Productivity in the UK 6:

Progress and new evidence

March 2006

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HM Treasury contacts

This report can be found on the Treasury website at:

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For general enquiries about HM Treasury and its work, contact:

Correspondence and Enquiry Unit
HM Treasury
1 Horse Guards Road
London
SW1A 2HQ

Tel: 020 7270 4558
Fax: 020 7270 4861
E-mail: public.enquiries@hm-treasury.gov.uk

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Department of Trade and Industry contacts

This report can be found on the DTI website at:

www.dti.gov.uk

For general enquiries about DTI and its work, contact:

Enquiry Unit
Department of Trade and Industry
1 Victoria Street
London
SW1H 0ET

Tel: 020 7215 5000
Fax: 020 7215 0150
E-mail: dti.enquiries@dti.gov.uk

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Executive Summary

E.1 The Government's central economic objectives are to achieve high and stable rates of economic growth and employment. Increased productivity growth is the key determinant of long-run growth, and together with employment growth is the primary route to higher prosperity. The intensification of global competition means that productivity growth is even more critical to securing long-term economic prosperity.

E.2 The Government's strategy for advancing productivity growth is based on two pillars: providing macroeconomic stability to allow firms and individuals to invest for the future, and making microeconomic reforms to ensure that markets function efficiently and that barriers to productivity growth are tackled.

Globalisation presents challenges and opportunities

E.3 There are signs this agenda is beginning to produce significant positive productivity effects, and this has occurred in conjunction with a historically strong employment performance. This challenge remains critical because in the long-run productivity growth is the only way to deliver sustained increases in prosperity. This challenge is greater in an increasingly globalised world. Globalisation can help promote productivity growth – increasing competitive pressures and allowing countries to specialise further in areas where they have a greater advantage – but it also presents challenges for the UK, particularly as developing economies move up the value chain investing in skills and research and development (R&D).

Record of macroeconomic stability and economic performance

E.4 The UK has an impressive record of macroeconomic stability and economic performance over the past decade, and is now experiencing the longest unbroken expansion on record with 54 consecutive quarters of economic growth. As a result:

- the UK is the only G7 economy to have avoided any quarters of negative output growth since 1997, and GDP growth has been the most stable in the G7;
- real disposable incomes have risen by three per cent a year on average since 1997; and
- the UK is enjoying the longest period of sustained low inflation since the 1960s.

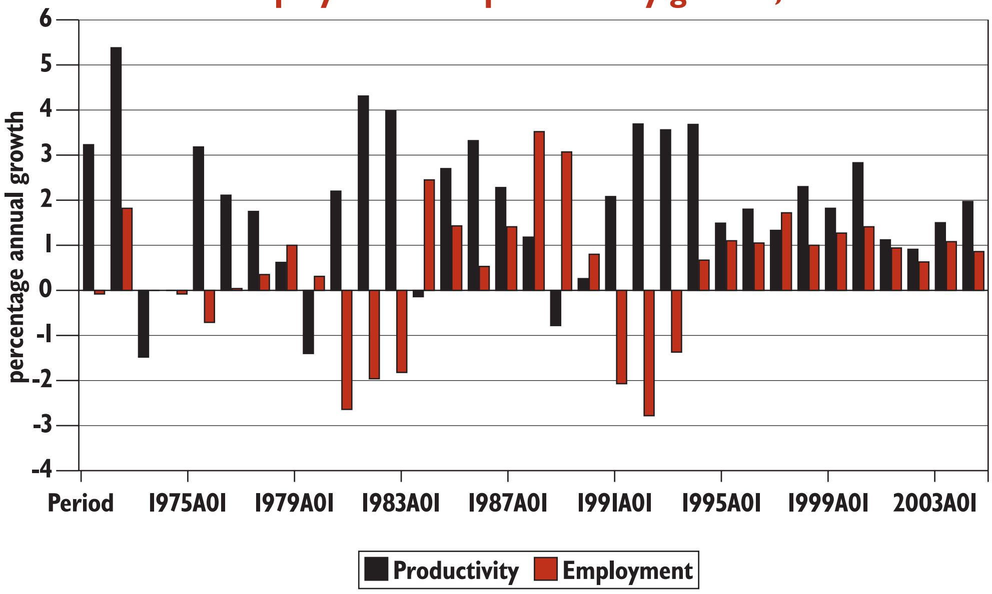
Rising productivity growth

E.5 There is evidence that the UK has raised its productivity growth over the current cycle to date compared to previous cycles. To make a judgement on overall changes in productivity performance requires making an assessment between on-trend points over an economic cycle because, as with GDP, productivity performance varies over the economic cycle and is generally pro-cyclical. Between two on-trend points in the current economic cycle, growth in actual trend output per hour worked productivity has been 2.59 per cent per annum, compared to around 2 per cent over the previous two cycles. Recent performance also compares favourably with other industrial economies, which have seen periods of lower, and sometimes negative, productivity growth. Productivity growth has also been more stable than in previous cycles.

Combined with rising employment

E.6 This performance is particularly impressive when considered in the context of the UK's very strong employment performance. Usually economies with periods of strong employment growth see relatively low productivity growth, as new workers are initially less productive while they gain job relevant skills. The UK has successfully generated higher and more stable employment growth with over 2.3 million new jobs created since 1997; and ILO unemployment falling by 517,000 since spring 1997 giving the UK one of the lowest annual unemployment rates in the G7. Chart 1 demonstrates this recent combination of stable and strong employment and productivity growth. Taken together the UK is experiencing the longest period of combined sustained productivity and job growth since current records began in the 1950s.

Chart E.1: Employment and productivity growth, 1973-2004



Source:ONS

E.7 The UK's productivity has historically lagged that of other major industrial countries either when measured on an output per worker basis or on an output per hour basis. Recently though the UK has made progress in narrowing the gap. Since 1995 the UK has:

- halved the output per worker gap with France (from 23 percentage points to 11);
- closed the gap with Germany (from a gap of 11 percentage points);
- extended the lead over Japan (from leading by 3 percentage points to 11); and
- been the only country in the G7 to have maintained the impressive productivity pace of the US (the gap was 30 percentage points and is now 27).

E.8 Despite this good progress the Government's overall objective remains to raise overall productivity and close the productivity gap with other major economies. This is an ambitious objective given the historical persistence of the gap and requires an understanding of the underlying drivers of productivity growth and the UK's comparative performance.

Reforms to raise productivity growth

E.9 The Government's overall approach to this challenge is drawn from an analysis of the underlying components of economic growth. From these the government has set out a framework of five "drivers" that interact to drive productivity growth. The Government has implemented major reform programmes under each of these drivers to address underlying failures.

- **competition** - radical strengthening of the competition institutions to ensure they are pro-active and fully independent; widening their powers to promote consumer interests and competitive powers including the power to conduct broad market studies where a market is suffering from weak competition; and the introduction of criminal penalties for price fixing;

- **innovation** - doubling funding of the public science base, by 2007-2008, and implementing a 10 year science and innovation framework to address years of under investment, linked to reforms to encourage more effective commercialisation of research. Business R&D and the spillovers that it can generate have been strongly incentivised through introduction of the R&D tax credits worth £1.5 billion to date;
- **investment** - radical reform to the macroeconomic framework has delivered the longest sustained period of growth on record giving businesses the certainty needed to invest. In parallel, the Government has systematically reviewed the "investment chain" to improve the efficiency of the allocation of capital. Under investment in public infrastructure has been addressed taking investment from 0.6 per cent of GDP in 1997–1998 to 1.6 per cent in 2004–2005, with a target of 2.25 per cent by 2007–2008. As result transport spending will, by 2007-08, be over 60 per cent higher in real terms than in 1997, whilst capital investment in schools will rise to £6.3 billion by 2007–2008, from a level of £700 million in 1997;
- **skills** - per pupil funding will have risen to at least £5,500 by 2007-08, more than double the 1997 figure. Adult and vocational training has been enhanced through expansion of apprenticeships, growing from 75,000 in 1997 to 255,000 currently and the introduction of the National Employer Training Programme (NETP) to deliver training in the workplace for over 220,000 low skilled employees tackling the adult skills gap. Further expansion of Higher Education has helped build on the UK's existing strengths in degree level skills whilst the new Highly Skilled Migrant Programme has helped attract migrants who have the skills and experience to help the UK compete in the global economy; and
- **enterprise** -capital gains tax has been reformed with reductions in tax rates for business investment alongside reductions in small and main companies' rate of corporation tax. The UK's regulatory framework is being radically overhauled to improve the quality whilst reducing administrative burdens. Financing constraints for small businesses have been tackled through the Small Firms Loan Guarantee, Regional Venture Capital Funds and the introduction of new Enterprise Capital Funds.

Raising productivity of the public sector

E.10 The Government is also committed to improving the productivity and efficiency of the public sector. Private and public sector productivity growth is inter-dependent, the public sector has a critical role to play in supporting productivity growth through the provision of key public services such as education, infrastructure and the public science base. If these public services do not receive adequate investment, or are delivered ineffectively, then they will have direct impact on the growth potential of the whole economy. More widely, increasing productivity across the public sector plays a key role in ensuring that the economy's resources and capacity are efficiently utilised and also deliver high quality public services.

Progress on the key drivers of productivity growth[1]

Competition

- **A KPMG peer review ranked the UK's competition framework as third in the world in 2004;**
- **The 2005 Global Competition Review rated the UK's competition authorities as second only to those in the US;**
- **The challenge remains to maintain this performance and ensure there is strong competition on energy market.**

Innovation

- **The UK consistently scores highly on the levels of papers and citations per head of population compared to the US, France and Germany. With 1 per cent of the world population the UK is responsible for 5 per cent of world science, publishes over 12 per cent of all cited papers and almost 12 per cent of papers with the highest impact;**
- **The challenge remains for the UK to increase expenditure on R&D to similar levels of comparator countries.**

Investment

- **In recent years the UK has had the most stable macroeconomic environment of all the G7 countries. Stable levels of output and low and stable interest rates should help firms make the correct investment decisions;**
- **Similar to other G7 countries, the UK has experienced a reduction in the levels of business investment over the last five years. The challenge remains to reverse this trend.**

Skills

- **The UK performs relatively well in terms of high-level skills and progress is being made on low skills. The percentage of those who are economically active with skills lower than level two declined to 27 per cent in 2005, from 37 per cent in 1996;**
- **The challenge remains for the UK to address the high proportion of people with only basic-level skills and address possible weaknesses in management quality.**

Enterprise

- **The UK continues to have a relatively inviting environment for entrepreneurs, the costs of starting a business are significantly below those of France and Germany and only slightly above those of the US;**
- **The entrepreneurial culture in the UK has improved recently and remains above those of France and Germany. The challenge for the UK going forward is to continue this performance and reach the impressive levels experienced in the US.**

Detailed analysis on the progress against each driver is set out in Chapter 5.

E.11 Previous HM Treasury and DTI papers have set out the Government's five drivers strategy for raising productivity. These papers also set out the joint HM Treasury and DTI productivity PSA target to raise productivity over the economic cycle and to narrow the productivity gap with key comparator countries. This paper builds on previous papers in the series by discussing more recent productivity data, new evidence on the drivers of productivity, and the progress on the Government's key policy measures since 1997.

E.12 Chapter 1 of this document sets a framework for understanding productivity growth. Chapter 2 discusses how productivity performance should be measured. Chapter 3 outlines the UK's productivity performance over the economic cycle and against key comparator countries. Chapter 4 refreshes and extends the evidence base underlying the Government's framework for the five drivers of productivity. The reforms the Government has put in place since 1997 to raise the UK's productivity growth are set out in Chapter 5.

1 UNDERSTANDING PRODUCTIVITY

INTRODUCTION

1.1 This is the sixth paper in a series examining productivity in the UK. The first document[1] analysed the UK's productivity gap and described the Government's strategy for raising productivity. The second paper in the series[2] developed these themes into key productivity drivers as a framework for the Government's response. Later papers in the series analysed productivity response from a regional and then local productivity perspective. The fifth paper in the series[3] outlined a set of productivity indicators to monitor progress at national and regional levels.

1.2 This document highlights recent productivity performance and builds on the earlier Government productivity papers by examining new evidence supporting the drivers of productivity growth.[4]

1.3 The first section of this chapter explains why productivity is the key long-run determinant of economic growth and why productivity is even more important in an increasingly global world. The second section of this chapter outlines a framework for thinking about economic growth and productivity using both traditional and new models of economic growth. This framework will be further developed in Chapter 4, which sets out the Government's five drivers framework for understanding productivity growth and the Government's policy response as set out in Chapter 5.

PRODUCTIVITY IS THE KEY DETERMINANT OF LIVING STANDARDS

1.4 The Government's central economic objectives are to achieve high and stable levels of growth and employment. Productivity and employment are key determinants of living standards and also of quality of life.

1.5 Chart 1.1 shows that as a result of relatively strong employment and productivity growth the UK enjoys a high standard of living as measured by GDP per capita. However, the UK's relative position also shows that more can be done to raise standards of living in the UK and highlights the importance of the Government's productivity agenda.

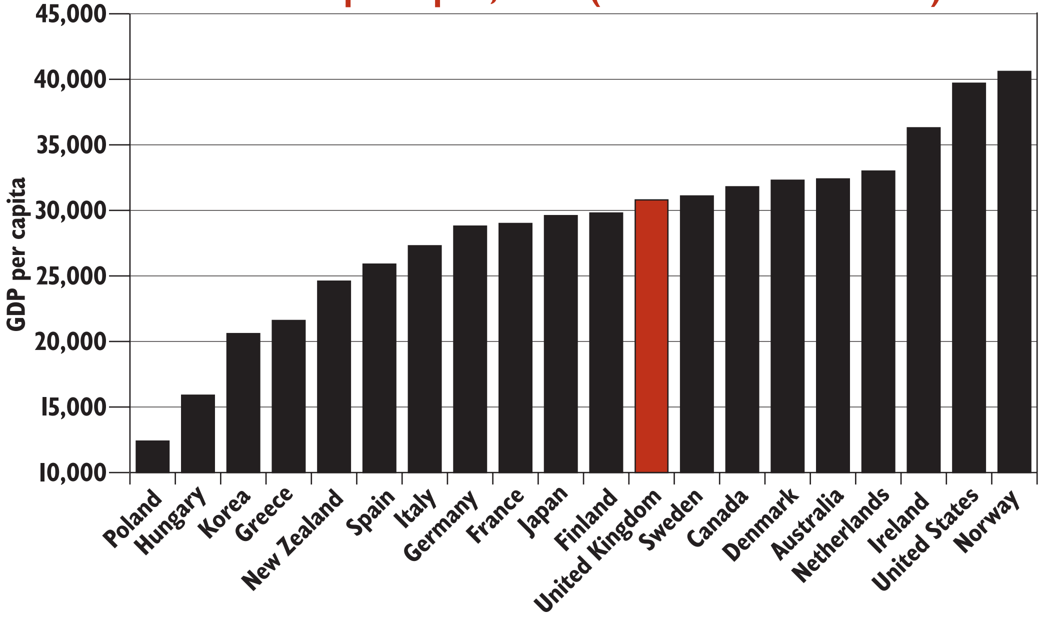
[1] HM Treasury, November 2000: *Productivity in the UK: The evidence and the Government's approach*.

[2] HM Treasury, March 2001: *Productivity in the UK: Progress towards a productive economy.*

[3] HM Treasury and DTI, *March 2004: Productivity in the UK 5: Benchmarking UK productivity performance*.

[4] DTI-HM Treasury (2002): *The 2005 Productivity and competitiveness indicators*.

Chart 1.1: GDP per capita, 2004 (US dollars current PPP)[5]



Source: OECD

Employment is a determinant of output

1.6 Economic output can be increased in two ways:

- increasing the overall amount of hours worked in an economy;[6] or
- improving the productive output of each worker.

1.7 Increasing the amount of labour input used in production will boost overall output. This can be achieved through increasing the population; or increasing the proportion of the population in work; or by increases in the hours people work. However, there is a constraint to the contribution of labour to long-run economic growth as there are obvious limits to the number of people of working age available to work, and to the hours that can physically be worked. In addition, working longer hours involves a trade-off with leisure time, and people may choose to enjoy more leisure time by working fewer hours as they become richer.

Labour productivity is the other determinant of output

1.8 The second way to increase output is to increase the productivity of the inputs to production. Most often we look at labour productivity, which usually refers to either the average amount produced for each hour worked, or the amount produced per worker. Increased labour productivity means that more output is produced for each hour worked or per employee. Labour productivity can increase through the following ways (Chapter 4 outlines the ultimate drivers of productivity growth):

- more productive labour – for example, by hiring more skilled workers or providing incentives for workers to work more efficiently;
- increasing the intensity of capital that labour uses – this is likely to occur through increasing the quantity of capital, for example, giving a factory worker machine tools that allow them to produce more;

[5] This is computed in purchasing power parity (PPP) terms. PPPs involve converting currency into a common unit to be able to allow international comparisons.

[6] Either by increasing total employment or by increasing the hours worked by the current labour force.

- new technology – adopting or inventing a new technology that allows workers to produce more per unit of labour or to produce a new product, for example, through the introduction of information technology; and finally
- innovative work practices – finding more efficient ways of combining capital and labour in production, this could include working more flexibly.

1.9 These four mechanisms for increasing output are not limited in the way that employment and hours worked are. In the long-run, economic theory suggests that only increases in labour productivity growth can produce ongoing increases in living standards. This is reflected by actual experience, for example, in the UK over the first half of the current economic cycle and over the previous economic cycle labour productivity growth accounted for around 80 per cent of total economic growth, with the other 20 percent being driven by growth in total hours worked. Chapter 2 provides more detail on the contribution of labour and productivity to economic growth.

A PRODUCTIVITY FRAMEWORK

1.10 The previous section set out how productivity is the main determinant of improvements in national prosperity. In the long-run productivity growth is the main driver of economic growth because gains from labour utilisation are limited.

1.11 Understanding the determinants of output growth also helps to explain productivity growth. Output growth can be broken down into different sources, such as labour inputs. This approach is known as growth accounting.

1.12 The basic approach looks at the contribution to output of various inputs or factors of production.[7] Equally increasing physical capital will raise productivity because there is more physical capital (e.g. machines) to produce goods.

1.13 In the simplest growth accounting frameworks, productivity growth can be attributed to growth in physical capital (machinery and equipment) and unexplained technical progress, or innovation. This latter factor is often referred to as total factor productivity (TFP). It can be thought of as a measure of the efficiency with which capital and labour inputs in the economy are being combined. Empirically, TFP is estimated as a residual, that is, as the part of productivity growth that cannot be attributed to the growth of labour or capital. It can represent technology, ways of working, management, economies of scale, competition and measurement error.

1.14 The TFP contribution to productivity growth has been found to be large, indicating that technological progress and innovation are very important to economic and productivity growth. Given the importance of technological progress and innovation in explaining economic growth it is important to capture it within economic models.

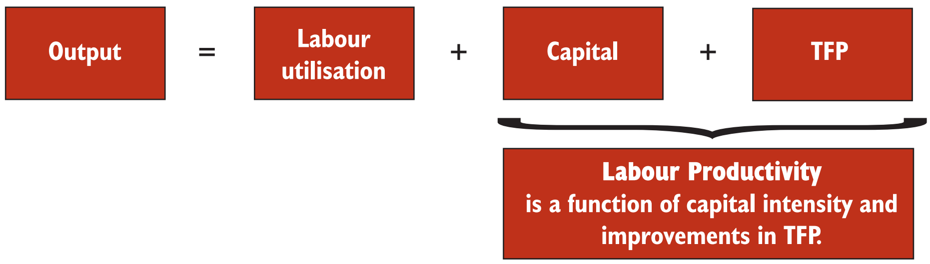
1.15 Growth accounting decomposes growth but does not explain the process of technological change. The amount of knowledge in the economy grows because firms and organisations undertake R&D and this knowledge can spillover between firms. The amount of knowledge is then treated as in the same way as capital and labour, and a significant amount of economic and productivity growth can be attributed to increasing amounts of knowledge in the economy, or innovation. Similarly, the basic model can be extended by allowing workers to have different skill levels. These different skills levels allow the derivation of a human capital index for the economy. A significant portion of economic growth (and by implication productivity growth) can be attributed to increasing levels of human capital.

[7] The basic framework can be extend in many ways, most frequently by incorporating human capital and the importance of institutions into the production function, see Mankiw, Romer and Weil (1992): A contribution to the Empirics of Economic Growth.

1.16 To summarise, empirical growth accounting suggests that productivity growth can be driven by growth in the capital stock, knowledge creation and rising skill levels.

1.17 Economic theory suggests that governments can have direct effects on these inputs. In some instances the government is a direct supplier of the inputs into the production process, for example, in public provision of education, and public investment in infrastructure and basic R&D. In others areas governments can set or influence the environment in which businesses and individuals operate, for example, through general regulations and the tax system.

Figure 1.1 Determinants of output



PRODUCTIVITY IN A GLOBAL ECONOMY

The globalisation challenge

1.18 The global economy is undergoing a major transformation as the boundaries between what can and cannot be traded are eroded by technological advance, and as economic activity becomes increasingly flexible, divisible and dispersed across continents. An example of this is the growth in recent years of outsourcing by developed countries of labour-intensive manufacturing and assembly to low-cost locations, while concentrating on high value, knowledge-based activities such as R&D or design. This process can benefit all countries because it leads to a more efficient use of resources and allows countries to concentrate on what they do best according to their comparative advantage.[8]

1.19 Globalisation provides an opportunity for open economies to generate economic benefits through increased productivity. Open economies benefit from trade because it strengthens the drivers of productivity through six important routes[9]:

- *more efficient allocation of resources* – trade enables a country to specialise in the production of those goods and services that it can produce most efficiently relative to other countries – otherwise known as the areas in which it has a comparative advantage. Countries can raise overall consumption by trading with countries that possess a different comparative advantage;
- *economies of scale* – trade allows industries and firms to produce on a more efficient scale by allowing them to export as well as serve a domestic market;
- *innovation* – trade promotes incentives for firms to innovate because the rewards from successful innovation will be proportionately greater if firms are

[8] Comparative advantage is explained in paragraph 1.19, for a a fuller discussion see '*Globalisation and the UK: strength and opportunitiy to meet the economic challenge*' HM Treasury 2005.
[9] HM Treasury (2004) '*Trade and the Global Economy*'.

selling in larger markets. Where highly productive firms expand as a result of exporting, this boosts the productivity of the economy as a whole;

- *greater competition* – exposing domestic firms to greater competition encourages exit from the marketplace of the least productive firms, reduces monopoly rents, drives down margins, and reduces prices for consumers;
- *access to technology* – trade can provide direct access to goods and services that incorporate new technologies, particularly where globalisation has led to different stages of the production process being undertaken in different countries; and
- *incentives to invest* – better access to imports and to export markets increases the scope for productive investment by creating new business opportunities. Foreign direct investment (FDI) enables the application of technology and innovation developed abroad to domestic production, enhancing competition and leading to faster diffusion of more efficient and innovative processes.

