

**Productivity and competitiveness indicators**  
update 2002



**dti**

Department of Trade and Industry



Ministerial foreword 3

Executive summary 4

## **ANALYSIS**

 Introduction 6

 **A** Investment 12

 **B** Innovation 16

 **C** Skills 22

 **D** Enterprise 28

 **E** Competitive Markets 32

## **ANNEXES**

 Bibliography 38

 Cross reference table 39

 Data notes and sources 40

## CHART LIST

1. GDP per head of population
  2. Growth of real GDP per head
  3. Average employment rates
  4. GDP per hour worked
  5. Explaining the UK's productivity gap
  6. Volatility of key macro-economic indicators
- A.1** Relative capital stock per hour worked  
**A.2** Business investment per worker  
**A.3** Business investment per worker – recent trends  
**A.4** Relative capital per hour worked by sector  
**A.5** Connectivity – weighted by business size  
**A.6** Government expenditure on investment
- B.1** Papers and citations per head of population  
**B.2** Industry-funded business enterprise R&D (BERD) real expenditure per worker  
**B.3** Patents granted and applications  
**B.4** Industrial R&D by foreign affiliates  
**B.5** Novel innovating enterprises  
**B.6** Information sources that firms use for innovation  
**B.7** Wider innovation activities  
**B.8** Factors hampering innovation
- C.1** Skill proportions by country  
**C.2** Adults with literacy and numeracy skills at the lowest level  
**C.3** Mean scores for student literacy  
**C.4** Qualifications at level 2+ and 3+ or equivalent  
**C.5** Performance against National Learning Targets for young adults: NVQ levels 2 and 3  
**C.6** Average hours of continuing education and training, by type of training  
**C.7** IT skills shortage reason for not adopting or further developing use of ICT  
**C.8** Business executive perceptions of quality of management
- D.1** Entrepreneurship rates  
**D.2** Costs and delays in setting up a business  
**D.3** Venture capital investment
- E.1** Trade in goods and services  
**E.2** Value of foreign direct investment  
**E.3** Business executive perceptions of how institutions and government policies support competitiveness  
**E.4** Standardised unemployment rates  
**E.5** Long-term and youth unemployment rates  
**E.6** Business executive perceptions of labour regulation  
**E.7** Hourly labour costs and non-wage labour costs  
**E.8** EU part-time, temporary and self-employment  
**E.9** Working days lost due to industrial stoppages



Improving productivity is the Government's key economic objective for this Parliament. Higher productivity generates prosperity, increases wages and profits, and permits investment in modern, high quality public services.

I have reorganised the DTI to put productivity and competitiveness at the heart of our activities. Our mission is to drive up productivity and competitiveness through successful business, world-class science and innovation, and fair markets. These goals reflect the five economic drivers of productivity growth - investment, innovation, skills, enterprise and competitive markets - and in particular those over which the DTI has most influence.

In line with the new goals and objectives I have set for DTI, the competitiveness indicators previously published and monitored by the department have been reorganized into the set of *Productivity and Competitiveness Indicators* in this document. And for the first time the indicators have been used to benchmark the UK's performance in each of the five drivers of productivity growth against that of our competitors. It is not sufficient for the UK to improve against the drivers; we must improve relative to other countries if we are to achieve our aim of narrowing the productivity gap with our major competitors.

The first edition of the Indicators was published in 1999, and was based largely on data up to 1997. Although individual indicators change slowly over time, some trends can already be discerned. Macroeconomic stability has improved as a result of the changes to the fiscal and monetary framework; the employment rate has increased; more universities are spinning out their ideas and turning invention into innovation. However, there remain areas of concern: investment lags our competitors,

many aspects of our innovation performance remain poor, and too few adults have the basic or vocational skills that allow them to engage effectively in the economy.

I am determined that the DTI should make excellent use of the available evidence and analysis as we design and implement the policies that drive up productivity. The information contained in this report is a valuable resource in this regard. It should be considered alongside the Manufacturing Strategy we published in May 2002 - the first by any government for 30 years - that explained the importance of a strong manufacturing sector to the UK economy, and our policies for achieving it. In July we delivered on a core element of the strategy, by earmarking an extra £1.25 billion for science in the next government spending round. The next step is to develop measures of success in the manufacturing sector and publish competitiveness studies on a sectoral basis.

As we develop our policies, we in government will continue to use the analysis presented in the *Productivity and Competitiveness Indicators* and other work in order to inform our decisions. I hope the material in this publication proves a useful analytical tool for others as well.

A handwritten signature in black ink, appearing to read 'Patricia Hewitt'.

Patricia Hewitt  
Secretary of State for Trade and Industry

## Overview

The Competitiveness Indicators were first published in 1999 to benchmark the UK's progress in driving up productivity and competitiveness.<sup>1</sup> The Indicators provide a framework for addressing the UK's strengths and weaknesses, and help to inform policy development and priority setting.

The Indicators have been restructured in order to benchmark the UK's performance in each of the five drivers of productivity against our competitors. The drivers form the framework underpinning the Government's productivity strategy.<sup>2</sup> The full set of indicators can be found on the DTI website at [www.dtistats.net/competitiveness](http://www.dtistats.net/competitiveness).

The Indicators show that the UK has enjoyed the fastest growth rate of GDP per head in the G7. This has largely been driven by strong labour market performance, rather than by improvements in labour productivity. Although progress is being made, productivity continues to lag our major competitors due to weaknesses in the underlying drivers.

## Assessment

### Investment

Business investment in new plant, machinery or vehicles and buildings plant has lagged behind our G7 competitors for decades, resulting in lower levels of capital per worker in nearly every sector. Public sector investment has also been low, with investment in transport infrastructure a particular problem, until recently. There has been some progress in the key area of investing in information and communications technology. UK investment has in the past been held back by macroeconomic instability. Reforms to the fiscal and monetary framework have ushered in a more stable economic and financial environment, which has helped contribute to a reduction in the hurdle rates by which businesses judge investments.

### Innovation

UK science and engineering is still world class but the record in the commercial exploitation of new ideas is less successful. UK companies spend too little on R&D and Government expenditure on research and development (R&D) is also low. The UK under-performs in terms of patenting, and the proportion of UK businesses that have introduced novel products is below the EU average. UK firms cite access to affordable finance and the provision of qualified personnel as the main constraints. However, the strength of the science base is shown by the fact that foreign firms continue to site their R&D in the UK.

### Skills

Shortcomings in basic skills hamper both productivity and employability. There are encouraging signs for the future, as the skill levels of young people are increasing. However, it will be some years before these improvements are felt in the labour market. The current skills gap with our major competitors is mainly the result of poor intermediate level skills. UK workers also are less able to catch up once they leave school because they spend relatively less time on continuing education and training. The skills shortages in information and communications technology appear to have eased but the quality of managers is still seen as a problem.

### Enterprise

Entrepreneurship rates in the UK are at best moderate despite some important advantages in our business and regulatory environment. However, some groups appear to be disadvantaged in starting enterprises; for example, relatively few UK women are involved in start-up firms. Access to affordable finance is important for would-be entrepreneurs, and the UK enjoys a relatively strong position in the important area of formal venture capital provision.

---

<sup>1</sup> DTI, (1999)

<sup>2</sup> HM-Treasury, (2000)

## Competitive Markets

The UK is relatively open to domestic and foreign competition and has institutions and policies generally seen as supporting competitiveness. Following the 1998 Competition Act the Enterprise Bill will introduce a range of measures designed to further strengthen competition policy. In the labour market, unemployment is relatively low and labour market regulation is generally well regarded by international standards. Employment opportunities are diverse and labour relations compare well with our competitors.

## Conclusion

Progress has been made, even in the relatively short period since the first set of Indicators. The macroeconomic environment has improved. The skill level of new entrants to the workforce is increasing. The UK has been an enthusiastic adopter of information and communications technology. These improvements in aspects of the UK's competitiveness build on the supportive institutional and regulatory framework. However, more needs to be done, especially in the area of innovation and skills, if the UK is to make progress in narrowing the productivity gap with our major competitors.

## Overview

The *Competitiveness Indicators* were first published in 1999 to benchmark the UK's progress in driving up productivity and competitiveness.<sup>1</sup> This Update provides an interim assessment of progress since then. Unlike previous editions, this Update does not cover all the individual indicators. The full set of indicators, with the latest data, can be found on the DTI website at [www.dtistats.net/competitiveness](http://www.dtistats.net/competitiveness).

In this edition the indicators have been organised along the lines of the five drivers of productivity, which form the framework underpinning the Government's productivity strategy.<sup>2</sup> The five drivers are:

- Investment;
- Innovation;
- Skills;
- Enterprise; and
- Competitive Markets.

In order to facilitate comparison with earlier editions, a cross-reference table is included in the Annex. Charts also contain cross references to Competitiveness Indicators, second edition (CI2).

*Productivity and Competitiveness Indicators Update 2002* is the first systematic attempt to use the Indicators to benchmark the UK's performance against the five drivers, both over time, and against our leading competitors.

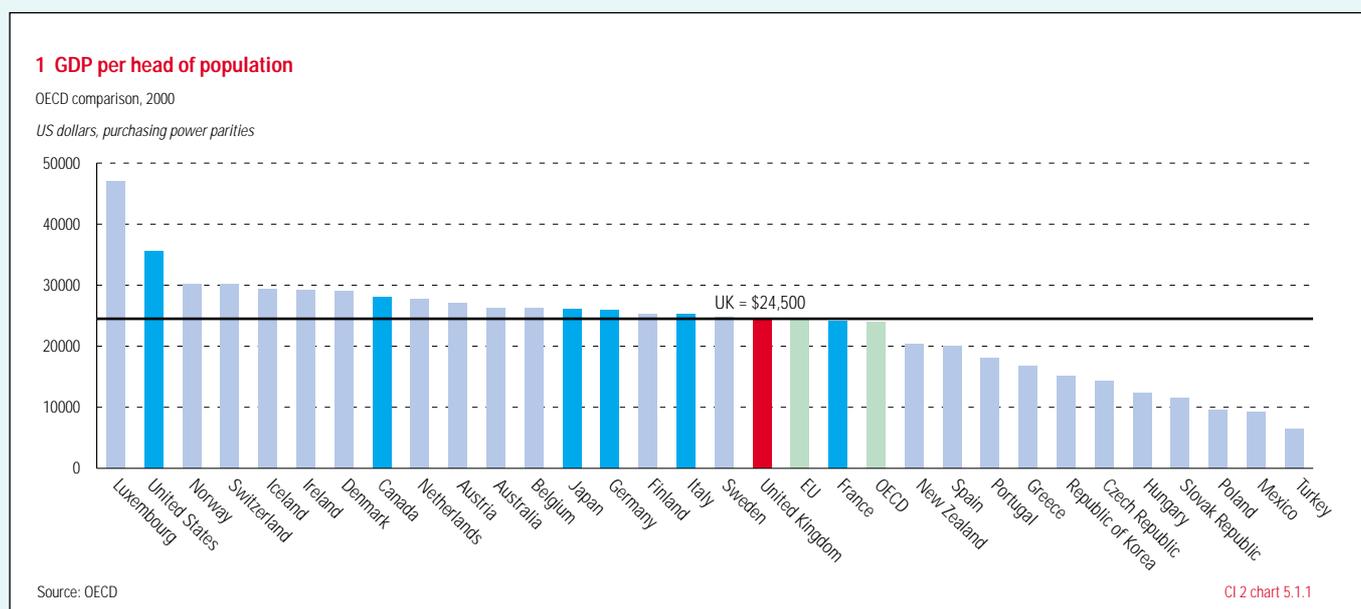
## Progress since the first edition

### The UK has enjoyed the fastest growth rate of GDP per head in the G7...

The Government's economic strategy is aimed at achieving prosperity for all. The best single measure of

<sup>1</sup> DTI, (1999)

<sup>2</sup> HMT, (2000)



prosperity, and overall living standards, is GDP per head. Since the publication of the first set of Indicators in 1999, the UK has enjoyed sustained growth in GDP per head. In 1998, GDP per head in the UK was £14,500, and by 2000 it had risen to £15,800, around the average level for the EU (**chart 1**). Moreover, there has been some evidence of catching up, especially with continental Europe. In the last major economic cycle, the UK had the fastest growth rate of GDP per head in the G7 (**chart 2**).

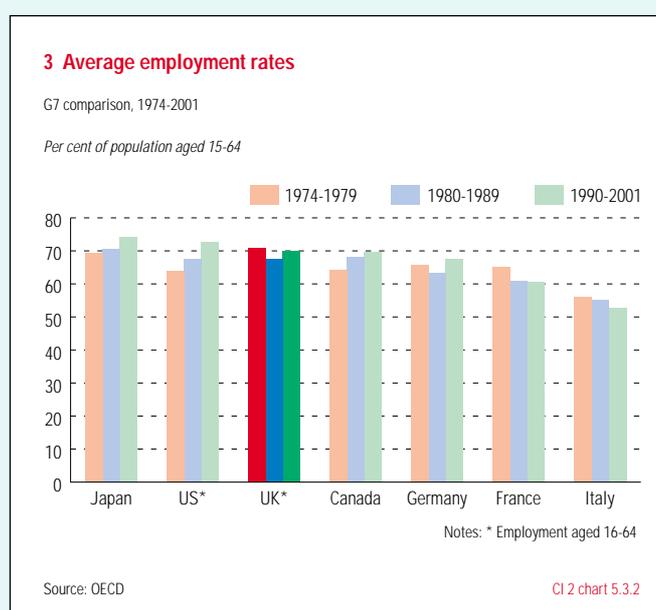
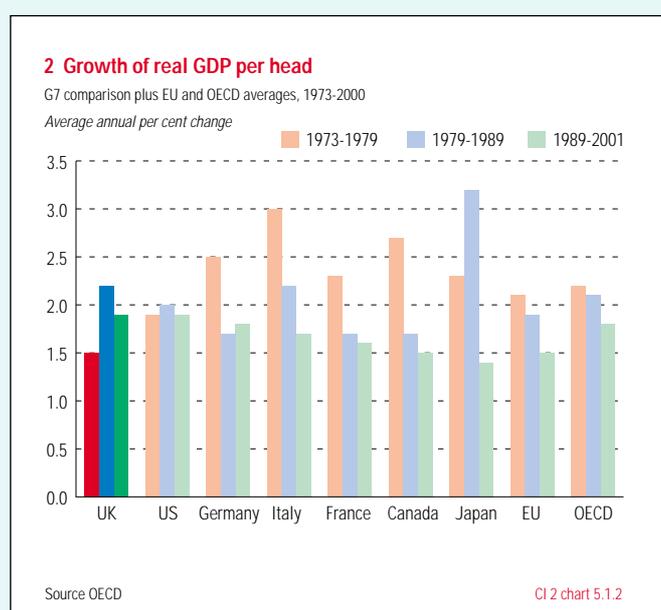
**...largely driven by strong labour market performance.**

Improvements in GDP per head are driven by increases in the proportion of people employed in an economy, and by the productivity of those workers. The UK's labour market performance has been relatively strong in recent years. Employment has increased by 1.5 million since 1997. In the period 1990-2001, UK employment rates were ahead of Canada, France, Germany and Italy. Compared to the previous economic cycle, employment rates have increased; this is common across the G7, with the exception of France and Italy (**chart 3**).

**However, productivity continues to lag.....**

Despite inferior labour market performance, Germany has a higher average standard of living than the UK. This is because the workers that are employed produce more per person and per hour worked. This productivity gap is not a new phenomenon; it has been a persistent feature of British economic history, opening up with the US at the start of the 20th century, and with Europe during the 1970s<sup>3</sup> (**chart 4**). Over the most recent economic cycle the UK has had the fastest productivity growth rate in the G7, although it has slowed recently as improved labour market participation has brought workers with lower average productivity into the labour market (**see box**). Since the publication of the first set of Indicators, relating to 1997 data, there has been a narrowing of the gap with Germany, while the position with France is broadly unchanged. However, the gap with the US has widened since 1997.

<sup>3</sup> Maddison, (1991)



## BOX 1: The impact of higher labour market participation

The Government's aim is full employment, with high employment rates and opportunities for all.<sup>§</sup> Active labour market policies supplemented by reforms to make work pay have encouraged more workers into the labour market. However, at the margin, new workers initially tend to be less productive than the average worker in the economy because they lack work-related skills. As a result, although bringing in additional workers has a positive effect on the employment rate and GDP per head, it depresses average labour productivity in the short term.

Analysis suggests that these new workers tend to be between one half and two thirds as productive than the average worker.<sup>\*</sup> This implies that for every 1 per cent

increase in the employment rate labour productivity growth will be 0.3 to 0.5 per cent lower than otherwise.

