accounts

There is, however, evidence that decoupling in the UK is partly explained by shifts in the location of production; with many of the goods and services consumed in the UK now being produced in other countries. For example, one study suggests that while emissions from the production of goods and services in the UK fell by 5% between 1992 and 2004, those from consumption (including emissions embedded in imports) actually rose by 18% over the same period.[30] Sustainable growth in the UK therefore requires that these international aspects are taken into account.

It is also important for the UK infrastructure to be resilient to environmental risks, such as those resulting from climate change, which will affect the underlying drivers of growth: capital investment, human health and productivity.[31] For example, climate change increases the risk of flooding, the impacts of which will not be felt evenly throughout the UK – thus some sectors and geographic areas will be more vulnerable to the effects of climate change than others.

The Context for Future Growth – Sectoral Opportunities and Challenges

The UK's long term prospects need to be seen in the context of continuing changes in both global demand and global supply, the latter involving technological change, increasing competition from developing economies and the associated development of global value

30 Wiedmann et al (2008).
31 Vivid Economics (2010).

chains. Such changes have profound implications for how a developed country such as the UK needs to develop its productive capabilities in order to compete successfully, particularly at a sectoral level.

Changing Global Supply – Globalisation and Technological Change

Central to developments in the global economy over the last few decades has been the **acceleration in the pace of globalisation**; with world trade in goods and services increasing more than sevenfold since the 1980s. This has been driven not just by the advanced economies, but also emerging countries, whose share of world trade has more than quadrupled.[32] The integration of the latter into global markets has also underpinned a fourfold increase in the effective global supply of labour, primarily in the form of low skilled workers.[33]

Table 3: Forecast Global Supply of Skilled and Unskilled Workers (millions)

	Total		Unskilled		Skilled	
	2001	2030	2001	2030	2001	2030
World	3,077	4,144	2,674	3,545	403	598
High Income Countries	481	459	327	276	154	183
Developing Countries	2,596	3,684	2,347	3,269	249	415
...China	773	870	740	816	33	54
...India	473	712	441	653	32	59

Source: World Bank Global Economic Prospects (2007)

This trend is expected to continue, with China and India alone expected to add over 300 million workers to the global labour pool by 2030. While skill and innovation capabilities are increasing in these economies, BIS analysis drawing on evidence from the OECD and World Bank, suggests that obstacles such as the supply of skills failing to keep pace with demand, poor IPR protection / enforcement and access to finance, are presently constraining their ability to move up the value chain.[34] Thus their growth is likely to continue to be more focussed around low to medium skill activities, increasing competitive pressures on UK firms in these types of sectors.

Technological progress has also facilitated increased trade and led to the development of global value chains. Improvements in ICT and logistics have made it possible to split out and separate particular production activities; with individual components of a final product now often designed and assembled in geographically disparate parts of the world.[35] 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 (in some cases outsourced to specialist providers).[36] As a result of this, many businesses are becoming more specialised in particular activities within the value chain.

32 WTO World Trade Database.
33 IMF (2007).
34 BERR (2009a).
35 World trade in intermediate products grew five-fold between 1988 and 2006, WTO (2008).
36 See BERR (2009b) for a more detailed discussion of the theory and evidence.

Although initially the impact of these changes was most visible in the production and trade of goods, more recently **service activities have also become more tradable**. Blinder (2007) estimated that as much as 26-29% of all US jobs (roughly 33m-38m) could potentially be offshored, where the activity is neither location specific, nor requiring face to face personal contact with the customers.

Although attention has understandably focused on the potential for UK service jobs to move overseas, these trends equally apply to the **potential for onshoring of service activities into the UK**. Amiti and Wei (2004) estimate that despite being amongst the largest offshorers of service activities, countries such as the UK and US onshore more ICT and business services than they offshore.

Whilst globalisation has increased the relative supply of low wage labour, it is also argued that **technological change has been skill-biased**, that is the adoption of new technologies has required higher proportions of skilled over unskilled workers. For example, the growing investment in capital in recent years has been strongly tied to rising automation, with new machines and skilled technicians being substituted for unskilled labour.

While technology is increasingly able to replace routine tasks within jobs, it is not yet able to replace the human interaction required for more non-routine aspects. At the same time, global competition for top talent is arguably pushing up the returns to the most skilled workers.[37] The increasing relative supply of low to medium skills, combined with skill-biased technological change, has led to concerns over a potential **hollowing out** of the UK work force; with the proportion of medium skills jobs in the economy in decline – either vulnerable to foreign competition or replaced by technology.

However, the evidence for these hypotheses remains mixed. For example, while there does appear to have been a reduction in middle income jobs in the UK since the 1980s, detailed analysis of jobs within sectors shows a more even change of employment share by skill level.[38]

The implications for sectoral opportunities in the UK economy appear much clearer. Increasing global competition will continue to put particular pressure on lower-wage, lower-skill activities. UK prospects will be stronger in more knowledge intensive parts of both manufacturing and services. But scope for a rising share of manufacturing in GVA is likely to be constrained if technological improvements continue to drive down relative prices of manufactured goods.

37 This is the so called ‘Superstars Effect’; see Piketty and Saez (2006).

38 See for example Goos and Manning (2003), Bell and Blanchflower (2009), Goos, Manning and Salomons (2009).

Changing Global Demand

A successful and growing UK economy will also need to respond to ongoing changes in the nature of global demand; these are being driven by factors such as:

- Rising per capita incomes
- Increased demand for environmental amenities
- New technologies
- Ageing population
- Growth in emerging markets

Rising Incomes

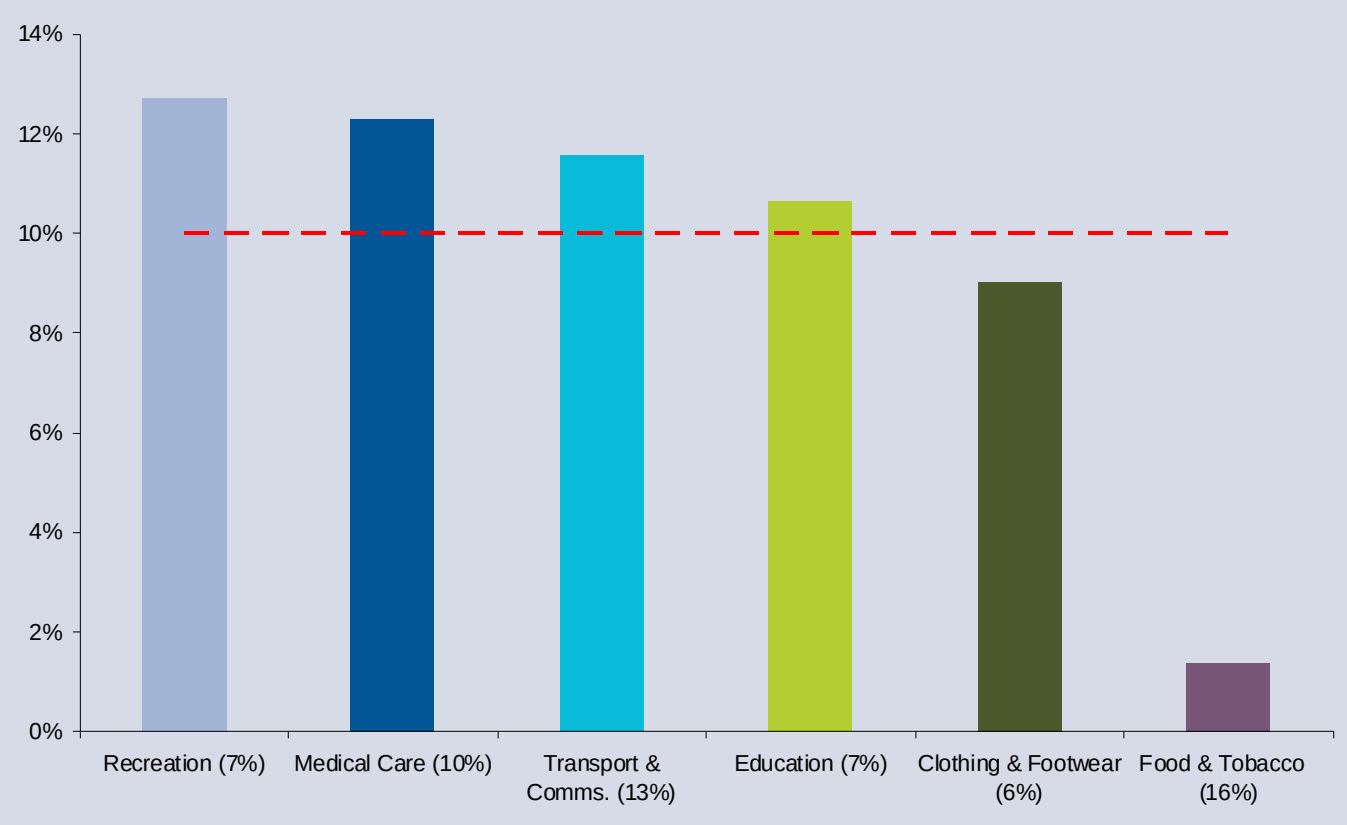
The coming years are likely to see **continuing growth in per capita incomes**, particularly disposable incomes, leading to a change in the composition of goods consumers will demand in both the UK and the UK's main export markets. As consumer incomes rise, expenditure will tend to increase disproportionately on products such as recreation, medical care and transport / communications, while spending on food and clothing lags behind. Such a shift would be a continuation of historic trends which saw for example the proportion of UK incomes spend on food roughly halve through the 20th century.[39]

Within sectors, spending will tend to shift towards the luxury, high quality end of the market; such as laser eye treatment and foreign travel. Similarly, wealthier consumers are likely to become more demanding,[40] with an increasing premium on **convenience consumption** (where the receipt of the product requires little time), **experience consumption** (a desire for more than just a product, but also for that product to be supplied in such a way) and **market segmentation** (where consumption reflects the self-identity of individuals and groups, increasing the importance of brands, labels and marketing).

39 In 1900 expenditure on food accounted for 28% of UK consumer spending, but by 1980, this figure had fallen to 17%. Over the same period spending on consumer durables and travel and communications doubled to 10% and 12% respectively. Spending on recreation and culture increased nearly seven fold between 1971 and 2004, including a five fold increase in foreign holidays taken by UK residents.

40 See Zee and Brandes (2007), SCP (2001).

Figure 5: Change in Expenditure Following a 10% Increase in Income in High Income Economies



Source: W. Michael Cox and Richard Alm, Federal Reserve Bank of Dallas, 2007 Annual Report. "Opportunity Knocks"
Note: Share of overall consumer expenditure given in brackets

Increasing Demand for Environmental Products

Rising incomes are also often associated with **increased demand for environmental amenities** such as better air quality. This generally triggers government action and more rapid development of energy efficient, less polluting technologies. These trends are reinforced by the tendency for growth in richer economies to be focussed on less industrialised, cleaner service activities.

Traditionally this pattern is characterised by the literature in terms of 'turning point' levels of per capita income, above which these demand and supply factors combine to reduce environmental deterioration as incomes rise. A conventional Kuznets Curve along with estimates of turning points for various air pollutants are given in Figure 6 below.

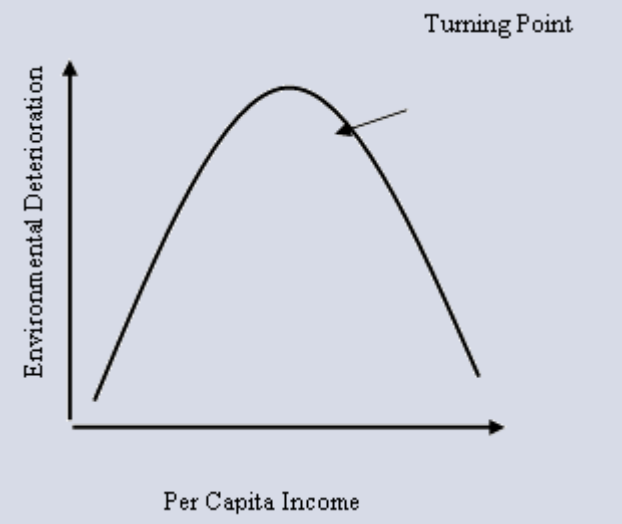
More recent research has suggested a more complex relationship, suggesting that it cannot be generalised to all types of environmental damage and across all countries and income levels.[41] Nevertheless, these trends are likely to remain a powerful driver for the sector.

The trend towards environmental standards resulting from rising incomes has been reinforced by the realisation that improvements in global welfare will be dependent upon reducing global carbon emissions. The expectation is that international agreements in these areas are likely to

41 See DEFRA (2010) for a discussion of these issues.

drive forward demand for goods and services which use lower levels of carbon during both their production and use.

Figure 6: The Environmental Kuznets Curve



Air Pollutant	Turning Point (US$, 2003)
Carbon Dioxide	37,000 – 57,000
Carbon Monoxide	16,300 – 16,600
Nitrates	25,600 – 41,000
Nitrogen Oxide	24,000 –29,700
Sulphur Dioxide	9,600 – 16,500
Particulates	12,300 – 30,400

Source: Yandle et al (2004)

Firms across a broad range of sectors will need to be aware of the environmental impact of their products, with the ability to reduce this impact potentially forming an important source of competitive advantage.

In this context, what is or isn't a low-carbon good or service is clearly debateable, and estimates of the global market for low-carbon and environmental goods and services should be treated with some caution; however the evidence points towards a substantial and growing market – estimated at £3.2 trillion in 2008/09 and forecast to grow by 4% a year over the next five years.

While renewable energies and more traditional environmental goods and services each make up a considerable proportion of this growing market, approximately half is attributed to 'emerging low-carbon' sectors, such as alternative fuels, building technologies, nuclear power and carbon finance.

New Technologies

The rapid growth of products such as mobile phones, DVD players and digital cameras demonstrates the strength of global demand for products which offer new functionality, entertainment or luxury to both consumers and businesses, as well as the increasingly compressed life cycle of such products. In particular, developments in ICT will continue to lead to new products and services appealing to both consumer and business needs.

- Facebook did not even exist prior to 2004 but now has 500m active users, of which over half access the site each day.

- In terms of business services, Ali-Babba founded in 1999, now has 50m registered users allowing firms of all types, but particularly SMES, to buy and sell in the global marketplace.

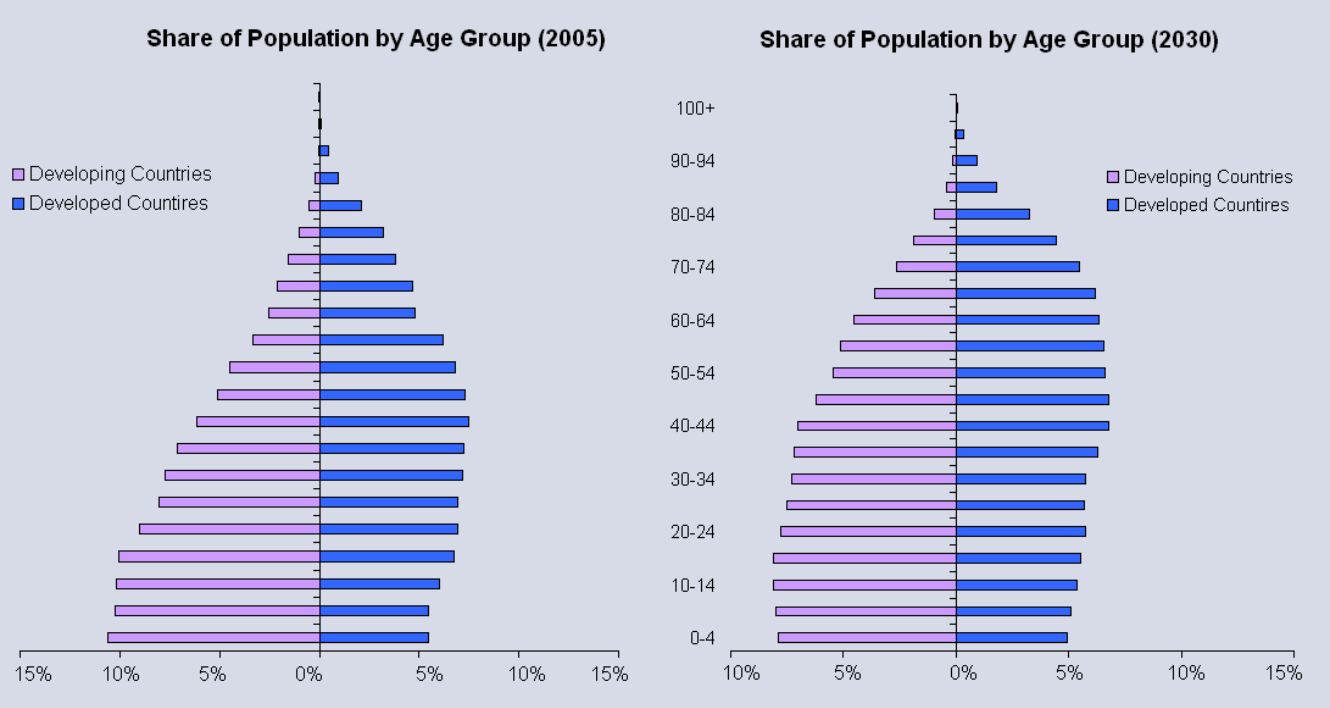
Technology is also changing how may of these new products are developed and used. Increasingly what matters is the ability to marry real world experience with an emerging technology to create a business opportunity, leading to a divergence between:

- Common platforms or technologies that facilitate the digital economy (e.g. iphone, Android, ebay).
- Business developed applications which deliver the actual products of the digital economy.
- User generated or 'crowd sourced' products which make use of these common platforms and applications.

Ageing Population

The UK is forecast to see its demographic profile shift towards an older population, as a result of a combination of declining fertility rates and increasing life expectancy. Over the next twenty years the ratio of elderly to the working age population in the advanced economies is expected to increase from 23% to 36%. By contrast the old age dependency ratio in developing economies is expected to be less than half this at 15% (Figure 7).

Figure 7: Change in Demographic Profile



Source: UN World Population Prospects (2008 Revision)

BIS analysis suggests that in the advanced economies the impact of these changes will be to reinforce the shifts towards spending on areas such as healthcare in more developed economies.[42] Similar work by the OECD points to an impact solely from ageing increasing the

42 BIS (2010a).

consumption of housing, energy and health services by 3% between 2005 and 2025, over and above the growth we would normally expect.[43]

Growth in Emerging Markets

While demand for higher value added goods and services will increase in the advanced economies, it will grow even more rapidly in the emerging countries. Although adversely affected by the global downturn, they are forecast to recover more quickly than the advanced economies and return to robust growth in the medium to longer term.

As Table 4 shows, the advanced economies still account for the majority of UK exports, but have seen their share decline in the face of more rapid growth in UK exports to emerging economies.

Table 4: Growth in Global Demand

	GDP growth		Import Growth		Share of UK exports	Change in share of UK exports
	2009	2010	2009	2010	2009	2000-2009
World	-0.6%	4.6%	-11.3%	9.0%		
Advanced Economies	-3.2%	2.6%	-12.9%	7.2%	78.9%	-6.0%
US	-2.4%	3.3%			17.3%	-0.8%
Japan	-5.2%	2.4%			2.1%	-0.6%
Euro Area	-4.1%	1.0%			43.1%	-5.9%
Germany	-4.9%	1.4%			9.0%	-1.9%
France	-2.5%	1.4%			6.6%	-2.3%
Emerging / Developing Economies	2.5%	6.4%	-8.3%	12.5%	21.1%	6.0%
China	9.1%	10.5%			2.0%	1.3%
India	5.7%	9.4%			1.2%	0.2%

Source: IMF (2010b) World Economic Outlook – October, ONS Trade Data

These trends are expected to continue, with the rapid growth of economies such as China and India driving two major changes in the global income distribution:

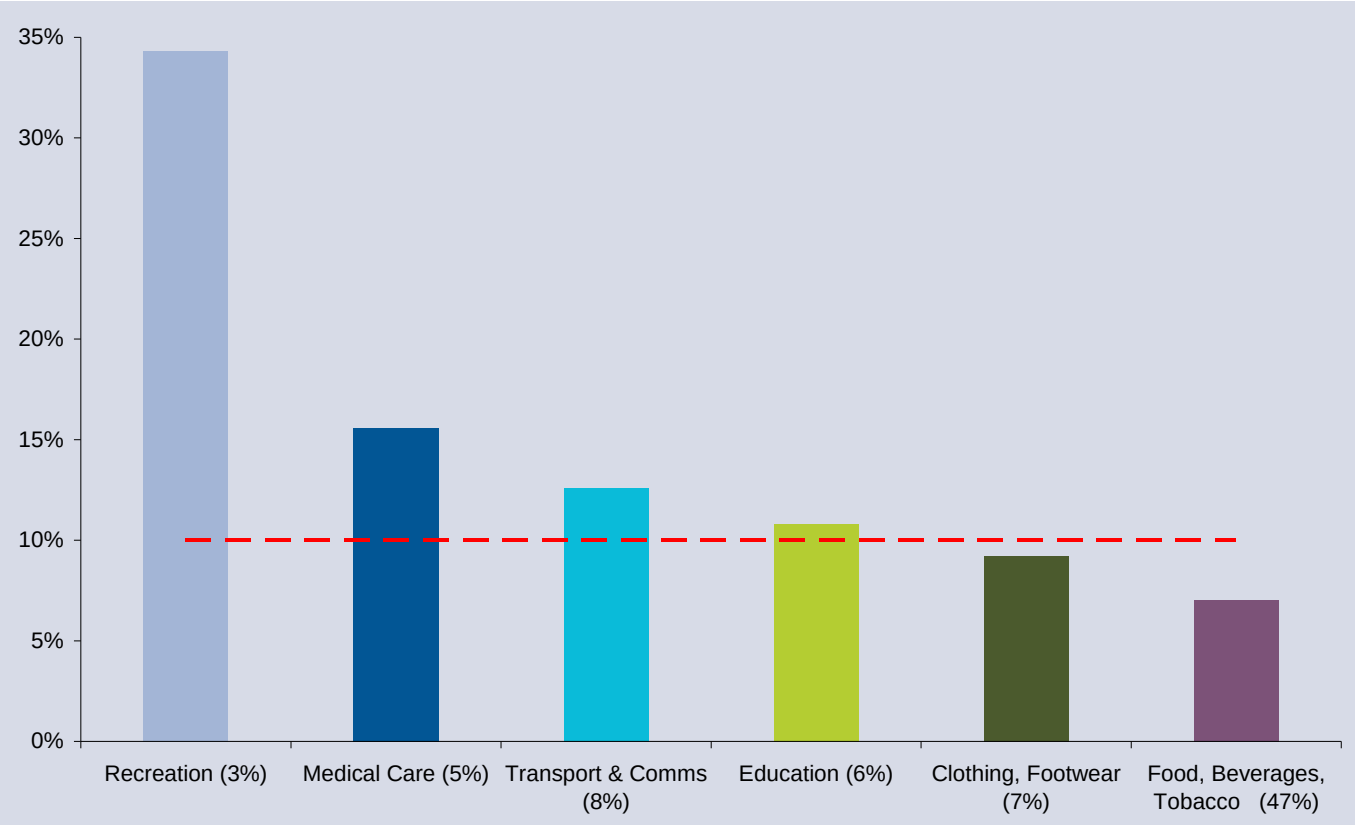
- Spending power is shifting towards middle income countries.
- Within this, middle class households increasingly dominate consumer spending.[44]

This has important implications for the potential growth of UK export markets, as Figure 8 below illustrates, growth in spending in poorer countries on areas such as recreation, health care and transport / communications grows substantially faster than incomes.

43 OECD (2006a).

44 Note that on this definition the majority of households in advanced economies would be classified as affluent or rich due to their much higher per capita incomes.

Figure 8: Change in Expenditure Following a 10% Increase in Income in Lower Income Economies



Source: W. Michael Cox and Richard Alm, Federal Reserve Bank of Dallas, 2007 Annual Report. "Opportunity Knocks"
Note: Share of overall consumer expenditure given in brackets

Although currently only a small proportion of overall spending, the sheer size of these markets (by 2030 China and India will have a billion middle class consumers) will create strong business opportunities. For example Chamon et al (2008) predict that car ownership in China will overtake that in the US by 2030, with India following suit by 2050. As a result their combined share of world car ownership will increase from less than 5% in 2005 to 33% by 2050, more than all of the advanced economies combined.[45]

UK Sectoral Strengths

The analysis above has highlighted the importance of both supply side factors (notably the continuing rise in importance of developing economies in the global economy and technological change facilitating increased trade, particularly for services) and demand side factors (including rising incomes and increasing environmental concerns) in shaping prospects for the UK economy. Such changes emphasise the need for the UK to continue to develop capabilities in areas such as skills, innovation and design in order to avoid competing primarily on the basis of low costs and prices.

Against this background of increasing need for skills and innovation capabilities, this section considers where the UK has particular strengths and where we might expect sectoral growth

45 See also Goldman Sachs (2003, 2007).

opportunities to be strongest. In particular it looks at a range of indicators taken together to provide some insights into the UK's underlying competitive advantage, these are:

- Revealed Comparative Advantage
- Relative Productivity Performance
- Skills intensity
- R&D intensity
- Revealed technological advantage

Revealed Comparative Advantage

Revealed Comparative Advantage (RCA) provides an indication of the relative specialisation of countries in particular sectors or products, by comparing a given sector's share of a country's exports with that sector's share in global exports. A positive RCA implies that a sector represents a disproportionately large share (by international standards) of a country's overall exports – implying that it is an area of relative specialisation.[46]

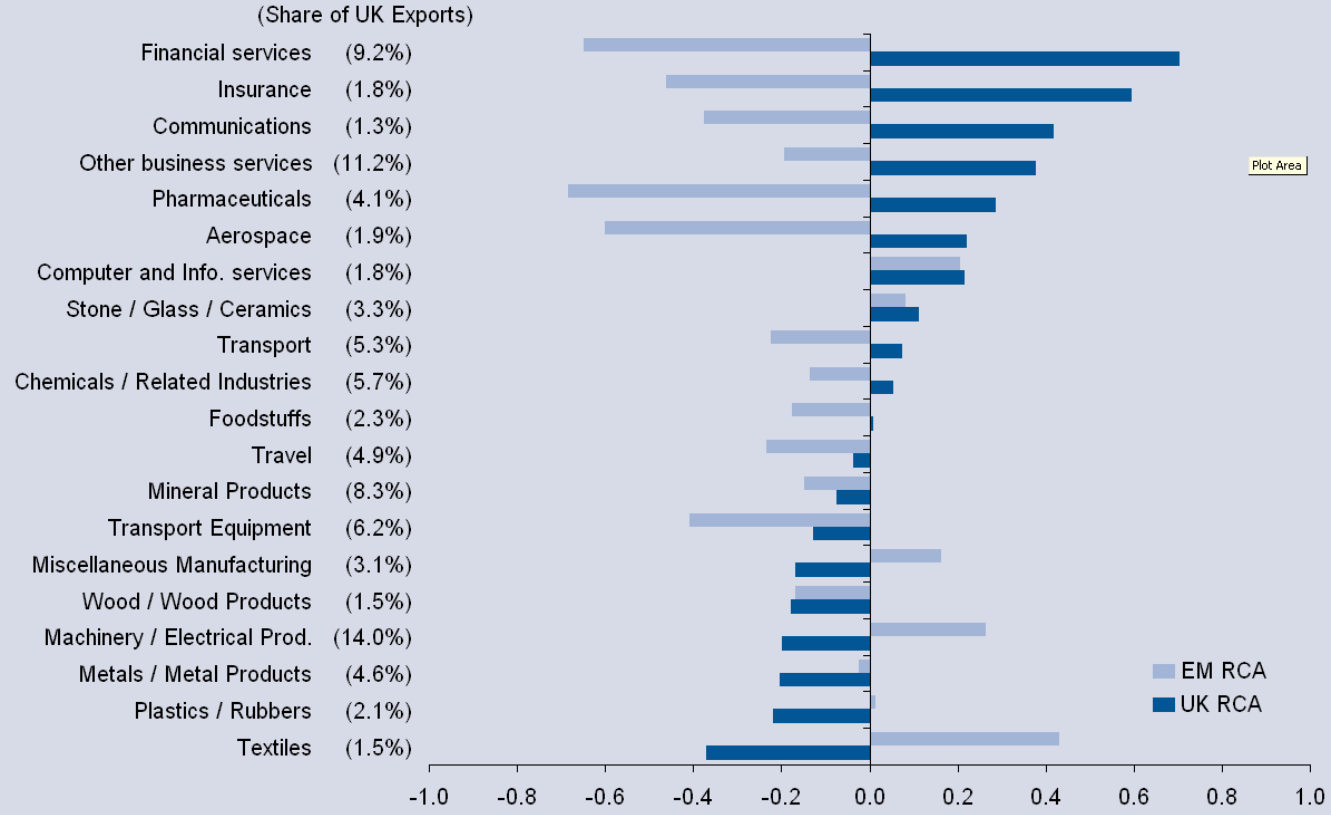
Following OECD analysis,[47] we examine the RCAs of the UK and a group of low-wage economies (China, Hong Kong, India, Indonesia, Malaysia, the Philippines, Singapore and Thailand). Figure 9 below shows both the RCA values and additionally, the share of overall UK exports in each sector, to give a sense of the importance of any UK sectoral advantage.

The overall picture reinforces the story outlined above, namely that low wage economies tend to specialise in manufacturing sectors that are relatively high volume / low technology (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.

46 A standard Balassa-Samuelson RCA index takes values from zero to infinity, with values above one indicating a relatively strong export sector, however here we present RCAs in symmetric from where they are normalised around zero.

47 OECD (2007a); low wage countries considered are China, Hong Kong, India, Indonesia, Malaysia, the Philippines, Singapore and Thailand.

Figure 9: UK and Emerging Market Revealed Comparative Advantage, Selected Sectors (2008)



Source: BIS calculations based on data from IMF BoP Database, UN COMTRADE (HS 2002)
Note: RCAs calculated to global exports.

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, lower technology sectors such as Textiles, Metal Products and Machinery. This suggests that in principle, the UK should be well placed to weather competition from Emerging Economies as they are essentially competing in different sectors in global markets.

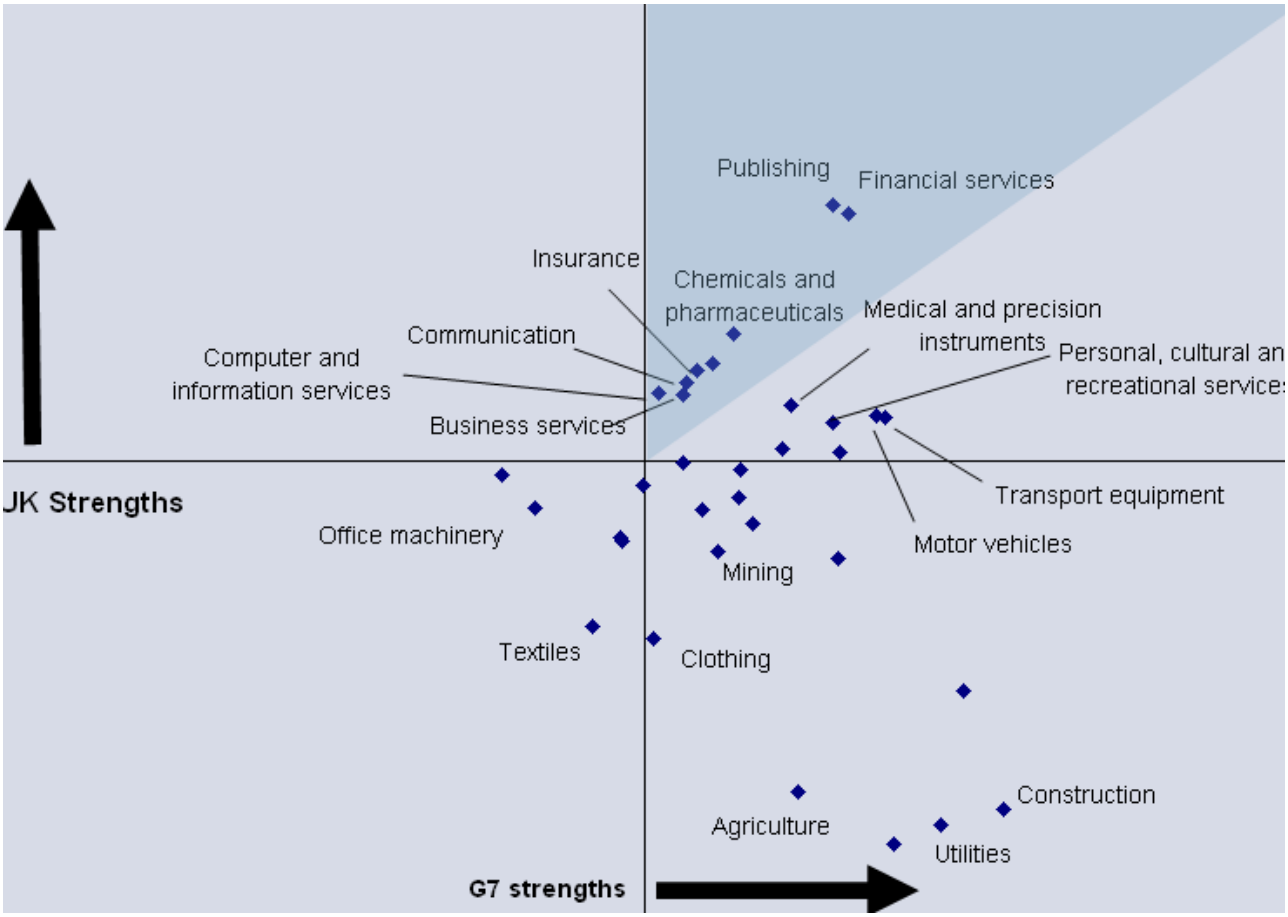
In thinking about the UK's sector strengths, we therefore need to focus on those sectors in which other relatively high-wage developed economies are also likely to be competing. As Figure 10 shows, there are a group of broad sectors such as Textiles and Office Machinery in which the G7 economies have no comparative advantage (i.e. global export markets are dominated by emerging economies) and which are less likely to offer significant business opportunities. However it also indicates that:

- The UK is relatively more specialised than its G7 counterparts, in sectors such as Publishing, Finance, Business Services, Communications and Computer and Information Services.

- The UK is relatively less specialised (by G7 standards) in sectors such as Precision Instruments, Transport Equipment and Personal, Cultural and Recreational Services.

- Although the G7 are relatively specialised in terms of exports of Construction, Utilities, Mining and Agriculture, the UK is not.

Figure 10: UK and G7 Revealed Comparative Advantage, Selected Sectors (2008)



Source: BIS Calculations based on data from OECD Globalisation Indicators
Note: RCAs calculated relative to overall OECD exports

In terms of future sectoral prospects for the UK, sectors such as Textiles and Office Machinery in which the G7 economies have no Comparative Advantage are unlikely to offer significant business opportunities. This is particularly true given that they are an area of strength for emerging economies, although there may be more realistic prospects for UK growth in high-tech niches within such sectors.

However, as noted above, care should be taken when interpreting RCAs as an indicator of sectoral advantage. RCAs only provide a snapshot of relative specialisation at a given point in time; while export success may indicate global competitiveness, it also reflects the size of resources devoted to a sector.[48]

Relative Productivity Performance

Although RCAs provide a useful indication of how well the UK performs in sectors open to international competition, it cannot shed light on those sectors whose products are not heavily traded. To this end Table 5 below supplements this analysis with evidence on the relative productivity of selected UK sectors, vis-à-vis the USA, Germany and France.

48 Other limitations of RCAs in this context include their reliance on trade data, which is classified according to products rather than sectors, and the limitations of services trade statistics which capture only part of the trade in these areas.

Table 5: Relative Productivity in Selected Sectors for the UK versus France, Germany and the US (UK = 100, 2004)

Sector	Average Labour Productivity			Total Factor Productivity		
	US	GER	FRA	US	GER	FRA
Food, drink and tobacco	128	78	91	132	70	84
Textiles	131	118	139	130	96	118
Apparel	168	138	146	186	113	
Leather and footwear	107	107	140	94	81	
Wood and wood products	158	139	205	153	108	
Pulp and paper products	143	129	157	133	109	
Printing and publishing	89	72	83	85	59	82
Chemicals	123	108	173	106	89	
Rubber and plastics	127	111	155	132	104	
Non-metallic mineral products	86	109	119	81	85	87
Basic metals	128	105	134	129	102	
Fabricated metal products	135	133	128	125	110	
Mechanical engineering	126	113	123	113	96	119
Computers	86	174	24	60	124	
Electrical machinery	182	154	140	144	132	
Electronic components	318	143	209	269	133	
Precision instruments	143	105	108	104	86	
Motor vehicles	217	174	164	215	155	138
Other transport equipment	100	97	143	88	81	104
Utilities	148	52	83	98	46	91
Construction	124	91	92	114	71	80
Motor trade and repairs	148	94	112	121	71	96
Wholesale trade	168	116	158	127	94	131
Retail trade and repair	144	90	126	131	93	110
Hotels and catering	162	90	151	168	94	135
Communications	137	120	187	98	76	189
Financial services	93	71	77	52	44	51
Insurance and pensions	112	33	140	194	33	145
Rental of machinery & equip.	72	494	164	37	85	
Computer services	176	100	154	133	64	
Research and development	95	79	88	85	74	83
Other business services	133	127	107	99	47	
All market sectors	136	107	120	116	83	104

Source: BERR (2008a) 'Cross Country Productivity Performance at the Sector Level'.

Overall the UK performs strongly in terms of both average Labour Productivity and Total Factor Productivity in innovative, high skill sectors such as Financial Services, Publishing and R&D. The data also show a comparatively strong performance in both Utilities (Electricity, Gas and Water Supply) and Construction.

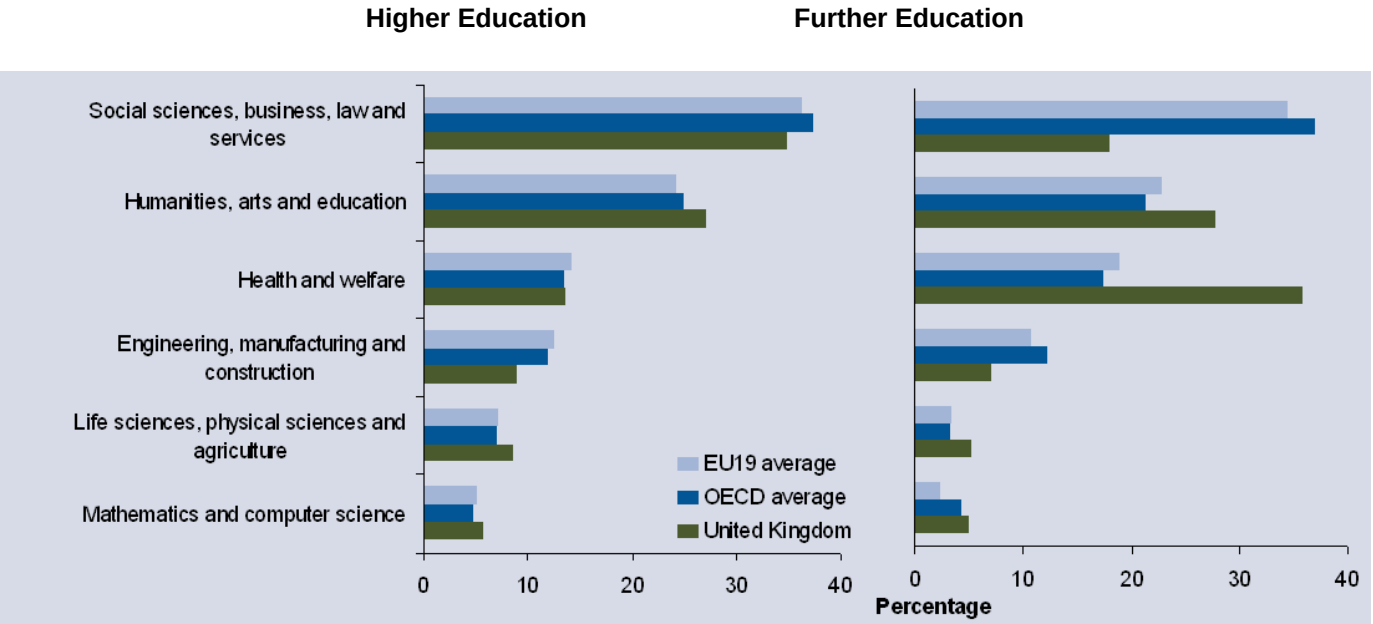
However the UK performs poorly on measures of productivity for a range of sectors relating to machinery and equipment; including Mechanical Engineering, Electrical Machinery / components and Precision Instruments. Perhaps more surprisingly, labour productivity in the UK's Business Services sector is lower than in all three of our major competitors (although the evidence for Total Factor Productivity shows the reverse).

