# Contents

- List of figures ii
- Foreword iv
- Executive Summary vi
- Introduction: UK Productivity Performance and the Global Context 1
  - 1. Investment 9
  - 2. Innovation 20
  - 3. Skills 35
  - 4. Enterprise 46
  - 5. Competition 58
## List of figures

<table>
<thead>
<tr>
<th>Figure</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.1</td>
<td>Prosperity and Employment</td>
<td>4</td>
</tr>
<tr>
<td>0.2</td>
<td>GDP per worker</td>
<td>5</td>
</tr>
<tr>
<td>0.3</td>
<td>GDP per hour worked</td>
<td>6</td>
</tr>
<tr>
<td>1.1</td>
<td>Volatility of GDP growth</td>
<td>12</td>
</tr>
<tr>
<td>1.2</td>
<td>Volatility of short-term interest rates</td>
<td>13</td>
</tr>
<tr>
<td>1.3</td>
<td>Business investment</td>
<td>15</td>
</tr>
<tr>
<td>1.4</td>
<td>Government investment</td>
<td>18</td>
</tr>
<tr>
<td>2.1</td>
<td>Papers and citations per head of population</td>
<td>24</td>
</tr>
<tr>
<td>2.2</td>
<td>Gross expenditure on R&amp;D</td>
<td>26</td>
</tr>
<tr>
<td>2.3</td>
<td>Business Enterprise R&amp;D</td>
<td>27</td>
</tr>
<tr>
<td>2.4</td>
<td>US patents granted</td>
<td>29</td>
</tr>
<tr>
<td>2.5</td>
<td>Cooperation in innovation</td>
<td>31</td>
</tr>
<tr>
<td>2.6</td>
<td>Proportion of turnover due to new or significantly improved products</td>
<td>32</td>
</tr>
<tr>
<td>3.1</td>
<td>Distribution of highest completed level of education</td>
<td>39</td>
</tr>
<tr>
<td>3.2</td>
<td>Highest qualification, UK</td>
<td>41</td>
</tr>
<tr>
<td>3.3</td>
<td>Business executive perceptions of management quality</td>
<td>43</td>
</tr>
<tr>
<td>4.1</td>
<td>Enterprise culture</td>
<td>47</td>
</tr>
<tr>
<td>4.2</td>
<td>Costs and time to start a business</td>
<td>50</td>
</tr>
<tr>
<td>4.3.1</td>
<td>Venture capital investment – early stages</td>
<td>51</td>
</tr>
<tr>
<td>4.3.2</td>
<td>Venture capital investment – expansion and replacement</td>
<td>52</td>
</tr>
<tr>
<td>4.4</td>
<td>Business start-ups</td>
<td>54</td>
</tr>
<tr>
<td>4.5</td>
<td>Business start-ups by gender</td>
<td>55</td>
</tr>
<tr>
<td>4.6</td>
<td>Productivity growth (basic prices) by size of enterprise</td>
<td>56</td>
</tr>
</tbody>
</table>
List of figures

Figure 5.1: Trade in goods and services 61
Figure 5.2: Product market regulation 63
Figure 5.3: Ranking of competition regimes – peer review 65
Globalisation is rapidly changing the context in which UK business operates. New technologies are allowing ever more types of goods and services to be traded internationally and the emerging economies are imposing themselves on the world scene. There are increasing opportunities for UK firms to export as new markets grow, whilst UK firms are facing increasing competitive pressure from abroad. It is clear that business and Government must respond to globalisation by boosting our productivity and competitiveness.

There is no single measure of how well the UK economy is responding to the challenge of globalisation. The *Productivity and Competitiveness Indicators* analyse a broad range of measures across the fundamental drivers of productivity growth to arrive at a balanced assessment of how well we are doing. This report shows that the UK is making good progress in many areas, but there is still a lot to do. For the UK to realise its potential, we need to invest more in our future – not just in buildings and machinery, but in our people, in new ideas and in enterprise. It is through nurturing the right skills and innovation that we can build the high value-added, enterprising economy of tomorrow.

Our role in the Government will be to encourage and facilitate those investments. We have a very clear role in setting the legal and institutional frameworks, but it is individual firms and workers in the wealth-creating private sector who will make the decisions that will lead to such progress. It is therefore vital that the Government and business focus together on the productivity agenda in order to achieve the progress we all desire.

This report shows that the UK has maintained the world-class performance of its research base in the face of increasing competition from abroad, facilitated by increases in the science budget in recent years. However, levels of innovation still seem to be lower than those of our main competitors, at least as measured by conventional indicators such as R&D spending.

Raising innovation levels will require better skills. Despite our children leaving school with more and higher qualifications, and good progress on adult basic skills, we are still some way behind France and Germany. Meanwhile, our attitudes towards enterprise and levels of entrepreneurial activity are better than those in France and German, but remain some way behind the US, and business investment continues to be comparatively low.
It is still too early to assess the impact of some of the policies we have put in place. The R&D tax credit, the Ten-Year Science and Investment Framework and the new National Employer Training Programme should have long-term impacts on our skills and innovation performance, perhaps several years into the future. But clear progress can already be seen from the reform of the competition law framework and education policies.

It is now seven years since the DTI first reported on the Indicators. In that time they have not just provided an overview of UK performance across investment, innovation, skills, enterprise and competition, but also assessments that have directly influenced policy development. They are a key plank of our productivity evidence base, and as such shall continue to be a crucial element in the policy-making process.

Brian Bender
Permanent Secretary, Department of Trade and Industry
Executive summary

The UK Government aims to raise the living standards of UK citizens, often measured by GDP per capita: the total output of the economy relative to the UK population. There are essentially two ways that this can be achieved. The first is to have a higher level of employment, so there are more people producing output. The second is to increase the amount of output each person produces, that is, increase their productivity. Given the UK’s strong employment performance, boosting UK productivity growth is likely to be our main route to improving our future standard of living.¹

Globalisation provides a further impetus to focus on improving productivity. The world economy is becoming ever more integrated. International trade and investment continue to expand rapidly, as barriers are lowered and new markets emerge. Internal changes in some developing countries, such as increased political and macroeconomic stability, have increased their competitiveness and allowed their manufacturing sectors to develop, whilst new technologies have allowed them to export services which were previously non-tradable. The focus of developed countries such as the UK is shifting towards higher value added activities, where quality is as important as cost.

Strong productivity growth is essential if UK companies are to be competitive and make the most of opportunities from globalisation – exploiting emerging markets and attracting foreign direct investment. It will also help pay for the adjustment costs as globalisation intensifies economic structural change.

UK productivity performance

The UK has a long-standing productivity gap with its main industrialised competitors. The latest ONS data shows that French productivity is 29 per cent higher than the UK on an output per hour worked basis, while the gap with both the US and Germany is 16 per cent. On an output per worker basis, US productivity is 27 per cent higher than the UK, while French productivity is 11 per cent higher and German productivity is the same as that in the UK.

Clear progress has been made in recent years on both measures of productivity. The productivity gap with France and Germany has narrowed over the past decade, and on the per worker basis, the gap has now closed with Germany.

¹ At 74.5%, the UK employment rate is currently one of the highest in the G7, but the Government also has a long-term ambition to raise it to 80 per cent.
The Indicators

The Government has identified five ‘drivers’ of productivity through which productivity improvements occur. Since 1999, the Government has monitored the UK’s performance on each of these drivers through a focused set of Indicators, comparing our performance to that of our main industrialised competitors: France, Germany and the US.

INVESTMENT

Investment in physical capital – machinery, equipment and buildings – is necessary to maintain and improve upon the capital stock. The more capital workers have at their disposal, generally the better they are able to do their jobs, producing more and better quality output. Hence they are more productive. The investment climate is influenced by a range of factors, including: the availability of finance, macroeconomic stability, workforce and managerial skills.

The Indicators show that the UK has experienced a period of relative macroeconomic stability, compared to its competitors, as measured by the volatility of GDP growth and short-term interest rates, since 1998. However, this has not yet translated into a superior investment performance, as assessed by the other investment Indicators. UK business investment has averaged a lower proportion of GDP than France, Germany and the US since 2000. Government investment has increased as a proportion of GDP since 2000, overtaking Germany in 2003, but it remains only just over half the level of the US and France. Further, the UK’s relatively low investment over the last few decades means that the capital stock has a long way to go to catch up with the US, France and Germany. Part of the UK’s investment gap with France and Germany may be associated with differing levels of labour market flexibility; arguably this affects the incentives for UK organisations such that they will choose to operate with higher labour to capital ratios, relative to France and Germany. This does not of course explain the gap with the US.

INNOVATION

Innovation is the successful exploitation of new ideas. New ideas can take the form of new technologies, often embodied in capital equipment, new products or new corporate structures and ways of working. Such innovations can boost productivity, for example as better equipment works faster and more efficiently, or better organisation increases motivation at work. In the absence of perfect measures of innovation performance, the Indicators look at a number of important components of the innovation system to assess how well the UK is doing.
The quality and performance of the science and engineering base is one of the Indicators, as it is an important part of the innovation system for many industries. A high-performing science and engineering base feeds in, not only directly to science-based industries such as pharmaceuticals or electronics, but also indirectly to a broad range of sectors through the training of ‘problem-solving people’. The UK base performs well, as measured by the Indicator publications and citations of research in academic journals. If a paper has been cited, it is taken as indication that it is of higher quality. The UK is second only to the US in terms of its share of world publications and citations, and leads the US, France and Germany in terms of citations per head of population. Some of the UK’s lead over France and Germany may be explained by a bias towards the English language in international academic research, but this would not affect the position relative to the US.

However, the UK has been less successful at exploiting the benefits of this strong science base. The ratio of both total and business R&D expenditure to GDP has been consistently lower than in the US, France and Germany over the last decade. This gap may be partly explained by the UK’s sector mix, with the UK having more sectors with low intensity of R&D use. While R&D expenditure is an imperfect measure of innovation, it does provide a measure of the resources in the economy that are devoted to the generation of new knowledge.

The UK also seems to perform poorly in patenting. Patents are a measure of the intermediate output of the innovation system, representing blueprints for new products or process that may or may not have commercial value. US Patent and Trademark Office data shows that, not surprisingly, the US obtains more patents in the US than the UK. France has a similar level to the UK, whilst Germany is a long way ahead, even after adjusting for population size. However, survey data also shows a greater proportion of UK innovation-active firms, compared to other European ones, use alternative methods of protection to patenting, such as complexity of design and copyright.

But in terms of innovation cooperation and innovation outputs, the UK performs reasonably well. On the incidence of innovation networks and collaboration the UK is significantly ahead of Germany, but behind France. These positions are reversed in relation to the proportion of turnover accounted for by new or significantly improved products (another measure of the degree of innovation in an economy), with the UK again in the middle, but in fact second in the EU15.

---

2 R&D expenditure accounts for only 40 per cent of all innovation-related expenditure according to the Community Innovation Survey.
SKILLS

Empirical evidence shows that higher levels of skills are associated with higher levels of productivity. Skills are integrally linked to innovation, as higher skills levels allow workers to generate new ideas and adapt to the changing economic environment. With a more skilled managerial and general workforce, firms are better able to introduce new technology and organisational change. Skills can be developed through education and also training throughout an individual’s working life.

The UK performance on workforce skills levels is mixed. At the higher level, by OECD standards the UK has a relatively high proportion of people with degrees, including degrees in science, engineering and technology, although this proportion is still significantly behind that seen in the US and slightly behind Germany. The UK has a low proportion of its population qualified at the intermediate level, below all three comparator countries, and concerns are often raised about the quality of UK vocational qualifications at the intermediate level. This leaves the UK with a large proportion of people with low-level skills, on a par with that of France, but with over twice the proportion seen in Germany and the US.

There is a lack of robust internationally comparable data on management skills and definitions of managers and management vary across countries. The available evidence points towards a UK weakness in management. For example, international surveys of business executives’ perceptions of the quality of management suggest that UK managers lag their colleagues in the US, France and Germany in terms of competence and experience.

ENTERPRISE

Enterprise, or the seizing of new business opportunities by both start-ups and existing firms, is an important source of productivity growth and wealth creation. The Government monitors performance on the enterprise driver in three main areas – the enterprise culture, barriers to enterprise and the extent of enterprise activity.

Overall, the UK tends to perform better on enterprise than France and Germany, but less well than the US. Attitudes to enterprise in the UK are positive, but lag those in the US; risk aversion of many UK individuals may be acting as a barrier to them pursuing the opportunities for enterprise they identify.
Barriers to enterprise are also lighter on average in the UK than in France or Germany, with the UK performing well in terms of levels of administrative burdens and start up costs. The UK came 9th in the World Bank’s ‘ease of doing business’ index, behind the US, but comfortably ahead of France and Germany. Start-up firms are also better supported in terms of access to finance, where the picture is again more positive than France and Germany. These indicators also show that the three European countries experienced a much smaller ‘dot-com bubble’ in venture capital than the US, from 1998 to 2002.