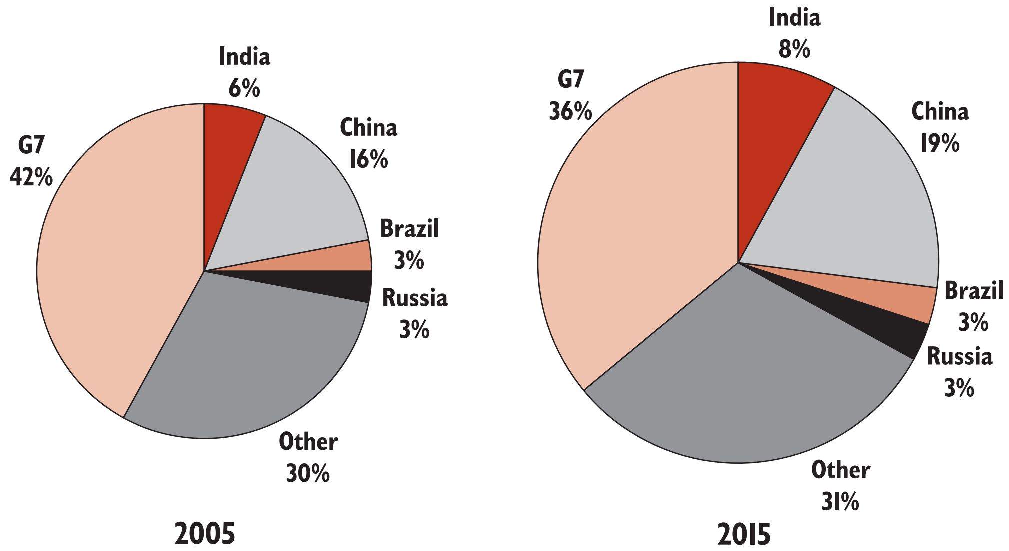
1.20 There is evidence that economies adopting outward orientated trade policies take the greatest advantage of the opportunities of globalisation and grow more rapidly. Openness to the world economy has played a key role in the UK's economic development over the last two centuries. Since moving to a more open approach in 1979, China has enjoyed average annual growth of 9.4 per cent, with the number of people living in poverty having fallen by 400 million.

1.21 This dynamic can be observed in practice with the rise of China, India and other major emerging economies as locations for the production of goods and services – China accounted for 14 per cent of world output in 2005, with the UK accounting for just over 3 per cent.[10] China and India contributed 43 per cent of global growth between 2001 and 2004, and by 2015 both countries are forecast to produce around a quarter of world output, as demonstrated by Chart 1.2.[11]

[10] This is computed in purchasing power parity (PPP) terms. PPPs involve converting currency into a common unit to be able to allow international comparisons.

[11] This is computed in PPP terms.

Chart 1.2: Evolving shares of global output



Source: IMF Consensus forecast, EIU September 2005 and HMT estimates.

1.22 To date China and India's growth has been based on their very large and low-cost labour forces and growing entrepreneurial culture. For example, China's exports of business and computer services currently total over US$18 billion, with India standing at US$17.5 billion. However, improvements in technology are widening the scope of what can be outsourced further still. In parallel, China and India are increasingly investing in the skills to enable their business to compete in new higher value added areas. China now educates around 2 million graduates each year, compared to 250,000 in the UK. India produces 260,000 engineers a year, and its number of engineering colleges is due to double to by 2010. Investment in skills means that China and India have the potential to increasingly challenge advanced economies in more knowledge intensive areas. For example, in 2004 the drug discovery market for India was estimated to be worth US$1.2 billion, with a further US $1.6 billion spent on clinical development.

1.23 The challenge for the UK is to remain ahead in the value chain as lower value activities relocate. The UK has a number of strengths which make it an attractive location for business, including its tradition of open and competitive markets, strengths in science, a transparent and well-respected regulatory regime, world class universities, and the use of English as the international language of business. The benefits are underpinned by the UK's high quality institutions, such as an open and transparent legal system for contesting commercial disputes and for the protection of property rights.

Exploiting the benefits of globalisation

1.24 Globalisation represents an opportunity for the UK by allowing world leading industries to expand further. Evidence suggests that in some sectors, certain factors drive the location choice of firms into clusters[12]. This occurs when firms can make productivity gains as the size of the industrial cluster in which they are based increases. Clusters generate such external economies of scale for firms through various mechanisms. First, they provide access to a pool of skilled labour, and provide incentives for workers to acquire specialised skills, which are more easily marketable in clusters. Second, they facilitate the exchange of knowledge between firms and between individuals. The sharing of knowledge in Silicon Valley is an example of this. Third, clusters give firms the ability to draw from specialised suppliers. This can include specialist business services such as venture capital or patent lawyers, which

[12] HM Treasury (2005) *Globalisation and the UK: Strength and opportunity to meet the challenge.*

would not be sustainable outside of a cluster.

1.25 It is partly because of these benefits of co-location and clustering that firms continue to locate in clusters in advanced economies. Sectors that demonstrate these sorts of characteristics are often referred to as 'sticky' because, once a cluster is created, no single business in the cluster is likely to gain from relocating elsewhere, and so it is more difficult for them to be pulled apart. Because such industries produce skilled labour, generate knowledge spillovers, and/or draw on specialised inputs, they also tend to be sectors with higher levels of productivity. An example in the UK is London's financial services sector, home to 486 foreign banks and half of all European investment banking activity. Other examples for the UK include business and legal services in London, pharmaceuticals, the creative industries and high value manufacturing, such as aerospace.

1.26 More countries are opening up their economies, while global output continues to grow. As production can be relocated increasingly easily, and as new sources of competition develop, it is important for businesses and governments to respond openly and flexibly. At an individual level too, the transition to a more open global economy can result in short-term insecurity and adjustment costs. Strong productivity growth is essential if UK companies are to be competitive and make the most of opportunities from globalisation – exploiting emerging markets and attracting foreign direct investment. It will also help pay for the adjustment costs that may result from the intensified structural change associated with globalisation. It is for these reasons that flexibility is important – the ability of individuals to respond efficiently and quickly to change, by adapting and re-skilling.

1.27 Chapter 5 outlines the UK's policy response to improving productivity growth in a global economy.

CONCLUSION

1.28 This chapter has outlined how growth is driven by labour utilisation and labour productivity. Employment is an important driver of prosperity and is the best route out of poverty. However, in the long-run productivity is the central driver of sustained increases in output. Maintaining strong labour market performance together with improvements in productivity growth are the key to long-term growth. In an era of increasing global competition productivity growth is even more critical, both to meet the challenges faced through globalisation, and to make the most of the opportunities it presents.

1.29 Understanding productivity growth is critical for understanding overall economic growth and working to improve standards of living. This chapter introduced a framework for understanding the drivers of productivity growth, evidence on the drivers of productivity growth will be further developed in Chapter 4.

2 MEASURING PRODUCTIVITY PERFORMANCE

INTRODUCTION

2.1 The previous chapter showed that labour productivity and employment jointly determine the level and growth rate of output. This chapter demonstrates how the most commonly used productivity measures allow underlying economic performance to be tracked. Different productivity measures can be used for different purposes, and each has their own advantages and disadvantages.

2.2 Changes in underlying productivity are an important measure of the performance of the economy. This chapter highlights the cyclical nature of productivity over UK economic cycles and in other countries and the implications for measuring changes in productivity over time. This chapter also discusses the challenge of raising productivity simultaneously with employment.

2.3 International benchmarks of productivity performance are also important for understanding the relative productivity performance of the UK. This chapter also explores how relative points in the economic cycle need to be taken into account when making international productivity comparisons due to the cyclical nature of productivity.

MEASURES OF PRODUCTIVITY

2.4 Productivity is a measure of how efficiently inputs (such as labour) are used to produce output. In other words, productivity is a measure of how much is being produced given how much is being used in production. This section sets out the different ways of measuring the efficiency of an economy and the advantages and disadvantages of each. There are several main measures:

- **output per worker** and **output per hour worked,** which are both labour productivity measures;
- **output per person of working age;** and
- **total factor productivity.**

Labour productivity measures

2.5 Labour productivity is the central productivity definition used by the Government: because it is a measure of the amount produced for a certain amount of labour effort it is closely related to living standards; and because it can be measured most reliably. The two most commonly used measures of labour productivity are output per worker and output per hour.

Output per worker

2.6 The simplest measure of labour productivity is **output per worker**, which is the average level of output produced divided by the number of people in employment. In other words, output per worker is the average amount produced by each worker. An advantage of this measure is that internationally consistent definitions of output and employment figures are readily available.

2.7 Increased output per worker could occur if workers produce more in the hours they work; or if they work longer hours by cutting holidays or moving from part-time to full-time employment. The fact that working longer hours also increases output per worker is a disadvantage of using this measure as a technical measure of productivity.

Output per hour

2.8 The second measure of labour productivity is output per hour, which is the average level of **output per hour** worked. In other words it is the average amount produced in each hour worked. Its main advantage is that it takes account of how effectively hours worked are being used, taking account of variation in the number of hours worked, for example through holiday entitlements and part-time workers.

2.9 The disadvantage of output per hour measures is that hours worked are not identically measured across countries. The OECD does work to adjust average hours worked to be as internationally consistent as possible but differences remain. For this reason, until very recently international comparisons of output per hour was classed as an experimental series.

Output per person of working age is a measure of prosperity

2.10 An alternative measure of prosperity is **output per person of working age.** This measure is closely linked to the Government's goal to increase overall economic growth, with productivity and employment being dual drivers of that goal. Output per person of working age shows how well an economy is using all its potential workers but is not a productivity measure.[1] Some countries may appear to have very high labour productivity, but this might be masking the fact that many lower productivity workers are not in employment. This measure highlights situations where high productivity can mask such problems of unemployment and underemployment.

Total factor productivity

2.11 As discussed above, labour productivity is a measure of output per unit of labour, either employment or hours worked. However, numerous other factors also contribute to production of output, such as the levels and quality of capital investment, land used, the availability of infrastructure, innovations and new technology, and improved skills of workers. Labour productivity measures will present output improvements due to these factors as improvements in labour productivity but do not actually say what is driving that improvement.

2.12 **Total factor productivity (TFP)** attempts to isolate these other factors. The advantage of using TFP is that it reflects how effectively several factors of production are combined. This can capture a range of influences such as economies of scale, the quality of labour, competition, organisation, and developments in technology.

2.13 However, TFP also has two key disadvantages:

- even basic measures of TFP are difficult to measure accurately due to problems estimating what the actual productive impact of a particular cash value of capital investment is; and
- while TFP is a measure of how effectively inputs are being used it is less closely related to overall prosperity.

[1] Output per person of working age represents the average amount of income generated by each member of a country's working age population. GDP per capita captures the average amount of income received by each member of a country's population and as such is an important indicator of prosperity and average living standards. Differences in the two measures reflect differences in demographic make-up.

Other forms of productivity measurement

2.14 This chapter focuses on national statistical measures of productivity. Productivity measures can also be used in a number of other levels of analysis:

- productivity can be measured at the firm level, allowing businesses or policy makers to understand firm performance, dispersion of performance, and productivity drivers at the firm level. For example, Chapter 4 uses firm level productivity measures to analyse the effect of ICT investment and management on firm performance; and
- productivity can be measured at the industry level.[2] Chapter 3 discusses the changing performance of UK sectors in an increasingly global economy.

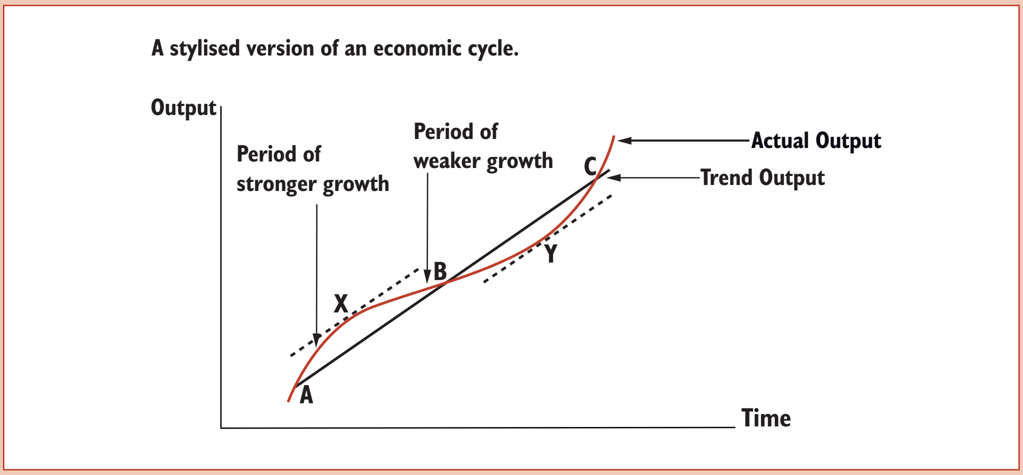
SHORT RUN FLUCTUATIONS AND TREND PRODUCTIVITY

2.15 The productivity performance of an economy will tend to vary positively with short-run fluctuations in the economy overall – *the economic cycle* – so that productivity is likely to grow more rapidly when demand for output is growing rapidly and grow more slowly when demand for output is growing more slowly. Box 2.1 explains the concept of an economic cycle in more detail.

[2] This analysis can be technically difficult due to measurement issues. In particular, analysis of the service sector can be fraught with difficulties due to measurement issues. It is particulary difficult to take account of quality appropriately when measuring service sector outputs. For example, if you are measuring the output of a transport company you may want to look at the number of passenger miles delivered, but this would give you no indication of the quality of service provided. Work is ongoing within ONS to look at improving measures of service sector productivity.

Box 2.1 Understanding the economic cycle and productivity measurement

The chart below shows a stylised version of an economic cycle.



The cycle in the graph starts at point A, where actual output is equal to trend output which is referred to as an on-trend point. Actual output is above its trend level during the time period from point A to point B (half-cycle), thus placing upward pressure on inflation during this period. At point B (half-cycle) the economy is back to its trend level. The second half of the cycle starts at point B and continues until point C, which is the end of the whole cycle. During the period from point B to C, in which actual output is below its trend level, there is downward pressure on inflation. The growth rate of output over the intervals A to X and Y to C exceeds the trend rate of growth, and over the interval X to Y the actual growth rate is below the trend rate of growth. The figure is stylized of course. In practice, cycles will tend to be less smooth and less symmetric. This shows that between two on trend points encompasses a period where the growth rate of output is both above and below the trend rate of growth.

Productivity growth is output growth divided by labour input. Productivity growth is generally pro-cyclical in the sense that it grows more rapidly when demand is growing more rapidly, and grows more slowly when demand for output grows more slowly. This cyclical nature means that productivity growth can also be measured over a half or full economic cycle.

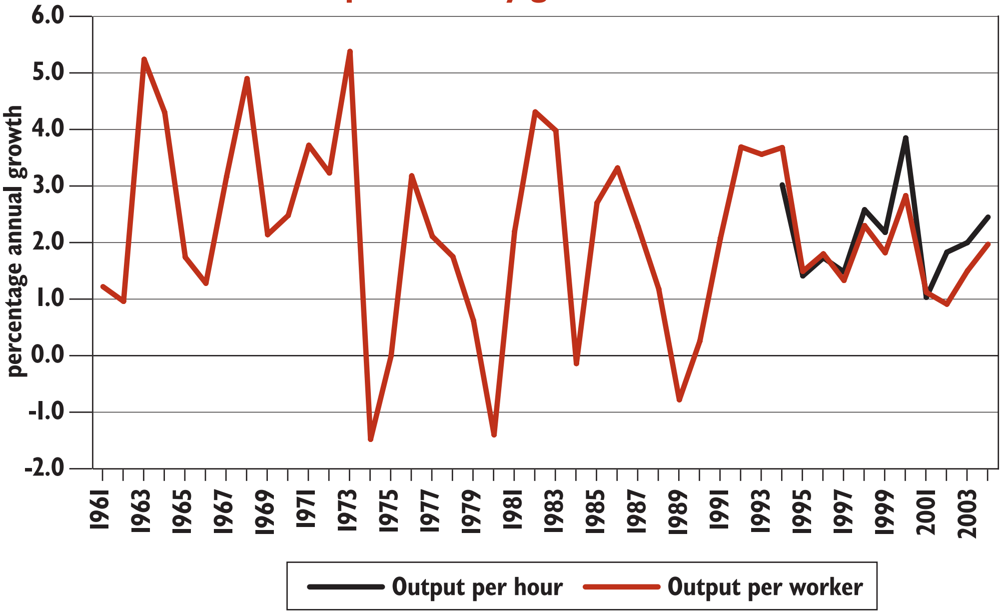
In the UK the current economic cycle is judged to have started in 1997, with the second on-trend point, the mid-point in the overall cycle, occurring in 2001. As demonstrated in the figure, over the second half of the economic cycle, output growth will be at first be weak, with the economy operating below normal rates of capacity utilisation. This is where the economy is currently assessed to be. Output and productivity are expected to grow more strongly again towards the end of the current cycle as the economy gets back to trend. The current cycle is expected to end in 2008–09.

2.16 A key reason for this cyclical pattern of productivity growth is that there are “adjustment” costs to firms for making changes in employment. For this reason, firms may wait to assess the permanence of changes in demand for their products before they fully adjust the size of their workforce. So firms may respond to changes in overall economic demand by varying the intensity with which the existing workforce and resources are utilised; that is, firms tend to work their resources harder when demand for their products is increasing, and may have spare capacity when demand for their products is falling. This means that productivity growth will be particularly rapid during periods of strong growth in demand and less rapid during periods of slow demand growth due to the intensity with which labour is being utilised. This phenomenon is sometimes known as "labour hoarding".

2.17 In order to assess whether a country is making progress towards achieving a sustained increase in the rate of productivity growth, it is important to abstract from such short run fluctuations. As demonstrated in Box 2.1 this can be done by measuring productivity growth over the full or half cycle.

2.18 Chart 2.1 shows that previously UK productivity has undergone periods of weaker, and sometimes even negative, growth. This variable pattern of productivity performance is also true for other countries. For example, the US had years of negative annual output per hour growth in 1974 and 1982, Canada in 1979 and 1986, Australia in 1977, 1982, and 1988.

Chart 2.1: Annual productivity growth



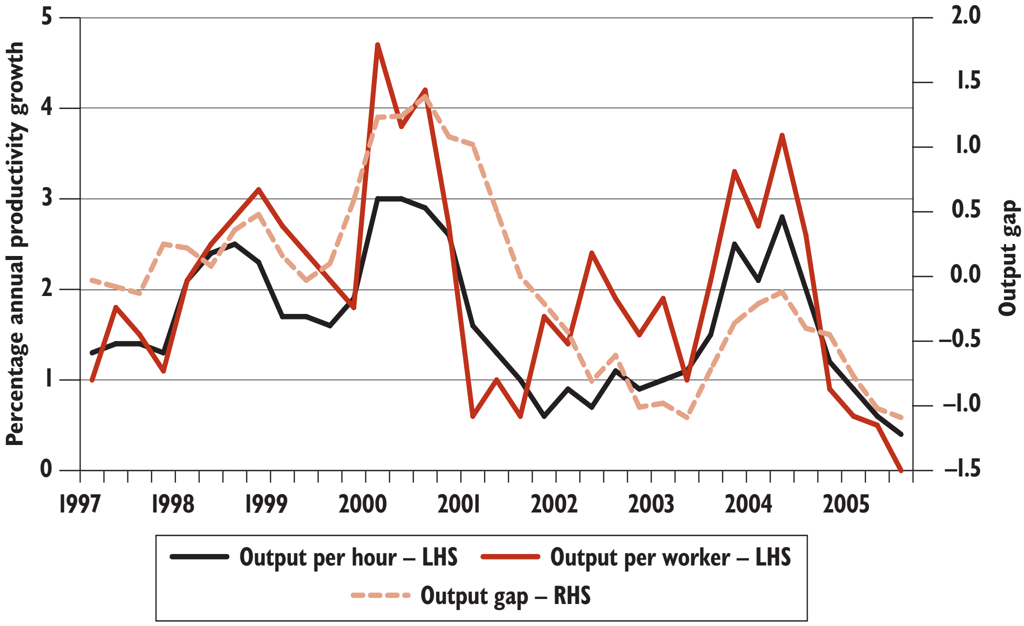
Source: ONS

2.19 As productivity performance tends to fluctuate with output demand, it is expected to vary closely with the economic cycle. The output gap is a common measure of where the economy is in the economic cycle as it provides an estimate of the extent to which the economy is operating above or below normal rates of capacity utilisation. A positive output gap implies excess demand for output and building up of inflationary pressure, whereas a negative output gap implies that the economy could expand without the risk of generating upward inflationary pressure.

2.20 Chart 2.2 illustrates labour productivity measured on a per hour and a per worker basis together with the estimated output gap for the UK. This chart shows that, while there are significant fluctuations in productivity growth within particular phases of the economic cycle, productivity growth, both on an output per worker basis and an output per hour basis, has largely followed a cyclical pattern since the start of the current economic cycle.[3]

[3] While a variety of methods are available for estimating the output gap and economic cycle, alternative approaches tend to yield a similar general profile for the output gap over time. The Treasury's approach to dating the economic cycle is set out in more detail in the Treasury papers *Evidence on the UK economic cycle* (July 2005); *Technical note on cyclical indicators* (December 2005) and *Trend Growth: Recent Developments* and *Prospects* (April 2002): and the Treasury's assessment that the last economic cycle ended in 1997H1 was audited by the NAO at the time of the 2005 Pre-Budget Report, who concluded that this judgement was reasonable.

Chart 2.2: Productivity growth and the output gap



Source: ONS (productivity) and HMT (output gap).