Comparisons of RCAs and productivity levels indicate where the UK is relatively strong compared to our major competitors, but do not explain the drivers behind this competitiveness. To gain a more detailed understanding of underlying sectoral strengths, we thus need to consider comparisons of skill, R&D and patent performance / capability in recent years.

Skills Intensity

Starting with **Skills Intensity;** while comparisons on educational specialisation across countries need to be treated with caution (Given differences in definitions of tertiary education between countries), analysis of OECD data suggests that the UK may invest relatively intensively in mathematics and sciences, but less intensively in engineering skills.

Figure 11: Distribution of Graduates from Higher and Further Education by Subject



Source: OECD Education Statistics

Despite the UK's significant advantages in Finance and Business Services, this does not appear to be reflected in a disproportionately larger number of graduates from related subjects such as Business and Law. One possibility is that these sectors are recruiting more heavily from relatively technical courses such as science, engineering and computing.

R&D Intensity

In terms of relative **R&D Intensity** by sector, the picture is also mixed. In areas such as Pharmaceuticals, Aerospace and Financial Intermediation, UK firms invest relatively heavily in

R&D; but in other knowledge intensive sectors such as Precision Instruments, Computing Machinery and Business Services they are less active (Table 6).

In the case of the latter this is particularly surprising given the UK's strong lead in these areas. Although we would not necessarily expect these sectors to be particularly R&D intensive given their reliance on other modes of innovation, UK performance remains comparatively weak even when benchmarked against other countries. However some of these sectors – and large areas of manufacturing – invest heavily in other types of knowledge assets, including software, business process improvement, design and workforce skills.[49]

49 NESTA Innovation Index (2010), forthcoming.

Table 6: UK R&D Intensity as a Percentage of Value Added by Sector

	UK	Relative to G7 average
Pharmaceuticals	42.45%	139%
Aircraft & Spacecraft	31.29%	103%
Radio, Television & Communication Equipment	24.05%	84%
Shipbuilding	12.97%	266%
Coke, Refined Petroleum & Nuclear Fuel	11.94%	341%
Motor Vehicles	9.02%	53%
Electrical Machinery & Apparatus	8.97%	105%
Medical, Precision & Optical Instruments	7.79%	38%
Chemicals (Excluding Pharmaceuticals)	7.13%	77%
Machinery & Equipment	5.83%	94%
Computer & Related Activities	4.23%	82%
R&D	3.27%	28%
Railroad Equipment & Transport Equipment	2.58%	17%
Food, Beverages & Tobacco	1.42%	94%
Computing Machinery	1.38%	3%
Rubber & Plastics Products	1.14%	29%
Non-Metallic Mineral Products	0.86%	44%
Basic Metals & Fabricated Metal Products	0.68%	50%
Financial Intermediation	0.57%	218%
Textiles and Clothing	0.38%	23%
Utilities	0.11%	27%
Business Services	0.05%	23%
Construction	0.05%	36%
Wholesale And Retail Trade	0.04%	44%

Source: BIS Calculations based on data from OECD STAN Database
Note: R&D Intensity for G7 calculated as un-weighted average

Patenting Intensity

Turning to innovation activity, while for a variety of reasons we need to treat patent intensity indicators with a great deal of caution,[50] they still provide a useful pointer towards areas of strong or weak innovation performance. Figure 12 presents BIS analysis of WIPO data on patent applications by UK residents over the period 2002-06. It highlights the UK's relative strength in various broad areas of technology.

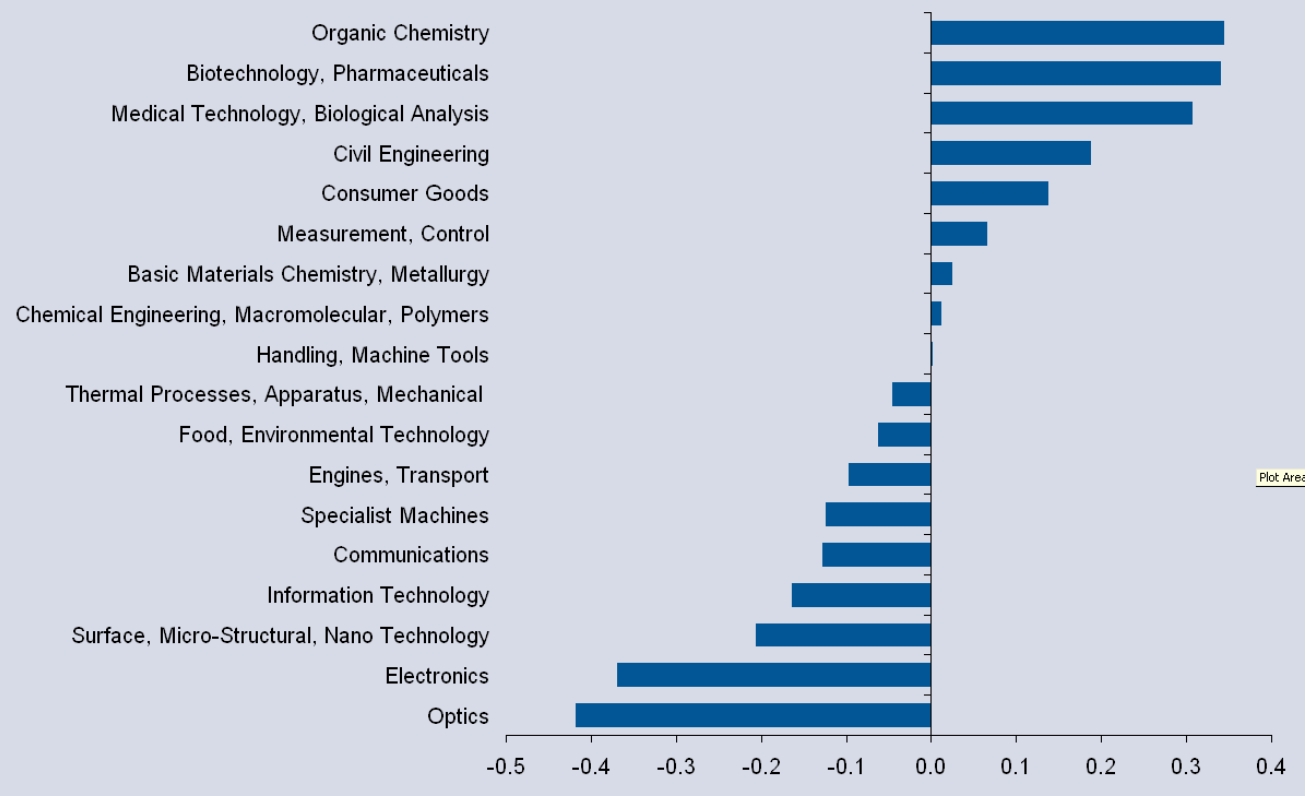
50 There are a number of significant caveats associated with this type of analysis; in particular firms have a variety of other mechanisms to protect their Intellectual Property – such as Trademarks. Also the number of patents is not necessarily indicative of their value.

Key trends include:

- The UK is relatively concentrated in Organic Chemistry, Biotechnology / Pharmaceuticals and Medical Technology.

- The UK is less concentrated in Electronics, Optics and Nano-Technology and Information Technology.

Figure 12: UK Revealed Technological Advantage (2002-2006)



Source: BIS Calculations using World Intellectual Property Indicators (2009) data

These results appear to support the UK's observed strength in Chemicals & Pharmaceuticals, but contradict our weaker performance in terms of RCA and R&D intensity in sectors such as Medical & Precision Instruments. One possibility is that this result reflects the UK's historically weak record in commercialising its research;[51] however it also likely reflects the UK's uniquely international position among major R&D performers, which shows up in patent data. International firms perform R&D in the UK and export its results, while many UK based innovators organise their inventive activities in a global context. The results below for IT also need to be read in the context of a much more restrictive patent regime for EU countries.[52]

Performing a similar analysis for the UK's major competitors we find:

51 These were discussed in the Lambert Review, HMT (2003).

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

- The **USA** is concentrated in Biotechnology / Pharmaceuticals and Medical Technology; weaker in Optics, Electronics, Thermal Processes / Apparatus and Engines / Transport.

- **France** is concentrated in Organic Chemistry, Engines / Transport; weaker in Optics, Information Technology and Electronics.

- **Germany** is concentrated in Engines / Transport, Thermal Processes / Apparatus and Organic Chemistry; weaker in Optics, Information Technology, Communications and Electronics.

- **Japan** is concentrated in Optics; weaker in Biotechnology / Pharmaceuticals, Medical Technology and Organic Chemistry.

The Government's approach - Four Pillars for Growth

As the preceding sections set out, over the last decade the UK's economy became unbalanced, while relying on unsustainable public spending and rising levels of public debt. The government wants to see a new type of more sustainable growth, built, above all, on releasing the dynamics and vibrancy of the market economy to support private sector job creation and higher levels of exports, investment and enterprise.

In order to achieve this we have identified four pillars, representing policy areas which are crucial to driving growth. In developing these four pillars, we have drawn carefully from international evidence on what drives growth.

In the short term, demand can play an important role in driving growth. But while in the short term expenditure can outstrip the income generated from the supply of goods and services (through dissaving or borrowing), in the longer term this will create unsustainable debt and inflationary pressure.

Delivering longer term growth requires improvements in the supply-side of the economy. In thinking about supply-side capability it is helpful to start with a simple model of output / economic growth:

$$Y = F(K, L, T); \text{ where}$$

Y = Output, K = Capital, L = Labour, T = Technological progress

In such a model, output, and therefore growth, is a function of:

- The quantity and quality of **economic inputs,** both labour and capital.

- The **efficiency** with which these inputs are put to use, often termed total or multi-factor productivity.

Early theories of growth focused on a relatively narrow definition of capital and labour (essentially plant, machinery and numbers of workers), with technological progress taken as a

given.[53] They predicted that over time countries would tend to converge on the similar levels of per capita GDP as poorer countries 'catch-up' to richer ones; with long run growth rates ultimately determined by population growth and technological progress.[54]

Since then the concept of capital has been broadened to include a much wider range of intangible investments such as education, innovation and design; while theories of endogenous growth have attempted to more explicitly model the underlying drivers of technological progress. In particular, research has focused on how enabling technologies such as ICT can have an impact on growth which goes well beyond their immediate sector.[55]

More detailed evidence on the role of different factors in enabling, assisting and driving growth is outlined in subsequent chapters. In terms of economic inputs, a range of studies confirm the importance to growth of **investment in both physical capital**, notably ICT and infrastructure, and **intangible capital**,[56] such as education, training, innovation, branding and design. These are particularly important given the context outlined earlier of increasing competition from low-wage economies, placing the emphasis on UK companies competing on the basis of the quality and innovative nature of their goods and services, rather than price.

While **increasing employment** can make an important contribution to growth in the short and medium term, particularly when employment rates are low, there is a limit to how far the employment rate can be improved in developed countries.[57]

Evidence also points to the importance of the overall business environment in providing the conditions in which firms have the **incentives and confidence to invest and raise productivity,** these arise from:

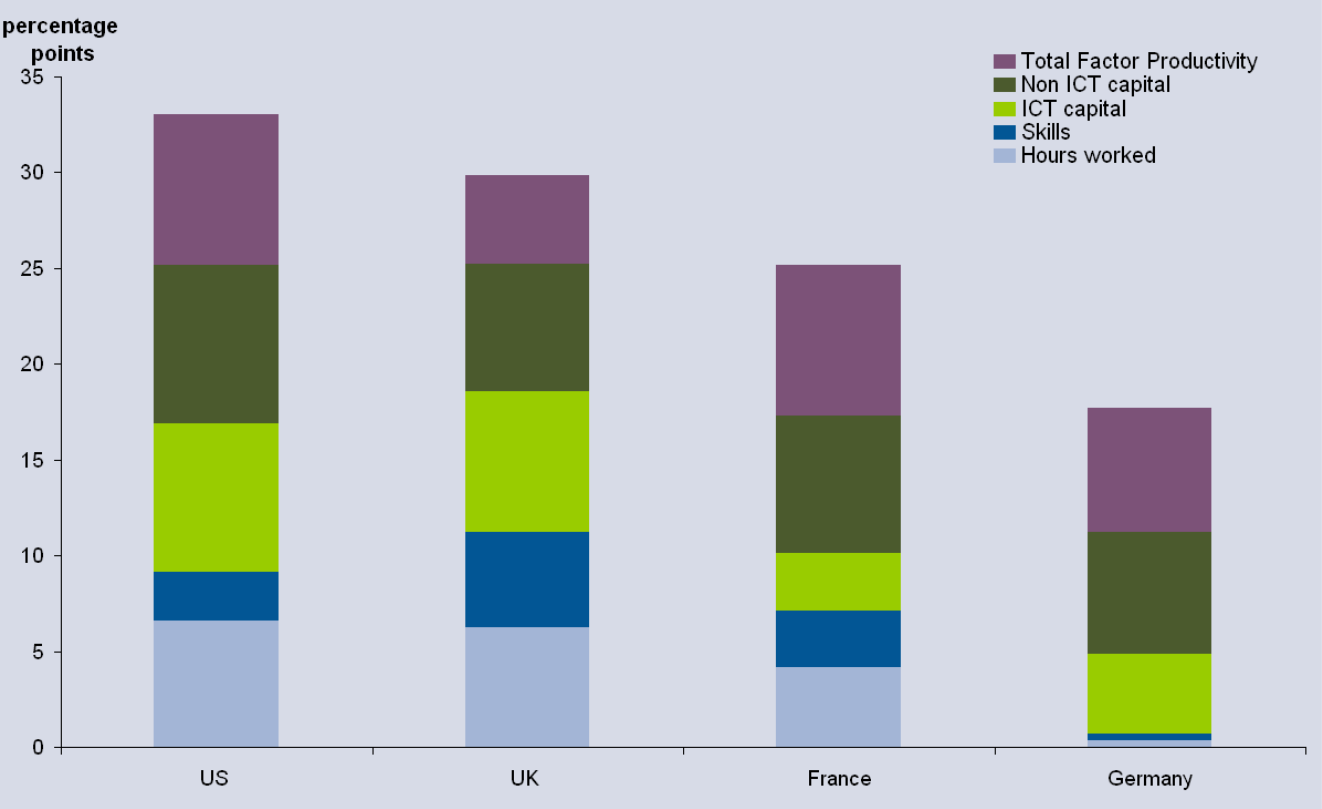
- **Favourable macroeconomic conditions,** in particular low and stable inflation, well developed financial markets, a low tax burden and a low share of distortionary taxes. These all play role in increasing business confidence to invest,[58] as well as encouraging entrepreneurial activity.[59]

- Institutions and policy frameworks which encourage **competition,** flexibility in capital and labour markets, and the diffusion of innovation are central to driving growth.[60] As chapter 2 notes in more detail, the replacement of low productivity firms by higher productivity new entrants accounts for about 50% of labour productivity growth over a 5 year period,[61] while competition also provides incentives for existing firms to improve performance. Box 3 considers the huge role that **high-growth firms** around the world have played in driving growth in their respective countries.

53 For a more detailed discussion of neo-classical growth theory see Barro and Sala-i-Martin (2003).
54 Strictly speaking over time countries converge on their steady state growth rate. The 'catch-up' phenomenon results from the assumption of diminishing returns to capital, which implies that the return from capital is greater in poorer countries than richer ones.
55 See Aghion and Howitt (1997) for a more comprehensive discussion of endogenous growth theory.
56 Marrano et al (2009).
57 "Productivity isn't everything, but in the long run it is almost everything." (Paul Krugman)
58 OECD (2004).
59 Audretsch and Thurik (2010).
60 Cotis (2006).
61 Disney, Haskel and Heden (2003).

Figure 13 below draws from the Groningen Growth and Development Centre's growth accounting work which attempts to estimate the role of increases in skills, ICT capital, non-ICT capital, hours worked and total factor productivity in driving growth in OECD leading economies over recent years.

Figure 13: Contribution to GVA growth (1997-2007)



Source: Gröningen Growth and Development Centre, EU KLEMS

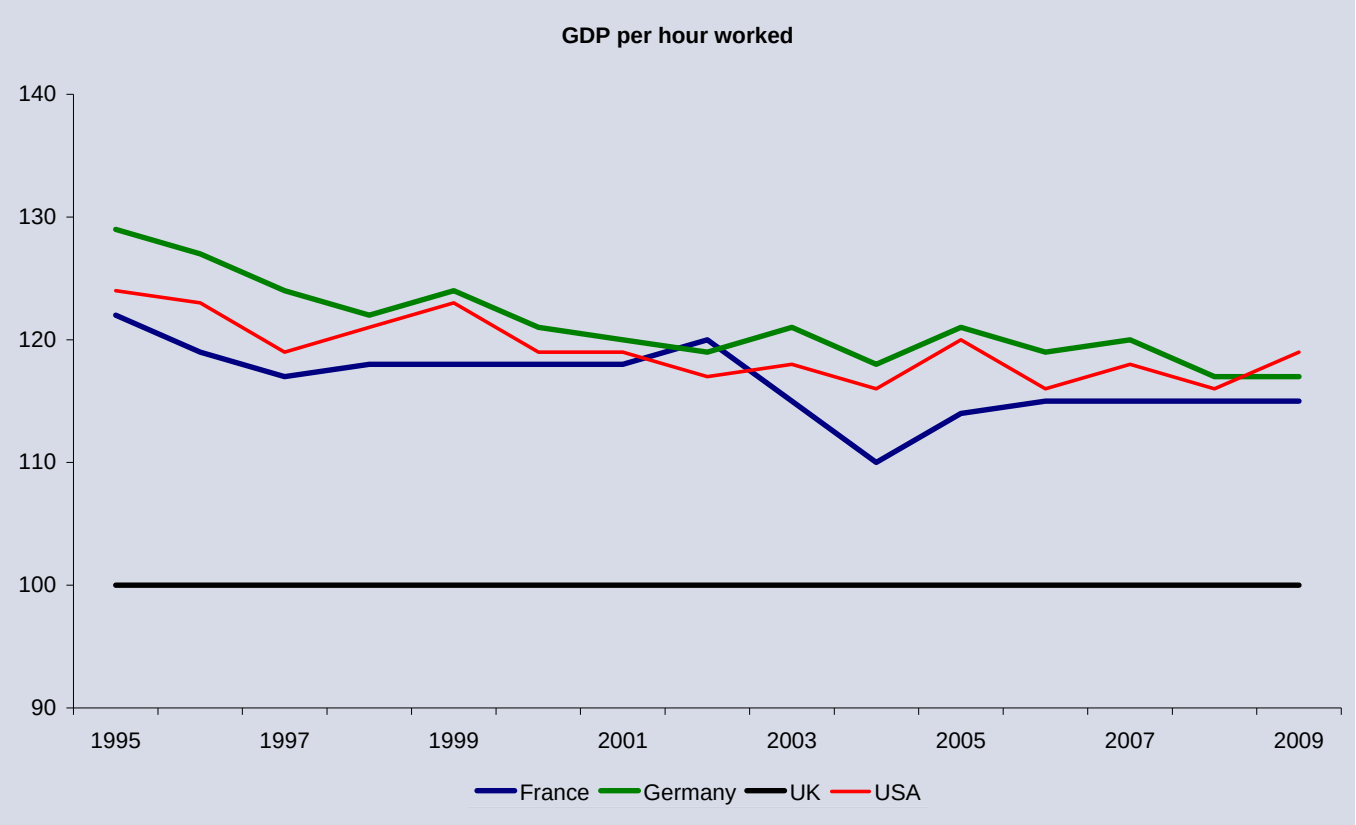
Figure 13 shows that while the UK has seen strong increases in skills and ICT-capital, the contribution of non-ICT capital and total factor productivity appears less strong than for our international competitors. This may imply that the investments government and business have made in this period have not been optimal, or that we have failed to make the best use of those investments. However, analysis which takes account of investment in knowledge by UK firms, recasting national accounts as if these expenditures were treated as asset formation rather than as intermediate consumption, shows a more positive picture – with UK firms investing proportionately more in these areas.[62]

Turning to a comparison of productivity levels (GDP per hour worked). Figure 14 shows that there has been a persistent gap in output per hour between the UK and its major competitors, which has only been partially closed by the UK's faster productivity growth during 1994 and 2006.[63]

62 OECD (2010a).

63 There are substantial measurement issues in international comparisons of productivity, e.g. productivity growth differentials between the US and UK tend to be in large hard-to-measure sectors such as finance, retail and wholesale trade. There are also concerns that the debt-fuelled booms in both countries will have inflated

Figure 14: International Comparisons of Productivity (UK = 100)



Source: ONS International Comparisons of Productivity

The weight of analysis studying the causes of this gap suggests that UK productivity is lower than in the US primarily due to lower Total Factor Productivity and lower than in France and Germany because workers are able to draw on more capital per head.[64] The main factors behind the UK's recent relative improvement appear to have been improving capital intensity, supported by some improvement in relative labour quality.[65]

Achieving long term sustainable growth means building on strengths and addressing weaknesses in both horizontal policy areas such as skills and innovation, and within specific sectors (including developing successful firms in emerging growth industries). The subsequent chapters consider UK performance in more detail, with evidence pointing to a range of factors, potentially constraining UK productivity and therefore growth performance.

These include skill deficits (particularly in relation to basic literacy and numeracy, as well as management skills), weaknesses in the commercialisation of a strong science and research

---

performance measures. Note also that these were years when the countries' business cycles were most closely aligned and cyclical biases reduced.

64 See BERR (2008a). Note, there are substantial measurement issues in international comparisons of productivity, e.g. productivity growth differentials between the US and UK tend to be in large hard-to-measure sectors such as finance, retail and wholesale trade. There are also concerns that the debt-fuelled booms in both countries will have inflated performance measures.

65 Note increasing capital intensity is not inconsistent with a falling share of investment in GDP, as capital intensity relates to the ratio of capital to labour.

base, a complex and, it has been argued, restrictive planning system, as well as weak performance in regions away from London.

As discussed above, recent UK growth has been built upon unsustainable Government spending and output. The OBR has forecast the UK economy to make a gradual recovery, with rebalancing occurring as a result of net exports and business investment making a greater contribution to growth than in the recent past. This is partly offset from a negative contribution from government spending as the fiscal consolidation is implemented. However they also stressed that a number of their key judgements are subject to significant uncertainty – in particular their estimate of the underlying supply potential of the economy, developments in the Euro Area, and credit and bank funding conditions.[66]

Box 3: The role of high growth firms in driving growth

High growth firms are those which achieve annual growth rates in turnover or number of employees of over 20% for three consecutive years. Only a minority of businesses meet this definition, but their economic impact is significant.

Using the Business Structure Database, NESTA research examined employment growth in businesses over the periods 2002-2005 and 2005-2008.[67] The main findings were:

- 6% of firms with over 10 employees fall into the 'high growth' category. These firms accounted for half of the net job creations achieved by existing firms of that size category over the 2005-08 period.

- This is equivalent to between 5-8% of all private sector jobs at any time having been created by the spurt of high growth achieved by these firms in the last three years.

Characteristics of high growth firms

High Growth firms are found in all sectors of the economy, but are over-represented in the service sector. NESTA found that Business Services and the Wholesale and Retail sectors account for nearly half of the high growth firms in the UK. High growth firms are also found in all regions of the UK. Although almost a third are located in Greater London and the South East, this primarily reflects the fact that these regions have a higher number of businesses. High growth firms tend to be small; over half are in the 10- 19 employee category – again this reflects the size structure of the population.

Young firms (those less than five years old) are over-represented amongst high growth firms, but the majority of high growth firms are over five years old. Similarly, firms that innovate are more likely to be high growth, but the majority of high growth firms are not recent innovators.

BIS research also showed that high growth firms are characterised by high levels of innovative activity.[68] The founders of high growth firms tend to be highly educated and hold significant business experience, usually having held a previous position as a company

66 HMT (2010a).
67 NESTA (2009).
68 BERR (2008c).

Box 3: The role of high growth firms in driving growth

director. Around two thirds of high growth firms were founded by teams rather than individual entrepreneurs.

There is a lot of churn among firms achieving high growth – the same small minority of firms do not continuously achieve high growth. Indeed, looking at the 1998 cohort of new business entrants, NESTA found that only a third of firms which achieve high growth in one year achieve a second year of high growth within a ten year period

How the UK performs in terms of the number of high growth firms

Data suggests that the UK performs well in terms of the percentage of firms which achieve high growth, outperforming most European countries. However comparisons with the US are less clear.

NESTA research suggested that a larger percentage of UK firms achieved high growth – 6.3% compared to 5.2% in the US. However other evidence suggests that the US outperforms the UK in terms of general business growth.[69] It is possible the UK could have a higher proportion of high growth firms, whilst overall a greater proportion of US firms exceed a more moderate growth threshold.

The percentage of individuals who are already in the process of starting a business, who have growth ambitions, and are producing innovative products is the same in both countries. The problem is that the UK has a lower percentage of adults starting up in business and therefore, overall has a lower proportion of adults in the population starting potentially high growth businesses.

Drawing on analysis of what Government needs to do to achieve sustainable growth; we have identified 4 pillars or priority areas:

Pillar 1 – Providing the stability business needs. To invest for the future businesses need confidence in the long term stability of the domestic and global economy. This needs government to create the conditions for private-sector led growth, building an economy that is no longer reliant on big government, debt and financial services.

Pillar 2 – Making markets more dynamic. Macro-economic stability is a necessary but not sufficient condition for sustainable growth. At the micro-economic level, government has a role in enabling the efficient operation of markets, helping overcome market failures and bottlenecks thereby encouraging innovation and the efficient allocation of resources.

69 For example Bartelsman, Scarpetta and Schivardi (2005) concluded that US firms after entry grow much faster that those in Europe (including the UK). While average firm size differs across countries, due to both sectoral specialization and within-sector characteristics, similar degrees of firm churning across countries are found. In most of them, about 20% of firms enter and exit most markets every year; and about 20–40% of entering firms fail within the first 2 years of life. However, post-entry growth of successful entrants is much higher in the USA than in Europe.

Pillar 3 – Effective government that supports investment and growth. The focus of government should be on providing the conditions for private sector growth and investment, focusing on the activities the market will not do by itself; while ensuring transparency and delivering value for money for the taxpayer.

Pillar 4 – Supporting individuals to fulfil their potential. People are the most valuable assets for our future as a knowledge-driven economy, and growth will be fairer and more sustainable if everyone has the opportunity to contribute and share in it. This requires government to deliver an effective skills and education system, complemented by a labour market framework which rewards work and creates opportunities across the UK.

The Government intends to take a range of measures to support the UK's capabilities in these areas, taking each in turn:

Providing the stability business needs

The Government will put in place a fiscal and macro-prudential framework which emphasises sound public finances and supports public sector investment, ensuring sustainable debt levels, low interest rates and financial resilience. Uncertainty will be minimised through a monetary framework which delivers price and output stability, and by working with international institutions to strengthen the rules-based global economic system and address global imbalances.

Making markets more dynamic

The Government will work with markets to promote open and effective competition throughout the economy, and ensure that financial services and corporate governance serve the needs of wider industry. UK firms will be helped to exploit new global opportunities by improving market access and reducing barriers to trade, while delivering a regulatory regime does not act as a burden on business but rather encourages sustainable long run growth and innovation.

Effective government which supports investment and growth

The Government will ensure that it is efficient and focused in its own activities, prioritising spending which supports private sector growth, innovation and investment. It will create a highly attractive business environment by working towards a stable and competitive tax system, attracting long term private investment in infrastructure and ensuring businesses have access to suitable sources of finance.

Supporting individuals to fulfil their potential

The Government will dismantle the barriers preventing people from accessing the opportunities to fulfil their potential. Labour market and welfare reforms will encourage job creation and provide the unemployed with tailored support to make work pay; the education system will be redesigned to help people invest in the skills they need to enter into and progress in the workforce; and local communities will be empowered to make local services more responsive to their needs, enabling them to drive local growth.

The government's delivery principles

The government aims to continue to deliver important policy outcomes with reduced public spending, which requires a more effective and focussed public sector, putting power back into the hands of businesses and individuals (Fairness, Freedom, and Responsibility). Where markets fail to deliver socially desirable outcomes, government will apply Green Book principles to public investment decisions, but the focus will be on removing barriers to growth, and working with markets by giving businesses and people the incentives and responsibility to meet their potential.

Providing the Stability Business Needs

There are clear economic costs associated with macroeconomic volatility and financial instability. In the UK, the cost of macroeconomic volatility was particularly evident in the 1970s and 1980s, while the cost of financial instability is currently being felt both globally and in the UK. This short chapter reviews some of the economic arguments and empirical evidence for why macroeconomic and financial stability support growth – underpinning the rationale for its inclusion as a pillar of the Government's growth framework.

Asset price booms, debt sustainability and financial instability

The benefits of financial stability for growth are best demonstrated by looking at the output cost of periods when financial stability has been lost. Following periods of rapid debt accumulation, which are usually associated with asset price booms, economies are often hit by financial crises when asset prices subsequently fall. History suggests that financial crises have often been extremely costly, with significant output losses and scarring effects that permanently reduce the level of output. For example, the IMF estimate that output remains 10% below its pre-crisis trend seven years after the start of a typical systemic crisis.[70] Reinhart and Rogoff (2009a, 2009b) have estimated that, on average, financial crises are associated with:

- Real housing prices falling by 35% over 6 years.
- Unemployment rising by 7 percentage points over 3 years.
- Real per capita GDP falling by 9% over 2 years.
- The real value of public debt rising by 86%.

As the Bank of England has highlighted, this means that "*...even if the probability of crises can be reduced slightly, the potential gains would be large. And there might be additional welfare benefits deriving from greater stability in a regime with less frequent crises.*"[71]

Macroeconomic stability and growth

Macroeconomic volatility can take the form of price and/or output volatility. However the majority of the empirical work has focused on using cross-country data sets to test the relationship between GDP volatility and the average rate of economic growth.[72] A number of these studies have found that volatility is associated with lower average growth rates.[73] These take account of changes in the average level of investment in order to isolate the impact of volatility over and above any impact on the average level of investment as a share of GDP. As such, they suggest that the link between volatility and growth is not only via its effect on the average level of investment, providing some support for the view that greater stability may improve the quality of investment, supporting productivity growth.

---

70 IMF (2009).
71 Bank of England (2010).
72 On the whole, studies in this area follow the methodology first set out in Ramey and Ramey (1995).
73 See, for example, Ramey and Ramey (1995), Aghion et al (2005), and Kose et al (2005).

There are four main channels through which reduced macroeconomic volatility can lead to improved living standards:

- Reducing fluctuations in output around its long run trend will raise living standards as individuals tend to prefer to consume a steady stream of goods and services over time.[74]

- Clearer relative price signals may reduce excessive search and negotiation costs incurred by firms and individuals seeking to avoid pricing mistakes. This may lead to better resource allocation and therefore a higher level of output, possibly spread over several years.

- Improvements in the quality and quantity of investment may lead to increased growth rates. If sustained over a number of years, even a small increase in the average rate of growth leads to large improvement in living standards.

- Increased flexibility at the firm level, leading to more efficient resource allocation and hence higher productivity.

Macroeconomic stability and the profile of consumption

Individuals generally prefer stable and predictable economic conditions so that they can plan and enjoy a steady flow of consumption over time. A volatile macroeconomic environment can bring income and mortgage payment insecurity, sometimes leading to unanticipated periods of low consumption. If all individuals had access to easily available credit, they could borrow and save so as to consume a steady flow of goods and services through economic upturns and downturns, but this is not always the case. Therefore, a fall in aggregate demand during a downturn may well create a larger fall in income and consumption among credit-constrained individuals. The costs of volatility for such groups in society could therefore be substantial.[75]

Macroeconomic stability, price signals and productivity

There are significant costs from unanticipated inflation, which is more likely to be associated with inflation volatility:

- The price mechanism works less effectively as firms and individuals find it more difficult to identify relative price changes when all prices are rising frequently.

- There are arbitrary redistributions of income and wealth.

- Long term investment is more difficult as agents are discouraged from entering into long term monetary contracts.

- Savers and lenders may respond to inflation uncertainty by demanding a risk premium.

---

74 Estimates of these types of benefits are generally small. Lucas (1987) estimated the costs of fluctuations in aggregate volatility of consumption to be “negligible” when compared with the benefits of even a small increase in growth.

75 For example, Krussell and Smith (1999, 2002) found that eliminating fluctuations would be worth almost 4% of lifetime consumption for individuals who do not save. Storesletten et al (2001) found that the cost could be as high as 7.4% for some groups in society, although much lower overall, and Beaudry and Pages (2001) found a cost of 1.4 to 4.4% for households with no wealth. It should be noted that these studies were all based on US data, so care should be taken when drawing inferences for the UK economy.

- Monetary policy makers are more likely to make mistakes due to greater uncertainty around key economic variables.

Macroeconomic stability and investment

Stability allows firms, consumers and the government to plan with the confidence that commitments to price stability and sound public finances will be maintained. Macroeconomic volatility can result in distortions in firms' and individuals' behaviour that could reduce the quantity and quality of investment.

Greater stability may improve the quality of investment, which may support productivity improvements and lead to higher economic growth. Investment is highly cyclical, so greater stability would reduce the number of less productive investments made at the peak of the economic cycle and increase the number of more productive investments carried out at the trough of the cycle, increasing the average return on investment over the medium term.[76]

There are various ways to explain the link between increased macroeconomic stability and better quality investment. For example:

- High volatility makes it more likely that firms will incur sizeable adjustment costs when increasing and decreasing the scale of their business. Costs are incurred when firms want to increase their investment substantially when demand is high, but there may also be costs to firms if they need to cut excess capacity when demand is very low.[77]

- Credit constraints exacerbate the impact of macroeconomic volatility on firms' long term investment projects and R&D spending. This is particularly true in a downturn associated with a credit supply shock, such as that experienced in 2008 and 2009.

Greater stability may also increase the level of investment to the extent that it reduces risk premia, encouraging investment. Potentially offsetting this is the fact that it also reduces the incentive to hold precautionary savings, reducing the funding available for investment.[78] In an open global economy, the likelihood of productive investment opportunities suffering from inadequate funding is increasingly remote. Empirically, the evidence suggests that overall greater stability is associated with higher investment.[79]

Macroeconomic stability and flexibility

Macroeconomic stability can foster greater flexibility at the firm level – in the sense that prices, wages and output can respond to changes in economic conditions. Improvements in labour and product market flexibility should improve resource allocation between sectors and firms. This improvement arises because firms and individuals are able to distinguish more clearly underlying trends in supply, demand and relative prices, both in the economy as a whole and in specific activities. This provides a stronger information set on which to base pricing, production

76 This idea was explored in Barlevy (2004). Given diminishing returns to investment, the average productivity of investment in boom periods is likely to fall, while the reverse is likely to be true during a downturn.

77 There is substantial evidence that these adjustment costs exist, and that these costs are 'convex', ie, for each extra unit of investment, adjustment costs increase by proportionately more. Empirical evidence suggests that convex adjustment costs are consistent with data at both the aggregate and industry level. For example Groth (2005).

78 See Aghion et al (2005) and Barlevy (2004) for a fuller discussion on this point.

79 For example, see Aizenman and Marion (1999), which examines this relationship at a macroeconomic level, and evidence set out in HMT (2004) for an overview at the firm level.

and resource allocation decisions. Greater flexibility means that firms are able to adjust prices, output, employment and investment more quickly in response to shocks and changes in macroeconomic policy. It can improve firm-level resilience to shocks and the efficiency with which resources are used.

Making Markets More Dynamic

Markets drive investment and growth by encouraging improvements in productivity – both through efficiency improvements within firms and the entry of new, more competitive firms. But markets can also fail to deliver desirable outcomes for a range of reasons, relating to externalities (including environmental externalities), and their tendency to move towards non-competitive structures. Government therefore has a key role in setting market frameworks to ensure that competition is fair, markets are open to trade, and regulatory burdens on businesses are reduced to the minimum necessary.

Promoting Open and Dynamic Markets

There is longstanding evidence to support the creation of an economic environment that encourages appropriate trade, investment, competition and innovation. Trade and competition create incentives and opportunities for firms to benefit from knowledge transfer, improved management, and to innovate; all of which contribute to raising productivity.

In 'The Wealth of Nations' first published in 1776, Adam Smith made the radical insight that a nation's wealth is really the stream of goods and services it creates. Today, we would call it Gross National Product. And the way to maximise it, he argued, was not to restrict the nation's productive capacity, but to set it free.[80]

And on competition, "*In general, if any branch of trade, or any division of labour, be advantageous to the public, the freer and more general the competition, it will always be the more so."* Adam Smith.[81]

Aggregate productivity growth is driven by a combination of productivity growth within firms, and the reallocation of resources between firms. The latter results from the dynamics of market share, as the best performing firms expand, and new firms enter an industry while poorer performers reduce in size or exit. These 'dynamic competition' effects can account for a large proportion of a country's aggregate productivity growth. Openness to trade impacts on this dynamic process by exposing firms and products to international competition, which augments both within firm productivity growth and resource re-allocation.[82]

Recent evidence on within firm productivity growth and the contribution of resource re-allocation comes from a study by Harris and Li (2007). They used data from 1996 to 2004 to examine the factors affecting productivity growth, and found that 42% of UK total factor

80 http://www.adamsmith.org/the-wealth-of-nations/.
81 The Wealth of Nations, Book II, Chapter 11, page 329, paragraph 106.
82 Bernard et al (2006).

productivity growth comes from reallocation between firms; 37% from exit and entry of firms and 22% from intra-firm productivity growth.[83]

Analysis by Disney et al (2003) on the manufacturing sector for the period 1980 to 1992 found a similar contribution of reallocation between firms to total factor productivity growth (41%) but a higher contribution from firm entry and exit (54%), and only a small contribution from 'within firm' productivity growth (6%). The relative contribution of 'between firm' and 'within firm' effects to growth will, however, vary between the markets and countries under consideration, and the stage of a product's life cycle.[84]

The benefits of competition to our growth potential are wide ranging.[85]

- Competition generates *short term* productivity gains by forcing firms to operate as efficiently as possible, constraining costs to maintain or grow market share. Competition therefore has a vital role in putting downward pressure on inflation.

- In the *medium term* downward pressure on inflation feeds through into lower interest rates which support investment in new capital equipment and hence ultimately growth.

- In the *longer term* open competitive markets are vital to allow routes to market for new entrant firms and new innovative products. Competition drives firms to innovate to survive. While incumbents may be more likely to regard new technologies as risks, new entrants need new technologies to successfully enter markets and so tend to experiment with innovation more aggressively.

Moreover, cartelised and monopolised industries tend to be characterised by higher costs, a narrower range of products and lower rates of technical progress and innovation. This is not only detrimental to UK consumers but also reduces international competitiveness in the long run, further depressing economic growth. Empirical work suggests that high rent firms have consistently lower productivity growth than low rent firms: a ten per cent increase in price mark-ups results on average in a 1.3 – 1.6% loss in TFP growth.[86] This demonstrates a negative relationship between market power and productivity,[87] although in some cases strong market power can support investment in innovation, and hence strong productivity (e.g. in the pharmaceuticals sector).

The UK airports industry is an example of a monopolised sector where rigorous pro-competitive action by the competition authorities can bring significant benefits to consumers. A recent investigation by the Competition Commission into the supply of airport services by BAA across the airports it owns in the UK concluded that lack of competition between its south east airports and between Edinburgh and Glasgow was leading to significant detriment to both passengers and airlines. It required BAA to sell both Gatwick and Stanstead as well as either Edinburgh or Glasgow. The Competition Commission is in the process of implementing the remedies,

83 An earlier study by Harris and Robinson (2005), covering UK manufacturing from 1990-98, found an even larger positive entry and exit effect; while 'within firm' total factor productivity growth was negative.

84 For example, entry and exit tend to be more prominent and have greater productivity enhancing potential at early stages of a product's life cycle.

85 For a relatively recent summary of this literature, see OFT (2007).

86 'Economic Rents' is a term used to reflect returns earned by a producer in excess of the costs of production, including a reasonable rate of return on investment.

87 See Disney et al (2003) and Nickell (1996).

subject to any appeal. The sale of Gatwick was completed in 2009 and initial reports on the performance of the newly independent airport have been encouraging.

There are a wide range of empirical studies on the wider effects of competition – for example, on the circumstances where enhanced competition drives innovation and growth (Griffith et al 2006) and the stimulus from competitive pressures to management efficiency (Bloom and van Reenen 2006). Reforms introduced by the UK government throughout the 1990s aimed at reducing entry barriers, such as market liberalisation, have been shown to have increased innovation and productivity in the UK.[88] Entry or the threat of entry increased the incentive on existing firms to innovate or adopt new techniques in order to avoid loss of market share. It also caused those firms that were less inefficient to exit, raising economy wide productivity levels.