The UK’s ranking on the extent of enterprise activity – as measured by the proportion of the labour force involved in starting a new business/running a young business – matched that seen on the other Indicators for enterprise: behind the US, but ahead of France and Germany. Cumulative productivity growth of SMEs in the UK has exceeded that of large firms over the last five years, which is an Indicator of healthy enterprise activity.

**COMPETITION**

The degree of competition in product, labour and capital markets affects market efficiency. The rules and institutions of these markets, determined in large part by government policy, are the major factor behind the degree of competition.

The UK performs very well on the competition Indicators. Competitive pressures are well supported by openness to foreign competition, a relative light touch regime of product market regulation and a highly regarded competition regime. Around half of UK GDP is accounted for by exports and imports, well ahead of the US, just ahead of France and a fair way behind Germany. The UK also has the highest stock of inward investment as a proportion of GDP of any G7 country.

The restrictiveness of product market regulation has declined since 1998, and it is at the second lowest level in the OECD, slightly ahead of the US, and some way ahead of France and Germany. Finally, the UK’s competition regime, as measured by the 2004 KPMG expert peer review, has improved since 2001, but remains behind that of the US and Germany. Another assessment concluded more positively that the Competition Commission and the Office of Fair Trading were respectively joint first and joint second in the world in the ranking of individual competition enforcement agencies.
INTRODUCTION

UK productivity performance and the global context

Globalisation – the world is changing…

The UK economy is facing significant challenges for the future. As markets are becoming integrated on a global scale, patterns of economic activity are shifting. The established nature of world trade, whereby the developed countries buy raw materials and basic goods from developing countries and turn these into higher value added products, is changing. The share of manufactured goods in developing countries’ exports, for example, has risen from about 25 per cent to over 80 per cent in the last twenty years. At the same time, the developed economies have gradually become more services-oriented, to the extent that services now account for over 70 per cent of output.

Internal changes in many lower wage economies, such as rising skill levels, greater macroeconomic and political stability, openness and improving infrastructure, have increased their competitiveness. At the same time developments in Information and Communications Technology (ICT) have been crucial in allowing greater competition in some areas, notably services. The need for personal contact limits the degree to which services are traded internationally, but new technologies are allowing an increasing number of services, including research and development and data processing, to be provided at long distance.

In responding, however, we neither can, nor should, try to resist the changes. Globalisation and low-wage imports present opportunities for the UK economy. Increased competition in product markets means lower-cost inputs for firms and lower prices for consumers. The cost of footwear, for example, has fallen by 23 per cent in real terms in the past ten years. These falling prices increase living standards, as more can be bought with a given income. Developed country consumers have more income available to spend on new and more interesting products – such as iPods and Dysons.

3 Source: Office for National Statistics data and DTI calculations
However, whilst the changes to the economy associated with globalisation are positive overall, in the short-term there are winners and losers, as in the case of any structural adjustment. Increased competition has led to a sustained and considerable reduction in manufacturing employment in the UK – so-called ‘deindustrialisation’ – while unemployment has increased amongst low-skilled individuals in the UK.

Moreover, the extent of the competitive challenge from emerging economies including China, India and the new EU member states is increasing over time. The emerging economies are experiencing dramatic growth – China has averaged annual growth of 8.7 per cent over the past decade, in contrast to 2.9 per cent in the UK. The new EU members of Central and Eastern Europe have relatively high skill levels, but wages are a fraction of those in the UK. Emerging economies are currently highly competitive in the production of ‘basic’ manufactured goods, but over time their capacities are building, allowing them to move increasingly into higher value added functions.

We can no longer rely on an inherent productivity advantage, which has traditionally insulated our industries from low-wage competition in many areas; emerging economies are catching up. In order to minimise the suffering of the losers from globalisation and to respond adequately to the challenges posed, we must focus on enabling individuals to position themselves higher up the value chain.

What this means, as Professor Michael Porter noted, is that UK companies need to upgrade their productivity, ‘competing on more unique and more innovative products and services’. Higher value added product strategies require a skilled workforce and innovative firms. Innovation can enable firms with higher labour costs to stay ahead of their lower-price competition. However, products and processes can be replicated by lower-wage competitors over time and it is for this reason that innovation and up-skilling are not one-off targets. Instead they represent a continual search for better products and ways of working, combined with adoption of the latest technology which UK firms and individuals must embrace if they are to stay ahead. The UK’s response must therefore be a commitment to a continuous focus on improving productivity.

4 DTI Economics Paper No.3 (2003), ‘UK Competitiveness: moving to the next stage’
...and good performance on the Indicators is important in order to move up the value chain.

The Government has identified five drivers of productivity – routes by which the UK can increase productivity and compete effectively in the globalising economy. These drivers are investment, innovation, skills, enterprise and competition. Progress in improving performance on the drivers is monitored using the Indicators presented in this document. The Indicators are grouped under each of the drivers and taken together provide a summary of performance on the driver.

This document provides a picture of the UK’s performance on the drivers of productivity against our main industrialised competitors: France, Germany and the US. The choice of countries for the comparison reflects the reality of our economic position: whilst it is the emerging economies which are fast changing the economic landscape, these economies remain very different from our own. UK productivity levels are a long way ahead of those of China and India, and the UK has a substantial productivity margin over the new EU members.

Benchmarking our performance against the economies which are closest to our own – the advanced, industrialised economies of France, Germany and the US – enables us to consider how effectively we are responding to the changing economic environment. We are not in competition with these countries, in the sense that productivity gains in Germany do not come at the expense of gains in the UK. But given that our economic structure and wage levels are most similar to these countries, if we do not achieve the same advances in these Indicators as they do, we will lose our ability to compete effectively in globalised economic markets; we will fall behind our peers and will not reap the full benefits of globalisation.

The UK economy has made substantial progress in recent years...

UK living standards have improved significantly in the last decade. The UK has climbed up the rankings of GDP per head, overtaking both France and Germany since 2000, aided by over fifty quarters of uninterrupted GDP growth. This strong performance has been aided by the impressive UK labour market performance and macroeconomic stability.

Figure 0.1 shows that, in 2004, the UK was relatively prosperous compared to our European neighbours – in fact, over the most recent economic cycle the UK has performed much more strongly than our European peers. However, the US continues to lead by a substantial margin, with average income per head of population over 25 per cent higher than in the UK.
High employment rates have been a major driver of the improvement in UK living standards. The UK’s employment rate is very similar to that of the US and exceeds those of France and Germany. Further, unemployment rates are considerably lower than those of France and Germany. In addition, the UK is one of the few EU member states to have exceeded the 70 per cent employment rate target set by the European Council in 2000 as part of the Lisbon Strategy, Europe’s agenda for structural reform.

Employment has played an important role in generating increased prosperity in recent years. But total income, or GDP, is a function of both the number of people working, and their productivity: how much they produce on average. As the opportunities for rapidly increasing incomes through increased labour market participation diminish, the importance of productivity improvements increases. This is particularly relevant for the UK, due to our high employment rate and historically poor productivity performance.

... our overall productivity performance has improved, but the gap remains.

The changing economic environment provides motivation for this focus on productivity and its drivers. But in addition, the UK has suffered from a historic under-performance on productivity. Tackling this will not only enable us to engage more positively with the changing economic environment, it will also allow us to achieve further gains in our standard of living.
In the last decade, we have made some progress in reducing our historical deficiency in terms of labour productivity. As illustrated in Figure 0.2, we have closed the gap with Germany on an output per worker basis. We have also narrowed the gap with France and with the US. However, workers in the US and France still produce around 27 per cent and 11 per cent more than the average UK worker, respectively.

**Figure 0.2:**
**GDP per worker**

Furthermore, these comparisons do not take account of the shorter working week and longer holidays in France and Germany. Output per hour worked figures in Figure 0.3 take these differences into account. On this basis, the UK has a sizable gap of 16 per cent with the US and Germany and 29 per cent with France. On average, workers in the UK have to work nine hours to produce the same output that workers in Germany achieve in eight, and workers in France in seven.
The story on productivity is clear: we have made some improvements, but a substantial gap with our main competitors remains. The Indicators provide an assessment of our strengths and weaknesses on each of the drivers of productivity and suggest areas where we may need to do better in order to be competitive with the best, generate higher value added and hence respond most effectively to the changing global environment.

**Policy’s role in productivity and the Indicators’ role in policy**

The Government has a key role to play in setting the macroeconomic, institutional and regulatory framework in which business operates. In general, it is private firms, not governments, that create wealth directly. Those frameworks need to encourage the development of dynamic, agile businesses able to respond to global change and produce goods and services that people want to buy. Government policy needs to set the frameworks to facilitate the UK’s transition to the next stage of competitiveness, and provide the basic building blocks for individuals and firms to become more skilled and innovative.
As well as providing the basic building blocks of a successful economy there is sometimes a role for more targeted policy interventions to address particular problems. The aim of this Indicators document is to provide a high-level view of where possible problems in the UK economy that affect our productivity might be. Benchmarking the UK’s performance relative to similar countries across a range of indicators can provide a picture of some of the factors which may be responsible for this productivity gap.

Identifying where strengths and weaknesses of the economy might lie is an important first step in the policy-making process. However, poor performance on one of the Indicators does not always mean there is a role for government intervention. It may be that some Indicators are better measures of performance in some countries than in others due to differences in the structure of those economies. For example, if one country has lower R&D than another it might be more to do with one country having fewer science-based industries – but more service industries, which may innovate through other means – than with one country necessarily being more innovative than another.5

Even where poor performance on the indicator does signify an underlying problem in the UK economy, it is not clear that government intervention will be able to resolve this problem cost effectively and without creating additional problems.

Government intervention is likely to be most effective where there is an economic rationale for that intervention based on the existence of a market failure. Rationales for intervention exist where problems in the economy are not resolved through normal market forces within a reasonable time period and where Government intervention is likely to mitigate those problems in a relatively non-distortionary way and at reasonable value for money.

---

There are a number of reasons why normal market forces may not solve problems in the economy. Such ‘market failures’ are often categorised as follows:

- **Externalities**: externalities, or ‘spillover’ effects, occur when the benefits (or costs) that are generated by an individual’s or firm’s actions are not fully captured (or borne) by that individual or firm.

- **Barriers to entry**: barriers to firm entry restrict competition and distort markets. Such barriers may be created by strategic private action or public regulation.

- **Imperfect information and uncertainty**: a lack of information can affect the decisions of firms and individuals, leading to an inefficient allocation of resources as individuals do not make the choices they would have made in the presence of perfect information.

- **Public goods**: Public goods and services are those where a large group of people can enjoy the benefits of their production without necessarily having paid for them. There may be under-provision of these goods, as the consumers of public goods have an incentive to ‘free-ride’ and producers are not able to appropriate the full returns from their output.

Such market failures can occur in factor markets, such as those for labour and capital, and in final product markets. Financial market failures can lead to inefficient outcomes across all sectors, as investment in all its many forms may suffer due to a lack of access to finance.

The Indicators in this document give us a picture of the competitive position of the UK economy. Performance against the Indicators gives us suggestions of where we may wish to look to improve UK productivity and prosperity in the future. The Indicators have already motivated a major re-prioritisation of spend towards science and innovation, and other policy changes have occurred partly in response to this benchmarking of UK performance. These comparisons are a valuable tool which, coupled with effective strategic prioritisation, enable the Government to help UK businesses remain competitive in the continually changing global economy.
CHAPTER ONE

Investment

**Chapter Summary**

The UK has historically suffered from relatively low levels of investment, which has often been attributed to instability in the macroeconomic environment. Following a sustained period of macroeconomic stability there are some signs of improvement to the UK’s investment climate. Business investment as a share of GDP has stabilised, and there has been an increase in government investment as a share of GDP, though both remain at low levels.

**Introduction**

Investment is undertaken to improve technology, productive efficiency (productivity) and future capacity. Investment in human capital (skills) and R&D (innovation) are considered in other chapters. This chapter concentrates on investment in physical capital, which is itself an essential determinant of economic growth and productivity. An increase in the quantity and quality of physical capital available to each worker can directly increase labour productivity. Capital investment also influences productivity indirectly, as it is through investment that new technology is embedded in the production process, therefore improving firm efficiency.

This section considers the following set of Indicators to monitor the investment driver:

- **Investment environment** – measures of the volatility of GDP growth and short-term interest rates in the UK against its competitors, since the 1980s, provide a comparison of macroeconomic stability;

- **Business investment** – overall business investment as a percentage of GDP in the UK in comparison to France, Germany and the US; and

- **Government investment** – public sector investment as a percentage of GDP.
Box A: Investment, productivity and economic growth

Investment expands the capacity of the economy, allowing economic growth. Investment is the opposite of consumption, and individuals and businesses are only willing to forego present consumption if they expect to achieve higher returns in the future to compensate for this loss in utility. Investment therefore takes place when profitable opportunities are perceived to exist to raise future consumption possibilities.