Over the longer term, these workers can be expected to improve their productivity, as they attract work-related skills.<sup>#</sup>

<sup>§</sup> DTI/DWP/DfES/HMT, (2002)

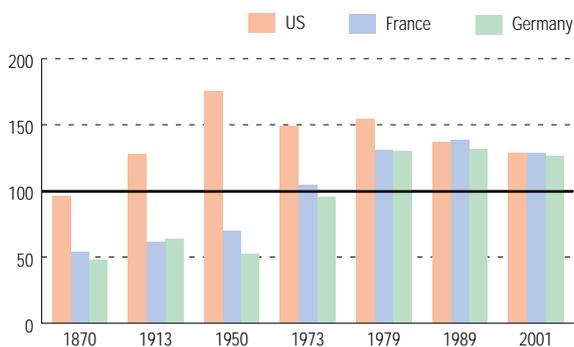
<sup>\*</sup> Gregg and Wadsworth, (2000)

<sup>#</sup> DTI and HMT, (2001)

### 4 GDP per hour worked

Comparison, 1870 - 2001

UK = 100

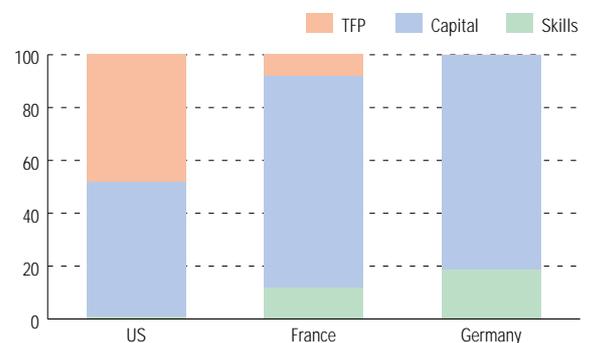


Sources: 1870 - 1973, Maddison (1991). 1979-1999, DTI calculations using OECD data, 2001 ONS

### 5 Explaining the UK's productivity gap

US, France and Germany, 1999

Per cent contributions



Source: NIESR

Recent analysis suggests that a range of factors account for the productivity gaps that exist between the UK and its major competitors.<sup>4</sup> The relatively lower capital stock that supports each UK worker appears to be a common factor across all comparisons. Skills appear to be more of a problem in relation to continental Europe than with the US. However, total factor productivity, which captures a range of less measurable factors such as innovation, company organisation and economies of scale appears to have a substantial role in accounting for the productivity gap with the US (**chart 5**).

The *Productivity and Competitiveness Indicators* permit further examination of the UK's relative performance against the individual drivers of productivity, along with a consideration of the main policy responses adopted by the Government.

**Investment** – Over the two most recent decades the UK has invested less than its international competitors, in both the public and private sector. This was to a significant extent the result of macroeconomic instability, which undermined the incentives and ability to invest. Improved stability should improve longer term performance. Evidence from the CBI suggests that it is already having an effect on the hurdle rates that inform business investment decisions.<sup>5</sup> The latest data shows that the average level of investment per worker has increased since the first edition of the Indicators. There has also been progress in terms of Information and Communication Technology (ICT) investment as the UK's position has improved on a range of ICT-related indicators, including connectivity. However, the legacy of low levels of public investment, especially in transport, continue to constrain competitiveness.

The Government has set out a range of policies to foster investment. The tax system has been reformed to create a climate where investment can flourish. The reforms to the fiscal framework have permitted the Government to begin to modernise the public sector capital stock, notably with substantial increases in capital spending on transport.

<sup>4</sup> O'Mahony and de Boer, (2002). This analysis, which uses growth accounting should be regarded as broadly indicative, as it does not take into account the interdependencies and complementarities that exist between different factors of production.

<sup>5</sup> Godden, (2001)

Inward investment continues to be attracted to the UK though InvestUK, the Government's inward investment arm.

**Innovation** – The UK continues to suffer from poor innovation performance. The welcome increase in the number of university spin-out companies and the underlying excellence of the science base demonstrates the UK's capacity for technological innovation. However, the level of R&D spend, at around the EU average, remains low in both public and private sectors compared with our key international competitors.

The strength of the science base is being increased through continued investment by the Government in basic scientific research. The Spending Review announced that the resources the Government devotes to science are set to rise by £1.25 billion each year. The Government has also recognised the importance of commercialising knowledge. The Chancellor legislated for a large firms R&D tax credit in the 2002 Budget. This builds on the successful introduction of R&D tax credits for SMEs in 2000. The DTI Reviews recognised the central importance of a new Innovation Group within the Department, which is tasked with developing an innovation strategy for the DTI, including encouraging commercialisation and knowledge transfer. The 2002 Spending Review supported this development with an additional £50 million for DTI innovation schemes.

**Skills** – There have been improvements in the skill levels of new entrants to the workforce, and substantial improvements in basic skills. However, there is a relatively high proportion of low and unskilled workers, with up to seven million adults functionally illiterate. There appear to be gaps at intermediate technical levels, and a relatively weak commitment by both employers and employees to lifelong learning.

The Government aims to build on its success in modernising education, by driving up adult basic skills. The Cabinet Office report, *In Demand*, set out the Government's strategy for increasing the average skill level of the working population.<sup>6</sup> The 2002 Budget took this forward by announcing a series of pilots to test the more effective approaches to tackling the market failures that hold back the acquisition of skills.<sup>7</sup> The recent Spending Review

<sup>6</sup> PIU, (2001)

announced a review of adult learning that will consider how to improve incentives to train, and how the training providers can become even more responsive to business needs.

**Enterprise** – The UK institutional environment supports business development, and a wide variety of finance is available. However, social and cultural attitudes are not always favourable to entrepreneurship and the UK has a relatively low rate of female entrepreneurial participation.

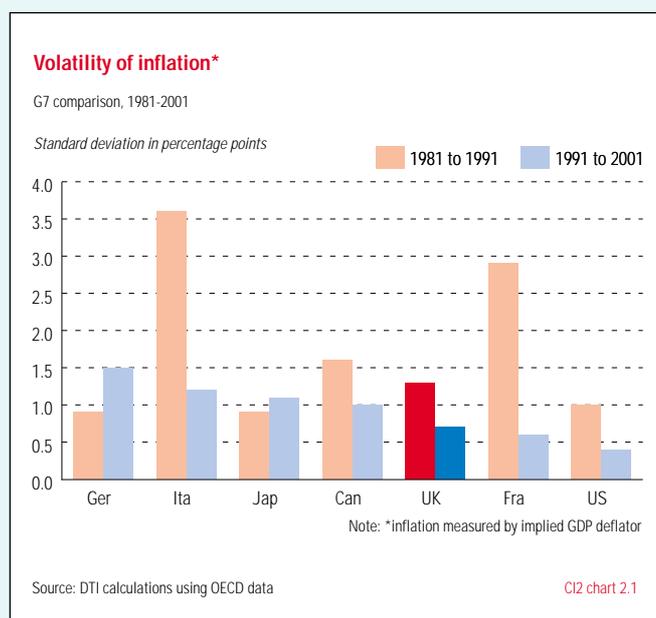
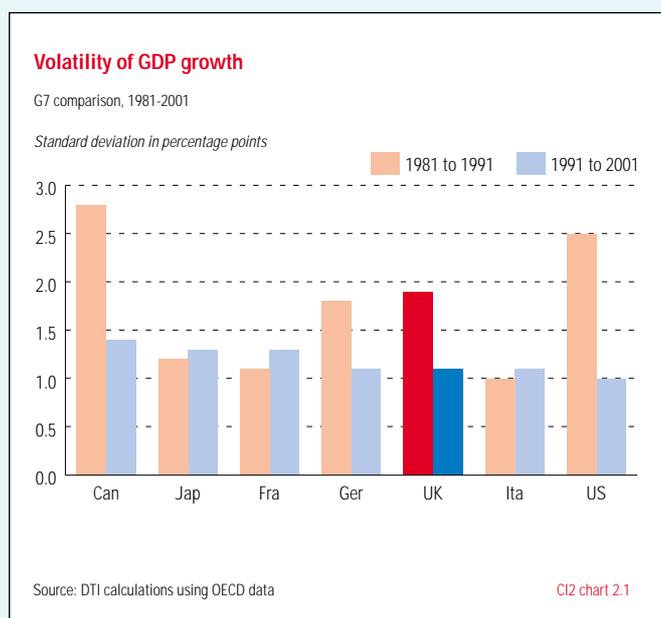
Reforms to the tax system have given further support to new and growing companies. A lower corporation tax starting rate – already the lowest in the European Union – reduced from 10 per cent to zero, has lifted 150,000 out of corporation tax; the 19 per cent small companies rate has reduced the corporation tax bills of a further 335,000 companies.

The Government continues to improve access to information and advice through the Small Business Service and Business Link network. Access to finance has been stimulated by reforms to venture capital provision. Finally, the Government has recognised the importance of capturing the imagination of the next generation of entrepreneurs. The Davies review set out a number of approaches on how to promote better understanding of business, the economy and enterprise throughout the school and further education systems.

**Competitive Markets** – The UK remains an open economy and continues to attract substantial foreign direct investment, relative to its output. Although business perceptions of labour market regulation have become less favourable, the same is true of other G7 nations, and the UK is still seen as a more favourable location to do business than most other G7 countries.

<sup>7</sup> HMT, (2002)

## 6 Volatility of key macro-economic indicators



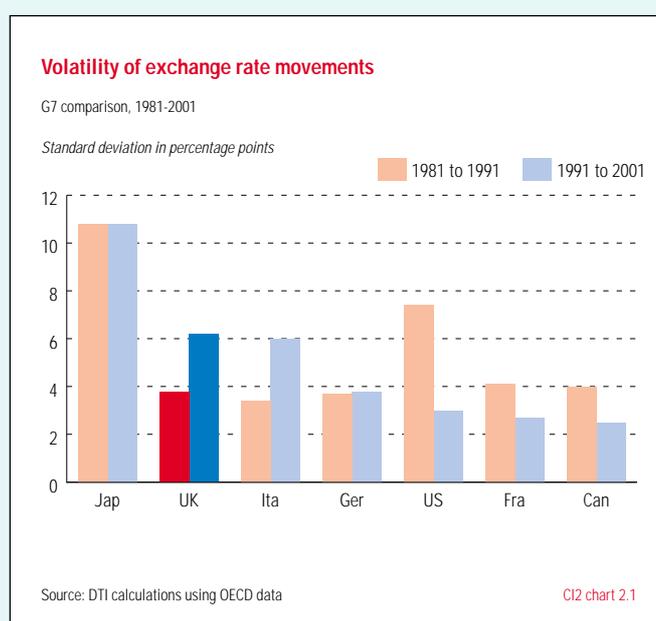
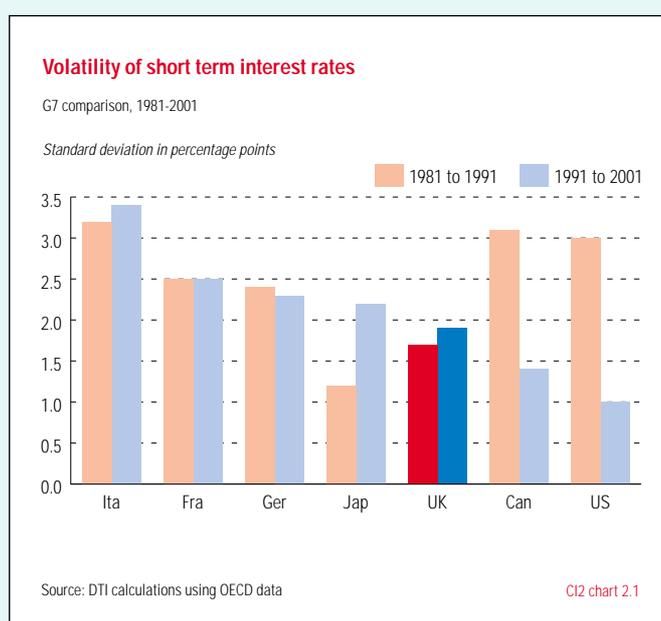
The UK is committed to enhancing the competitive advantage that is generated by its regulatory and institutional environment. The Competition Act 1998 and the current Enterprise Bill, together with increased resources for the Office of Fair Trading, constitute a substantial strengthening of the UK competition regime. The framework for labour market regulation has been improved through the Employment Act 2002, which aims to create highly productive, modern and successful workplaces through fairness and partnership.

However, more needs to be done, especially in the area of innovation, if the UK is to make progress in narrowing the productivity gap with our major competitors.

### Conclusion

Progress has been made, even in the relatively short period since the first set of Indicators. The macroeconomic environment has improved as acknowledged in a recent study which concluded that ‘the policy changes since 1997 have been a significant success’<sup>8</sup>. GDP and inflation volatility has diminished, and long-term interest rates are around their lowest levels since the 1960s (chart 6). The skill level of new entrants to the workforce is increasing. The UK has been an enthusiastic adopter of ICT. These improvements in aspects of the UK’s competitiveness build on the supportive institutional and regulatory framework.

<sup>8</sup> Nickell, (2002)



**Both the public and private sectors in the UK have under-invested in physical capital, though progress has been made in adopting ICT. Improved macroeconomic stability should lay the foundation for increased capital spending as the world economy improves.**

Investing in physical capital in the form of new plant, machinery, vehicles and buildings can help a company to reduce costs and produce better products or services that its customers value more highly. Costs can be reduced through faster production runs and better organisation of production. New equipment and other assets may help the company to meet better the needs of current and new customers and to move into higher value added activities.

**Business investment per worker has lagged behind the G7 for decades...**

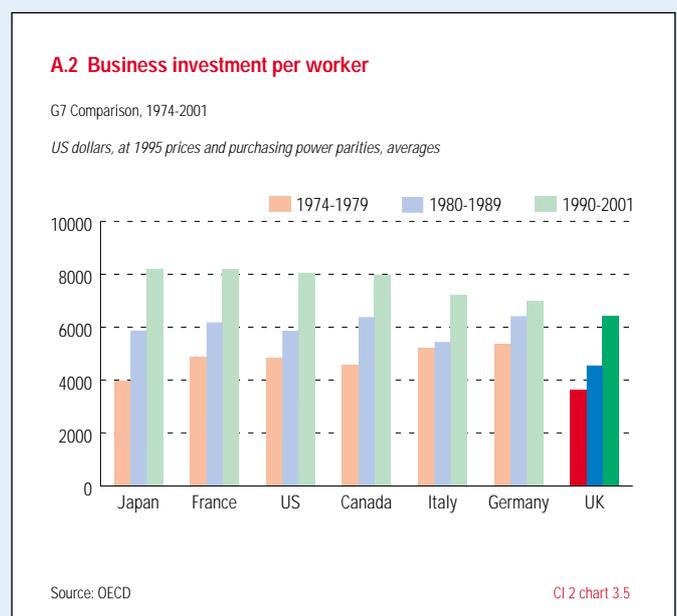
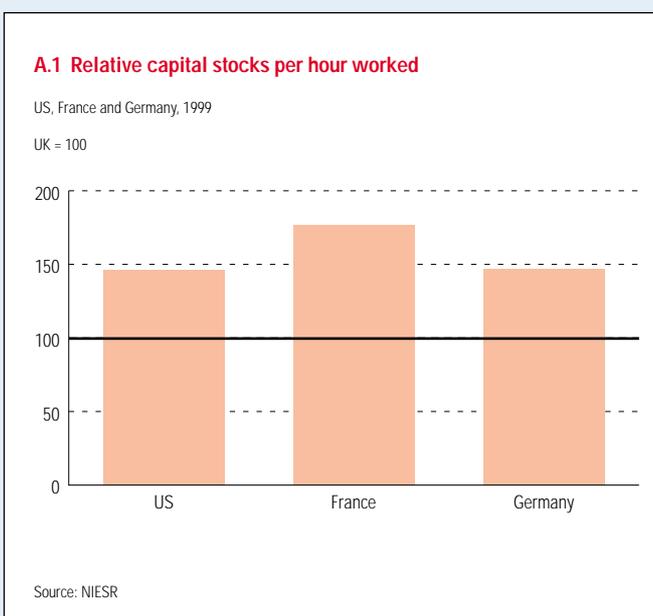
Historically, the UK has tended to under-invest in physical capital. Research by the National Institute of Economic and Social Research (NIESR) showed that in 1999 capital per hour worked, a measure of the stock of capital relative

to the labour input, in the US, France and Germany was between one half and three quarters higher than in the UK<sup>1</sup> (chart A.1). This contributed substantially to the labour productivity gap of the UK with these countries.

The UK's lower stock of physical capital per hour worked is a consequence of the relatively weak levels of investment expenditure by both the private and the public sector over the past three decades. The UK's average business investment per worker in real terms has been lower than its G7 competitors over the last three economic cycles (chart A.2)

Analysis of the most recent data suggests that, following initial rapid growth during the mid 1990s, the UK's investment performance has levelled off, although investment per worker remain above 1997 levels. As a result, the UK has made some progress in improving business investment per worker but it has failed to reach the levels of the US and France.

<sup>1</sup> O'Mahony, and de Boer, (2002)



The US has been the best performer in terms of investment in recent years as a result of the strength of output growth and optimism about the productivity effect of ICT advances (chart A.3). The picture for the European economies is more mixed. Germany's level of investment per worker has failed to reach pre-unification levels. France's investment per worker levelled off during the mid 1990s, after earlier falls, but has since begun to grow again, despite steady employment growth.