Consumer confidence in markets is also essential to their proper functioning and to reinforce the competitive process. Consumers need to be confident that goods on offer are correctly described and their rights can be enforced; lack of confidence in this area can reduce competition and ultimately have a negative impact on demand. Hence the consumer framework has an important place in the creation of competitive markets and growth.[89]

Similarly, the pressure on firms to attract and retain customers provides a strong incentive for businesses to act responsibly and improve their products and services. Confident consumers are more likely to know their rights, be more willing to hold suppliers to account and seek the best deal by shopping around between suppliers. This behaviour in turn encourages competition. Consumer confidence in markets is therefore central to making markets work well, delivering better outcomes for consumers and the economy generally. They can therefore exert significant pressure on business practices without the need for burdensome regulation. There is growing evidence to show that empowered consumers act as a spur to drive competition (OFT, 2009) and as a driver for firm-level innovation (Waterson, 2004).

The process of dynamic competition is further influenced by international trade. By exposing firms and products to international competition, economies are encouraged to focus on areas of comparative advantage. This helps ensure that scarce skills and resources are deployed where they are most productive. International trade also influences within firm productivity growth, as firms benefit from larger potential markets (and hence greater economies of scale) and exposure to productivity enhancing ideas and technologies.[90] Econometric evidence for the UK indicates that firms tend to increase their productivity after entering export markets.[91]

Analysis of the UK suggests that 60% of aggregate productivity growth is generated by exporting firms.[92] Of this, 'within firm' productivity growth accounted for 34%, while reallocation effects across exporting firms accounted for 42%, and net exit only 7%. This is in sharp contrast to non-exporters, whose contribution to aggregate UK productivity growth was almost entirely through exit of low productivity firms (91%); while 'within firm' productivity growth contributed only 5%.

88 Aghion et al (2009).
89 BERR (2008b).
90 Mayer et al (2009).
91 Harris and Li (2007), Greenaway and Kneller (2007).
92 Harris and Li (2007).

Whilst exporting firms tend to be more productive than those which do not export, one cannot fully attribute increased productivity in these firms to benefits acquired through exporting. This is because there may be a selection bias present in that exporting imposes costs such as; learning about customs procedures, building networks, and conforming to regulatory standards etc. Firms that can absorb or overcome these costs are generally those which are the most productive. Therefore, it may be that exporting firms were already more productive, before they began exporting. It is important to note this systematic bias when considering the evidence.

These findings are supported by more aggregate level evidence. For example, the OECD estimates that a 10 percentage point increase in trade openness (i.e. a decrease in tariffs and non-tariff barrier equivalents) translates into an increase of around 4% in income per person.[93] It is not just exporting that can increase a firm's productivity. UK firms that import services also have better performance characteristics in terms of productivity and employment than firms which do not trade. The European Commission estimates that a 1% increase in the openness of the economy, as measured by the ratio of imports to value added, results in an increase of 0.6% in labour productivity in the following year.[94]

Analysis of UK firms shows that those which import services account for 2.8% of all firms but 7.9% of employment and 11.2% of output.[95] Firms which both export and import services perform even better accounting for 4.4% of firms but 11.3% of employment and 16% of output.

Open markets also encourage innovation, partly because greater foreign competition makes this more necessary, but also because larger markets make the rewards from innovation more profitable and provide access to a larger pool of capital to fund innovation. Trade, like investment, is an important mechanism by which countries can have access to new technologies.[96]

The dynamic competition effects of international trade also impact positively on the aggregate level of innovation and R&D in the economy, as exporters tend to be more innovative and conduct more R&D. UK owned exporters account for over 70% of UK R&D, nearly twice their share in total output.[97] A similar association between innovation and exporting has been found for other countries. Recent analysis of a panel of firms which were in two consecutive waves of the Community Innovation Survey (CIS 4 and 5) found that for manufacturing firms exporting was associated with a higher probability of investing in research and development in the subsequent time period. For non-manufacturing firms, exporting was associated with a higher probability of innovating in the subsequent time period.[98]

FDI and Growth

Foreign Direct Investment (FDI) is another means by which technology and know-how can be transferred between countries – which can in turn lead to more efficient production processes and enhanced organisational structures. One such mechanism for this is the R&D that foreign multinationals (MNEs) undertake in the UK. Between 2003 and 2005 over 25% of UK patents were filed by foreign residents. Foreign-owned plants which export contribute proportionally

93 OECD (2003) http://www.oecd.org/dac/ictcd/docs/otherdocs/OtherOECD_eco_growth.pdf.
94 European Commission (2007a).
95 Breinlich and Criscuolo (2009).
96 Lilleva (2008).
97 Harris (2008).
98 Harris and Li (2010).

more to UK R&D spending than non-exporting foreign owned plants (13.3% and 4.3% respectively in 2004).[99]

There is mixed evidence about the impact of FDI on growth. Most FDI into the UK results from foreign mergers and acquisitions (M&A), however new 'Greenfield' investments also take place. Much of the economic evidence around the impact of FDI comes from analysis of merger and acquisition activity or both Greenfield and M&A. Earlier studies have tended to find positive effects of FDI on productivity, however, as analytical techniques have developed and more factors have been controlled for, the effect has become less clear.

At the micro level, empirical evidence suggests there is a labour productivity differential between foreign multinationals and domestic firms, which partly translates into higher wage levels for the former. Such differentials persist when we control for factors such as plant size, but largely disappear when domestic multinational firms are compared to foreign owned firms – the main exception to this being US owned firms.[100] The US advantage has been attributed to them acquiring more productive UK plants, their better usage of technology,[101] higher investment in IT capital and achieving higher labour productivity from IT capital.[102]

The wider knowledge spillover effects mentioned above can occur horizontally (between competing or complementary companies) or vertically (between the foreign investor and its local suppliers).[103] However, such spillovers tend to be confined to firms in the same region and industry and are influenced by the absorptive capacity of domestic firms – with spillover benefits increasing with absorptive capacity.

Large firms with high skill intensity tend not to benefit from spillovers, possibly due to these firms already being high performers and therefore having less to learn or gain from other firms since they are already close to the technology frontier. Girma et al. (2001) found that in aggregate, domestic manufacturing firms do not gain from the presence of foreign firms, as the positive effects that some firms experience are cancelled out by the negative effects of others. It should be noted though that the absence of such a link could be due to differences in industrial and firm level characteristics. By contrast, Hubert and Pain (2000) found that there are both intra- and inter-industry spillovers, improving technical progress in the UK manufacturing sector. The presence of spillover benefits is not only influenced by the characteristics of domestic firms but also the motivation of the foreign firm for investing. Those which are 'technology seeking' are not associated with spillovers to firms in the host country.[104]

One cannot consider the impact of FDI on growth without considering its impact on employment and potential plant closure. It is sometimes perceived that Greenfield investments raise employment while M&As do not. A foreign M&A could lead to a reallocation of resources to more productive uses and possibly to an associated employment loss. This could be because multinational enterprises (MNEs) are potentially more footloose as international expansion is considered riskier than a purely domestic venture;[105] or foreign acquisitions being

99 Harris (2008).
100 Criscuolo and Martin (2005).
101 Driffield and Taylor (2005).
102 Bloom et al (2007).
103 OECD (2007b) http://www.oecd.org/dataoecd/1/45/40476100.pdf.
104 Driffield and Love (2007).
105 It is widely believed that the more embedded the foreign investor is, the less likely it is to demonstrate footloose behaviour. The concept of embeddedness relates to the extent to which firms have built linkages with

a device to acquire market access, distribution channels, skills, etc, only for short term interest; or because the MNE takes over domestic competitors to close them down and reduce the degree of competition in the industry.

It is also possible that if the foreign acquirer transfers knowledge, technology or skills and thus contributes to an increase in its performance such acquisitions could lead to an increase in the survival probabilities of acquired plants and positive employment effects. However, recent evidence on foreign M&A activity in the UK finds that, for 1984-2005, foreign M&A was associated with a higher probability of plant closure post-acquisition. Labour productivity at foreign-owned plants was found to significantly exceed that of domestic-owned plants, across both manufacturing and services. This difference seems to have been driven by the greater use of intermediate inputs by foreign-owned firms. However, M&A by foreign owned firms was not associated with increased total factor productivity (TFP) in manufacturing plants and only a short-lived boost to TFP was observed for plants in the services sector.[106]

International empirical evidence confirms that assessing the impact of FDI on employment and plant survival is complex. Multinationals are typically stronger (more productive, invest more, pay more and are larger) than non-multinationals. Hence simple comparisons tend to show multinationals as being stronger and less likely to close plants than domestic firms. However, once the strength of their underlying characteristics is allowed for, studies suggest that multinationals may be more likely to shut plants than domestic firms.[107]

Harris (2009) also explored employment effects by contrasting UK, US and EU takeovers in the manufacturing and services sectors over a 5-year post-acquisition period. For services, there were initially employment gains for US-acquired plants, but these turned to a slight decline by the end of the period. For EU acquisitions, there was overall no significant change over time, whilst initial improvements in service sector plants acquired by UK-owned firms declined to zero. For manufacturing, plants acquired by US and EU-owned firms did experience improvements in employment levels, but there was little evidence of any change in UK-acquired plants. However, these surveys only considered surviving plants. A similar study by Schiffbauer et al (2009) which used firm level data from 1999-2007 found declines in employment post acquisition.[108] Other studies of FDI have found associations with higher wages and an increase in demand for skilled workers, leading to increased wage inequality.[109]

To conclude, it is important to note that evidence on employment effects of greenfield and M&A investments refers to employment effects within firms and does not provide a basis for concluding the overall effects are positive. At an aggregate employment level we would need to take account of potential wider effects on employment, either negative (from displacement) or positive (if productivity spillovers allow others firms to improve their productivity and performance and subsequently also employment).

customers, suppliers and other bodies and is also relevant to the probability that an inward investor generates spillovers.

106 Harris (2009).

107 Harris (2009), Schiffbauer et al (2009).

108 Schiffbauer et al (2009).

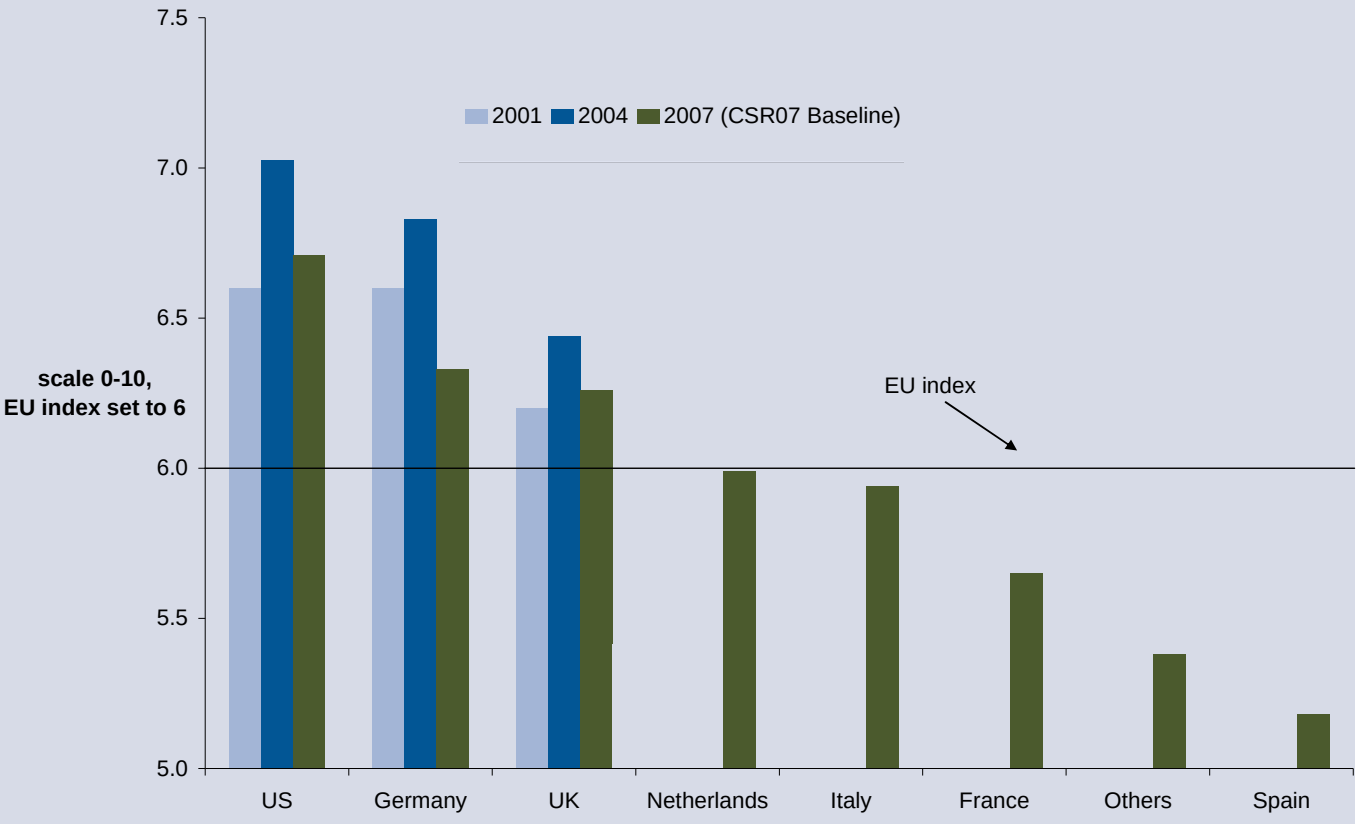
109 See for example Driffield and Taylor (2000).

Indicators of Success

The European Commission estimates that the Single Market delivered gains equal to 2.2% of EU GDP between 1992 and 2006, creating 2.75 million jobs in the process. This translates into a benefit of around £25 billion to the UK over that period.[110]

The UK domestic competition regime is ranked among the best in the world. The Global Competition Review, which rates competition agencies worldwide, gives the Competition Commission its highest rating, at five stars, putting it on par with the US Department of Justice and the Federal Trade Commission. The Office of Fair Trading receives a 4.5 star rating, equal to the rating accorded to the European Commission's DG Competition. In addition, the 2006-07 'Peer Review of Competition Policy' compiled by KPMG which assessed the competition regimes of different countries, ranked the UK third behind the USA and Germany.[111]

Figure 15: Competition Regime Performance Index



Source: KPMG, 2007

There is a substantial evidence base to support the idea that relatively small amounts of public expenditure on the competition regime can potentially generate a large increase in UK productivity. The actions of the competition authorities, particularly on the enforcement of competition law and merger control, where deterrence effects can be powerful, are substantial. In its latest evaluation report the OFT conservatively estimated that its work on mergers, competition enforcement and market studies, produces a direct financial benefit to consumers

110 European Commission (2007b).
111 DTI (2007).

of over £300m per annum.[112] Moreover, this figure does not take into account the deterrence effect of competition interventions, or the wider benefits of competition, such as the impact on consumer confidence, innovation or productivity, which are less readily measurable.

Key Challenges Ahead

Whilst the UK competition regime is widely regarded as world class, we want to continue to improve it. There could be longer term economic benefits from merging the competition functions of the Office of Fair Trading and the Competition Commission to create a more aligned and streamlined competition regime. This may provide the opportunity to strengthen the ability to tackle anticompetitive abuses whilst minimising any process inefficiencies inherent in the current bipartite system, which causes costs and burdens to both business and the competition authorities themselves.

With regards to FDI, there are concerns that some take-overs, domestic and international, are driven by very short term motivations, which could be at the expense of longer run social welfare. Our toolkit to influence corporate behaviour is currently limited. Changing this position is possible in principle, but in reality any change risks deterring investment in the UK by both national and international firms, imposing additional burdens on businesses or possibly leading to a loss of 'efficiency stimulus' because of reduced competition for corporate control.

The Single Market has delivered considerable benefits to the UK and full implementation of the Single Market programme could roughly double the existing benefits, driven by progress on services (0.5-1% increase in EU GDP); financial markets (1.1%); energy (0.6-0.8%) and tax co-operation (0.2%).[113]

A new BIS-CEPII study shows that the complete removal of all obstacles to trade could boost EU welfare by 14.1% after 10 years of implementation. This would translate into 7.1% of additional national income for the UK economy. Whilst the complete elimination of all trade barriers across Europe is a very ambitious scenario, the study indicates that further (more realistic) reductions to obstacles to trade could substantially boost UK and EU growth in years to come.

Better Regulation

Evidence of why regulation is important for growth

The role of regulation in the economy and its impact on growth has been the subject of significant debate and research. While the focus has been on reducing the burden of regulation and minimising the costs it can impose, economic analysis also finds that in some cases targeted and proportionate regulation can promote economic growth and wider economic welfare. The use of regulation should therefore be based on a strong market failure argument (or equity arguments when market outcomes are not desirable) and designed to guide markets towards producing the desired outcomes with the minimum of side effects.

Central to good regulation is choosing the right instrument(s) to tackle each problem. As much as possible, government should give responsibility for achieving desired outcomes to individuals, communities and businesses. However where risks are unacceptably high, or

112 OFT (2010). This is comprised of Competition Enforcement (£84m), Mergers (£310m) and Market studies and Investigations (£345m). For further information see OFT (2009).
113 European Commission (2007b).

where market failures mean that markets alone cannot deliver, regulation can apply a range of instruments to tackle these failures:

- Direct (command and control) regulation;
- Market based instruments, including taxes and trading;
- Information provision and public engagement programmes;
- Self regulation and co-regulation

Well designed regulation that provides long term signals to individuals and businesses has an important role in incentivising investment and innovation. However, badly designed or contradictory regulations can place unnecessary burdens on businesses and constrain economic growth.

It is generally recognised that direct regulation, where legislation is highly prescriptive about how those affected are required to act, can be a blunt instrument. Before its introduction, there is usually only limited information available on what its effects are likely to be, and on how agents might respond. Furthermore, it is inflexible, in that behaviour is dictated, rather than allowing individuals to develop their own response to reach the desired outcome. In some cases it may be the best way of securing objectives (e.g. to ensure that a hazardous substance is no longer used in production), but in many cases such prescription over the process of achieving the desired outcome is unnecessary. This lack of flexibility might also mean that the costs of compliance are higher than they might be with an alternative approach, and therefore the direct and indirect impacts on productivity could well be higher.

Majumdar and Marcus (2001) note that better designed regulations tend to be more flexible; giving firms some freedom on how to achieve the goals, the time to develop new capabilities (R&D and new technologies) to achieve them and also setting ambitious objectives to encourage development beyond current practices. Outcome based regulation, where the outcome is prescribed but not the means of achieving it, can be used to address these concerns, and can be a way of reducing the direct and indirect costs of regulation on productivity. Using 1990 data from the US electric utility industry, they find that when the utilities were given the freedom to develop a regulatory response sensitive to varying local conditions, the regulations were more likely to result in competitive advantage. By contrast when utilities were forced to install a particular technology specified by regulation, they were likely to pay a greater price, with no associated gain in productivity.

However, for outcome-based regulation to be successful, the activities of businesses must be appropriately incentivised and supervised so that regulations can, where necessary, be enforced. One example of this noted by May (2003) occurred in New Zealand, where poor monitoring of building practices resulted in the ‘leaky’ building crisis.

Benefits of regulation

By addressing market failures and tackling inefficiencies, regulation can boost the productive potential of the economy and thus raise economic growth. Broad regulatory frameworks can drive growth by promoting competition and facilitating an improved climate for investment and innovation (despite the fact that the individual regulations that comprise them will impose some direct compliance costs on firms).

The existence of an appropriate corporate governance framework, for example, is a pre-condition for enterprise and investment, and a key determinant of company performance. Equally the existence of a robust competition framework is vital to ensure that the productivity enhancing effects of competition can be realised. A regulatory framework that provides regulatory certainty and a credible commitment to investors is essential in driving large, sunk investments in the economically regulated sectors.[114]

Unless carefully designed, however, these frameworks can also hinder growth. For example, Maher and Wise (2005) noted that the UK planning regime can protect incumbent firms from competition and can inhibit efficient operation, lowering productivity growth. But the planning regime is intended to achieve a number of goals, of which its impact on productivity is only one aspect.[115] Equally, unconstrained development could have a negative impact on productivity.

The Government recently started aggregating the benefits and costs of regulations it introduced. Based on the estimates of benefits and costs in their Impact Assessments, regulations introduced in 2008-09 produced an overall benefit to cost ratio of 1.85 (meaning that Government regulation is expected to deliver at least £1.85 in yearly benefits for every £1 of cost).[116] This mirrors findings in the US, where estimates of the benefits of regulation were found to outweigh the associated costs. Aggregated data for major federal rules shows that rules introduced in 2006/07 induced annual benefits estimated at between $29bn and 184bn compared to costs of between $9bn and 11bn.[117]

Economic research suggests that the relationship between regulation and innovation is extremely complex – and can be positive or negative. Changes in regulation bring about changes in innovation through a variety of channels, such as through altering the incentives and risks from innovation as well as the costs and benefits. For example, while the removal of regulation can increase the incentives to innovate by reducing barriers to entry, greater regulation can also stimulate innovation by strengthening intellectual property rights.

Regulation can affect innovation on both the supply side and demand side of the 'innovation system'.[118] On the supply side, it can influence decisions about inputs (e.g. R&D investment, external knowledge) and the nature of outputs (e.g. the characteristics of new differentiated products and services). For example, as the UK telecommunications sector has been opened up to increased competition, there has been a shift in investment away from infrastructure to services resulting in new products such as innovative call plans and the bundling of fixed and mobile phone services.[119]

On the demand side, innovation can also drive the development of particular technologies. For example, the development and adoption of low carbon technologies has been stimulated by the UK government's goal of reducing greenhouse gas emissions by 80% by 2050. The relationship is also dynamic in that the development on new technologies, products and

114 Helm and Yarrow (1988).
115 The second Barker Review highlighted the planning system as a serious impediment to labour mobility and improved labour market flexibility.
116 HM Government (2009).
117 US Office for Management and Budget Report (2008).
118 The concept of the 'innovation system' is discussed in more detail in the section below on science and innovation.
119 OfCom (2004).

business processes can lead to the emergence of new markets and market failure which in turn may necessitate changes to the current regulatory framework in order to address them.

The link between regulation and innovation has been explored in the environmental context – where environmental regulation can enhance incentives to innovate and invest. The so-called Porter Hypothesis (Porter (1991), Porter and van der Linde (1995)) postulates that strict environmental regulations can induce improved efficiency of production processes and encourage innovations that help improve commercial competitiveness, thus having a positive impact on productivity that outweighs any negative impact of compliance costs.[120]

Reid and Miedzinski (2008) found that government policy is a major driver in green innovation; requiring compliance with environmental regulations has also been found to increase innovation – for example, Jaffe and Palmer (1997) found an increase in compliance expenditure was associated with an overall short-run increase in R&D.

It is difficult to reach firm conclusions on the effect of environmental policy on overall levels of R&D investment across the whole economy. Early studies of the impact of climate policies found that they stimulated innovation in alternative energy industries, but discouraged R&D in non-energy sectors – leading to a contraction in total production and reducing the overall rate of technical progress.[121] However, more recent studies have reached different conclusions. For example, Carraro et al (2009a) and Carraro et al (2009b) analysed climate policy and found that investment in energy-related R&D do *not* lead to crowding-out of investment in other sectors, nor do they lead to a deterioration in levels of human capital.

A further positive example is standards regulations which provide a key enabling mechanism for the widespread diffusion of major technologies, and hence are productivity enhancing.[122] Standards can be used by government to tackle information failures (by diffusing technical information which innovators can use to develop new products, services and technologies which are compatible with existing ones) and co-ordination failures (by reducing transaction and search costs minimising the duplication of research and ensure compatibility of new goods, services and technologies to the benefit of consumers).

DTI (2005a) found that the growth in standards as measured by the BSI catalogue accounted for 13% of labour productivity growth in the post-war period. Common standards across countries (e.g. EU wide) can be important in facilitating innovation, notably in major technology based innovation where the role of scale is important. Also, regulation can play a further role in facilitating innovation through providing a shared framework for interoperability where developments require network economies (e.g. EU telecommunications regulation).[123]

---

120 SQW (2006) provides a summary of the literature that challenges Porter's hypothesis on both theoretical and empirical grounds. The challenge is two-fold. First, the hypothesis rests on the assumption that public authorities can be efficient when it comes to regulation when the evidence suggest they have difficulties in resisting lobby pressure for exemptions and exclusions. Second, it is based on what many regard as the unlikely assumption that firms systematically fail to pick low hanging fruit and that more stringent regulations are more likely to do so than market forces.

121 Among which Goulder and Schneider (1999).

122 By this we refer to standards defining best practice established by consensus and approved by a recognised body (such as the British Standards Institute).

123 Certainty in the regulatory process, however, is important to create the right incentives in the innovation process. Unplanned delays can in some cases critically impact on the deployment of new products, providing a greater opportunity for competitors to imitate, and these delays may reduce the payback to innovators.

Adverse impacts of regulation

Regulation can typically raise the costs of operating a business by placing both financial and time demands on it. According to businesses, the five areas which impose the highest administrative costs are health and safety law, employment law, taxation law, sector specific legislation and environmental law.[124]

Regulation imposes compliance costs on businesses which can include changes to working practices. In some cases where a business does not have the skills required to handle the changes imposed, it may feel the need to seek external advice. There is also the risk that where regulations are particularly complex, risk-averse organisations will resort to 'gold-plating' – implementing compliance to the maximum, in order to avoid any conflict with the law. Complex regulations are also likely to lead to higher monitoring and enforcement costs for both the government and regulators.

Crafts (2006) concludes that while the direct impact of compliance costs is important, it is likely to have a relatively small impact on productivity when compared to other channels. However, the impact should not be underestimated, particularly in the case of smaller firms, which are limited in their capacity to absorb such costs (as a result of a lack of management time to deal with compliance and their inability to exploit the same economies of scale as large firms).

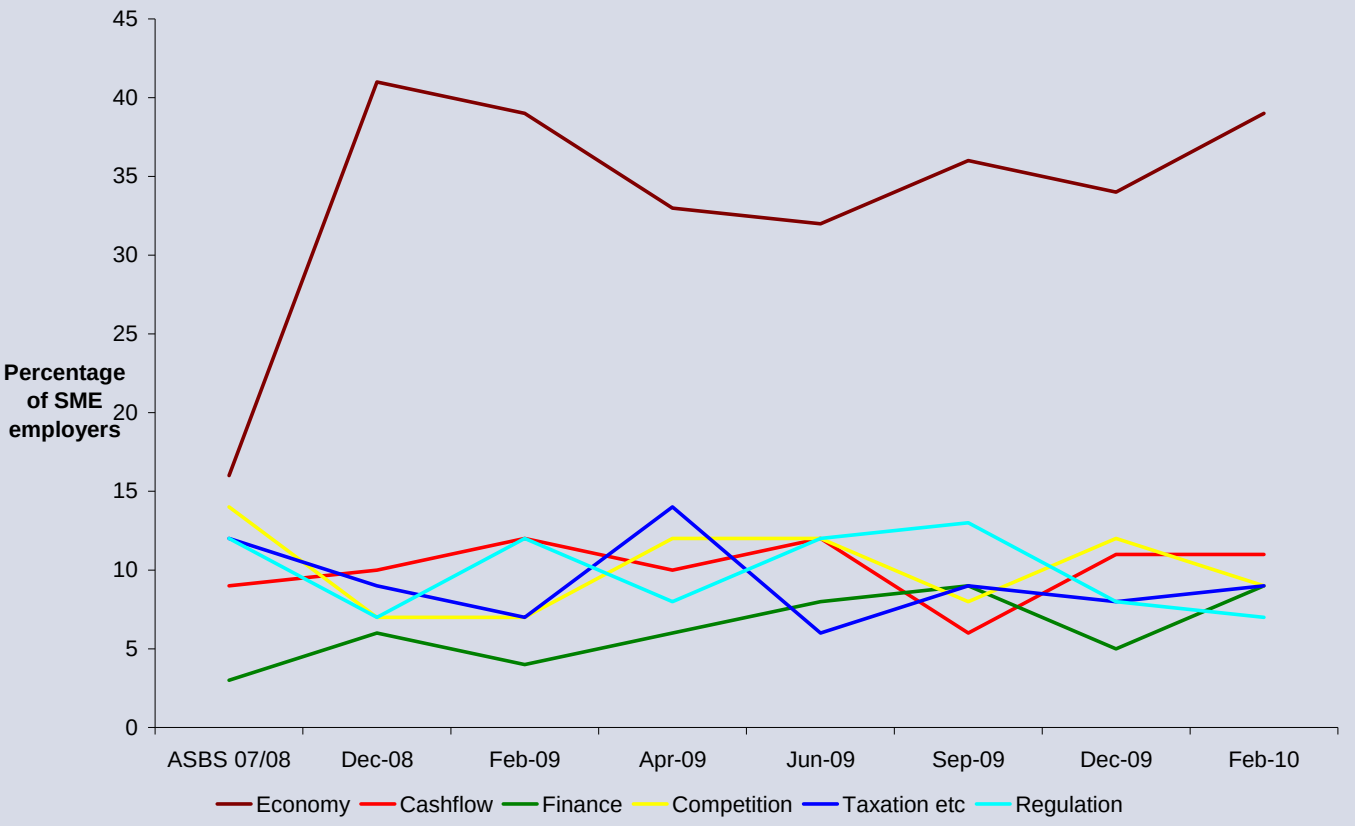
It is the indirect impacts which arise when regulations create barriers to entry that are likely to have the more significant effect. These barriers can constrain the intensity of competition and discourage the formation of firms,[125] as new firms find it harder to enter existing markets and compete with incumbent firms.[126] This weakening of competitive pressures can then reduce firms' incentives to innovate or to imitate (impeding technological diffusion).[127]

The introduction of new regulation can impose additional costs on business as a result of the introduction of a number of interventions at the same time. For example, organisations trying to comply with many regulations simultaneously or before earlier changes have been bedded down. Thus the cumulative effect may be overlooked where one regulation may not be especially burdensome but the wider policy landscape may pose a larger obstacle to growth.

The SME Business Barometer suggests that small businesses view regulations as a key constraint on growth.[128] This can be due to direct influences where they are obliged to comply or through indirect influences, for example where their market (competitors, customers, employees, etc.) and non-market (regulatory authorities) relations have been altered. Given the nature of business and the level of interdependence between a business and key relations, the extent of indirect regulatory influences is potentially very significant and complex.[129]

124 BERR (2007).
125 Commission paper (2006) cites internal work showing how GDP per capita is positively related to the ease of starting a business as measured in the World Bank's "Doing the Business" database.
126 Klapper et al (2004).
127 This has been lent support from firm-level studies such as Nickell et al (1997) which find that greater competition has a beneficial impact on productivity growth.
128 BIS (2009a) and BIS (2010c).
129 BERR and Kingston University, London (2008).

Figure 16: Main Barriers to Business Success



Source: BIS SME Business Barometers and Annual Small Business Survey 2007/08.

The magnitude of the impact of regulation on business performance can be largely determined by the capacity of businesses to adapt to regulations. The adaptability of businesses and their responsiveness to changes in the regulatory environment can depend on a number of factors, not least personality of management and capacity for change.

The impact of regulation thus depends not just on the intervention itself but on a number of factors related directly to the business e.g. sector, size and the stage in lifecycle of the business are key determinants of how successfully a firm will adapt to change.[130] In the SME Business Barometer[131] there was a significant variation in the ranking of regulation as an obstacle to success by sector (15% of the primary/manufacturing sector viewed regulation as the main obstacle, whereas 10% of the services sector, 6% of the transport, retail and distribution sector and just 1% of the construction sector held a similar view).

Empirical evidence of the overall impact of regulation on growth

Two types of empirical approaches have been used to investigate the relationship between regulation and growth. At an aggregate level, some studies rely on economy-wide indices such as the Economic Freedom Index published by the Fraser Institute or indicators published by the World Bank in their Doing Business studies to establish econometric relationships between regulation and economic performance. On the other hand, many studies focus instead on specific sectors such as product market regulation.

130 BERR and Kingston University London (2008).
131 BIS (2009a).

Nicoletti and Scarpetta (2003) examine the macroeconomic links between elements of product market reform and productivity, as measured by total factor productivity growth. To do this they make use of the OECD's indicators of product market regulation for 18 OECD economies between 1984 and 1998.[132] They find that product market reforms (comparing the state of regulation between the 1980s and the 1990s) are positively correlated with total factor productivity growth, with the strongest correlation for reforming administrative burdens.

Based on an economy-wide regression analysis, they find that strict product market regulation has a negative effect on total factor productivity growth by slowing down technological change. In particular, it can create barriers to entry, which were found to be more damaging in the context of new technological opportunities. While privatisation, as expected, has a strong statistically significant effect on productivity, the negative impact of barriers to entrepreneurship is not statistically significant. Moreover, further detailed analysis provides some ambiguous findings – for example, that restrictive regulation in the services sector has a positive impact on productivity, which they attribute in part to data issues as well as to the relative diversity of market conditions in the service sector.

Gorgens et al (2003) use the Fraser index of economic freedom as a proxy for the level of regulation, and find that an improvement in regulation from a high level to a moderate level suggests an increase in economic growth of about 2.5 percentage points. However, the relationship is not statistically significant at lower levels of regulation.

Box 4: Empirical evidence on the overall impact of environmental regulation on growth

While debates over regulation to correctly value environmental assets as part of the move to a green economy are often characterised as short terms costs versus long term benefits, empirical evidence is more mixed. For example Albrecht (1998) tested the impact of ozone-policies on the products that use ozone depleting substances and concluded that well-designed environmental policy can increase R&D into resource-efficient products and processes, resulting in improved business competitiveness and profitability.

Similarly Meyer (1992, 1993) finds no statistically significant negative impact on growth in US states with more stringent environmental regulations. However, Frohwein and Hansjurgens (2005) find that although some firms may benefit from more stringent regulations, others will be worse off. Jorgenson and Wilcoxen (1990) find that capital investment to comply with more stringent environmental regulations slowed the US economy by 0.2% annually between 1974 and 1985 compared to business-as-usual. The study concludes that the growth effects would have been even more modest had more effective policy choices been made.

Indicator type evidence on UK performance in terms of regulation

The UK performs well on some international measures of regulation but less so on others. There are signs that, while UK regulatory barriers may not be increasing, other countries may be catching up and, in some cases, overtaking the UK's efforts at reducing regulatory burdens. The UK's performance varies between indicators as shown below:

132 It should be noted that these indicators look at the extent of regulation, rather than the level of compliance. It is likely that the enforcements regime across countries would influence the level of compliance, which in turn affects the extent to which productivity can be affected.

- The OECD ranked the UK joint first along with the US on their product market regulation (PMR) indicators (last published in 2008). [133]

- The World Bank ranked the UK 4th in terms of ease of doing business (and first in Europe) in the 2011 Doing Business Report. However, despite some improvements to UK performance in the 'trading across borders' and 'enforcing contracts' indicators, the UK declined in the 'starting a business' indicator. However, the 'employing workers' indicator, where the UK usually ranks relatively lowly, was excluded from the 2011 report, which may have contributed to the UK's relatively high rank.

- According to the World Economic Forum 'Global Competitiveness Report' 2010-11 the UK has seen significant relative decline in many measures of regulatory burden such as 'the burden of government regulation' over the last few years. The Report, which captures a range of factors important to competitiveness including regulation (based on responses to surveys sent out to business executives), points to UK competitiveness in regulatory burden declining relative to many other countries over the last few years.

There is clearly scope for improvement in a number of international measures of UK regulatory burdens. In particular, while measures of UK regulatory burdens indicate barriers may not be increasing, some countries seem to be reducing burdens beyond that achieved by the UK so far.

Table 7: UK International Ranking

Rank	WEF Global Competitiveness 2010/11	World Bank 2010	OECD Product Market regulation Index 2008
1	Switzerland	Singapore	**United Kingdom** (joint first)
2	United States	Hong Kong	United States (joint first)
3	Singapore	New Zealand	Ireland
4	Sweden	**United Kingdom**	Canada
5	Denmark	United States	Netherlands
12	**United Kingdom**		

Evidence on the impact of better regulation strategies

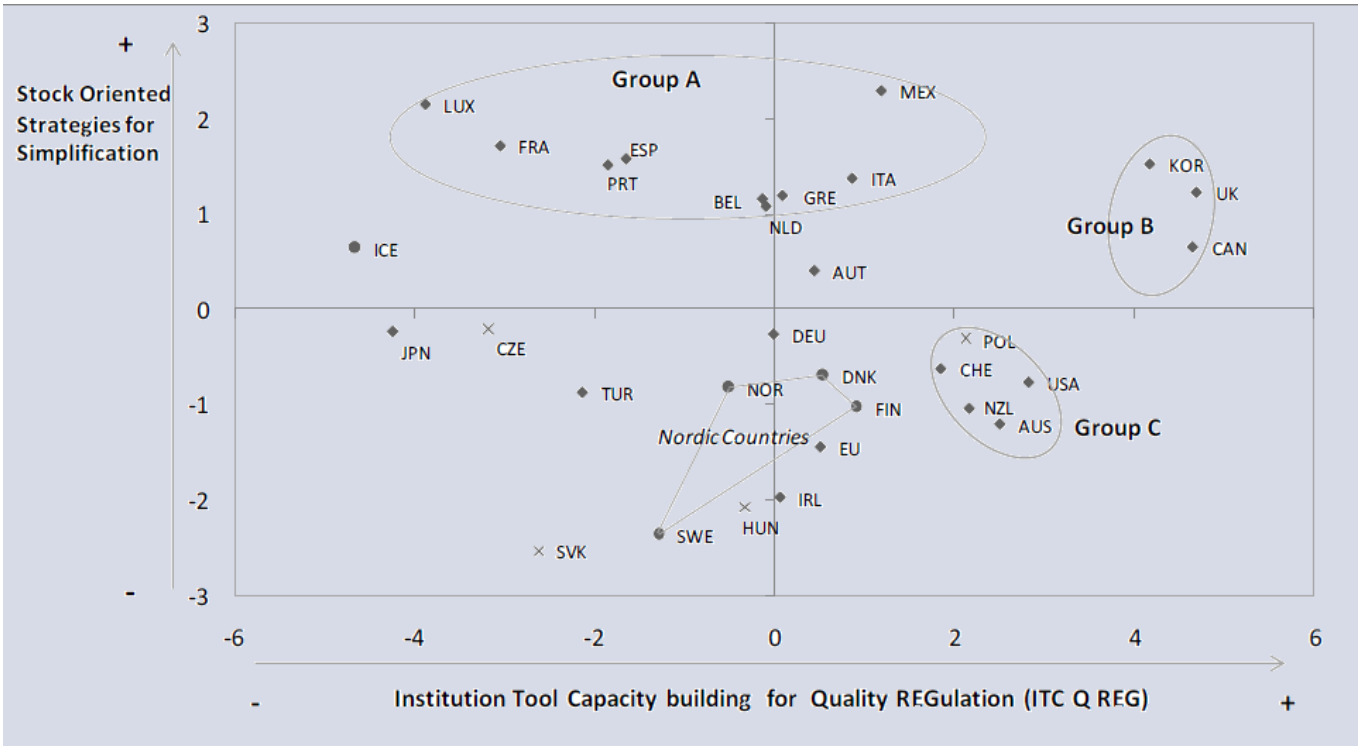
Jacobzone et al (2010) provide a first attempt to assess the impact of strategies aimed at reducing regulatory barriers (e.g. existence of central regulatory oversight and coordination, requirements to consult, justify regulatory action, seek less burdensome alternatives and conduct impact assessments, existence of simplification targets, etc).

Based on OECD data, they categorise OECD countries depending on whether their regulatory strategies relies on simplification strategies (reducing the stock of regulation) and/or on putting in place institutions and tools and building capacity to address the flow of new regulations.

133 OECD (2008b).

The UK, alongside Canada and Korea, is placed in a group that is most advanced in terms of recourse to regulatory quality tools and institutional set up, while also developing policies for administrative simplification and burden reduction.

Figure 17: Cross Country Patterns of Regulatory Management Strategies in 2005



Source: Jacobzone, S. et al. (2010)

They then run a series of correlations between these two strategies when dealing with regulations and a series of aggregate indicators and several of their components, such as the World Bank's Doing Business Indicator, the World Economic Forum's Global Competitive Index or the OECD's Product Market regulation indicator and Regulatory Reform Index.

Strong correlation is found, for example, between a regulatory strategy based on putting in place institutions and tools as well as building capacity to address the flow of new regulations, and a reduction in the time to start a business, dealing with licenses, or even employing workers. There is also a strong correlation between this same approach to regulation and the Regulatory Reform Index (RRI), which in turn has been found to make a statistically significant contribution to increasing long term economic growth.

Finally, Jacobzone et al also assess the impact of regulatory reform strategies on macroeconomic efficiency by running a series of regressions. They conclude that a "movement towards best practice in the regulatory management system unambiguously corresponds to improved economic performance. (…) While most of the cross country variance is explained by country specific characteristics, a small share can be attributed to the impact of factors linked to the quality of regulations. (…) This implies that an improvement in regulatory quality corresponds to a statistically significant increase in total employment, employment in the business sector, GDP for the business sector, and labour productivity in the business sector".