A firm’s or individual’s decision to invest or not will be influenced by two key elements: time and risk. An investor will always have a preference for acquiring returns sooner rather than later and individuals would need to expect larger returns to undertake an investment that is considered risky or takes many years to pay off. The availability of necessary funds, either from retained profits or from bank or equity finance is also crucial for investment decision-making.

Solow’s ‘neoclassical’ growth model argued that capital investment could not generate long-run economic growth: diminishing returns to capital investment would limit the availability of profitable investment opportunities and so investment could only generate growth through short-run adjustment dynamics.¹ But this viewpoint has been discredited by the recognition of the presence of positive externalities from investment identified by ‘new’ growth theorists. Where externalities arise from investment in assets such as human capital and R&D, investment will always have a positive impact on economic growth.² This approach suggests that while diminishing returns to investment may occur at the level of individual decision-making, increasing or constant returns may hold at the whole economy level, meaning that investment can generate ongoing economic growth.

New investment is required to replace, update and increase an economy’s capital stock. This investment in physical capital impacts on productivity through two channels: capital deepening and incorporating new technology. Capital deepening is defined as an increase in the average amount of plant and machinery each worker in the economy has to work with. Such increases can lead to direct improvements in labour productivity levels. New physical capital can also bring technological advances into the production process. Therefore, provided that the wider environment supports innovation, and workers are equipped with the relevant skills to take advantage of new technologies, investment in physical capital may lead to an increase in total factor productivity (TFP).
Investment environment

WHY IS IT IMPORTANT?

Firms’ decisions on whether or not to invest are often influenced by a range of macroeconomic factors, particularly levels of demand, inflation and interest rates. In general, investment is more likely to take place where both inflation and interest rates are low and stable. Such stability helps individuals and businesses plan for the long term, as uncertainty increases the risk associated with investment decisions. Stability may also reduce the cost of borrowing for individuals and firms, because in an uncertain environment, creditors are likely to require a higher rate of return from borrowers, to compensate for the higher risks involved. Finally, low and stable inflation increases price transparency, therefore allowing firms and individuals to make well-informed judgements about the kind of investment that will give them the highest returns.

The effect of improved macroeconomic stability on investment performance is expected to be positive, but the magnitude of this effect is difficult to estimate. Empirical analysis of the effect of uncertainty on investment has produced mixed results, but the majority of studies do find some negative impact of uncertainty on investment. Macroeconomic stability is also important for the other drivers of productivity.

The performance of the UK in providing an economic environment that encourages investment is measured by the volatility of GDP and interest rates. Volatility in GDP growth indicates the extent of fluctuations in demand. Volatility in short-term interest rates indicates the extent to which there is uncertainty for potential investors in terms of the cost of capital. As short-term interest rates are the main instrument of central banks’ monetary policy, volatility of interest rates is also a proxy for fluctuations in inflation. Frequent and steep fluctuations in inflation usually mean that a central bank has to change its interest rates often, in order to keep prices under control. However, this indicator needs to be interpreted with care, as there may be a negative bias against central banks that are more responsive to changes in inflation and GDP growth when setting interest rates.

---

3 European Commission (2003), EU Economic Review
5 This indicator needs to be interpreted with care, as there may be a negative bias against central banks that are more responsive to changes in inflation and GDP growth when setting interest rates.
HOW DOES THE UK PERFORM?

In the 1970s and ‘80s, inflation was high and unstable and GDP growth was subject to considerable fluctuations. This climate of instability may have had an adverse effect on firms’ long-term investment decisions. However, the introduction of new frameworks for the operation of monetary and fiscal policy in the 1990s has helped the UK to achieve high and stable levels of growth and low inflation.

Figure 1.1 shows that although UK GDP growth was relatively volatile in the 1990s (and earlier data shows this was also the case in the 1980s), the UK has seen less fluctuation in growth than its competitors since 1998. The UK economy proved more resilient than France, Germany or the US to the world economic slowdown of 2001-2003, and has now achieved over fifty quarters of uninterrupted GDP growth.

Figure 1.1:
Volatility of GDP growth

Source: DTI calculations on OECD data

7 Figure 1.1 reports the coefficient of variation, which is the standard deviation expressed as a proportion of the mean. Under this measure, a 2 per cent standard deviation from an 8 per cent mean growth rate would be seen as a lower level of variation than a 2 per cent standard deviation from a 4 per cent growth rate.
Similarly, as illustrated in Figure 1.2, interest rates in the UK have, on average, been less volatile relative to our international competitors since 1998. This is mainly due to lower and more stable inflation, which followed the Government handing operational independence of monetary policy to the Bank of England, alongside measures to ensure the accountability and transparency of monetary policy. Since the start of inflation targeting at the end of 1992, inflation has deviated little from each year’s target.

**Figure 1.2:**
*Volatility of short-term interest rates*

![Diagram showing volatility of short-term interest rates from 1992 to 2004 for US, Germany, France, and UK.](image)

Source: DTI calculations on OECD data

Note: since 1999 Germany and France have had the same interest rate

Another indication that the investment climate in the UK has improved is the Confederation of British Industry’s (CBI) 2001 survey, investigating hurdle rates. Hurdle rates refer to the minimum expected rate of return firms require on their investment for the project to proceed. The results from CBI’s survey show that both the nominal and the real\(^8\) required return fell considerably between 1994 and 2001. This suggests not only falling inflationary expectations, but also an improvement in firms’ perceptions of the investment climate in the UK.\(^9\)

---

8 The inflation-adjusted rate of return.
WHAT DOES THIS MEAN FOR THE UK?

There have been significant improvements in the last decade in terms of macroeconomic stability and performance.

Macroeconomic stability may not always be sufficient on its own to encourage investment, but the effect of stability on confidence and general incentives to invest is clear, and stability is a decisive contributor to sustainable long-run output growth. It is important that this positive macroeconomic climate is maintained in the future. This requires the maintenance of accountable and transparent monetary policy, insulated from short-term political considerations, and sound, long-term fiscal policy.

Business investment

WHY IS IT IMPORTANT?

Business investment impacts directly on the amount of capital and technology available to each business sector worker, and hence that worker’s productivity: investment by businesses in extra plant and equipment makes it possible to increase the output produced by a given input of labour. Business investment accounts for approximately two thirds of total investment in the UK. It is not an end in itself, but a major determinant of the economy’s ability to increase future capacity. Business investment may also impact positively on total factor productivity through improvements in technology embodied in new kinds of capital equipment purchased by firms.

HOW DOES THE UK PERFORM?

Figure 1.3 shows that despite strengthening macroeconomic fundamentals, UK business investment in terms of capital flows has generally remained lower than that of our main competitors over the last decade. The cyclical effects from the world economic slowdown of 2001-2003 kept business investment subdued in both the UK and its main competitor countries.
This pattern of relatively weak UK business investment has been present over the past thirty years. The accumulated impact of this deficit in capital formation is that our capital stock per hour worked represents around two thirds of that of France or Germany, according to DTI estimates of updated capital stock figures to 2001. However, this represents an improvement since 1990, when the UK’s capital stock per hour worked was only around half of that in Germany or France. A breakdown of the UK’s relative capital stock by class of asset suggests that whilst the UK is performing relatively poorly with regard to the stock of non-ICT assets, in particular non-residential structures, it has invested heavily in the ICT asset classes of IT equipment, communications equipment and software.10

WHAT DOES THIS MEAN FOR THE UK?

The UK still has low levels of business investment, which hinders productivity and growth. As a result of our overall poor level of capital stock compared to our competitors, the need for the UK to encourage higher business investment is even greater. Macroeconomic stability and falling hurdle rates are signs that the investment climate is becoming more attractive, and the foundations are there for businesses to invest more.

---

10 Data taken from O’Mahony and De Boer (2002), ‘Britain’s relative productivity performance: Updates to 1999’, DTI/Treasury/ONS, NIESR: London and from a dataset provided to DTI by Mary O’Mahony.
Box B: Investment in Information Communications Technology (ICT) and productivity

Average annual labour productivity growth in the US accelerated from 1.4 per cent per annum in 1980-1995 to 1.8 per cent per annum between 1995-2001. This is in contrast to a marked slowdown in Europe, with average annual productivity growth rates for the European Union falling from 2.3 per cent to 1.4 per cent per annum, and the UK falling from 2.3 per cent to 1.5 per cent per annum. This divergence in performance has often been attributed to ICT investments (capital deepening) and total factor productivity gains in the ICT-producing industries in the US. ICT investment is expected to play at least some role, and probably an important role, in explaining differences in productivity performance. Recent analysis by the Centre for Economic Performance has found a positive impact of ICT on productivity, estimating that a doubling in the stock of ICT hardware would lead to a 3 per cent increase in the productivity of British establishments.¹ In addition, a study by the economic consultancy London Economics has found that 50 per cent of the annual average labour productivity growth in the UK non ICT-producing sectors can be explained by ICT capital deepening. The sectors that benefited most from ICT investment were the manufacturing sector and large services sectors like financial intermediation and wholesale and retail trade.²

However, ICT investment in itself may not be sufficient for the UK to replicate the US’s sharp productivity acceleration of the late 1990s. Complementary investment in skills and changes in the organisational structure of firms are important in order to obtain a higher return on ICT investment.³ In general, more positive attitudes across the workforce towards ICT may be necessary to reap its full rewards. Research by the Economist Intelligence Unit suggest that economies with a strong performance in terms of skills, R&D and access to venture capital, together with a developed ICT infrastructure and a favourable business environment tend to achieve higher rates of GDP growth.⁴

¹ Bloom, Sadun and Van Reenen (2005), ‘Information technology, multinational enterprises and productivity: Evidence from a panel of UK establishments’, CEP, London School of Economics
³ Bloom, Sadun and Van Reenen (2005), ‘It ain’t what you do it’s the way that you do I.T. – Testing explanations of productivity growth using US affiliates’
⁴ Economist Intelligence Unit (2004), ‘Reaping the benefits of ICT – Europe’s productivity challenge’
Government investment

WHY IS IT IMPORTANT?

Government investment is a significant contributor to the economy’s capital stock, especially through infrastructure and the provision of public services. Good transport infrastructure such as effective roads, railways and airports can improve productivity by lowering transport costs and also permit greater specialisation and economies of scale. Recent research by the Centre for Economic Performance (CEP) has suggested that a 10 per cent reduction in average journey times throughout the UK due to transport improvements would result in a 1.12 per cent increase in productivity levels, and nearly twice this amount for areas that enjoy the largest benefits in terms of access to economic mass. According to a recent survey of macroeconomic studies by the European Commission, the majority found positive impacts of improved infrastructure on productivity, although in most studies the effect was not strong.

Moreover, in the UK the public sector is responsible for much of the provision of health and education, and some housing provision. These services have direct and indirect impacts on the productivity of UK citizens, and on the attractiveness of the UK as a location to live, work and invest.

International comparisons of government investment need to be interpreted with care, primarily because the size of the public sector varies across countries for historical reasons and because of different choices. Government investment by itself is not a sign of increased future potential productivity growth. In addition, the Government needs to ensure that public sector investment is efficiently allocated and sustainable so that it does not lead to high accumulated public debt, which can stifle economic growth in the long run.

HOW DOES THE UK PERFORM?

For most of the 1980s and 1990s the UK public sector has invested less than its major competitors. Previous UK governments chose to cut capital budgets and withdraw from certain activities that had previously been delivered by the public sector. As shown in Figure 1.4, government investment in the UK stabilised as a proportion of GDP in 2000, and has since been increasing, overtaking Germany in 2003.

In recent years, spending on transport, education and health has increased. A study of public spending in the UK conducted by the Institute for Fiscal Studies (IFS)\textsuperscript{13} showed that from 1997 to 2004, spending on the NHS, education and transport grew in real terms at an annual rate of over 4 per cent.

**WHAT DOES THIS MEAN FOR THE UK?**

Macroeconomic stability and the Government’s fiscal rules have helped public finances, allowing more room for manoeuvre on public investment. Government investment is now on the increase as a proportion of GDP, and investment in key services has risen substantially. However, there is still some room for improvement, in order to narrow the gap with France and the US. The relatively low levels of government investment over the last few decades have led to the UK having poorer infrastructure than would otherwise have been the case. This is likely to have increased transport costs, for example, and hence raised the overall costs of doing business in the UK. The extent of this effect is, however, debateable because the empirical evidence on how public investment and infrastructure affect output and productivity is ambiguous.

---

\textsuperscript{13} Emerson, Frayne and Love (2004), ‘A survey of public spending in the UK’, IFS Briefing Note No.43
The policy agenda

The Government approach to promoting investment is to maintain a stable macroeconomic environment and to remove microeconomic barriers that prevent the market from functioning properly.

Government actions in recent years to stimulate private sector investment include steps to enhance the efficiency of the capital market and therefore reduce the cost of borrowing and make investment more attractive to firms. These involve an attempt to enhance the ‘private investment chain’ through improved interaction between fund managers, firms and capital markets, and the implementation of the principles of the Myners review,14 to increase efficiency in the allocation of capital. Moreover, corporation tax has been cut to its lowest ever level. In addition to these measures, the existence of complementarities between different forms of investment implies that policies to improve skill levels and foster knowledge transfer are also expected to facilitate investment in physical capital.