**...resulting in lower levels of capital per worker in nearly every sector**

Differences in the sectoral mix in output have been advanced as an explanation for the UK's lower levels of investment. In theory, relatively manufacturing-intensive countries should have higher investment than more service-oriented nations. However, the differences in sectoral mix explain little of the difference in capital intensity between the UK and its competitors. Research by NIESR shows that the capital stock per hour worked in most individual sectors is substantially lower in the UK in comparison to the US, France and Germany (chart A.4)<sup>2</sup>.

**Investment can bring wider benefits...**

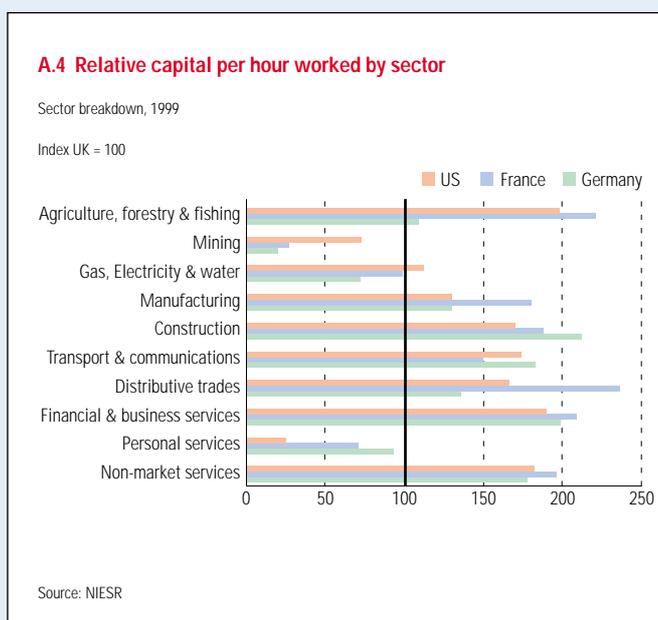
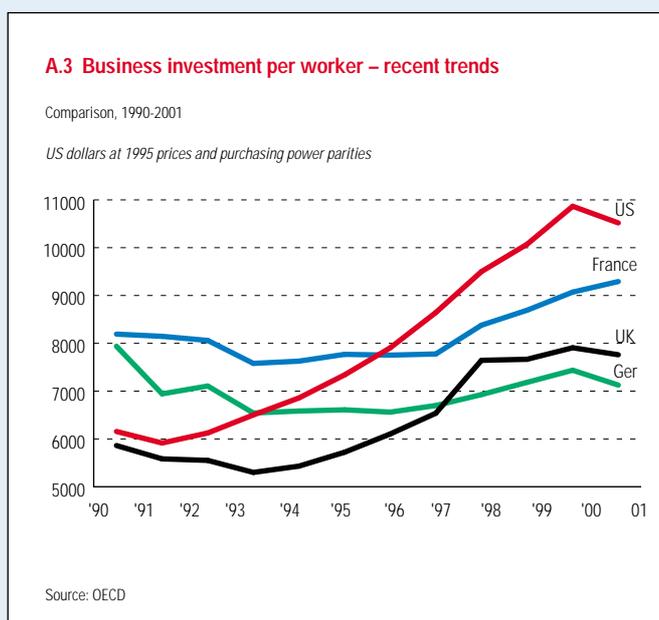
The benefits of private sector investment may not be confined to the investing company. Investment can generate new ideas about how to organise production or implement best practice technology. These ideas can be adopted by other firms, and used to stimulate productivity improvements. Foreign investment is often regarded as an important source of these 'spillover' benefits, as it gives UK firms access to the global knowledge pool.<sup>3</sup> The UK is especially well placed to benefit from international knowledge-transfer, as it has become the most open economy in terms of foreign direct investment (FDI) in the G7, overtaking Canada, which was identified as the leading nation in terms of FDI in the first set of indicators.

Spillovers are also thought to arise from investment in ICT through the presence of network externalities.<sup>4</sup> These occur where the benefits to an individual firm of investing in a technology increase with the number of users. For example, a firm may be unwilling to invest in a computer in

<sup>2</sup> O'Mahony and de Boer, (2002)

<sup>3</sup> Ashworth, (2001)

<sup>4</sup> Castells, (1996)



order to communicate with one supplier over the Internet, but would be more attracted to this investment if it could deal with its entire supply chain. As each new firm joins the network, it makes it even more attractive for other firms to invest and join.

The presence of these wider benefits, together with the ability of ICT to generate efficiencies through the re-organisation of production, has led to an increasing focus on the role of ICT in improving productivity.

#### ...and some progress is being made in the key area of ICT.

The UK appears to have made progress in embracing the new economy, through the deployment of ICT. In 1999, the UK had scope for catch-up in terms of ICT. NIESR estimated that the UK had less ICT capital per hour worked than the US and France in 1999.<sup>5</sup> Similarly the Indicators showed that the UK had the smallest proportion of businesses connected to the Internet. Although NIESR data is not available for recent years, the latest Indicators

show that the UK now has the largest proportion of businesses connected to digital networks in the G7<sup>6</sup> (chart A.5).

#### Public sector investment has been low....

The state also has an important role as a provider of investment. Companies use public infrastructure, such as the road network and communication systems, to obtain supplies and bring their product to the market. Transport infrastructure in particular can have productivity benefits by reducing transit times and costs, and by expanding the size of the market which permits greater specialisation and efficiency gains. Moreover, improved public infrastructure in a particular location can make enterprise more attractive and make it easier for workers to take up new

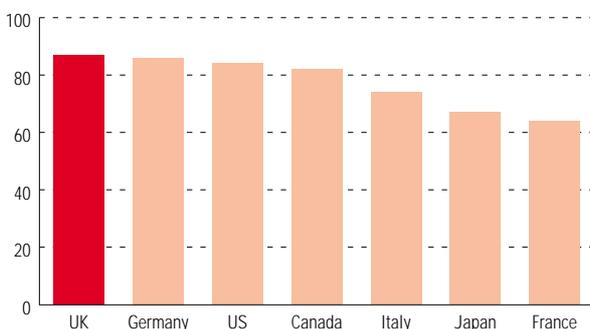
<sup>5</sup> O'Mahony and de Boer, (2002)

<sup>6</sup> DTI, (2001)

#### A.5 Connectivity (weighted by business size)

G7 Comparison, 2001

Per cent of business, results weighted to reflect employee distribution

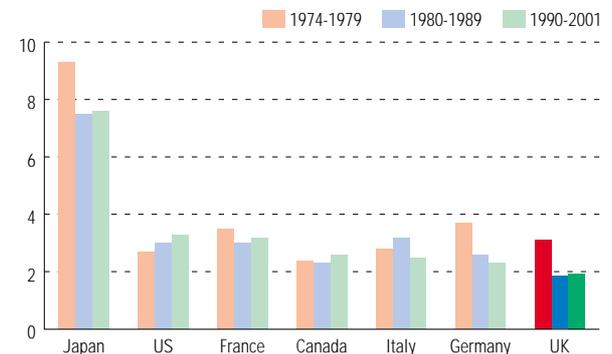


Source: Business in the Information Age: International Benchmarking Study, 2001.

#### A.6 Government expenditure on investment

G7 Comparison, 1974-2001

Average per cent of GDP, at 1995 Prices



Source: OECD

CI 2 chart 3.6.1

employment opportunities.

Conversely, inefficient public infrastructure can undermine productivity growth. It imposes extra costs as, for example, congestion raises the costs of transporting goods, and increases uncertainty about the arrival of deliveries.

In common with business investment, average Government expenditure on investment as a share of national output in real terms has been lower than the rest of the G7 over the two most recent economic cycles (**chart A.6**). This is partly a legacy of macroeconomic instability: historically in the UK when the economy moved from boom to bust, it was often less painful for Governments to cut the capital budget rather than reduce current expenditure.

### **...with investment in transport infrastructure a particular problem, until recently.**

The effect of this legacy can be seen in the provision of transport infrastructure. The most recently available data shows that between 1987 and 1996, the UK invested a lower proportion of GDP on transport infrastructure than other major European economies. At the same time, there is evidence of congestion problems in the UK, with UK commuters more likely to encounter congestion on their drive to work than their European G7 counterparts.<sup>7</sup>

## Conclusion and policy response

Over the two most recent decades the UK has invested less than its international competitors, and its lower levels of capital per hour worked account for the majority of the UK's labour productivity gap. Additional investment provides an opportunity for the UK to improve its economic performance, provided that the use of capital assets is part of an integrated strategy, and not pursued for its own sake.

The evidence shows that both the private and public sectors in the UK have invested proportionately less than their international comparators. Macroeconomic instability is likely to have been a major reason for the UK's poor investment record. Private sector investment is affected because of financial instability. Public sector investment is affected by pressures on the public finances caused by periods of recession. Improved macroeconomic stability in

recent years is already beginning to have a positive effect. The CBI has found that the average hurdle rate, which is the minimum rate of return a company requires to invest, fell from 16 to 11 per cent between 1994 and 2001.<sup>8</sup>

There may also be market failures that affect investment. The market may not always provide the "right" amount of investment, because of a lack of information about the costs and benefits of investment projects, the presence of spillovers, or failures in the capital market. Investment is also constrained by the availability of complementary assets, such as skilled workers, because of other market failures.

The Government has been active in creating a more attractive climate for companies to invest. It has reformed the business tax regime to encourage investment, including:

- a reduction in the main rate of corporation tax to 30 per cent;
- a reduction in the small company's tax rate from 20 per cent to zero, for companies with profits below £10,000; and
- reforms to the capital gains tax taper for business assets.

There have also been measures to help firms assess investment opportunities and, when they seek external sources of finance, to help them communicate their plans to third parties.

It has also sought to attract foreign investors to the UK. InvestUK, with its development agency and specialist partners, plays a vital role helping secure inward investment projects. In 2002/03, InvestUK will provide £13 million towards the inward investment activities of RDAs. In 2001/02, InvestUK were notified of 884 inward investment 'successes'. InvestUK had significant involvement with 245, and indirect involvement with the others through the coordination of the UK effort.

The Government has also recognised the vital role that public infrastructure plays in bolstering competitiveness. The last two Spending Reviews have enabled the Department for Transport and its predecessor departments to double planned public spending on transport in real terms over the period 2000/01 to 2005/06. This increased funding will allow the Department for Transport to make progress on the agreed objectives in the Ten Year Plan.

<sup>7</sup> European Conference of Ministers of Transport, (1998); Council for Integrated Transport, (2001); EUROSTAT, (2000)

<sup>8</sup> Godden, (2001)

**UK innovation performance continues to lag our competitors, despite the continued excellence of the UK science base.**

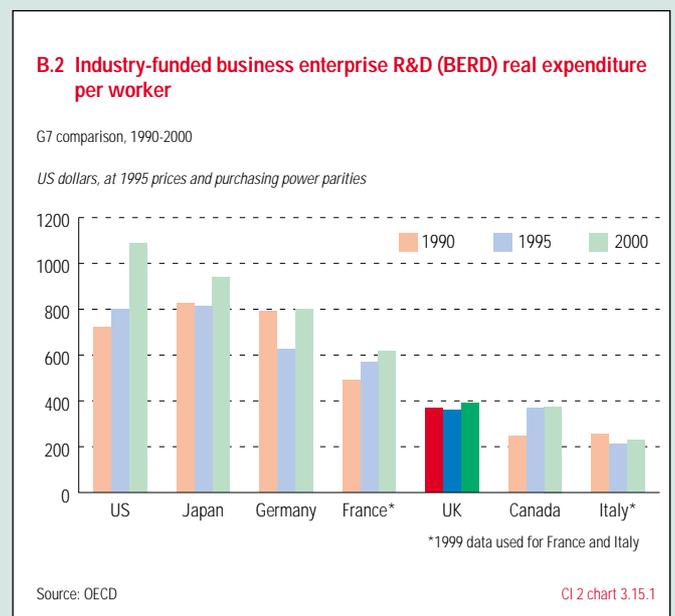
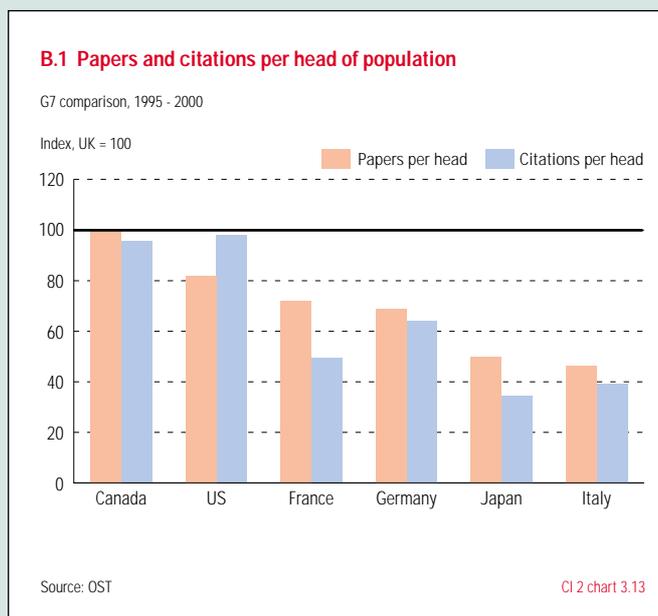
Innovation, in its broadest sense, is about improving performance by doing something differently. Innovation is the successful exploitation of new ideas. It can result in new technologies, new products and processes, novel services and means of delivery, changes in business models, and the exploitation of new markets.

Changes in the global economy highlight the role of innovation in driving sustainable increases in productivity and living standards. The combined forces of globalisation, changing tastes and preferences and ICT are shortening product cycles. Products and processes in many industries can be copied more easily and more quickly by competitors. This means that products move from being able to command a premium to being price-sensitive commodities much more quickly. As a result firms have to innovate to stay ahead.<sup>1</sup>

The importance of innovation is confirmed by NIESR's analysis of the productivity gap which suggests that even if the UK had the same level of capital and skills as France and the US, there would still be a significant productivity gap. Studies suggest that much of this gap is the result of inferior innovation performance.<sup>2</sup>

**UK science and engineering is still world class...**

The science base is an element of the national innovation system. The UK has a world-class science and engineering base, and is among the most productive and highest quality in the world. In terms of papers and citations per head the UK is in the leading group along with Canada and the US (**chart B.1**). The UK science and engineering base (SEB) is responsible for 4.5 per cent of the world's spending on science, produces 8 per cent of the world's scientific papers, receives 9 per cent of citations and claims around 10 per cent of internationally recognised science prizes.<sup>3</sup>



**...but the record in knowledge transfer is less successful.**

There is a long-held perception that the UK has been poor at profiting from its science base; that the UK has found it hard to move from invention to commercialisation. One indicator of scientific commercialisation is the number of university spin-outs; firms that are created by universities to exploit the output of their research efforts. There appears to have been some progress on spin-outs. A survey by the Office of Science and Technology and HEFCE found that there were 199 spin-off firms in 1999/2000, compared to an annual average of 68 during the previous five years.<sup>4</sup> While this is promising, the UK tends to perform less well on a range of innovation indicators.

**UK companies spend too little on R&D...**

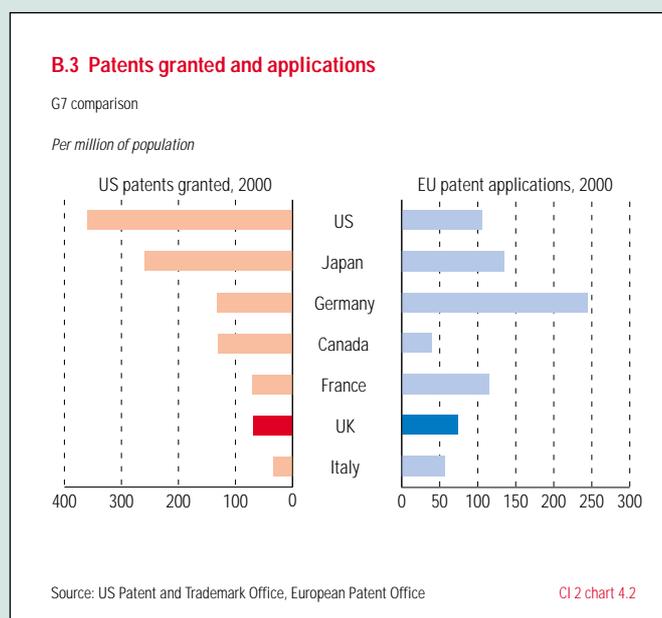
Research and Development (R&D) has been shown in a number of studies to be an important driver of economic growth.<sup>5</sup> R&D carried out by businesses across different sectors has had a large impact on performance, with R&D spend generating private rates of return of 10 to 15 per cent.<sup>6</sup> Moreover, there are also significant positive spillover effects from R&D activity, generating benefits to the economy as a whole. Spillovers can occur through a number of channels, for example the publication of new ideas in scientific journals, or the movement of skilled workers between firms. Research confirms the presence of these wider benefits since the social rate of return for R&D is consistently found to be higher than private returns.<sup>7</sup>

The UK's weak productivity performance partly stems from relatively fewer resources being devoted to innovation. The UK has one of the lowest levels of R&D per worker in the G7, and we have failed to catch up to the levels in the US, France and Germany over the past 20 years. Not only is the UK's level low, but it has remained broadly flat since 1990, while French, US, and Japanese businesses have been increasing the amount of R&D per worker (**chart B.2**).