Instrument selection: making the right choice

The choice of regulatory policy is dependent on the nature of the problem to be tackled, as well as wider economic, social, environmental, political and institutional concerns. Some instruments, such as trading schemes and direct regulations, have the advantage of providing a degree of certainty over their outcome. Other interventions may provide less certainty but in some cases will be more cost-effective or impose fewer burdens on businesses.

Behavioural research can make an important contribution by identifying the public preferences that underpin public value and therefore are potential areas for government action. It can complement standard microeconomic preference theory by exploring when, how and why decision makers display 'human limitations and complications' (Mullainathan and Thaler 2000). Behavioural interventions can then be developed with the external community to provide an opportunity for Government and citizens to have shared ownership of solving problems and achieving a desired future. In some cases this can be more cost-effective and acceptable than other behaviour change instruments.

As acknowledged in the Stern Review,[134] removing barriers to behaviour change is essential in encouraging the take-up of energy efficient appliances. Lack of reliable information coupled with behaviour inertia can lead to appliances not being purchased that would contribute to economic growth by both improving the environment and saving money. Minimum standards and labelling can help address such barriers by cutting through complexities where price signals alone are not adequate and allowing decisions to be made through simple information.

It is possible that some types of intervention may provide less certainty but in some cases will be more cost-effective or impose fewer burdens on businesses. This includes behavioural programmes (focused on addressing the key determinants of behaviour (e.g. habit, social norms, or role of influencers), communication campaigns, education, peer-to-peer engagement and citizens and community engagement programmes. These interventions have potential to bring about long term ingrained behaviour change and provide a process for government to work in partnership with individuals, communities and business in a less coercive and more cost-effective manner, with lower risk of government failure.[135]

Market Based Instruments

By making proper use of incentives Government can encourage particular types of behaviour through individual choice (in contrast to regulation, which compels changes in behaviour) and allow the market players to respond as they see appropriate.

Economic theory suggests that market-based instruments such as competitive tendering, user choice or tradable permits can have advantages over traditional regulatory instruments. Significant benefits can be achieved in the form of lower costs and better services, arising from enhanced competition among suppliers and greater choice for consumers, with the scope to yield significant productivity gains.

In addition, Helm (2006) argues that market-based instruments and independent regulatory bodies tend to reduce the scope for regulatory capture, where the regulator is dominated by the vested interests of the existing incumbents in the industry that it oversees. Market based

134 HMT (2006).

135 In addition, it is important to note that interventions do not always need to be government led, e.g. choice editing / offering are behavioural interventions which could happen through business on the supply side.

instruments may therefore reduce the scope for regulation to lead to anti-competitive restrictions. However, the effect is not clear cut; at the point of establishment of any market based approach, there is extensive scope for lobbying, and hence capture. This could result in an arrangement which is favourable to incumbents being set in place for the whole duration of the system's operation, to the detriment of outsiders.

One area where a market based approach has been used rather than strict regulation has been in controlling greenhouse gas emissions. The EU Emission Trading Scheme ensures that greenhouse gas emissions from industrial sectors across the EU are limited to an agreed level. With the limit on emissions set below the business as usual level, scarcity of allowances creates a price signal, encouraging greater resource efficiency, abatement amongst firms and investment in low carbon infrastructure. Trading of allowances allows firms to meet the cap cost in the most cost-effective way so as to minimise the impacts on growth. There is also the potential to consider mechanisms that can better 'capture' the value of the natural environment in other areas.

The development of environmental markets (such as payments for ecosystem services) is one such innovative approach.[136] Recent evidence shows that globally new markets for biodiversity and ecosystem services are emerging and there is potential for these markets to represent major business opportunities. The global market for mandatory biodiversity offsets is worth $3.4bn, and predicted to be $10bn by 2020.[137] Further thinking on how government could facilitate such approaches to help ensure that our economy and society is set for smarter, greener growth will be reflected in the publication of a White Paper on the natural environment by Spring 2011.

Self-regulation and co-regulation

One alternative to classic regulation as administered by Government is allowing industries to regulate themselves. Self-regulation is an approach used in the legal sector – a competitive sector where firms have an incentive to maintain standards, and where the threat of government intervention if standards are not maintained provides discipline to market participants. Self-regulation can therefore be a more proportionate policy response, achieving the same objectives in a potentially less distortionary way.

Stefanadis (2003) developed a theoretical model of the financial market – a sector where self-regulation has been a feature. In an infinitely repeated game, varying the regulatory controls between self, government, and no regulation, he finds that continuous innovation in a market can be a driving force for the success of self-regulation. In essence the threat of direct government intervention in a fast moving market is enough to encourage those self-regulated organisations to pursue 'socially desirable objectives'. This is because self-regulation can eliminate the bureaucratic delays in the introduction of new products arising from a centrally directed regulatory structure, thus fostering innovation.

Where used appropriately, such an approach can thus ensure that outcomes are achieved at a lower cost to productivity performance. However, it may also be the case that industry chooses to introduce and invest in promoting an extremely high level of voluntary standards, thus creating a barrier to entry. Furthermore, compliance costs may be high, increasing the burden particularly for small firms in the industry. As DeMarzo et al (2005) note, it is important for self-

136 Payments for ecosystems services can be essentially defined in terms of payments to land managers and others to undertake actions that increase the levels of desired ecosystems services.

137 TEEB (2010).

regulated organisations to face enough competition to induce socially efficient levels of regulation. As with other forms of regulation, enforcement is key and they argue that government oversight of self-regulation (in the form of investigation and imposition of penalties for example) can benefit customers by leading the self-regulated organisations to engage in more aggressive enforcement themselves.

Sometimes government is involved in enforcement, by providing legislative backing to industry led and administered arrangements, enabling these to be effectively enforced. This is generally referred to as co-regulation or enforced self-regulation.

Using a mix of instruments

Using a mix of policy instruments could mean several instruments being imposed on any one sector or part of the economy. In many cases, a combination of different policies could be more efficient than reliance on one of these instruments alone. Complementarities between instruments can improve the efficiency of the overall policy package as long as the instruments target different market failures. For example, a combination of market-based instruments and information and public engagement policies could be more efficient in delivering desired outcomes in a way that minimises constraints on growth.

The challenge is determining the conditions under which a particular instrument, or set of instruments, is the appropriate choice. Use of multiple instruments can increase the economic costs of government regulation if:[138]

- They are inconsistent with each other or their interaction leads to perverse consequences.
- Policies / instruments are frequently modified or withdrawn, increasing uncertainty and dulling agents' incentives to respond.
- They are poorly designed and/or lack policy coherence (for example, between environmental, energy, transport, and other related policies), which raises the overall costs and mitigates some or all of the potential gains.

138 DECC and Defra (2009).

Box 5: Case study: Using a mix of instruments to tackle waste

One example where a number of measures have been used to influence individual and business behaviour is the area of waste. The presence of the landfill tax encourages waste producers to create less waste and recover more value from waste (for example, through recycling, composting or more environmentally friendly methods of waste disposal). Other complementary waste measures have been implemented to overcome the remaining behavioural barriers that result in non-optimal levels of waste being disposed to landfill. This is through both measures targeted at:

- Individuals – through the 'Love Food Hate Waste' campaign, designed to raise awareness of the environmental and cost impacts of unnecessary food waste and promote behaviour that reduces the amount of food waste sent to landfill; and

- Businesses – through packaging measures such as the Courtauld Commitment, a voluntary agreement with major grocery businesses to deliver absolute packaging waste by 2010. Additionally a market-based system has been developed in which businesses have to buy Packaging Waste Recovery Notes (PRNs) from re-processors as evidence that a proportion of the packaging currently used has been derived from recovered or recycled material. This incentivises businesses to reduce packaging - the less packaging a business handles, the less they have to pay towards recovery and recycling.

Key regulatory challenges for the UK for driving growth

The change in the Government's approach to regulation across Whitehall requires a transformation in the regulatory culture in terms of examining how alternatives to regulation can be better used to produce a desired outcome. Regulation should only be used as a last resort (where it is shown that it is clearly superior to other approaches) and by using a mix of instruments (regulatory and non-regulatory) to deliver outcomes more cost effectively. This work will draw on the insights of behavioural economics and social research to inform and improve the design of interventions.

The approach going forward will focus on bearing down on the costs of regulation, and being more responsive to business and public needs. There is an imperative to look at both stock and flow of regulations and how they combine to produce an overall burden. One Government initiative in this area is the review of the pipeline measures (regulations which are due to come into force from summer 2010 onwards).

Two key reviews in this area have already been announced: Lord Young of Graffham will lead a review of Health & Safety regulation, whilst a new industry-led Task Force chaired by Richard McDonald will consider ways to reduce the regulatory burden on the farming industry. As announced in the Emergency Budget each relevant Department will be reviewing the employment laws in their policy areas to "ensure they maximise flexibility for both parties while protecting fairness and providing the competitive environment required for enterprise to thrive".

In addition, the "One In One Out" Programme will help ensure that the burden of regulations introduced cannot be greater than the burden removed through repealed or simplified

regulations. This will end the culture of 'tick-box' regulation, and instead target inspections on high-risk organisations through co-regulation and improving professional standards. 'Sunset clauses' for regulations and regulators will be introduced to ensure that the need for each is regularly reviewed.

It is evident from the international rankings that the UK is performing well relative to many other countries with regard to a strong regulatory framework which fosters business and aids growth. This does not negate the feedback from surveys in which businesses still perceive regulation to be an obstacle to their growth. There is some evidence that this is a problem of perception rather than reality. The proposed "Public Challenge of Worst Regulations" has provided a forum for business and the public to voice their opinions on which regulations they deem to be excessively burdensome or ineffective.

Corporate Governance

The link between corporate governance, firm performance & growth

The corporate governance framework is the set of processes, customs, policies, laws and institutions that shape the way a corporation operates – how it is directed, administered or controlled.[139] The framework plays an important role in supporting growth by creating the incentives for investors and managers to improve firm productivity, and by improving the information available to investors to reduce the cost of finance raised by the firm.[140]

Governance problems may arise because of the **asymmetry of information** between the owners and managers of a firm,[141] leading to conflicts of interest. Under the assumption that the owner wants a return on his investment, and the manager primarily wants to maximise his income, the owner is at a disadvantage as he has no means of directly observing the manager's effort or of controlling the actions of the manager (the 'Principal-Agent problem).

If information asymmetries between the owner and the manager are not corrected for or moderated, there is the potential for **moral hazard** – where the manager may make poor investments or under-perform because they do not bear all the potential costs of the decision. **Adverse selection** can also occur when managers encourage a particular allocation of the firm's resources for their personal gain, as opposed to the best result for the company; or where the owner has less information than the manager on the best choice of investment projects for the firm.

Reducing the cost of these conflicts of interest between the owner and manager should ultimately lead to a greater availability of capital at lower cost; improve resource allocation; increase firm valuation; and, in theory, lead to better firm productivity and performance.

International comparisons of corporate governance systems have found that frameworks that give stronger protection to investors can reduce the costs of obtaining outside finance and thus improve corporate performance.[142] In general the evidence shows that links between corporate governance and productivity growth are difficult to determine given causality issues, although Nicolo et al (2006) did find a stronger link at national level.

139 A more detailed definition of corporate governance was provided by the Cadbury Committee (1992).
140 See for the summary of research results set out in Krosner (2003).
141 Agency theory can be used to model the interaction between principals and agents, with in this case the firm owners as the principals and the managers as their agents.
142 See for example research such as La Porta et al (1999) and La Porta et al (2000).

UK evidence supports the view that the degree of shareholder control impacts positively on firm productivity. Using data from 580 UK manufacturing firms, Nickell et al (1997) find that product market competition, financial market pressure and external shareholder control are all associated with the productivity performance of UK firms. This builds on a survey of evidence which found that owner-controlled firms outperformed manager-controlled firms.[143]

There are concerns that markets for ownership of firms do not work effectively. Equity markets are susceptible to **asset price bubbles** where prices deviate significantly from underlying value, suggesting that these markets are far from efficient. In response to this behavioural finance models have been developed to explain how and why these price differentials arise.[144] The development of bubbles in equity markets has been associated with an increase in investors taking a short term approach to equity investments, with commentators pointing to shorter holding periods, greater levels of trading and a greater focus on short term returns.

The impact of **takeovers** as a mechanism for changing ownership of the firm has attracted particular attention. Studies of takeovers have been numerous, controversial and often inconclusive. The findings depend on the rationale of the merger, the benchmark used to assess the impact of the merger, the counterfactual, and the time frame under consideration.

Researchers have come to the following conclusions from the literature:[145]

- There is broad consensus that takeover bids result in large share premiums for target firms. However, the returns to shareholders of acquiring firms are often zero or negative.

- The empirical literature does not provide strong evidence that target firms underperformed prior to takeovers, suggesting a limited disciplinary function of the market for corporate control.

- There are productivity gains associated with takeovers, as well as falls in employment and short term sale of assets. Generally, takeovers (particularly hostile takeovers) result in lower levels of investment and an increase in dividends paid to shareholders.[146] This suggests that due to the takeover threat, managers could be inclined to sacrifice long term investments in order to engage in short term strategies to bolster share earnings.

Indicators of UK strengths and weaknesses in corporate governance

The corporate governance framework in the UK has scored well in international comparisons of corporate governance, although some rankings have fallen following the credit crunch:

- The draft World Bank Report on the Observance of Standards & Codes assessment of corporate governance scored the UK very highly against the OECD Principles of Corporate Governance.

143 Short (1994).
144 See Shleifer (2000) for a discussion of financial market efficiency from a behavioural finance perspective, and Shiller (2000) for a discussion of stock market booms.
145 A summary of the evidence is provided by Filatotchev et al (2007).
146 Nuttall (1999).

- The World Bank Ease of Doing Business Survey ranks the UK 10th of 183 countries in protecting investors.[147]

- According to World Economic Forum survey evidence although the UK still ranks first in the overall financial development index, it fell in some of the corporate governance rankings, for example falling from 2nd to 17th on efficacy of corporate boards between 2008 and 2009.[148]

- Individual UK firms tend to score highly on corporate governance in international comparisons undertaken by companies such as Governance Metrics.[149]

Key issue in corporate governance

Recent developments have prompted a number of debates around the effectiveness of corporate governance arrangements, and the market for firm ownership, in the UK. These issues are discussed in more detail in the call for evidence on a long term focus for corporate Britain published in October 2010.[150]

A: Markets increasingly focused on short term returns

Investment decisions may be increasingly based on expected short term returns, with an increase in turnover shareholding as result. Commentators have highlighted evidence that increased liquidity and information availability have led to increased trading and share price volatility in the UK.[151] This may make it more difficult for firms to take long term investment decisions where the impact of these decisions is seen as detached from the short term share price of the firm.

B: Length and incentives of the investment chain

The chain of share ownership and control is much more complicated than the theoretical model of a simple shareholder-owner and agent-manager would suggest. While there are still individual shareholders in companies, most individual holdings are aggregated into bigger managed pools of capital. There are also very large pools of 'institutional' capital like pension funds, insurance companies, charities, local authorities and sovereign wealth funds.

There are concerns that these chains are subject to multiple information asymmetries. This may lead to both more short term behaviour in relation to the companies in which intermediaries invest and to a reduction in returns to beneficial owners. For example, fund managers may be trading in and out of companies too much in response to short term news or views generating rents for themselves but not necessarily long term value for their clients.

Evidence for this is provided by a recent Future of Finance report, which suggests that high turnover is costly to long term investors. It cites evidence that pension funds are having their assets exchanged with other pension funds at a rate of 25 times in the life of the average liability, for no collective advantage, but at a cost that reduces the end-value of the pension by around 30%.[152]

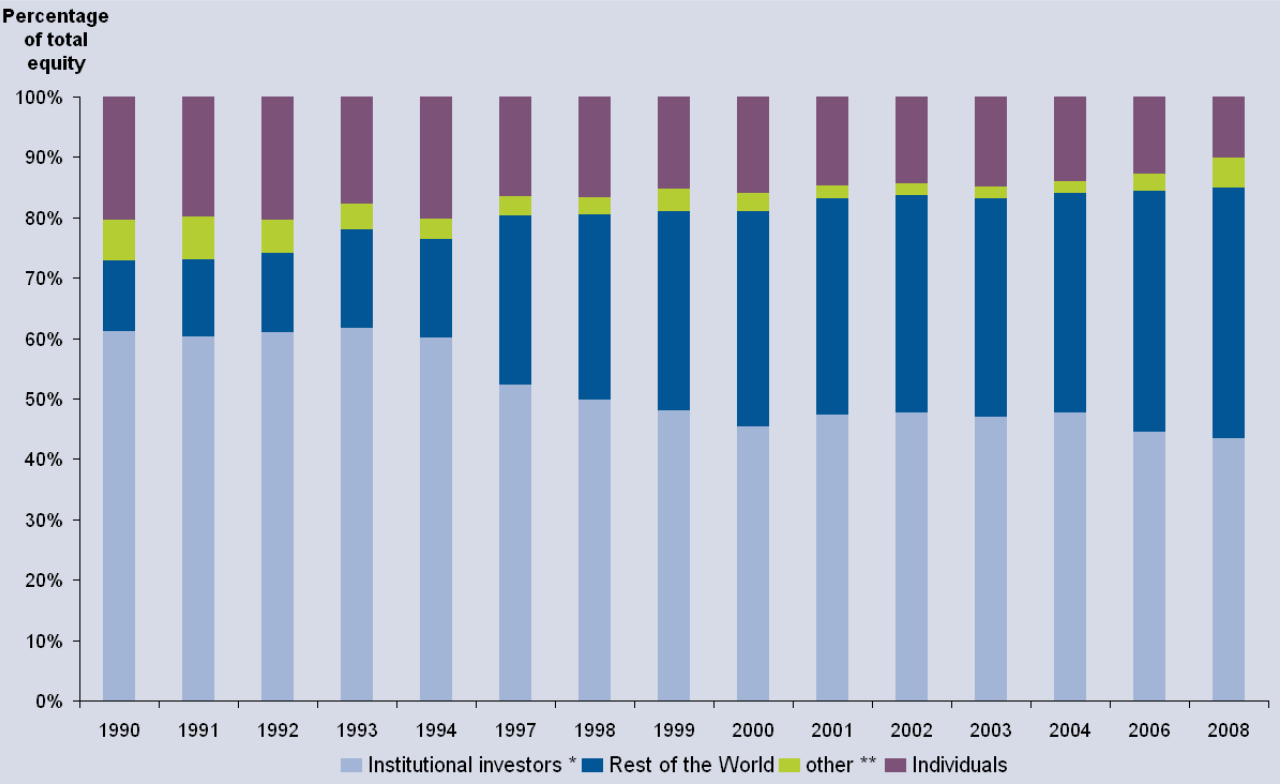
147 World Bank (2010).
148 World Economic Forum (2009).
149 See http://www.gmiratings.com/(kpn22eiphusrrhm3rfis1zuz)/about.aspx#methodology.
150 BIS (2010d).
151 See for example speech by Andy Haldane, available at: http://www.bankofengland.co.uk/publications/news/2010/067.htm.
152 Woolley (2010).

C: Role of shareholders and boards

Under the UK corporate governance model, shareholders have a responsibility to engage effectively with the company's directors with a view to enhancing the long term performance of the companies in which they invest and maximising returns for their ultimate beneficiaries. However, the costs to individual and small shareholders of engagement may be high relative to the benefits which are dispersed over the shareholder base – hence some shareholders may not be sufficiently incentivised to engage. In addition, changes in beneficial share ownership towards more short term investors and in some cases more passive investors is thought to have had an impact on both the quality and quantity of engagement.

Historically, the beneficial share ownership structure in the UK could be characterised as being dominated by domestic institutional investors who had a clear willingness and ability to engage (Figure 18). Over the years, however, there has been a relative decline of the share of those institutions and a corresponding rise of the share of foreign ownership and other financial institutions, such as hedge funds and sovereign wealth funds.

Figure 18: Changing Pattern of UK Share Ownership



**Institutional investors includes insurance companies, pension funds, unit trust, investment trust and other financial institutions*

*** Includes all share ownership other than individuals, rest of the world and institutional investors*

Source: ONS Share Ownership Survey available at http://www.statistics.gov.uk/statbase/tsdtables1.asp?vlnk=srs

In some cases, these shareholders may be less 'activist', although in others engagement with management may be greater but focused on short term returns with the result that overall investors take a less active interest in the long term management of firms.[153]

153 See for example McKinsey (2010).

D: Takeovers and Executive Pay

The impact of a short term approach to shareholding, and the changing pattern of share-ownership on the market for firm ownership becomes particularly acute when firms are subject to takeover bids. For example, there has been considerable debate about the incentives for shareholders and directors during the period when firms are subject to takeover bids and whether shareholders are overly influenced by considerations of short term returns. This has received particular intention since the Kraft takeover of Cadbury, and has been the subject of a recent Takeover Panel consultation and is further explored in the consultation on a long term focus for corporate Britain.[154]

Shareholders might also be expected to hold companies to account in relation to executive pay but despite significant improvements in the UK corporate governance regime over the last twenty years there is little evidence of a link between executive pay and improved company performance. The greatest determinant to executive pay remains firm size, not executive performance.[155]

154 The Takeover Panel (2010).
155 Gregg et al (2005), Gabaix and Landier (2007).

Effective Government that Supports Investment and Growth

In facilitating growth government has a dual role, both investing directly in areas of the economy where there are particularly strong public good / externality arguments (e.g. basic research, infrastructure), as well as leveraging and encouraging investment by the private sector. The latter requires correcting market failures such as those around access to finance, and encouraging long term investment by business through a favourable business environment, including stable and competitive taxes and a culture of enterprise.

Competitive Tax Environment

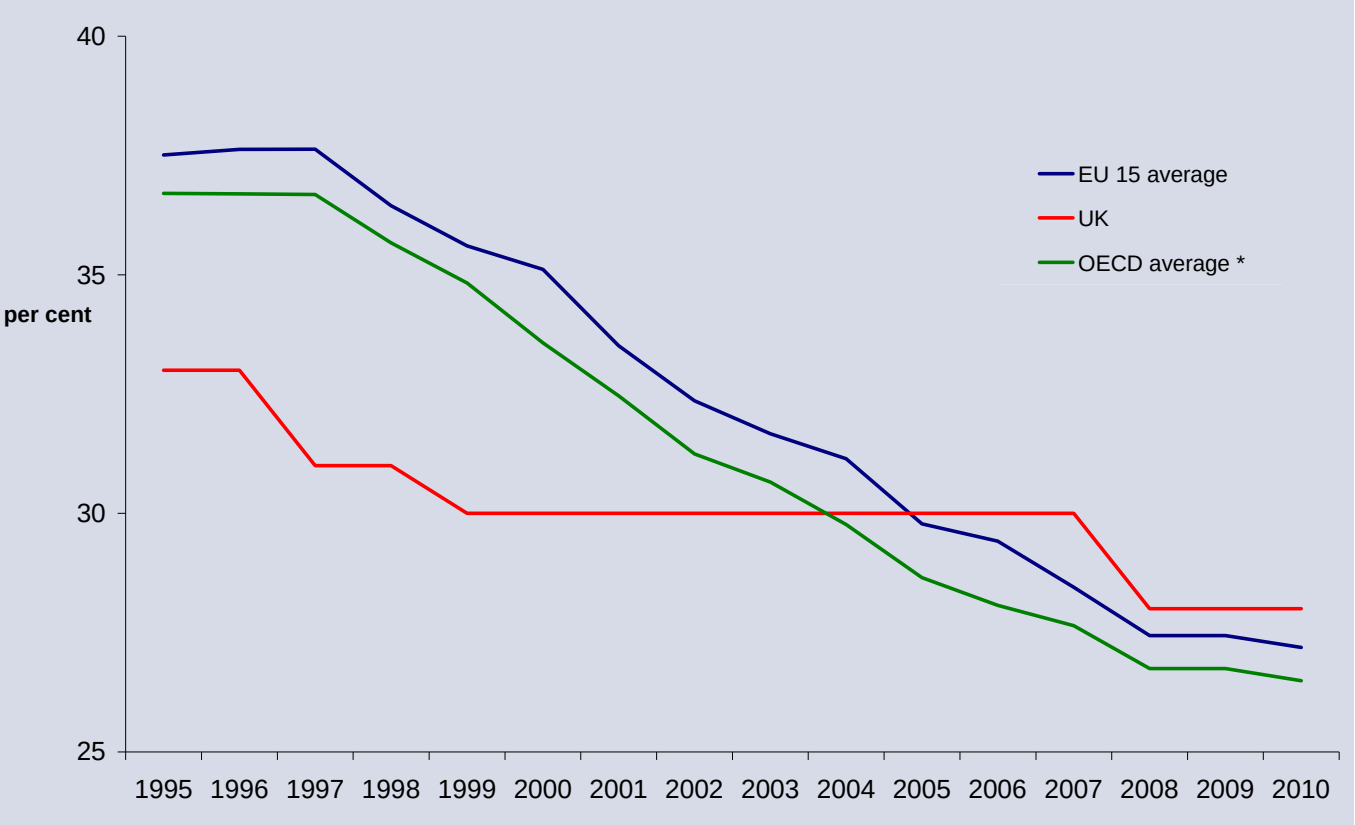
The tax system can play an important role in influencing growth and business competitiveness. For example, OECD research suggests that in general, shifting the tax burden away from corporate taxes to consumption and property taxes would raise the level of GDP per capita by 2.1 percentage points for each 1% shifted in the long run.[156]

The negative impacts on growth and productivity arising from high business taxes come primarily through reduced incentives for business investment as well as higher labour costs. In a world of increasingly global capital, the tax system can also impact on the attractiveness of a country for mobile foreign direct investment.[157]

As Figure 19 illustrates, despite being at historically low rates, the headline rate of UK Corporation Tax has become less attractive in recent years, as other countries have consistently cut rates. Within the EU-15, the UK main corporation tax rate was the third-lowest in 1997, but by 2008 had moved to being the sixth-highest.

156 See OECD (2008a, 2009b).
157 Devereux and Lockwood (2006).

Figure 19: Statutory Corporate Tax Rates



Source: BIS calculations on data from OECD tax database

The announcement in the 2010 Budget of a phased reduction in the Corporation Tax rate to 24% has therefore been welcomed by business as an important step in raising UK competitiveness.[158]

However, the headline corporation tax rate is not the only element in the overall burden of the corporate tax environment. The structure and implementation of corporation tax, for example through allowances and the application of more technical rules, plays an important role in determining the effective rate of corporation tax paid by businesses (in addition to any compliance costs).

Alongside the June 2010 Budget, the Treasury and HMRC launched a consultation "*Tax policy making: a new approach*", with the aim of improving the way tax policy is made. [159] The key principles underlying this are to:

- Increase **predictability**, the Government will provide taxpayers with clarity on its approach and certainty on the future direction of the tax system.

158 UKTI's latest Quarterly Issues Report noted that investor feedback on the June Budget was generally positive, particularly the aspiration to create a more business-friendly environment and a more competitive international tax regime.

159 HMT (2010c).

- Increase **stability**, the Government will slow down the rate of change to the tax code, focusing on fewer and better developed proposals supported by improved processes for changing tax law.

- Increase **simplicity**, the Government has confirmed its intention to create an independent Office of Tax Simplification.

As part of this approach, the Government has established a new forum of tax professionals who will meet bi-annually with Treasury Ministers to discuss the making of tax policy.

These changes are supported by the findings of business surveys, such as that by the ICAEW which found that 49% of respondents identified business tax changes as a hindrance to the operation and development of their business.[160]

Access to Finance

Importance for growth

The ability of business to access finance is critical in facilitating new business start ups, funding investment and ensuring businesses reach their growth potential. A lack of finance can constrain growth and hamper businesses' survival prospects.

The supply of appropriate finance to business ensures that funds are available for investment in both physical capital (e.g. machinery, equipment and buildings) and intangible capital, (e.g. intellectual property, software, branding and process improvements). Such investment increases the amount of capital available to each worker, which in turn facilitates greater productivity and higher growth.

There are two main types of external finance for a business, debt or equity. **Debt finance** involves borrowing money, often in the form of a loan or overdraft. Although debt from banks is the most widely available source of external finance, larger businesses can also obtain debt finance from capital markets through corporate bonds, private placements and commercial paper. **Equity finance** is a way of raising money by selling a shareholding of a business to an investor, either through stock exchanges or direct to private investors. Venture capital is a form of equity finance, particularly suited to small, innovative, high growth businesses where investors seek rapid and high growth, but lack the security or cash flow to service debt repayments.

Access to different types of external finance varies significantly by size of firm. While large businesses have access to a wide range of different sources of finance, around a third of SMEs do not use formal sources of external finance at all,[161] relying instead on retained earnings or personal finance to fund investment and growth. The remaining two-thirds who use at least one form of external finance more commonly look to bank funding and private equity finance,[162]

160 ICAEW (2010).
161 The 2009 Finance Survey defines Small and Medium sized enterprises, as having less than 250 employees
162 BIS (2009b).

from either venture capitalists or business angels,[163] as their size prevents them from accessing capital markets.

In theory, a properly functioning financial market will allocate resources to their most productive use, resulting in the most efficient firms obtaining finance, while more inefficient firms will encounter problems. However, a number of viable SMEs still face difficulties obtaining external finance as a result of market failures. These market failures are primarily due to information asymmetries between the borrower and the lender / investor, or due to lack of competition in finance markets.

Evidence on UK performance

The majority of SMEs are still able to access appropriate finance, for instance survey evidence suggests that 78% of SMEs in 2009 managed to obtain some finance from the first source approached.[164] However, problems can arise due to market failures associated information failures and a lack of competition in financial markets, and during the financial crisis some larger firms have also experienced difficulties. Widespread problems in the provision of finance to business in the aftermath of the recession have resulted in more attention being paid to the efficiency and the effectiveness of the financial sector in providing finance.

Prior to the recession, cheap credit was made easily available to a large number of businesses; with net lending to UK businesses peaking at record levels of almost £90 billion in 2007 (see Figure 20 below).

163 Business Angels are high net-worth individual investors that typically provide smaller amounts of equity finance to SMEs than venture capitalists.

164 BIS (2009b).

Figure 20: New Financing for Corporates

Source: Bank of England, Sectoral breakdown of aggregate M4 and M4 lending, November 2010

The financial crisis also had implications for the level of competition in the UK banking sector. There were a number of mergers in the run up to the crisis, and the crisis itself led to further mergers, despite concerns that they might reduce competition. Alongside this, there was a withdrawal of a number of foreign-owned banks that had previously been active lenders in the SME market place. The reduction in the number of lenders may have negative implications for the cost and availability of finance to firms in the long run.

In general the supply of finance is related to economic conditions. Looking at the pattern of recovery in output and credit following recessions in a variety of countries and across time, it is not unusual to see similar contractions in lending. When it comes to recessions associated with credit crunches, the real economy typically recovers even while net credit is contracting. The empirical evidence makes clear that while a lack of supply has the ability to constrain the recovery – growth in credit is not a necessary condition for a recovery in GDP growth.

Set against this, the ability to access finance is concerned not only with the amount of finance offered but also the cost at which it can be obtained and the availability of alternative sources of funding. Although interest rates have fallen considerably since the crisis,[165] margins on loans have increased,[166] reflecting higher credit risk as well as the higher cost to banks of longer term funding.

165 The Bank base rate is currently 0.5% compared with a high of 5.75% in November 2007.

166 Bank of England data shows that the effective interest rate on new lending is currently 1.8 percentage points over the bank base rate, compared to less then 0.5 percentage points over base rate in mid 2008.

It should be noted that a fall in the stock of lending and an increase in spreads on loans is not necessarily a cause for concern. For example, there are clear indications that in the run up to the crisis, the level of bank lending was over-inflated, with loans and overdrafts under-priced as banks did not reflect risk in their pricing and competed for market share.

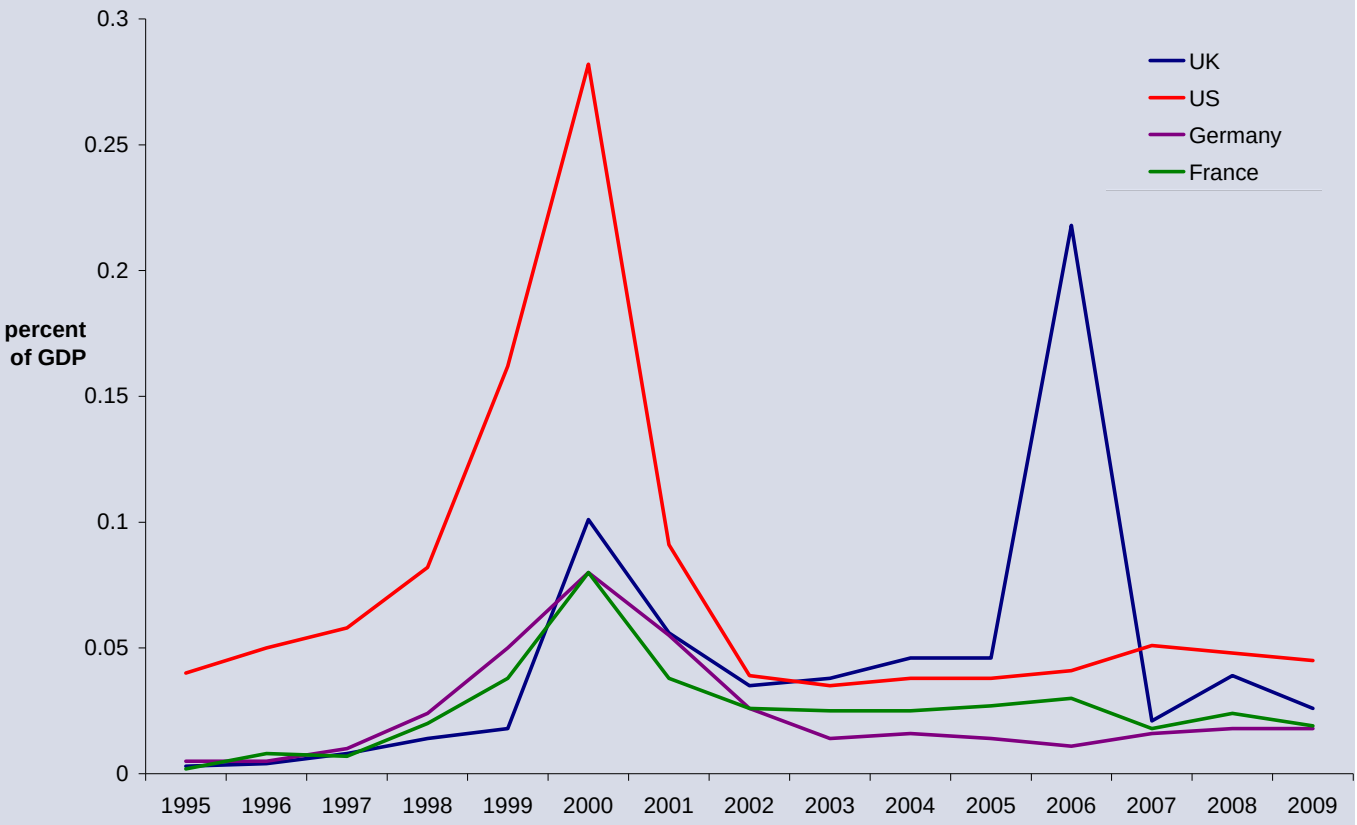
However, certain sectors of the economy (in particular SMEs), are more vulnerable than others. This is due to a number of factors such as their more limited financial expertise, and a lack of real alternatives to bank finance – which means they may face more of a challenge accessing external finance in the future. Going forward, viable businesses, particularly high growth businesses and start ups, may face difficulties obtaining a sufficient amount of finance, which could constrain growth.

There are also persistent structural market failures that firms have faced long before the onset of the credit crisis. Early-stage innovative SMEs with high growth potential fit the profile for equity investment from business angels and venture capitalists due to their level of risk, lack of cash flow and security, which make them less suitable for debt financing.[167] However, information asymmetries between the investor and the firm can lead to transaction costs that have a fixed element regardless of the size of investment. As a result, larger deals tend to be more attractive to equity investors as these transaction costs are proportionately lower.

Furthermore, growth capital investors looking to make equity investments in established firms tend to be more risk averse when investing in SMEs, due to the limited existing number of growth capital investments of this size. Therefore, the restrictions on the supply of venture capital may be considered a key factor in determining the availability of finance to high growth potential businesses in the economy.

167 See BERR (2009c)

Figure 21: International Comparison of Early Stage Venture Capital Investments



Source: Eurostat, based on data from EVCA & PriceWaterhouseCoopers

Despite the presence of an established equity gap in the supply of equity finance to SMEs the Figure 21 above shows that in the run up to the crisis, the UK was performing comparatively well in relation to French, German and US levels of venture capital investment.[168]

However, more recent data from the BVCA shows that the supply of early-stage venture capital investment to SMEs decreased by 18% in 2009 from the previous year as a result of the credit crunch.[169] Many private sector venture capital funds have withdrawn from making new investments and have instead focused on managing their existing portfolio due to difficulties in raising new funding, and constraints affecting exit routes such as public equity markets like AIM. Lower levels of venture capital investment could thus significantly constrain growth, if high growth potential firms are unable to access the required levels of funding from other appropriate sources.

Business Angels normally provide smaller amounts of equity finance to SMEs than venture capitalists. They typically invest less than £200,000 per deal, but are able to invest greater amounts when in a syndicate. Business Angels bridge the gap left by institutional investors that have moved upstream to bigger value, lower risk and higher return deals – as shown by evidence that they have become a more significant source of early stage venture capital over

168 SQW (2009).
169 BVCA (2010).

the past decade.[170] Recent research estimates the total value of investments made by business angels in the UK during 2008/09 was in the region of £400m.[171]

Key challenges in access to finance for driving growth in the UK

Key challenges affecting the provision of business finance, including both bank lending and other sources of finance in the coming years have been set out in the recent green paper 'Financing a private sector recovery'. [172] These are summarised below:

Regulation and availability of bank financing

Following the rapid expansion of bank balance sheets in the past decade, banks currently face a significant challenge to complete the restructuring of their balance sheets and to refinance their liabilities. Major UK lenders will need to refinance or replace £800bn of funding by the end of 2012.[173] At the same time, banks will face tightened liquidity requirements. These factors have the potential to constrain the amount of assets banks can fund, which in turn could affect banks' ability to lend.

Promoting greater competition in banking

Promoting competition by encouraging new entrants into the UK market will help increase the range of finance products available to firms and individuals, while putting downward pressure on fees and loan spreads as lenders compete to attract and retain customers. This would help firms access more finance at more competitive rates, enabling greater investment and growth.

Issues of competition in the banking sector are being considered by the Independent Commission on Banking, which will report in September 2011.[174] In the mean time the OFT is engaged in a review on the barriers to entry, expansion and exit in retail banking, including both personal and SME banking. The review is looking at a range of issues including; regulatory requirements, access to essential inputs (such as IT infrastructure and payment systems); barriers preventing banks achieving scale; inertia in switching; and the role of brands and branch networks.

Promoting access to debt capital markets

Access to debt capital markets tends to be restricted to large companies due to the high initial costs involved in debt issuance, and a lack of investor appetite for small issues. This effectively prevents SMEs from accessing this market. There is also a view that even larger UK businesses, 'the mid-caps' make less use of public debt markets than their counterparts do in the US. Decreasing the cost of issuance by increasing market efficiency would allow debt capital finance to be available to a wider range of large businesses, in particular to mid-sized ones. Increasing awareness of debt capital market financing options and increasing the investor base in smaller debt issuance, such as through private placements, will also encourage a broader range of firms to use these markets.

The Government is establishing a Capital Markets for Corporate Financing Taskforce chaired by a Treasury Minister and comprised of investors and business representatives. This Taskforce will broker the development by industry of direct and wholesale UK corporate-debt capital markets by taking further steps to:

---

170 NESTA (2008).
171 BIS (2010e).
172 HMT and BIS (2010).
173 According to the Bank of England.
174 See the Independent Commission on Banking (2010) for a discussion of these issues.

- Raise awareness of the diverse sources of finance, including non-bank investors, available to companies.

- Improve bond market efficiency and minimise the burden of regulatory compliance, through better adaptation and standardisation of bond documentation and better information flows.

- Develop deeper sterling bond markets, for example a private placement market for mid-sized companies. This would include encouraging the market led development of a broader, more sustainable issuer and investor base.

- Develop wholesale market corporate-debt financing mechanisms.

These will encourage a broader, more sustainable issuer and investor base, help develop corporate-debt financing funds on the wholesale markets and would promote deeper sterling bond markets, such as the private placement market for mid-sized companies.

Promoting access to equity markets and growth capital

Structural problems in equity and growth capital markets resulting from information asymmetries between investors and owners often prevent small firms getting appropriate access to these sources of funding. A lack of equity available to small, often high growth, businesses has the potential to stifle their growth potential and the UK's recovery.