---

14 Paul Myners (2001), ‘Institutional investment in the UK: a review’, HM Treasury. This review aims to address the problem of distorted decision-making by institutions.
CHAPTER TWO

Innovation

Chapter Summary

The UK has a strong science base, but spends less than its competitors in terms of research and development (R&D), particularly business R&D, and patenting. UK firms perform better on the other Indicators of innovation performance. A relatively large number of innovators make use of network relationships, and a relatively large proportion of firms’ turnover comes from sales of new or improved products.

Introduction

Innovation – the successful exploitation of new ideas – is one of the main engines of long-term economic growth and structural change. It can result in new technologies, goods and processes, as well as novel services and means of delivery. The exploitation of new ideas, knowledge and creativity to create valuable goods and services is the only sustainable way for UK business to compete in the face of increased competition from firms in lower cost economies, such as China, and is essential for gains in productivity and quality of life.

The Government uses the following set of Indicators to monitor our performance on the innovation driver:

- **Strength of the science and engineering base** – publications and citations of scientific papers per head of population;
- **R&D expenditure** – business enterprise R&D and gross expenditure on R&D, both as a percentage of GDP;
- **Patents** – the number granted by the US Patent and Trademark Office (USPTO);
- **Networks and collaborations** – proportion of innovation-active firms reporting innovation cooperation arrangements with other organisations; and
- **Innovative products** – share of firms’ turnover attributed to new or significantly improved products.
Strength of the science and engineering base

WHY IS IT IMPORTANT?

The number of publications and citations in academic journals provides an indication of the strength and the effectiveness of the science base in the UK. A strong science base is an essential resource. Businesses can benefit from access to a high quality source of research and expertise, which also provides a training ground for the scientists, engineers and technologists of the future.

The number of peer-reviewed publications is a measure of the volume of knowledge produced in each country, while the number of citations gives an indication of the quality of that knowledge, because papers of better quality are more likely to be cited. The publication of articles in academic journals is an important output of the science base, although it is not the only one. For example, contract research for business, which may not be published immediately, is also a key output.
Box C: Innovation, productivity and economic growth

There are several strands of economic theory that describe the relationship between innovation and economic growth (and by implication productivity growth). These strands model the relationship in various ways, but they are all agreed that innovation is fundamentally important for, and indeed the prime driver of, economic growth.

In the neoclassical tradition stemming from Solow, 1956,1 long-run economic growth comes only through growth in factor inputs, such as capital and labour, and innovation. This innovation is exogenous, i.e. unexplained by the model. Technical progress improves the production functions of firms and countries, allowing goods and services to be produced more efficiently. This increase in efficiency, whereby more output is produced for less input from the factors of production, amounts by definition to an increase in productivity. So-called growth accounting techniques have applied the neoclassical model to empirical data, decomposing growth into the contributions of growth in factor inputs and the residual: total factor productivity (TFP) growth. The TFP contribution to economic growth has been found to be extremely large, indicating that innovation is very important to economic growth. However, some of the empirical TFP contribution might be caused by factors other than innovation. The discovery of the apparent importance of innovation led to movements to try to endogenise the innovation process itself, i.e. to explain it in the model.

Endogenous growth theory models the innovation process by the addition of a knowledge capital input factor and spillovers. The stock of knowledge in the economy grows because firms and organisations undertake R&D. They know how much to invest in R&D because, even if they do not know whether a particular R&D investment will lead to successful innovation, they know the probabilities of success or failure, a situation described as weak uncertainty. The usual assumption of diminishing marginal returns to R&D investment is relaxed in endogenous growth models in by using spillovers. Knowledge spills over, either inter-temporally (e.g. Aghion and Hewitt ,19922), or to other firms (e.g. Romer, 19903). This means that there can be increasing returns to R&D investment in the economy at the aggregate level and hence long-run economic and productivity growth is possible.

Nelson and Winter, 19824 began what might be termed the neo-Schumpeterian or evolutionary strand of economic growth theory. The evolutionary strand emphasises the importance of modelling innovation more realistically at the level of the firm or organisation. In particular, this literature critiques the static, steady-state equilibrium assumptions, the uniformity of significance of innovations, and the lack of uncertainty in mainstream endogenous growth theory. Competitive market innovation can be seen as analogous to Darwinian biological mutation. Firms are continuously evolving new ways of working and new products to supply, in order not to fall behind rival firms, and to exploit new opportunities. New firms enter and existing firms evolve or exit, in an economic model driven by a systemic innovation process.
HOW DOES THE UK PERFORM?

As illustrated in Figure 2.1, the UK leads its competitors in terms of both the number of papers and the number of citations per head. The fact that the UK performs better than France, Germany or the US when academic publications and citations are adjusted for a country’s population is an indication that the UK has a world-class science base.\(^{15}\)

The UK is second only to the US in terms of its overall share of world citations. Our research base performs relatively strongly right across the subject spectrum. The UK is ranked second in six of the nine broad scientific disciplines. However, there is some variation. The UK performance is very good in clinical sciences, pre-clinical health-related sciences, environmental sciences and biological sciences, but not quite so good in mathematics, engineering and physical sciences.

\(^{15}\) Although there is a known bias to citing English language publications, this does not explain the significant UK lead over the US. Nor is it likely to explain entirely the large lead over France and Germany.
As well as being a leader in publications and citations per head, the UK ranks well in terms of PhDs awarded per head of population, second only to Germany in the G7.

**WHAT DOES THIS MEAN FOR THE UK?**

The UK has maintained its strong research performance. But we need to maintain and build on this success, translating scientific excellence more effectively into innovation outcomes. These are key aims of the Government’s 10-year ‘Science and innovation investment framework’, which emphasises the need for continued investment to ensure the science base remains world class and the importance of effectively mining the body of recently developed knowledge in search of profitable business opportunities.

R&D expenditure

WHY IS IT IMPORTANT?

Total expenditure on R&D provides one measure of the amount of resources an economy dedicates to the generation of new knowledge. Business enterprise R&D is a component part of that total expenditure and a measure of the extent to which businesses are developing new technology.

Differences in R&D investment have been used to explain the UK’s relatively poor productivity performance: differences in R&D accounted for a quarter of the UK’s productivity gap with the US and a sixth of the gap with France in 1999. Moreover, R&D expenditure has been shown to generate important productivity benefits for firms beyond the innovator, as other firms can benefit from the innovator’s advances. R&D can also generate significant social returns, such as improved health, which may not be properly reflected in productivity statistics.

R&D expenditure is, however, an imperfect measure of innovation. It only provides a measure of input to technological innovation processes and accounts for just 40 per cent or so of all innovation-related expenditure. Furthermore R&D is concentrated in relatively few industries. The development of new products and processes is evident across all industries.

Publicly-funded R&D is an important complement to privately-funded R&D. The Government may finance investment that would otherwise not be carried out by the private sector, because of a lack of incentives to do so. Empirical studies have tended to find that complementarities exist between public and private R&D investment: public R&D stimulates private R&D rather than displacing it, although the evidence is somewhat ambiguous. Public expenditure often provides the building blocks – such as the underpinning science – which individual firms can then use to extend their understanding of specific technologies. The fact that this basic output is available makes R&D more profitable to the individual firm, such that they are more likely, not less likely, to undertake R&D activities.

18 Griffith (2000), ‘How important is business R&D for economic growth and should the Government subsidise it?’, IFS Briefing Notes, BN12
19 Source: Community Innovation Survey 3, which covered the period 1998-2000
HOW DOES THE UK PERFORM?

The UK performs less well than its competitors in terms of Gross Expenditure on R&D (GERD) as a percentage of GDP. The GERD to GDP ratio declined steadily in the 1980s and early 1990s as GDP growth rates exceeded R&D growth rates. Figure 2.2 shows that GERD currently stands at 1.9 per cent of GDP, having risen marginally from its low point of 1.8 per cent in 1998. Figures from the European Commission suggest that the UK’s GERD intensity was also lower than the EU25 average in 2003.21

Figure 2.2: Gross expenditure on R&D

Unsurprisingly, as business enterprise R&D (BERD) accounts for 65 per cent of UK GERD, BERD as a percentage of GDP is also lower in the UK than in its major competitors (Figure 2.3). The BERD to GDP ratio declined in the UK during the 1990s but stabilised after 1997, before falling again in 2004.

Source: OECD. US data excludes most or all capital expenditure.

21 European Commission (2005), ‘Key Figures on Science, Technology and Innovation. Towards a European knowledge area’
Analysis suggests that differences in R&D intensity between countries can be explained to a significant degree by differences in industrial structure. For example, research by the Institute for Fiscal Studies (IFS) suggests that roughly 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. OECD research also shows that differences between the UK and other countries are to a large extent the result of such ‘industry-mix’ effects. Meanwhile, DTI/HMT research suggests that UK-based R&D performers, whether UK-owned and foreign owned, have, on average, a similar R&D intensity to their overseas competitors in the same sector. Finally, the UK is host to a number of major foreign investors, many of whom depend to a great extent on R&D inputs from their home base overseas.

22 Abramovsky, Harrison and Simpson (2004), ‘Increasing Innovative Activity in the UK? Where now for government support for innovation and technology transfer?’, IFS Briefing Note No. 53
23 OECD (2005), ‘Economic Survey 2005: United Kingdom’. This finds that over half of the UK’s gap with France, Germany, Japan and Finland can be explained by industry mix effects. HM Treasury, DTI, DfES (2004), Science and Innovation Investment Framework, 2004-14, The Stationary Office, London, July. This showed that differences in manufacturing R&D intensity between the US and UK could be largely ascribed to a more R&D intensive industrial structure in the US.
24 DTI Economics Paper No.11 (2005), ‘R&D Intensive businesses in the UK’
WHAT DOES THIS MEAN FOR THE UK?

The UK’s comparatively low levels of R&D expenditure suggest that the UK has relatively low levels of technological innovation. Policies to increase R&D expenditure in the UK are important for improvements in the UK’s productivity performance. R&D is a main input into the innovation process, albeit a major one for some industries. Still, whilst R&D is a necessary condition for innovation in some industries, it is not a sufficient condition. Data for R&D expenditure does not provide information about the effectiveness of R&D spending and the capacity of the economy to translate technology into new products or processes.

It seems that part of the reason for the UK’s relatively low R&D intensity lies in a relative lack of very large firms in R&D-intensive sectors; large UK firms are concentrated in sectors that have lower R&D intensities or do no R&D at all.

R&D expenditure is concentrated in relatively few sectors. R&D does not provide insight into the intensity of innovation outside these sectors. In other sectors, expenditure on design, marketing and training could be equally important inputs into the innovation process. To firms in these industries alternative indicators of innovativeness, such as trademarks or designs, are more relevant than R&D expenditure.

Patents

WHY IS IT IMPORTANT?

Patents are a measure of intermediate output from the innovation process in some sectors, particularly those sectors that do formal R&D. To qualify for a patent, inventors need to demonstrate that they have produced something innovative. However, not all patents are directly valuable, and there are still significant hurdles between acquiring a patent and developing a commercially valuable product or process. The number of patents granted to firms located in the UK therefore gives an indication of the success of UK firms in generating knowledge, which may subsequently prove to be commercially valuable.

The propensity to use patents as a means of protecting intellectual property varies by industry; whereas science-based industries such as pharmaceuticals, biotechnology and chemicals have a high propensity to patent, for other sectors, such as financial services, publishing and electronic media, patenting is not usually an appropriate means to protect intellectual property.
In addition, differences between countries’ patenting performance tend to be highly correlated with BERD performance; it is therefore likely that international differences in patenting are related to differences in industrial structure.\textsuperscript{25}

**HOW DOES THE UK PERFORM?**

Figure 2.4 shows how UK-based firms perform in terms of patents awarded by the US Patent and Trademark Office (USPTO). Germany and the US have a greater number of patents per million of population than the UK, while the UK and France have a similar patenting performance. Despite progress since the 1990s, the UK has some way to go to catch up with its competitors. The large difference with the US is partly due to home country bias: the fact that, for a patent of given expected value, US firms are more likely to register this with the USPTO than non-US firms. However, USPTO data is broadly consistent with other measures of patenting performance, such as triadic patents, which correct for this bias.\textsuperscript{26}

**Figure 2.4:**
US patents granted

![Graph showing US patents granted per million of population from 1992 to 2004 for the US, Germany, France, and the UK.]

Source: US patent and trademark office
Note: Patent data suffer from home country bias


\textsuperscript{26} A triadic patent is a patent for the same invention that is registered in the patent offices of US, EU and Japan.
WHAT DOES THIS MEAN FOR THE UK?

The USPTO data shows that the patenting performance of firms based in the UK is significantly lower than that of firms located in Germany and the US. The Intellectual Property Scoreboard for the UK also shows that only three UK-incorporated firms appeared in the top 20 firms that registered patents with the UK Patent Office in 2000. This is consistent with UK-based firms’ tendency to be active in less R&D-intensive sectors.