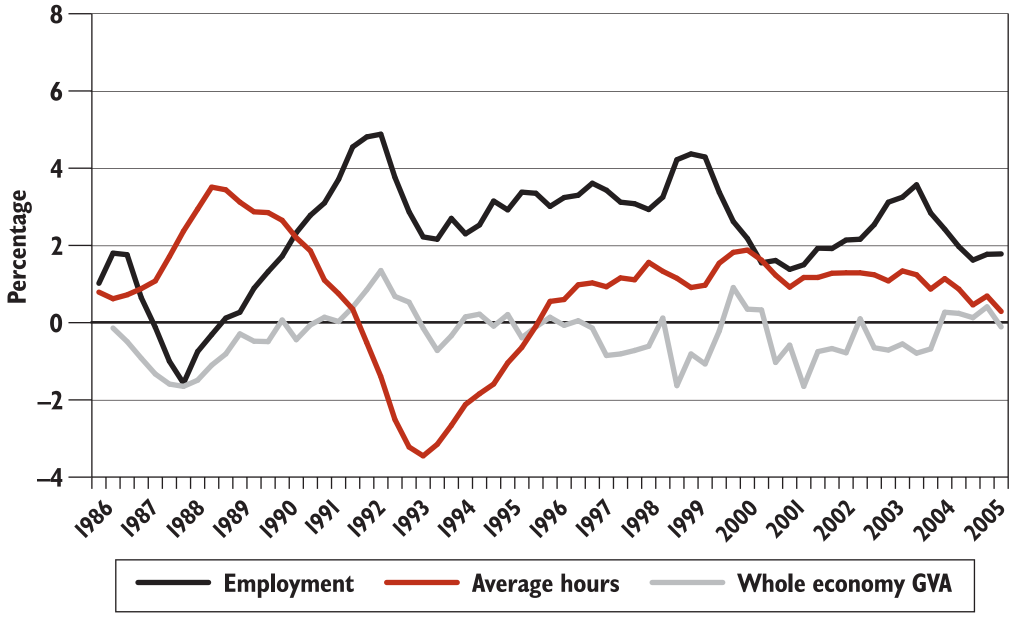
2.21 As discussed, a key reason for the cyclical fluctuation in labour productivity is that firms may take some time to adjust labour input in response to changes in demand, this is referred to as labour hoarding. Since labour input can be measured in terms of number of people employed or the number of hours worked, labour hoarding can also be measured in terms of hours and jobs. On the whole, if labour input is defined as the number of hours worked, then the level of effort applied by the workforce over those hours will tend to vary as demand for output fluctuates. If on the other hand labour input is characterised as the number of people employed, then during periods of labour hoarding average hours worked and effort rate that applies over those hours will tend to fall as firms keep employment levels unchanged.

2.22 Analysis by the Bank of England showed that there was some evidence of labour hoarding in terms of the number of people employed, as firms adjusted average hours rather than employment during the slowdown in 2001, see Chart 2.3.[4] The extent of labour hoarding in the more recent slowdown is however less clear as hours worked have remained relatively unchanged. This is a somewhat unusual pattern, given that average hours have tended to rise when output has risen rapidly, and fall when output has slowed, making it difficult to reconcile recent labour market and output data. However, the decline in employment at the end of 2005 tentatively suggests the possibility of some earlier labour hoarding.

2.23 Given the substantial cyclical fluctuations in productivity, to assess whether a country is making progress towards achieving a sustained increase in the rate of productivity growth it is crucially important to abstract from these fluctuations and measure the trend productivity growth.

[4] See *Assessing the extent of labour hoarding*, Bank of England Quarterly Bulletin: Summer 2003.

Chart 2.3: Labour hoarding



Source: ONS.

Relationship between employment and productivity growth

2.24 It is also important to consider the wider impact of interactions between employment growth and productivity. To understand these interactions it is helpful to distinguish between cyclical changes in employment and long-term or structural changes in employment.

2.25 The cyclical nature of productivity was discussed in the previous section and is driven by employment not fully adjusting to short-term cyclical fluctuations in output. As discussed above, hours worked generally fall during a slowdown along with output and productivity growth but any fall in employment is less marked.

2.26 A structural change to the rate of employment refers to a higher or lower rate of employment over the economic cycle. This is a long-term change due to some underlying factor, such as policies to increase labour market flexibility. Raising the rate of employment could have two potential impacts on productivity:

- in the short-term – productivity may be temporarily reduced as new workers are generally less productive than existing workers while gaining job relevant skills. This is a short-term effect as once workers gain these skills productivity rises back to its original level and growth rate.
- in the long-term – if an economy has high unemployment then the unemployed may be on average less productive than those employed. For example, the unemployed often have lower levels of formal qualifications. This implies that it may take a considerable period of time for these workers to become as productive as other workers. Therefore, when employment rates rise productivity levels may initially grow more slowly or even fall.

Box 2.2 Public sector productivity

This document assesses productivity as GDP per labour input. One component of productivity is public sector productivity. In principle public sector productivity is the ratio of public sector outputs (e.g. health improvements directly attributable to NHS care or increased educational attainment directly due to schools) to total inputs. In practice there are problems measuring this so public sector productivity is measured as the volume of expenditure on those services after allowance for wage and price changes. Raising public sector productivity plays a key role in ensuring that resources and capacity are effectively utilised to deliver high quality public services and to contribute to overall productivity and efficiency. Historically, the UK and other countries tended to measure aggregate public sector productivity by using measures of inputs (i.e. total spending on the public sector, wages, goods and services) as an approximation for public sector outputs. Such measures, by definition, imply zero productivity growth and are therefore misleading.

Introducing more sophisticated measures of public sector output and productivity is far from straightforward. In the general absence of a market for public services, putting a value on the output that they generate has to be inferred from indicators. Moreover, quality is an integral dimension of the value of these services. Adjusting for quality improvements is itself a considerable task.

For this reason the National Statistician commissioned the Atkinson Review of the measurement of government output and productivity. It published its final report in January 2005. The ONS has since established the UK Centre for the Measurement of Government Activity to take forward recommendations, including quality adjustments in output measures.

Initial work has so far enabled ONS to publish productivity articles in health and education.

- **The Education Productivity Article published in October 2005, described several different approaches to measuring schools productivity, some of which included adjustments for quality and the increasing value of education due to rising real earnings in the economy. These estimates showed that productivity growth could have risen by around 2 per cent or fallen by around 2 per cent a year since 1998, depending on the methodology used.**
- **The latest Health Productivity Article published in February 2006, also presented a range of measures for NHS productivity. Estimates using National Accounts measures showed an average fall of between 0.6 per cent and 1.3 per cent a year over the period 1995-2004. But these estimates take no account of quality improvement, as the Atkinson Review recommended should be the case. Estimates including adjustments for quality and the increasing value of health in a growing economy showed productivity growth could have changed in a range of -0.5 per cent to 1.6 per cent a year, over the period 1999-2004.**

The ONS emphasise that these articles represent staging posts in an ongoing programme of work to improve productivity information. The various interim estimates presented are intended to support further public debate and consultation as to the best methodologies to use. ONS will be actively facilitating this debate over coming months.

2.27 Increasing the long-run rate of employment means that adults previously inactive or unemployed are now in work. This has important social and economic benefits as it raises the level and possibly the growth rate of per capita prosperity measures such as output per person of working age, and because it is recognised as the best route out of poverty for the individuals concerned. Employment and productivity both drive economic growth and are key goals of this Government, however, raising both simultaneously is particularly challenging.

2.28 This section has discussed issues around domestic productivity measurement including the importance of measuring productivity changes over the economic cycle to strip out cyclical effects, and the impact of periods of rising employment on measured productivity growth. There are particular issues around measuring the productivity of the public sector, this is covered in Box 2.2.

MEASUREMENT OF INTERNATIONAL PRODUCTIVITY COMPARISONS

2.29 As previous sections have set out assessing overall performances in productivity performance can be a difficult task, particularly over short periods. One way of assessing progress is to benchmark performance against appropriate comparator countries. There are a range of measurement issues that need to be considered to ensure such comparisons are valid.

2.30 The previous section also outlined the importance of measuring productivity performance over the economic cycle. This section sets out the importance of making international productivity comparisons when countries are at comparable points of their economic cycle to strip out cyclical effects.[5] This section also outlines issues around comparing international data including the use of purchasing power parities (PPPs).

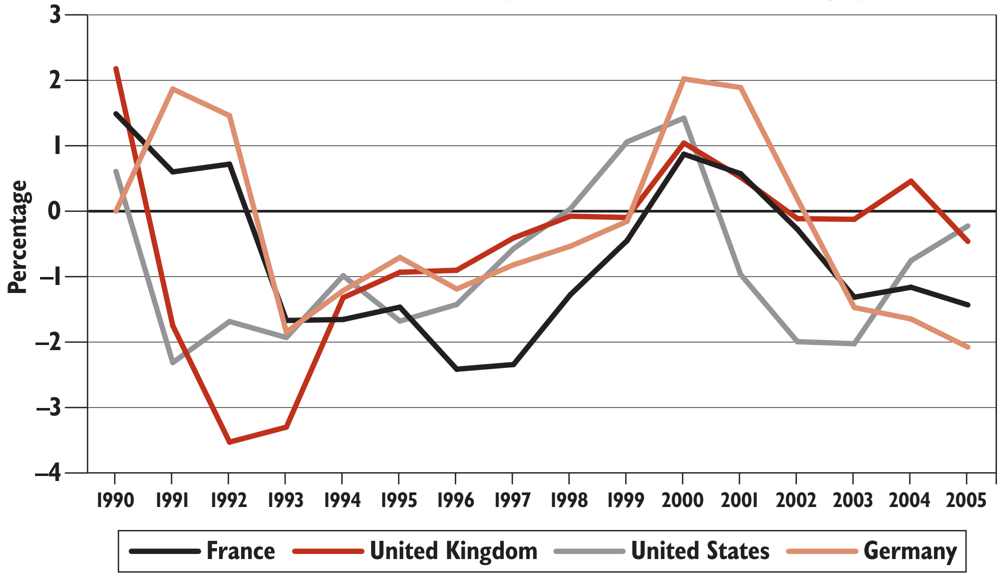
International productivity comparisons at comparable points in the economic cycle

2.31 As discussed in the previous section, productivity performance is generally affected by cyclical factors. To make meaningful comparisons of international productivity these cyclical distortions need to be removed to make comparisons when countries are at similar points in their economic cycles. The Government uses this approach.

2.32 The Government uses OECD output gap estimates to determine in which years comparator countries are at similar points in their cycles, as OECD estimates are available for a large number of countries. When the most recent published assessment was made in 2004 the most appropriate years for international comparisons appeared to be 1995, 2000, and 2002 – years when the UK, Germany, France and US appeared to be at the most similar points in their economic cycles. However, since these dates were set data revisions mean that the US's output gap has opened out in 2002, and 2003 might be a better year for comparisons with the US. Chart 2.4 shows the OECD's most recent output gap estimates for the comparator countries.

[5] There are a number of possible methods for comparing across cycles between countries. However, they rely on complex data and comparisons can often only be made a long time after the event. The Government's current method offers a timely and sensible approach to comparing countries across their economic cycles.

Chart 2.4: International comparison of the output gap



Source: OECD Economic Outlook No. 77.

Choice of purchasing power parity methodology

2.33 International productivity comparisons use productivity measures based on domestic GDP, which is measured in a domestic currency. To compare levels of productivity between countries requires converting output into a common unit, which is generally done by using purchasing power parities. PPPs use relative prices from a basket of goods and services to convert output into a common currency and eliminate differences in price levels between countries.

2.34 To compare international productivity performance over time requires deciding between two main methods for computing PPPs:

- constant PPPs – which fix PPPs at a base year. Under this methodology the difference in productivity growth between countries can be directly calculated as the domestic productivity growth rate of country A minus the domestic productivity growth rate of country B. This methodology becomes less reliable for making cross-country comparisons the further from the base year.

- current PPPs – which involves recalculating PPPs in each period using up to date prices and weights for different product groups. Domestic productivity growth rates cannot be directly compared across countries under this methodology but it does take account of shifts in relative prices or the industrial mix over time.

2.35 Each of these PPP methodologies has strengths and weaknesses. The Government has historically used current PPPs for comparisons. In 2004 the Government's PPP methodology was revisited and opened to a public consultation.[6] Following the consultation the Government announced its intention to continue using current PPPs as it is a better indicator of relative productivity levels between countries at a point in time.

[6] See HM Treasury (2004) 'Productivity in the UK 5: Benchmarking UK productivity performance'

Significance of international comparisons of productivity

2.36 In making any assessment of comparative productivity performance it is important to ensure that any quoted differences are substantial enough not simply to be the result of remaining inconsistencies in collected data. There remain international variations in definitions of hours worked and measures of investment. GDP and PPP measures are also subject to revision.[7] The Government, therefore uses a cautious approach and only defines changes in international productivity gaps of five or more percentage points relative to the UK level as significant.

CONCLUSION

2.37 This chapter demonstrated that together labour productivity growth and employment are the routes to higher prosperity. A strong productivity performance is critical to drive long-run growth and to make the most of the opportunities presented by an increasingly global economy. Chapter 3 discusses UK productivity and employment performance and shows that over the recent past the UK has managed to combine improving productivity performance with strong employment growth, a historically rare occurrence.

2.38 Changes in productivity growth over time are used to assess changes in underlying economic performance. This chapter showed that productivity performance is generally pro-cyclical, and that previous UK productivity cycles and cycles in other countries have periods of weaker, and often even negative productivity growth. This means that measures of underlying productivity performance must strip out cyclical factors. Therefore, the Government assesses changes in productivity performance over the economic cycle. Productivity performance over the current economic cycle and compared to previous cycles is discussed in Chapter 3.

2.39 It is also useful to assess productivity performance as compared to other key countries. This chapter showed how differences in economic cycles also affect international comparisons and how the Government controls for these cyclical effects by selecting comparison years when countries are at similar points in their economic cycles.

2.40 Raising the productivity rate over the economic cycle and in comparison to comparator countries are key goals of this Government. These goals are set out in the HM Treasury and DTI Productivity PSA Target: *Demonstrate progress by 2008 on the Government's long-term objective of raising the rate of UK productivity growth over the economic cycle, improving competitiveness and narrowing the gap with our major industrial comparators.* Chapter 3 outlines progress against these targets.

[7] OECD 2001 Employment Outlook.

3 UK Productivity Performance

INTRODUCTION

3.1 Chapter 1 set out how productivity and employment growth are twin drivers of economic growth and living standards. Chapter 2 suggested that productivity growth is generally pro-cyclical so performance must be assessed over the economic cycle. Chapter 2 also discussed how employment and productivity growth are related, as rising levels of employment may subdue productivity growth while workers gain new skills.

3.2 This chapter covers the UK's productivity performance. It sets out how recent productivity performance has been characterised by a period of strong productivity growth compared to previous economic cycles, and this performance has been particularly impressive as it occurred in an environment of strong employment growth.

3.3 This chapter sets out the UK's:

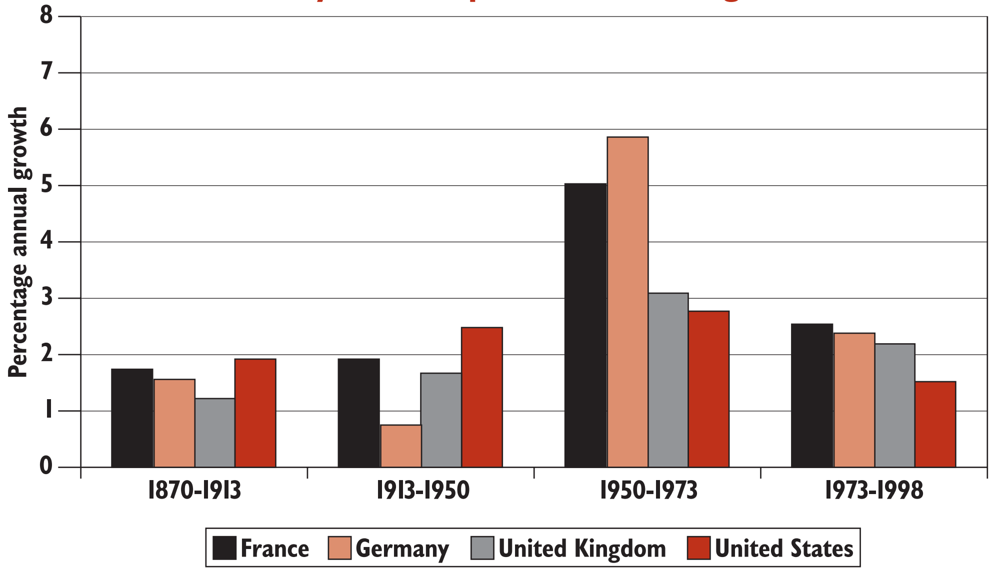
- historical performance – and discusses how since 1870 a productivity gap opened up between the UK and the US, and later with France and Germany;
- recent performance over the economic cycle – and sets out that the UK has raised the rate of productivity growth of the first half of the current economic cycle in comparison to the two previous cycles, despite rising employment;
- comparative performance – shows recent UK progress narrowing or closing the productivity gap with key comparator countries, it also outlines how this occurred in conjunction with the UK having the strongest employment rate of its comparator countries; and
- comparative performance by industry - looks at productivity performance by industry and areas of comparative advantage.

HISTORICAL PRODUCTIVITY PERFORMANCE

3.4 This section outlines the historical evolution of the UK's productivity gap divided into four distinct periods that academics often use to explain the development of this gap. Chart 3.1 shows the UK's comparative annual output per hour worked productivity growth over:

- the gold standard era (1870-1913);
- the interwar period (1913-50);
- post World War II (1950-73); and
- post-oil shocks (1973-98).

Chart 3.1: History of GDP* per hour worked growth rate[1]



Source: OECD-Maddison; The World Economy, A Millennial Perspective.
** = Average compound growth rate.*

3.5 In the late 18th century Britain became the first country to experience an industrial revolution with very substantial growth in productivity.[1] Britain was uniquely placed at this time because of its access to imperial markets, greater level of urbanisation and superior knowledge in the coal-based technologies.[2] Britain was able to maintain its productivity advantage up until the later part of the 19th century when leadership passed from the UK to the US.

3.6 The US caught and then surpassed the UK in productivity performance during the 1890s. This was followed by a sustained period of strong productivity growth in North America compared to Europe, the US productivity advantage peaked around 1950. Some commentators have suggested that the initial US productivity surge US was the result of abundant natural resources and US specific technological advances.[3] In the twentieth century US investment in education and skills set alongside innovations such as mass production are likely to have driven further productivity growth.[4]

3.7 In the period following the Second World War the UK and key European economies enjoyed a degree of catch-up in productivity growth as they imitated US innovation and technology and began to catch-up with the US's productivity performance. However, this catch-up process was slower for the UK than it was for France and Germany, thus the UK slipped down the overall productivity rankings. This slower catch-up may have been due to the UK's relatively low investment in research and development and human capital, with a decline in vocational training, and weak firm level competition.[5] The fourth period followed the turbulent oil shocks of the mid-1970's, when productivity growth in both the US and Europe slowed significantly.

[1] Madison (1995): *Monitoring The World Economy,* 1820-1992.
[2] Crafts (1998): *Forging Ahead* And Falling Behind; The Rise and Relative Decline of The First Industrial Nation.
[3] Crafts (1998) *Ibid*.
[4] Broadberry and O'Mahoney (2004) *Britain's Productivity Gap With The United States And Europe; A Historical Perspective*.
[5] Nickell and Van Reenen (2002) Country Studies: *The United Kingdom. In Technological Innovation and Economic* Performance; Bean and Crafts (1996) *British Economic Growth Since 1945: Relative Economic Decline and Renaissance?*

3.8 In the early 1990s the US appeared to experience a structural break, almost doubling its productivity performance. Most commentators believe that investment in information and communication technologies (ICTs) were an important driver of this productivity surge however European countries seemed unable to match this growth.[7] In particular, productivity in the US ICT using sectors grew at around 5 per cent a year, while the same sectors in Europe were growing at 2 per cent a year. Recent ONS revisions to ICT software investment now suggest that the UK enjoyed similar levels of ICT software investment to the US over this period as discussed in Box 3.1.

3.9 The UK is the only country in the G7 to have narrowed the labour productivity gap with the US since 1992, when the US productivity surge began. However, this catch-up was from a comparatively low productivity base so a significant productivity gap remains with the US.

3.10 The remainder of this chapter looks at measures of the UK's performance over the more recent past. This includes looking at the performance of the UK over the economic cycle in relation to other cycles and in comparison to the other key economies just discussed. Chapter 4 outlines evidence on the underlying drivers of the current productivity gap. This includes recent research that has increased our understanding of the UK's productivity gap and therefore the appropriate policy response. The current UK policy response to the productivity agenda is outlined in Chapter 5.

UK RECENT ECONOMIC PERFORMANCE

3.11 As discussed in Chapter 2, in order to assess productive performance over time it is important to control for cyclical factors, since productivity growth varies with the economic cycle. To make a meaningful assessment of performance the Government measures productivity growth between "on-trend" points to compare current performance to performance with previous cycles (see Box 2.2).

Table 3.1: Labour productivity growth over the cycle

		Output per hour	Output per worker
1970s to mid 1980s cycle	1974Q2–1986Q2	2.02	1.5
Previous cycle	1986Q2–1997H1	2.04	1.93
First half of current cycle	1997H1–2001Q3	2.59	2.13

Footnote: the decomposition of the Treasury's trend growth estimates and projections into productivity and labour input makes allowances for employment and hours worked lagging output as explained in table B2 in the 2006 Budget Report.

3.12 Table 3.1 shows that both the core measure of output per hour and output per worker have increased progressively over each of the last two and a half economic cycles, and this increase is particularly pronounced over the first half of the most recent cycle. Output per hour productivity growth between the "on-trend" points in the first half of the current economic cycle was 2.59 per cent, compared to 2.04 per cent over the previous cycle, and 2.02 per cent over the cycle before that.

[6] See for example Metcalf (2004): British Unions: *'Resurgence or Perdition?'*
[7] Oliner and Sichet (2002): *Information Technology and Productivity:* Where Are We Now and Where Are We Going.