**...and Government expenditure on R&D is also low.**

This deficit can also be observed in Government expenditure on R&D. The US, French and German Governments all spend more on R&D per worker than the UK. The persistently lower level of R&D undertaken by the public and private sectors in the UK has resulted in a lower stock of R&D when compared to our major competitors. One analysis suggests that the persistently lower levels of R&D expenditure may account for over 90 percent of the total factor productivity (TFP) gap with the US.<sup>8</sup>

<sup>1</sup> DTI, (1998)  
<sup>2</sup> Crafts, (2001)  
<sup>3</sup> DTI, (2000)  
<sup>4</sup> HEFCE, (2001)



<sup>5</sup> Aghion and Howitt, (1998)

<sup>6</sup> DTI & HMT, (2002)

<sup>7</sup> DTI & HMT, (2002)

<sup>8</sup> Crafts, (2001)

**Patents are another area where the UK underperforms.**

Patents provide another indicator of how successful the UK is at converting knowledge into new products or processes. Patent data needs to be interpreted with care. However, the UK substantially under-performs nearly all its major competitors in terms of the number of patents granted or filed per head of the population. Within the EU, the UK's level of patenting is lower than Germany or France, but better than Italy's (chart B.3).

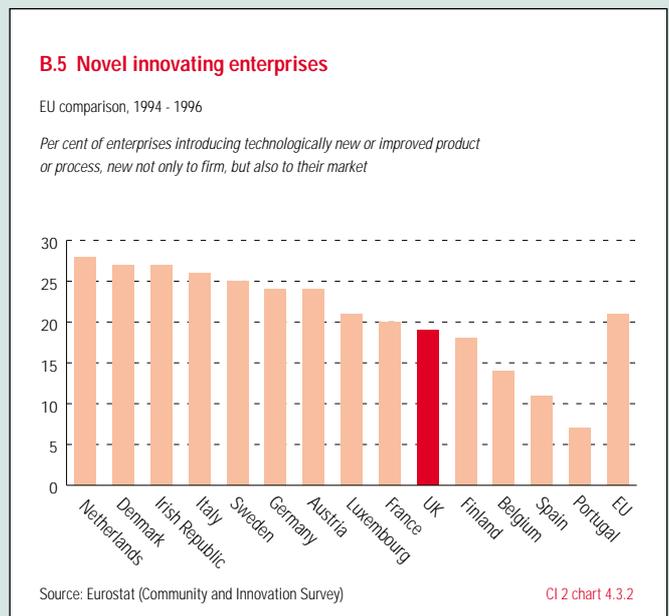
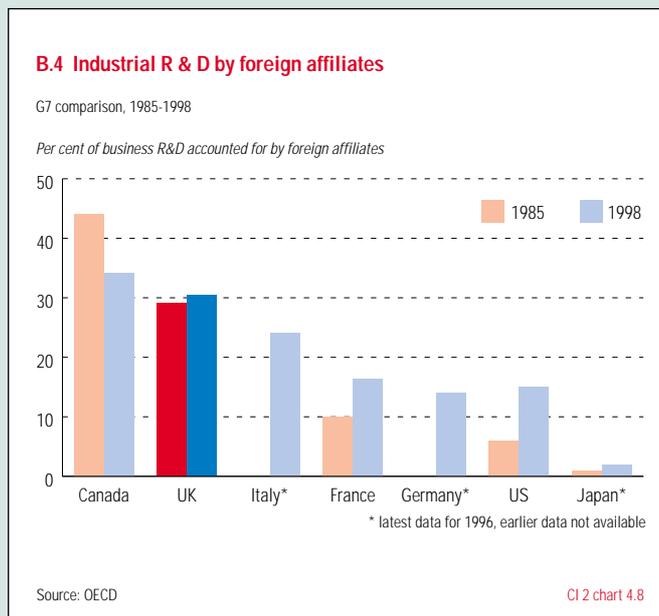
Although UK firms on average undertake less R&D than their foreign counterparts, the UK is nevertheless an attractive location for foreign firms wanting to access UK scientific excellence. The UK has one of the highest shares of foreign R&D as a proportion of total R&D in the OECD (Chart B.4).

**Other indicators reveal weakness in innovation performance...**

The UK's weakness in innovation performance is reflected in the number and value of new products coming to market.<sup>9</sup> For example, although UK service sector performance is above the EU average, in manufacturing new products account for around 25 per cent of UK sales, compared to over 40 per cent for Germany. This performance places UK manufacturing in the bottom half of the EU. Overall, the proportion of UK businesses that have introduced novel products is below the EU average (chart B.5).<sup>10</sup>

<sup>9</sup> Defined here as new products produced by manufacturers using new technology.

<sup>10</sup> Novel innovations introduce products or services that are new to their market.



Analysis of the sources of information that firms use for innovation also shows the relatively low priority that firms give to exploiting the SEB. Universities or higher education institutes were used by a relatively small proportion of firms as sources of information, although this was common across the EU. More worryingly, an initial study of comparable results from the Community and Innovation Surveys (CIS) suggests that firms are becoming less likely to access the SEB for information. The proportion of firms using universities or other higher education institutes for information fell from 43 per cent in 1996 to 30 per cent in 2000. The most common source of innovation information was within the enterprise and UK firms also seem to be learning less from their competitors (chart B.6).

Innovation extends wider than the science base. Enterprises can also change their behaviour or business strategies to make themselves more competitive, often in conjunction with technological change. The latest CIS shows that a change in marketing strategy was the most often cited innovation (chart B.7).<sup>11</sup> The introduction of

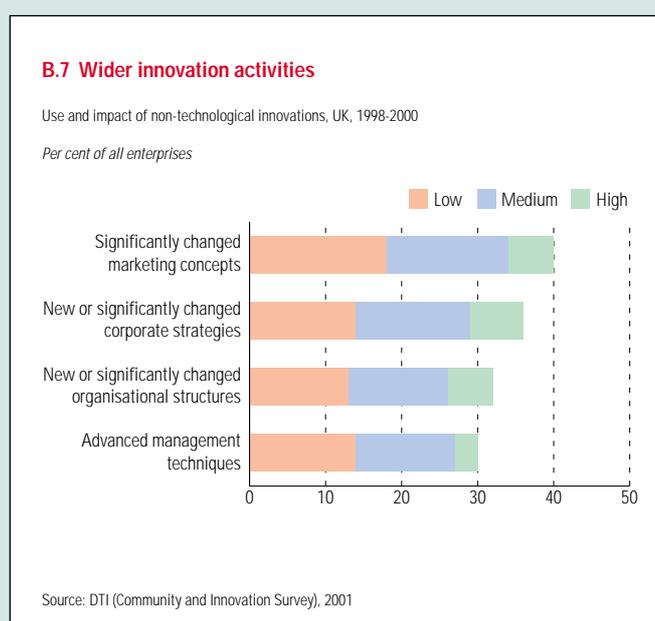
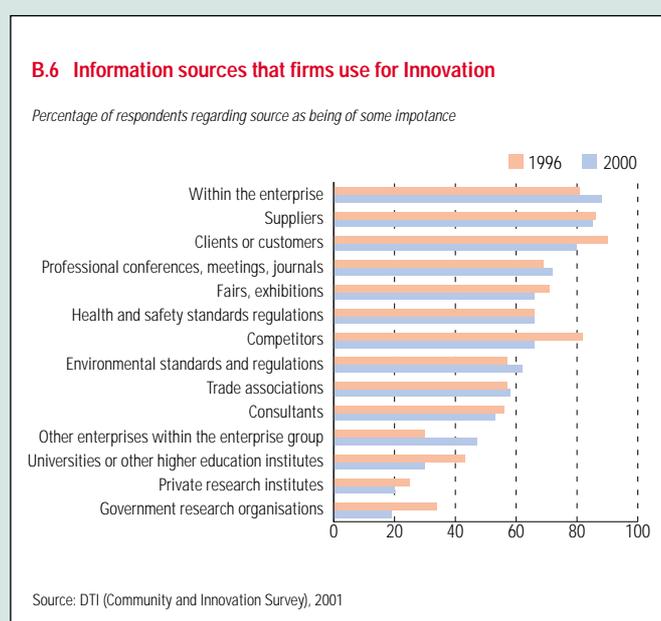
advanced management techniques was the least cited innovation, which is consistent with other evidence on the quality of UK management.<sup>12</sup> As might be expected, SMEs were less than half as likely as large firms to have introduced a major organisational change.

**...with access to affordable finance and qualified personnel cited as the main constraints.**

The latest CIS, (covering 1998-2000), sheds further light on the reasons behind the UK's weak innovation performance. The survey asked about a range of constraining factors and the strength of any effect on the ability to innovate. Cost factors were the most cited, including the direct resource costs of innovation activities, and the cost and availability of finance. In particular, obtaining affordable finance was more often a problem for SMEs than for larger enterprises (chart B.8).

<sup>11</sup> Stockdale, (2002)

<sup>12</sup> Bosworth, (2000); EEF, (2001)



More enterprises felt constrained by economic circumstances than by internal factors, although the lack of qualified personnel was viewed as one of the more important factors constraining innovation. This is consistent with other evidence that suggests the UK's weakness in intermediate skills means that highly qualified workers spend time dealing with problems caused by poor skills, rather than on innovative activities.<sup>13</sup> The impact of regulations and standards was also thought to be a substantial barrier to innovation, particularly for SMEs.<sup>14</sup>

### Conclusion and policy response

The UK continues to suffer from poor innovation performance. The excellence of UK science and engineering, in producing both new ideas and highly skilled scientists and engineers, continues to tempt foreign firms to locate their R&D activity in the UK. But UK firms appear relatively less able or willing to translate UK scientific excellence into successful new products and processes.

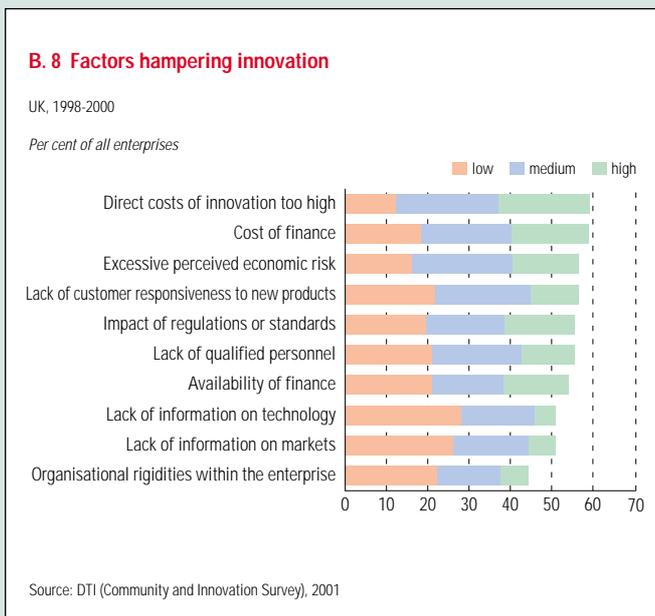
The presence of spillover effects and the uncertainty inherent in R&D means that the market will tend to under-invest in innovation. This provides a rationale for Government intervention to sharpen incentives for firms to increase the level of privately funded R&D.<sup>15</sup>

The Government has set in place a range of measures to address market failures and barriers in the stages of development that link research to new products and processes. It has provided additional resources for the science base and measures to help firms use the science base and other sources of information to innovate.

<sup>13</sup> Prais, (1995)

<sup>14</sup> Innovators rated these constraints more highly than non-innovators, suggesting that the decision to not innovate is influenced by other factors.

<sup>15</sup> DTI & HMT, (2002)



The Spending Review announced that the resources the Government devotes to science are set to rise by £1.25 billion each year. This includes increases in the budget of the Office of Science and Technology and extra resources for both DTI and DfES.<sup>16</sup>

The Science Budget is set to rise by 10 per cent a year on average in real terms over the 2002 Spending Review period, compared with 7 per cent over the 2000 Spending Review period, and will grow from £2.0 billion in 2002-03 to £2.9 billion by 2005-06. It will provide the resources for:

- a dedicated capital funding stream, increasing to £500 million a year by 2004-05 for universities' science research infrastructure, and providing an additional £120 million a year from 2005-06 to the Research Councils to increase their contribution to the costs of research projects undertaken in universities;
- science and engineering research programmes to receive an extra £400 million a year by 2005-06 (compared to 2002-03), an average rise of 5 per cent per year in real terms; and
- an additional investment of £100 million a year by 2005-06 to ensure a strong future supply of skilled scientists and engineers to take forward the key recommendations of Sir Gareth Roberts' Review. This includes measures to attract students in schools and universities to science, to improve career prospects in science through better pay and training for PhD students and postdoctoral researchers, and to provide better teaching and research facilities.

In addition to strengthening the science base, the Government has also designed measures to boost the take-up of ideas from the science base to produce innovation, including:

- an R&D tax credit for small and medium-sized companies and, following consultation, a volume-based R&D tax credit for large companies;
- increased resources for the Office of Science and Technology for knowledge transfer from the science base, amounting to £64 million in 2002-03 to £114 million in 2005-06 (including £20 million per year from DfES). The Government will also provide an extra £90 million per year by 2005-06 for a newly enlarged Higher Education Innovation Fund. The Government will complement these measures by increasing resources (an extra £50 million by 2005-06) for DTI's programmes to stimulate business innovation.

---

<sup>16</sup> DTI & HMT, (2002)

**Historic weaknesses in skills continue to hamper UK performance. Progress since 1999 on basic skills needs to be built on and matched by improved intermediate skills and a greater commitment to workforce development.**

Human capital has been identified as an important driver of economic performance.<sup>1</sup> If firms do not have access to sufficiently skilled workers, they may be unable to implement new investments or organisational innovations.<sup>2</sup> Skills gaps may cause a lack of, or delay to, product or process innovation because workers may not have sufficient skills to cope with producing new or better quality products or improved ways of making an existing product. This will constrain their ability to reap potential productivity gains.

As well as influencing productivity growth, the skill of the nation's workforce is one of the determinants of how well the economy adapts to structural change. As the economic structure evolves, some industries decline, and some new industries emerge. The ability of an economy

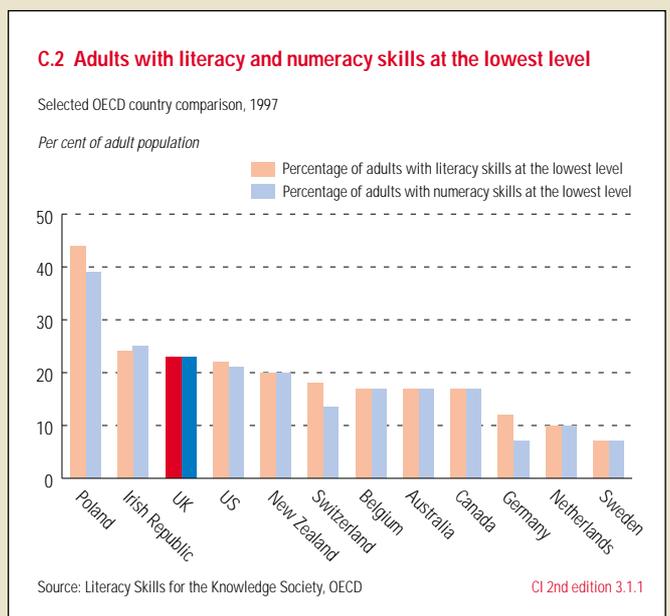
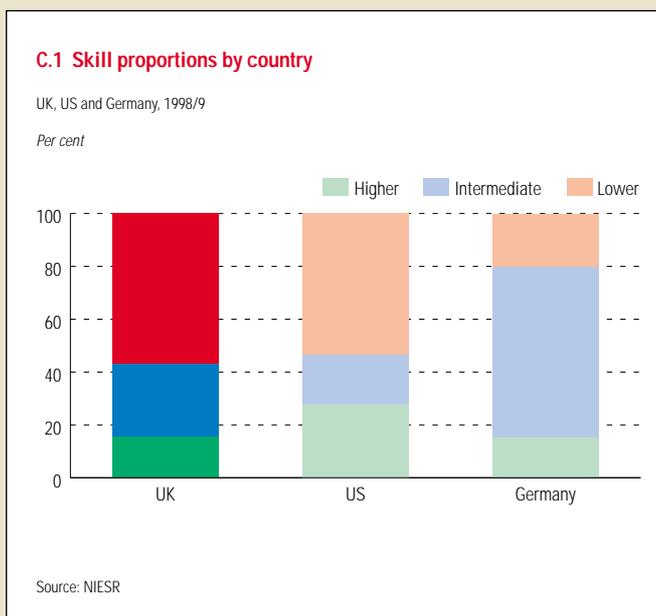
to foster lifelong learning is becoming increasingly important as this rapid structural change creates constantly changing skill needs.

Research by NIESR suggests that lower average skill levels in the UK account for a fifth of our productivity gap with Germany.<sup>3</sup> Although the UK has a similar proportion of graduates to Germany, the UK has a much higher proportion of lower skilled workers (**chart C.1**).<sup>4</sup> The US has a higher proportion of graduate level workers than the UK, and the US stock of workers with intermediate skills may also be significantly understated by conventional data (such as that used in the NIESR study cited here) due to the lack of comparable national qualification structures in the US and the prevalence of uncertified vocational training. This suggests that the UK may have a higher proportion of low skilled workers than the US.