The UK Patent Office is working to improve UK patenting performance through improving awareness of intellectual property rights and reducing the difficulties and costs associated with using the patent system to protect intellectual property.

In spite of this relatively weak patenting performance, the UK seems to lead its competitors in terms of the protection of non-technological intellectual property. One example of this is registered trademarks, with UK firms dominating the top 10 in the UK Trade Mark scoreboard. Data from the latest Community Innovation Survey also shows that a greater proportion of UK innovation-active firms, compared to other European ones, use alternative methods of protection to patenting, not only using trademarks, but also lead-time advantage, secrecy, complexity of design, registration of design patterns and copyright. The sharp contrast between patent and trademark performance is likely to reflect the different industrial structure in the UK and suggests that UK firms achieve improvements in their market position or product quality through means that are under-recorded in traditional innovation indicators.

Networks and Collaboration

WHY IS IT IMPORTANT?

Firms rarely innovate alone; instead they make use of relationships with a wide range of partner organisations including other firms, universities, government laboratories, consultancy enterprises, suppliers and customers. The Lambert Review of business-university collaboration highlighted this increasing tendency for innovators to seek collaborations with other organisations, which is likely to be partly driven by the increasing complexity of technologies. Firms may find it hard to innovate individually, because of the high risks and costs that this involves. Equally important is the pooling of complementary skills through networking, for example in the biotechnology sector, where the skills and capabilities needed to make scientific progress are scattered across different organisations.

29 OECD (2005), ibid
HOW DOES THE UK PERFORM?

According to the latest Community Innovation Survey (CIS-3), 23 per cent of innovation-active firms in the UK reported some cooperation arrangement in their innovation activities. As illustrated in Figure 2.5, this is higher than in Germany, but lower than in France. The UK firms’ propensity to engage in formal networks or linkages for innovation activity is above average by European standards across both the services and manufacturing sectors. Among the innovation-active enterprises in the UK, large firms are more likely to participate in cooperation arrangements than small and medium-sized enterprises (SMEs).

Figure 2.5:
Cooperation in innovation

![Bar chart showing cooperation in innovation among France, UK, and Germany.]

Source: Eurostat – Community Innovation Survey

WHAT DOES THIS MEAN FOR THE UK?

UK firms’ performance in forming collaborative relationships for innovation is relatively strong, especially in networking with customers and suppliers. In terms of collaboration with universities, the Lambert review of business-university collaboration suggested that British universities and businesses have made real progress in working together, but there is still scope for improvement: firms need to improve their communication of business needs and universities need to get better at communicating their comparative research strengths.
Innovative products

WHY IS IT IMPORTANT?

New ideas are not sufficient for productivity improvements; ideas must be translated into new products and processes. Therefore, the capacity of firms to create productive value from their innovation activities is a useful indicator of innovation performance.

HOW DOES THE UK PERFORM?

Figure 2.6 shows the proportion of turnover due to product innovations.\textsuperscript{32} The share of turnover in UK businesses accounted for by new or significantly improved products was higher than in France and lower than in Germany. Although the UK is behind Germany, it needs to be noted that German firms are the strongest performers in the EU15 on this measure, and UK firms are second best.

\textbf{Figure 2.6: Proportion of turnover due to new or significantly improved products}

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{figure2_6}\par
\caption{Comparison, all firms, 2000} \par
\end{figure}

\textsuperscript{32} All firms in the UK, France and Germany, not only product innovators
There appears to have been indicates a concentration of innovative activity. A comparison of results between the second and third Community Innovation Surveys (CIS-2 1994 to 1996 and CIS-3 1998 to 2000) reveals that the proportion of UK firms reporting product innovation fell, but that of those who did, more reported a high proportion of their turnover being due to new or improved products in CIS-3.

The UK leads both Germany and France on the proportion of turnover that is due to new or improved products looking at product innovators only, and is the strongest performer among the countries included in the CIS. UK firms that are product innovators appear to be highly dependent on new or improved products, with 41 per cent of their turnover generated from such products.

WHAT DOES THIS MEAN FOR THE UK?

This is a positive result for the UK, showing that product innovation is important for UK firms. In the context of increasingly competitive international product markets, UK companies will have to compete more and more on the basis of unique and innovative products. To remain a successful economy, the UK needs to respond quickly to rapid technological and market changes and promote innovation, thus moving up the value chain.

The policy agenda

The Government has an important role in providing the necessary infrastructure, raising skill levels, encouraging networks and supporting businesses in making innovative ideas flourish. However, UK firms have an even more crucial role to play in the development and diffusion of new technologies, products and processes. Other evidence suggests that, as a group, UK-owned firms appear to be less creative than their peers because they lack skills and appear to place less emphasis on developing a learning culture. Creating a workplace culture in which new ideas are encouraged and rewarded is essential for UK firms to gain competitive advantages and shift towards higher value-added production.

The importance of innovation in ensuring the UK remains a highly competitive global economy has led to an increased policy focus in this area in recent years. The Indicators continue to show that UK performance could improve further and policy is likely to continue to place heavy emphasis on science and innovation.

---

34 DTI (2003), ‘Innovation report – Competing in the Global Economy: the Innovation Challenge’
35 DTI Economics Paper No.7 (2003), ‘Competing in the Global Economy – the Innovation challenge’
Policy initiatives to improve UK innovation performance have been far-reaching. They have covered all aspects of the innovation process, including measures in the 10-year Science and Innovation Investment Framework to ensure the ongoing strength of the UK science base. Building on the conclusions of the Lambert Review there has also been a heavy policy emphasis on building the relationships between the business and university sectors.

The Government’s Technology Strategy is designed to encourage the use of networks and collaboration in innovation. Grant funding is available for collaborative research and development projects in strategically important areas identified by the Technology Strategy Board, where at least one of the innovators must be a business. In addition, the Technology Strategy provides funding for Knowledge Transfer Networks, with the aim of accelerating the diffusion of knowledge between the science, engineering and technology base and industry.

General initiatives to encourage innovation have included the introduction of the R&D Tax Credit to encourage R&D by firms in all sectors. It should, however, also be noted that many of the Government’s policies to promote innovation are aimed much more broadly than just at R&D-based innovation. These include using public procurement to promote innovation; supporting entrepreneurship and small business, e.g. through supporting SME access to finance and promoting best practice such as the business performance diagnostic tool; developing the UK skills base through the Skills Strategy; having a wide intellectual property rights framework including copyright and trademarks, not just patents; and using standards and regulations to promote innovation.
CHAPTER THREE

Skills

Chapter Summary
The UK performs relatively well in terms of high-level skills including science, engineering and technology skills, and is beginning to catch up with its competitors in terms of intermediate skills. However, the UK still has a very high proportion of people with only basic skills, and appears to suffer from lower management quality than our main competitors.

Introduction
A skill can be defined as an ability or proficiency at a task, normally acquired through education, training and/or experience. Workers with higher skill levels are able to work more efficiently and effectively and are more adaptable to the changing economic environment. More skilled individuals are also more likely to generate innovative ideas and enable firms to engage in more sophisticated production processes. Improving skills can raise employability and support social cohesion, particularly in conditions of globalisation, rapid technological change and the associated increased demand for skilled workers. Finally, there are complementarities between skills and investment in physical capital, as a firm’s decision to invest in new plant and equipment can be affected by the availability of skilled employees. Deficiencies in skill levels across the economy may therefore act as a constraint on both investment and the ability of firms to innovate, with damaging implications for productivity growth.

The Government monitors the following Indicators of performance on the skills driver:

- **Workforce qualifications** – international comparisons of the qualifications of the workforce and changes in the qualifications of the UK workforce over time; and

- **Management quality** – survey evidence on the perceptions of business executives of management skills in the UK and its competitors.

---

36 Assuming that technological change is skill-biased; that is, it increases the demand for higher-level skills and reduces the demand for lower-level skills. The empirical literature is mostly in agreement that this has been the case in developed economies in recent decades. There is also empirical support for organisational change being skill-biased. See Tether, Mina, Consoli and Gagliardi (2005), ‘A literature review on skills and innovation – How does successful innovation impact on the demand for skills and how do skills drive innovation?’, report for DTI.
Box D: Skills, market failure and economic performance

Skills are key for economic performance. Human capital is expected to increase the efficiency with which labour and capital inputs are used: a better skilled labour force is expected to be more productive and use physical capital more efficiently; it is also more likely to generate new ideas and adopt new business practices. The model developed by Mankiw et al.\(^1\) suggests that human capital is a major factor of production, and differences in human capital stocks may explain differences in prosperity between countries. In addition, Lucas' seminal contribution to endogenous growth literature\(^2\) suggests that differences in growth rates between countries can partly be accounted for by differences in the rate of human capital accumulation. A recent study by the OECD, has found a positive and significant effect of education on growth in OECD countries. One additional year of schooling was estimated to increase output by 6 per cent in the long run.\(^3\) In addition, a study of the impact of basic literacy and numeracy on economic growth across 14 OECD countries shows that countries with literacy scores 1 per cent above average have 2.5 per cent higher labour productivity and 1.5 per cent higher GDP per capita than average.\(^4\)

Becker's theory of human capital\(^5\) suggests there are many possible reasons, or market failures, why individuals and firms may under-invest in skills in a free market. These include lack of information on the returns to education and training, insufficient access to finance and inability (or fear of it) of employers to appropriate the returns to training, because the trained worker can leave after the training to work at another firm. These market failures, for which there is some evidence in practice, provide a justification for Governments to intervene to promote and support individuals and firms in their acquisition of skills.

Better workforce skills are expected to be positively associated with higher value added product strategies.\(^6\) This is possibly due to complementarities between skills and investment in capital, technology and innovation as well as the effect of skills on the rate of adoption and diffusion of existing innovations. Individual investment in education may therefore involve positive spillovers, giving rise to wider benefits for society than accrue to the individual alone.

Job-related training and types of skills not necessarily related to education, like ICT and managerial skills, are also expected to have an important effect on productivity. Continuous human capital formation, professional training tailored to employers’ and individuals’ needs and on-the-job learning can affect productivity on a firm level and therefore yield significant benefits for an economy.\(^7\) Measuring the stock of skills purely on the basis of educational attainment and qualifications may not provide a very accurate picture when it comes to having the necessary skills to do the job.
Further, human capital, and especially intermediate-level qualifications, can have an effect on employability and labour market participation. An increase in the proportion of the population that is equipped with intermediate level skills can therefore have a beneficial effect on the economy through stronger labour market performance, and may have an indirect role in decreasing social inequality, and reducing crime and health problems.8

3 Serge Coulombe, Jean-François Tremblay and Sylvie Marchand (2004), ‘Literacy scores, human capital and growth across fourteen OECD countries’, Statistics Canada
5 Becker (1964), ‘Human capital: A Theoretical and Empirical Analysis’
8 Department for Education and Skills (2004), ‘Education and skills: the economic benefits’

Workforce skills

WHY IS IT IMPORTANT?

Recent research has shown that firm-level productivity is positively associated with both the proportion of educated workers in the firm and the degree of skill density in the area where the firm operates.37 Historically, the UK has not performed well on skills, and comparisons with other EU nations suggest that up to a fifth of the UK’s productivity gap with France and Germany in 1999 could be explained by lower skill levels in the UK.38 Whilst differences in workforce skills levels were not found to be significant in explaining the gap with the US, skills development could still play a role in closing the productivity gap with the US. See Box D for further detail on the importance of skills.

Skills are developed in a variety of ways, including on-the-job coaching and learning-by-doing, as well as formal educational qualifications. Ideally, our measure of skills in the UK economy would take account of all these factors. However, reliable data is only available for educational qualifications, which is therefore our best available proxy for ‘skills’.

37 Galindo-Rueda, Machin and Vignoles (2003), ‘Sectoral and area analysis of the economic effects of qualifications and basic skills’, DIES
HOW DOES THE UK PERFORM?

The UK performs relatively well in terms of higher-level skills, defined as the achievement of a university degree or other higher-level qualification in the National Vocational Qualification (NVQ) system. Figure 3.1 shows that the UK is behind the US, on a par with Germany and ahead of France in terms of the percentage of the working age population possessing high-level qualifications, with all four countries being strong performers by OECD standards. Participation rates in higher education in the UK are now over 30 per cent and have improved significantly since the early 1990s. A large proportion of this expansion in higher education has been in Science, Engineering and Technology (SET) degrees (for more on SET see Box E).

However, the UK has a significantly lower proportion of its workforce educated to an intermediate level than Germany or the US as shown in Figure 3.1. Intermediate level skills cover two key stages in the UK education system, ‘Level 2’, the equivalent of five or more passes at GCSE, and ‘Level 3’, the equivalent of two ‘A’ levels. According to OECD data, 35 per cent of the UK’s working age population had not managed to acquire skills equivalent to Level 2 in 2002. This proportion is higher than in Germany or the US, but on a par with France.