To foster growth, the Government will support the development of a sustainable 'funding escalator', and will focus on solutions for start-ups through to established, growing businesses. Evidence shows that there is a 'missing market' or 'equity gap' in the supply of equity finance at a number of points along the funding escalator.

In particular, through policies such as the Enterprise Investment Scheme (EIS), the Government is committed to supporting Business Angel investment – typically the first step of the equity funding escalator – as well as continuing Government support for equity finance through Enterprise Capital Funds (ECFs) and Venture Capital Trusts (VCTs).

Supporting demand for finance - promoting investment readiness

A key constraint which has been identified is firms' lack of investment readiness when seeking finance. A large number of SMEs lack adequate information on the types of finance available to them, while firms seeking external finance can lack the ability to present themselves as viable investment opportunities. Firms that are investment ready (i.e. they meet appropriate standards of governance, are able to describe and communicate a business plan to investors or lenders and are comfortable with the concept of third party control) are more likely to be more successful in accessing external finance.

The Government has identified a particular need to ensure high growth potential businesses are more investment ready and able to access equity finance. The planned network of Growth Hubs will play an important role in this, but the Government is keen not to crowd out private sector initiatives in this area. Indeed, many private sector-led programmes are now under way, including the BBA Taskforce's plan to fund a network of business mentors to provide financial advice to small firms, and Goldman Sachs' pilot small-business-support programme in Yorkshire and Humber, offering mentoring and business education to firms with serious growth potential, together with support in handling legal and finance issues.

Box 6: Green Investment Bank

The Government will create a Green Investment Bank (GIB) to support the growth, industrial transformation and greening of the UK economy. The bank will finance green infrastructure and large-scale, late stage innovation projects in areas where private sector investment is currently constrained. It will invest in, for example, green energy, transport, water, waste and low carbon industrial projects. It will also seek to unlock further investment by catalysing significant additional private capital. The Spending Review announced that the Green Investment Bank will be initially capitalised with a £1 billion spending allocation, with additional significant proceeds from the sale of Government-owned assets, to catalyse additional investment in these areas.

Many of the market failures that occur in access to finance may apply to a greater extent in the activities where the Green Investment Bank is likely to invest; given the scale of investment required and the speed at which particular aspects of infrastructure upgrade / renewal and technology development may be required. Information problems are more likely to arise where the returns are long term or particularly uncertain. In addition, following the financial crisis, investors who had previously under-priced risk, may now over-price the risk associated with viable, but novel projects. Furthermore, the restructuring of financial sector balance sheets may mean that some types of financial institutions may be less able to raise the funding required for large scale investments. Funding of such projects may also require more investors to come together, increasing the potential for co-ordination failures.

As well as the market failures associated with the provision of finance and the long term uncertainty for new or novel projects and technologies, there are other market and government failures that can constrain socially beneficial investment in infrastructure and late-stage innovation. For example, environmental externalities will be central to the rationale for many of the potential activities of the Green Investment Bank. There may be a role for a GIB where there are individual and institutional failures and importantly where they interact.

Infrastructure

Why is infrastructure important for growth?

Reliable, resilient, and low carbon infrastructure is vital for sustainable economic growth. Almost all economic activity relies on a foundation of infrastructure networks such as energy, transport, waste and water. In particular, transport and communication networks facilitate the movement of goods, people and ideas both within the UK and to and from the rest of the world.

The efficient functioning of these networks is essential to maximise the number of potential workers, customers and suppliers businesses can access. This fosters an environment which facilitates competition, trade and the diffusion of knowledge and innovation; all of which are instrumental in driving economic growth. Furthermore, UK infrastructure is an important feature of our competitive 'offer' to overseas investors considering investing in the UK; and our overall attractiveness as a location to work, live and invest.

A wide range of studies have attempted to estimate the impact of infrastructure on economic growth. These have broadly concluded that although infrastructure does impact on productivity, the impact varies across countries, time periods and types of infrastructure.

The relationship between infrastructure stock and growth is also found to be non-linear. When starting from no infrastructure stock "first infrastructures only have limited impact on private sector productivity since their effect is primarily local". The greatest productivity gains are found when moving from a low provision of infrastructure towards developing a well connected infrastructure network. However, "subsequently, when the network is largely completed, the addition of new infrastructures again has only limited impact, if any, on private sector productivity".[175]

The IMF (2010c) and OECD (2006b) both note that the relationship between infrastructure investment and economic growth could turn negative beyond a certain threshold if funding predominantly relies on distortionary taxes. This suggests a theoretical growth maximising level of infrastructure provision.

Recent empirical work by the OECD found that over the period 1970 – 2005 investment in UK roads, rail and electricity generating capacity had a stronger positive effect on the level of GDP per capita, and short term growth, than would have been the case for other types of capital investment; suggesting that investment over this period improved the UK's infrastructure networks. [176] In the case of transport, such network improvements reduce journey times and directly increase the time available for productive work. They can also increase journey reliability, which reduces the need to allow additional time for delays, and permits firms to hold less stock.

175 OECD (2006b)

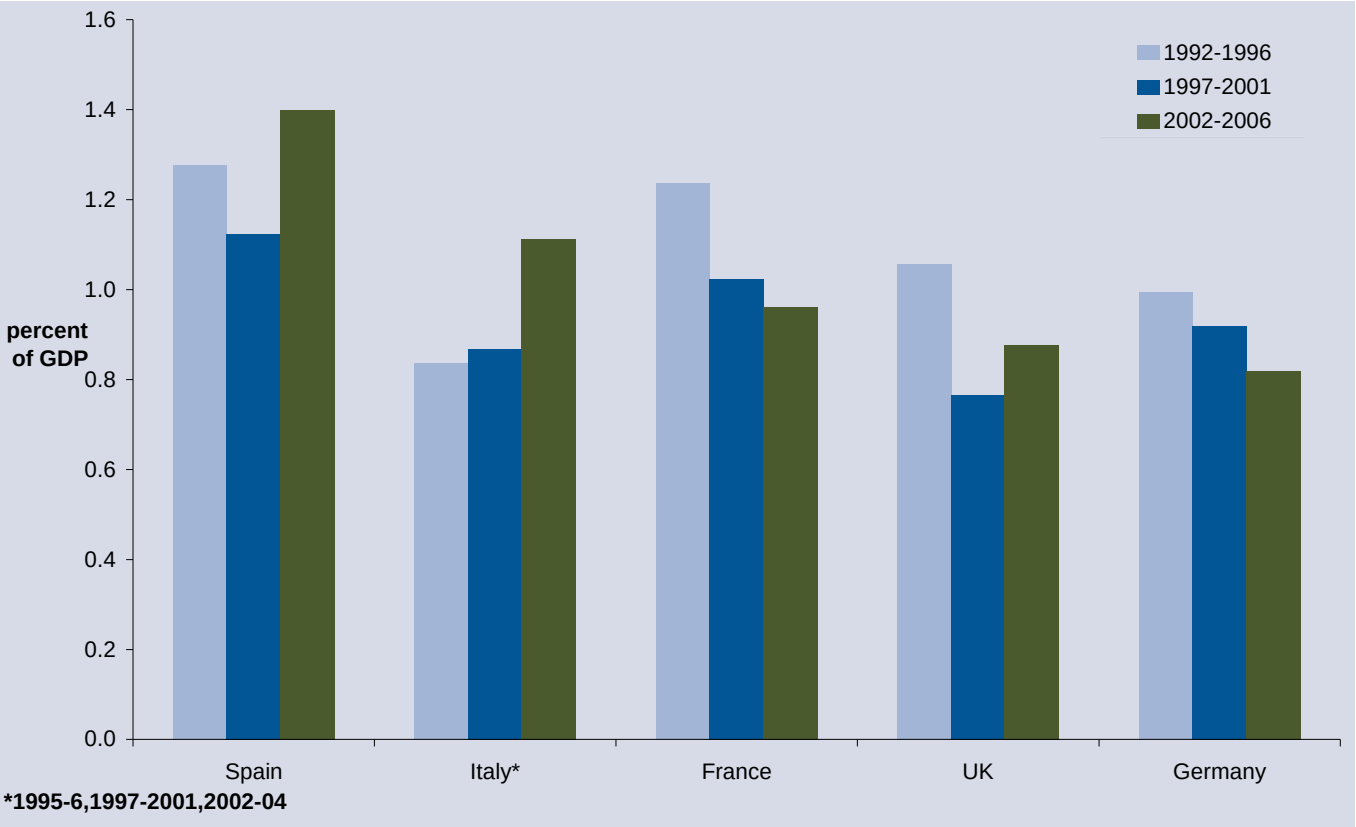
176 Egert et al (2009) using time series growth regressions based on an exogenous growth model and using indicators of both infrastructure stock and investment as variables. Infrastructure variables such as length of roads, motorways and rail tracks per capita, number of telephone mainlines per capita and electricity generation capacity are included individually. The combined investment rate in infrastructure and non infrastructure capital is included separately. This allows the effects of infrastructure investment on growth beyond its impact via increasing productive capital stock to be isolated.

Current UK infrastructure

The UK has a well developed infrastructure network and, in the case of transport infrastructure, Crafts (2009) concludes that the best evidence indicates we are currently close to the growth maximising level of major infrastructure provision. However, Crafts also highlights that significant investment will be needed in the long run to maintain this position.

The graph below shows that UK investment in transport infrastructure has been slightly lower than in other major European countries in recent years.

Figure 22: Transport Infrastructure Investment as a % of GDP



Source: DfT calculations based on data from International Transport Forum and Eurostat

Not maintaining our current level of infrastructure provision will act as a constraint on growth. One of the key threats to maintaining our current transport provision is congestion. Indeed, in the most recent economic survey of the UK, the OECD concluded that "road and airport congestion, and problems in the rail system impede business and constrain productivity". This view is supported by the Eddington Review, which estimated that growing congestion in England will result in additional costs to the economy of £25 billion per annum by 2025 (compared with 2003), if demand is not met.[177]

The challenge is not limited to transport. The UK needs to make significant investments in infrastructure in coming years in order to maintain our competitiveness and move to a low carbon economy. Some estimates suggest that investment of up to £50 billion per annum will

177 HMT and DFT (2006).

be required to maintain, upgrade and replace our infrastructure – significantly higher than the recent run rate of investment.[178] Without this investment in UK infrastructure, the business environment and UK competitiveness will suffer from restricted capacity, higher costs of adapting to low carbon, and out-dated technologies.

OfCom, in its latest Communication Market report, noted that the take-up of super-fast broadband was still very limited (probably driven by high price differentials between super-fast broadband and current broadband, and perceptions that current broadband was satisfactory for existing services).[179]

The Government is seeking the rapid roll-out of super-fast broadband across the country. It has been envisaged that without government intervention the market will deliver super-fast broadband to around 50% of the population by 2012, and over time it may be commercially viable to extend the roll-out to around 70% of the population. However, investment in super-fast broadband involves higher costs, longer pay back periods and continuing uncertainty about consumer demand.

These factors together may reduce incentives and willingness to carry out further investment, thus delaying further increases in the reach and coverage of super-fast broadband to the rest of the country. Hence the potential benefits may not be available to many consumers for a number of years, and UK businesses may be less able to exploit new opportunities created by the global move to super-fast broadband.

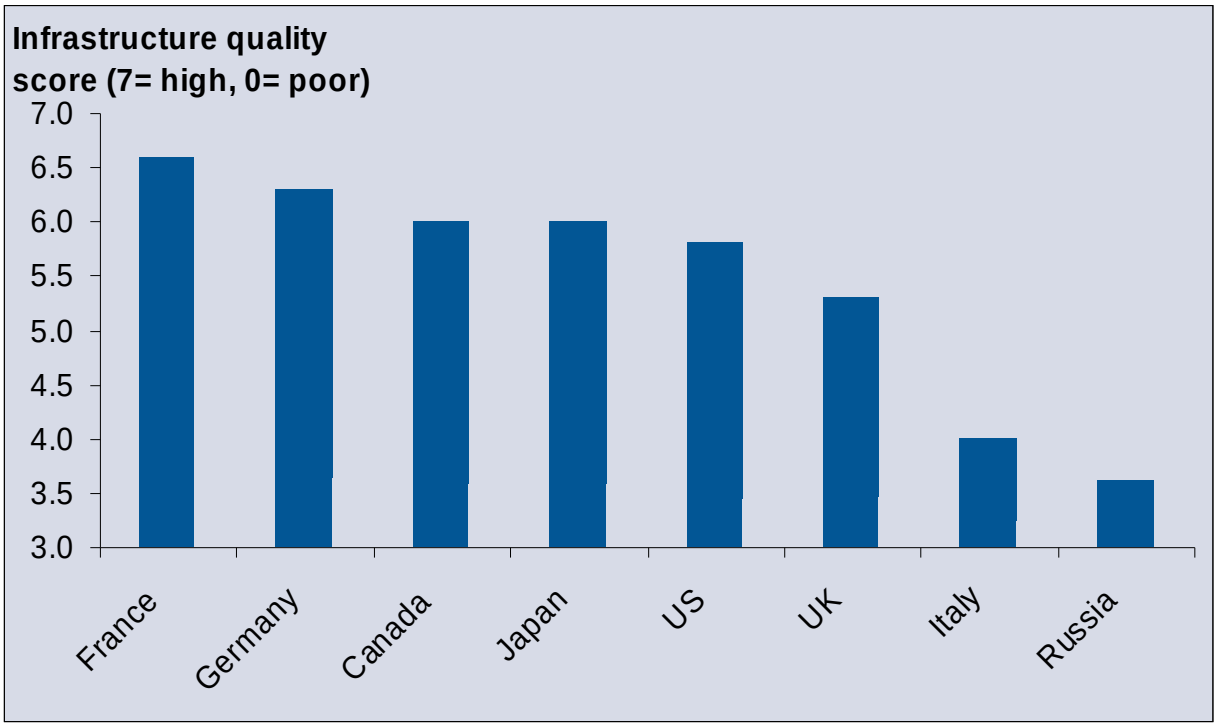
The World Economic Forum's 2010/11 global competitiveness index revealed that business opinion placed the UK 33rd out of 139 economies in terms of the perceived general infrastructure quality: behind France (4th), Germany (9th), Canada (13th), Japan (15th) and the US (23rd).[180]

178 Policy Exchange (2009).

179 OfCom (2010).

180 World Economic Forum (2010). The Global Competitiveness Index combines publicly available data measures and survey based measures collected through an Executive Opinion Survey of over 13,000 business leaders around the world. This particular measure is based on responses to the survey question "How would you assess general infrastructure (e.g., transport, telephony, and energy) in your country? (1 = extremely underdeveloped; 7 = extensive and efficient by international standards).

Figure 23: 2010/11 Global Competitiveness Index – Assessment of General Infrastructure Quality in G8 countries



Source: World Economic Forum, Global Competitiveness Report

Key Challenges in Infrastructure

There are a number of drivers that will have a long term impact on the infrastructure need across all sectors. These are set out below and discussed in more detail in the recently published National Infrastructure Plan.[181]

- **Obsolescence** – All infrastructure has a limited life span and much of the UK's infrastructure is ageing and becoming outdated. Key networks such as the rail, water and sewage systems that are still in use today were built in the 19th century.

- **Population growth** – The UK population is set to increase to 72 million by 2033, which will compound the increasing demand for all forms of economic infrastructure. The geographical location and concentration of this will also be an important consideration.[182]

- **Increasing demand** – Infrastructure will need to react to economic growth which involves people using more resources and travelling more, increasing pressure on existing networks. Expectations of quality are also increasing, consumers will expect faster broadband connections, quicker, more reliable and more comfortable public transport. For example, in 2010, 30.1 million adults in the UK (60%) accessed the internet every day or almost every day. This is nearly double the estimate in 2006 of 16.5 million.[183]

181 HMT (2010b).
182 Data source: ONS.
183 Data source: ONS.

- **Climate change** – The UK has legally binding targets to reduce greenhouse emissions by 34% by 2020 and by at least 80% by 2050 (based on 1990 levels) and for 15% of UK energy to be from renewable sources by 2020. To ensure that these targets are met will require fundamental changes to not only the energy technologies on which most core UK infrastructure relies, but also the way we plan, coordinate and procure infrastructure in the UK. In addition, infrastructure will need to adapt to the forecast impact of climate change.

- **Compliance** – European legislation acts, and will continue to act, as a key driver for infrastructure investment in specific sectors. For example:

    - The European Landfill Directive requires the reduction of biodegradable municipal waste going to landfills.

    - The Large Combustion Plant Directive requires the reduction of pollutants from large power stations (those producing more than 50 megawatts).

    - The Water Framework Directive commits member states to achieve good qualitative and quantitative status of all water bodies (including marine waters up to one kilometre from shore).

- **Affordability balance** – The UK economy, including individual consumers, must be able to afford the cost of new infrastructure while still recognising the opportunity cost of not investing in growth.

- **Improving planning, prioritisation and delivery of infrastructure** – providing greater clarity of UK infrastructure needs to give markets the confidence to invest, improving delivery by reducing excess costs and improving the land-use planning system, especially for major infrastructure projects.

Science and Innovation

Why is Science and Innovation Important for Growth?

Science and Innovation are key drivers of economic growth, primarily through the improvements they generate in productivity as a result of technological progress.[184] Indeed, in the long run, technological progress has been the most important determinant of growth in advanced economies such as the UK, for whom the scope to increase the supply of capital or labour is limited.[185]

Investments in Science and Innovation underpin technological progress and provide the supply of skills needed to understand and apply new advances. In the literature technology is commonly conceptualised as a stock of knowledge which underpins the productive capacity of the economy, with successive investments adding to a country's technological capabilities.

184 In this context technological progress refers to both the invention of new or better products and improvements in physical and human capital.

185 By contrast, emerging economies such as China and India still have considerable scope to mobilise additional labour for industry by using technology to free up labour from the agricultural sector.

In common with other forms of knowledge, technology can be accumulated without limit, with each generation of discoveries standing on the shoulders of the last. Ideas can also be rapidly disseminated and applied by many users at a time, multiplying their productive power. Finally while it can be superseded or replaced by newer ideas, knowledge in and of itself does not grow old, depreciate, or wear out through use.

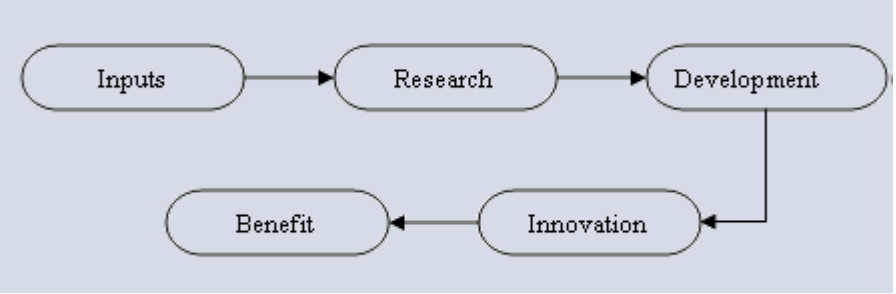
As a result, investing in science and innovation not only generates a ***private return*** to the individual or organisation carrying it out, it also generates a wider ***social return*** through the spillover benefits it creates for other individuals and firms.[186] As we discuss below, the estimated magnitude of both the private returns and social returns to R&D is significant. For the purposes of this discussion we define science and innovation as:

> ***Science:*** the discovery of new knowledge through the systematic exploration of the natural and social worlds.
>
> ***Innovation:*** the application of knowledge to create new or improved products, processes and organisational structures.

It should be noted that innovation does not just result from the application of science. Many new technologies arise from the painstaking development of practical and engineering knowledge, or the application of creative effort in areas such as software and design – independent of any research. Nevertheless, the evidence strongly points towards the increasing use of the science base in technological problem solving, and that highly innovative firms are closely connected to universities and the science base across many industries.

The traditional conceptual model of how science and innovation leads to economic and social benefits was a linear process in which the initial inputs (skilled researchers, capital etc) are transformed into ideas, and then applied to create new products or services (Figure 24).

Figure 24: Simple Linear Model of Science and Innovation

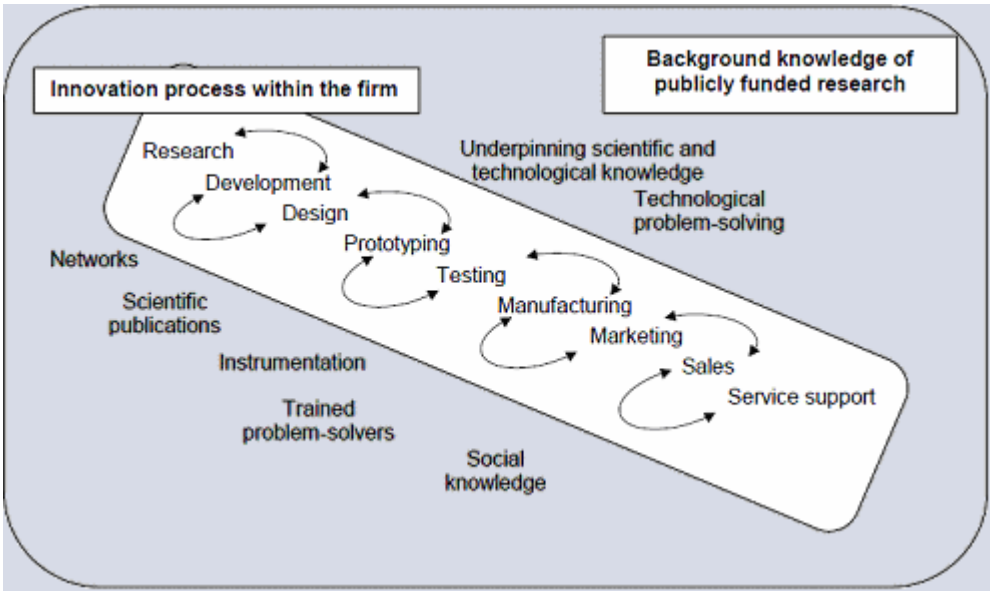


In reality the relationship is more complex, with both publicly funded and private research / innovation repeatedly interacting in various ways at different stages of the process, as well as experience from later stages being fed back into the next round of innovations. For example

186 This derives from the fact that knowledge is partially non-rival and non-excludable. That is, the use of a new idea by one individual or firm does not prevent its use by another. Moreover, in the absence of legal constraints (e.g. patents) it is also difficult to prevent ideas being by other individuals or organisations – leading to knowledge spillovers.

many firms organise innovation as a chain of processes, with linkages to and from the external knowledge base at various points along it (Figure 25).[187]

Figure 25: The Innovation Process and Publicly Funded Research



Source: Salter et al (2000)

Identifying these types of relationships is difficult and investments in science and research take long periods of time to build into usable knowledge. For example, the most immediate output of research ***Codified Knowledge*** (research papers, designs etc) typically takes 5–7 years to appear.[188] Other outputs such as the ***Tacit Knowledge*** embodied in people as human capital (skills, experience etc) accrue over time, and are far more difficult to quantify.

Although codified knowledge in the form of new designs and production processes is the most visible output of the innovation process, more recent research has emphasised the role of tacit knowledge in underpinning the capacity of countries to carry out research and innovation. In particular, it provides the ***Absorptive Capacity*** needed to understand and apply the results of research and innovation carried out elsewhere.[189]

In particular, Mancusi (2004) found that a country's absorptive capacity (as measured by past research) increases the responsiveness of that country's innovation activity to national and international R&D spillovers. Moreover, the larger the gap between a particular country and the technological frontier, the weaker its ability to absorb and exploit external knowledge will be.

The Innovation System

Modern research on innovation stresses the fact that firms rarely, if ever, innovate alone. A successful innovator must assemble an array of tangible and intangible assets; create

187 This is a version of the 'chain link' model of Kline and Rosenberg (1986); in reality any model of this kind will understate the complexity of the research and innovation process which is both highly dynamic and includes a wide array of different feedback mechanisms.
188 SPRU (2004).
189 See Cohen & Levinthal (1989), Geroski (1995), and Griffith, Redding & Van Reenen (2003).

competitive knowledge bases; conform to technical standards; and operate within institutions such as the financial system and existing knowledge infrastructure.

The institutional, regulatory and infrastructural framework is commonly referred to as the 'innovation system'. The structure and performance of this system can have a significant influence on the incentives and abilities for firms to innovate, and hence a direct impact on the rate and direction of innovation in the wider economy. For this reason, growth policy must consider how the operation of the innovation system affects (and is affected by) the behaviour of businesses.

What is the Impact of Science and Innovation on Growth?

Although at a theoretical level the links between science and innovation, and long run growth are well established, empirical evidence of the relationship has proved harder to come by. This is due to difficulties in accurately measuring the level of innovation activity in an economy, as well as identifying where ideas originate and the linkages between them. In addition, investments in science and innovation are subject to varying levels of uncertainty in terms of when (if at all) they will lead to a profitable discovery.

For example, while it is straightforward to derive estimates of the level of R&D expenditure in the UK, a lot of what firms would consider to be innovation activity sits outside of the standard definitions of R&D (e.g. process improvements, organisational change etc). Similarly measures of innovation performance such as numbers of patents may be heavily influenced by industrial structure (some industries rely on patents more than others).

A number of studies have attempted to address this shortfall, for example NESTA have produced an 'Innovation Index' for the UK which draws on a wider range of metrics for innovation. The results suggest that the UK invests more heavily in innovation than implied by R&D expenditures alone and compares more favourably with other advanced economies than previously thought (although making robust international comparisons of these types of measures is always difficult).[190]

Numerous empirical studies which have attempted to quantify the link between R&D and productivity at different levels of aggregation (e.g. firm, sector, economy). This research confirms it is an important determinant of growth, with the estimated elasticity of output with respect to business R&D varying between 10% and 30%.[191]

Recent studies have also attempted to separately capture the impact of R&D carried out by government, public research institutions, or from overseas.[192] Although sensitive to the model used, they generally point to the spillover effects on productivity from R&D carried out overseas, or in public research institutions, as being both positive and significant, and in some cases exceeding the returns to business R&D.[193]

There is also a substantial literature which has attempted to quantify the rate of return to investment in R&D, and in particular the difference between the private and social returns.

190 The finalised version of the index is to be published in NESTA (2010).
191 For a useful survey of the literature see Nadiri (1993).
192 See for example Coe & Helpman (1995), Park (1995), Mohnen (2001), Guellec & de la Potterie (2004).
193 For a discussed of these issues see Khan & Luintel (2006).

Estimation of these rates of return is not straightforward however, which is one explanation for the wide range of values found in the summary table below.[194]

The broad consensus in the literature points towards a social rate of return from R&D of the order of 20% to 50%, which encompasses the rate of return of 28% estimated by Mansfield's (1991) study of industrial innovations in the US, a study described by Salter et al (2000) as "the best study in this area". The most recent attempt to estimate ex post social returns on a rigorous basis found a rate of return of around 40%,[195] which also lies within the range given above. It concluded that each pound invested in R&D generates a return of £0.38 in every year thereafter, which then cumulates year on year over time.[196]

Table 8: Private and Social Rates of Return to R&D

Study	Private Rate of Return	Social Rate of Return
Minnasian (1962)	25%	
Mohnen & Lepine (1988)	56%	28%
Griffith et al (2004)		40%
Sveikauskas (1981)	10% – 23%	50%
Nadiri (1993)	20% – 30%	~50%
PICTF (2001), Garau & Sussez (2007)	14%	51%
Jaffe (1986)		30%
Griliches & Litchenbreg (1984)		41% – 62%
Mansfield et al (1977)	25%	56%
Terleckyj (1974)	27%	48% – 78%
Goto & Suzuki (1989)	26%	80%
Bernstein & Nadiri (1991)	14% – 28%	20% – 110%
Scherer (1982, 1984)	29% – 43%	64% – 147%
Bernstein & Nadiri (1988)	9% – 27%	10% – 160%

Source: Welcome Trust (2008), Salter et al (2000)

Thus the spillovers from R&D are thought to be both positive and more substantial than the private benefits from R&D, implying a rationale for government intervention – if researchers do not take into account these wider benefits when making R&D investment decisions (due to the fact they do not capture them), they are likely to under invest in R&D.[197]

194 It should be noted that these studies range from analyses at the whole economy or cross-sector level, to individual industries or even firms. In addition earlier studies will not incorporate the transformational impact ICT has had on research productivity since the 1990s.

195 Welcome Trust and MRC (2008).

196 Summed over a thirty year horizon, the discounted value of this flow of benefits gives an overall social return of around 8 to 1 from investment in R&D.

197 A further rationale relates to the uncertainties around the timing and nature of the outputs of research, particularly basic or fundamental research – which is likely to lead to under investment in these areas by private individuals and organisations.

Directly Accounting for the Impact of R&D on Growth

In light of the importance of R&D to long run economic performance, an increasing body of research now aims to explicitly account for the role of knowledge accumulation in contributing to productivity growth. The logic behind this approach is that knowledge accumulation can in principle be treated like any other form of capital formation.

Expenditures like business R&D are currently captured in official statistics as operating expenses such as electricity or material inputs. These expenses, on a purely accounting basis, do not directly contribute to the measure of GDP as they are netted off from output when estimating value added.[198] However, following the 2008 revision of the UN System of National Accounts, R&D is to be treated as capital formation of an intangible asset.[199]

A preliminary assessment shows that if R&D were treated as capital formation, the level of UK GDP would increase by approximately 1.5%,[200] however it would have hardly any visible impact on the estimates of recent GDP growth because of the subdued level of R&D expenditures, particularly amongst businesses.[201]

How Does the UK Perform in Terms of Science and Innovation?

Assessments of the UK science and innovation system generally find it to be a strong performer, albeit with some weaknesses. In its 2008 Science and Technology Outlook the OECD concluded that the UK had: [202]

- A strong reputation for **world class research**, ranking second only to the US in terms of most influential publications.[203]
- A **highly productive research base**, producing more publications per researcher or per pound spent than any other advanced economy.
- **Good international linkages**, ranking first in terms of R&D financed from abroad and the number of international post-doctoral students studying in the UK.
- Well developed venture capital due to a **deep financial system**.

Set against this the UK was found to have weaknesses in terms of:

- **Below average R&D intensity** (R&D as a share of GDP) and declining business R&D intensity.
- **Lower rate of patenting intensity** (no. of patents per head of population).[204]

---

198 Conversely, expenses that qualify as fixed capital investments are not deducted from output, but are subject to depreciation which is then reflected in measures of net value added and national income.

199 The EU Commission is currently in the process of deciding how this methodological change will be implemented through a Satellite R&D account that will, in the interim, coexist with the existing reporting framework.

200 Galindo-Rueda (2007).

201 Set against this, work by Haskel et al (2010) suggests that real R&D expenditure may actually be growing more rapidly than implied by the national accounts due to the effect of ICT in raising productivity in key research sectors.

202 OECD (2008c).

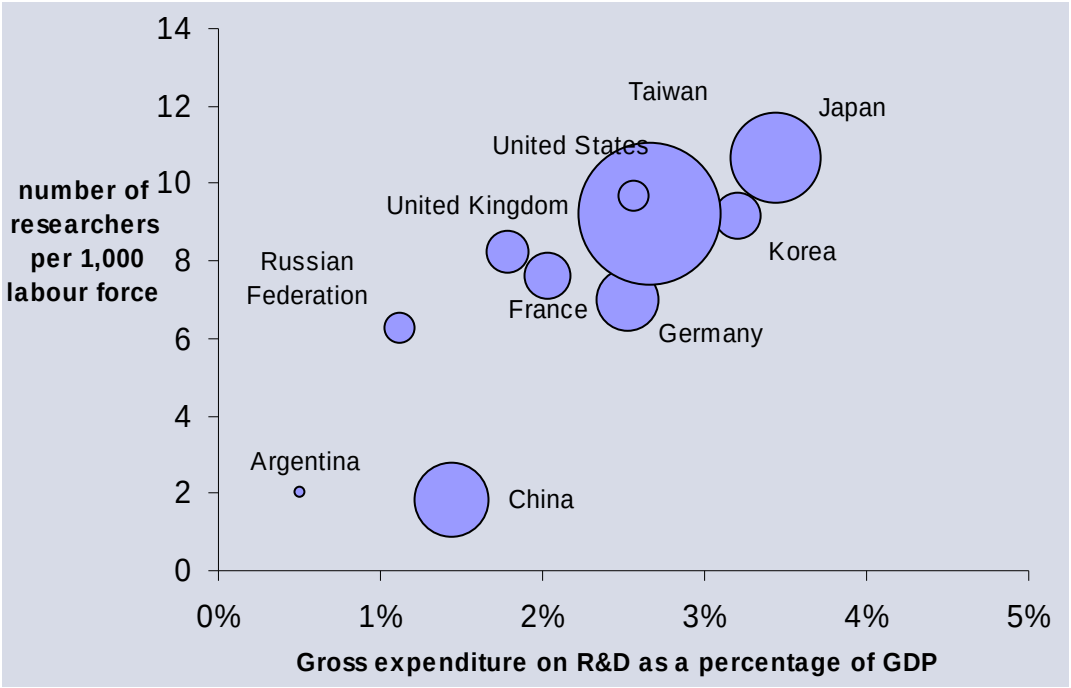
203 As measured by share of most highly cited articles.

- **Weak links between innovators in the private and public sectors**, with a small percentage of firms collaborating with public research organisations.[205]

Figure 26 below illustrates the UK's comparative R&D performance in terms of inputs against a selection of advanced and emerging economies. Although the UK performs relatively well, it still lags behind our major competitors in terms of numbers of researchers and R&D expenditure as a share of GDP.

One explanation for this may be the UK's industrial structure. Research by the Institute for Fiscal Studies (IFS) 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.[206] This is consistent with OECD research which showed that differences between the UK and other countries are to a large extent the result of such 'industry-mix' effects.[207] Research by DTI/HMT found that UK-based R&D performers, whether UK or foreign owned, have on average similar R&D intensity to their overseas competitors in the same sector. [208]

Figure 26: R&D Intensity in a Selection of Countries



Source: OECD Main Science and Technology Indicators (2010)
Note: Size of Bubble proportional to Gross Expenditure on R&D in Dollars at constant prices converted at PPP

Another, related explanation is that the UK may be relatively specialised in activities for which R&D is not the primary form of innovation. As highlighted earlier, recent research has

204 This is despite the UK having the best IPR system (as rated by users) among leading R&D performing countries.
205 This finding was considered to be surprising given the UK's strong scientific performance and the growing number if high-tech start ups clustered around some universities.
206 Abramovsky, Harrison & Simpson (2004), HMT, DTI, DfES (2004).
207 OECD (2005).
208 DTI (2005b).

attempted to quantify the UK's investment in a broader range of 'knowledge assets'. This suggests that the UK invests more heavily in innovation than implied by R&D expenditures alone, although the results vary by sector (See Box 7 Below).

Box 7: Innovation and Intangible Investment

The majority of the empirical evidence presented in this section has related to R&D activity and expenditure, as this is more readily available and comparable across countries. But findings from NESTA's Innovation Index work with Imperial College and the Office for National Statistics has given fresh insight on knowledge investment in the UK market sector.

The results show that knowledge assets (R&D, software, design, copyright creation, branding, business processes and workplace skills) are now more important to the UK than other more 'conventional' investments. Furthermore, it found that over the period 2000 to 2008:

- Investment in knowledge assets rose from £98bn to £141bn, while tangible investment rose more slowly from £87bn to £104bn.

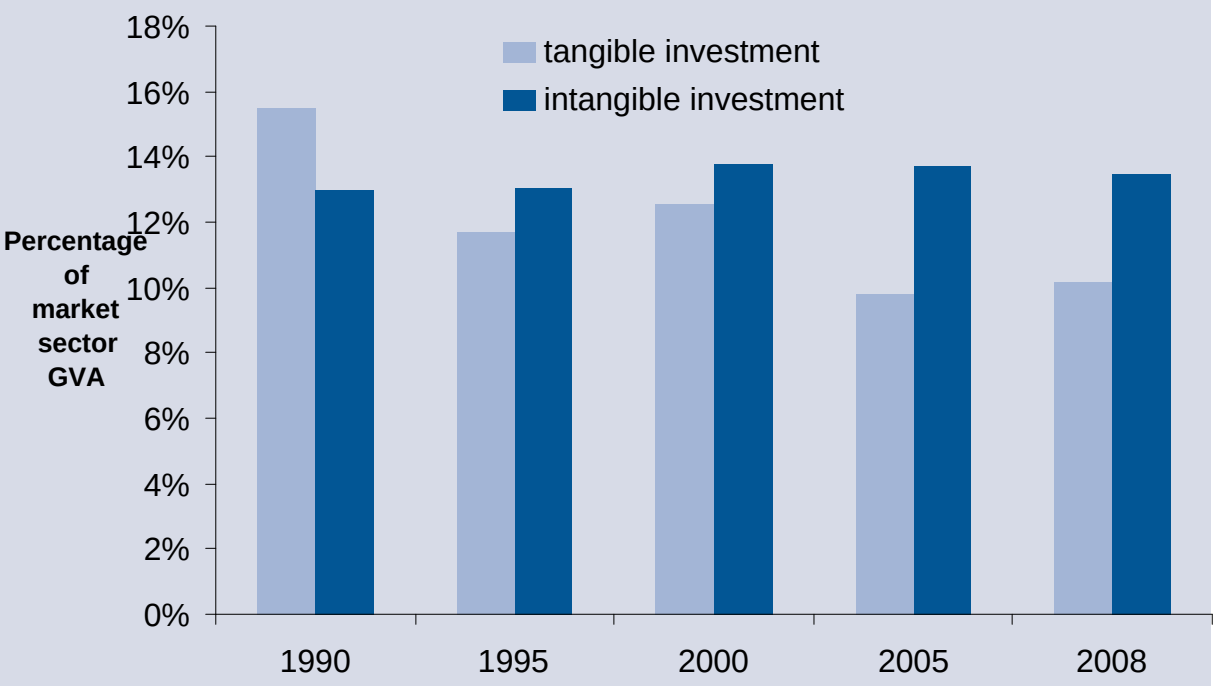
- Investment in knowledge assets, plus growth attributable to unmeasured innovation, accounted for over 60% of business productivity gains.

- Manufacturing and business services accounted for over 50% of UK knowledge investment, with retailing / hotels / restaurants close behind. Together they contributed 80% of the improvement in UK market sector productivity (TFP).

- In financial services, intangible investment per person fell compared to output – a decline from the very high investment levels seen in the late 1990s (particularly in software). Labour productivity growth was also lower than in manufacturing, business services and retail / hotels / restaurants.

Box 7: Innovation and Intangible Investment

Figure 27: UK Investment – Tangibles and Intangibles (1990-2008)



Source: ONS data for tangibles, NESTA for intangibles.

Note: Investment figures, in £bn, current prices. 'Design' refers to architectural & engineering design, and financial product development.

Measuring investment in innovation in this way adds to the normal definition of GDP by treating business spending that supports future innovation in the same manner as computers and software – as creation of an asset, not as a cost.

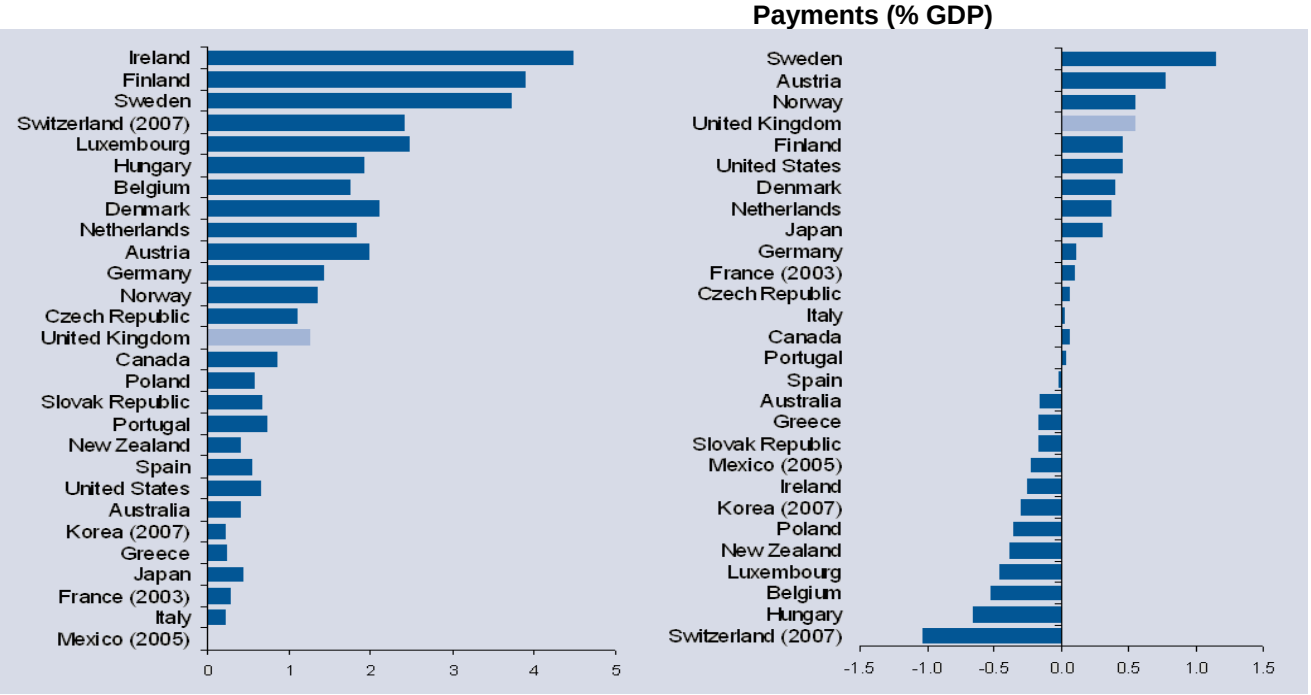
Evidence presented in the OECD innovation strategy shows that the UK has one of the highest ratios of intangible to tangible investment in the world. Major areas of spending growth since 1990 have been software, design, business processes and workplace skills. R&D and branding have also grown, but more in line with tangible investment.