<sup>1</sup> Barro and Sala-I-Martin, (1995)

<sup>2</sup> Jarvis, O'Mahony and Wessels, (2002)

<sup>3</sup> O'Mahony and de Boer, (2002)



### Shortcomings in basic skills hamper both productivity and employability...

As well as being a key driver of productivity growth, skills are also essential for labour market inclusion and employability. In recent years there has been a collapse in the demand for unskilled workers. Unskilled male inactivity rates have rocketed from 3.8 per cent in 1979 to 30.5 per cent in 1998 and have since stabilised. Male workers with degrees now earn 93 per cent more than those without qualifications, compared to 63 per cent more in 1979.<sup>5</sup> This is despite the rapid increase in the graduate population. This is because technological progress allows firms to produce the same output with fewer unskilled workers, while increasing the demand for skilled labour.<sup>6</sup> As a result, almost every job now requires competence in basic skills. Improving the skill levels supports employability and thereby helps to foster social inclusion.

The UK has for a number of years lagged behind other developed economies in terms of the development of basic skills. Up to seven million adults in England are functionally illiterate. This translates into 20 per cent of adults reading less well than the average eleven year old.<sup>7</sup> The UK performs poorly on basic skills when compared to our competitors (**chart C.2**). Moreover, since the first set of indicators, US literacy has improved marginally relative

to the UK. Low skills also present a barrier to the acquisition of additional skills, as workers with low skill levels are less likely to engage in adult education and training.<sup>8</sup>

### ...but literacy and numeracy among the young is on the increase.

However, there are encouraging signs for the future. Although the stock of skills possessed by existing workers is low by international standards, there are encouraging signs that the *flow* of new workers should possess higher basic skill levels. Reforms to schooling have increased the proportions of children attaining the expected standards for their age in both literacy and numeracy. Since 1997, the

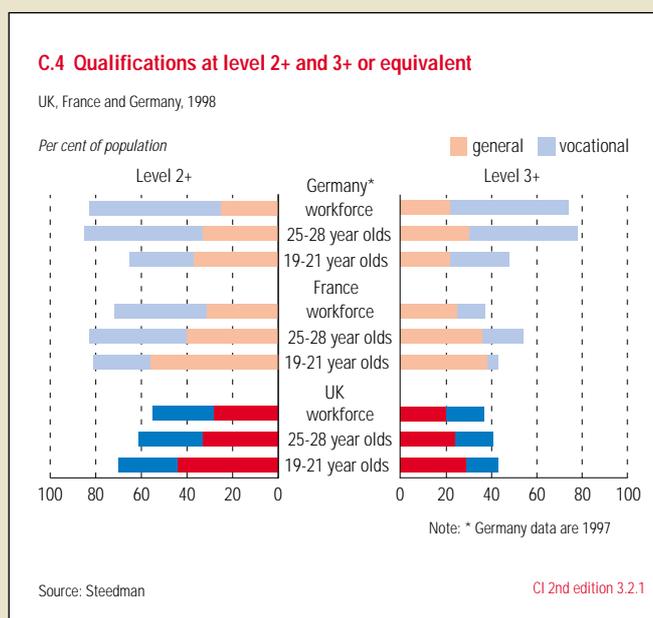
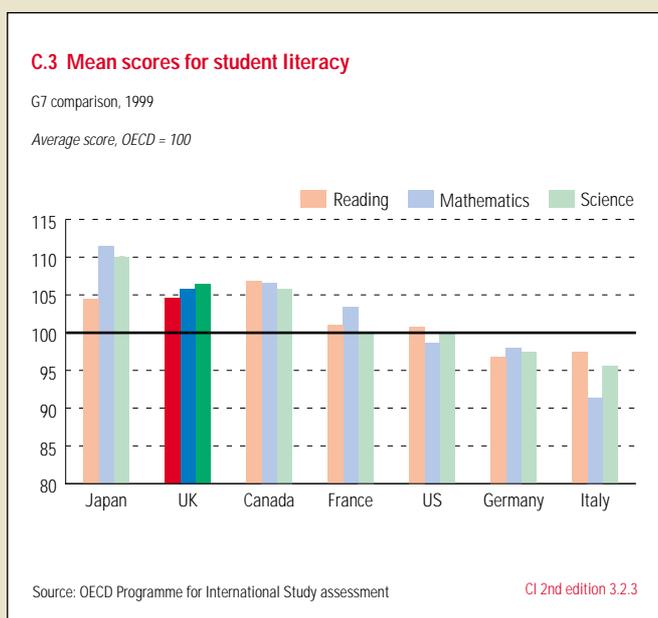
<sup>4</sup> Data taken from O'Mahony, M., and de Boer, W., (2002). The estimates here rely in the main on proxy measures of skills based on education and training *outputs*, for example, the proportions of the workforce with different levels of certified qualifications. However, even these measures are deficient in that many skills may be acquired by informal on-the-job training and remain uncertified. Furthermore, although data on vocational qualifications are readily obtainable for Britain and Germany, the same is not true for the US.

<sup>5</sup> Nickell and Qunitini, (2002)

<sup>6</sup> Bermin, Bound and Machin, (1997)

<sup>7</sup> Moser, (1999)

<sup>8</sup> ONS, (2001)



proportion of 11 year olds who have attained the standard in literacy required by the National Learning Targets has increased from 63 per cent to 75 per cent, and for numeracy, the proportion has increased from 62 per cent to 71 per cent. Furthermore, the Programme for International Study Assessment found that the performance of UK young people was significantly above the OECD average in all three of the subjects covered – ‘reading literacy’, ‘mathematical literacy’ and ‘scientific literacy’ (chart C.3). However, it will be some years before the beneficial effects of these improvements are felt in the labour market.

#### Lack of intermediate skills is the main cause of the skills gap...

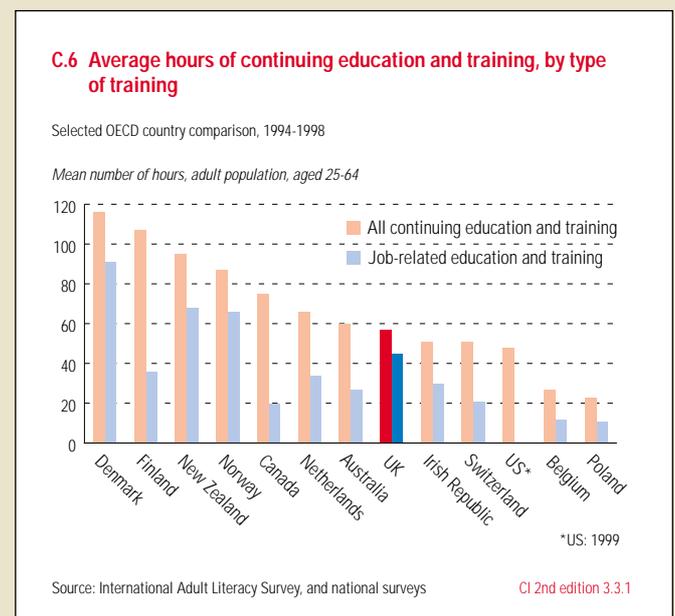
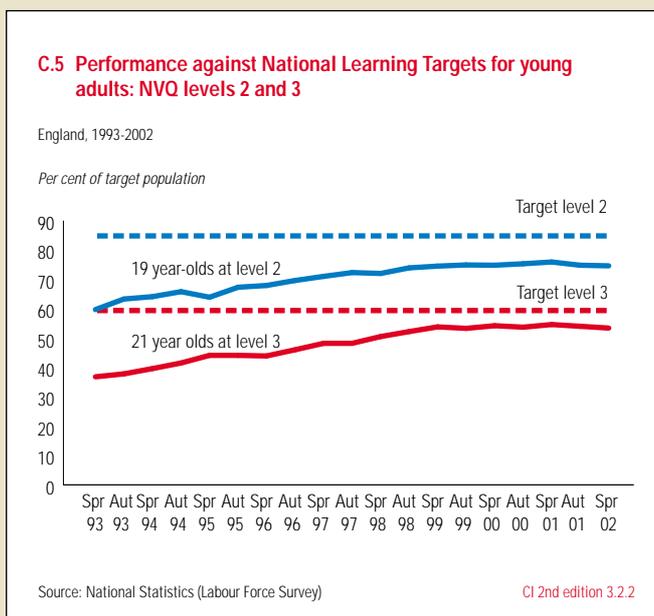
The overall weakness in terms of the current stock of basic skills extends to adult skills levels more generally. NIESR suggests that the UK's skills gap arises from a relative lack of intermediate skills.<sup>9</sup> The UK has one-third fewer people qualified to level 2 than either France or Germany and only half as many people qualified to level 3 or above as Germany (chart C.4).

The chart suggests that the problem is most acute in terms of vocational skills. The UK is still some way behind Germany and France in terms of the percentage of the workforce with vocational qualifications at level 2 and above. This is despite improvements over the period 1994 to 1998.

#### ...but younger workers are gaining more qualifications...

However, as with basic skills, there are encouraging signs for the future. New entrants to the labour force enjoy higher qualifications than those they replace. The proportion of 19 and 21 year olds holding level 2 and level 3 qualifications has been increasing, with the proportion of 21 year olds with a level 3 qualification rising from 48 per cent in 1997 to 54 per cent in 2001 (chart C.5).

<sup>9</sup> Level 5 is equivalent to degree level; level 4 is higher education below degree level; level 3 is A level/apprenticeship; level 2 is GCSE grade A-C or equivalent; level 1 is GCSE below grade C.



**...though time spent on continuing education and training falls short of our competitors.**

The acquisition of skills does not begin and end at school. Individuals develop skills over the course of their working lives, both through formal and informal ('on-the-job') training. Although the UK performs relatively well in terms of job-related training, the International Adult Literacy Survey shows the UK performing ahead of the US but behind Canada and others in terms of hours of all continuing education and training undertaken (chart C.6). As a result, the advantage that many of our competitors already enjoy from school is enhanced by a relatively higher commitment to lifelong learning.

**ICT skills shortages appear to have eased...**

Information and Communication Technology (ICT) skills are an especially important vocational skill. A consensus is emerging which suggests that the full gains from investments in ICT are achieved only when there is corresponding investment in organisational change and improvements in employee skill levels.<sup>10</sup>

There has also been substantial progress on the development of ICT skills. In 1999 the first set of *Competitiveness Indicators* showed that in the UK the proportion of firms

who thought that their staff needed ICT training was the highest in the G7. The lack of skilled workers was holding the UK back from taking full advantage of ICT. However, the latest data suggests that skills were less important as a constraint on the adoption or further development of ICT (chart C.7). Although this could reflect problems in the high tech sector, and associated reduction in demand for ICT skills, recent analysis also suggests there has been an improvement in the supply of ICT skills.<sup>11</sup>

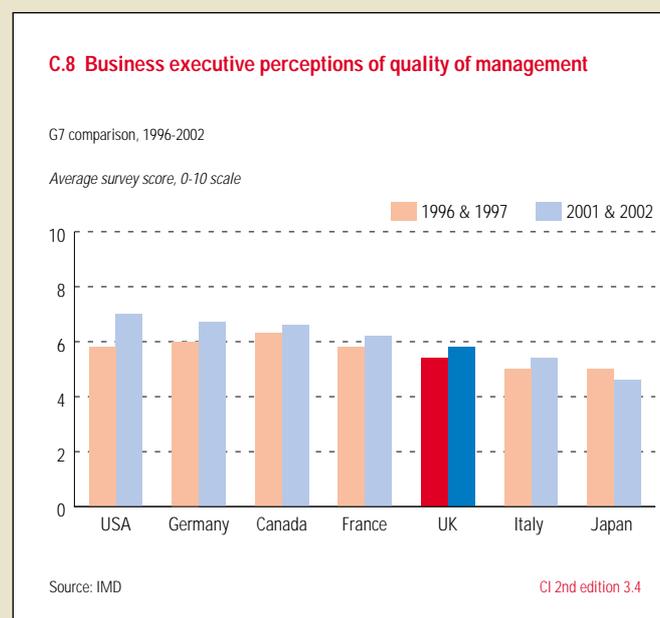
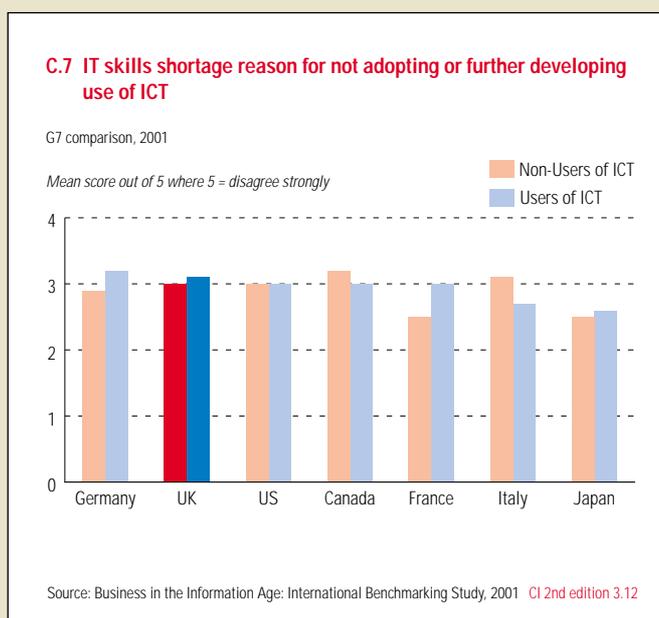
**...but the quality of managers is still seen as a problem.**

There are also increasing concerns about the quality of UK management.<sup>12</sup> Managers affect productivity through organising businesses, sanctioning investment, fostering innovation and leading and motivating employees. Although there has been progress since 1996/97, UK managers are perceived to be of lower quality than their counterparts in Germany and France. Significantly, the gap with the US and Germany has widened in the last five years (chart C.8).

<sup>10</sup> OECD, (2001a)

<sup>11</sup> Mason, (2002)

<sup>12</sup> TUC/CBI, (2001); Council for Excellence in Management and Leadership, (2002)



Similarly, analysis for the National Skills Taskforce showed that UK managers were inadequately qualified in comparison with international competitors. It also showed that UK managers performed particularly badly in terms of their adaptability, entrepreneurial and technical skills when compared with US, German, French and Japanese managers.<sup>13</sup>

### Conclusion and policy response

The low levels of skills in the UK have been holding back investment, innovation and productivity. This partly reflects historic weaknesses in the educational system, together with an inadequate commitment to workforce development.

The market alone is unlikely to be able to rectify the UK's skills gap. This is because of market failures, such as imperfect information about the costs and benefits of training, reluctance of lenders to finance training or the risks that one firm will not invest in training because non-training rivals will 'poach' their staff. As a result there is a strong role for Government to aid the development of skills, from basic schooling and higher education through to support for vocational training.<sup>14</sup>

There are signs of progress. The improvements in basic skills amongst the young are especially encouraging, since they lay the foundation for a higher skilled workforce in the future. Employees and employers will have a firmer platform on which to undertake additional training and adapt to the rapidly changing economic environment. However, it will take many years before the benefits of improved schooling feed into the UK workforce.

The UK still has substantial scope to catch up to the average skill levels of our major competitors.<sup>15</sup> This would require a sharper focus on developing basic and intermediate skills, especially vocational skills. The Government has made education one of the key themes of this parliament and the recent Spending Review signalled its intent to deliver improvements. Spending on education and skills in England is set to rise by an average of 6 per cent a year in real terms over the next three years, taking it from £45.0 billion in 2002-03 to £57.8 billion in 2005-06. UK

education spending is forecast to rise to 5.6 per cent of GDP by 2005-06, fulfilling the Government's pledge to raise the share of national income devoted to education over the parliament.

Achieving and maintaining the skill levels found in other major European countries will also require a greater commitment to lifelong learning, from both employers and employees. The PIU set out an approach to develop the skills of the workforce in the UK in its report *In Demand: Adult Skills in the 21st Century*, which outlined a strategic framework consisting of three elements – raising demand from employers and individuals; increasing the quality and responsiveness of the supply of learning; and a supportive Government framework. The PIU expects to publish a further report in Autumn 2002 with their recommendations and a timetable for implementation.

To build further on the work of the PIU, the Government outlined in the Pre-Budget Report 2001 an approach to target basic and level 2 skills. The approach is designed to tackle the market failures caused by poaching, difficulties gaining finance from external sources and a lack of information. These difficulties are more acute at lower skills levels; there is thus a strong rationale for Government intervention at these skill levels.

The Spending Review also set out an ambition to help a total of 1.5 million adults with basic skills between 2001 and 2007 and to reduce by 40 per cent the numbers of adults in the workforce who lack level 2 qualifications by 2010. In addition to an increase in funding for further education colleges, SR2002 announced a review of adult learning to examine incentives and consider how to encourage institutions to be more responsive to employer needs.