3.13 If these figures are updated to include the most recent period, during which the UK has had below trend output growth, then actual trend productivity on a per hour basis is estimated to have grown at 2.34 per cent. This is again higher than productivity growth over the two previous cycles. This figure though is potentially misleading because it does not average between two "on-trend" points, and as the economy is currently estimated to be operating below trend level (with a negative output gap) output growth is expected to be, on average, higher than the trend growth rate between now and the end of the cycle. So, given the broadly pro-cyclical behaviour of productivity growth we may also expect average productivity growth to be above its estimated trend rate between now and when the cycle ends.

3.14 More recently, annual productivity growth has been relatively subdued during a period of below trend output growth. After growing at a rate of 3 per cent in 2004, based on initial ONS estimates productivity growth measured on a per hour basis slowed to around 1 per cent in 2005. As discussed above, these figures can only be used meaningfully to assess overall productivity performance when looked at over the cycle. The cyclical slowing in growth in 2005 may in part reflect labour hoarding, as explained in the previous chapter. A further possible explanation for at least some of the recent measured productivity slowdown is that the recent slowdown in GDP growth has not been quite as marked as implied by official data.

Possible revisions to GDP

3.15 Changes to the ONS' methodology for measuring ICT investment, could also boost investment estimates, and consequently GDP and productivity estimates. The ICT investment revisions data will not be published until the 2007 in the ONS Blue Book. The implications of this methodological change are discussed further in the box below.

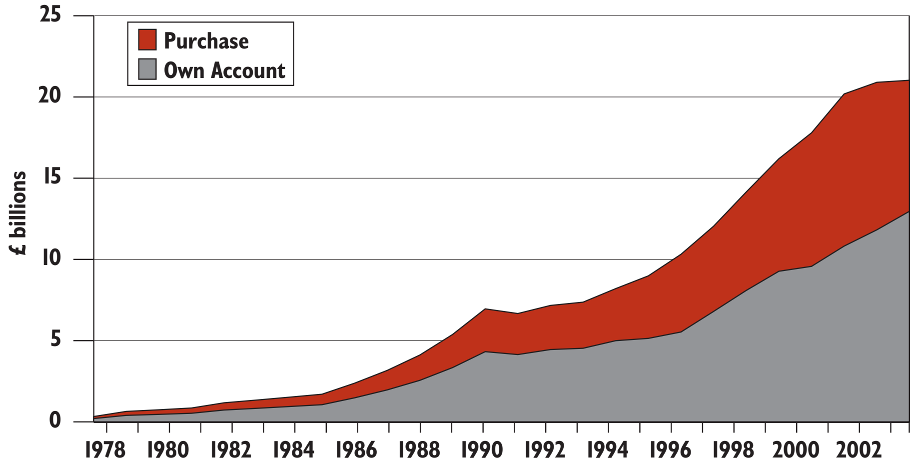
Box 3.1: Revision to software investment

The ONS have recently announced changes to the measurement of information and communications technology (ICT) in the economy. This step forward in methodology has significant impacts on level of investments and therefore on GDP and productivity measures.

The new method covers both software investments purchased by firms and organisations from external suppliers, and own account software written in-house by employees. The new estimates show higher levels of software investment than previously estimated, with estimates rising from £8 billion to £21 billion in 2003. Software investment is now thought to account for around 12 per cent of UK investment in that year, and 1.9 per cent of GDP. This suggests that UK software investment is similar to that in the US as a percentage of GDP.

The Chart below shows the data for software investment between 1974 and 2003. Own account software is now estimated at £13 billion for 2003, up from £2.5 billion on existing estimates. This represents an increase in capital formation and GDP. Purchased software investment have increased from £5.5 billion to £8 billion in 2003. However, this does not change the level of capital formation; it alters the split in investment between plant and machinery and purchased software.

Total software investment, 1974-2003



Source: ONS.

These are experimental estimates and will be further developed and incorporated into the National Accounts in summer 2007 (in Blue Book 2007). Other revisions are likely to be made to National Accounts data between now and then but, if all else holds equal, the impact of this change on GDP and productivity can be summarised as follows:

- the increase in own account software investment of £10.5 billion, could add around 1 per cent to the level of GDP;
- the effect on GDP growth in a year could be up to 0.1 percentage points;
- the level of productivity may be around 1 per cent higher;
- the UK's productivity gap with the rest of the G7 may be around 1 percentage point lower; and
- the investment to GDP ratio may be higher, rising from 16 per cent in 2003 on current estimates to 17 per cent.

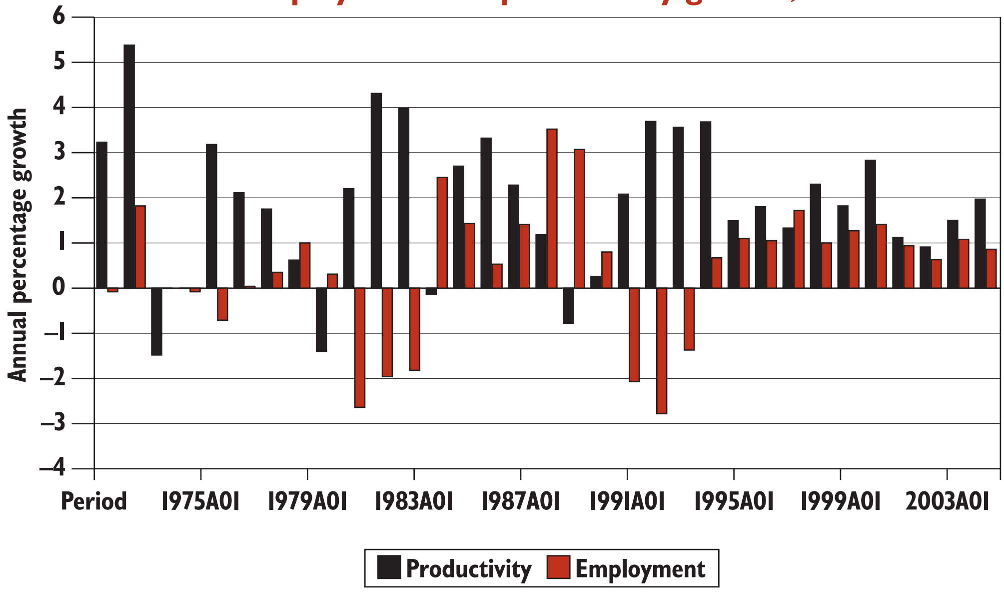
Employment, economic growth and productivity

3.16 Productivity and employment have both contributed to the recent strong economic performance. The previous section showed that productivity growth over the first half of the current economic cycle has been higher than over either of the previous two economic cycles. The UK's employment performance over recent years has also been impressive and has also contributed to this strong economic growth.

3.17 Chapter 2 explained that it is historically rare to see periods of strong employment and productivity growth, as new workers may be less productive when they first enter the labour market.

3.18 Employment is currently close to record levels with almost 28 million in work and the working age employment rate (74.5 per cent) is close to the highest for a generation. Unemployment is also close to its lowest for around thirty years and is significantly lower than the EU25 average. The International Labour Organisation (ILO) measure of the rate of UK unemployment has fallen by more than 500,000 since spring 1997. This impressive employment performance has wider benefits for equity and has also helped to increase overall economic performance. Table 3.2 breaks down historical estimates of trend output growth between the two determinants of economic growth: labour input and labour productivity.

Chart 3.2: Employment and productivity growth, 1973-2004



Source:ONS

[8] See HMT (2002): *Trend Growth: Recent Developments and Prospects*, for further detail.

3.19 Indeed, as can be seen in Chart 3.2, previous periods of strong productivity growth often occurred during periods of flat or even negative employment growth, and similarly strong employment growth was often accompanied by falling productivity growth. However, there appeared to be a structural change in the mid 1990s; since then the UK economy has enjoyed a rare period of stable growth in both productivity and employment. Taken together the UK is experiencing the longest period of combined sustained productivity and job growth since current records began in the 1950's.

COMPARATIVE PRODUCTIVITY PERFORMANCE

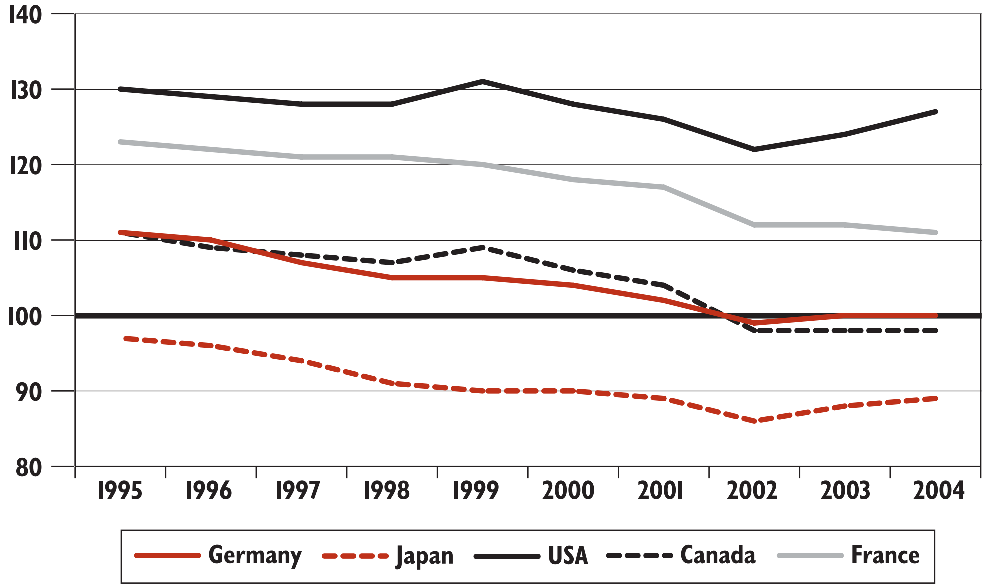
3.20 Changes in productivity over the economic cycle are key drivers of prosperity and living standards. An environment of increasing global competition and opportunity further highlights the importance of the UK closing the historical productivity gap with key comparator countries. This section discusses the progress that has already been made in narrowing the productivity gap with these comparator countries.

3.21 As discussed in Chapter 2, comparisons of international productivity performance will be distorted if countries are at different points in the economic cycle. Therefore, international productivity comparisons should be done in years when the countries are at similar points in their economic cycle. As set out in Chapter 2 key comparator countries were assessed to be at similar points in 1995, 2000 and 2002, although on most recent data 2003 may be a better year than 2002 for comparisons with the US.[9]

3.22 Chapter 2 also showed that the US is current in a cyclically buoyant period of economic growth while Europe, including the UK, is currently in a period of cyclically subdued growth. This difference in economic cycles helps to explain the US's very recent strong productivity growth compared to Europe.

[9] There are several possible methods of stripping away cyclical effects to make international productivity comparisons. However, many of these rely on complex data that often takes several years to compile. Given the data constraints the Government's approach appears both sensible and timely.

Chart 3.3: Output per worker (UK=100), 1995-2004



Source: ONS.

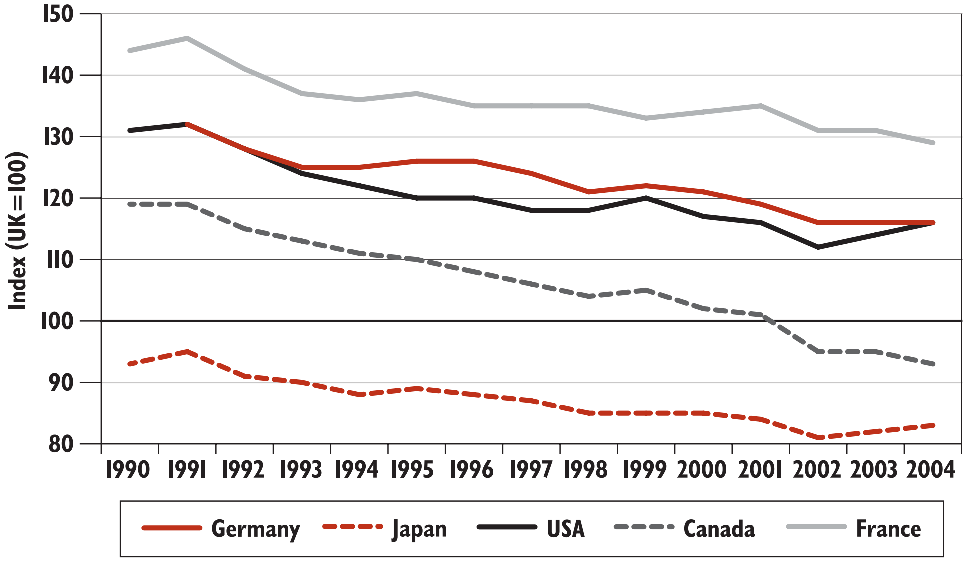
3.23 Chart 3.3 above sets out international comparisons of output per worker. Since 1995 the UK has:

- made progress narrowing the gap with France (from 23 index points to 11);
- broadly closed the gap with Germany (from 11 index points to 0);
- opened a slight lead over Canada (11 index point gap to a 2 percentage point lead);
- increased its lead over Japan (from 3 index points ahead to 11); and
- tentatively narrowed the gap with the US. The gap has fallen from 30 index points to 27, which is less than the significance test of 5 index points. However, 2003 may be a better year for comparisons with the US due to relative cyclical positions. Between 1995 and 2003 the gap narrowed by 6 index points.

3.24 Chart 3.4 shows similar figures for output per hour worked. International comparisons of output per hour worked have recently been classed as an official series by the ONS, as some difficulties with international comparisons of hours worked data have been addressed. The table shows that there have been similar changes in the productivity gap, as measured by output per hour worked. Since 1995 the output per hour worked gap:

- with Germany has fallen 10 index points;
- fallen 8 index points with France;
- the positive gap over Japan has been increased; and
- the gap with the US has fallen by around 4 index points.

Chart 3.4: Output per hour (UK=100), 1995-2004



Source: ONS.

Comparative productivity and employment performance

3.25 Productivity and employment are both drivers of economic growth. Discussions of comparative productivity performance should also include employment performance for two key reasons.

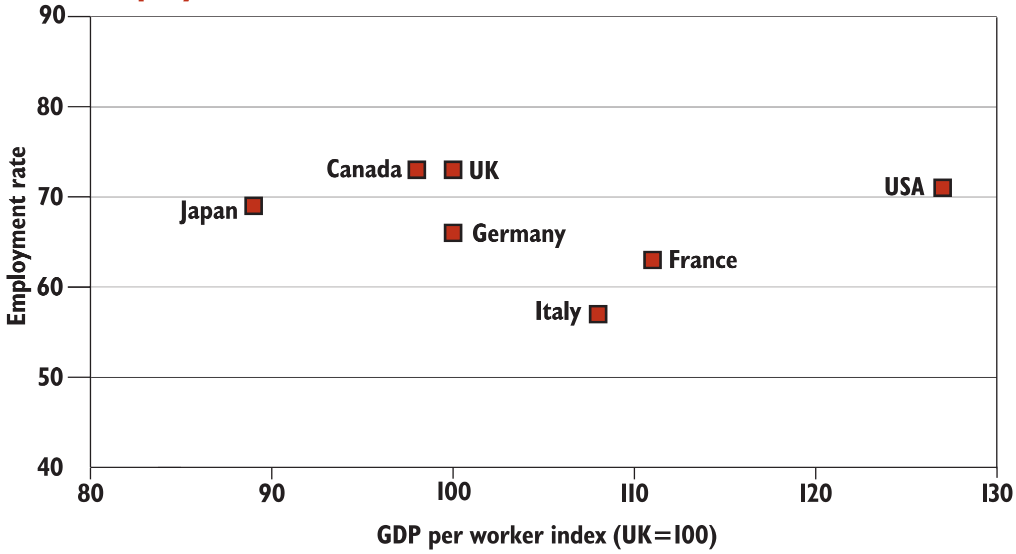
3.26 Firstly, as was discussed in Chapter 1, employment and productivity together determine economic output and living standards. Employment also has important social effects as it is recognised as the best route out of poverty.

3.27 Secondly, employment or productivity growth can impact on each other. This is because increases in employment can temporarily subdue productivity growth. This temporary muting of productivity growth is discussed above and occurs if new workers take time to acquire job relevant skills. This productivity damping effect could be more persistent if new workers have lower levels of skills and qualifications than existing workers. This means that it is more challenging to achieve strong productivity growth with simultaneously rising employment.

3.28 Chart 3.5 shows that the UK now has the second highest employment rate in the G7, a higher rate than the US, France or Germany. The strong labour market performance makes the UK's recent productivity performance even more impressive.

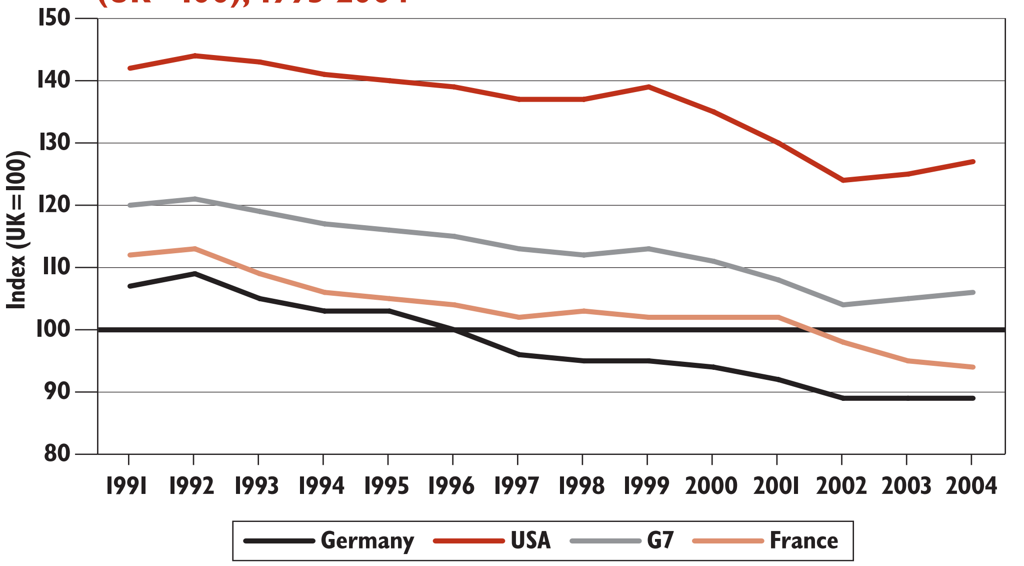
3.29 This combination of a strong labour market and improving productivity performance both contribute to the UK's relatively strong output per person of working age performance. The UK has higher output per person of working age than either France or Germany, as can be seen in chart 3.6 below.

Chart 3.5: Comparisons of Productivity and Employment in the G7



Source: Employment OECD, PDF per worker index.

Chart 3.6: Output per person of working age (UK=100), 1995-2004



Source: .

Future productivity challenge

3.30 As discussed in Chapter 1 the UK's productivity benchmark should not be restricted to traditional comparators such as the US but also rapidly growing emerging economies such as China and India. These economies currently have significantly lower levels of productivity than the UK and its core comparator countries. However, these economies are currently enjoying very rapid productivity growth as they emulate the technology, skills, and innovation of more productive economies.

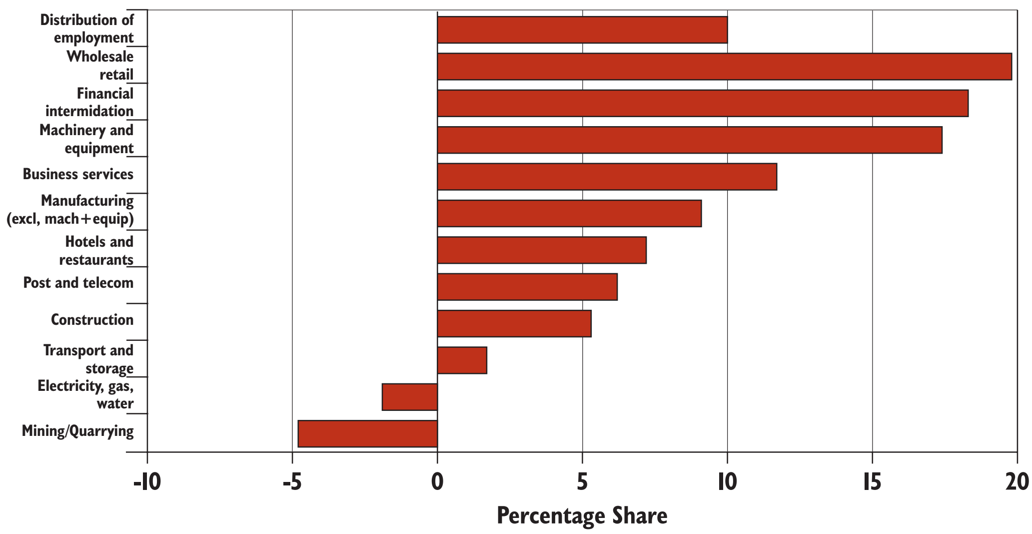
PRODUCTIVITY BY INDUSTRY

3.31 This chapter has looked at the UK's productivity over time, and compared to other countries. This final section considers the UK's productivity at a industry level.

3.32 Aggregate productivity figures may conceal marked variations in productivity at the industry level. It is important to establish whether the productivity gap is the result of industrial composition, or actually reflects lower productive capacity throughout the economy. However, data and definitional issues make international comparisons of industry level productivity difficult. The following subsection looks at the evidence regarding the industrial composition of the productivity gap and then considers this relationship with the changing structure of the UK economy.

3.33 Recent academic work[10] has explored the industrial composition of the UK's productivity gap within the business sector with the US and finds that the productivity gap is explained largely by lower productivity within three broad sectors: wholesale and retail, financial intermediation and machinery and equipment accounting for more than half the gap in 2001. This contribution is a combination of sector size and differences in productivity. Charts 3.7 and 3.8 below show the industry share of the gap and share of UK employment, respectively.