Tracking innovation this way correlates well with conventional measures – such as new products / services and patent activity – covered by the EU Innovation Scorecard. Countries which have high proportions of intangible compared to tangible investment score as 'innovation leaders' using this wider set of metrics.

Investments in knowledge assets, many of which are covered by intellectual property rights, earn real returns for the UK in international markets. Relative to its GDP the UK has the third highest surplus on technology and royalty payments in the OECD (Figure 28).

Box 7: Innovation and Intangible Investment

Figure 28: Technology Balance of Payments



Source: OECD Economic Globalisation Indicators 2010
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.

Key Challenges for the UK

The most visible challenge for the UK is in relation to R&D expenditure, with the UK consistently lagging behind other advanced economies in recent years in terms of the share of GDP spent on R&D. In a more fiscally constrained environment the scope for further improvement on this metric is clearly limited.

Against this background, in a period where many other leading nations are increasing their investment in science and technology, the UK faces the following key challenges:

- **To maintain and improve the attractiveness of the UK as a destination for R&D-based foreign investment.** The UK is currently a major site of foreign investment in science and technology-intensive activities, with evidence suggesting that the UK is attracting significantly more R&D-intensive investment projects than other EU countries. We need to maintain and if possible improve this.

- **To make the UK the most attractive destination for the best researchers**. At present the UK is an attractive location for scientific talent. BIS analysis shows that we attract more academic researchers to the UK than leave, and so we have a strong pool of foreign talent. In a world of increasing 'talent competition' this position must be maintained and if possible enhanced.

- **Increasing the economic impact of the research base.** Current evidence suggests strong interactions between the UK science base and UK business. We know that highly-innovative firms are intensive users of the science base, and that there are strong informal knowledge flows between universities and UK business. Further improvements are needed and can be made.

- **Ensuring the supply of a workforce with the STEM skills required for those industries which will contribute to economic growth.** There has been strong growth in Science, Technology, Engineering and Mathematics (STEM) graduates in recent years, and likewise in STEM postgraduate training. This is an achievement to build on and to develop.

Tackling these challenges will inevitably require improvements in the efficiency of the research base, which is already the most productive in the G8, and increasing the incentives for business to take advantage of the UK's research capacity. The Hauser and Dyson Reports set out a number of avenues for achieving this.[209] The ultimate goal of these proposals is to improve the UK's exploitation of technologically relevant knowledge, including the wider knowledge base on which innovation depends, such as design and branding – which are increasingly recognised as co-investment in innovation alongside R&D.

209 BIS (2010f), Conservatives (2010).

Enterprise

The importance of enterprise to growth

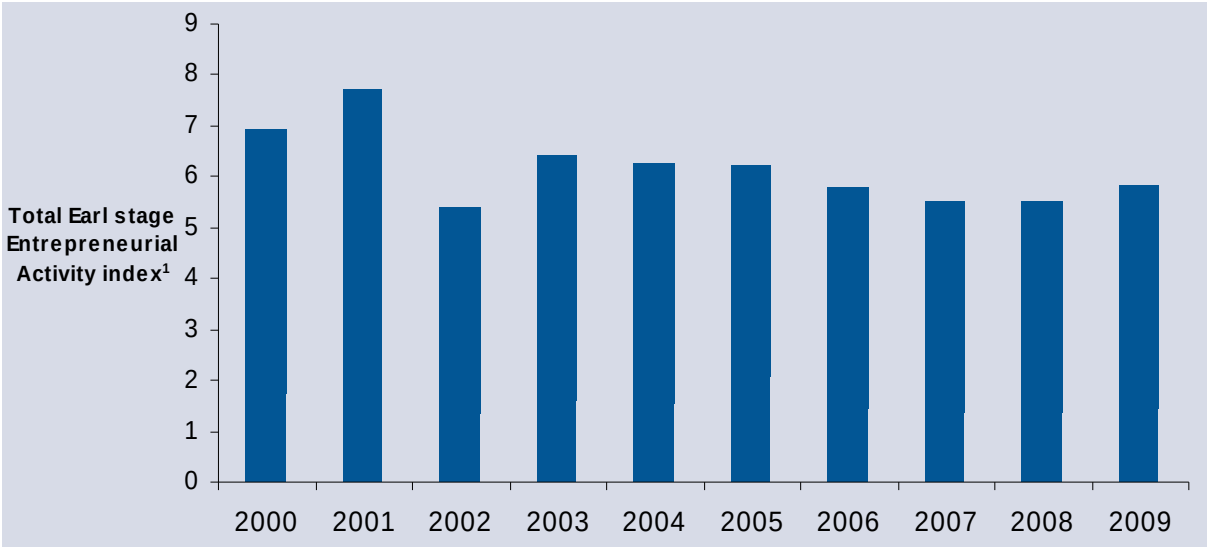
A strong enterprise culture and dynamic small business sector is central to restoring strong, sustainable, long term growth. Enterprise underpins economic growth through its impact on employment and productivity. New and small businesses drive economic growth by stimulating innovation; by creating a competitive spur to existing businesses to increase their productivity;[210] and by making a disproportionate contribution to job creation.[211]

Firms which enter export markets tend to be more innovative and more productive and thus can contribute proportionately more to economic growth. Indeed, these firms have proved more resilient, and more likely to have reported growth during the recession. Enterprise also has a pivotal role in creating a fairer and more balanced economy, less dependent on a narrow range of economic sectors, and more evenly shared between regions, industries and individuals.[212]

Evidence on UK performance

The Global Entrepreneurship Monitor (GEM) survey measures international entrepreneurial activity and culture over time. The results in the chart below show that early stage enterprise activity has been generally stable in recent years.

Figure 29: UK Total Early Stage Entrepreneurial activity – Proportion of the Working-age Population Involved in Starting or Running a New Business

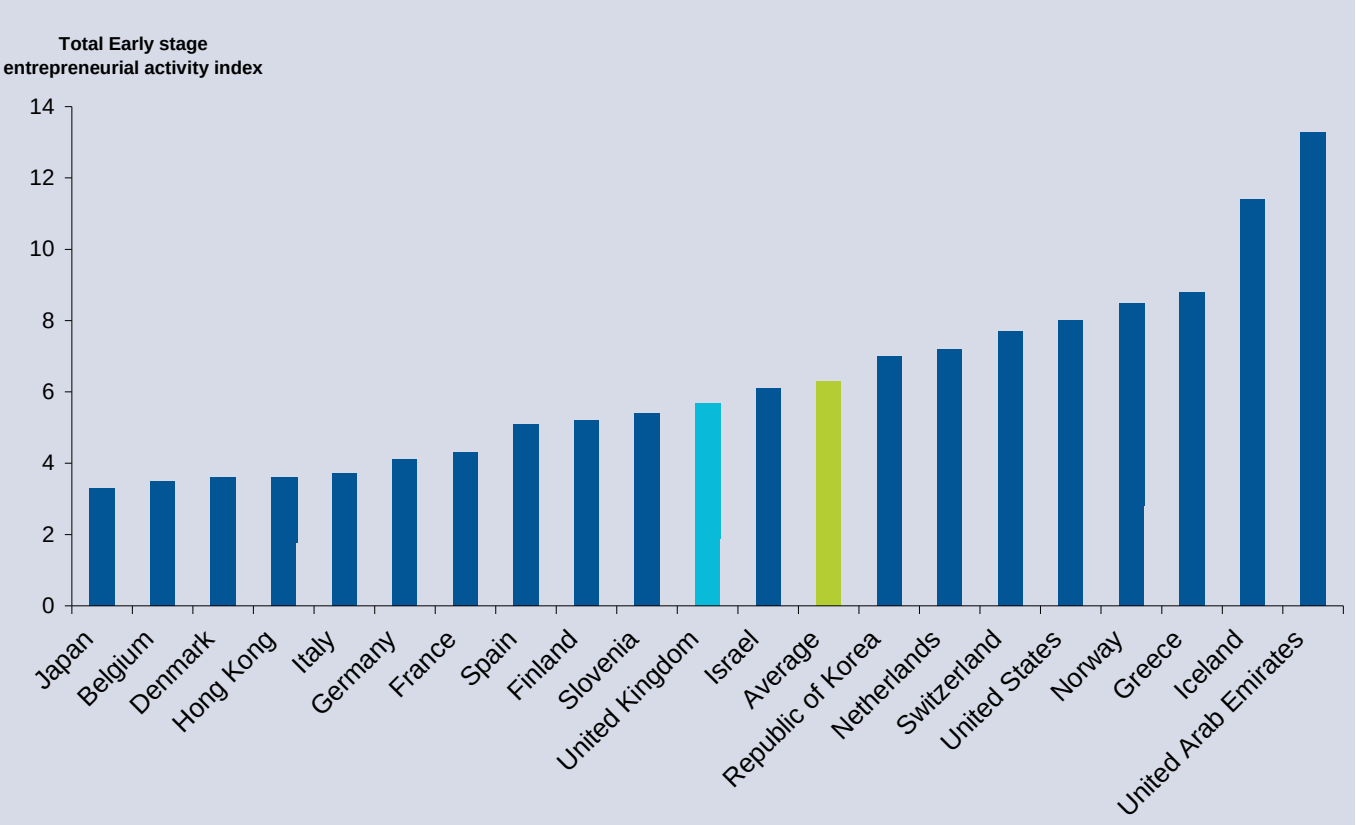


Source: Global Entrepreneurship Monitor, UK report 2009

In terms of international comparisons the UK currently outperforms most G7 countries including Germany and France but still trails the US and many other international competitors, thus leaving room for improvement.

210 Robinson et al (2006) and Scarpetta et al (2002)
211 Most recently, Hijzen et al (2010).
212 E.g. Raising entrepreneurship levels could boost employment levels in deprived areas, as evidence indicates a correlation between deprivation and enterprise activity, with the most deprived areas having the lowest activity. (Source: BIS analysis of employment and business demography data).

Figure 30: International Early Stage Entrepreneurial Activity



Source: GEM Global Report 2009
Note: Total Early Stage Entrepreneurship Index: Proportion of the working age population involved in starting or growing a new business (under 42 months old)

Evidence suggests that people in the UK, while being supportive of enterprise and entrepreneurs, tend to favour employment as a career option.[213] Often this decision is based on poor information or knowledge about the risks, benefits and skills needed to run a business. These are particularly prominent amongst those with little enterprise engagement, such as not having a parent in business or not knowing someone who has set up a business. The result may be that people follow a career path that undervalues their skills and leads to relatively low productivity employment.[214]

Key challenges for the UK in enterprise

There are four main priorities for delivering enterprise interventions to ensure the maximum contribution to balanced and sustainable economic growth. These are:

- A more targeted and efficient model of business support delivery, including a greater focus on management and strategic capacity.

- Increasing the strength of enterprise culture.

213 Global Entrepreneurship Monitor (2009).
214 BIS analysis of GEM data (various years) and Household Survey of Entrepreneurship (2007).

- Ensuring that businesses with export potential can access overseas opportunities and optimise that potential.

- Improving access to finance for businesses with growth potential.

Access to Finance is covered elsewhere in the paper and so this section focuses on business support, enterprise culture and accessing international markets.

A more targeted and efficient model of business support delivery

Publicly funded business support addresses gaps in private provision that result from market failures that would otherwise constrain the growth of many businesses. In particular information failures mean that some businesses, mainly SMEs, are not able to assess the potential value or quality of external advice and guidance, leading to sub-optimal use. Addressing this gap is important for growth as on average those businesses that use external advice grow faster.[215]

Business support is also used to promote entrepreneurship which can support disadvantaged regions and groups. It also reduces the costs and any market distortions that Government imposes on businesses through regulation.

Evaluation evidence of existing business support interventions (Business Link) finds that intensive assistance resulted in business improvements that had a positive and statistically significant impact on business' employment growth. It was found that within a year £2.26 of additional value was generated for every £1 spent on providing Business link services.[216]

Future Delivery

Despite evidence that the previous intervention adds value to the economy we know more can and should be done. Many start-ups and established small businesses are not reaching their full growth potential. Survey evidence shows that 67% of SME employers have an ambition to grow over the next 2-3 years, but only 20% achieve employment growth in any given year.[217]

A key factor in the success of new businesses is advice and support from people with strong experience of the challenges they face and the markets they want to operate in. We also want to address the market failures of poor awareness of the benefits of mentoring and the difficulties of accessing mentoring. That is why we are joining forces with mentoring organisations and the British Bankers' Association to challenge perceptions and to create a single gateway to mentoring provision.

Analysis also shows that there is a particular issue regarding management capacity, particularly in SMEs.[218] This can affect a businesses ability to set out and deliver a strategic plan to grow their business and navigate various 'tipping points'. These include addressing internal issues - people management, business strategy, operational improvements. External 'tipping points' include access to finance and accessing new markets through innovation or internationalisation.

215 Annual Small Business Survey 2007/08 and Hart et al (2007).
216 Hart et al (2007).
217 Source: BIS Annual Small Business Survey 2007/08.
218 N Bloom et al (2005).

Success at these tipping points will depend on the firm's learning capability or '**absorptive capacity**'. This is the ability of a firm to recognise that an issue needs addressing, and, where necessary, to act by seeking external help and / or building their own management and leadership capability to resolve the problem.[219] However, even for firms with fully developed management capacity there are still market failures, such as access to finance and recruitment and skills shortages, which prevent them from realising their growth ambitions.[220] This further reinforces the need for publicly funded business support.

In future we will need to increase the effectiveness and efficiency of business support. This will be achieved by developing a new model of business improvement services to deliver greater value for money by replacing the Business Link network with more targeted and prioritised support for growth and start ups and by moving more services online.

The creation of Growth Hubs will focus Government support on those firms with high growth potential. The hubs will provide the missing link in Government support for innovation, enabling SMEs with ideas to develop their capabilities to take that idea to the market and develop a world beating business. For this reason they will work closely with the new Technology and Innovation Centres. They will also ensure that there is a single access point to other business improvement services and act as a magnet for regional networks of business angels and other professional services.

Strengthening Enterprise culture

Enterprise and a strong enterprise culture are essential to a number of government priorities, particularly productivity, growth, reducing regional disparities and social inclusion. To drive economic growth, the UK needs a strong pool of active thinkers with the intent and attributes to start a business, and that these businesses need to be productive and have the potential for growth.[221]

Government aims to increase the proportion of adults with the intent and attributes to start a business by ensuring the market failure of information asymmetry is addressed (not necessarily by direct government intervention), thus increasing awareness and perceptions about running a business and the opportunities it affords.

This requires developing a new model to promote a radical change in enterprise culture. This will focus on embedding enterprise more systematically in mainstream education and skills provision, and supporting under represented groups in enterprise, such as the unemployed.

The value for money of enterprise culture interventions will be improved by reducing spend through delivery bodies as they move towards self-financing. We will also ensure all those in education have improved opportunities to develop enterprise awareness and skills by promoting partnership working across both the public and private sector in achieving common enterprise goals.

The 2006 GEM survey shows that those that had enterprise education – whether at school, college Higher Education or government provided – were significantly more likely to be entrepreneurially active (nearly twice that of those without in some cases).

219 Bessant et al (2005).
220 BERR (2008d).
221 The creation and growth of new businesses contributes to the beneficial process of 'productive churn' and is a key driver of productivity growth. Robinson et al (2006).

Analysis by Cowling (2008) using GEM data to model the influence of enterprise education after controlling for other factors, confirmed that it increased entrepreneurial activity. There was some evidence – less broadly found – that it could improve entrepreneurial quality.

Entering Overseas Markets

A further means of developing the growth potential of enterprises is entering international markets. This is evidenced by surveys which indicate that the most widespread benefit of exporting is that it enables firms to achieve a level of growth not otherwise possible.[222] In addition research finds that such businesses tend to employ more workers and pay higher wages,[223] while those firms which start trading subsequently experience more rapid employment growth than other firms.[224]

Factors investigated in quantitative studies of the decision to export can only partially explain whether or not companies export, indicating that softer factors, such as management attitude and confidence, also play a significant role. There are still many UK companies who have the profile associated with success in exporting, but have not yet begun to export, or have very limited export experience.

Apart from policy barriers to trade, such as tariffs, firms face significant non-policy barriers to entering export markets, such as difficulty identifying or gaining access to the right contacts. Firms or sectors seeking to enter a new market face barriers in gaining access to the relevant networks and information if they do not have support from a trusted intermediary who can facilitate access to appropriate contacts.

The extent to which firms face non-policy barriers varies by overseas market (firms face more barriers when entering emerging markets than developed markets), and the extent to which its products or services are innovative, with innovative firms and those holding intellectual property more likely to report experiencing barriers. Survey evidence suggests that firms with growth aspirations are more likely to report having experienced barriers to entering overseas markets with 72% of those having an objective to grow substantially reporting that they experienced at least one barrier compared to 58% of firms with objectives to stay the same size. (Table 9)

Policies to support SME internationalisation in the UK aim to help firms overcome non-policy barriers and issues related to the 'softer factors' mentioned above. This support can broadly be grouped under two headings:

- ***Policies to help individual firms overcome barriers to entering new markets:*** These include the range of commercial services provided by staff in a network of consulates and embassies overseas. Services typically include identification and facilitation of access to specific potential business partners and other important contacts in the market, as well as tailored information and advice.

- ***Policies to help firms build internationalisation capabilities***: These tend to focus specifically on capabilities related to international business, including know how about what knowledge and information are likely to be needed to evaluate and exploit potential opportunities, and to identify what changes may be required to products or services or

222 OMB (2008, 2010).
223 Kneller et al (2010).
224 Bernard et al (2005).

marketing strategy in order to succeed overseas. Services typically involve providing advice to individual firms - including advising firms not to export where appropriate - as well as providing information or training to groups of firms who are exporting or interested in doing so.

Table 9: Percentage of Firms Reporting Significant Barriers to Export Markets, by Growth Objective and Innovation Status

	Growth objectives			Innovation & Growth		
	Stay same	Moderate growth	Substantial growth	Innovation & expect substantial growth	Innovation other	Non innov-ation
Base: All exporters	108	482	234	192	456	210
Types of Barriers						
Legal & regulatory	35%	40%	47%	48%	41%	34%
Customs	23%	26%	28%	28%	26%	26%
Access to Contacts	17%	27%	33%	34%	29%	17%
Access to Information	13%	15%	21%	22%	15%	13%
Resource (e.g. management time)	14%	19%	26%	28%	19%	15%
Language & cultural	19%	19%	21%	23%	19%	18%
Bias (buyer preference for using domestic suppliers)	13%	19%	19%	19%	17%	16%
Number of Barriers						
At least one significant barrier	58%	66%	72%	75%	68%	55%
One	20%	17%	15%	14%	17%	20%
Two	11%	15%	19%	21%	15%	11%
Three	7%	13%	9%	10%	14%	8%
Four or more	19%	20%	29%	31%	21%	16%
No significant barriers	42%	34%	28%	25%	32%	45%

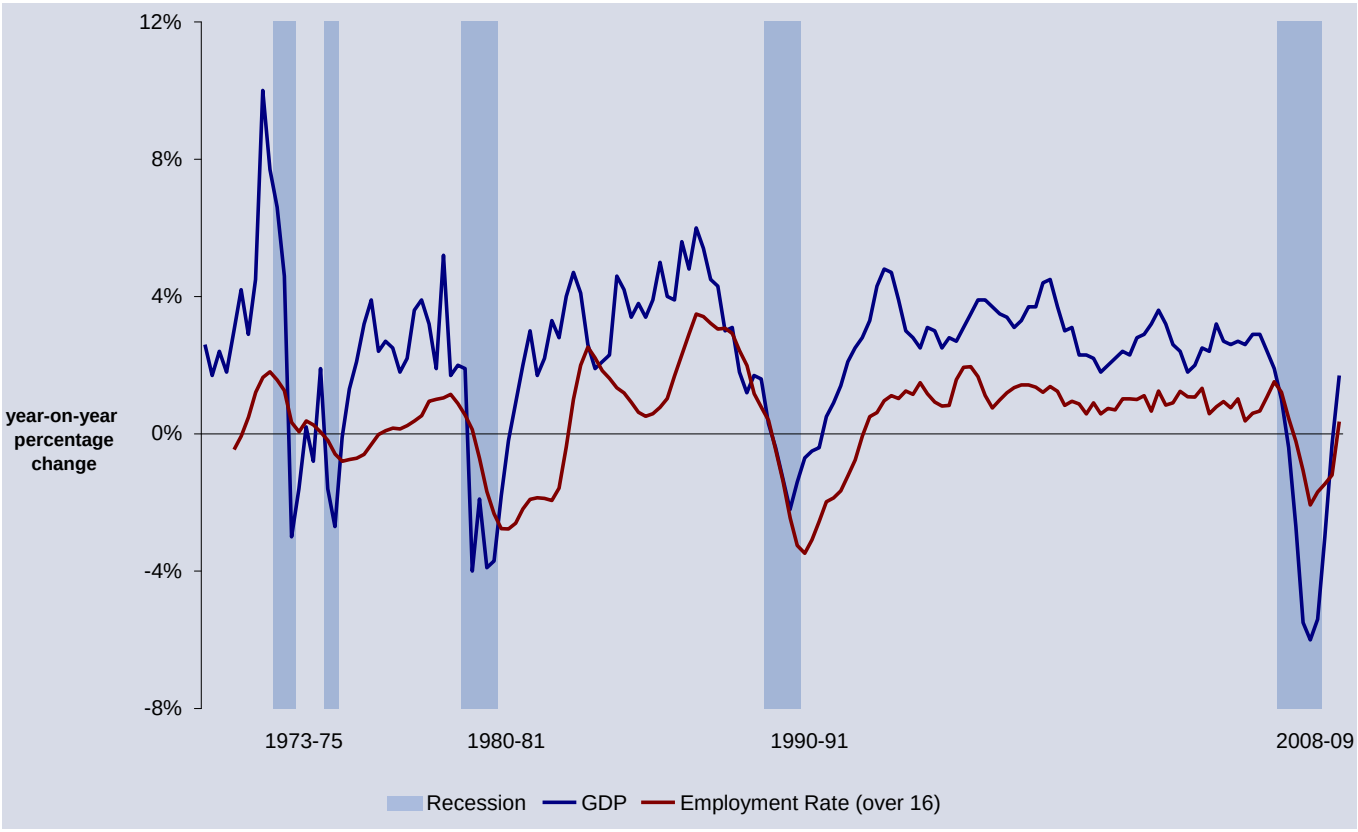
Source: OMB (2010) 2010 UKTI International Business Strategies, Barriers and Awareness Survey
Note: Percentage of firms giving a rating of 4 or 5, using a 1-5 scale, where 1 = not difficult, and 5 = extremely difficult.

Supporting Individuals to Fulfil their Potential

Achieving sustainable growth will ultimately be dependent upon maximising the potential of the labour force. This means both creating the incentives for people to enter employment, and helping ensure that people have the skills at all levels to maximise their productive potential. However, where clear skill shortages exist, migrant labour has an important role to play in raising growth through complementing local skills. This section also considers the relationship between inequality and growth, and the potential role that improving equality of opportunity can play in driving growth.

Both in the UK and internationally economic growth and employment have a close relationship. Figure 31 shows that growth in Gross Domestic Product (GDP) and growth in employment are tightly related.

Figure 31: The Co-movement Between Growth in GDP and Employment Since the 1970s in UK



Source: ONS employment and National Accounts data

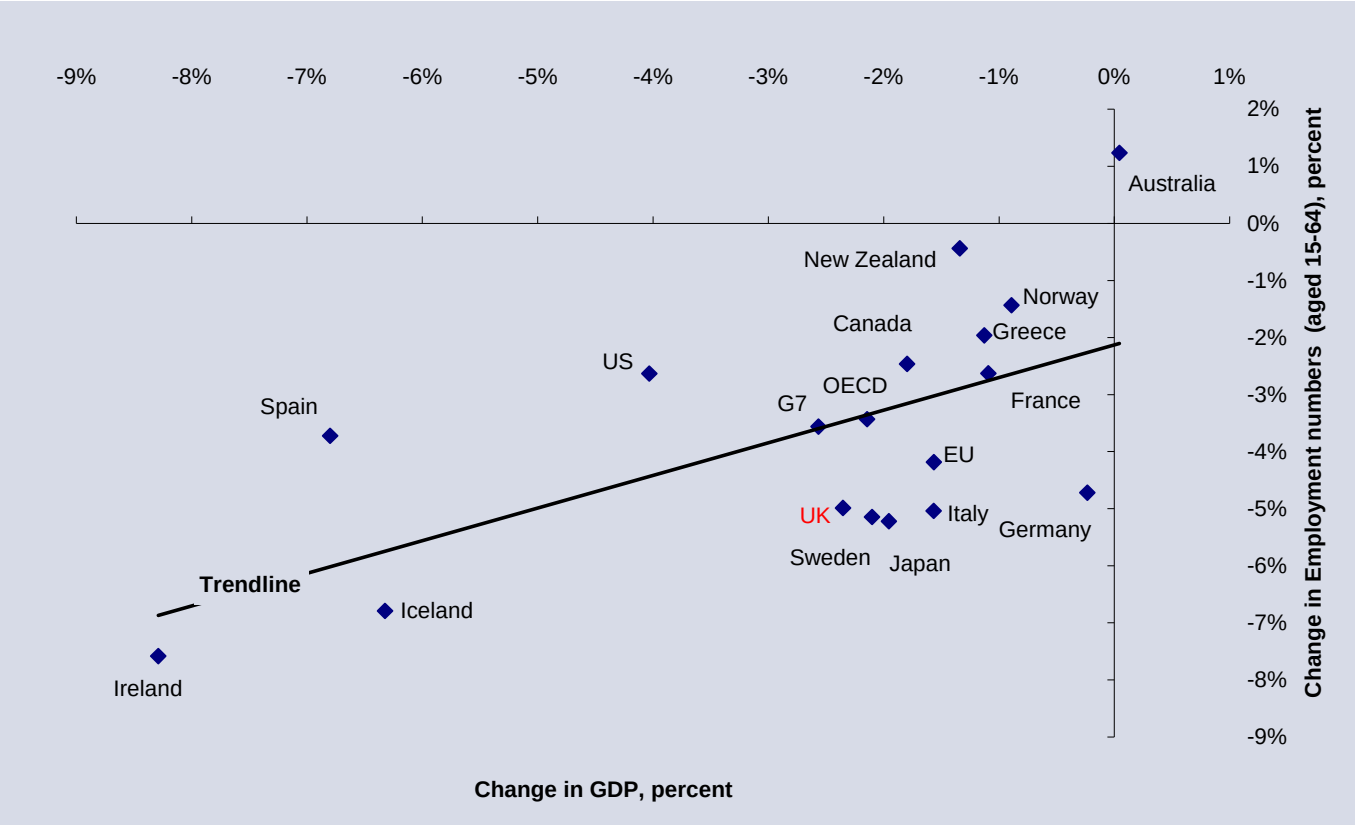
The overall relationship between employment and growth depends on a range of factors such as work incentives, the benefits system, the type of labour market policies in place to help people find work, social mobility, qualifications and skills of the workforce, management

practices, labour market regulation, as well as much wider factors such as access to finance and the ability to combine labour and capital in production.

The exact nature of the link between growth and employment may change over time. Figure 32 suggests that during the recent recession the UK has seen a change in the historical relationship, with a smaller fall in employment compared to the decline in GDP than that experienced by other OECD economies (and relative to previous UK recessions).

The reasons for the differences across countries and recessions come down to the structure of the labour market and labour market dynamics - the extent to which the labour market can adapt to changes in the economy. Many factors have been put forward for explaining the relatively smaller drop in employment, for example, a more active unemployment regime, the willingness of more workers to reduce hours or take up part-time jobs, pay cuts and freezes, a historically small increase in the real hourly cost of labour to firms, firm profitability and labour hoarding.

Figure 32: Average Annual Percentage Changes in Employment and GDP 2008-2009

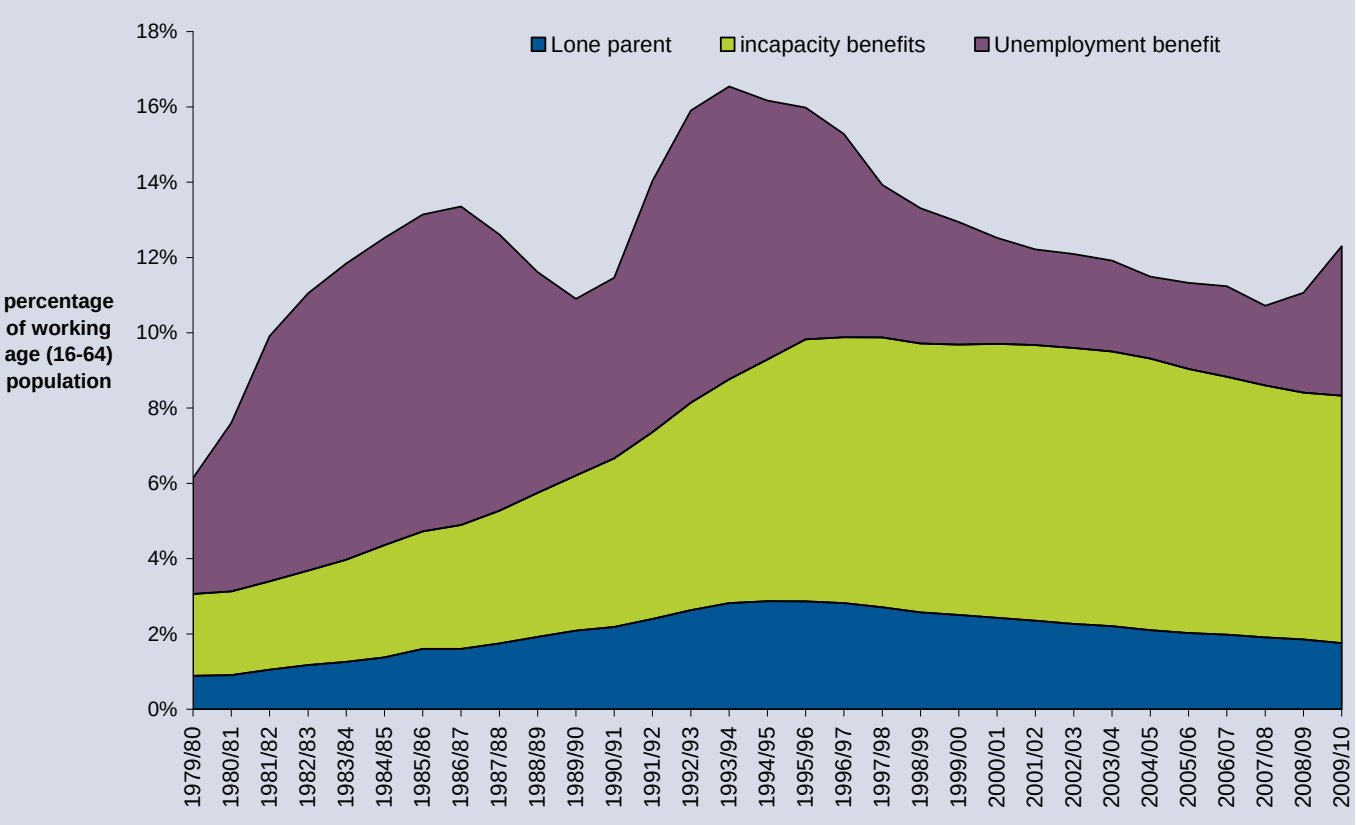


Source: OECD national Accounts & Labour Force Survey databases

Benefits System and Active Labour Market Policies on Employment

Both the incentives provided by the benefits system and the quality of direct help provided through active labour policies can have a strong impact on employment rates and levels, potentially supporting growth in the economy. Helping people to move off benefit and back to work more quickly takes people from an unproductive state to a situation where they are adding economic value, driving growth and filling vacancies in firms.

Figure 33: The Proportion of the Working Age Population Claiming Out of Work Benefits



Source: ONS Labour Force Survey population statistics, DWP benefit statistics

The impacts of recession and boom periods in the 1980s and early 90s can be seen in Figure 33 above. This is most striking in terms of the cyclical nature of the unemployed claimant count. From 1993 to the end of 2007, a period of steady economic growth coincided with a gradual decline in benefit numbers combined with a steady increase in employment.

There has also been a long term shift towards inactive benefits, notably the proportion of people claiming incapacity benefits remains much higher than at any point in the 70s or 80s and now accounts for the majority of people claiming out-of-work benefits. The majority of people claiming inactive benefits have been claiming for several years. The number of lone parents claiming income support also increased through the 1980s before making steady improvements in line with their increasing employment rate and with economic growth.

This points to a twin challenge in the UK labour market:

- Ensuring that those people claiming Jobseeker's Allowance continue to re-enter work as quickly as possible and do not drift toward inactivity.

- Moving the stock of inactive people (particularly those claiming benefits because of disability or ill health) closer to the labour market and into work. Many of the people in this group will have significant barriers to work, but these barriers should not be seen as insurmountable and a large portion of this group want to find work, but may need support in doing so.

The UK Approach: Mutual Obligations

The UK approach to these challenges places an emphasis on mutual obligations between the state and the benefit claimant. On the one hand, the Government provides support to those who need it and ensures that work is always seen to pay more than benefits. On the other, where appropriate, the claimant is required to take steps to move themselves towards and into work. This type of benefit conditionality is a key element of the Active Labour Market Policy that Government uses to combat unemployment and economic inactivity.

By taking such action the Government aims to encourage claimants to return to employment quickly rather than spending periods away from the labour market where their skills are likely to become out of date. In the extreme, where extended periods are spent out of the labour market, these skills may be permanently lost and the claimant may drop out of the labour market completely.

As such, the policy of "activation" is essential to ensure that the claimant avoids this depreciation of skills that can hinder employment prospects and lead to a loss in human capital. This is not just important for the individual; it is also key to ensuring that the economy does not suffer from a loss of human capital. In the medium to longer term in order to improve economic output and growth further, helping those move from economically inactive benefits into productive and gainful employment, will help both to boost growth and improve the income and living standards of these groups.

As well as the obvious contribution to GDP, employment has wider social and economic benefits. It encourages independence, and offers a route out of poverty through job promotions and wage progression, contributing to wider objectives such as reducing child poverty, promoting equality of opportunity and increasing social mobility. Employment also reduces the burden on the state directly through tax revenues, and may also contribute indirectly through improved longer term health outcomes and reduced incidences of crime.

Changes to the benefits system - Universal Credit

For people reliant on benefits the returns from work can be extremely low. In the current system, many have all or almost all of their earnings deducted from their benefits. This lack of any significant return from work is compounded by the complexity of separate out-of-work benefits and in-work Tax Credits and Housing Benefit, creating a disconnect between out-of-work benefits and in-work support.

Poor work incentives have contributed to the UK having one of the highest rates of children growing up in homes where no one works; less than 60% of lone parents in the UK are in employment, compared to 70% or more in France, Germany and the Netherlands.

The Coalition Government has announced plans for a new Universal Credit that will start to change this by improving financial work incentives and thereby ensuring that support is reduced at a consistent and managed rate as people return to work and increase their working hours and earnings.

Universal Credit will be an integrated working-age credit that will provide a basic allowance with additional elements for children, disability, housing and caring. It will support people both in and out of work, replacing Working Tax Credit, Child Tax Credit, Housing Benefit, Income Support, income-based Jobseeker's Allowance and income-related Employment and Support Allowance.

Universal Credit will ensure that all amounts of work will be more financially rewarding than inactivity and remove the current barriers to small amounts of work.

We expect the highest marginal deduction rate, including tax and National Insurance contributions, for low-earning workers will be reduced from around 96% to around 76%, thereby improving the work incentives of around 700,000 people.

In the long-run we anticipate that there will be savings from the dynamic labour supply effects, with Universal Credit reducing the number of workless households by as much as 300,000. A more work-focused benefit system will also have wider benefits for society, in terms of better health outcomes, higher educational achievements, and reduced crime. It is difficult to quantify these effects precisely but their existence is not in doubt.

Intergenerational Effects

Despite having relatively high individual employment rates, Eurostat data suggests that the UK has one of the highest rates of children living in workless households in Europe. This has important social and economic impacts both today and for the future. Worklessness does not just inhibit economic growth today, but transmits to loss of potential and growth in future generations.

There is now growing evidence to show that children growing up in workless households are more likely to experience worklessness themselves as adults. New UK research shows that males are more than twice as likely to experience workless spells themselves if their father was out of work during their childhood, compared to males with a father observed as working.[225] This is not dissimilar to research conducted in the United States, which found women who experienced a spell of welfare receipt during childhood being almost three times more likely to become welfare participants themselves as adults, compared to women whose parents did not receive welfare.[226]

225 Macmillan (2010).
226 Page (2002).

Labour Market Regulation

Evidence on the relationship between labour market regulation and economic growth

Labour market regulation could be described as a system of laws and institutions covering the broad areas of; labour and employment, industrial and collective relations, and aspects of social security. Such regulation can impact upon both employment and growth outcomes in a number of ways. OECD (2007c) reached the following findings:[227]

- ***Stringent employment protection for regular contracts*** has a small, but statistically significant negative impact on long-run productivity growth (particularly TFP), most likely by restricting the movement of labour into emerging, high-productivity activities, firms or industries. Conservative estimates suggest that if OECD countries liberalised provisions for regular contracts to reflect those of the United States, labour productivity growth would increase, on average, by about 0.04 percentage points per year.

- ***Additional parental leave*** appears to increase the level of productivity, but the effect is small and not always statistically robust. It is possible that other policies that encourage sustained workforce participation by parents, such as child care or family-friendly working arrangements, could have a similar positive impact on productivity.

Aiginger (2004) considered evidence relating growth to **procedures and lengths of temporary contracts**. Growth was found to be significantly higher in countries which had fewer restrictions on temporary contracts in 1990. However, the report did not conclude that a one-sided policy focused exclusively on increasing labour market flexibility alone would boost growth and emphasised the importance of complementary investment in research, technology and human capital.

A more wide ranging study was carried out which compared different regimes of labour market functioning.[228] It identified two groups of countries which achieved good labour market performance, but with different degrees of intervention. The second country group, made up of North European countries, spent about 2.5 times more as a percentage of GDP, on both active and passive employment measures than the first group of mainly English-speaking countries (the UK was among this group, identified as delivering high employment).

However, income inequalities and relative poverty rates appeared to be lower in the first country group. The analysis suggests the existence of two broad alternative employment-enhancing reform strategies that resemble each other in terms of demand-side policies, but differ on the supply-side. The review was clear however, that strategies that were not geared towards removing barriers to competition were likely to lead to poor economic performance.