<sup>13</sup> Bosworth (2002)

<sup>14</sup> HMT, (2002)

<sup>15</sup> O'Mahony and de Boer, (2002)

Finally, UK managers need to reach the standards of the best in the world in order to provide leadership, foster innovation and drive up productivity. The Council for Excellence in Management and Leadership (CEML) was commissioned by the Government to analyse UK management and to recommend a strategy to improve it. It published its final report to the Government in May. The Government has recently issued its response which set out its strategy to raise the quality of UK management and leadership.

**There has been little evidence of change since 1999; the UK's enterprise performance is average for a major industrialised economy, with strengths in the regulatory environment and venture capital provision, but continued weakness in socio-cultural attitudes and female involvement.**

Enterprise involves the identification and exploitation of new business opportunities.<sup>1</sup> It can be found at different levels across all types and sizes of firm, but it is the ability and willingness to start a new business and develop it through its early stages that is considered here. Measures designed to encourage the creation and growth of new firms have become an increasingly important focus of policy in most developed economies.

Enterprise plays an important role in economic growth through fostering innovation and investment.<sup>2</sup> The entry, exit, growth and decline of firms are crucial mechanisms through which economies can allocate society's scarce resources to their most productive application. There is also some evidence to suggest that the expansion of ICT

in recent years has heightened the economic importance of entrepreneurship in driving growth.<sup>3</sup> New technologies are able to lower the costs associated with information gathering, communication and making transactions, which can reduce the commercial advantages of large incumbent firms, offering opportunities for new, innovative start-ups that can improve products and processes.<sup>4</sup>

<sup>1</sup> OECD, (1999)

<sup>2</sup> Audretsch and Thurik, (2000)

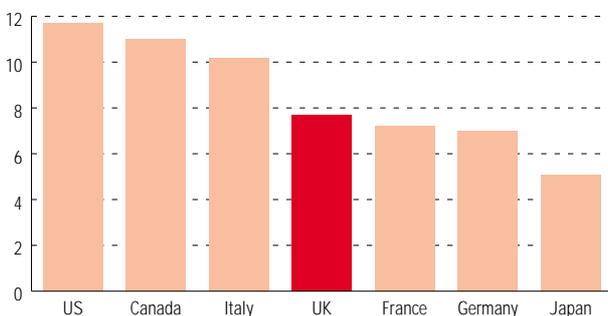
<sup>3</sup> Audretsch and Thurik, (1997)

<sup>4</sup> OECD, (2001a)

### D.1 Entrepreneurship rates

G7 comparison, 2001

Per cent



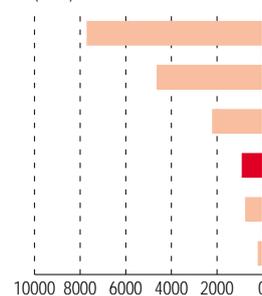
Source: GEM

CI 2nd edition 4.10.1

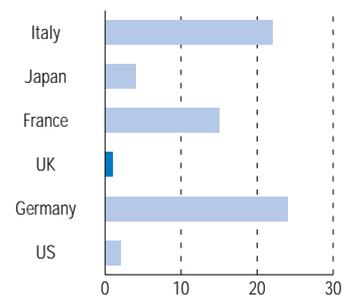
### D.2 Costs and delays in setting up a business

G7 comparison, 1998

Minimum cost to establish a company (euros)



Maximum delay to establish a company (weeks)



Source: OECD

### Entrepreneurship rates in the UK are at best moderate...

Measuring entrepreneurship is a difficult task, and making international comparisons presents a further set of problems. One systematic attempt to address these problems is the Global Entrepreneurship Monitor (GEM)<sup>5</sup>. The GEM defines the participation rate in entrepreneurial activity as the proportion of individuals in the process of starting a new business, or who are owner-managers of businesses that are less than 3 and a half years old. Using this measure the level of entrepreneurship in the UK economy is higher than in Japan, broadly comparable with France and Germany, but significantly lower than in Italy, the US and Canada (**chart D.1**).

### ...despite some important advantages in the business and regulatory environment.

The latest GEM report notes that the UK environment for entrepreneurship has some important strengths, including conducive business and regulatory conditions and a highly developed venture capital market. But the study concludes that the main factors constraining entrepreneurship in the UK are social and cultural attitudes towards wealth creation, self-employment and business failure.

Aspects of the business environment such as tax, regulation and administrative burdens can act to discourage entrepreneurship. For example, research has shown that levels of regulation and administrative difficulties in starting new firms have significant negative effects on rates of new firm entry, and may even have a discernible negative impact on productivity in the wider economy.<sup>6</sup> The GEM also finds that skills play an important part in determining levels of opportunistic entrepreneurship.<sup>7</sup>

The UK scores well on many aspects of the business environment (**chart D.2**). Both the cost and time taken to start a new firm are below the average for major industrialised economies. The UK ranked third out of 17 countries in the OECD's overall indicator for the ease of establishing a business.

<sup>5</sup> Reynolds, (2001)

<sup>6</sup> Djankov, (2000); Audretsch and Thurik, (1997)

<sup>7</sup> Defined as the voluntary pursuit of a business opportunity, and contrasted with 'necessary' entrepreneurship, which results from an absence of employment opportunities

### Relatively few women are involved in start-up firms

However, an important factor that may be limiting enterprise in the UK is a low rate of female involvement in entrepreneurship. GEM shows that the proportion of women in the UK involved in entrepreneurial activity is less than one-third of the rate for men. This compares poorly with the average female participation rate across the 29 GEM countries of approximately half the male rate. And these findings are supported by an OECD study that showed the UK had the third lowest rate of female entrepreneurial participation amongst a sample of 15 industrialised countries.<sup>8</sup> Countries such as the US, Canada, Australia and New Zealand, which score very highly on overall measures of entrepreneurship, also have strong rates of female entrepreneurial participation.

### Access to finance is important for would-be entrepreneurs...

As well as cultural and regulatory barriers, an important factor in the development of entrepreneurial firms is access to finance. For many companies, 'internal' finance (i.e. retained profits) is an important source of funds for investment. But start-up and early stage businesses will often not yet have generated profits, so will have to rely on 'external' finance.

Bank and trade finance are the most important sources of external finance for the majority of smaller firms, and factoring and leasing are becoming increasingly important. However, where a firm is involved in projects perceived to be of high risk, or where lead times are long, equity finance is often more suitable. Equity finance is particularly appropriate for high risk, high growth firms because it avoids the cash flow problems associated with debt finance, and allows the finance provider a share of any upside to compensate for the greater risk.

<sup>8</sup> OECD, (2001b)

The main sources of equity finance range from informal finance from family, friends, and 'business angels', to formal venture capital. Informal finance dominates, with GEM showing that 82 per cent of equity finance for nascent and new firms in the UK comes from informal sources. However, although the total financial input of formal venture capital is much less than that of informal venture capital, it still has a vital role to play in enabling entrepreneurship to flourish.

### ...and the UK enjoys a relatively strong position in venture capital provision.

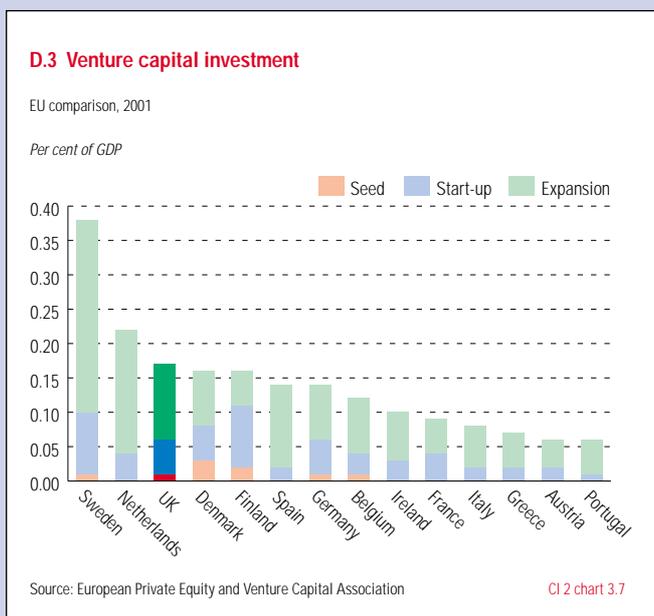
The UK has the largest venture capital industry in Europe, accounting for 28 per cent of all European venture capital investment, and is one of the largest in Europe, in comparison to GDP (**chart D.3**). This is an important strength for the UK, for whilst the amounts invested by formal venture capitalists may not be as large as informal investment, evidence shows that companies backed by venture capital tend to grow very quickly and generate significant amounts of employment.

The US-led boom in the ICT sector in the late 1990s led to a rapid expansion in venture capital activity across many countries, including the UK. There were huge increases in the amounts invested and very high rates of return<sup>14</sup>. The recent downturn in equity markets has certainly curtailed this growth, both directly as institutional investors have been less willing to invest in venture capital funds, and indirectly as lower valuations have constricted exit routes (such as trade sales and IPOs). But figures from the European Venture Capital Association (EVCA) show that although the total value of UK venture capital deals was sharply lower in 2001 than in 2000, the number of deals rose (implying more, smaller investments). Moreover, the total funds raised by venture capitalists increased, as did the proportion of funds directed to high-tech industries.

### Conclusion and policy response

In a modern, high-tech economy, entrepreneurship has an increasingly important role to play in driving up average living standards. New firms, particularly those that grow very quickly in their infancy, are an important source of technological innovation and job creation. And it is important for productivity and competitiveness that weaker firms are replaced by stronger ones.

In international comparisons the UK has an average score on rates of entrepreneurship, with a similar rate of entrepreneurial participation to other major European countries but a significantly lower rate than in the US and Canada. Although the UK scores well on venture capital availability and in having an accommodating business environment, social and cultural attitudes are not encouraging. In addition to this, the UK has a relatively low rate of female entrepreneurial participation. In combination with the finding that skills are a determinant of entrepreneurship, this suggests a role for Government in providing opportunities for young people to gain a meaningful experience of enterprise as part of their education, especially among women and in disadvantaged communities. In terms of finance, the recent downturn in equity markets has had an effect on flows of venture capital, but the UK venture capital industry remains strong, and is clearly the leader in Europe.



In seeking to make Britain one of the most competitive environments for business in the world, the Government is committed to rewarding entrepreneurial spirit and promoting growth, especially among new and small businesses.

The Government has made a number of changes to the tax regime to provide further support to new and growing companies and to simplify their negotiation of it. It has:

- reduced the corporation tax rate for companies with profits below £10,000 - already the lowest in the European Union - from 10 per cent to zero, meaning that 150,000 small companies will no longer pay any corporation tax;
- lowered the small companies' rate from 20 to 19 per cent, reducing the corporation tax bills of a further 335,000 companies;
- simplified the VAT system for small businesses: and
- introduced the Enterprise Management Incentive Scheme – promoting share ownership and entrepreneurial participation in smaller, high-risk growth companies.

The Government also acts as a central provider of information to help companies seize opportunities. This information needs to be provided in a way that is accessible, particularly at the local level. The Small Business Service (SBS) and the RDAs will pilot and evaluate different RDA-led approaches to achieving improved coordination of business support services at the local level and ensuring that local Business Link services promote the RDAs' Regional Economic Strategies. Examples of such approaches include piloting the setting up of RDA business support boards to coordinate business support activities and piloting regional management of Business Link services in one or two regions. The SBS will work closely with pilot RDAs. These pilots should start by April 2003 and if possible earlier.

Despite growth in private sector activity, many small and growing firms still face problems in accessing risk capital, particularly for smaller amounts. These problems also have a regional dimension. Therefore, the Government has introduced a number of measures, including the Early Growth Funding initiative, the High Technology Fund and the Regional Venture Capital Fund.

The Government is committed to encouraging enterprise, investment and wealth creation across all regions in Britain. To ensure that Britain's most disadvantaged communities are not left behind, it is introducing a range of measures to encourage investment and enterprise in these areas.

Following the recommendation of the Social Investment Taskforce and consultation, the Government announced its intention to proceed with a new Community Investment Tax Credit to encourage private investment in not-for-profit and profit-seeking enterprises in under-invested communities. The Government is also taking forward the task force's recommendation to help set up a Community Development Venture Capital Fund - a matched funding partnership between government and the venture capital industry to provide finance for firms operating in disadvantaged areas. Moreover, it has introduced an exemption from stamp duty for all property transfers up to £150,000 in the most disadvantaged areas.

As well as resources and information, improving levels of entrepreneurship needs a culture in place that promotes sensible risk taking. Many potential entrepreneurs are dissuaded from starting new businesses by the perceived costs of failure. The Enterprise Bill, introduced on 26 March 2002, takes further steps toward reducing the stigma attached to business failure, creating effective incentives for the rescue of viable businesses, and recognising the needs of all creditors. The Government has reformed both personal bankruptcy laws and corporate insolvency laws to recognise the interest of all creditors.

Strengthening the links between the education system and business is vital to promote an enterprise culture for the future. In February 2002, Sir Howard Davies, Chairman of the Financial Services Authority (FSA), reported to the Chancellor and the Secretaries of State for Trade and Industry and Education and Skills on how to promote better understanding of business, the economy and enterprise throughout the school and further education systems.

**The Competitive Framework is an asset for the UK. It provides an open, effective competition regime, access to world markets and a flexible labour market. The UK needs to build on success to enable markets to work better.**

The framework within which businesses, consumers and employees interact is central to productivity and competitiveness. The framework sets out the rights and responsibilities of participants and gives parties the confidence to interact. It ensures that contracts are fulfilled, that consumers have rights of redress, that intellectual property is safeguarded, that workers have minimum rights and that managers have the incentives to behave with probity. Weaknesses in the framework undermine confidence and make it more costly for firms to generate productivity gains.

The effectiveness of this framework can be difficult to measure. However there are several broad aspects to the competitive framework within which market participants interact. They depend on the openness of the market to domestic and foreign competition, the supportiveness of

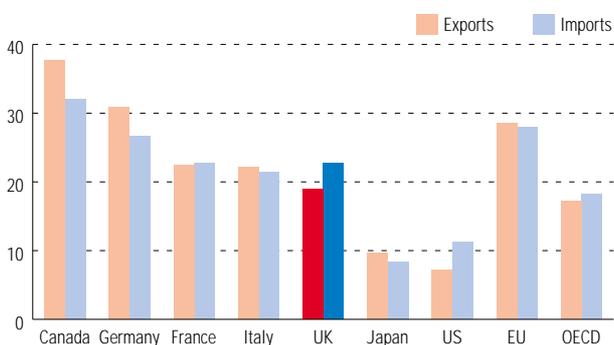
the political and institutional environment and the degree of regulation, especially in the labour market.

Any successful framework must aim to secure vigorous competition between companies. Competition can raise productivity both now and in the future. It raises productivity now by ensuring resources are allocated to those sectors and companies that are most productive and by forcing them to maintain the lowest possible production costs. Competition can raise productivity in the future by encouraging companies to produce new or better products and ways of producing them; if they fail to innovate then there is every chance that one of their competitors will do so. Conversely, an absence of competition enables incumbent firms to block new entrants, denying consumers choice and stymieing innovation. A recent OECD review concluded that "the link between product market competition and productivity is positive and robust".<sup>1</sup>

### E.1 Trade in goods and services

G7 comparison plus EU & OECD averages, 2001

Per cent of GDP



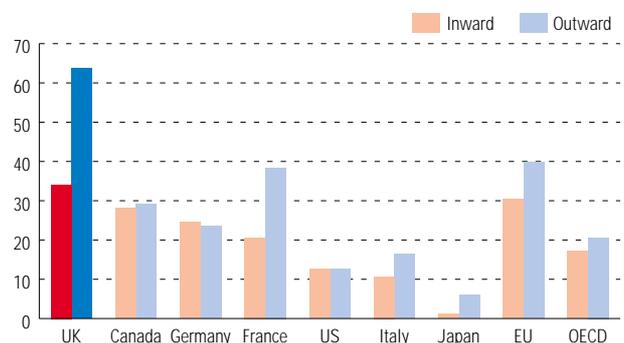
Source: OECD

CI 2 chart 2.2.1

### E.2 Value of foreign direct investment

G7 comparison plus EU & OECD averages, 2000

Book value of balance sheet as per cent of GDP



Source: UN World Investment Report

CI 2 chart 2.2.3

### The UK is relatively open to domestic and foreign competition...

The UK is now perceived as having one of the most effective competition regimes in the world. A recent peer review put the UK in the top half of its peer group, behind the US and Germany, but ahead of the rest of the OECD.<sup>2</sup>

Competitive intensity reflects not only competition in the domestic market but also from international sources. Economies benefit from open trade and foreign direct investment because they are able to specialise in the goods and services they produce most efficiently. Openness can also facilitate the spread of best practice and knowledge. Similarly access to overseas markets gives access to larger markets, permitting productivity gains through economies of scale.

As in the first edition of the Indicators, the UK continues to be an open economy as measured by total exports and imports as a percentage of output (**chart E.1**). The UK has however fallen behind Germany on this measure.