Chart 3.7: Share of UK – US gap, 2001

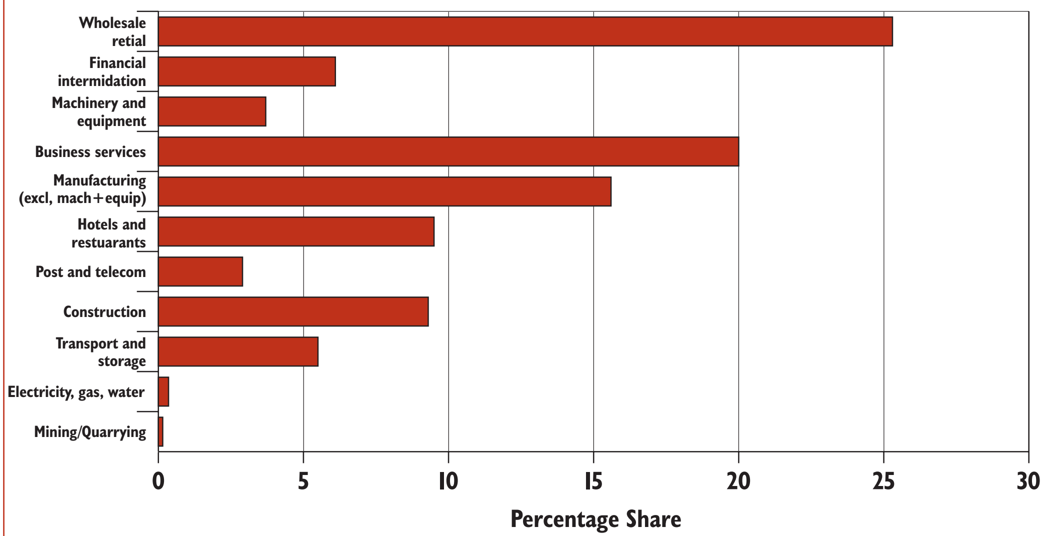


Source: taken from AIM (2003) "The UK productivity Gap and the importance of the Service Sector".

[10] Griffith, Harrison, Haskel & Sako (2003): *The UK Productivity Gap & The Importance of The Service Sectors*, AIM Briefing note.

3.34 Over the period 1990-2001 this work also suggests that the total productivity gap does not change substantially, yet its composition does. De-regulation in utilities and telecommunications sectors in the UK appears to have induced strong productivity growth and a subsequent narrowing of the gap with the US in these sectors. Despite strong employment growth in business services, the sector also enjoyed good productivity growth and a narrowing in the gap with the US in this sector. However, the gap worsened in the wholesale and retail, financial intermediation, hotels and restaurants and machinery and equipment sectors. With strong employment growth in both wholesale and retail and hotels and restaurants, these sectors' performances were found to be dragging down the UK's relative productivity performance over the data period. In sectors where the gap worsened, this was not the result of a productivity slowdown, but rather an acceleration in US productivity growth

Chart 3.8: Share of UK employment, 2001



Source: taken from AIM (2003) "The UK productivity gap and the importance of the service sector".

3.35 The recent phase of globalisation helped to significantly change the structure of the UK economy. Like many developed countries over the past quarter of a century, the UK has experienced a shift from producing manufactured goods towards providing more services. Economic theory suggests that trade induced changes in the output mix will both reflect changes in productivity at the industry level and also help foster growth in productivity through allocating resources more efficiently within and between industries. It is likely that the UK firms and industries that export their goods and services will exhibit higher productivity relative to others. Firms that are involved in international trade are also likely to experience strong productivity growth because of: increased incentives to innovate, increased incentives to improve product quality and increased competition[11].

[11] For a more complete discussion of the relationship between productivity trade and comparative advantage see Greenaway Gorg & Kneller (2005): *Globalisation and Productivity Growth Theory and Evidence*.

3.36 The UK has experienced a more marked shift towards service-orientated exports than most other G7 countries. The UK exports substantially more services than it imports. The sub-sectors of insurance, financial services, computer services and other business services comprise most of this trade surplus. In general, countries will specialise in and be net exporters of goods or services in which they have a comparative advantage. Looking at the relative importance of a sector's exports in a country compared to its relative importance to a group of similarly economically developed countries, say the G7, can demonstrate what sectors a country most effectively exports. A value greater than 1 indicates that a country is a relatively heavy exporter of goods or services in that sector. This technique is known as Revealed Comparative Advantage (RCA) because it attempts to show in which sectors countries have a relative advantage in trade.[12] The table below shows the Revealed Comparative Advantage measures for services exports in the G7 countries. The UK has a comparative advantage in several sub sectors, most noticeably in insurance, financial services and computer and information services. According to IMF figures, the UK exported more financial services than any other country in 2003.

Table 3.3: Revealed Comparative Advantage (RCA) in Services Exports (2003)

RCA>1 is considered to have revealed comparative advantage compared to G7

	Canada	France	Germany	Italy	Japan	United Kingdom	United States
Transport	0.6	1.2	0.8	0.7	1.2	1.2	1.1
Travel	0.6	1.4	0.7	1.5	0.3	0.9	1.4
Communictions	1.1	1.2	0.7	1.1	0.3	1.5	1.2
Construction	0.1	1.3	1.7	1.2	1.8	0.1	0.6
Insurance	1.4	0.7	1.1	0.5	0.1	3.2	0.7
Financial	0.3	0.2	0.4	0.5	0.5	3.8	1.4
Computer and information	1.2	0.5	1.3	0.2	0.3	2.6	0.9
Royalties & licence fees	0.4	0.4	0.2	0.1	1.2	1.1	2.3
Other business services	0.6	1	0.7	1.1	0.6	1.8	1.2
Personal, cultural and recreational	1.5	1.1	0.3	0.5	0.1	1.3	2
Government, n.i.e	0.4	0.2	1.1	0.4	0.4	0.9	2.1

Source: IMF balance of payments statistics yearbook 2004, HMY calculations.

[12] These calculations are based on the export-based Balassa Index of Revealed Comparative Advantage. This index can be calculated by taking the country share of sector exports in the country's total exports divided by the World or country group share of sector exports in total world exports. A value greater than 1 reveals that the country has a comparative advantage in that sector. The denominator here is the share of the named sector in total G7 goods and services exports.

CONCLUSION

3.37 This chapter has outlined the UK's historical and recent productivity and economic performance over the economic cycle, compared to key comparator countries, and at an industrial level.

3.38 Chapter 2 emphasised the importance of considering productivity growth over the economic cycle. This chapter showed that productivity growth has increased over the first half of the current cycle in comparison to the last two cycles. These gains in productivity performance are all the more impressive as the UK has also experienced strong increases in employment.

3.39 This chapter has also considered comparative productivity levels. The UK has historically lagged the US, France, and Germany in terms of productivity, a gap that built up over the 20th century. Statistics show that the UK has made real progress in narrowing the productivity gap over the past decade. Since 1995, the UK has halved the output per worker gap with France, closed the gap with Germany, is leading Japan, and since 1997 has been the only country in the G7 to keep pace with the US.

4 THE GOVERNMENT'S PRODUCTIVITY FRAMEWORK

The Government's productivity framework identifies five drivers that underlie long-term productivity. Each driver has important relationships with other drivers, determining long-term productivity and the way in which the UK responds to the challenges of globalisation.

Competition: competition improves productivity by creating incentives to innovate and ensures that resources are allocated to the most efficient firms. It also forces existing firms to organise work more effectively through imitations of organisational structures and technology. The threat of entry and exit of firms, with more productive firms replacing less productive firms, drives these incentives to innovate. Competition has important links to innovation, as firms compete through innovation to gain market share.

Innovation: innovation has positive and significant effects on growth through new technologies or ways of working. This occurs directly through expenditure on innovation and indirectly through spillovers. Spillovers can boost productivity of all firms through emulation and raise the capacity to innovate further. Innovation is stimulated by competition but also needs the correct skills mix and investment to exploit the full potential of innovations.

Skills: the quantity and quality of skilled labour available in an economy is an important determinant of economic performance and productivity growth. Skills complement physical capital, and are needed to take advantage of investment in new technologies and organisational structures. Furthermore management skills are an important influence over how firms react to competition, new innovations and how physical investments and human capital are employed.

Investment: physical capital stocks are closely correlated with productivity performance, as they directly influence how much a unit of labour can produce. Investments increase labour productivity by increasing the capital each worker can utilise. Skilled workers enhance investments and investments in technology can improve production (e.g. ICTS). Infrastructure investments facilitate movement of goods and services influencing the location decisions of business.

Enterprise: new enterprises compete with existing firms through new ideas and technologies increasing competition. Entrepreneurs are able to combine factors of production and new technologies forcing existing firms to adapt or exit the market. The ability of entrepreneurs to turn ideas into production is affected by the skills of the labour force, availability of capital and the rules and regulations that affect the competitive environment.

NEW EVIDENCE ON THE FIVE DRIVERS OF PRODUCTIVITY

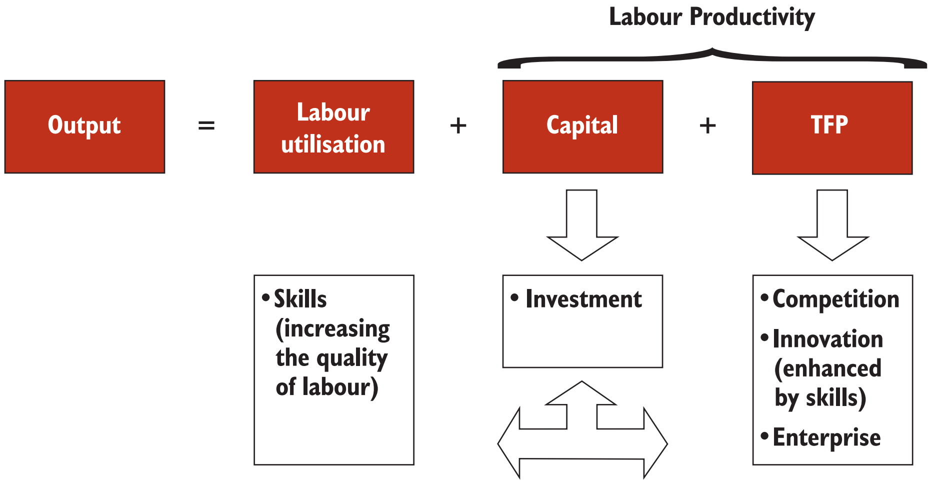
4.1 The last chapter showed how the UK has made labour productivity gains against its comparator countries, halving the output per worker gap with France and closing the gap with Germany. However, there remains a significant productivity gap with the US. Since 1997 the US has increased its output per worker productivity gap with every country in the G7 except the UK, which has kept pace. Using the US, arguably the strongest global performer, as a productivity benchmark illustrates the degree of the Government's ambition for the productivity agenda.

4.2 To effect real changes to the long-run rate of productivity growth requires policies to support and strengthen the underlying drivers of productivity growth. In 2001 the Government set out its analysis of the underlying drivers of productivity growth and a productivity enhancing policy framework.[1] This framework set out the following five drivers of productivity growth:

- competition;
- innovation (including technological progress);
- investment (physical capital);
- skills (human capital); and
- enterprise.

4.3 These drivers are based around the basic principles of growth accounting set out in Chapter 1, which separate growth into three subcomponents: labour; investment in physical capital; and total factor productivity (TFP). TFP can be thought of as a measure of the efficiency with which capital and labour inputs in the economy are being combined. Of the five drivers of productivity, investment directly refers to investment in physical capital, but is also related to innovation as new capital can embody technological change which can improve the efficiency of the production process. Improved skills can contribute directly to improved productivity through higher quality of labour – a trained bricklayer can produce more than an unskilled labourer; improving skills and education can also have wider effects on TFP – helping to generate new innovations, technologies, and ways of working. Competition, innovation and enterprise are all drivers of the efficiency of production so are drivers of TFP. The relationship between the five drivers of productivity and the components of economic growth are set out in the following diagram.

Figure 4.1: Growth accounting and the five drivers of productivity growth



[1] HM Treasury (2001), *'Productivity in the UK: Progress towards a productive economy'*.

4.4 Technological change and innovation are key drivers of productivity growth. For example, Chapter 2 outlined how the UK grew strongly during the industrial revolution, a period of intense technological and innovative progress. There are a number of possible drivers of technological change and innovation. For example:

- investments in technology raise the efficiency of production and when combined with skilled labour raise the productivity of firms;
- competition creates incentives to innovate, raising a firms productivity against its competitors; and
- entrepreneurs create new ways of combining factors of production and new technologies forcing existing firms to adapt or exit the market.

4.5 The drivers are interlinked, for example, skills not only affects the quality of labour, they also affect the skills of entrepreneurs and how firms react to competition and innovation. The exact effect of each driver on productivity will be looked at in turn in the rest of this chapter.

4.6 As Chapter 1 explained, government policy can have direct effects on how firms and individuals invest and innovate. The government is a direct supplier of some of the inputs of production, for example, funding public education, public investment in infrastructure and public R&D. The government also influences the business environment, for example through the competition regime, regulations and tax system. This environment affects incentives to invest in innovation, share knowledge, and to compete with other firms.

COMPETITION

Competition as a driver of productivity growth

4.7 Competition refers to the number of firms in a market and the behaviour of those firms. It affects the prices consumers face and how much they consume, but also affects incentives for firms to innovate and raise productivity compared to their competitors. The framework for productivity growth set out in the introduction showed how competition can raise productivity though TFP, by combining labour and capital more effectively in production. Box 4.1 describes the potential impact of two stylised forms of market competition.

Box 4.1: Monopolistic and perfectly competitive markets

Two stylised types of markets can be used to explain the effect of competition on output and productivity.

Perfect competition is a market where there is a large number of firms, who have no control over prices and output and there is costless entry and exit to the market. In this market output is sold for the additional cost to the firm of making it, termed marginal cost. From society's point of view perfect competition is an efficient market because output is sold at marginal cost and goods are sold to consumers at the lowest price.

Monopoly is a market where there is only one producer or seller, so can be described as the absence of competition. A monopolistic firm is able to use its market power to set prices higher than marginal costs. These higher prices mean that consumers buy less than in the perfectly competitive market. Charging higher prices allow a monopolistic firm to earn additional profits after covering all costs. Monopolies can occur naturally, for example if production requires very significant initial investment, or can occur because the firm is able to eliminate competitors.

A monopoly is an extreme example of a non-competitive market, however, similar analysis can also apply to other markets with a limited number of firms. Firms using market power to earn higher profits provide clues to why greater competition can produce higher output and productive efficiency.

4.8 Competition impacts on productivity through two main channels:

- **actual entry and exit**, in which new high productivity firms enter the market and replace low productivity firms. The entry of more productive firms will increase competition and cause less productive firms to exit because they are unable to compete with new entrants. The effect of entry and exit is to raise aggregate productivity. Global competition makes this effect even more powerful as there are more firms competing, with different forms of technology and ways of working; and

- **efficiency and innovation of existing firms** can also be increased by both the threat of entry and exit and actual entry of new firms. The threat of entry provides an incentive for existing firms to speed up adoption of new techniques and innovations to avoid bankruptcy or loss of market share. Actual entry of new firms introduces new innovations that can raise the productivity of existing firms through imitations of technology and ways of working.

4.9 Competition can occur through domestic firms, but also foreign multi-nationals who may be more productive as they may have access to better product or process technologies and access to knowledge from the parent company and other affiliates.

Evidence on competition as a driver of productivity

4.10 Empirical studies show a link between competition in product markets and productivity performance.[2] For example, studies have found that increasing competition pressures in the UK has been an important factor in narrowing the TFP gap since the 1970s.[3]

[2] OECD (2002a), *Economic Outlook*, No. 72, Paris.

[3] See Crafts, N. & Mills, T. (2003): *TFP Growth in British and German Manufacturing, 1950-1996*, Centre for Economic Policy Research, Discussion Paper No.3078.

4.11 Threat of firm entry and exit is a reflection of the competitiveness of a market. One study suggested that 20 to 40 per cent of total factor productivity differences between eight OECD countries could be explained by firm entry and exit.[4] Other studies using firm level data also generally conclude that competition through firm entry and exit has positive effects on productivity growth.[5]

4.12 Another study looking at the UK manufacturing sector found that productivity was driven by a process of productive firms expanding and the unproductive ones exiting the market, as well as by improvements in techniques and organisation.[6] The study found that entry and exit accounted for 20 to 50 per cent of the labour productivity growth in UK manufacturing.

4.13 Similarly a study looking at the retail sector found that entry and exit are significant drivers of productivity growth, but also that it contributed more to productivity growth in the US than in the UK.[7] Over the period of the study (1997-2001) entry and exit drove all productivity gains for the US retail sector but only 43 per cent of productivity gains in the UK.

Foreign direct investment

4.14 Foreign direct investment (FDI) in terms of foreign ownerships can increase the average productivity of an economy through competition, because:

- there is considerable evidence that multinational firms are generally more productive than domestically owned firms.[8] Therefore, higher productivity may derive from access to better product or process technologies and the ability to access knowledge from the parent company and other affiliates;
- raising the productivity of domestic firms though increased competition as discussed previously; and
- increasing the productivity of domestic firms through spillovers, such as the spread of knowledge and techniques. Technology also flows within a firm, so purchasing a new plant can raise aggregate productivity.

4.15 There is good evidence to suggest that there may be productivity spillovers from FDI to the UK.[9] One study found evidence of positive spillovers from foreign firm activity in the domestic economy, with a 10 per cent increase in foreign presence increasing TFP by 0.5 per cent.[10] Another study has found that one way that increases in foreign firm presence increase TFP is that it assists UK firms to adopt existing technologies at a faster rate.[11]

[4] Cited in OECD (2005): *Micro-polices for Growth and Productivity: Final Report*,. p.16

[5] Nickell, S. (1996): *Competition and Corporate Performance*, Journal of Political Economy, Vol. 104, No. 4, pp. 724-46., and Disney, R., Haskel, J. & Heden, Y. (2003): *Restructuring and Productivity Growth in UK Manufacturing*, Economic Journal, July 2003.

[6] Disney, R., Haskel, J. & Heden, Y. (2003): *Restructuring and Productivity Growth in UK Manufacturing*, Economic Journal, July 2003.

[7] Haskel, J. & Khawaja, N. (2003): *Productivity in UK Retailing: Evidence from Micro Data*, Discussion Paper CeRiba, Centre for Research into Business Activity.

[8] Griffith, Redding, & Simpson (2004) found that foreign-owned multinationals are on average 25 per cent more productive (value added per worker) and invest more per worker than both British-owned multinationals and domestic firms, in both the manufacturing and service sectors. Criscuolo and Martin (2003): *TFP Growth in British and German manufacturing, 1950-1996* Centre for Economic Policy Research, Discussion Paper No. 3078 show that foreign-owned firms in the UK are roughly twice as productive (output per worker) as domestic firms.

[9] Gorg, H. & Hijzen, A. (2005): Multinationals Enterprises and Spillovers, in Horg, H., in Greenaway, D. & Kneller, R. (eds.) (2005): Globalisation and Productivity Growth – Theory and Evidence, Palgrave Mcmillan.

[10] Haskel, J., Pereira, S. & Slaughter, M. (2002): Does Inward Foreign Direct Investment Productivity of Domestic Firms?, NBER Working Paper No. 8724, January.

A second way that foreign firms provide knowledge spillovers is that they conduct a substantial amount of R&D in the UK.[12]

Competition as a driver of innovation

4.16 Competition also has significant effects on innovation as the threat of competition from existing firms or new entrants raises the incentive on incumbents to compete through:

- innovation of new products and process, this is often achieved through investment in research and development (R&D); and
- adopting technologies and ways of working from more innovative entrants or existing firms, this is known as technological diffusion.

4.17 On the first effect one study found that stronger competition leads to higher investments in R&D.[13] On the second effect a study found that new entrants bring with them higher rates of productivity.[14] Covering both these effects, other studies showed that increased innovation and technological diffusion have been important factors in explaining the link between competition and productive performance.[15, 16]

4.18 A specific form of threat of entry is from multinational firms, who are generally more technologically advanced and productive than solely domestic firms.[17] Increasing the foreign firm entry rate by 1 per cent has been shown to increase TFP growth of domestic firms by 0.5 – 1 per cent.[18]

4.19 Generally empirical studies find a positive link between competition and innovation. However, a recent study finds that for certain markets there may be an optimal level of competition that maximises the incentive to innovate.[19] This could occur if intense competition reduced profits from investing in innovation. The study also found that innovation may be low in markets with weak competition due to lack of competitive incentives.[20]

[11] Griffith, R. & Simpson, H. (2003): *Characteristics of Foreign-Owned Firms in British Manufacturing*, NBER Working Paper No. 9573.

[12] Griffith, R., Redding, S. & Simpson, H. (2004): *Foreign Ownership and Productivity: New Evidence from the Service Sector and the R&D Lab*, Institute of Fiscal Studies Working Paper No. 04/22.

[13] Ahn, S. (2002): *Competition, Innovation and Productivity Growth: A Review of Theory and Evidence*, OECD Economics Department Working Papers, No. 317. and OECD (2003a): *The Sources of Economic Growth in OECD Countries*, Paris, and OECD (2003k), and OECD (2003k): *Product Market Competition and Economic Performance*, OECD Economic Outlook, No. 72, Chapter 6, OECD, Paris.

[14] Caves, R. (1998): *Industrial Organization and New Findings on the Turnover and Mobility of Firms*, Journal of Economic Literature, December.

[15] Aghion, P., Bloom, N., Blundell, R., Griffith, R. & Howitt, P. (2001): *Empirical Estimates of the Relationship Between Product Market Competition and Innovation*, mimeo.

[16] Gust, C. & Marquez, J. (2002): *International Comparisons of Productivity Growth: The Role of Information Technology and Regulatory Practices*, International Finance Discussion Papers 727, Board of Governors of the Federal Reserve System (U.S.).

[17] Criscuolo, C. & Martin, R. (2003): *Multinationals and US Productivity Leadership: Evidence from Britain*, draft note, CeRiBA, Centre for Research into Business Activity.

[18] Aghion, P., Blundell, R., Griffith, R., Howitt, P. & Prantl, S. (2004a): *Entry and Productivity Growth: Evidence from Micro-level Panel Data*, Journal of the European Economic Association, 2 (2-3), 265-276, and Aghion, P., Blundell, R., Griffith, R., Howitt, P. & Prantl, S.(2004b): *Firm Entry, Innovation and Growth: Theory and Micro Evidence*, mimeo, Harvard University.

[19] Aghion, P., Bloom, N., Blundell, R., Griffith, R. and Howitt, P. (2005): *Competition and Innovation: An Inverted U Relationship*, Quarterly Journal of Economics, May 2005.