39 Department for Education and Skills (2003), ‘Education and Skills: The economic benefit’
40 NVQ Level 2 and Level 3 are classified as intermediate qualifications, while NVQ Levels 4 and above correspond to higher education or higher-level skills.
UK workers are less well equipped than their colleagues in many other OECD countries in terms of basic literacy and numeracy skills. An international comparison of basic skills published in 2000 showed that in the years 1994-1998 more than 20 per cent of the UK’s adult population was at the lower level of literacy and numeracy skills. This performance was comparable to the US but substantially worse than Germany, which had half the proportion of its workforce with only low-level skills.\(^{41}\) This is consistent with a more recent survey by the Department for Education and Skills (DfES),\(^{42}\) which found that, in 2003, 16 per cent of respondents were below Level 1 in literacy skills – the standard expected for GCSE grades D-G.

---

\(^{41}\) OECD/Statistics Canada (2000), ‘Literacy in the information age – Final report of the International Adult Literacy Survey’

\(^{42}\) DfES (2003), ‘National needs and impact survey of literacy, numeracy and ICT skills’
Box E: SET SKILLS

SET stands for Science, Engineering and Technology. SET skills are crucial for R&D and science-based industries, but are also valued across the economy. The development of SET skills can boost productivity directly and also indirectly through the technological forms of innovation they are associated with.

The UK does relatively well in international comparisons of degree-level skills, and this performance is also reflected in international comparisons of degree-level SET skills. The figure below shows that the UK has a relatively high proportion of SET degrees overall, although the proportion of engineering, manufacturing and construction degrees is fairly low.

**SET degrees as a proportion of all new first degrees, 2003**

1. All sciences included in life sciences
Source: OECD
Refers to all students graduating in the country in question, including foreign nationals. Source: OECD

In recent years, there has been a rapid expansion of higher education in the UK, which has been biased towards SET degrees. The number of SET graduations rose 43 per cent between 1994/95 and 2003/04, compared to just 11 per cent for non-SET degrees. There has been strong growth in medical related subjects, biological sciences and computer science graduations. However, there has been a large decline in engineering and technology graduations and likewise in physical sciences and architecture.¹

These inflows of new SET graduates feed into the overall stock of SET skills in the labour market. The declines in graduations in engineering and other subjects have not yet had much of an impact on the overall stocks of SET degree holders. The stocks of each of the nine main types (medicine and dentistry, biological sciences, engineering etc.) are all on flat or upward trends.²

46% of SET degree holders in Britain work in SET occupations, 8% in teaching and 45% in other occupations. This means that nearly half of them are working in areas apparently unrelated to their degree. Although this varies by subject – e.g. 92% of medicine graduates work in SET occupations – it suggests that in most SET areas there is a pool of labour available in the event of SET skills shortages.²

For more detail on SET skills, see DTI (2006), ‘Science engineering and technology skills in the UK’, DTI Economics Paper No. 16

1. Source: Higher Education Statistics Authority statistics and DTI calculations
2. Source: Labour Force Survey
Data from the UK Labour Force Survey (LFS) show encouraging progress in upgrading skills over the last ten years. Figure 3.2 shows that the percentage of the UK’s active adult population, that is in work or actively seeking it, who possess skills lower than Level 2 has declined to 27 per cent in 2005, from 37 per cent in 1996.43 Most of the progress has come in the form of an increased proportion of people at Level 4 and above (rising from 24 to 31 per cent) and a smaller increase in the proportion at Level 3 (18 to 20 per cent), whilst the proportion at Level 2 has barely changed. The percentage of the active population with no qualifications has also declined, from around 15 per cent in 1996 to 9 per cent in early 2005. The inactive population, those not in employment who are not actively seeking work, have lower levels of qualifications on average, but there has been a little progress here too. The proportion of inactive people qualified below Level 2 declined from 57 per cent to 49 per cent from 1996 to 2005.

**Figure 3.2:**

**Highest qualification, UK**

![Chart showing the percentage of economically active adults with different levels of qualifications from 1996 to 2005.](source: Labour Force Survey, summer data)

The discrepancy between Figures 3.1 and 3.2 reflects the different age groups that are used in each measure and the different populations concerned.
The UK’s skill levels are improving over time, but narrowing the gap with our competitors will require improving skills levels faster than in competitor countries. Data collected by the recent Skill Audit Update\(^44\) shows that the percentage of the workforce qualified to at least Level 2 grew at a higher rate in the UK than in France, Germany and the US in the period 1994-2003.\(^45\) The proportion of people in the UK qualified to Level 3 and above also rose faster in the UK than in Germany and the US, but slower than in France.\(^46\) The overall progress in raising skill levels reported by the LFS survey, and the fact that older workers with few qualifications are gradually leaving the workforce and are being replaced by increasingly well qualified younger cohorts, suggest that the UK’s position in the OECD comparison illustrated in Figure 3.1 should improve in the next few years.

**WHAT DOES THIS MEAN FOR THE UK?**

The UK has made some progress in the last decade in addressing skill gaps and equipping workers with the skills they need to make them more productive. We are making steady progress in addressing the ongoing gap with our main competitors in terms of intermediate qualifications. The UK performs comparatively well internationally in terms of the proportion of the population with higher/degree-level qualifications. This means the UK is retaining its strong position with respect to high-level skills which are associated with higher productivity and value-added and slowly improving with respect to intermediate skills where we have traditionally been weak. However, the UK still has too many people with low literacy and numeracy skills, holding back their potential to excel in their current roles and making them less adaptable in the face of the changing demand for skills, threatening their future employability.

**Management quality**

**WHY IS IT IMPORTANT?**

As the decision-makers setting the organisational strategy and environment, managers and leaders are pivotal to investment, innovation, skills development, delivery of service and quality of performance across both the public and the private sectors.\(^47\) Management can therefore influence productivity outcomes directly, and also indirectly through its role in determining innovation, workforce skills, investment and enterprise outcomes.

---

\(^44\) DfES/DTI (2004), ‘International Comparisons of Qualifications: Skills Audit Update’

\(^45\) Since 1994, the number of employees possessing at least Level 2 skills grew at an average annual rate of 2.7 per cent in the UK, compared to 1.29 per cent in France, 0.84 per cent in Germany and 0.39 per cent in the US.

\(^46\) Since 1994, the number of employees possessing at least Level 3 skills grew at an average annual rate of 2.72 per cent in the UK, compared to 3.56 per cent in France, 0.94 per cent in Germany and 0.8 per cent in the US.

\(^47\) As noted by the final report of the Council for Excellence in Management and Leadership, 2002
The importance of good management practices for firm level productivity has been highlighted by a recent study of manufacturing firms conducted by the Centre for Economic Performance (CEP) and McKinsey and Company. Companies found by the study to be ‘better managed’ were shown to have higher rates of growth in sales and higher stock market valuations, irrespective of their country of operation, size and sector.

**HOW DOES THE UK PERFORM?**

Figure 3.3 shows that UK managers are perceived to lag their colleagues in France, Germany and the US in terms of their experience and competence, according to the latest survey on management perceptions by the International Institute for Management Development (IMD). All countries have seen fluctuations in scores in line with fluctuations in macroeconomic performance, but the UK has consistently ranked behind the comparator countries. These results are consistent with the CEP/McKinsey study which finds that, on average, UK manufacturing firms perform less well than firms in the US, France and Germany in terms of overall management practice, including talent management and performance management.

**Figure 3.3:**
**Business executive perceptions of management quality**

Source: International Institute for Management Development

---

48 Bloom, Dorgan, Dowdy, Van Reenen and Rippin (2005), ‘Management Practices across firms and nations’, CEP (London School of Economics)/McKinsey
In 2003, the DTI and the Economic and Social Research Council (ESRC) commissioned Professor Michael Porter and Christian Ketels to investigate UK competitiveness. Porter and Ketels reviewed the literature on management and its role in productivity and competitiveness. They found that the UK is believed to have relatively high levels of professional management, as opposed to management by the owner’s family and also that modern executive compensation techniques are used more widely than elsewhere, except in the US. However, they also found evidence that in the manufacturing sector the UK adopts modern management techniques later and less often than its competitors.

Given the high ratings of UK management schools and the relatively high level of expatriate managers in the UK, Porter and Ketels believe the supply of top-level management in the UK is likely to be very competitive. The problems appear to be concentrated at the lower and middle management levels, reflecting the UK’s overall skills deficit. However, this conclusion from the Porter and Ketels report is tentative.

Further, the UK has a relatively low share of managers with advanced formal qualifications, although this could be simply because the definition of management is broader in the UK than elsewhere. There is a general perception of UK management weakness, but there is little evidence to enable an objective international comparison to be made.

WHAT DOES THIS MEAN FOR THE UK?

Although more evidence would be needed to draw strong conclusions about the quality of management skills in the UK, there is an indication that UK managers may not be as effective as their foreign peers.

Variations in management practice are likely to arise due to combinations of historical, cultural, economic and institutional factors, which might include differences in the competitive intensity of markets and the strictness of regulations on firing and hiring workers. Management and leadership partly depend on the inherent ability of individuals, but they are also associated with generic skills including planning, communication, problem solving and technical know-how, which can be developed. A recent survey of trends in workforce skills has reported an improvement in these types of skills in the UK in the years 1997-2001. For the UK to catch up with the ‘best in the world’, this positive trend must continue.
The policy agenda

The Government’s Skills Strategy provides support to any adult without a good skills foundation to get access to training in order to achieve a ‘Level 2’ or ‘Level 3’ qualification; it also helps adults gain ICT skills and aims to ensure the provision of a wide range of learning for adults in all local areas.\(^5\)

In addition to measures to increase the supply of skills, the Skills Strategy recognises the importance of moving towards a more demand-led approach. It has been argued that demand for skills in the UK appears low in comparison to other industrialised nations, which may be because UK firms choose product market strategies that require the use of less skilled labour.\(^5\) The direction of this causal relationship is unclear, as production choices can themselves affect skills supply, but government initiatives to increase the availability of skills need to be supported by increased demand for skills by business.

The roll-out nationally from 2006/07 of the National Employer Training Programme aims to increase demand for skills and training to a more ambitious level. At the heart of the programme is a brokerage service. It will start by identifying, through a training needs assessment, the employer’s skills needs at all levels, both those leading to qualifications and more informal development. It will then source training to meet those needs (generally at the employer’s cost for training beyond the core of basic literacy, language and numeracy skills and Level 2), for delivery as part of a single, integrated training package. In return for free and flexibly-funded training, employers will be expected to allow employees enough time at work to undertake the training successfully.\(^6\)

---

51 DfES (2003), ‘Skills strategy, White Paper’
52 Mason (2004), ‘Enterprise product strategies and employer demand for skills in Britain: Evidence from the Employers’ Skill survey’, SKOPE Research Paper No. 50
53 DfES (2005), ‘Skills: Getting on in business, getting on at work’ White Paper
Enterprise can be defined as the seizing of new business opportunities, both by start-ups and existing firms. Enterprising firms bring new ideas, knowledge and skills into an economy and provide incentives for others to become more innovative. This increases competitive pressure in markets and has a direct impact on productivity through the process of ‘productive churn’, where productive, new entrants win market share and less productive firms exit the market. As global competition intensifies, the ability of firms and individuals to identify and take advantage of entrepreneurial opportunities becomes increasingly important. In addition, small businesses make a positive contribution to employment, as they are an important source of job creation.

The Government uses the following Indicators to monitor the overall state of enterprise in the economy:

- **Enterprise culture** – individuals’ attitudes to, and experience of, enterprise;
- **Barriers to enterprise** – the extent to which administrative burdens and access to finance are likely to act as barriers to enterprise; and
- **Enterprise activity** – the proportion of the labour force involved in starting or running a new business and small and medium-size enterprises’ (SMEs) productivity growth.

---

**Chapter Summary**

The UK performs relatively well in terms of enterprise and has limited barriers to entrepreneurship. However, whilst the UK is marginally ahead of its European peers in most aspects of the enterprise driver, there is still work to do in order to narrow the gap with the US, in particular with respect to the level of entrepreneurial activity.
Enterprise culture

WHY IS IT IMPORTANT?

For enterprise to flourish, there needs to be a culture where people with the initiative, skills and drive to start and run a successful business have the confidence to do so and consider it to be a realistic career choice. Cultural attitudes to risk are also important, as entrepreneurs sometimes need to be able to learn from their mistakes, and excessive risk aversion may prevent individuals from seizing viable business opportunities.

HOW DOES THE UK PERFORM?

Using the Global Entrepreneurship Monitor (GEM) survey, a cultural support index for each country is calculated from: perceptions of entrepreneurs and entrepreneurship; its suitability as a career choice; and its coverage in the media, giving a score out of 3.0. The UK’s score of 1.83 is a relatively high score, coming ahead of France on 1.63 and Germany on 1.73. This is shown in Figure 4.1.

Figure 4.1:
Enterprise culture

Source: Global Entrepreneurship Monitor

---

54 SBS (2003), ‘A government action plan for small businesses. Making the UK the best place in the world to start and grow a business’
GEM data shows that a relatively large proportion of UK-based respondents believed they had the skills to start a business and saw good opportunities to start a business, but a relatively lower proportion reported that they knew an entrepreneur. Further GEM data indicates that individuals in the UK are much more likely than their counterparts in the US to be deterred from going into business by fear of failure. However, French and German individuals are considerably more likely to be put off by fear of failure.