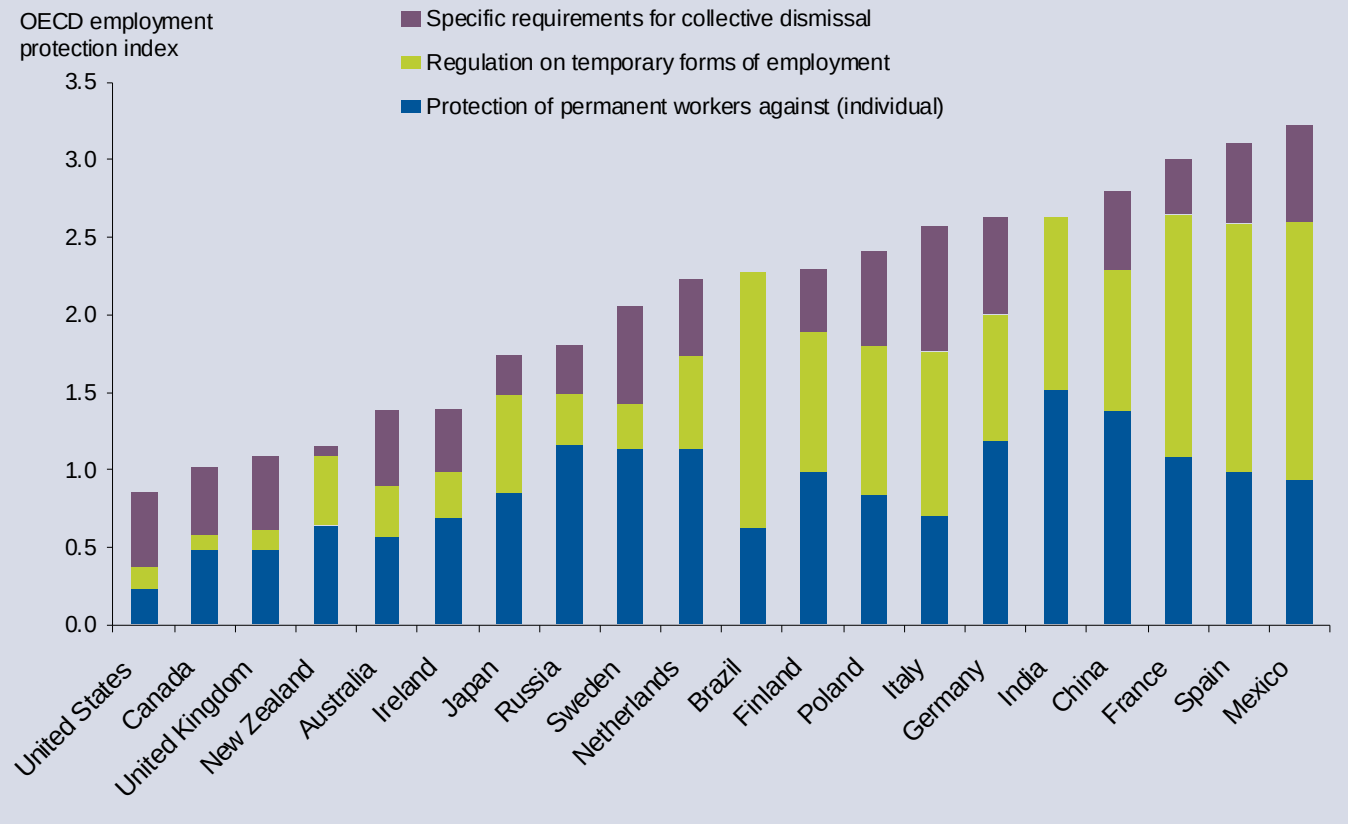
227 'More jobs but less productive? The impact of labour market policies on productivity' in OECD (2007c).
228 'Reassessing the role of policies and institutions for labour market performance: a quantitative analysis', in OECD (2006c).

How the UK performs against international measures of labour market regulation

In the quantitative analysis above (OECD 2006c) the UK was identified as delivering high levels of employment using a combination of demand and supply-side policies, both aimed at strengthening market mechanisms.

In 2008 the OECD employment protection indicators were updated to assess the stringency of employment protection in all OECD countries and a selection of non-OECD countries.[229] The indicators are compiled from 21 sub-components quantifying the costs and procedures involved in dismissing individuals or groups of workers, or from hiring workers on fixed-term or temporary work agency contracts. The overall summary indicator is made up of three sub-indicators quantifying different aspects of employment protection; individual dismissal of workers with regular contracts, additional costs for collective dismissals, and regulation of temporary contracts.

Figure 34: Strictness of Employment Regulation 2008



Source: OECD Indicators on Employment Protection

Among OECD countries, the strictest employment protection is in Turkey, Luxembourg and Mexico, while the least strict is in the United States, the United Kingdom, Canada and New Zealand.

The World Bank Doing Business Project measures and compares regulations relevant to small and medium-sized business in 183 economies. The table below highlights the results from

229 Source: OECD Indicators on Employment Protection.

2009. Each of the indices is assigned values between 0 and 100, with higher values representing more rigid regulations. Each index is compiled from a detailed survey of employment regulations completed by local lawyers and public officials.[230] Employment laws and regulations as well as secondary sources are reviewed to ensure accuracy. The overall rigidity of employment index is a simple average of the 3 sub-indices.

Table 10: World Bank Doing Business – Ease of Employing Workers in the UK

	UK	US	Netherlands	France	Germany	Italy
Rigidity of employment index (0-100)	**10**	**0**	**42**	**52**	**42**	**38**
Components of employment index						
Difficulty of hiring index (0-100)	11	0	17	67	33	33
Rigidity of hours index (0-100)	20	0	40	60	53	40
Difficulty of redundancy index (0-100)	0	0	70	30	40	40

Source: World Bank Doing Business (2009)

While the US has the most flexible employment regulations, the UK performs well relative to other European economies against each of these indicators of employment regulation.

Future policy challenges: Although the UK performs well against international comparisons, and especially against other European economies, there remain concerns about the cost and complexity of the UK employment law system.

As the UK emerges from recession, a flexible labour market which creates opportunities for employment is more important than ever. The future challenge for employment regulation is to provide maximum flexibility and promote competition without compromising fairness, providing a framework that enables businesses and individuals to develop ways of working that best suit their needs.

230 http://www.doingbusiness.org/ExploreTopics/EmployingWorkers/Details.aspx?economyid=196.

Education and Skills

Education and skills make an important contribution to economic growth and competitiveness. They provide individuals with a core set of competences that enable them to be active and find employment within the labour market and once in jobs allow them to work more productively. Skills also contribute to social mobility and fairness, particularly in higher education, where widening participation of students from disadvantaged backgrounds provides greater access to some of the best jobs in the UK.

Contribution to growth

The benefits from investing in skills are wide-ranging and well-established. For example, the OECD state that "Education has always been a critical investment for the future, for individuals, for economies and for societies at large".[231] The two main mechanisms for skills to promote economic growth are through the impact on employment and productivity.

In terms of **employment** outcomes, it is found that on average, the percentage of individuals in employment increases with the level of qualification held. The most significant rise in employment probabilities are observed between those with no qualifications and level 2 – 44% of those with no qualifications are in employment compared to 75% of those with level 2, and 84% of those with level 4 or above qualifications.[232]

Research has shown the UK has made progress in recent years in closing the **productivity** gap with other countries and that skills continue to explain part of this gap.[233] The relationship between skills and productivity, however, is complex. Possible mechanisms through which higher levels of skills enhance productivity include:

- Skills enable individuals to work more effectively, adapt to change and carry out more complex higher value-added tasks. Research by DfES (2007) found that employers think graduates are more flexible, use their initiative, challenge how things are done, solve problems and assimilate knowledge faster than non-graduates. One study found that a one percentage point increase in the proportion of the workforce with a degree, instead of A-level or equivalent qualifications, raised productivity by 0.5%.[234]

- Graduates in particular complement innovation and investment and facilitate the introduction of new ideas and technologies. Enterprises that are innovation-active are observed as employing a greater proportion of graduates within their workforce compared to non-innovators.[235]

The empirical literature on economic growth has generally found a positive relationship between measures of education and growth in GDP across countries. One of the most influential studies (Mankiw et al, 1992) found that the number of years of education raised the growth rate of income per capita across a number of countries between 1960 and 1985. In reviewing the macroeconomic literature, Sianesi and Van Reenen (2003) concluded that the evidence suggests that education and human capital are productivity-enhancing.

231 OECD (2009c).
232 Labour Force Survey 2009 Q4.
233 BERR (2008a)
234 Machin et al (2003).
235 Community Innovation Survey.

As a proxy for productivity, there is a substantial amount of literature that attempts to estimate the wage enhancements individuals with a range of qualifications receive in the labour market. Although there has been an increase in the supply of individuals with these qualifications, the wage returns have remained fairly constant over time, suggesting that demand has kept pace with supply.

- McIntosh and Vignoles (2001) estimated that individuals with level 1 **numeracy skills** earn 11-12% more than similar individuals with numeracy skills below this level, while for **literacy skills** the equivalent wage impact is estimated to be 16%.

- **Level 2** qualifications when delivered through the workplace are found to increase earnings by 10%. **Apprenticeships** are also found to deliver significant wage returns – 16% and 18% at levels 2 and 3 respectively.[236]

- There are strong returns to **academic** qualifications at all levels, for example, the wage returns to two or more A-levels are around 15% and 9-11% for five or more GCSEs at A*-C.

- For **higher education**, it is currently estimated that graduates earn, on average, comfortably over £100,000 more than an individual whose highest qualification is two or more A-levels, net of taxes and in today's valuation.[237]

- For the wider set of generic skills used within the workplace, evidence suggests that there are also wage returns for **influencing skills** and for both the overall use of **computing skills** and the complexity of the tasks performed.[238]

Box 8: Equity and growth

Economic research points to a negative correlation between inequality and growth.[239] In economies in which people start life with different levels of wealth, or cannot access sufficient borrowing, and where human capital is widely different across individuals, increases in inequality may have a direct negative effect on growth, for example, through reductions in investment opportunities, worsening borrowers' incentives and potentially generating macro-economic volatility.[240]

The evidence is particularly strong in relation to inequality of opportunity. A recent World Bank Development Report concludes that inequality of opportunity within nations sustains extreme deprivation, results in wasted human potential and weakens prospects for overall prosperity and economic growth.[241]

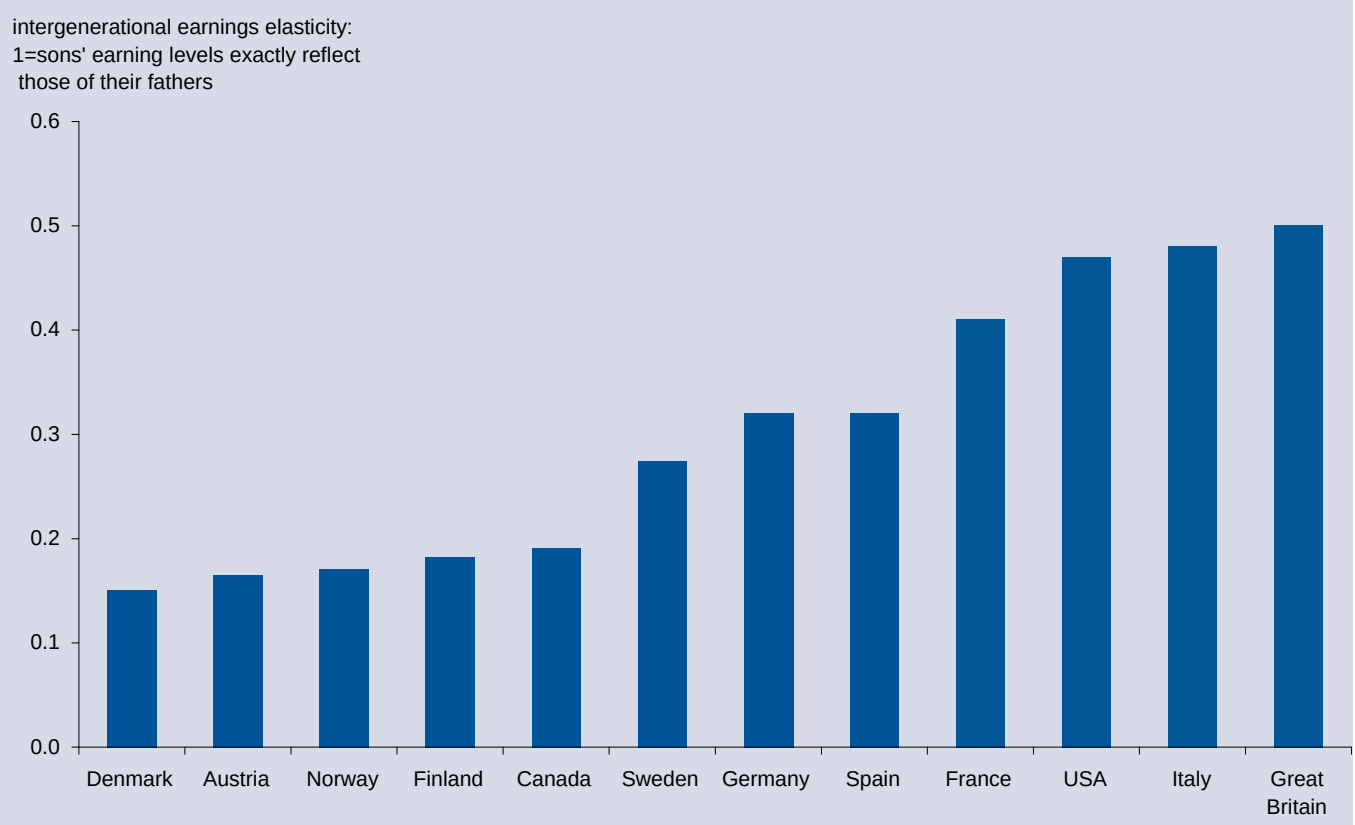
Inequality also impacts social mobility. D'Addio (2007), looking at intergenerational social mobility, by comparing individual earnings with parental earnings, in the OECD, found that social mobility tends to be lower in countries with high income inequality and higher in countries with a more even income distribution. In his sample, the UK had the greatest persistence of earnings across generations and therefore the lowest intergenerational earnings mobility, closely followed

236 Jenkins et al (2007), McIntosh (2009).
237 O'Leary and Sloane (2005), UUK/PWC (2007).
238 Felstead et al (2007).

Box 8: Equity and growth

by Italy and the US.

Figure 35: Links Between Individual and Parental Earnings Across OECD Countries



Source: D'Addio (2007), within OECD (2010d)

Inequality often starts early in life, with substantial inequalities in school readiness at ages 3 and 5 between children from poorer and richer families.[242] The level of a mother's education is also repeatedly found to influence a child's outcome. Cullis and Hansen (2008), comparing children's development when entering school, find that the level of a mother's education is associated with a difference in child's development by up to several months (as judged by teachers' assessment).[243]

Using free school meals as a measure of disadvantage, Burgess et al. (2009) find there is a

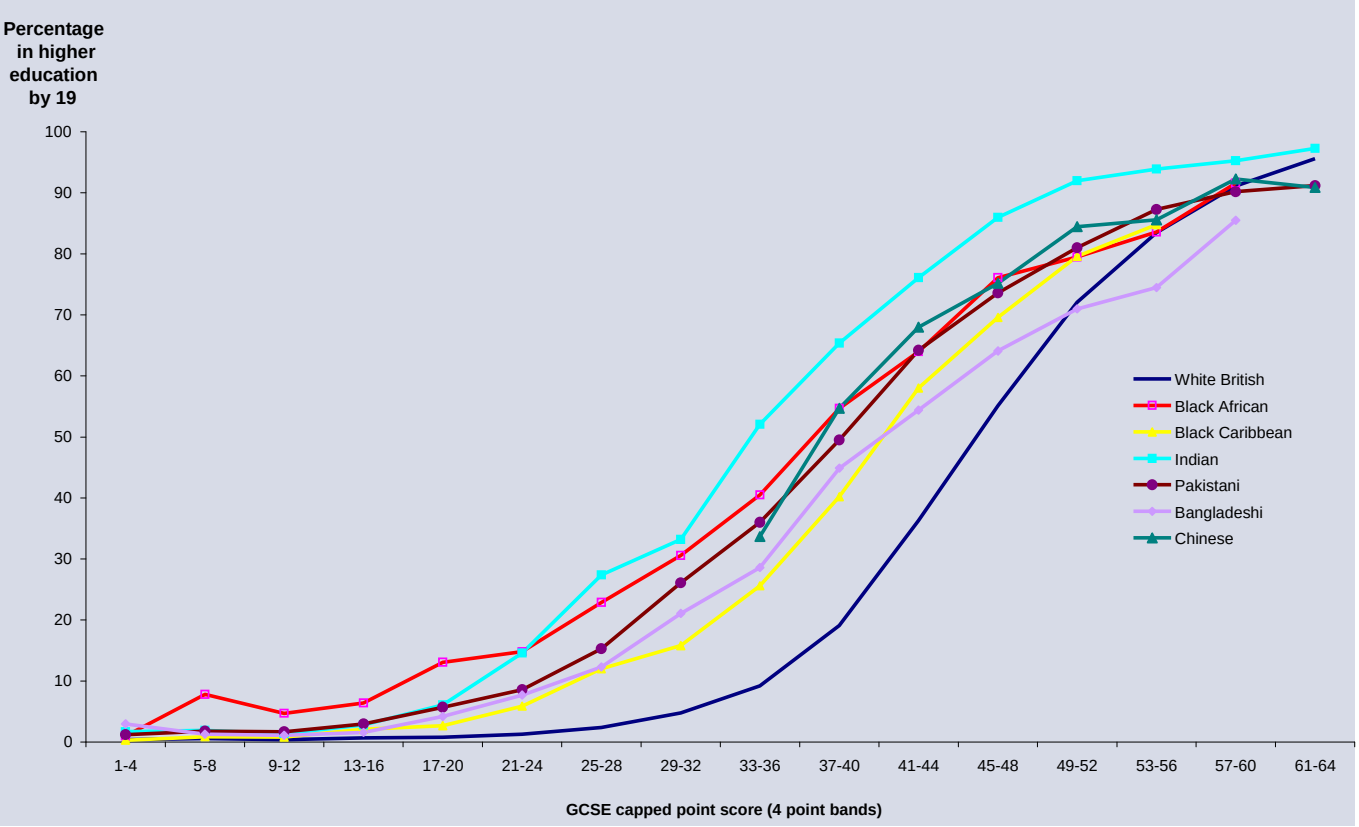
239 For a comprehensive review of the literature, see for example, Benabou R (1997), Alesina and Rodrik (1994), Persson and Tabellini (1994).
240 Aghion et al (1999).
241 World Bank (2006).
242 Waldfogel and Washbrook (2008), based on MCS.
243 Cullis and Hansen (2008) based on MCS.
244 Burgess, Wilson and Worth (2009).

Box 8: Equity and growth

deterioration in educational attainment for low income boys. Specifically, he finds that while Pakistani and Bangladeshi boys not on free school meals (a measure of disadvantage) catch up with average test results between 7 and 16, Black Caribbean boys fall behind, as do White British boys on free school meals.[244]

Such inequalities extend to participation in higher education. For a given GSCE attainment, while boys and girls are equally likely to enter higher education, high attaining poorer children are less likely than children from richer backgrounds, as are white children with middle attainment at 16 compared to ethnic minority children.

Figure 36: Participation in Higher Education at 19 by Prior Attainment and Ethnicity



Source – Government Equalities Office (2010)

Finally, there is also growing evidence to show that children growing up in workless households are more likely to experience worklessness themselves as adults. Macmillan (2010) shows that males are more than twice as likely to experience workless spells themselves if their father was out of work during their childhood, compared to males with a father observed as working.

The evidence therefore suggests that carefully targeted measures to address differences in inequality, particularly regarding educational opportunity, can play an important role in improving long term economic growth performance, particularly through raising employment rates.

Evidence strongly suggests that **raising attainment levels in schools is important to the skill levels of the adult workforce**. Individuals with good attainment at school are far more likely to participate in post-compulsory and higher education. For those aged 19 in the 2009 cohort, 58% who had gained 5A*-C GCSEs by age 16 had achieved 2 or more A-levels by age 19 compared to only 18% of those who had not gained 5A*-C GCSEs by age 16.[245] Early attainment at school is highly predictive of later attainment. 68% of pupils achieving the expected Level 4 at the end of primary school obtained 5A*-C GCSEs, compared to 18 per cent of those who achieved Level 3 at the end of primary school.[246]

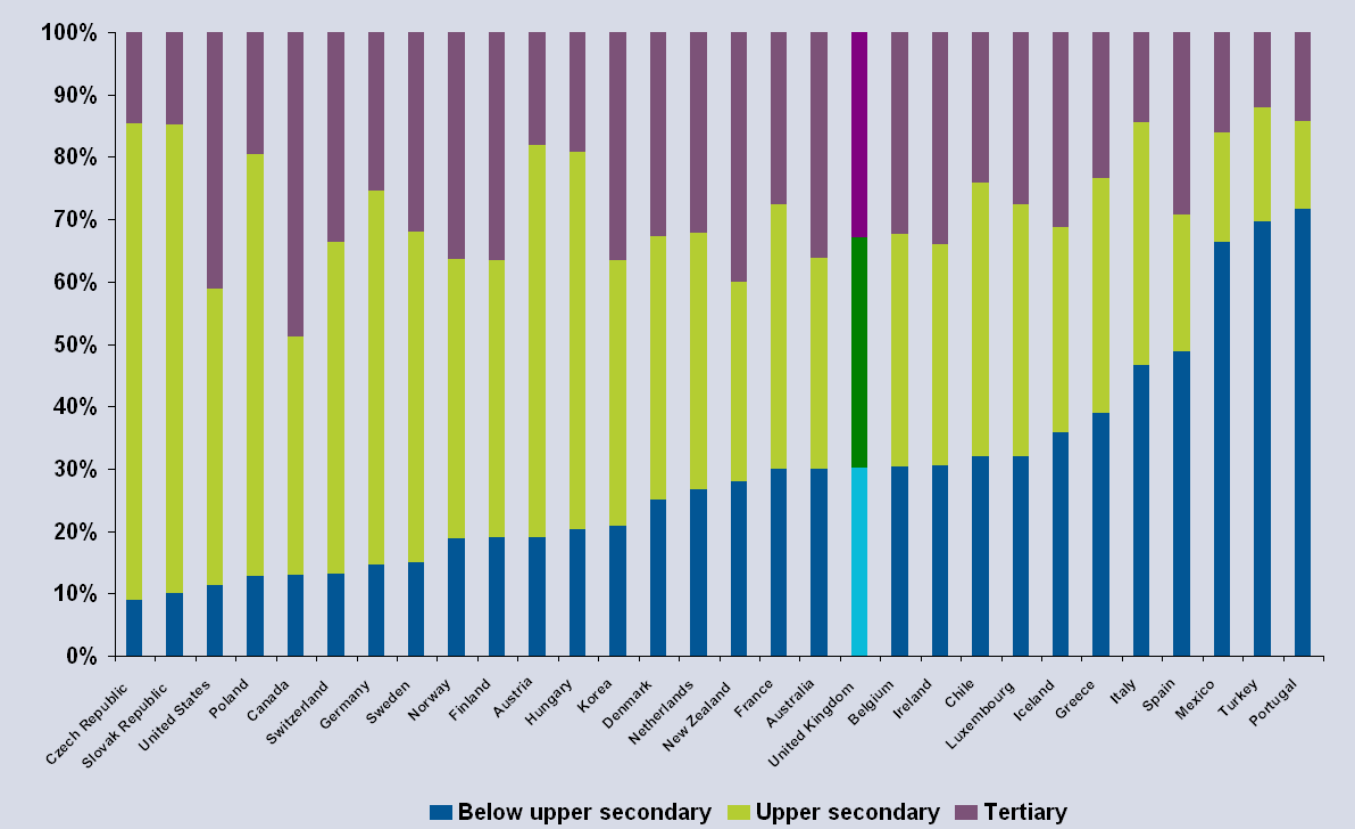
A wide range of international evidence also suggests that experience of **pre-school education** has positive effects on children's cognitive development. The Effective Provision of pre-school Education (EPPE) project investigated the effects of preschool education for children in the UK aged 3-7 years old. The EPPE team collected a wide range of information on 3,000 children who were recruited at age 3+ and studied longitudinally until age 7. EPPE found strong evidence that children with pre-school experience of childcare enter school at a cognitive advantage.[247] Follow-up EPPE research on children between the ages of 7 and 11 found that having attended high quality pre-schooling continued to result in positive attainment benefits for children throughout their primary schooling. [248]

International position

Figure 37 presents the latest OECD international comparisons of educational attainment of the working age population, showing the percentage with 'below upper secondary' (equivalent to those in the UK whose highest qualification is below level 2), 'upper secondary' (highest qualification held at level 2 or 3) and 'tertiary' (qualified to at least level 4) qualifications. The UK is ranked 12th out of 31 countries for the percentage with tertiary education and 19th out of 30 OECD countries for the percentage with at least upper secondary education (i.e. upper secondary or tertiary). [249]

245 DfE analysis.
246 Ibid.
247 EPPE (2004).
248 EPPE (2008).
249 It should be noted that the UK position on attainment levels is underestimated as the estimates from the Labour Force Survey in England have been revised since the OECD commissioned the data for Education at a Glance 2010. If the scale of change in 2008 for England were reflected in the UK level measure, then the UK would be around three places higher in both of these rankings.

Figure 37: Percentage of Population Aged 25-64 with Below Upper Secondary, Upper Secondary and Tertiary Education (2008)



Source: OECD Education at a Glance 2010

For younger age groups, there are a number of international surveys that assess the UK's relative performance in reading, mathematics and science. The Progress in International Reading Literacy Study conducted in 2001 and 2006 showed that Year 5 pupils in England achieved significantly above the international mean in 2006, but significantly below some countries, in particular, Hong Kong, the Russian Federation and Singapore. There was also a drop in performance between 2001 and 2006 both in absolute and relative terms. The Trends in International and Mathematics Study shows that between 1995 and 2007, England's score for Year 9 pupils in mathematics has improved and science has remained steady from a high base.

The OECD's Programme for International Student Assessment, taken by a sample of 15 year olds in 50 countries (including all 30 OECD countries and 25 of the 27 EU members), reported that:

- Seven countries had significantly higher mean scores than England in reading: Korea, Finland, Hong Kong, Canada, New Zealand, Ireland and Australia. The distribution of performance in England between the 5th and the 95th percentile was 337 scale points, wider than only 14 other countries in the study. England has a relatively long tail of underachievement compared with the highest performing countries - 19% of students in England achieved at level 1 or below compared with 5.8% in Korea, 4.8% in Finland and 7.1% in Hong Kong.

- Eighteen countries achieved a mean score in mathematics significantly higher than England, placing England in a middling position relative to other countries. Twelve of the countries that outperformed England are OECD countries and seven are EU members.

- Seven countries had a significantly higher mean score than England in science: Finland, Hong Kong, Canada, Chinese Taipei, Estonia, Japan and New Zealand. The distribution of performance in England between the 5th and the 95th percentile was 350 scale points, an attainment gap only exceeded by two other countries in the study.

- Hanushek and Woessmann (2010) estimated that increasing test scores to the same level as Finland (the highest performer in the OECD) could increase the long run rate of growth in the UK by 0.5 percentage points.

Leaving the full-time education system without gaining a core set of skills and competences places both individuals and employers at a potential disadvantage. In a survey of employers recruiting young people, almost one-third felt that 16 year old school leavers were poorly prepared for work, falling to around one-fifth and one-tenth for 17-18 year old school/college leavers and higher education leavers respectively.[250] At the end of 2009, 9.2% of 16-18 year olds were Not in Education, Employment or Training (NEET) – a rate that has remained fairly constant in recent years.[251] The UK has significant scope for improvement in this area – it has a higher NEET rate than any other OECD country except Spain and Turkey. [252]

Entering the labour market with low qualifications is associated with a significantly reduced chance of receiving job related training, which further limits the ability of individuals to acquire new skills and progress. Overall, one-third of employers in England provide no training and as a result 44% of employees receive no job-related training.[253] Comparisons of training activity across European countries present a mixed picture with the UK having a high incidence of training but often characterised by low quality short duration training.[254]

Within firms, managers have an important role to play in linking product market strategies to workplace training and wider human resource strategies. In a series of influential surveys across manufacturers CEP/McKinsey (2005, 2007) show that management capability is positively associated with a range of measures of business performance, including sales growth and labour productivity. The UK, however, is found to rank below key competitors such as the US, Germany and Japan in terms of overall management capability and has a relatively low percentage of managers educated to degree level. By re-interviewing firms in 2009, CEP (2010) found that the UK remains behind a number of its competitors although has made progress in closing the gap with the US. The ability to hire managerial and non-managerial staff with the appropriate skills is found to be the most significant barrier UK firms face in developing management capability.

Government policy has focused on identifying sources of market failure that lead individuals and employers to under-invest in skills from society's perspective. These include:

250 UKCES (2010a)
251 DfE (2010).
252 OECD (2010e).
253 UKCES (2010b).
254 CVTS3 (2008).

- **Externalities** arising from the transfer of knowledge as individuals move between jobs along with wider benefits relating to improved health and social cohesion;

- **Informational failures** that lead to individuals or firms not being aware of or able to access the full range of courses available, or lacking complete knowledge of the benefits; and

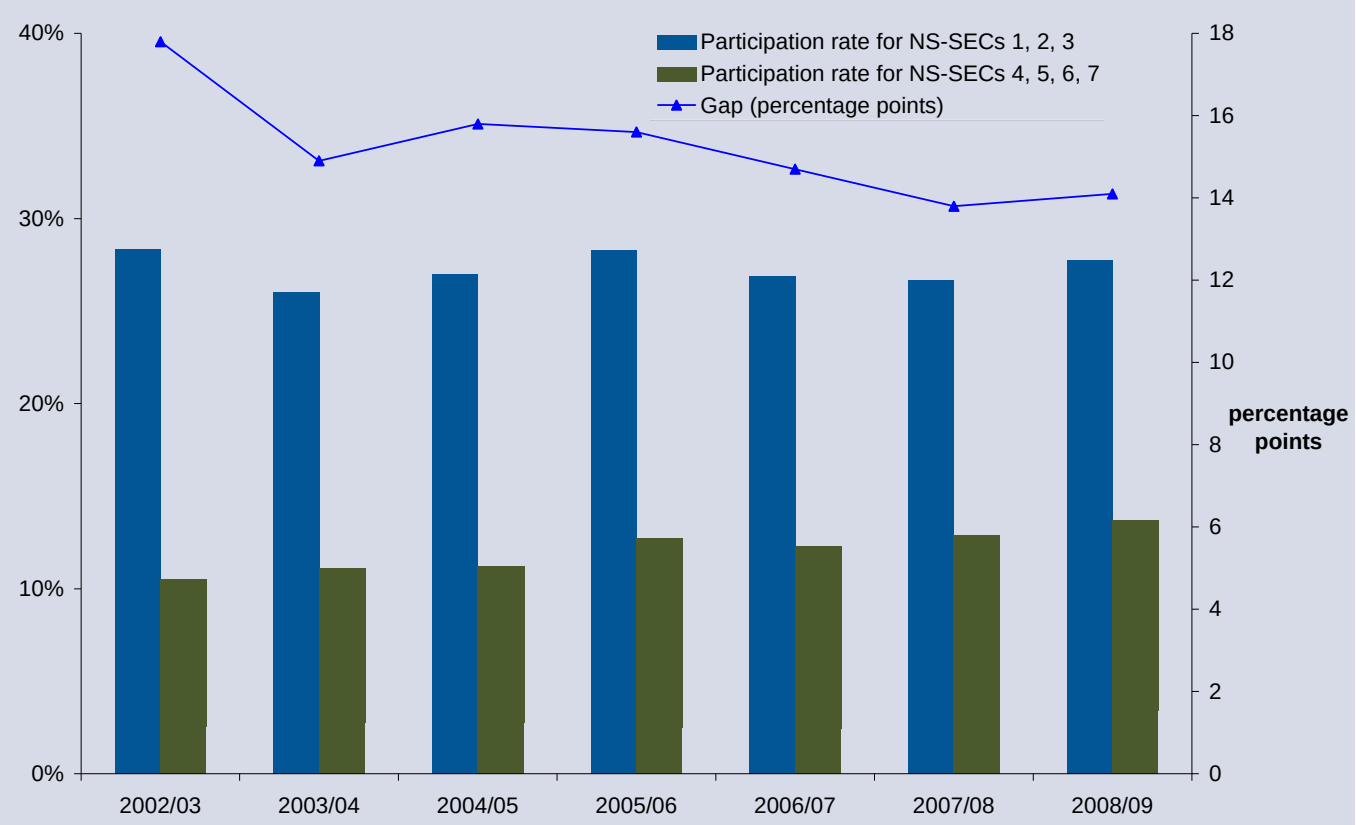
- **Credit constraints**, which combined with debt and risk aversion, limit the ability or willingness of low income individuals to invest in training.

Providing greater access to education and training for individuals from low-income households or disadvantaged groups opens up the possibility of securing employment in high-skilled occupations, helping to promote social mobility. In higher education there has been considerable progress in widening participation as measured by a number of indicators – including the narrowing of the participation gap amongst 18 year olds between those from the bottom four socio-economic classes and the top three classes by 3.7 percentage points over the period 2002/03 to 2008/09 (Figure 38).[255]

Recent analysis by HEFCE has found that while there are still large differences in participation rates according to where young people live, the proportion of young people living in the most disadvantaged areas who enter higher education has increased by around 30% over the past five years, and by 50% over the past 15 years – substantially higher growth rates than in more advantaged areas.[256]

255 For the most recent data available (2008/09), socio-economic class can only be compared amongst students aged 18 or under due to an underlying data issue and the chart presents the comparable time series back to 2002/03. Previous releases of the data (up to 2007/08) provided participation data for 18 to 20 year olds.
256 HEFCE (2010).

Figure 38: HE Participation Rates by Socio-Economic Class



Source: Full-Time Young Participation by Socio-Economic Class 2010 Update, BERR

Challenges

Although the UK has made progress in terms of the educational attainment of its workforce, other developed countries have also up-skilled and expressed a strong desire to progress even further. A recent OECD survey reported that "in most countries increasing public investments to education form an integral part of stimulus measures for economic recovery".[257] France, Germany, the US and Australia are all making significant investments in education, universities and research. UK spending on higher education increased from 1.0% of GDP to 1.3% between 2000 and 2007 but remains below the OECD average of 1.5%.[258]

As discussed earlier, although they have made significant progress, developing economies are predominantly unskilled and have a comparative advantage in relatively low value added goods and services. Technological change tends to be skill-biased and provides opportunities, particularly in developed economies, to specialise in high value-added activities. The extent to which developing economies are able to adopt new technologies and raise skill levels over time will affect the range of sectors in which they are able to compete with the UK.

There are a number of challenges for ensuring that individuals are equipped with the skills to enable them to enter and progress in the labour market, and then also be able to undertake further learning and training to meet the changing requirements of jobs in the future global market, including:

257 OECD (2009d).
258 OECD (2010e).

- Raising **attainment among school pupils**, including the lowest attainment groups, to the levels of the best performing schools internationally;

- Providing **support for those facing the greatest barriers to learning**, including those actively seeking work, young people making the transition from education to work or self-employment and those who lack basic literacy and numeracy;

- Developing a set of **vocational qualifications**, with apprenticeships at their heart, that are valued by learners and employers and that provide a platform for progression into higher education;

- Provide **clear and comparable information** on the quality of colleges and training providers to enable individuals and employers to make informed choices, and simplify the system to be more responsive to their requirements; and

- Improving the way skills are developed and used in modern workplaces by working with business to **find industry-led solutions** to stimulate greater employer interest and investment in skills.

Migration

International migration has an important role to play in promoting economic growth both through increasing the size of the workforce and in some cases also exerting a positive impact on productivity. Migration provides employers with a pool of labour that enables greater flexibility in terms of responding quickly to changing short term needs and improving the match between vacancies and labour. Highly skilled migrants in particular may also facilitate trade and investment as well as bringing new skills, innovations and technological capability that have the potential to benefit UK workers. However, some sectors are more reliant on migrant flows and there is a longer term challenge for both employers and the UK skills system to train individuals for these jobs and also maximise the employment rates of those already in the UK.

Contribution to growth

Although migration can increase the size of the economy and GDP, it may be preferable to consider the impact on GDP per head (or per head of the resident population) in thinking about the impact on economic welfare. The overall effect will depend on a range of factors including the relative employment rates of migrants relative to the domestic population,[259] the skills mix of migrants, the matching of migrants to jobs, and the externalities associated with migration which could generate opposing impacts on welfare.

Positive externalities could arise from migrants facilitating knowledge transfer, enterprise and innovation as they complement existing factors of production. Negative externalities, however, could emerge as migration raises the size of the population, placing greater pressure on public services and social cohesion, as well as creating additional costs associated with, for example, congestion.

259 For UK nationals the employment rate was 70.6% in April to June 2010, compared to 75.5% for EU nationals, 83.3% for EUA8 nationals and 60.2% for non-EU nationals (ONS Labour Market Statistics October 2010).

A number of estimates have been made relating to the contribution migration has made to growth. For example, Riley and Weale (2006) found that of the 5.3% growth in the UK economy between 2004 and 2005, migration accounted for 17%. In terms of employment, between 2005Q2 and 2008Q2 total employment grew by 2.6%. Over half of this (1.4 percentage points) was attributable to the growth in employment of EU nationals, with non-EU nationals accounting one percentage point and UK nationals the remaining 0.2 percentage points.[260]

There is very little evidence that migrants have displaced UK labour from work. For example, Lemos and Portes (2008) found no statistically significant effect of A8 migration on the employment rate of the UK-born population. Some studies do suggest, however, the possibility of displacement over the short term, for example, Jean and Jimenez (2007) for OECD countries and Peri (2010) for the US in recession.

The theoretical literature indicates that migration generates benefits to the economy if the skill mix of migrants differs from that of resident workers (Borjas, 1995). If capital remains perfectly elastic, an inflow of low skilled migrant labour would be expected to reduce the wages of domestic unskilled labour, for which it is a substitute, but raise the wages of skilled labour to which it is complementary. The impact of migration on wages might therefore be expected to vary across the earnings distribution. Dustmann et al (2007) estimate that a one percentage point increase in the migrant population is associated with a 0.5% decrease in the wages of those in the first decile of earnings and a 0.4% increase for those in the ninth decile. In addition, Nickell and Salaheen (2008) found a negative impact from migration on wages in the unskilled and semi-skilled service sector.

To the extent that the impact of migration on average wages can be taken as an imperfect proxy for its impact on GDP per head, the evidence overall is mixed. Dustmann et al (2007) found an average increase across the earnings distribution in non-migrant wages of 0.3 to 0.4% as a result of a one percentage point increase in the share of migrants in the working-age population. However other authors such as Nickell and Salaheen (2008) and the IPPR (2009), have found effects of similar magnitude but in the opposite direction. In summarising the literature, Wadsworth (2010) argues that although there is a modest effect on the wages of the less skilled, overall there appears to be little effect on pay.

Huber et al (2010) estimate the effect that migration, and particularly highly skilled migration, has on productivity across the EU. Looking across all sectors of the economy, their results indicate that highly skilled migrants are associated with higher levels of value added, with this effect being even stronger when highly skilled migrants complement ICT capital. The results for EU and non-EU migrants more generally however are mixed, with it being difficult to establish if migrants exert any significant effects. In terms of the growth of value added, the effect of highly skilled migration is weakened but non-EU migrants are found to make a positive contribution. Analysing the data further, the authors find that amongst the set of skill-intensive sectors, highly skilled migration does have a positive impact on productivity growth, suggesting that selective immigration policies may have the greatest potential for productivity growth.

Indicators

In 2009 net migration to the UK was 198,000 and is composed of three main groups. Amongst UK nationals there was net emigration of 44,000 while for both EU and non-EU nationals net

260 Labour Force Survey.

immigration was 58,000 and 184,000 respectively. Data from the International Passenger Survey in 2009 also reveals that 34% of all immigration is for work-related reasons, while for EU and non-EU nationals the proportions are 59% and 20% respectively.

Table 11: Total Immigration, Emigration and Net Migration by Citizenship, 2009 (000s)

	Total	UK	Non-UK		
			Total	Of which EU	Of which non EU
Immigration	567	96	471	167	304
Emigration	368	140	228	109	119
Net Migration	198	-44	242	58	184

Source: ONS, Long term Immigration statistics

Table 12 presents the percentage of UK nationals, EU nationals and non-EU nationals who are in employment by their level of highest qualification held. [261] Whilst EU migrants in employment tend to hold lower qualifications than UK workers (35% are educated below level 2 compared to 20% of UK workers), non-EU workers contain a mix of both relatively unskilled and skilled labour (42% hold degree-level qualifications compared to 38% of UK workers).

Table 12: Qualifications Held by Those in Employment and Nationality

Employed			
	UK	EU	Non-EU
Below Level 2	20%	35%	30%
Level 2	21%	21%	18%
Level 3	21%	11%	11%
Level 4+	38%	32%	42%

Source: LFS 2010 Q2

In terms of the sectors migrants are employed in, relatively large numbers of non-EU migrants (90 thousand or more) are employed in health/social work, business activities, hotels/restaurants, retail trade repairs and education.[262] In some cases, this reliance is even more pronounced in certain regions, for example, the social care sector in London.

Although it is not possible to establish a causal relationship in a descriptive analysis, the five fastest growing sectors of the UK economy over the period 2005 to 2008 (defined as having an above average growth of GVA) have a greater share of migrants in the workforce compared to the average across the economy. Table 13 shows that amongst these sectors, hotels/restaurants has the greatest migrant share with 18.8% of the workforce being migrant

261 The estimates presented here are not comparable with BIS's headline measure of qualifications held within the population in England. The method used to calculate the headline Labour Force Survey measure allows for known issues arising from capturing data on attainment through social surveys, but this method cannot currently be applied to sub-populations. As a result, the estimates provided for different nationalities are potential underestimates; it is not known whether the improved methodology has a differential effect on the estimates of attainment for different sub-groups.