[20] *Ibid.*

The role for government in encouraging competition

Competition regime

4.20 Strong competition drives productivity through the efficient allocation of resources, the development and adoption of innovation, encouraging entrepreneurship, and investment in human and physical capital.[21] In the absence of barriers to competition, the market will provide strong levels of competition and its accompanying productivity benefits. However, markets may face barriers to competition including: natural barriers such as significant initial investment; or because large firms are able to collude to set higher prices, or able to act anti-competitively to drive out competition.

4.21 These barriers to competition mean that governments aim to operate a competition regime to encourage healthy competition. A well designed competition regime will balance objectives providing the best prices and quality for consumers and helping to drive productivity growth through incentives and innovation. A competition regime that fosters strong and flexible enterprises will not only allow business to compete domestically but raising innovation and productivity will also assist them to compete internationally.

Effect of global competition

4.22 Competition and the benefits it brings can be increased by openness to trade. Global competition increases the productivity of UK firms by allowing them to adopt foreign advances in technology and innovation, providing rewards and incentives for firms to invest in technology and innovation, and allowing the UK to focus on areas of its comparative advantage. These increases in productivity enable UK firms to compete on a global scale.

4.23 Chapter 1 showed that shifting balance in global trade means that a greater proportion of global output is coming from emerging economies. This has profound effects on the exposure of business to new market conditions and opportunities. The removal of barriers to trade and improvements in transport and communications has meant technology, and goods and services are easily traded across borders forcing firms to adapt; globalisation has therefore exposed firms to greater competition.

4.24 Globalisation intensifies pressures of entry and exit as more productive firms replace the least productive ones, which reduces monopoly rents, drives down margins, reduces x-inefficiencies and slack, and reduces prices for consumers. Furthermore it creates further incentives to innovate, as the rewards from being competitive in the global market are much bigger because of the larger market. If a larger number of firms are exposed to globalisation this should increase aggregate productivity, as it should intensify competition within domestic firms. This may be supported by empirical evidence that shows exporters may be on average more productive, compared to their non-exporting domestic counterparts in the same industry.[22]

4.25 The UK's openness to trade has allowed the UK to shift production to more productive activities. As described in Chapter 1 trade has allowed the UK to increase its productivity by expanding production in areas where it has a comparative advantage and importing products that are more efficiently produced elsewhere. Shifting production towards areas of comparative advantage raises living standards by both raising domestic productivity by focusing on comparative advantage and providing consumers with improved or cheaper goods.[23]

[21] HMT (2005): *Globalisation and the UK: strength and opportunity to meet the economic challenge*.

[22] However, this could be because self-selection, i.e. firms that are the most productive becomes exporters; therefore the world market may not wholly explain productivity. For a more detailed discussion see Falvey, R.& Yu, Z. (2005): Exporting and Productivity: Theory, in Görg, H., Greenaway, D. & Kneller R. (eds.)(2005): Globalisation and Productivity Growth Theory and Evidence, Palgrave Macmillan.

[23] Disney *et al* (2003) shows a reallocation of resources from less productive forms to productive ones is a major source of productivity growth in UK manufacturing.

The UK competition regime

4.26 A sound competition regime will lead to more efficient reallocation of resources and allow the UK to realise its productivity potential. The Government has significantly reformed the competition regime since 1997 and there is international recognition that the competition regime is world class.[24] A more detailed discussion of the UK performance and polices underlying competition can be found in the following chapter.

INNOVATION

Innovation as a driver of productivity

4.27 Innovation – the successful exploitation of new ideas – is one of the main engines of long-term economic growth and structural change. Innovation can occur through investment in R&D, or through adopting new technologies from other firms or countries, or through trying different ways of working. These investments in innovation can result in new technologies, products and processes, as well as novel services and means of delivery.

4.28 Innovation can raise productivity through a number of channels:

- direct productivity gains to the firm who has invested in innovation or R&D in terms of efficiencies in production or product improvements;
- spillover productivity gains when a new innovation assists firms to also take advantage of other innovations; and
- spillover productivity gains for other firms or other countries involved in trade who are able to emulate the innovation.

Evidence on innovation as a driver of productivity

4.29 History clearly highlights the importance of innovation as a driver of increasing productivity and living standards. There is also a rich body of evidence on the effect innovation has on productivity. For example a study suggests that around 80 per cent of the productivity gap with the US in 1999 was explained by TFP, which was partially driven by innovation and technological spillovers amongst other factors.[25]

4.30 Studies looking at the impact of innovation on productivity tend to focus on the three specific channels of innovation as listed above. First, considering overall studies on the impact of investment in innovation:

- investment in R&D is one of the key components of direct innovation. Studies find a positive relationship between R&D expenditure and productivity, for example recent studies found that a 1 per cent increase in R&D raised TFP by 0.02 to 0.03 per cent.[26 27] Studies have also found that investment in R&D is critical to allow firms to compete and emulate foreign technologies when they expand to foreign markets, suggesting that becoming an exporter may increase firm level investment in R&D by 10 per cent;[28 29]

[24] DTI (2006): *UK Productivity and Competitiveness Indicators 2006*, DTI Economics Paper No.17.
[25] O'Mahony, M. & de Boer, W. (1999): *Britain's Relative Productivity Performance*: *Update 1999, NIESR, 2002*. Since the total factor productivity element is a residual, it may also be capturing other factors, e.g. unaccounted for capital and labour heterogeneity, or measurement error.
[26] Cameron, G. (2003): *Why Did UK Manufacturing Productivity Growth Slow Down in the 1970s and Speed Up in the 1980s?*, Economica, 70.(2), 121-141.and Coe, D. & Helpman, E. (1995): *International R&D Spillovers*, European Economic Review, 39 (5), 859-88.
[27] Griliches (1980b) also finds that a 1 per cent increase in R&D raised output by 0.07 per cent.

- innovation also encompasses areas such as process innovation and organisational change. A recent study suggested that design expenditure may generate a positive return to the company of up to 17 per cent.[30]

Evidence on innovation spillovers

4.31 Innovation can also have positive and significant effects on productivity through innovation spillovers. As described above this can occur though innovations building on each other and adding greater benefit over time, or though firms or countries emulating existing innovations.

4.32 Innovation spillovers can have a significant and positive effect on growth through emulating technology or working practices. Because other firms can raise their productivity by emulating innovation, studies have found that the total or social return on innovation is significantly higher than its private return to the innovator.[31] One example of a study suggests that this could raise the value of the innovation by 20 to 50 per cent.[32]

Innovation and competition, skills, and investment

4.33 Innovation is also linked to the other drivers of productivity, these are explored further in the other sections of this chapter:

- the level of available skills will affect the ability to innovate and receive transfers of technology, therefore higher skills, including management skills, will bring higher productivity as labour can adopt new technologies at a faster rate;[33, 34, 35]
- access to capital also impacts on the firm's ability to produce and use new innovations, and levels of FDI has implications for technology transfers;
- businesses need an open regulatory environment to exploit innovations.

A role for government in encouraging innovation

4.34 The Government has a important role to play in supporting a thriving innovation system for these returns to be realised. This includes:

[28] Baldwin, J. & Gu, W. (2004): *Trade Liberalisation: Export-market Participation, Productivity Growth, and Innovation*, Oxford Review of Economic Policy, Oxford University Press, vol. 20(3), pages 372-392.

[29] Some recent work has found a similar link between exports and R&D for the UK with: business spending on R&D dominated by the manufacturing sector, within which some 70 per cent of firms who are engaged in R&D also export; and sales to international markets were found to be a strong influence on whether or not R&D is undertaken, and vice versa. See Harris, R. & Li, Q Cher. (2005b): Establishment Level Empirical Study of Links Between Exporting, Innovation, and Productivity, Report to UKTI.

[30] Haskel, J. Cereda, M., Crespi, G. & Criscuolo, C. (2005): DTI Think Piece, *Creativity and Design Study for DTI using the Community Innovation Survey*, Queen Mary, University of London, AIM, University of Sussex, OECD in DTI Economics Paper Number 15: Creativity. Design and Business Performance.

[31] Griliches, Z. (1992): *The Search for R& D Spillovers*, Scandinavian Journal of Economics, 94 (Supplement), 29-47.

[32] Cameron, G. (1998): *Innovation and Growth: A Survey of the Empirical Literature*, mimeo, Nuffield College, Oxford.

[33] Benhabib, J. & Spiegelm M. (1994): *The Role of Human Capital in Economic Development: Evidence from Aggregate Cross-Country Data*, Journal of Monetary Economics, 34, 143-173.

[34] Acemoglu, D. (1998): *Why do Technologies Complement Skills? Directed Technical Change and Wage Inequality*, Quarterly Journal of Economics, 113(4), 1055-1089, 1998.

[35] Haskel Hawkes & Pereira (2004) *How Much do Skills Raise Productivity? UK Evidence from Matched Plant, Worker and Workforce Data,* Centre for Research into Business Activity. Shows that productive firms hire more skilled workers. However, skills only explain 3-10% of the TFP gap between the top and bottom firms.

- provision of the public science base;[36]
- strengthening links between business and the public research base;[37]
- incentivising private sector R&D spend;[38] and
- ensuring an attractive regulatory regime and business environment.

4.35 There is wide spread acceptance that government has an important role in providing basic research because it provides the underpinning research that enables future innovations. Firms may not fund basic research because the expected private return is not high enough to cover cost. However, this research provides wider benefits to other firms and consumers. If basic research was not publicly funded then it would either not be undertaken and the full productivity benefit would be lost, or private firms would protect their intellectual property and part of the productivity benefit through spillovers of knowledge would be lost. Public funding of research also provides a population of highly skilled researchers and students that businesses can draw on and form networks with.[39]

4.36 Business investment in R&D also generates positive spillovers to other firms and consumers. This means that firms may under invest in R&D to the extent that they take account of their private benefits but not the wider social benefits. This means that there is scope for productivity enhancing government interventions to encourage higher levels of business R&D, such as the R&D tax credit introduced for large firms in the UK in 2002.[40]

4.37 Finally, governments have a role in supporting a business environment that rewards success and helps firms gain maximum benefit from their investments in innovation. One example of a way that the Government supports firms to gain maximum benefits from innovation is by providing publicly agreed standards to ensure that the full spillover benefits of innovation are achieved.[41]

Increasing business R&D

4.38 The UK has an excellent academic base, with universities ranked world class and consistently scoring highly on the levels of papers and citation per head of population compared to the US, France and Germany. However, the challenge remains for the UK to convert this world class research base into levels of investment in business innovation and R&D that are as high as comparator countries. The UK's performance and policy measures on innovation are explored in more detail in the next chapter.

[36] Science, here and throughout, is defined in its broadest sense as encompassing all aspects of engineering, technology, design, social sciences, arts and humanities.

[37] OECD (2001): *Economic Studies: No. 33*, 2001/2 OECD.

[38] *Ibid*. Increased expenditure on R&D is correlated with a positive and persistent effect on growth. However, R&D is not the only source of new technology: in advanced, industrial economies, other activities, such as learning by doing or design are conducted in most cases on the basis of new technology coming out of R&D

[39] OECD (2001b): Measuring the Information Economy 2002, OECD, Paris.

[40] Bloom, N., Griffith, R. & Van Reenen, J. (2000): *Do R&D Tax Credits Work? Evidence from an International Panel of Countries* 1979-1994, IFS Working Papers, W99/08.

[41] A recent empirical study of the role of the publicly supported standards process has found that technology transfer facilitated by written standards made a major contribution to post war productivity growth of around 13 per cent of the growth in labour productivity in the UK over the period 1948-2002 DTI (2005): The Emperical Economics of Standards. DTI Economics Paper No. 12.

INVESTMENT

4.39 Investment increases labour productivity by increasing the capital stock that each worker can utilise. Investments in physical capital are complementary to other forms of investment such as skills and innovation. Investment has been an important factor in explaining the UK's productivity gap with comparator countries. It is estimated that in 1999 lower levels of capital investment account for around 80 per cent of the output per hour gap with France and around half the gap with the US and Germany.[42]

4.40 Capital accumulation raises labour productivity both through direct and indirect effects.[43] The direct impact is the increase in capital intensity; this means that labour is more productive because it has more capital to work with. The indirect productivity effect of capital investment is when using new investment helps labour to gain new skills and becomes more efficient at using that capital. For example, introducing an assembly line machine will require staff become familiar with the operation of the machine and become more effective at using it, which raises their skill levels.

4.41 This section considers several sub-categories of investment, each with different attributes and impacts:

- physical capital – refers to the overall level of physical capital, which directly influences how much a unit of labour can produce;
- ICT investment – is a specific component of physical capital and is the most recent example of technological change with a pervasive influence on production processes across a wide range of sectors of the economy;
- infrastructure – refers to investments that provide a base to support for other economic activities. Infrastructure is often publicly funded due to its wide public benefits in areas such as transport; and
- public sector capital investment – government also invests in other forms of capital such as schools and hospitals. These investments are critical for productivity enhancing services supporting a healthy, skilled workforce. The services these capital investments support also directly enhance quality of life.

Evidence on investment as a driver of productivity

Physical capital

4.42 Empirical studies show that levels of the overall physical capital stock are closely correlated with productivity performance, as they directly influence how much a unit of labour can produce. A number of studies have identified strong cross-country correlations between the growth rate of TFP, a proxy for technological progress, and measures of investment or capital intensity.[44] In addition to investment raising TFP, some economists argue that TFP growth also leads to rising investment. This is because rises in TFP increase the profitability of capital and provide an incentive to increase investment. This further highlights the importance of TFP, as it is also a potential driver of capital accumulation.

[42] O'Mahony, M. & de Boer, W. (1999): *Britain's Relative Productivity Performance:* Update 1999, NIESR, 2002.

[43] Mankiw, Romer and Weil (1992): *A Contribution to the Empirics of Economic Growth,* suggest that capital accounts for one-third of the level of output per head.

[44] Baumol, W., Blackman, S. and Wolf, E. (1989): *Productivity and Leadership: The Long View, Cambridge,* found a high correlation between TFP growth and growth in the capital-labour ratio for seven OECD countries over the period 1880 to 1979. Grossman and Helpman (1994): *Endogenous Innovation in the Theory of Growth,* found a positive correlation between the investment-to-GDP ratio and TFP growth in a sample of 22 countries between 1970 and 1988.

ICT investment

4.43 As discussed investments are important for raising long-term growth, in particular investments in new innovation provide a source of long-term growth. Information and communication technology (ICT) is the most recent example of technological change with a potentially pervasive influence on production processes across a wide range of sectors of the economy.

4.44 Industries that use or produce ICT contributed to most of the productivity surge in the US, as described in Chapter 3.[45] Industries using ICT in the EU have not experienced such a marked surge in productivity growth as in the US, although this effect seems less pronounced in Britain than in France and Germany.[46 47] This suggests the possibility that the US economy has been better able to exploit the opportunities offered by ICT to enhance the production processes to increase efficiency. Although there are also suggestions that the role of ICT in productivity growth compared to the US has been underestimated, particularly for the UK.[48 49]

4.45 Industrial analyses also suggest considerable variation across sectors of the impact of ICT on productivity, with the US productivity surge attributed to the performance of only six industries, yet a further 53 economic sectors invested heavily in ICT.[49] This suggests that the most successful applications of ICT have been industry-specific.

4.46 There is also considerable evidence at the firm level of a positive relationship between ICT investment and firm performance. Recent firm-level research showed that investment in ICT is associated with significantly higher output per worker, supporting the findings of earlier studies.[50]

Investment in infrastructure

4.47 Infrastructure provides a base for economic output and other forms of investment, and therefore is a driver of productivity. It facilitates the movement of goods and people, encourages business investment, influences individuals' location decisions, supports social objectives, and benefits consumers through lowering the cost of goods and services and increasing the variety available to them.

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[45] Jorgenson, D. (2001): *Information Technology and the U.S. Economy*, American Economic Review, American Economic Association, vol. 91(1), p.1-32), Oliner, S. & Sichel, D. (2002): *Information Technology and Productivity: Where Are We Now and Where Are We Going?,* Federal Reserve Bank of Atlanta Economic Review, Third Quarter. (2001), and Stiroh, K. (2002): *Information Technology and the US productivity Revival: What do the Industry Data Say?*, American Economic Review, Vol. 92, No. 5 (Dec, 2002), pp. 1559-1576.

[46] O'Mahony, M. & Van Ark, B. (2003): *EU Productivity and Competitiveness: An Industry Perspective Can Europe Resume the Catching-up Process?*, European Commission, and Basu, S., Fernald, J., Oulton, N. & Srinivasan, S. (2003): *The Case of the Missing Productivity Growth: Or, Does Information Technology Explain Why Productivity Accelerated in the United States but not the United Kingdom?*, FRB Chicago Working Paper.

[47] However some research argues that benefits of ICTs have been somewhat disguised because of different accounting methods between the US and EU. See Jorgenson (2003). *Information Technology and the G7 Economies,* Harvard University. And Oulton & Srinivasan (2005): *Productivity Growth and the Role of ICT in the UK: An Industry View; 1970-2000,* Centre for Economic Performance,

[48] *Ibid*, Discussion Paper No. 681.

[49] McKinsey Global Institute (2001): *US Productivity Growth 1995-2000, Understanding the Contribution of Information Technology Relative to other factors*, McKinsey Global Institute.

[50] Bloom N., Van Reenen J. & Sadun, R. (2005): *IT Ain't What You Do IT's The Way That You Do I.T. – Testing Explanations of Productivity Growth Using U.S. Affiliates*, Centre for Economic Performance, London School of Economics, and earlier by Stiroh, K. (2002): *Information Technology and the US productivity Revival: What do the Industry Data Say?*, American Economic Review, Vol. 92, No. 5 (Dec, 2002) , pp. 1559-1576.

4.48 Well targeted efficient infrastructure investment can encourage private investment through raising the profitability of private investment. There is a wide spread of evidence of significant positive effects on economic growth arising from infrastructure investment.[51] There are multiple channels through which infrastructure boosts growth, including lower production costs, allowing increased firm diversification and specialisation, and an improved use of time as travel and transit times were reduced.

4.49 Infrastructure investment is linked to the other drivers of productivity including:

- facilitating movement of labour to where people can be employed to make the best use of their skills, therefore increasing the returns to investment in skills; and
- enabling effective competition even when economic activity is geographically dispersed.

Investment in public capital

4.50 The provision of high quality public services is also critical for productivity and quality of life. Government invests in capital to support the provision of educational and research services in the education sector. The productivity enhancing impact of the skills and innovation these services provide is discussed under their respective drivers.

4.51 Government also invests in capital to support the provision of a health services, for example through hospitals. Heath is critical for enjoying a high quality of life. Health is also critical to be able to work effectively, or for those on incapacity benefits to be able to work at all. This means that effective health services can enhance both employment and productivity, and thus support economic growth.

UK investment performance

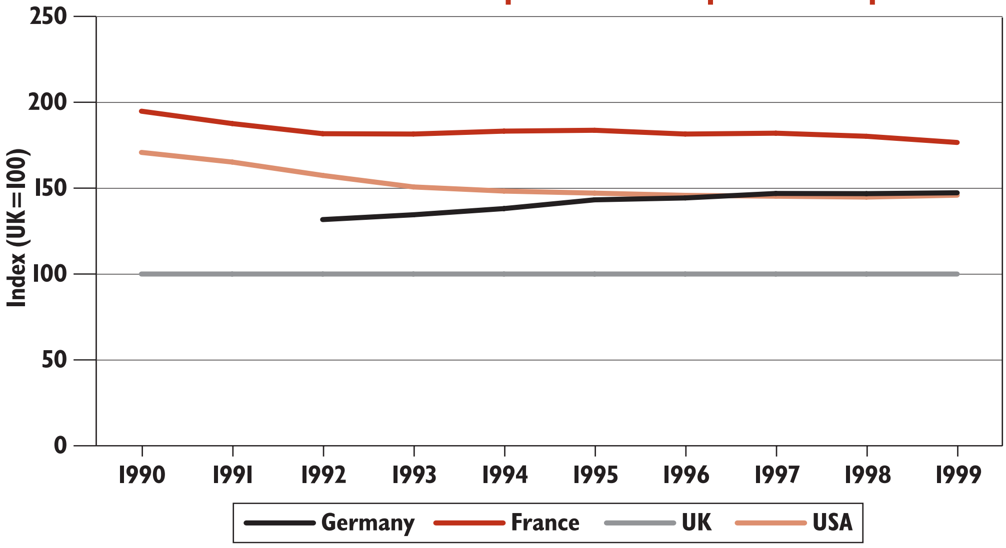
4.52 This section considers UK investment performance and its role in explaining the productivity gap. Over the past four decades the UK has been characterised by relatively low levels of fixed investment, a measure that incorporates both the public and the private sector investment. In recent years levels of new investment, that is flows of investment, in the private sector have been broadly comparable with other major industrialised countries. However, because of historical levels of low investment the overall investment stock is lower. Previously low levels of public sector investment contributed to the overall low capital stock. It is estimated that in 1999 lower levels of capital investment account for around 80 per cent of the output per hour gap with France and around half the gap with the US and Germany.[52]

4.53 Chart 4.1 sets out the UK's capital to labour ratio relative to the US, France and Germany. The UK's capital to labour ratio is well below its comparator countries, which may explain some of the productivity gap. However, measuring the capital stock is difficult as it consist of a large number of different ages, run at different utilisation rates.

[51] Aschauer, D. (1989): *Is Public Expenditure Productive*, Journal of Monetary Economics 23.