In 2000 foreign direct investment into the UK and its investment in the assets of other countries were both the highest in the G7, as a proportion of GDP (**chart E.2**). This maintains and even improves slightly on the UK's record since the first

Indicators publication. In 1996 the UK was ahead of all the other G7 countries in both outward and inward investment, with the exception of Canada, which had higher inward investment as a proportion of GDP.

Taken together these two indicators suggest that the UK is a relatively open economy. As discussed, openness brings a number of productivity gains and empirical evidence suggests that international openness has raised economic growth in the UK and other European economies.<sup>3</sup>

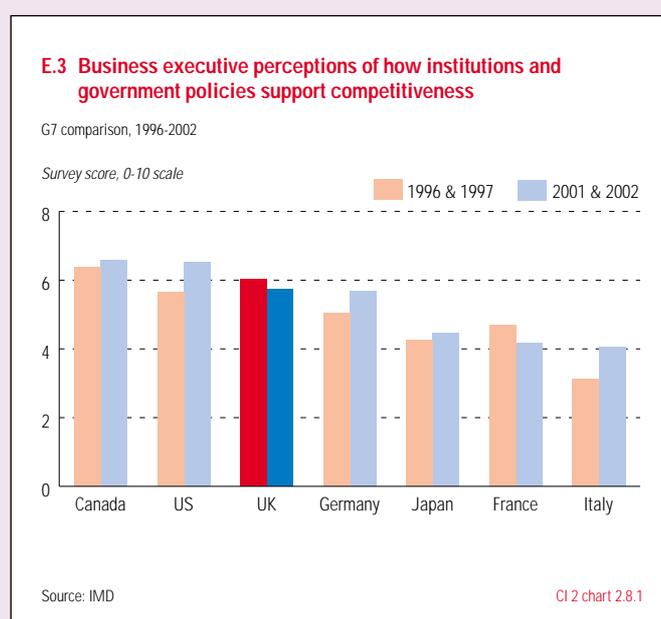
### ...and has institutions and policies generally seen as supporting competitiveness.

For the UK to remain a key destination for inward investment it needs to continue to provide an attractive environment for business. This includes both the macro and microeconomic conditions, in particular, factors such as access to skilled managers and workers, specialist premises and infrastructure. Institutions and regulations also need to be supportive of competitiveness.

Surveys suggest that the UK is perceived to have institutions and policies that support competitiveness. The most recent results put the UK behind only Canada and the US (**chart E.3**).

On regulation, surveys suggest that the UK remains well-regarded as a business location, although, the UK's score on this measure has fallen since 1996/1997.

Mirroring the above composite indicators, the separate measures show that the regulatory environment is perceived to be supportive. Competition laws are seen to prevent unfair competition; price controls are not perceived to affect prices in most industries; and the legal framework is seen to aid competitiveness.



<sup>1</sup> OECD, (2002)

<sup>2</sup> PWC, (2001)

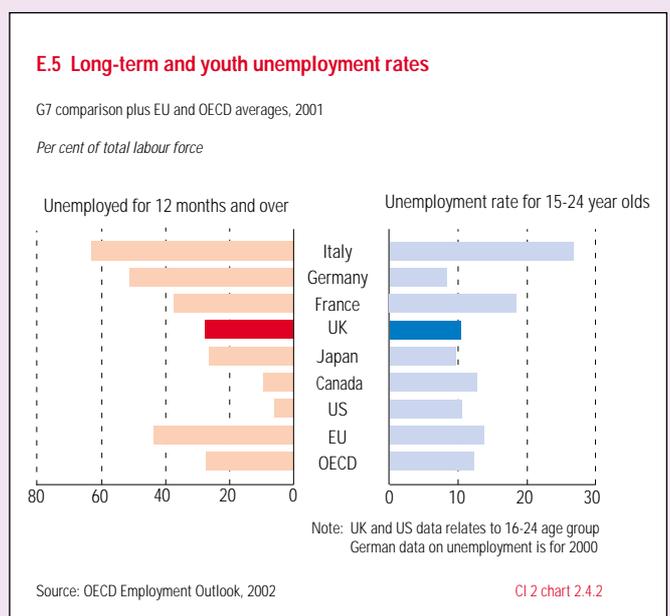
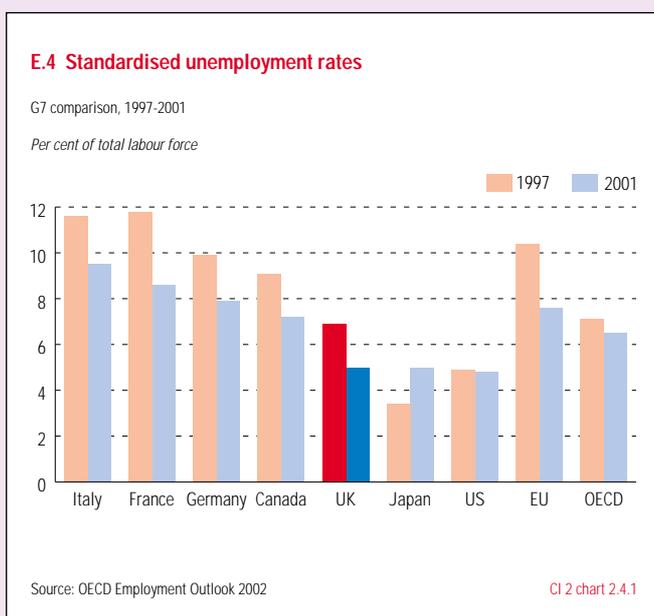
<sup>3</sup> Proudman and Redding, (1998)

### In the labour market, unemployment is relatively low...

A flexible and well functioning labour market is essential if markets are to work efficiently and allocate resources to their most productive use. Labour market flexibility has contributed to the sustained period of successful employment performance in the UK.<sup>4</sup> The UK had a lower unemployment rate than the EU average in 2000, and a rate lower than its European G7 competitors, but higher than the rate in Japan and the US (**chart E.4**). The unemployment rate fell in all G7 countries except Japan between 1997 and 2001.

The UK also performs well by European standards in terms of long term unemployment. Minimising long term unemployment helps to keep workers in touch with the labour market. This is because long periods of unemployment can make skills obsolete and reduce the motivation to find employment. Moreover, employers can take time spent in unemployment as a signal of a worker's quality. Overall, 28 per cent of UK unemployed have been out of

work for more than 12 months (**chart E.5**). However, this is well below the EU average of 44 per cent and also represents an improved performance when compared to the first edition of the Indicators.



**...and labour market regulation is generally well-regarded.**

International managers recognise the effectiveness of UK labour market regulation.<sup>5</sup> The IMD's survey suggests that the UK labour market has a regulatory environment perceived as significantly better than other major European countries, and only slightly behind the US (chart E.6).

Managers' perception of the degree of flexibility has, however, fallen since it was measured in 1996 and 1997. The same trend is apparent in some other G7 countries, particularly France.

The mark-up on wage costs faced by employers (e.g. social security charges) is another measure of the burden of government intervention. US figures show that the UK compares very favourably with other G7 countries on this measure, with non-wage labour costs just under 13 per cent of total labour costs, compared with roughly 15-30 per cent for the other G7 and EU countries (chart E.7).

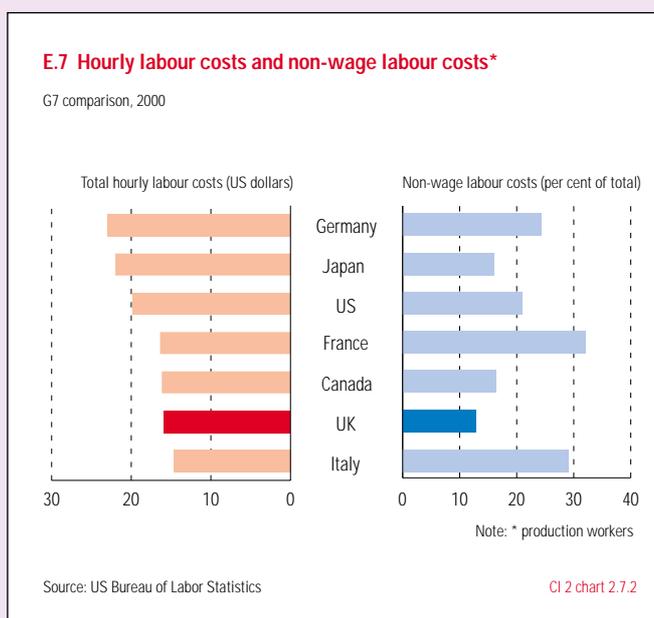
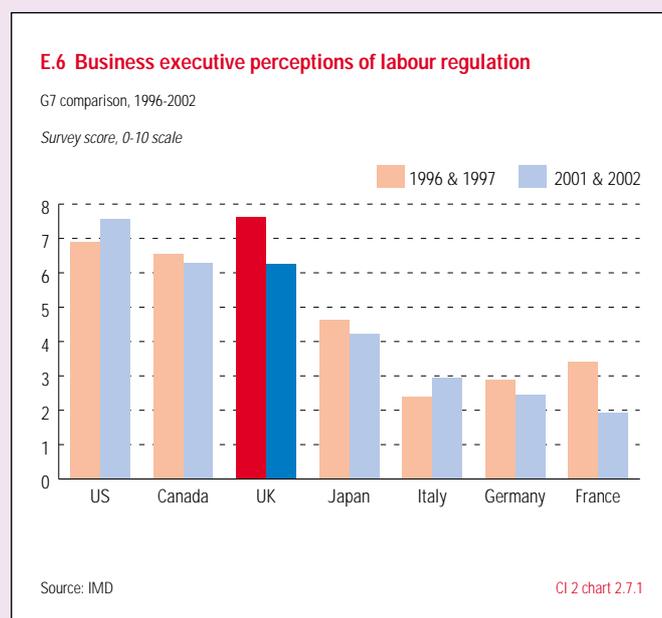
**Employment opportunities are diverse...**

Diversity of employment opportunity has an important role to play in ensuring that an economy makes the most of the skills embodied in its labour force. Diversity of opportunity should reduce costs associated with absenteeism and frequent staff turnover.

A measure of the diversity of employment can be gauged by examining full-time, part-time and temporary working. The last decade has seen an increase in both part-time working and temporary working as a percentage of total employment in the UK, the latter to a much lesser extent. In comparison with its European competitors the UK had a higher proportion of part-time workers and a lower proportion of temporary workers in 2000 (chart E.8). The UK's position has remained largely static since the first edition of the Indicators, which contained 1997 European data.

<sup>4</sup> Nickell and Quintini, (2002)

<sup>5</sup> International Institute for Management Development, (2002)



### ...and labour relations remain good by international standards.

Finally, the Government sets the framework of employment law, governing how employers and employees relate to one another. This is a key area for competitiveness, because an adversarial industrial relations climate can reduce output, and inhibit the introduction of productivity-enhancing working practices. UK performance has recently been strong. The UK has seen a lower rate of labour disputes than Canada, Italy, France and the US, but does not perform as well as Germany and Japan, where the rates are very low (**chart E.9**). All G7 countries, and the EU as a whole, have seen the number of days per worker lost due to stoppages fall in comparison to the 1990 – 94 period, with the exception of France.

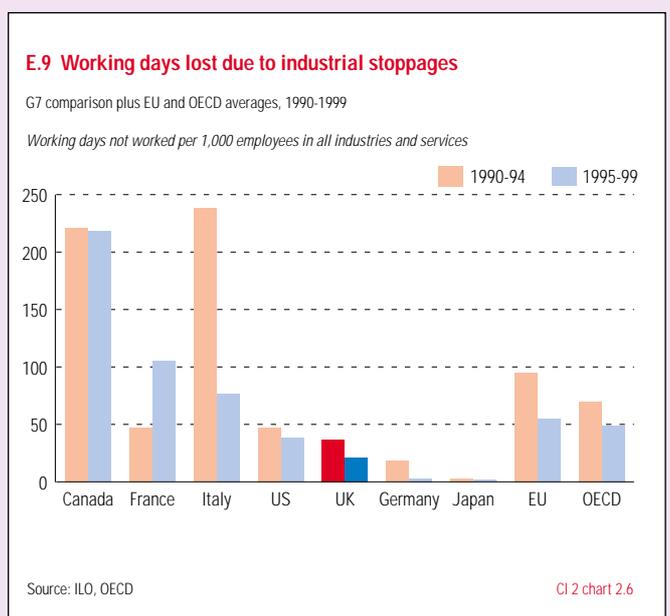
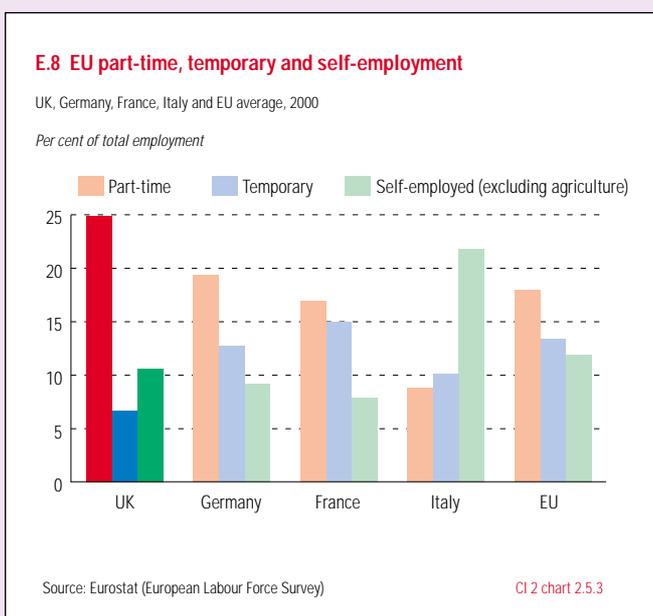
### Conclusion and policy response

The competitive framework is an asset for UK competitiveness. The UK remains an open economy and

continues to attract substantial foreign direct investment, relative to its output. These two factors help the UK both to specialise in those products that it can produce most productively and to take advantage of knowledge transfer. The success of the UK, especially in terms of FDI, reflects international managers' perception that UK institutions and regulation are supportive of competitiveness.

The Government has not been complacent about the success of the competition regime and has sought to strengthen it through reforms and increased resources for the UK's competition authorities. The Competition Act 1998 took this agenda forward and came into force on 1 March 2000. Key aspects of the legislation are:

- anti-competitive agreements, cartels and abuses of a dominant position are now unlawful from the outset;
- businesses which infringe the prohibitions are liable to financial penalties of up to 10 per cent of UK turnover for up to 3 years ;
- competitors and customers are entitled to seek damages;
- the Director General of Fair Trading has new powers to



- step in at the outset to stop anti-competitive behaviour;
- investigators are able to launch 'dawn raids', and to enter premises with reasonable force; and
- the new leniency policy will make it easier for cartels to be exposed.

This year the Government built on the Competition Act when it introduced the Enterprise Bill, which, amongst other measures:

- gives full independence to the UK competition authorities, so that they will take decisions free from political interference in the overwhelming majority of cases;
- gives the Office of Fair Trading (OFT) a clear proactive role to keep markets under review and enable it to refer markets to the Competition Commission where they may not be working well;
- improves the mergers and monopolies investigations regimes, giving greater certainty through clearer timetables and a more transparent decision-making process; and
- introduces new criminal penalties for individuals who engage in cartels, covering the most serious forms of anti-competitive activity.

In line with their greater responsibility, the Spending Review increased the funding for both the Office of Fair Trading and the Competition Commission.

The UK's labour market continues to perform well and the regulation of it is highly regarded by companies deciding where to invest. The unemployment rate is low by recent historical and European standards. The UK is more successful than its European competitors at keeping the unemployed in contact with the labour market, which is demonstrated by a lower proportion of long term unemployed. International managers perceived labour market regulation as significantly better than other major European countries, and only slightly behind the US.

The UK cannot afford to be complacent, and a number of policies have been developed to entrench the successful labour market framework and build on its success. The Government aims to foster even greater participation, and, to help achieve this it introduced the Employment Act 2002, which supports its commitment to create highly productive, modern and successful workplaces through fairness and partnership at work. It delivers a balanced package of support for working parents, at the same time as reducing red tape for employers by simplifying rules governing maternity, paternity and adoption leave and pay, and making it easier to settle disputes in the workplace.