**WHAT DOES THIS MEAN FOR THE UK?**

Overall, there is a relatively favourable attitude to enterprise in the UK. However, the risk aversion of many UK individuals acts as a barrier to them pursuing the opportunities for enterprise they identify. Entrepreneurial education to improve skills and entrepreneurial attitudes are identified as a critical issue by both the GEM and the OECD, in encouraging entrepreneurial spirit and leading individuals to consider self-employment as a realistic career path.

Barriers to Enterprise

**WHY IS IT IMPORTANT?**

Barriers to enterprise may limit the creation and growth of smaller businesses. Regulations exist in order to achieve a range of public policy objectives, be they social, environmental, health or safety goals. However, where these goals are met using regulations which impose unnecessary burdens on business, they may act as a barrier to enterprise. The costs and time associated with starting a business are an important indication of the administrative burdens faced by start-up firms.

Poor access to finance may also represent a barrier to enterprise. Well-functioning capital markets facilitate business start-ups and ensure that existing businesses are able to access the capital necessary to expand and reach their potential. SMEs that lack access to funds may not be able to generate new technologies or new ways of operating, even if they have the technical knowledge to do so. Although the majority of individuals going into business raise the capital they need from banks, efficient venture capital markets are also important, especially for innovative smaller businesses. Such businesses may undertake projects that are perceived to be high risk or that take a while to generate cash flow, for which venture capital is often more appropriate than bank finance.

---


56 SBS (2003), ‘A government action plan for small businesses. Making the UK the best place in the world to start and grow a business’

57 HM Treasury/SBS (2003), ‘Bridging the finance gap: a consultation on improving access to growth capital for small businesses’
Reducing the burden that businesses face when complying with regulations would enhance their ability to innovate and to compete. Therefore, the Government is pursuing a Better Regulation agenda: a programme of reforms which will ensure that regulation is delivered according to the five principles of proportionality, accountability, consistency, transparency and targeting.1

The use of regulation

The Government has accepted the recommendations of the Hampton report,2 and the ‘Less is More’ report3 of the Better Regulation Task Force (BRTF). These reports focused on the importance of regulators behaving in fair, open and proportionate ways, basing their actions on risk so that regulators’ resources are focused on areas where the risk to society is greatest. Furthermore, a reduction in the number of national regulatory bodies – thirty one will be consolidated into seven new bodies – will reduce the number of different interfaces that businesses have with Government.

The reports also called for greater emphasis on simplifying regulations and a focus on compensating for the introduction of new measures by simplifying existing measures. To this end:

- all departments will publish plans by Autumn 2006 that will identify regulations that can be simplified, repealed, reformed, and/or consolidated, and where the administrative burdens can be removed or reduced;
- a Better Regulation Bill will be introduced by 2006, which will make it easier for departments to remove or amend outdated, unnecessary or over complicated regulations; and
- the Government has set up an online portal for businesses and other stakeholders to submit proposals for simplifying regulations, with a commitment to respond within 90 working days.

Cutting the administrative burdens of regulation

The Government has also accepted the BRTF’s recommendations on minimising the administrative burdens imposed by regulation on business. These include the costs of form-filling, the paperwork associated with inspection and other data requirements such as permits and licenses. Work on estimating the administrative burden of regulation faced by businesses in the UK is currently underway, drawing upon the successful Dutch approach:4 a target for departments to reduce the burdens they impose will be published by the Government in 2006.

1 Better Regulation Task Force (1998), ‘Principles of Good Regulation’
2 Hampton (2005), ‘Reducing Administrative Burdens: effective inspection and enforcement’, HM Treasury
4 This refers to the Standard Cost Model. For more information visit http://www.cabinetoffice.gov.uk/regulation
HOW DOES THE UK PERFORM?

As illustrated in Figure 4.2, the US administrative environment is most favourable to new start-up businesses, with the lowest cost and time to start a new business. The UK is the second best performer in terms of cost, but lags France in terms of the number of days needed to register a new business, mainly because the number of days to register for VAT remains relatively large in the UK. Germany lags each of the other three countries by a substantial margin.

Figure 4.2:
Costs and time to start a business

![Comparison, 2005]

<table>
<thead>
<tr>
<th>Country</th>
<th>Cost to start a business (per cent of capita per income)</th>
<th>Time to start a business (days)</th>
</tr>
</thead>
<tbody>
<tr>
<td>US</td>
<td>6</td>
<td>1</td>
</tr>
<tr>
<td>France</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>UK</td>
<td>2</td>
<td>20</td>
</tr>
<tr>
<td>Germany</td>
<td>0</td>
<td>30</td>
</tr>
</tbody>
</table>

Source: World Bank

This comparison forms part of the World Bank’s international comparison of the ‘ease of doing business’. The UK was ranked ninth in the world overall, behind the US (third), but comfortably ahead of Germany (19th) and France (44th).

In addition to low start-up costs, the UK has relatively well-developed capital markets. The significance of finance as a barrier to enterprise growth has declined in the last decade, but new businesses continue to be more likely to experience difficulties in accessing finance than established firms. The SBS Annual Small Business Survey shows that 37 per cent of new businesses seeking finance in 2003 reported difficulties in accessing it, compared to an average of 23 per cent for all businesses.

58 World Bank (2005), ‘Doing business in 2006: creating jobs’
As Figures 4.3.1 and 4.3.2 show, in all four countries venture capital investment as a percentage of GDP has declined since the dot-com bubble of 2000, but remains ahead of levels seen through most of the 1990s (except in the US). Venture capital at the seed and early stages is similar across all countries in Figure 4.3.1, though it remains to be seen whether the US will regain its historic advantage.

**Figure 4.3.1:**
**Venture capital investment – early stages**

![Venture capital investment – early stages](image)

Source: Eurostat (EVCA & PriceWaterhouseCoopers)

The bulk of venture capital investment is made up of expansion capital for established businesses, which in the last decade has risen to more than 0.18 per cent of GDP in the UK. Figure 4.3.2 shows that UK businesses have greater access to expansionary venture capital than their peers in either France or Germany. Comparison to the US is not yet possible for 2003 and 2004.

Regarding access to finance, there is evidence that general financing conditions for small businesses are improving. Firms now find it easier to access debt finance and total private equity funds invested in the UK have increased in the last decade, although venture capitalists are still appear somewhat reluctant to invest in early-stage businesses.

---

61 SBS (2003), ‘A government action plan for small businesses. Making the UK the best place in the world to start and grow a business’
Figure 4.3.2: 
Venture capital investment – expansion and replacement

Comparison, 1992-2004
Per cent of GDP

Source: Eurostat (EVCA & PriceWaterhouseCoopers)

WHAT DOES THIS MEAN FOR THE UK?

The UK economy performs relatively well on these Indicators and the administrative burden imposed on new UK businesses is limited. However, it is important that the whole range of regulations governing business achieve their intended regulatory outcome without imposing unnecessary costs on business. This is particularly important for SMEs as smaller businesses suffer disproportionately from the administrative costs associated with compliance with government regulations. The Government is pursuing the better regulation agenda, having accepted the recommendations of the Hampton Review62 and the Arculus Report of the Better Regulation Taskforce.63 Implementation of these recommendations is expected to lead to a more streamlined regulatory structure and will reduce regulatory burdens on SMEs (For more on the Better Regulation agenda see box F).

62 Philip Hampton (2005), ‘Reducing administrative burdens: effective inspection and assessment’, HM Treasury
63 Better Regulation Task Force (2005), ‘Regulation – Less is more. Reducing burdens, improving outcomes’
There is evidence, as cited above, that general financing conditions for firms are improving and the UK’s level of venture capital investment relative to its GDP is high relative to the levels in France and Germany. This would suggest that insufficient access to finance preventing entrepreneurial activity is not more of a problem here than there.

Enterprise activity

WHY IS IT IMPORTANT?

SMEs are a very important part of the economy; in 2003, SMEs accounted for nearly half of total employment and turnover in the UK\(^{64}\) while in the period between 1995 and 1999 they accounted for 66 per cent of new jobs.\(^{65}\)

The benefits to productivity from a rise in small business activity will be larger if new businesses survive long enough to have an impact on the economy and if SMEs enjoy healthy average rates of productivity growth. If, over time, new businesses grow to be more productive than the average incumbent, a rise in entrepreneurial activity will lead directly to higher productivity levels.

HOW DOES THE UK PERFORM?

Enterprise refers to start-up and new businesses as well as ‘enterprising’\(^{66}\) behaviour by existing businesses. The GEM’s Total Entrepreneurial Activity (TEA) index provides an indicator of the former: the extent to which new businesses are starting in the economy. TEA is defined as the percentage of members of the labour force who are in the process of starting a new business, or who own or manage a business less than 42 months old.

As shown in Figure 4.4, entrepreneurial activity in the UK, as measured by the TEA index, is stronger than in France and Germany, but remains significantly lower than in the US. The TEA index fell for all four countries following the boom period of 2000 to 2001, demonstrating the often cyclical nature of business start-ups.

\(^{64}\) Source: Small Business Service, ‘SME statistics UK 2004’


\(^{66}\) Enterprising being defined as the seizing of new business opportunities
In 2005, 12.4 per cent of the US labour force was involved in new businesses, as opposed to 6.2 per cent in the UK. It is also striking that whilst there is a gender gap in all four countries (with men having higher tendencies to entrepreneurship), Figure 4.5 shows that women in the US have higher entrepreneurship rates than men in the UK, France and Germany.
Finally, Figure 4.6 shows that SMEs have enjoyed faster productivity growth than large firms in the last five years. Gross value added per employee in fact grew by 25 per cent in SMEs over the period, compared to 19 per cent in large firms. Note that this growth is in nominal terms because of a lack of data to provide appropriate deflators. Small businesses are on average more productive than larger ones in certain sectors, notably agriculture and construction.
Figure 4.6: Productivity growth (basic prices) by size of enterprise

What does this mean for the UK?

There is still a relatively large gap in TEA with the US. Disparities in the level of enterprise between and within UK regions have also persisted in recent years. Lower than optimal levels of enterprise, especially in certain areas of the UK, are probably holding back UK productivity.

The policy agenda

Policy to boost enterprise has focused on three main themes: increasing the incentives for enterprise; removing any obstacles discouraging individuals from pursuing entrepreneurial projects; and promoting an enterprise culture.

Tax cuts on small firms have increased the incentives to start new businesses. The better regulation agenda is also expecting to boost the incentives for enterprise by reducing the costs of doing business.
Initiatives to reduce barriers to enterprise have focused primarily on access to finance, especially to early-stage businesses which are least likely to access capital from the market. Measures include changes to eligibility criteria for the Small Firms Loan Guarantee\(^69\) to ensure that support is provided to the newest businesses. Regional Venture Capital funds and Early Growth funds provide risk capital to SMEs with high growth potential, and the Phoenix Fund increases access to finance and risk capital for entrepreneurs from disadvantaged or under-represented groups.\(^70\)

In addition to strengthening the incentives for enterprise, policy has focused on improving attitudes to entrepreneurship in the UK. A number of initiatives have been introduced to promote enterprise, particularly in schools, including the Budget 2005 announcement that all 16 year olds will receive a week of enterprise education.\(^71\) Steps have also been taken to encourage enterprise amongst under-represented groups and in disadvantaged communities with the goal of bringing entrepreneurial activity in these communities closer to the UK average.

---


\(^70\) GHK (2004), ‘An evaluation of Phoenix Fund support for Community Development Finance institutions – A final report for the small business service’

\(^71\) Note that the UK GEM 2005 survey found that individuals who had received enterprise education were significantly more likely to be engaged in entrepreneurial activity.
CHAPTER FIVE

Competition

Chapter Summary
The UK has a relatively open economy and as such UK businesses are well exposed to foreign competition through international trade and investment flows. Product market regulation is more supportive of competitive markets than in the comparator countries and the competition regime is well regarded. These Indicators together suggest the UK performs well on the competition driver.

Introduction
Increased product market\(^2\) competition can boost productivity growth through a variety of channels. Competitive markets encourage new entry and increase the pressures on incumbent firms to improve product quality and reduce prices, as well as to develop new and innovative products and production processes. Thus, a greater level of competitive intensity delivers benefits for consumers and encourages firms to strive for greater efficiency, with a positive effect on productivity.

Globalisation, by expanding the range of goods and services traded internationally, exposes UK companies to an even greater intensity of competitive pressure. This brings further benefits to the UK, ensuring greater innovation and improvements in product quality and variety. Exposure to proper competitive forces in domestic markets will enable UK companies to be better equipped to compete in global markets.