262 Labour Force Survey 2010Q1.

labour and 10.2% being non-EU. Overall, 59% of all non-EU workers were employed within these sectors compared to 39% of UK nationals.

Table 13: Gross Value Added (GVA), non-EU Migrant Employment Shares and Estimated GVA per Person Employed by Fastest Growing Sectors, 2008

	Sector GVA as share of total	Ratio of GVA 2008 / 2005	Migrant share		% of total employment	
			All	Non-EU	UK	Non-EU
Financial intermediation	9%	1.19	9.7%	5.1%	4%	5%
Real estate, renting and business activities	23%	1.14	10.3%	6.0%	12%	18%
Hotel and restaurants	3%	1.08	18.8%	10.2%	4%	11%
Health and social work	7%	1.08	8.8%	6.3%	12%	19%
Transport, storage and communication	5%	1.07	8.5%	4.0%	7%	6%
All	100%	1.06	7.8%	4.1%	100%	100%

Sources: ONS Blue Book 2010, Tables 2.3 and 2.4; Labour Force Survey Q2 2008.

Challenges

The evidence suggests that at the aggregate level migration has made a contribution to growth within the UK. Migrants have accounted for a significant proportion of total employment growth whilst there is little evidence to suggest UK workers have been displaced. The impact of migration on the wages of non-migrants and on productivity is, however, more mixed. Recent evidence seems to point towards the importance of highly-skilled migrants, especially when they interact with ICT capital. This suggests that policies of greater selectivity of migrants may pay the most dividends.

Employers value the range of routes available through the Points Based System for non-EU migration, including intra-company transfers and the filling of skilled vacancies through the shortage occupation list. Some sectors of the UK economy employ a relatively high proportion of migrant labour, which may not be desirable as any reduction in the flow of migrant labour may impact on business in the short term. Over the medium to long term, adjustments are likely to occur within the labour market in response to any shortages, helping to incentivise both employers and individuals to invest in the skills demanded. The UK skills system will also need to be responsive to these needs and ensure high quality learning opportunities are available through colleges and training providers.

References

Abramovsky, L., Harrison, R. and Simpson, H. (2004) Increasing Innovative Activity in the UK? Where now for Government Support for Innovation and Technology Transfer, IFS Briefing Note No. 53

Aghion, P., Banerjee, A., Angeletos, G. M., and Manova, K. (2005) Volatility and Growth: Credit Constraints and Productivity-Enhancing Investment, NBER Working Paper No. w11349

Aghion P., Blundell R., Griffith R., Howitt P., and Prantl S. (2009), The Effects of Entry on Incumbent Innovation and Productivity, Review of Economics and Statistics, Vol. 91(1), pp. 20-32

Aghion, P., Caroli, E., and Garcia-Penalosa, C. (1999) Inequality and Economic Growth: the Perspective of New Growth Theories, Journal of Economic Literature, No. 37(4), pp. 1615-1660

Aghion, P., and Howitt, P. (1997) Endogenous Growth Theory, MIT Press

Aiginger, K. (2004) The Relative Importance of Labour Market Reforms to Economic Growth – the European Experience in the 1990s, Austrian Institute of Economic Research WIFO, No. 232/2004

Aizenman, J., and Marion, N. (1999) Volatility and Investment: Interpreting Evidence from Developing Countries, Economica, London School of Economics and Political Science, Vol. 66(262), pp. 157-79

Albrecht, J. (1998) Environmental Regulation, Comparative Advantage and the Porter Hypothesis, FEEM Working Paper No. 59/98

Alesina, A., and Rodrik, D. (1994) Distributive Politics and Economic Growth, Quarterly Journal of Economics, Vol. 109(2), pp. 465-90

Amiti, M., and Wei, S. (2004) Fear of Service Outsourcing: Is It Justified?, IMF Working Paper, WP/04/186

Audretsch, D., and Thurik, A (2010) Unravelling the Shift to the Entrepreneurial Economy, Tinbergen Institute Discussion Paper, TI 2010-080/3

Bank of England (2010), Financial Stability Report, June

Barlevy, G. (2004), The Cost of Business Cycles Under Endogenous Growth, American Economic Review, Vol. 94(4), pp.964-990.

Barro, R., and Sala-i-Martin, X. (2003) Economic Growth, 2nd Edition, The MIT Press

Bartelsman, E., Scarpetta, S., and Schivardi, F. (2005) Comparative Analysis of Firm Demographics and Survival: Evidence from Micro-Level Sources in OECD Countries, Industrial and Corporate Change, Oxford University Press, Vol. 14(3), pp. 365-391

Beaudry, P., and Pages, C. (2001) The Cost of Business Cycles and the Stabilization Value of Unemployment insurance, European Economic Review, Vol. 45(8), pp.1545-1572

Bell, D., and Blanchflower, D. (2009) What Should be Done About Rising Unemployment in the UK?, Stirling Economics Discussion Papers, No. 2009-06

Benabou, R. (1997) Inequality and growth, NBER Working Paper No. 5658

Bernard, A., Jensen, J., and Schott, P. (2005) Importers, Exporters and Multinationals: A Portrait of Firms in the US which Trade Goods, Peterson Institute for International Economics Working Paper, WP 05-10

Bernard, A., Redding, S., and Schott, P. (2006) Multi-product firms and Trade Liberalization, CEP Discussion Paper No. 769

BERR (2007) Annual Small Business Survey, available at: http://webarchive.nationalarchives.gov.uk/+/http://www.berr.gov.uk/whatwedo/enterprise/enterprisesmes/research-and-statistics/research-evaluation/business-surveys/page38370.html.

BERR (2008a) Cross-country Productivity Performance at a Sectoral Level: the UK Compared with the US, France and Germany, BERR Occasional Paper No. 1

BERR (2008b) High Growth Firms in the UK: Lessons from an Analysis of Comparative UK Performance, BERR Economics Paper No. 3

BERR (2008c) Benchmarking the Performance of the UK Framework Supporting Consumer Empowerment Through Comparison Against Relevant International Comparator Countries, Report prepared for BERR by the ESRC Centre for Competition Policy

BERR (2008d) The Economic Drivers of Government Funded Business Support: Supporting Analysis for 'Solutions for Business: Supporting Success'

BERR (2009a) China and India: Opportunities and Challenges for UK Business, BERR Economics Paper No. 5

BERR (2009b) The Globalisation of Value Chains and Industrial Transformation in the UK, BERR Economics Paper No. 6

BERR (2009c) Rowlands Review: The Provision of Growth Capital to UK Small and Medium Sized Enterprises

BERR and Kingston University London (2008) The Impact of Regulation on Small Business Performance

Bessant, J., Phelps, B., and Adams, R. (2005) A Review of the Literature Addressing the role of External Knowledge and Expertise at Key Stages of Business Growth and Development, Report Prepared for the DTI

BIS (2009a), SME Business Barometer

BIS (2009b) SME Finance Survey

BIS (2010a) Is Business Ready for an Ageing Nation? Economic Opportunities and Challenges of Ageing: Analytical paper

BIS (2010b) Low Carbon and Environmental Goods and Services: An Industry Analysis Update for 2008/09

BIS (2010c) Small Business Survey (formerly the Annual Small Business Survey)

BIS (2010d) A Long Term Focus for Corporate Britain, A Call for Evidence

BIS (2010e) Annual Report on the Business Angle Market in the United Kingdom 2008/09

BIS (2010f) Hauser Review: The Current and Future Role of Technology and Innovation Centres in the UK

Blake, N., Dods, J., and Griffiths, S. (2000), Employers Skill Survey: Existing Evidence and its Use in the Analysis of Skill Deficiencies, DfEE Research Series

Blinder, A. (2007) How Many US Jobs Might be Offshorable?, CEPS Working Paper, No. 142

Bloom, N., Dorgan, S., Dowdy, J., Van Reenen, J., and Rippin, T. (2005) Management practices across firms and nations, CEP

Bloom, N., Sadun, R., and Van Reenen, J. (2007) Americans Do I.T. Better: US Multinationals and the Productivity Miracle, NBER Working Papers, No. 13085

Bloom, N., and Van Reenen, J. (2006) Management practices, work-life balance and productivity: a review of some recent evidence, Oxford review of economic policy, Vol. 22 (4), pp. 457-481

Breinlich, H., and Criscuolo, C. (2009) 'International Trade in Services: A Portrait of Importers and Exporters', CEPR Discussion Paper, No. 7837

Borjas, G. (1995) The Economic Benefits from Immigration, Journal of Economic Literature, Vol. 9(2), pp. 3-22

Burgess, S., Wilson, D., and Worth, J. (2009) An Investigation of Educational Outcomes by Ethnicity and Religion, Report for the National Equality Panel

BVCA (2010) Report on Investment Activity

Cadbury Committee (1992), Financial Aspects of Corporate governance

Carraro, C., De Cian, E., and M. Tavoni (2009a) Human Capital Formation and Global Warming Mitigation: Evidence from an Integrated Assessment Model, Fondazione ENI Enrico Mattei

Carraro, C., Massetti, E., and Nicita, L. (2009b) How Does Climate Policy Affect Technical Change? An Analysis of the Direction and Pace of Technical Progress in a Climate-Economy Model, Fondazione ENI Enrico Mattei, Nota di Lavoro 08-2009

CEP/McKinsey & Company (2005) Management Matters

CEP/McKinsey & Company (2007) Management Practice & Productivity: Why they Matter

CEP (2010) Constraints on Developing UK Management Practices, BIS, Forthcoming

Chamon, M. Mauro, P., and Okawa, Y. (2008) Mass Car Ownership in the Emerging Market Giants, Economic Policy, Vol. 23(04), pp. 243-296

Clark, D. (2002) Participation in Post-Compulsory Education in England: What Explains the Boom and Bust?, CEE Discussion Paper, No. 24

Coe, D., and Helpman, E. (1995) International R&D Spillovers, European Economic Review, Vol. 39, pp. 859–887

Cohen, W. T., and Levinthal, D. (1989) Innovation and Learning: The Two Faces of R&D, Economic Journal, Vol. 99, pp. 569–596

Conservatives (2010) Dyson Review: Ingenious Britain Making the UK the Leading High Tech Exporter in Europe

Cotis, J.-P. (2006) Economic Growth and Productivity, Annual Conference, Government Economic Service

Cowling, M. (2008) The Impact of Entrepreneurship Training and Small Business Experience on Future Entrepreneurial Activity in the UK, IES Working Paper, No. 21

Cox, W. M., and Alm, R. (2007) Opportunity Knocks, Federal Reserve Bank of Dallas, 2007 Annual Report

Crafts, N. (2006) Regulation and Productivity Performance, Oxford Review of Economic Policy, Vol. 22(2)

Crafts, N. (2009) Transport Infrastructure Investment: Implications for growth and productivity, Oxford Review of Economic Policy, Vol. 25(9), pp. 327-343

Criscuolo, C., and Martin, R. (2005) Multinationals and US Productivity Leadership: Evidence from Great Britain, CEP Discussion Paper, No. 672

Cullis, A., and Hansen, K. (2008) Child Development in the First Three Sweeps of the Millennium Cohort Study, DCSF Research Report, RW077

CVTS3 (2008) Community Vocational Training Survey, DIUS Research Report 08/17

DECC (2009) Carbon Valuation in UK Policy Appraisal: A Revised Approach

DECC (2010) UK Climate Change Sustainable Development Indicator: 2008 Greenhouse Gas Emissions, Final Figures

DECC & DEFRA (2009) Making the Right Choices for our Future: An Economic Framework for Designing Policies to Reduce Carbon Emissions

DEFRA (2010) Economic Growth and the Environment, DEFRA Evidence and Analysis Series, Paper 2

DeJong, D., and Ingram, B. (2001) the Cyclical Behaviour of Skill Acquisition, Review of Economic Dynamics, Vol. 4(3), pp. 536-561

Dellas, H., and Sakellaris, P. (1996) On the Cyclicality of Schooling: Theory and Evidence, IRES Discussion Papers, No. 1997002

DeMarzo, P., Fishman, M., and Hagerty, K. (2005) Self Regulation and Government Oversight, Review of Economic Studies, Vol. 72(3), pp. 687-796

Devereux, M., and Lockwood, B. (2006) How are Plant Location Decisions and Capital Flows Affected by Corporate Income Taxes, European Tax Policy Forum, April

DfE (2010) Participation in Education, Training and Employment by 16-18 Year Olds in England, Annual Report

DfES (2007) Employer and University Engagement in the Use and Development of Graduate Level Skills, DfES RR835B

Disney, R., Haskel, J., and Heden, Y. (2003) Restructuring and Productivity Growth in UK Manufacturing, Economic Journal, Vol. 113, pp. 666–694

Driffield, N., and Love, J. (2007) Linking FDI Motivations and Host Economy Productivity Effects: Conceptual and Empirical Analysis, Journal of International Business Studies, Vol. 38, pp. 460-473

Driffield, N., and Taylor, K. (2000) FDI and the Labour Market: A Review of the Evidence and Policy Implications, Oxford Review of Economic Policy, Vol. 16(3), pp. 90-103

Driffield, N., and Taylor, K. (2005) Are Foreign Firms More Technologically Intensive? UK Establishment Evidence from the ARD, Scottish Journal of Political Economy, Vol. 52(1), pp. 38-53

DTI (2005a) The Economics of Empirical Standards, DTI Economics Paper, No. 12

DTI (2005b) R&D Intensive Businesses in the UK, DTI Economics Paper, No. 11

DTI (2007) Peer Review of Competition Policy 2006-07 (KPMG, 2007)

Dustmann, C., Frattini, T., and Preston, I. (2007) A Study of Migrant Workers and the National Minimum Wage and Enforcement Issues That Arise, Low Pay Commission

Égert, B., Kozluk, T., and Sutherland, D. (2009) Infrastructure Investment: Links to Growth and the Role of Public Policies, OECD Economics Department Working Papers, No. 686

EPPE (2004) The Effective Provision of Pre-School Education (EPPE) Project: Final Report – A Longitudinal Study Funded by the DfES 1997-2004

EPPE (2008) EPPE 3-11 Project: Influences on Children's Cognitive and Social Behaviour (Attainment, Progress and Development) to the End of Primary School

European Commission (2007a) Raising Productivity Growth: Key Messages from the European Competitiveness Report 2007

European Commission (2007b) Steps Towards a Deeper Economic Integration: the Internal Market in the 21st century; a Contribution to the Single Market Review, Economic Papers, No. 271, available at http://ec.europa.eu/economy_finance/publications/publication784_en.pdf.

Felstead, A., Gallie, D., Green, F., and Zhou, Y. (2007) Skills at Work 1986-2006, SKOPE

Field, A., (2003) The Most Technologically Progressive Decade of the Century, American Economic Review, Vol. 93, pp. 1399-1414

Filatotchev, I., Jackson, G., Gospel, H., and Allcock, D. (2007) Key Drivers of Good Governance and the Appropriateness of UK Policy Responses, King's College London, Report Commissioned by DTI

Frohwein, T., and Hansjürgens, B. (2005) Chemicals Regulation and the Porter Hypothesis: A Critical Review of the New European chemicals Regulation, Journal of Business Chemistry, Vol. 2(1) pp. 19-36

Gabaix, X., and Landier, A. (2007) Why has CEO Pay Increased so Much, Quarterly Journal of Economics, Vol. 123(1), pp.49-100

Galindo-Rueda F (2007) Developing an R&D Satellite Account for the UK; a Preliminary Analysis, Economic & Labour Market Review, Vol. 1(12), pp. 18-29

Geroski, P. A. (1995) Do Spillovers Undermine the Incentive to Innovate?, in Dowrick S. (ed.), Economic Approaches to Innovation, Edwar Elgar, Aldershot, pp. 76–97.

Girma, S., Greenaway, D., and Wakelin, K. (2001) Who Benefits from Foreign Direct Investment in the UK?, Scottish Journal of Political Economy, Vol. 48, pp.119-33

Global Entrepreneurship Monitor (2009)

Goldman Sachs (2003) Dreaming with the BRICs: The Path to 2050, Goldman Sachs Global Economics Paper, No: 99

Goldman Sachs (2007) BRICs and Beyond

Goos, M., and Manning, A. (2003) Lousy and Lovely Jobs: the Rising Polarization of Work in Britain, CEP Discussion Papers, No. 0604

Goos, M., Manning, A., and Salomons, A. (2009) Recent Changes in the European Employment Structure, American Economic Review Papers and Proceedings, Vol. 99, No. 2, May 2009, pp. 58-63

Gorgens, T., Paldam, M., and Wurtz, A. (2003) How does Public Regulation Affect Growth?, University of Aarhus Department of Economics Working Paper, No. 2003-14

Gorgens, T., Paldam, M., and Wurtz, A., (2005) Growth, Income and Regulation: a Non-Linear Approach, Centre for Applied Macroeconomics Working Paper

Goulder, L., and Schneider, S. (1999) Induced Technological Change and the Attractiveness of CO2 Emissions Abatement Policies, Resource and Energy Economics, Vol. 21, pp.211-53.

Government Equalities Office (2010) An anatomy of Economic Inequality in the UK

Greenaway, D., and Kneller, R. (2007) Industry Differences in the Effect of Export Market Entry: Learning by Exporting?, Review of World Economics, Vol. 143(3), pp. 416-432

Gregg, P., Jewell, S., and Tonks, I. (2005) Executive Pay and Performance in the UK 1994-2002, Centre for Market and Public Organisation, University of Bristol, Working Paper No. 05/122

Griffith, R., Harrison, R., and Simpson, H. (2006), The Link between Product Market Reform, Innovation and EU Macroeconomic Performance, European Economy Economic Papers, No. 243.

Griffith, R., Redding, S., and Van Reenen, J. (2003) R&D and absorptive capacity: theory and empirical evidence, LSE Research Online

Groth, C. (2005) Estimating UK Capital adjustment Costs, Bank of England Working Papers, No. 258

Guellec, D., and Loannidis, E. (1997) Causes of Fluctuations in R&D Expenditures: A Quantitative Analysis, OECD Economic Studies, Vol. 29(2), pp. 123-138

Guellec, D., and de la Potterie, B. (2004) From R&D to Productivity Growth: Do the Institutional Settings and the Source of Funds of R&D Matter?, Oxford Bulletin of Economics and Statistics, Vol. 66(3), pp. 353-378

Haldane, A. (2010) Speech at Oxford China Business Forum available at http://www.bankofengland.co.uk/publications/news/2010/067.htm

Hanushek, A., and Woessmann, L. (2010) The High Cost of Low Educational Performance: The Long Run Economic Impact of Improving PISA Outcomes, OECD

Harris, R., and Robinson, C. (2005) Impact of Regional Selective Assistance on sources of productivity growth: plant-level evidence from UK manufacturing, 1990-98, Regional Studies, Vol. 39(6), pp. 751-765

Harris, R. (2008) An Empirical Study of the Respective Contributions of Exporting and Foreign Direct Investment to UK R&D, Report submitted to UKTI November 2008.

Harris, R. (2009) The Effect of Foreign Mergers and Acquisitions on UK Productivity and Employment, Report Submitted to the UKTI

Harris R., and Li, Q.C. (2007) Firm Level Empirical Study of the Contribution of Exporting to UK Productivity Growth, Report Submitted to the UKTI

Harris R., and Li, Q.C. (2010) Study of the Relationship between Innovation, Exporting and the Use of E-Commerce, Report Submitted to the UKTI

Haskel J., Clayton T., Goodridge P., Pesole A., Barnett D., Chamberlain G., Jones R., Khan K., and Turvey A. (2010) Innovation, knowledge spending and productivity growth in the UK: interim report for NESTA 'Innovation Index' project

Hart, M., Roper, S., Storey, S., Mole, K., and Saal, D. (2007) Economic Impact Study of Business Link Local Service, Annual Small Business Survey 2007/08

HEFCE (2010) Trends in Young Participation in Higher Education: Core Results for England

Helm, D. (2006) Regulatory Reform, Capture and the Regulatory Burden, Oxford Review of Economic Policy, Vol. 22(2), pp. 169-185

Helm, D., and Yarrow, G. (1998) The assessment: The Regulation of Utilities, Oxford Review of Economic Policy, Vol. 4 (2), pp.1-19

Hijzen, A., Upward, R., and Wright, P. (2010) Job Creation, Job Destruction and the Role of Small Firms: Firm-Level Evidence for the UK, Oxford Bulletin of Economics and Statistics, Vol. 72(5), pp. 621-647

HM Government (2009) The Total Benefit / Cost Ratio of New Regulations 2008 – 2009, available at http://www.berr.gov.uk/files/file53280.pdf.

HMT (2003) Lambert Review of Business-University Collaboration

HMT (2004) Productivity in the UK 5: Benchmarking UK Productivity Performance

HMT (2006) Stern Review: The Economics of Climate Change

HMT (2010a) Budget 2010, June Budget

HMT (2010b) National Infrastructure Plan 2010

HMT (2010c) Tax policy making: A New Approach

HMT and BIS (2010) Financing a Private Sector Recovery

HMT and DFT (2006) The Eddington Transport Study

HMT, DTI, DfES (2004) Science and Innovation Investment Framework 2004-14

Huber, P., Landesmann, M., Robinson, C., and Stehrer, R. (2010) Migrants' Skills and Productivity: A European Perspective, National Institute Economic Review 2010, 213: R20

Hubert, F., and Pain, N. (2000) Inward Investment and Technical Progress in the United Kingdom Manufacturing Sector, NIESR Discussion Paper, No. 175

ICAEW (2010) Enterprise Survey 2010

IMF (2007) World Economic Outlook

IMF (2009) World Economic Outlook, October

IMF (2010a) Credit Conditions and Recoveries from Recessions Associated with Financial Crises, IMF Working Paper 10/83

IMF (2010b) World Economic Outlook, October

IMF (2010c) Public capital and growth, IMF Working Paper, No. 10/175

Independent Commission on Banking (2010) Issues Paper – Call for Evidence

IPPR (2009) The Economic Impacts of Migration on the UK Labour Market, Economics of Migration Working Paper, No. 3

Jacobzone, S., Steiner, F., Lopez Ponton, E., and Job, E. (2010) Assessing the Impact of Regulatory Management Systems, OECD Working Paper, No. 17

Jaffe, A., and Palmer, K. (1997) Environmental Regulation and Innovation: A Panel Data Study, The Review of Economics and Statistics, Vol. 79(4), pp. 610-619

Jean, S., and Jimenez, M. (2007) The Unemployment Impact of Immigration in OECD Countries, OECD Economics Department Working Paper, No. 563

Jenkins, A., Greenwood, C., and Vignoles, A. (2007) The Returns to Qualifications in England: Updating the Evidence Base on Level 2 and Level 3 Vocational Qualifications, Centre for the Economics of Education Discussion Paper, No. 0089

Jorgenson, D., and Wilcoxen, P. (1990) Environmental Regulation and U.S. Economic Growth, RAND Journal of Economics, Vol. 21(2), pp. 314-340

Khan, M., and Luintel K. (2006) Sources of Knowledge and Productivity: How Robust is the Relationship?, OECD Science, Technology and Industry Working Paper, No. 2006/6

Klapper, L., Laeven, L., and Rajan, R. (2004) Business Environment and Firm Entry: Evidence from International Data, NBER working paper, No. 10380

Kline, S. and Rosenburg, N. (1986) An Overview of Innovation, in The Positive Sum Strategy Landau, R. and Rosenberg, N. editors, National Academy Press

Kneller, R., Upward, R., and Wright, P. (2010) A Study of the Impact of Exporting on Services Traders, Report Submitted to UKTI

Kose, M., Prasad, E., and Terrones, M. (2005) Growth and Volatility in an Era of Globalization, IMF Staff Papers, Vol. 52

Krosner, R. (2003) Economics of Corporate Governance Reform, Journal of Applied Corporate Finance, Vol. 16(2-3), pp. 42–50

Krussell, P., and Smith, A. (1999) On the Welfare Effects of Eliminating Business Cycles, Review of Economic Dynamics, Vol. 2(1), 245-272

Krusell, P., and Smith, A. (2002) Revisiting the Welfare Effects of Eliminating Business Cycles, Working Paper, Carnegie-Mellon University

La Porta, R., Lopez-de-Silanes, F., and Shleifer, A. (1999) Corporate Ownership Around the World, Journal of Finance, Vol. 54(2), pp. 471-517

La Porta, R., Lopez-de-Silanes, F., Sheifer, A., and Vishny, R. (2000) Investor Protection and Corporate Governance, Journal of Financial Economics, Vol. 58(1-2), pp. 3-27.

Lemos, S., and Portes, J. (2008) New Labour? The Impact of Migration from Central and Eastern European Countries on the UK Labour Market, University of Leicester Department of Economics Discussion Paper, No. 08/29

Lilleva, A (2008) Trade Liberalization and Productivity Dynamics: Evidence from Canada, Statistics Canada Economic Analysis Research Paper Series, No. 051

Lucas, R. Jr (1987) Models of Business Cycles, In Structural Change and Economic Dynamics, Vol. 3(1), pp. 177-182

Machin, S., Vignoles, A. and Galindo-Rueda, F. (2003) Sectoral and area analysis of the economic effects of qualifications and basic skills, DFES Research Report, No. 456

Macmillan, L. (2010) The Intergenerational Transmission of Worklessness in the UK, CMPO Working Paper, No. 10/231

Majumdar, S., and Markus, A. (2001) Rules Versus Discretion: The Productivity Consequences of Flexible Regulation, Academy of Management Journal, Vol. 44 (1), pp. 170-179

Mancusi, M. (2004) International Spillovers and Absorptive Capacity: A Cross-Country, Cross-Sector analysis Based on European Patents and Citations, STICERD - Economics of Industry Papers, No. 35

Mankiw, N., Romer, D., and Weil, D. (1992) A Contribution to the Empirics of Economic Growth, Quarterly Journal of Economics, Vol. 107(2), pp. 402-437

Mansfield, E. (1991) Academic Research and Industrial Innovation, Research Policy, Vol. 20, pp. a-12

Marrano, M, Haskel, J., and Wallis, G. (2009) What Happened to the Knowledge Economy? ICT, Intangible investment, and Britain's productivity record revisited, Review of Income and Wealth, Vol. 55 (3)

May, P. (2003) Performance Based Regulation and Regulatory Regimes: The Regulation of Utilities, Law and Policy, Vol. 25(4), pp. 381-401

Mayer, T., Melitz, M., and Ottaviano, G.I.P. (2009) Market Size, Competition and the Product Mix of Exporters, Mimeo

Maher, M., and Wise, M. (2005) Product market competition and economic performance in the United Kingdom, OECD Economics Department Working Paper, No. 433

Meyer, S. (1992) Environmentalism and Economic Prosperity: Testing the Environmental Impact Hypothesis, Massachusetts Institute of Technology

Meyer, S. (1993) Environmentalism and Economic Prosperity: An Update, Massachusetts Institute of Technology

McIntosh, S. (2009) The Economic Value of Intermediate Education and Qualifications, UKCES Evidence Report 11

McIntosh, S., and Vignoles, A. (2001) Measuring and Assessing the Impact of Basic Skills on Labour Market Outcomes, Oxford Economics Papers, Vol. 53(3), pp. 453-481

McKinsey (2010) How Institutional Investors Should Step up as Owners

Mohnen, P. (2001) International R&D Spillovers and Economic Growth, Chapter 3, in Pohjola M. (ed.), Information Technology, Productivity, and Economic Growth: International Evidence and Implications for Economic Development, Oxford University Press, London, pp. 50–71.

Nadiri, I. (1993) Innovations and Technological Spillovers, NBER Working Paper Serie, No. 4423

NESTA (2008) Shifting sands: The Changing Nature of Early Stage Venture Capital Market in the UK

NESTA (2009) Measuring Business Growth

NESTA (2010) Innovation Index (forthcoming)

Nickell, S. (1996) Competition and Corporate Performance, Journal of Political Economy, Vol. 104(4), pp. 724-46

Nickell, S., Nicolitas, D., and Dryden, N., (1997) What Makes Firms Perform Well? European Economic Review, Vol. (41), pp. 783-796

Nickell, S., and Saleheen, J. (2008) The Impact of Immigration on Occupational Wages: Evidence from Britain, Federal Reserve Bank of Boston, Working Papers No. 08-6

Nicoletti, G., and Scarpetta, S. (2003) Regulation, Productivity and Growth: OECD evidence, World Bank Policy Research Working Paper, No. 2944

Nicolo, G., Laeven, L., and Ueda, K. (2006) Corporate Governance Quality: Trends and Real Effects, IMF working paper, No. 06/293

Nuttall. R (1999), An Empirical Analysis of the Effects of the Threat of Takeover on UK Company Performance, Nuffield College Oxford, University of Oxford, Working paper, No. 5

OECD (2003) The Sources of Economic Growth in OECD Countries

OECD (2004) The Sources of Economic Growth in OECD Countries

OECD (2005) Economic Survey 2005: United Kingdom

OECD (2006a) Projecting OECD Health and Long term Care Expenditures: What Are the Main Drivers?, OECD Economics Department Working Paper, No. 477

OECD (2006b) Infrastructure to 2030: Telecom, Land Transport, Water and Electricity

OECD (2006c) Employment Outlook

OECD (2007a) Economic Survey of the United Kingdom

OECD (2007b), Economic and Other Impacts of Foreign Corporate Takeovers in OECD Countries, International Investment Perspectives: Freedom of Investment in a Changing World

OECD (2007c) Employment Outlook

OECD (2008a) Do Tax Structures Affect Aggregate Economic Growth?: Empirical Evidence from a Panel of OECD Countries, OECD Economics Department Working Paper, No. 643

OECD (2008b) Product Market Regulation Indicators

OECD (2008c) Science and Technology Outlook

OECD (2009a) The Effect of Financial Crises on Potential Output, Economics Department Working Paper, No. 699

OECD (2009b) Economic Policy Reforms: Going for Growth

OECD (2009c) Education at a glance

OECD (2009d) Impact of the Economic Crisis on Education, OECD, EDU Working Paper, No. 43

OECD (2010a) Innovation Strategy

OECD (2010b) Main Science and Technology Indicators

OECD (2010c) Economic Globalisation Indicators

OECD (2010d) A Family Affair, Social Mobility across OECD Countries, in Going for Growth

OECD (2010e) Education at a Glance

OfCom (2004) Strategic Review of Telecommunications – Phase 1 Consultation

OfCom (2010) Communication Market Report

Office for Management and Budget (2008) Report to Congress on the Benefits and Costs of Federal Regulations, available at http://www.whitehouse.gov/omb/inforeg_regpol_reports_congress/

OFT (2007) Productivity and Competition: An OFT Perspective on the Productivity Debate, OFT887

OFT (2009) Assessing the Wider Benefits from OFT's work: Evidence on Consumer Confidence

OFT (2010) Positive Impact 2009/10

O'Leary, N., and Sloane, P. (2005) The Changing Wage Return to an Undergraduate Education, Institute for the Study of Labor Discussion Paper, No. 1549

OMB (2008) UKTI 2008 International Business Strategies, Barriers and Awareness Survey, Report Submitted to the UKTI

OMB (2010) UKTI 2010 International Business Strategies, Barriers and Awareness Survey, Report Submitted to the UKTI

Page (2002) New Evidence on Intergenerational Correlations in Welfare Participation, University of California, Davis and Joint Centre for Poverty Research

Park, W. (1995) International R&D Spillovers and OECD Economic Growth, Economic Inquiry, Vol. 33, pp. 571–591

Peri, G. (2010) The Impact of Migrants in Recession and Economic Expansion, Migration Policy Institute, University of California

Persson, T., and Tabellini, G. (1994) Is Inequality Harmful to Growth? American Economic Review, Vol. 84(3), pp. 600-621

Piketty, T., and E. Saez (2006) The Evolution of Top Incomes: A Historical and International Perspective, American Economic Review, Vol. 96(2) pp. 200-205

Policy Exchange (2009) Delivering a 21st century infrastructure for Britain

Porter, M. (1991) America's Green Strategy, Scientific American, Vol. 264(4)

Porter, M., and Van der Linde, C. (1995) Toward a New conception of the Environment Competitiveness Relationship, Journal of Economic Perspectives, Vol. 9 (4), pp. 97-118

Ramey, G., and Ramey, V. (1995) Cross-Country Evidence on the Link between Volatility and Growth, American Economic Review, Vol. 85(5), pp. 1138-51

Reid, A., and Miedzinski, M. (2008), Eco-innovation: Final report for Sectoral Innovation Watch, Technopolis Group, Brighton

Reinhart, C., and Rogoff, K. (2009a) The Aftermath of Financial Crises, American Economic Review, Vol. 99(2), pp. 466-72

Reinhart, C., and Rogoff, K. (2009b) This Time is Different: Eight Hundred Years of Financial Folly, Princeton University Press

Riley, R., and Weale, M. (2006) Immigration and its Impacts, National Institute Economic Review, No. 198

Robinson, C., O'Leary, B., and Rincon, A. (2006) Business Start Up, Closures and Economic Churn, Report Prepared for the Small Business Service

Saint Paul, G. (1993) Productivity Growth and the Structure of the Business Cycle, European Economic Review, Vol. 37(4), pp. 861-883

Salter, A., D'Este, P., Martin, B., Geuna, A., Scott, A., Pavitt, K., Patel, P., and Nightingale, P. (2000) Talent not Technology: Publicly Funded Research and Innovation in the UK, Report Presented to CVCP and HEFCE

Scarpetta, S., Hemmings, P., Tressel, T., and Woo, J. (2002) The Role of Policy and Institutions for Productivity and Firm Dynamics, Evidence from Industry and Micro Data, OECD Economics Department Working Paper, No. 329

Schiffbauer, M., Siedschlag, I., and Ruane, F. (2009) Do Foreign Mergers and Acquisitions Boost Firm Productivity?, ESRI Working Paper, No. 309

SCP (2001) Het Nieuwe Consumeren, Sociaal en Cultureel Planbureau, Netherlands

Sepulveda, F. (2004), Training and Business Cycles, Research School of Social Sciences, The Australian National University

Shleifer, A. (2000) Inefficient Markets, Clarendon Lectures in Economics, Oxford University Press

Shiller, R. (2000) Irrational Exuberance, Princeton University Press

Short, H. (1994) Ownership, Control, Financial Structure and the Performance of Firms, Journal of Economic Surveys, Vol. 8(3), pp. 25-37

Sianesi, B., and Van Reenen, J. (2003) The Returns to Education: Macroeconomics, Journal of Economic Surveys, Vol. 17(2), pp. 157-200

Smith, A. (1776) The Wealth of Nations, Book II, Chapter 11, page 329, paragraph 106

SPRU (2004) The Productivity of Science: An International Analysis

SQW Ltd (2006), Exploring the Relationship between Environmental Regulation and Competitiveness – Literature Review, Report prepared for the Department for Environment Food and Rural Affairs, UK

SQW (2009) The Supply of Equity Finance to SMEs: Revisiting the Equity Gap

Stefanadis, C. (2003) Self Regulation, Innovation and the Financial Industry, Journal of Regulatory Economics, Vol. 23(1), pp. 5-25

Stiglitz, J. Sen, A., and Fitoussi, J. (2009) Report by the Commission on the Measurement of Economic Performance and Social Progress

Storesletten, K., Telmer, C., and Amir, Y. (2001) The Welfare Cost of Business Cycles Revisited: Finite Lives and Cyclical Variation in Idiosyncratic Risk, European Economic Review, vol. 45(7), pp. 1311-1339

Takeover Panel (2010) Review of Certain Aspects of the Regulation of Takeover Bids, PCP 2010/2

TEEB (2010) Report for Business, Published at http://www.teebweb.org/ForBusiness/tabid/1021/Default.aspx

UKCES (2010a) National Employer Skills Survey for England 2009: Main Report

UKCES (2010b) Ambition 2020: World Class Skills and Jobs for the UK

United Nations (2008) World Population Prospects, 2008 Revision

UUK / PWC (2007) Research Report The economic benefits of a degree

Vivid Economics (2010) Promoting Economics Growth When the Climate is Changing

Wadsworth (2010) Immigration and the UK Labour Market: The Evidence from Economic Research, in CEP Election Analysis 2010

Waldfogel, J., and E. Washbrook (2008) Early Years policy, In Social Mobility and Education: Academic Papers Presented a High Level Summit Sponsored by the Carnegie Corporation of New York and the Sutton Trust, 1-3 June 2008, Available at: http://www.suttontrust.com/reports/academic_papers_report.pdf

Waterson, M. (2004) Research to Analyse the Links Between Consumer Empowerment and Competition / Productivity and to Scope Further Work Which Could be Undertaken to Quantify These Effects, University of Warwick

Welcome Trust and MRC (2008) Medical Research, What's it Worth

Wiedmann T., Wood R., Lenzen M., Minx J., Guan D. and Barrett, J. (2008) Development of an Embedded Carbon Emissions Indicator – Producing a Time Series of Input-Output Tables and Embedded Carbon Dioxide Emissions for the UK by Using a MRIO Data Optimisation System, Report to DEFRA

WIPO (2009) World Intellectual Property Indicators

Woolley, P. (2010) The Future of Finance: the LSE report; Chapter 3

World Bank (2006) World Development Report: Equity and Development

World Bank (2007) Global Economic Prospects

World Bank (2009) Doing Business Report

World Bank (2010) Doing Business Report

World Economic Forum (2009) Financial Development Report

World Economic Forum (2010) Global Competitiveness Report 2010-11

WTO (2008) World Trade Report

Yandle, B., Bhattarai, M., and Vijayaraghavan, M. (2004) Environmental Kuznets Curves: A Review of Findings, Methods and Policy Implications, PERC, Research Study 02-1

Zee, F., and Brandees, F. (2007) Manufacturing Futures for Europe – A Survey of the Literature, Foresight Brief No. 137

BIS Economics Papers

BIS places analysis at the heart of policy-making. As part of this process the Department has decided to make its analysis and evidence base more publicly available through the publication of a series of BIS Economics Papers that set out the thinking underpinning policy development. The BIS Economics series is a continuation of the series of Economics papers, produced by the former Department for Business, Enterprise and Regulatory Reform (BERR) which analysed issues central to business and industry.

The main series is complemented by a series of shorter Occasional papers including literature reviews, appraisal and evaluation guidance, technical papers, economic essays and think pieces. These are listed below:

Main BIS Series

8. **UK trade performance: Patterns in UK and global trade growth**, November 2010

7. **Understanding local growth**, October 2010

6. **Learning from some of Britain's successful sectors: An historical analysis of the role of government,** March 2010

5. **Internationalisation of innovative and high growth SMEs,** March 2010

4. **Supporting analysis for "Skills for Growth: The national skills strategy",** March 2010

3. **The space economy in the UK: An economic analysis of the sector and the role of policy,** February 2010

2. **Life Sciences in the UK - Economic analysis and evidence for 'life sciences 2010: Delivering the Blueprint',** January 2010

1. **Towards a low carbon economy – economic analysis and evidence for a low carbon industrial strategy,** July 2009

Main BERR Series

6. **The globalization of value chains and industrial transformation in the UK,** February 2009

5. **China and India: Opportunities and Challenges for UK Business,** February 2009

4. **Regulation and Innovation: Evidence and Policy Implications,** December 2008

3. **High Growth Firms in the UK: Lessons from an analysis of comparative UK Performance,** November 2008

2. **Five Dynamics of change in Global Manufacturing**, September 2008

1. **BERR's Role in Raising Productivity: New Evidence**, February 2008

BIS Occasional Papers

2. **The economic rationale for a national design policy**, August 2010

1. **Research to improve the assessment of additionality,** October 2009

BERR Occasional Papers

3. **Impact of Regulation on Productivity,** September 2008

2. **Evaluation of Regional Selective Assistance (RSA) and its successor, Selective Finance for Investment in England,** March 2008

1. **Cross-Country Productivity Performance at Sector level: the UK compared with the US, France and Germany,** February 2008

Copies of these papers can be obtained from the BIS publications orderline at http://www.bis.gov.uk/publications or telephone **0845 015 0010**.

These papers are also available electronically on the BIS Economics website at http://www.berr.gov.uk/Policies/economics-statistics/economics.

Further information on economic research in BIS can be found at http://www.bis.gov.uk/policies/economics-statistics/economics/bis-research . This site includes links to the various specialist research areas within the Department.

Evaluation reports are available on the BIS evaluation website at http://www.berr.gov.uk/Policies/economics-statistics/economics/evaluation.

The views expressed within BIS Economics Papers are those of the authors and should not be treated as Government policy. We welcome feedback on the issues raised by the BIS Economics Papers, and comments should be sent to bis.economics@bis.gsi.gov.uk.

This publication is also available on our website at http://www.bis.gov.uk

Any enquiries regarding this publication should be sent to:

Department for Business, Innovation and Skills
1 Victoria Street
London SW1H 0ET
Tel: 020 7215 5000

If you require this publication in an alternative format, email enquiries@bis.gsi.gov.uk, or call 020 7215 5000.

URN 10/1213