## BIBLIOGRAPHY

- Aghion P., and Howitt P., *Endogenous Growth Theory* (1998)
- Ashworth, P., Hubert, F., Pain, N., Riley, R. *UK Fixed Capital Formation: Determinants and Constraints*, A report for DTI, TUC and CBI (2001)
- Audretsch, D. and Thurik, R. 'Sources of Growth: The Entrepreneurial vs. the Managed Economy' *Centre for Economic Policy Research Paper No. 1710* (1997)
- Audretsch, D. and Thurik, R. 'Linking Entrepreneurship to Growth' paper prepared for the OECD Directorate of Science, Technology and Industry (2000)
- Barro, R., and Sala-i-Martin, X., *Economic Growth* (1995)
- Bermin, E., Bound, J., Machin, S. 'Implications of Skill-biased Technical Change' *CEP Discussion Paper 37* (1997)
- Bosworth, D. 'Empirical Evidence of Management Skills in the UK' *Skills Task Force Research Paper* (2000)
- Castells, M., *The Rise of the Network Society* (1996)
- Council for Excellence in Management and Leadership, *Managers and Leaders, Raising Our Game* (2002)
- Council for Integrated Transport, *European Best Practice in the Delivery of Integrated Transport* (2001)
- Crafts, N.F.R., 'Post-Neoclassical Endogenous Growth Theory: What are its Policy Implications?' *OxREP* (1996)
- Crafts, N.F.R., "Supply Side Policy and British Economic Decline", in HM Treasury, *Economic Growth and Government Policy* (2001)
- Crafts, N.F.R., and O'Mahony, M., 'A Perspective on UK Productivity Performance' *Fiscal Studies* (2001)
- Djankov, S. et. al. 'The Regulation of Entry', *NBER Working Paper No. 7892* (2000)
- DTI, *Building the Knowledge Driven Economy: Analysis and Background* (1998)
- DTI, *UK Competitiveness Indicators* (1999)
- DTI, *Excellence and Opportunity: a science and innovation policy for the 21st Century* (2000)
- DTI, *Business in the Information Age: Benchmarking Study* (2001)
- DTI, DWP, DFES, HMT, *Full and Fulfilling Employment: Creating the labour market of the future* (2002)
- DTI & HMT, *Enterprise and the Productivity Challenge* (2001)
- DTI & HMT, *Investing in Innovation* (2002)
- EEF, *Catching up with Uncle Sam* (2001)
- European Conference of Ministers of Transport, *Traffic Congestion in Europe* (1998)
- EUROSTAT, *EU Transport in Figures* (2000)
- Godden, D., *Investment Appraisal in the UK: Has it changed since the mid 1990s*, CBI (2001)
- Gregg, P. and Wadsworth, J., 'Mind the Gap, Please: The Changing Nature of Entry Jobs in the UK', *Economica* 67, (2000)
- HEFCE, *Higher Education Business Interaction Survey* (2001)
- HMT, *Productivity: The Evidence and the Government's Approach* (2000)
- HMT, *Developing Workforce Skills: Piloting a New Approach* (2002)
- International Institute for Management Development, *World Competitiveness Yearbook* (2002)
- Jarvis, V., O'Mahony, M., Wessels, H., 'Product Quality, Productivity and Competitiveness' *NIESR Occasional Paper 55* (2002)
- Maddison, A., *Dynamic Forces in Capitalist Development* (1991)
- Mason, G., *Industrial Performance, ICT Investments and Workforce Skills: Literature and Statistical Review – A report for DTI, NIESR* (2002)
- Moser, C., *Improving Literacy and Numeracy for Adults: A Fresh Start, An independent review for HM Government* (1999)
- Nickell, S., 'The Assessment: The Economic Record of the Labour Government Since 1997', *OxREP v.18 (2)* (2002)
- Nickell, S. & Quintini, G., 'The Recent Performance of the UK Labour Market' *OxERA v.18 (2)* (2002)
- Nicoletti, G., Scarpetta, S. and Boyland, O. 'Summary Indicators of Product Market Regulation with an Extension to Employment Protection Legislation', *Economics Department Working Paper No. 225*, OECD (1999)
- O'Mahony, M., and de Boer, W., *Britain's Relative Productivity Performance: Updates to 1999*, NIESR (2002)
- OECD, *Fostering Entrepreneurship* (1999)
- OECD, *The New Economy: Beyond the Hype* (2001a)
- OECD, 'Drivers of Growth: Information Technology, Innovation and Entrepreneurship' *Science, Technology and Industry Outlook* (2001b)
- OECD, 'Competition, Innovation and Productivity Growth: A Review of Theory and Evidence' *Economics Department Working Paper No. 317* (2002)
- ONS, *Labour Force Survey*, (2001)
- PIU, *In Demand: Adult Skills in the 21st Century* (2001)
- Prais, S J, *Productivity, Education and Training: An International Perspective* (1995)
- Proudman, J and Redding, S., *Openness and Growth* (1998)
- PWC, 'Peer Review of UK Competition Policy Regime', *Report to DTI* (2001)
- Reynolds, P. D., Camp, S. M., Bygrave, W. D., Erko, A., Hay, M., *Global Entrepreneurship Monitor* (2001)
- Stockdale, B., 'UK Innovation Survey 2001' *Economic Trends* (2002)
- TUC and CBI, *Productivity Report* (2001)

## CROSS REFERENCE TABLE

The table below groups the indicators in terms of the main drivers of productivity. The table shows how this structure relates to the organisation of the indicators in the second edition, which was published in February 2001.

Productivity Driver		Indicator reference in the 2nd edition		
<b>Results</b>	Macro-environment	2.1 Macroeconomic stability		
	Output / productivity	5.1 GDP per head 5.2 Labour productivity		
	Employment	5.3 Employment rate		
	Quality of life	2.9 Quality of life		
<b>Investment</b>	Physical capital	3.5 Business investment 3.6 Government investment		
	Information and communications technology	3.10 Connecting to the digital market place 3.11 E-commerce		
<b>Innovation</b>	Science And Technology	3.13 Publications and citations 3.14 Government spend on R&D 3.15 Business spend on R&D		
	Technology commercialisation	4.1 Business spend on innovation incl. R&D 4.2 UK's patenting performance 4.3 Proportion of firms that innovate 4.4 Sales from new or improved products		
	Knowledge Transfer	4.5 University licensing, spin-outs & start-ups 4.6 Sources of information for innovation 4.7 Joint publishing by universities and industry		
	Receptiveness To Foreign Ideas	4.8 Internationalisation of R&D 4.9 Technological alliances between firms		
	<b>Skills</b>	Human Capital	3.1 Adult literacy and numeracy 3.2 Intermediate and higher-level skills 3.3 Lifelong learning 3.4 Management skills 3.12 ICT understanding in companies	
			<b>Enterprise</b>	Entrepreneurship
Finance				
			<b>Competitive markets</b>	Product market
Labour market				

### Glossary

**G7** includes the UK, the US, Japan, Germany, France, Italy, Canada.

**G5** includes the UK, the US, Japan, Germany and France.

**OECD** refers to countries belonging to the Organisation for Economic Cooperation and Development. The following 30 countries are members: Australia, Austria, Belgium, Canada, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Japan, Korea, Luxembourg, Mexico, The Netherlands, New Zealand, Norway, Poland, Portugal, Slovak Republic, Spain, Sweden, Switzerland, Turkey, United Kingdom, United States.

**EU** refers to the 15 countries that are currently members of the European Union: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, The Netherlands, Portugal, Spain, Sweden, United Kingdom.

### General notes on data compilation

International comparisons of GDP (and many of the derivatives used in the Indicators report such as GDP per head, labour productivity, business investment per worker etc) depend on

i) *a consistent basis for calculating GDP. In contrast to data used in previous Indicators report, the latest data are generally compiled according to the new **System of National Accounts (SNA93)** standard. (The EU Member States compile their national accounts according to the equivalent European System of Accounts, ESA95);* and

ii) a common unit or currency in which GDP is expressed. The simplest way to convert GDP would be to use official currency exchange rates. However these are widely recognised as being inadequate because exchange rates do not adequately reflect the comparative purchasing power of local currencies in their own markets. **Purchasing Power Parities (PPPs)** were developed to provide an alternative conversion rate for GDP to equalise this effect: a given sum of money when converted into different currencies at PPP rates will buy the same basket of goods and services in all countries. In other words PPPs are the rates of currency conversion that eliminate the differences in price levels between countries.

The bulk of the **data sources** used in the *Indicators* report have been taken from the publications of the following organisations:

Organisation for Economic Cooperation and Development (OECD)  
 Statistical Office for the European Community (Eurostat)  
 Office for National Statistics, UK (ONS)  
 United Nations (UN)  
 International Monetary Fund (IMF)  
 International Institute for Management Development (IMD)  
 National Institute of Economic and Social Research (NIESR)

**Historical data for Germany.** National accounts for the Unified Germany officially commence in 1991. Prior to that long-run data (for use in comparisons over economic cycles) have been imputed generally using growth rates from the data for West Germany spliced on to the Germany data.

**1 GDP per head of population**

Levels of GDP per head in the OECD are published on the OECD web site ([www.oecd.org](http://www.oecd.org)).

**2 Growth of real GDP per head**

GDP per head growth rates are derived from GDP and population data taken from the OECD *Economic Outlook* database, June 2002.

Additional population data has been taken from the OECD Labour Force Statistics 1981-2001 publication.

**3 Average employment rates**

Data used to derive the average percentage of the population of working age (men and women aged 15-64) in paid employment is the OECD *Economic Outlook* database, June 2002.

**4 GDP per hour worked**

The data on GDP per hour worked for 1870-1973, comes from Maddison (1991). For the later period 1979-1999, DTI calculations using OECD data were used. The latest data for 2001 are produced by the Office for National Statistics (ONS) and published on their web site ([www.statistics.gov.uk/productivity](http://www.statistics.gov.uk/productivity)).

**5 Explaining the UK's productivity gap**

This data was published in March 2002 in a NIESR report entitled "Britain's relative productivity performance: Updates to 1999" by Mary O'Mahony and Willem de Boer. Within the NIESR report, this data comes from table 8 on page 16.

**6 Volatility of key macro-economic indicators**

Data for GDP growth and inflation (implied GDP deflator), exchange rate changes and nominal short-term interest rates come from the OECD Economic Outlook database, June 2002. Volatility is measured by the standard deviation across the two periods.

**A.1 Relative capital stock per hour worked**

This data was published in March 2002 in a NIESR report entitled "Britain's relative productivity performance: Updates to 1999" by Mary O'Mahony and Willem de Boer. Within the NIESR report, this data comes from table 3 on page 9.

**A.2 Business investment per worker**

Figures for investment per worker in the business sector are taken from the OECD *Economic Outlook* database, June 2002. Business investment includes investment in public corporations. In contrast to data used in the first Indicators report, the latest data are compiled in accordance with the new System of National Accounts (SNA93) standard.

**A.3 Business investment per worker – recent trends**

See notes for A.2 above.

**A.4 Relative capital per hour worked**

This data was published in March 2002 in a NIESR report entitled "Britain's relative productivity performance: Updates to 1999" by Mary O'Mahony and Willem de Boer. Within the NIESR report, this data comes from table 12 on page 27.

**A.5 Connectivity weighted by business size**

The data on connectivity are taken from the DTI Business in the Information Age: International Benchmarking Study, 2001.

**A.6 Government expenditure on investment**

Government investment and GDP data are taken from the OECD *Economic Outlook* database, June 2002.

**B.1 Papers & Citations per head of population**

Data are compiled by the Office of Science and Technology from the Science Citation Index (SCI). The SCI accesses biographical information, author abstracts and cited references in 5,700 of the world's leading scholarly and technical journals covering more than 150 disciplines in over 170 countries. A paper written in 1999 will receive few citations in 1999. By 2000 it will have received more and by 2005 it will have probably received an average of 10 per paper. For this reason, recent data on citations is generally lower than historic levels. To allow for this the latest six year interval has been selected.

**B.2 Industry-funded business enterprise R&D (BERD) real expenditure per worker**

All data are taken from the OECD Annual Business Enterprise R&D (ANBERD) database, which collates the results of national R&D surveys.

**B.3 Patents granted and applications**

Data for patents granted in the US come from the US Patent and Trade Mark Office. Data for EU patent applications are provided by the European Patent Office.

**B.4 Industrial R&D by foreign affiliates**

Data are taken from OECD's Activity of Foreign Affiliates Database. The geographical origin of a foreign affiliate is the country of the parent company if it holds over 50 per cent of the affiliate's voting shares.

**B.5 Novel innovating enterprises**

This data was gathered by member states and compiled and published in 1997, by Eurostat to produce the Community and Innovation Survey (CIS). The data covers the survey period 1994 to 1996.

### B.6 Information sources that firms use for Innovation

This data is being gathered by member states as part of the 2001 Eurostat Community and Innovation Survey (CIS). The data shown are for the UK, as Eurostat results are not yet available.

### B.7 Wider Innovation Activities

See B.6 above.

### B.8 Factors hampering Innovation

See B.6 above.

### C.1 Skill proportions by country

This data was published in March 2002 in a NIESR report entitled "Britain's relative productivity performance: Updates to 1999" by Mary O'Mahony and Willem de Boer. Within the NIESR report, this data comes from table 5 on page 11.

### C.2 Adults with literacy and numeracy skills at the lowest level

Data for literacy and numeracy are taken from OECD, *Literacy Skills for the Knowledge Society*. The chart shows the percentage of adults with 'poor' level 1 literacy and numeracy skills. Further results were obtained from the Adult Literacy Survey, November 1997, OECD.

### C.3 Mean scores for student literacy

The data for the mean scores for student literacy are taken from the OECD Programme for International Study Assessment.

### C.4 Qualifications at level 2+ and 3+ or equivalent

Data on vocational and general qualifications in France, Germany and the UK are taken from the Skills Task Force Research Paper.

### C.5 Performance against National Learning Targets for young adults: NVQ levels 2 and 3

This data is published in the Labour Force Survey produced by National Statistics. The latest data comes from the Spring edition of the bi-annual publication.

### C.6 Average hours of continuing education and training, by type of training

Data on continuing education and training are taken from the OECD Programme for International Study Assessment (PISA), sourced on the International Adult Literacy Survey 1994-98 and national household surveys on adult education and training.

### C.7 IT skills shortage reason for not adopting or further developing use of ICT

Data on IT skills shortages as a reason for not adopting or developing ICT are taken from DTI *Business into the Information Age: International Benchmarking Study*, 2001. Note that this indicator has changed since *UK Competitiveness Indicators: 2nd Edition*. The latter recorded data on IT skills shortages as a reason for not adopting or further developing e-commerce.

### C.8 Business executive perceptions of quality of management

Data on business perceptions of the efficiency of management are taken from the International Institute for Management Development's *World Competitiveness Yearbook 2002*. The IMD surveys the opinions of a panel of over three thousand top and middle management from 47 countries with a 110-item questionnaire. All data sourced for the IMD (C.8, E.3 & E.6) were averaged to eliminate some of the year-to-year volatility.

The indicators used from the publication chosen were the availability of competent senior managers and the international experience of management. The priority of employee training was also included (with a lower weight) as an indicator of the degree to which management invests in its people.

### D.1 Entrepreneurship rates

This data is taken from chart C.01 Total Entrepreneurial Activity Prevalence rate by country, 2001, of the Global Entrepreneurship Monitor produced by Paul D. Reynolds, S Michael Camp, William D. Bygrave, Erko Autio and Michael Hay.

### D.2 Costs and delays in setting up a business

Data on registration times and start up costs are taken from the OECD Science, Technology and Industry Outlook, Drivers of growth: information technology, innovation and entrepreneurship. Table 5.1 Formalities for establishing a corporation, 1998.

### D.3 Venture capital investment

The data on the amount and composition of venture capital comes from the European Private Equity and Venture Capital Association. "Seed" venture capital is defined as: financing provided to research, assess and develop an initial concept before a business has reached the start-up phase. "Start-up" venture capital is defined as: the provision of finance to companies for use in product development and initial marketing. Companies may be in the process of being set up or may have been in business for a short time, but have not yet sold their product commercially. "Early stage" venture capital is defined as: the provision of financing to companies that have completed the product development stage and require further funds to initiate commercial manufacturing sales. They may not yet be generating profits.

### E.1 Trade in goods and services

Trade data are taken from OECD Monthly International Trade Statistics, June 2002.

### E.2 Value of foreign direct investment

Data on foreign direct investment stocks are taken from UN World Investment Report 2001. A foreign investment is classified as a direct investment if the foreign investor holds at least 10 per cent of the ordinary shares or voting rights in an enterprise and exerts some influence over its management.

**E.3 Business executive perceptions of how institutions and government policies support competitiveness**

See also notes for C.8. Data are taken from the IMD *World Competitiveness Yearbook*.

Fifteen representative indicators were selected from the IMD list, with the results averaged to produce the indicator.

**E.4 Standardised unemployment rates**

Standardised unemployment rates are taken from OECD Employment Outlook, July 2002

**E.5 Long-term and youth unemployment rates**

Long-term and youth unemployment rates are taken from OECD Employment Outlook, July 2002

**E.6 Business executive perceptions of labour regulation**

See also notes for C.8. Data are taken from the IMD *World Competitiveness Yearbook*.

Respondents were asked whether their countries labour market regulations are "too restrictive or flexible enough".

**E.7 Labour and non-wage labour costs**

Data were taken from the US Bureau of Labor web site (<http://www.bls.gov/>), and can be found in their publication: International Comparisons of hourly compensation costs for production workers in manufacturing, 1975-2000.

**E.8 EU part-time, temporary and self-employment**

Data used are National Statistics taken from the Labour Force Survey produced by ONS.

The EU comparison data are taken from the 2002 European Labour Force Survey compiled by Eurostat. ELFS data relate to Spring and so potentially may include some seasonal effects (compared with annual results taken from the UK's national LFS results) though these will be less significant when looking at changes over a number of years.

**E.9 Working days lost due to industrial stoppages**

Data on working days lost are taken from ONS Labour Market Trends, April 2001. The original source for the number of days lost was taken from the International Labour Organisation (ILO) and the employee data from the OECD.