[52] O'Mahony, M. & de Boer, W. (1999): *Britain's Relative Productivity Performance:* Update 1999, NIESR, 2002

Chart 4.1: International comparisons of capital stock per hour



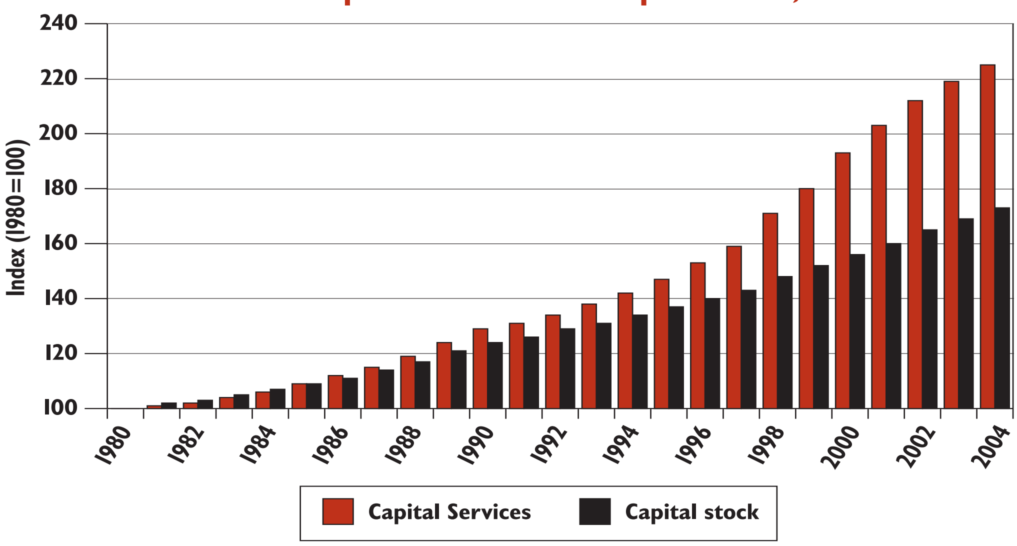
Source: NIESR

Capital services show increasing investment

4.54 Capital services are a measure of the stream of services generated by capital stock rather than the capitals asset value. Therefore capital services are a better measure of the productive value of capital in that year than capital stock. For example, a firm purchases a computer and additional office space that have similar values but productive lives of three and 50 years respectively. The computer will have a higher level of capital services per year because its flow of capital services is over a small time period. The standard capital stock measure does not adequately reflect the shift towards shorter life and more productive investment goods.

4.55 Chart 4.2 shows the divergence between capital services and capital stock measures, this suggests that estimates of the productive potential of the UK economy is dependent on which measure of capital's input into the production process is chosen. The volume of capital services has increased by over 40 per cent between 1997 and 2004, which capital stock has only increased by 20 per cent, so the later measure may underestimate the contribution of capital to output and overstate the contribution to TFP.

Chart 4.2: UK capital services and capital stock, 1980-2004

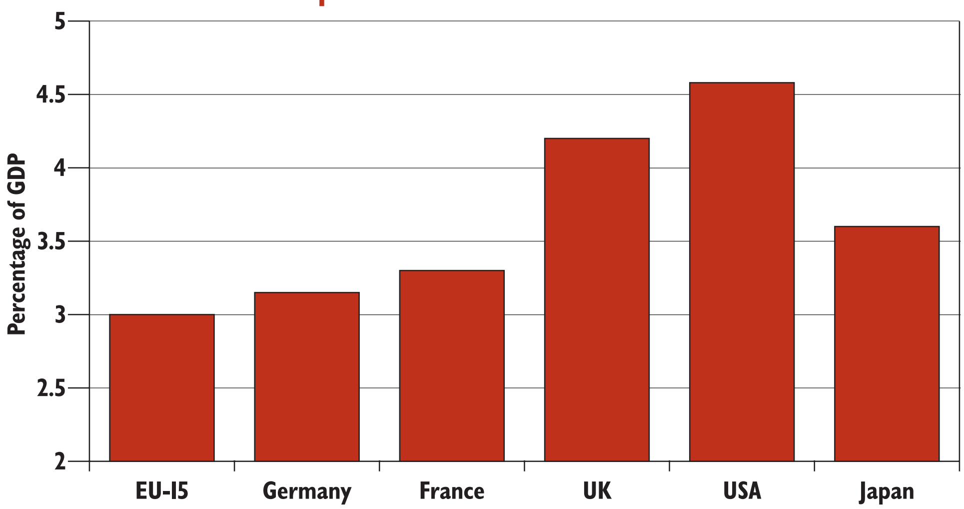


Source: ONS, capital service data is experimental.

High levels of ICT investment

4.56 ICT investment is a sub-component of overall capital investment, and can have high productivity benefits. Like many economies, the UK has over the past two decades experienced high and growing levels of investment in ICT. Chart 4.3 shows that out of key comparator countries the UK has levels of ICT investment second only to the US. Recent work by the ONS suggests that in fact the UK's software investments statistics have been under-estimated, and will be revised up in 2007. The precise revisions are not yet available so the investment numbers in this paper have not been updated. However, initial estimates suggest that the investment to GDP ratio will rise from 16 percent in 2003 on current estimates to 17 per cent, and raise the level of GDP by around 1 per cent. See Box 3.1. previously for further detail on the likely impact of these revisions.

Chart 4.3: ICT expenditure in 2004



Source: Eurostat Yearbook 2005

4.57 There are a number of hypotheses about why the impact of the technological opportunities offered by ICT has been greater in the US economy than in other economies, for example:

- US firms have been better at investing in complementary investments (skills, management and organisational), this has led both to higher ICT investment and to a greater impact of ICT investment on productivity;
- a higher degree of competitive pressures through entry and exit in the US creates incentives to implement ICT successfully, and firms which have been unable to do so have exited markets more quickly in the US than elsewhere;
- the differences are the products of different statistical methodologies used in the US and EU. Furthermore as Box 3.1 shows software investment have been underestimated, and revisions could increase levels of productivity by 1 per cent.

The role for government in infrastructure and investment

Quality of investment

4.58 Government has several roles in encouraging infrastructure and investment:

- government directly provides some forms of infrastructure investment;

- government plays an important role in setting a stable and rewarding environment for firms to invest into.

4.59 First, as discussed above good infrastructure provides a critical base for economic activity and growth. Government often has a role in providing infrastructure as it would often form a natural monopoly due to the high level of initial investment required; and because of the intrinsic social benefits of a good and reliable system of infrastructure.

4.60 Historically the UK has had lower levels of public investment in roads, housing, schools and hospitals compared to other countries.[53] Recent academic research suggests that a reduction in journey times would raise productivity.[54] Recently transport investment has been increased to address this and the Eddington Study of Transport is currently considering further means of improving transport's contributions to productivity.

4.61 Secondly, the Government has a role to play in ensuring the UK has an optimal rate of investment. An optimal rate is when investment occurs when the total benefits from investment exceed or equal its cost. This means that encouraging investment involves good institutional structures that do not constrain capital. A sound economic environment that is attractive for investment encourages efficient investment decision-making by the private sector and is therefore an important policy priority. Two specific areas where the Government provides a positive environment for investment is through providing high quality institutions and macroeconomic stability.

4.62 Institutions play an important part in facilitating good investments. The UK has high quality institutions such as an open transparent legal system for contesting legal disputes and protection of property rights.

4.63 Macroeconomic stability provides a platform to support investment.[55] This is because firms prefer to invest in a stable environment. With less uncertainty firms can plan for the long-term, allowing better quality decision-making. Increased macroeconomic stability may improve the quality as well as raise the quantity of investment, supporting productivity improvements and leading to higher economic growth.[56] For example, macro-stability may help reduce adjustment costs associated with installing new equipment and hiring and training new staff, as uncertainty often means that firms have to change the scale of their business more frequently to remain competitive.

4.64 The challenge for the UK is to foster a sound and stable investment climate. This will allow the UK to exploit investment in particular ICTs. As emerging economies become attractive locations for future investment stimulated by rapid integration into financial markets, it is important that the UK is able provide an attractive investment climate to influence both the quality and quality of investment.

[53] Clark, T., Elsby, M. & Love, S. (2001): *Twenty-five Years of Falling Investment? Trends in Capital Spending on Public Services*, 01 Nov 2001, IFS Briefing Notes, BN20.
[54] Rice, P. & Venables, A. (2003): *Equilibrium regional disparities; Theory and British Evidence*, Regional Studies 37, 675-686.
[55] Empirical studies at the firm level have confirmed a negative relationship between investment and uncertainty. Bloom, N., Bond, S. & Van Reenen, J. (2001) show for a panel of UK manufacturing firms that these respond less to demand shocks when the firms' environment is more uncertain, consistent with the real options theory of investment. Bond, S. et al (2005) also study a panel of UK firms and continue to find a negative impact of uncertainty on investment even controlling for the impact of expected future profitability on investment. Further, this paper finds that increased uncertainty not only reduces investment rates in the short run, but also leads to lower capital stocks in the long run.
[56] Barlevy, G. (2004): *The Cost of Business Cycles Under Endogenous Growth*, American Economic Review.

SKILLS

4.65 The quantity and quality of skilled labour available in an economy is an important determinant of economic performance and productivity growth.[57] Skills raise labour productivity and TFP through:

- enabling workers to carry out more complex work, work more effectively, and produce higher value products;
- investments in innovation and technology are more profitable when combined with skilled labour. Lack of skilled labour can constrain new investment and therefore productivity;
- skilled workers are also better at adapting to changing environments. Skilled workers can adapt faster and more effectively to change, and better implement new investments and innovation. A highly skilled workforce enables firms to update working practices and products at the rate demanded by rapidly changing global markets, making the economy more flexible and productive; and
- there are also indirect effects of education and training as skills can spill over to wider society as workers learn from each other.

Evidence on skills as a driver of productivity growth

4.66 Analysis suggests that improvements in the skills of UK workers have contributed around one fifth of annual growth in the UK economy over the past 25 years.[59] Another study found a similar contribution over the five years to 2000, around 0.37 percentage points of annual growth.[60]

4.67 Different types of skills have different impacts on productivity, at the most fundamental level basic numeracy and literacy are skills that have a positive impact on productivity. A recent study found that increasing the literacy score of a country by 1 per cent leads to a 2.5 per cent rise in labour productivity and 1.5 per cent increase in GDP per head.[61]

[57] For national level see for example Dearden, L., Reed, H. & Van Reenen, J. (2000): *Who Gains When Worker Train? Training and Corporate Productivity in a Panel of British Industries*, IFS Working Paper No. 00/04), for firm level see Haskel, J., Hawkes, D. & Pereira, S. (2004): *How Much do Skills Raise Productivity? UK Evidence from Matched Plant, Worker and Workforce Data*, draft note, CeRiBA, Centre for Research into Business Activity.

[58] Bell, Burriel-Llombart and Jones, (2005): *A Quality-adjusted Labour Input Series for the United Kingdom (1975-2002)*, Bank of England Working Paper 280, 2005.

[59] Lau and Vaze (2002): *Accounting Growth: Capital, Skills and Output*, Office for National Statistics, 2002.

[60] Coulombe, Tremblay, and Marchand, (2004): Literacy scores, *Human Capital and Growth Across 14 OECD Countries*, Statistics Canada, 2004.

4.68 Studies also find particularly strong impacts of skills on individual productivity, as proxied by wages. The effect on income can be broken down by qualifications, GCSE, A-levels, and degree can increase wage returns by 24-28 per cent, 15 per cent and 26 per cent respectively.[65] These returns are cumulative so someone with all three qualifications earns 62 per cent more on average than someone who is unqualified. Therefore improving skills more quickly than in the past has the potential to increase income and output.

4.69 In addition to the significant wage returns to formal qualifications, basic skills such as literacy and numeracy are also highly valued in the workplace. For example, those with good numeracy skills earn 10-15 per cent more than those with poor numeracy skills.[66]

Management and productivity

4.70 Soft skills such as interpersonal, teamwork, problem solving, management, and adaptability are also likely to be important in explaining the productivity gap. Recent studies have linked good management practices with stronger firm level productivity and high quality investment.[67] Evidence is beginning to build that overall the UK may have poorer management practices than its competitor countries. One study concluded that high incidence of unforseeable downtime in Britain compared to the EU was associated with relative deficiencies in production management, supervisory and other workforce skills.[68]

4.71 Good management is important in making high-quality ICT investment decisions and then maximizing the benefits of those investments. Recent evidence indicates that firms that make good ICT investments can benefit in terms of productivity and profitability.[69] ICT investments can also support innovative management techniques. For example, UK retail companies have been able to use ICTs and management practices to create large efficiency gains through areas such as use of real time inventories and supply chain logistics. ICT and stock management techniques are areas that many other UK firms may be able to use to respond to increasing competitive pressures and to enhance productivity.

4.72 A recent survey of the manufacturing sector indicated that overall the UK may have poorer management practices than its competitor countries, and in particular a long tail of poorly managed firms (see Box 4.2 on management).[70]

[63] Dearden, L., Reed, H. & Van Reenen, J. (2000): *Who Gains When Worker Train? Training and Corporate Productivity in a Panel of British Industries*, IFS Working Paper No. 00/04.

[64] King, (1995): *High-Performance Work Systems and Firm Performance*, Monthly Labour Review, May 1995.

[65] Sianesi, B. (2003): *Returns to Education: A Non-Technical Summary of CEE Work and Policy Discussion*, Institute of Fiscal Studies and the Centre for the Economics of Education.

[66] See, for example, Dearden, L., Reed, H. & Van Reenan, J. (2000): *The Returns to Academic, Vocational and Basic Skills in Britain*, Skills Task Force Research Paper, Institute for Fiscal Studies.

[67] See for example Haskel, Hawkes and Pereira (2005 Haskel, J., Hawkes, D. & Pereira, S. (2005): *Skills, Human Capital and the Plant Productivity Gap: UK Evidence from Matched Plant, Worker and Workforce Data*, CEPR Discussion Papers 5334, C.E.P.R. Discussion Papers.), which shows that firms that are more productive use better managers.

[68] Mason, G., Van Ark, B. & Wagner, K. (1994): Productivity, Product Quality and Workforce Skills: Food Processing in Four European Countries, National Institute Economic Review, No. 147, 1994.

[69] Bloom N., Van Reenen J. & Sadun, R. (2005): IT Ain't What You Do IT's The Way That You Do I.T. – Testing Explanations of Productivity Growth Using U.S. Affiliates, Centre for Economic Performance, London School of Economics. and McKinsey Global Institute (2001): US Productivity Growth 1995-2000, Understanding the Contribution of Information Technology Relative to other factors, McKinsey Global Institute.

[70] Bloom, N., Dogarn, S., Dowdy, J., Rippin, T., & Van Reener, J. (2005) 'Management practices across firms and nations', McKinsey & Co and Centre for Economic Performance.

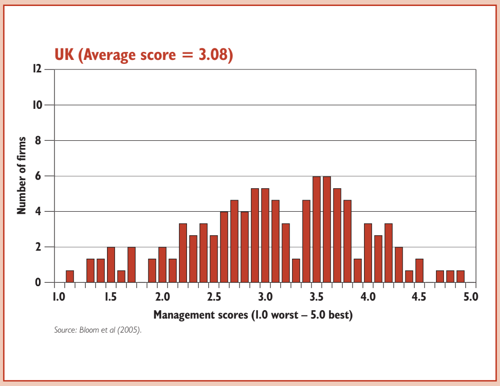
Box 4.2: Management and Productivity

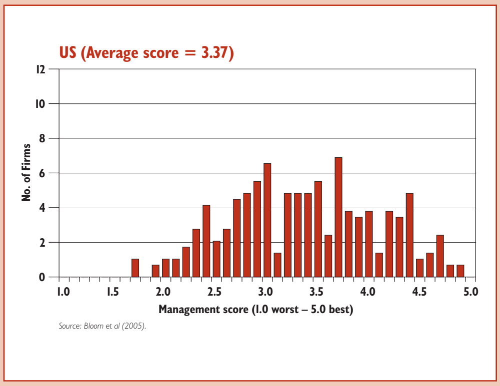
Recent research has shown how good management is associated with superior firm performance. A recent study suggest that US multinationals achieve better returns on their ICT investments due to differences in management practices, for example relatively high of organisational devolution.[71] The study used found that 'better managed' manufacturing firms across in the USA and Europe had higher rates of sales growth, higher stock market valuations. Around half of the worst performers and half of the average gap between the US-Europe can be explained by management performance. They suggest two reasons for this disparity: competition and family owned firms.

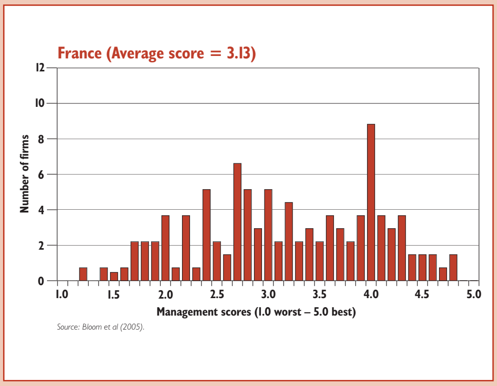
- **Firms in less competitive environments were less well managed. Survival of poorly managed firms may depend on the degree competition to which firms are exposed. Competition encourages managerial effort and weeds out poorly managed firms; there may also be knowledge spillovers in highly competitive market allowing best management practices to spread faster.**
- **In this study, firms where management control had been passed to the eldest son were found to be on average less well managed. This was found to be less common in the US.[72]**

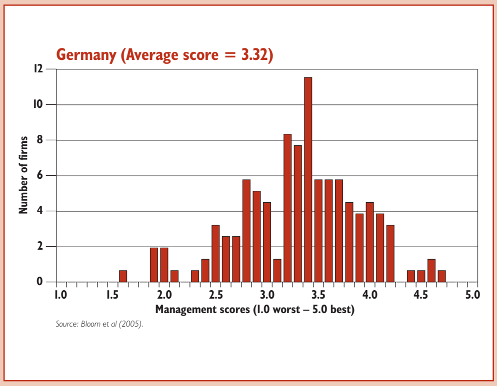
Competition and family management was found to explain one third of the gap in managerial practices in between UK and US.

The chart below shows the distribution of management scores for manufacturing firms across countries, where five indicates a very well managed firms and one very poorly managed firm. The UK has much larger tail of firms who have lower management scores than France, Germany and the USA.









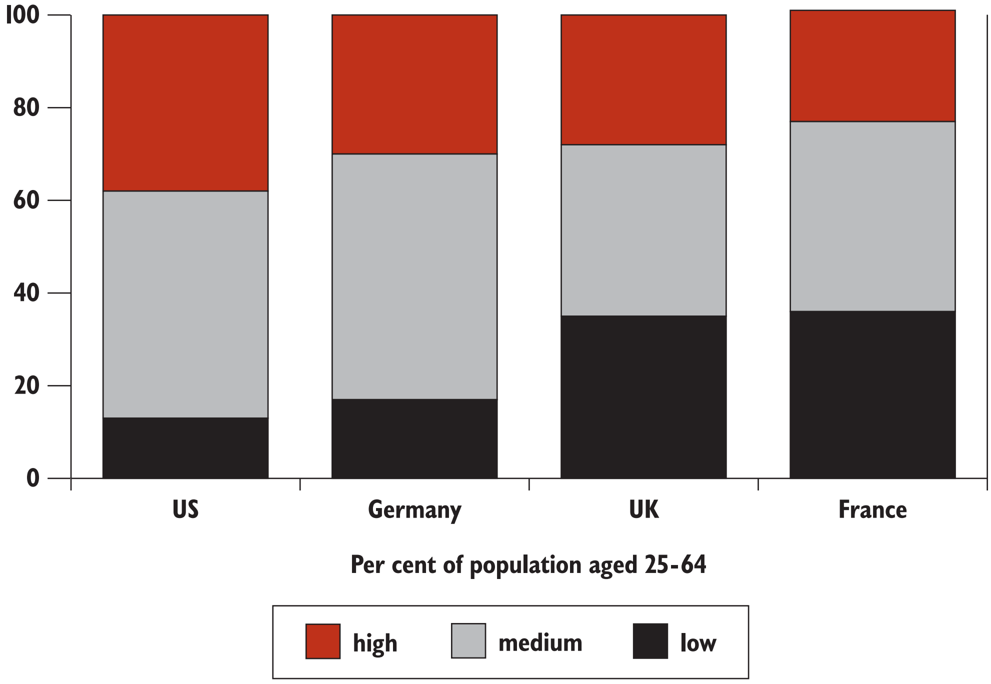
[71] *Ibid*.

[72] Villaonga, B., & Amit, R. (2005): How Does Family Ownership, Control and Management Affect Firm Value?, forthcoming Journal of Financial Economics.

UK skills performance

4.73 The UK has good quality higher education and performs well in terms of high level skills. However, basic numeracy and literacy skills amongst the UK's adult population are low by international standards and this has built up over a long period of time. In 1999, skills accounted for around a fifth of the output per hour productivity gap with Germany and an eighth of the gap with France.[73] The skills gap with the US is less clear, although the US compares favourably in terms of graduate skills. The UK's relative skill distribution is shown in Chart 4.4.

Chart 4.4: Distribution of highest completed level of education comparison, 2003



Source: OECD (Education at a glance, 2005).

4.74 Skills compliment investment in physical capital, this is because skills are often required to gain the greatest productivity advantage from capital. Therefore lower levels of skills may be related to the UK's relatively low levels of private investment. This could occur if higher skills are required to use capital effectively, or if firms are able to substitute low skill labour for capital.

Role for Government in increasing skills

4.75 Higher levels of skills raise productivity, employment, and living standards, as well as contributing towards social objectives such as allowing everyone to benefit from increasing economic prosperity. The UK has historically performed well in terms of high level skills but has performed relatively poorly on lower skill levels. In particular the UK has suffered from having a relative large proportion of the adult population with poor skills, including low levels of literacy and numeracy. Addressing this skill deficit has required investing in improving educational standards for those in the educational system, and also assisting adults who

[73] O'Mahony and de Boer. (2002), *'Britain's Relative Productivity Performance: Update 1999'*.

currently have low skills to gain work relevant skills to allow them to raise their productivity and standard of living.

4.76 These skills can be gained through:

- formal routes such as education and training, which include basic literacy and numeracy as well as higher level qualifications; and
- informal routes on the job – which may include technical skills such as how to use a machine or soft skills. Soft skills include natural or acquired skills covering areas such as teamwork, problem solving, adaptability, and management.

4.77 Skills can be enhanced through investment in firm level training. Studies show that training is associated with significantly higher productivity.[63] Furthermore training can lead to productivity increases within a firm, in one study net sales per worker were 10 per cent higher in firms with training than those without.[64]

4.78 Looking ahead, globalisation further raises the need for higher skills, as firms need higher skilled workforce so they can compete internationally and make use of new technology and ways of working. Higher skills also help labour to be flexible to move between sectors in response to changes in the UK's competitive advantage in response to changes in the global economy.

ENTERPRISE

4.79 Enterprise – the creation of new firms – brings ideas, knowledge and skills and provides incentives for others to innovate through raising competition. Entrepreneurship can be viewed as dynamic competition or what is sometimes called creative destruction.[74] This occurs when new firms or entrepreneurs enter the market with new technology or work practices and compete with existing firms, which tend to have more mature technology or work practices. If these new firms are more productive then productivity levels will rise as more mature firms also adopt these innovations or are replaced.