There is no single measure of the intensity of product market competition within an economy. Instead, the Government monitors aspects of the competitive environment using the following Indicators:

- **Openness to international trade and investment** – the percentage of GDP which is traded as imports and exports;
- **Product market regulation** – the extent to which product market regulation is restrictive as measured by the OECD;
- **Effectiveness of the competition regime** – peer review of the effectiveness of competition regimes.

\(^2\) Product markets are markets for final goods and services produced by firms for consumers, as opposed to markets for intermediate goods that are an input into production in other markets and markets for the factors of production.
Box G: The link between competition, productivity and social welfare

More competitive product markets are expected to drive prices downwards, bringing them in line with the marginal costs of production and eradicating excess profits. In addition, as firms compete to hold or increase market share, they may offer better quality products and a wider range of goods and services, thereby increasing consumer welfare. A recent DTI economics paper has found that stronger competitive pressures in the markets for international calls and European flights have led to lower prices, as well as an increased choice of operators in these markets.

Competitive product markets also provide the right incentives for firms to reduce slack and structure the workplace in a more efficient way. Thus, competition increases productive efficiency, forcing inefficient firms to improve performance or exit the market, with their resources being re-allocated to new entrants or more efficient rivals. This process of ‘natural selection’ can lead to an increase in aggregate productivity, even when there is no productivity growth within firms. Research has shown that entry and exit effects account for 30 to 50 per cent of labour productivity growth in UK manufacturing firms. This is consistent with OECD analysis of productivity growth in eight OECD countries, which found that up to 40 per cent of total labour productivity growth in the last ten years can be explained by the entry and exit of firms.

Competition may also be a driver of innovation and vice versa. Competition is inherently a dynamic process and innovation is an integral part of this process. A competitive market can encourage firms to compete by developing new or improved products or processes. In some cases, such innovations can lead, at least in the short term, to the innovating firm gaining some monopoly power. There are cases where such temporary monopoly power is given legal protection in order to provide incentives to innovate, e.g. a patent effectively grants a temporary monopoly on the use of a particular technology. Without this, the firm may not have invested in the innovation in the first place for fear of not being able to profit from it. Clearly, a balance must be struck between making sure that, on the one hand, there are sufficient incentives for innovation and, on the other hand, ensuring that emerging dominant positions are not abused to the detriment of consumers. What matters is that, over time, firms within a market compete with one another in a way that generates growth, profit and jobs whilst improving products, services and value for money for the consumer.

1 Social welfare here means the utility, happiness or living standards of everyone in the country.
2 The marginal cost of production is the cost of producing an extra unit of output. In perfectly competitive markets, prices are driven down until they are equal to marginal costs. At this point the allocation of resources is optimal.
3 DTI Economics Paper No.9 (2004), ‘The benefits from competition: some illustrative cases’
5 OECD (2003), ‘The Sources of Economic Growth in OECD countries’
Openness to international trade and investment

WHY IS IT IMPORTANT?

The degree to which industries are exposed to international competition through trade and foreign direct investment (FDI) is an important determinant of the strength of competitive pressures faced by firms in many industries. Trade allows each country to specialise in the production of those goods and services where it has a comparative advantage.73 Specialisation raises productivity directly, as resources are allocated to their most productive uses and the accompanying increase in market size makes it more likely that economies of scale are achieved. In turn, this increases the competitiveness of product markets, stimulating efficiency gains and increasing the potential rewards to successful innovation.74

In addition, trade and FDI can facilitate international transfers of skills, technology and managerial know-how, and promote best practice. FDI provides access to international markets and can stimulate competition by increasing the number of players in a market. However, an effective competition regime and openness to trade are required to ensure that powerful multinational enterprises do not exploit their ability to prevent new entry in domestic markets.

HOW DOES THE UK PERFORM?

The UK performs relatively well in terms of trade as a proportion of output. The UK and France enjoy broadly similar levels of openness, behind Germany as shown in Figure 5.1. The US is not directly comparable to the EU countries, due to the different size and nature of the economy.

73 Each country has a comparative advantage in the production of a good or service that it can produce relatively most efficiently in comparison to other countries.

74 DTI Economics Paper No. 10 (2004), ‘Liberalisation & Globalisation: Maximising the Benefits of International Trade & Investment’
The UK has been a strong advocate of free trade in the EU and WTO, and although the economy’s total trade as a percentage of GDP has declined since 1999, this is not a sign of higher barriers to trade. Instead, the decline has largely been the result of a slowdown in demand from the UK’s main export markets during a period of slow economic growth in Europe between 2001 and 2003.

The UK is also relatively open to FDI, with the highest stock of inward investment of any G7 country, as a percentage of GDP. The UK’s stock of inward investment as a percentage of GDP rose from 21 per cent in 1990 to 36 per cent in 2004, in contrast to 2004 figures of 26 per cent, 13 per cent and 13 per cent for France, Germany and the US respectively.

WHAT DOES THIS MEAN FOR THE UK?

The UK is a relatively open economy and is in a good position to reap the benefits of rapidly growing global trade. It is an advocate of free trade and remains an attractive location for foreign investors.
Further steps need to be taken at the world level, through the completion of the WTO Doha Development Round, and at the EU level to complete the EU Single Market through stronger competition and further liberalisation in the service and agricultural sectors (for more information on service sector liberalisation see Box H). Such liberalisation will increase trade with partners both within and outside the European Union, and extend the benefits of competition to a range of sectors which have until now been largely insulated from the process of international competition.

Box H: The proposed EU Directive on Services in the Internal Market

While the EU has made significant progress in creating an internal market for goods, the internal market for services remains highly fragmented. In 2003, services accounted for only 20 per cent of total intra-EU trade despite contributing more than 70 per cent to GDP and employment in most Member States.

The proposed EU Directive on Services in the Internal Market aims to open up the internal market for services in the EU by breaking down barriers to cross border trade within the EU. These barriers have a disproportionately adverse effect on small and medium-sized enterprises that form the vast majority of providers of services in the EU. The proposed Directive will make it easier for providers to:

a) establish themselves and offer services in other Member States; and

b) supply services temporarily and/or at a distance into other Member States on the basis of the laws of their country of establishment, with some important derogations from this ‘country of origin’ principle.

Opening up the internal market in services in the EU has the potential to deliver significant economic benefits. These include higher productivity, employment and wages, and increased competition leading to greater consumer choice, lower prices and better quality services.

A recent study by the Copenhagen Economics Institute for the European Commission, published in February 2005, estimates that the proposed Directive could increase total economic benefits to producers and consumers by some €37bn (nearly £26bn), raise value added in the services sectors by some €33bn (around £23bn) and create around 600,000 new jobs in the EU.

For further information on the Directive see:
http://www.dti.gov.uk/ewt/servgen.htm
Product market regulation

WHY IS IT IMPORTANT?

Regulations exist in order to achieve a range of public policy objectives, be they social, environmental, safety or health goals. However, regulations can have side-effects such that the burden on business is increased, artificial barriers to entry are created, or industry concentration is altered. Countries with legislation that fulfils primary policy objectives without imposing damaging restrictions on the operation of markets are likely to see the most competitive product markets.

HOW DOES THE UK PERFORM?

The UK performs well on the OECD international comparison of the competitive impact of product market regulation, as illustrated in Figure 5.2, with the UK’s regulatory environment found to be less restrictive than those of the comparator countries. The UK is ranked second in the OECD on this measure, substantially ahead of France and Germany, which are ranked 24th and 18th respectively. The US is ranked fourth.

Figure 5.2:
Product market regulation

The UK has dropped from 1st in the OECD to 2nd behind Australia since 1998. Australia has made rapid regulatory reforms and, in order to retain its strong position, the UK must also keep improving.
WHAT DOES THIS MEAN FOR THE UK?

Product market regulation is relatively light touch and unrestricted in the UK. However, even though we do comparatively well, there is a potential for excessive regulation to hold back productivity in the UK.

Better regulation is therefore an important focus of current government policy. Taking forward recommendations for regulatory reform will cut the burdens imposed by government regulation on business, facilitating entry into, and increased competition in, product markets. For more on the Better Regulation agenda see box F.

Effectiveness of the competition regime

WHY IS IT IMPORTANT?

The nature of an economy’s competition regime is a key determinant of the overall level of competition. An effective competition regime ensures that firms are not able to exploit positions of market power, and can help ensure that consumers get a fair deal in markets where competitive intensity appears to be low.

The strength of enforcement powers and the degree of political independence given to competition authorities determine the effectiveness of the authorities in deterring anti-competitive behaviour. The Competition Act 1998 and the Enterprise Act 2002 strengthened the powers and increased the independence of the UK competition authorities, taking government Ministers out of the decision making process for mergers and market investigations. Competition policy is now delivered and enforced independently by the Office of Fair Trading (OFT) and the Competition Commission (CC).
HOW DOES THE UK PERFORM?

The UK competition regime’s performance, as measured by the 2004 KPMG expert Peer Review, has edged up since 2001, but Figure 5.3 shows that the UK remains in third place, behind the US and Germany, which were judged to have also improved. However, the UK is ahead of all other OECD economies, as was the case in 2001.

Figure 5.3:
Ranking of competition regimes – peer review

The Global Competition Review for 2004 confirms that the UK’s competition regime is among the best in the world. The CC and the OFT were rated joint first and joint second in the world, respectively, in the ranking of individual competition enforcement agencies.

76 KPMG (2004), ‘Peer review of competition policy’ – report for DTI
77 Global Competition Review (2005), ‘Rating Enforcement Survey – 2004’. The ratings for agencies are arrived at through a mixture of ‘editorial opinion’ and a survey of 500 ‘users’ (in other words those who have had cause to liaise with a competition authority) – a relatively small sample size for an international survey. It is therefore not the most robust indicator, but can be a useful one nevertheless.
WHAT DOES THIS MEAN FOR THE UK?

The UK has made substantial legislative changes to the competition regime. The improved score on the peer review indicates that these changes have been successful, but that more time may be needed for the benefits to be fully realised. These benefits should include a better deal for consumers and improved UK productivity performance.

The policy agenda

Policy is likely to increase product market competition in coming years through increasing the openness of UK markets to foreign competition. Technological change and market forces have substantially increased competitive intensity in some markets, for example the provision of back-office functions and IT services. But competition in some sectors remains limited by government regulation and trade restrictions. Agreements to cut tariffs through the Doha Development Agenda and, closer to home, agreement to extend the EU Single Market to cover services should both yield substantial increases in competitive pressures in UK product markets.

The Better Regulation agenda is also likely to be important for the competition driver in the coming years. Successful implementation of the proposed regulatory reforms should yield substantial benefits for enterprise and, in turn, contribute to the goal of increasing product market competition. In contrast, the potential to increase competitive intensity through further reforms to the competition regime is limited. The past few years have seen extensive legislative change and time is required before the impacts of these reforms, and any implications for future policy, can be identified.
The DTI 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 DTI Economics Papers that set out the thinking underpinning policy development.

The main series is complemented by two further series:

- Sector Competitiveness Studies. These are comparative studies and analyses of the competitiveness of different productive sectors of the UK economy; and
- A series of shorter Occasional papers including literature reviews, appraisal and evaluation guidance, technical papers and economic essays and think pieces.

Previous titles include:

### Main Series

15. Creativity, Design and Business Performance, November 2005
12. The Empirical Economics of Standards, May 2005
10. Liberalisation and Globalisation: Maximising the Benefits of International Trade and Investment, July 2004
9. The Benefits from Competition – some Illustrative UK Cases, Professor Stephen Davies, Heather Coles, Matthew Olczak, Christopher Pike and Christopher Wilson (Centre for Competition Policy, University of East Anglia), July 2004
8. Raising UK Productivity – Developing the Evidence Base for Policy, March 2004
6. UK Productivity and Competitiveness Indicators 2003, November 2003
5. DTI Strategy – The Analysis, November 2003
4. Options for a Low Carbon Future, June 2003
3. UK Competitiveness: Moving to the next stage, Professor Michael Porter and Christian H M Ketels (Institute of Strategy and Competitiveness, Harvard Business School), May 2003
2. A Comparative Study of the British and Italian Clothing and Textile Industries, Nicholas Owen (DTI), Alan Canon Jones (London College of Fashion), April 2003
Sector Competitiveness Studies

1. Competitiveness in the UK Electronics Sector, May 2005

Occasional Papers

4. Making Linked Employer-Employee Data Relevant to Policy, March 2006
1. Options for a Low Carbon Future: Review of Modelling Activities and an Update, September 2005

Copies of these papers can be obtained from the DTI publications orderline at http://www.dti.gov.uk/publications/ or telephone 0845 015 0010.

These papers are also available electronically on the DTI Economics website at http://www.dti.gov.uk/economics/papers.html.

Further information on economic research in the DTI can be found at http://www.dti.gov.uk/economics/research.html. This site includes links to the various specialist research areas within the Department.

Evaluation reports are available on the DTI evaluation website at http://www.dti.gov.uk/about/evaluation/.

The views expressed within DTI Economics Papers are those of the authors and should not be treated as Government policy. We welcome feedback on the issues raised by the DTI Economics Papers, and comments should be sent to dti.economics@dti.gsi.gov.uk