4.80 Enterprise raises TFP through:

- raising competition – higher entry of new firms driving out poor performers, which reallocates production towards more productive firms;[75] and
- through new firms and entrepreneurs introducing new technology and innovation – which both introduces a new high productivity firm and creates spillover productivity benefits for existing firms which adopt the innovation or technology.

4.81 Entrepreneurship can be defined as a process by which an individual or group identifies and successfully exploits a new idea or opportunity. It requires creativity, ambition, independence, and the willingness to take the risks involved. Entrepreneurship includes both the creation of new businesses and enterprising behaviour within existing small and medium-sized firms.

[74] Ahn, S. (2002): *Competition, Innovation and Productivity Growth: A Review of Theory and Evidence*, OECD Economics Department Working Papers, No. 317.

[75] Jovanovic, B. (1982): Selection and the Evolution of Industry, Econometrica, 50(3), p.649-70.

[76] Scarpetta, S., Hemmings, P., Tressel, T. & Woo, J. (2002): *The Role of Policy and Institutions for Productivity and Firm Dynamics: Evidence from Micro and Industry Data*, OECD Working Paper.

4.82 The UK lags the US in terms of entrepreneurial activity, defined as the proportion of the population involved in starting or growing a new firm. The UK also lags the US in terms of high-growth start-ups as new firms in the US typically expand more rapidly.[76]

4.83 Enterprise can also be viewed as an underlying theme across the productivity drivers: as it is a key driver of levels of innovation, investment, competition, and provides reward for the skills of entrepreneurs. Enterprise is also driven by the level of skills, new technology and innovations, and availability of capital.

Evidence on enterprise as a driver of productivity

4.84 New high-growth firms raise TFP through both raising competition and also because they enter the market with innovative work practices and new technologies.

Enterprise drives innovation

4.85 If existing firms are unwilling or unable to take risks then entrepreneurs can be the driving force behind new innovations. One study found that entrepreneurs are essential to exploit the potential of R&D expenditure.[77] The competitive pressure caused by new entrants can also force incumbents to innovate, possibly driving successive investments.

Enterprise drives competition

4.86 New firms created by entrepreneurs drives productivity growth and can drive competition, raising the incentive for incumbent firms to invest, innovate and improve efficiency. For example, a study showed that 80-90 per cent of TFP growth is from entry and exit of establishments, with 30 per cent of TFP growth coming from highly productive new firms and 50 per cent of TFP growth coming from the exit of the least productive firms.[78]

Links to other drivers

Skills, investment and regulation

4.87 The other drivers of productivity also help to promote opportunities for the creation of new enterprises:

- skills determine the ability of entrepreneurs to turn ideas into products. For example, high levels of technical skills may be needed for the commercialisation of innovation. Skills of the potential labour force also affect how effectively new innovations or work practices can be implemented.

- access to physical capital is also required by entrepreneurs so that they can create the production process needed to implant their ideas.

4.88 Education can contribute to enhancing entrepreneurial culture, and training can develop entrepreneur's skills, such as through management training and business advisory services. In a knowledge-based economy skills are vital for entrepreneurs to develop new ideas, as highly skilled workers are needed to successfully exploit new ideas. One example of this is introducing innovative ways of using ICTs into production processes.

4.89 Good management practices play an important role in changing a market, especially in a market that is subject to global competition. Evidence suggests that management training can reduce failure rates of small firms particularly in their early years.[79] This is a particularly important finding given the previous discussion on issues around quality of UK management.

[77] Michelacci, C. (2003): *Low Returns in R& D Due to the Lack of Entrepreneurial Skills*, *Economic Journal*, 113 (484), 207-225.
[78] Disney, R., Haskel, J. & Heden, Y. (2003): *Restructuring and Productivity Growth in UK Manufacturing*, Economic Journal, July 2003.
[79] OECD (2002i), 'Management training in SME's,' OECD, Paris.

4.90 A recent study demonstrates that mentors form a significant component of the enterprise resource network, including access to labour, capital, materials, partners and knowledge.[80] The enterprise resource network assists success in the early years of a start-up company.

Role for government in promoting enterprise

4.91 Governments should seek to promote enterprises through the provision of a supportive business environment. For example: through appropriate institutions, such as a legal system that supports property rights; and raising skills through the education system. Evidence suggests that governments should not subsidise or intervene in markets where there is no market failure. However, government can play a role in helping correct specific market failures in areas where the market is not providing a socially optimal solution. For example, there is evidence to suggest there may be specific market failures around the provision of capital to small start-up firms. The paragraphs below discuss in more detail some of the factors that influence the business environment.

Availability of capital

4.92 Access to capital is a critical factor for entrepreneurial success, without capital entrepreneurs cannot turn ideas into products and services. Access to capital can be affected by the relative costs, risks and availability of different sources of finance. This includes debt finance through loans or equity finance through venture capital. As discussed, cost of capital and stability of the economic environment are important for investment. For entrepreneurs it will affect lender's and investor's assessment of risk and therefore decisions to invest in their enterprises.

4.93 Venture capital is a type of equity finance, usually more suited for high-risk ventures. Firms use venture capital for start-ups, product development or growth. The high-risk nature of enterprises that use venture capital, often with intangible assets (e.g. high-technology firms) and negative cash flow on start-up, make it unlikely they will obtain other forms of debt financing. The Government has implemented programmes to improve access to finance for small business and recent data suggests that the UK now performs well on access to venture capital for start-ups.

Regulation

4.94 Regulatory and administrative environments affect entrepreneurial opportunities. Regulations can affect whether a new enterprise can enter the market by hindering entry into protected sectors and slowing the time for start-up. Regulations can also affect access to international markets, transfer of knowledge, and access to labour.

4.95 Regulations can restrict the efficient running of firms, slowing innovation; restrict good management practice and therefore reduce productivity. However, appropriate regulation can benefit firms and consumers by providing certainty on product quality and giving consumers confidence to try the products of new entrants.

[80] Chernow, R. (2005): '*British Innovators: Developing World Class Entrepreneurs for a Competitive Future, Insights and Recommendations from an American Perspective*.'

4.96 A study found that UK productivity growth over the past two decades has been boosted by reforms that encourage private corporate governance and competition.[81] They find that strict product market regulation – and lack of regulatory reform appear to underlie the meager productivity performance of some European countries, especially those in industries where Europe has accumulated a technology gap.

4.97 Regulation also extends to labour markets, another study found that economies with highly regulated labour and product markets are indeed less able to make productive use of new technologies, which harms productivity growth.[81] This is because firms are unable to acquire either right amount of labour inputs or the right type of labour, for example labour with the right skills mix. Low levels of appropriate regulation has positive benefits for employment as well as productivity.

CONCLUSIONS

4.98 There is a wealth of evidence behind the five drivers framework. Each driver has a positive role to play in raising the UK's productivity performance. As well as having direct effects on productivity each driver has significant links to other drivers.

4.99 Competition improves productivity through new firms entering the market and existing firms exiting. This ensures an efficient allocation of resources and drives incentives to innovate. Therefore competition can have significant effects on innovation as firms compete through new products and process.

4.100 Innovation is one of the main engines of long-term growth. Through new technologies, products and process, services and delivery. The evidence suggests that R&D expenditure has positive effects on productivity as well as important spillovers. Furthermore non R&D innovation such as process innovations and organisational change make contributions to productivity. Finally the ability to create new innovations will depend on level of skills and availability of capital.

4.101 Investments or capital improve productivity by directly influencing how much a unit of labour can produce, and indirectly through knowledge creation which makes physical capital more productive, as labour is more efficient at using it. A sound economic environment that is attractive for investments can encourage efficient investments decisions as firms prefer to invest in stable environment.

4.102 Skills and knowledge complement physical capital and new technology. There is strong evidence to show that skills boost productivity. Furthermore, recent literature on management emphasises the importance of management skills to fully exploit potential productivity improvements.

4.103 New enterprises and entrepreneurs are important for introducing new products and work practices. The levels of skills, availability of capital and regulation can affect how entrepreneurs enter the market. Therefore barriers to new enterprises and entrepreneurs can have impacts on productivity.

4.104 Given the evidence for the five driver of productivity the next chapter sets out the policy approach across the drivers and the evidence on progress.

[81] Gust, C., & Marquez, J. (2004): *International Comparisons of Productivity Growth: the Role of Information Technology and Regulatory Practice*, Labour Economics, 11, 33-58, 2004.

[82] Blanchard, O.& Giavazzi, F. (2003): *Macroeconomic Effects Of Regulation and Deregulation in Goods and Labor Markets*, The Quarterly Journal of Economics, MIT Press, vol. 118(3), pages 879-907.

5 IMPROVING PRODUCTIVITY GROWTH IN A GLOBAL ECONOMY

PRODUCTIVITY AND THE GLOBALISATION CHALLENGE

Productivity in a global economy

5.1 The previous chapters set out the UK's comparative productivity performance alongside an analytical framework – the five drivers – for understanding the underlying drivers of productivity growth. As previous chapters have shown, productivity growth is the only long-term sustainable route to higher prosperity. Despite some encouraging signs that the UK's historically low productivity growth may be improving the priority the Government has placed on to tackling the underlying causes of low productivity growth remains as important as ever.

5.2 This importance of this objective is heightened by the increasing impact of globalisation. As Chapter 1 sets out, globalisation creates both opportunities and challenges for the UK economy: expanding export markets and technology improvements allow more goods and services to be traded than ever before lowering costs and creating new markets, but at the same time increasing competitive pressure on UK firms. In parallel, emerging economies are increasingly moving up the "value chain" by investing in skills and R&D so their firms can compete effectively in areas and sectors where the UK has a traditional advantage. A continued drive to improve productivity will help ensure that the UK continues to maintain a comparative advantage in higher value-added sectors that will support further growth in prosperity.

5.3 This chapter sets out the strategic policy response the Government has put in place to improve productivity growth over the long-term and ensure the UK is equipped to meet and benefit from the challenges and opportunities of globalisation.

THE GOVERNMENT'S STRATEGIC FRAMEWORK

5.4 The Government's strategy for improving productivity is built round two principal economic objectives:

- maintaining macroeconomic stability to ensure businesses and individuals have the certainty needed to make long-term investment decisions; and
- ensuring that markets work by tackling the underlying causes of low productivity through a strategic approach to microeconomic reform built around the five drivers framework.

Macroeconomic stability

Ensuring macroeconomic stability

5.5 Economic instability makes it difficult for individuals and firms to make plans for the long-term, whether that is to invest in new equipment or new skills or workforce training. There is a general consensus that macroeconomic stability is an important contributor to sustained long-term economic growth. Large fluctuations in output, employment and inflation add to uncertainty for firms, consumers and the public sector, and can reduce the economy's long-term growth potential. Stability allows businesses, individuals and the Government to plan more effectively for the long-term, improving the quality and quantity of investment in physical and human capital and helping to raise productivity.

5.6 Alongside its poor historic productivity performance the UK has had, for most of the past fifty years, a poor record of macroeconomic stability. High volatility in inflation, output and employment contributed to poorer overall growth.

5.7 The Government's macroeconomic framework is designed to ensure lasting stability so that businesses, individuals and the Government can plan effectively for the long-term. The framework is based on the principles of transparency, responsibility and accountability. The framework has now delivered the UK's longest period of sustained and stable economic growth since records began fifty years ago. Maintaining this macroeconomic stability remains a core foundation to the Government's overall strategy for further improvements in economic performance.

Microeconomic reform

The five drivers framework

5.8 The Government's strategy for implementing microeconomic reform is built around the five drivers framework set out in this document. The Government's approach is to tackle specific market failures in each of the fiver drivers and ensure that Government interventions and institutions are effectively structured to support growth.

The rest of this chapter:

- sets out the Government's overall strategy under each of the fiver drivers;
- explains the most significant reforms implemented by the Government to implement that strategy; and
- sets out progress to date in improving underlying performance (see Box 5.1 below).

Box 5.1: Measuring Progress: The Productivity and Competitiveness Indicators

Headline productivity figures are only a partial measure of performance of the UK economy. They do not provide a detailed insight into the factors driving underlying performance in each of the five drivers. Because long-term improvements in productivity and growth take time to emerge the Government uses a broader set of key indicators to track the effectiveness of the Government's productivity strategy. Careful use of the Indicators allows the Government to identify, in greater depth, areas of strength and weakness and can provide an early warning of where policy action may be needed.

The Government has published 'UK Productivity and Competitiveness Indicators' since 1999, benchmarking the UK's performance against major industrialised comparators. These indicators were revised following consultation in 2004, and are now published annually jointly by HM Treasury and DTI. The new indicators are more focused, and allow easier benchmarking of progress against the US, Germany and France. This helps us to monitor progress towards narrowing the UK's productivity gap.

Further details can be found in DTI (2006): UK Productivity and Competitiveness Indicators 2006, available at www.dti.gov.uk/competitiveness.

COMPETITION

5.9 Strong competition in markets is linked to improved productivity performance, as set out in Chapter 4. This is because competition drives firms to supply products and services at higher quality and lower prices to satisfy customers who can choose where they purchase. Competitive markets where the price of goods or services is driven down can also encourage firms to innovate to develop new products and services where the firm may be able to get higher returns, this can drive further entrepreneurship and investment in human and physical capital. By contrast markets or sectors in which competition is weak, or where formal or informal barriers to the entry of new firms are high tend to make firms less productive resulting in higher prices and/or lower quality for consumers and, potentially, less innovation and investment.

The Government's strategy

5.10 The Government's overall strategy is therefore to ensure there is **strong competition in every market within the UK** by ensuring that the UK's competition enforcement authorities are world class.

Implementing the strategy

Reforming the competition framework

5.11 Since 1997 the Government has radically reformed the UK's competition framework to ensure it is able to deliver against this objective. The Government has legislated to:

- reform the competition authorities to ensure they are strong, pro-active and fully independent of Ministers;
- give the Office of Fair Trading new wider powers to promote consumer interests including the power to conduct "market studies" where there is evidence that a particular market is suffering from weak competition;
- introduce criminal penalties, for firms and individuals who engage in cartel or price fixing activities and give the competition authorities the powers necessary to investigate cartels; and
- give consumer associations the right to bring "super-complaints" to the OFT where there is evidence in effective markets or regulatory or other constraints are harming consumers .

Independent economic regulators

5.12 The Government has also acted to further reform the independent economic regulators who protect consumers against potential abuse of monopoly power in sectors, such as the utilities, where there can be significant barriers to entry. Independent economic regulators in the utilities sectors protect consumers against potential abuse of monopoly power, introducing competition where possible and regulating prices where necessary.

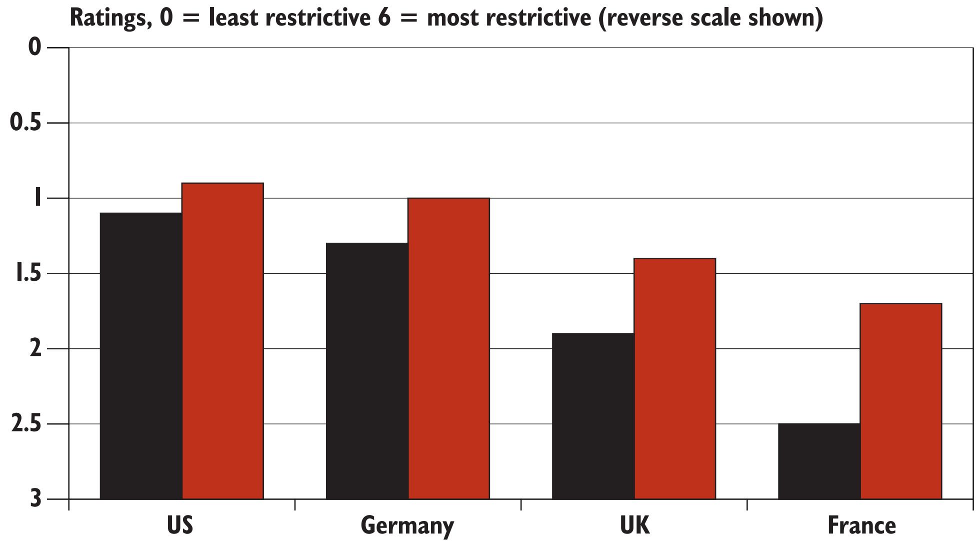
5.13 The UK regulatory framework for the utilities has successfully driven efficiency gains towards higher quality of service, while allowing companies to finance their activities. This system of regulated markets has allowed significant increases in network investment, safeguarding and enhancing services for all consumers.

Evidence of progress

A strong competition regime

5.14 The UK performs well on its competition driver. It is open to international trade and investment and has the second lowest product market regulation in the OECD, less restrictive than USA, Germany and France (See Chart 5.1 below).

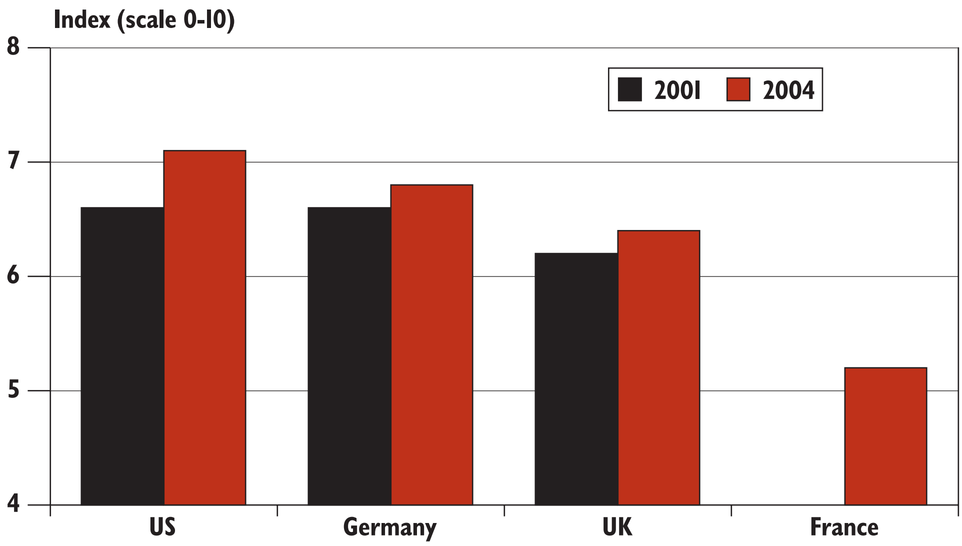
Chart 5.1: Product market regulation Comparison, 1998 and 2003



Source: OECD.

5.15 The perceived effectiveness of the UK's competition regime has been improving but remains behind the USA and Germany according to a 2004 independent peer review, as Chart 5.2 illustrates. However, the 2005 review of competition authorities by the Global Competition Review puts the UK competition regime second only to the US regime internationally. Overall the UK fares very well in terms of the assessment of its competition regime. A 2004 independent review described the UK competition authorities as having all the necessary powers to develop a world class regime.

Chart 5.2: Ranking of competition – peer review Comparison, 2001 & 2004



Source: PriceWaterhouseCooper 2001: KPM6 2004.

Looking forward

5.16 The reform of the competition regime has promoted consumer choice and protection and encouraged flexible markets and fair dealing businesses. Government continues to monitor progress, for example, through the establishment of an independent review of the comparative effectiveness of the UK competition regime with its peers in the OECD in 2006-2007.

INNOVATION

Harnessing innovation spillovers

5.17 Innovation – the creation of new ideas, technologies and processes – has a direct and significant effect on productivity growth. Innovations tend to have "spillover" effects that create wider benefits to the overall economy than just the benefits to the person or firm who create the innovation. These spillovers can increase productivity of all firms as new processes and ideas are emulated; for example, the introduction of assembly lines that drove large-scale productivity improvements in manufacturing. New technologies, such as mobile communications, can have similarly significant effects creating new products and markets. Some new technologies are generated directly by firms, other innovations, particularly in completely new fields, have their roots in pure research undertaken in universities and institutes (for example the bio-tech industry that developed out of pure research in genetics). The commercial development of such research is another powerful example of a spillover effect.

5.18 The increasing pace of globalisation puts an even higher premium on innovation. As more countries move up the value chain, developed countries comparative advantage will increasingly be built on successfully generating and exploiting innovations and new technologies alongside expansion of creative industries.

The Government's strategy

Achieving world class levels of innovation

5.19 The Government's overall objective is to achieve world class levels of business innovation in the UK economy, including through a step change in levels of R&D. The Government has delivered this strategy through:

- maintaining and promoting the UK's world class science base to ensure that it produces not only the highest quality research, but also that it translates this effectively into innovative new products and services;
- supporting business investment in research and development so the wider economy can benefit from spillovers; and
- encouraging the growth of wider innovative activity and the rapid diffusion of innovations throughout the economy.

5.20 In support of this strategy the Government has set a challenging target to increase public and private sector R&D as a percentage of GDP from the current level of 1.9 per cent to 2.5 per cent by around 2014. This was set out in the ten year science and innovation framework published in 2004.

Implementing the strategy

Increasing public investment in science

5.21 Over the past eight years the Government has introduced major reforms backed by substantial new investment to implement these objectives:

- the decline in public investment in science during the 1980s and early 1990s has been reversed. Funding for the science base as a share of GDP has increased from 0.29 per cent in 1997-98 to 0.39 per cent in 2005-06;
- introduced new funding streams to support and incentivise universities and researchers to commercialise their research such as through the Higher Education Innovation Fund (HEIF);
- stimulating business collaboration with the science base through the business-led Technology Strategy which is set to increase to at least £178 million by 2007-08, and giving Regional Development Agencies (RDAs) enhanced responsibility for promoting business-university collaboration. Altogether, the RDAs will invest over £360 million 05-06 in developing science and innovation across the regions;
- introduced the R&D tax credit to stimulate business investment in R&D, which can generate spillover benefits, the Government has introduced an R&D tax credit, first for SMEs and then subsequently for large firms. The credit allows companies to deduct up to 150% (SME scheme) or 125% (large company scheme) of qualifying expenditure on R&D activities when calculating their profit for tax purposes; and
- significant reform of business advisory services to help disseminate best and innovative new practices. For example, through the establishment of the Manufacturing Advisory Service which addresses the practical needs of British manufacturers by delivering hands on advice and assistance from experts in a wide range of manufacturing disciplines.

Evidence of progress

Global scientific excellence

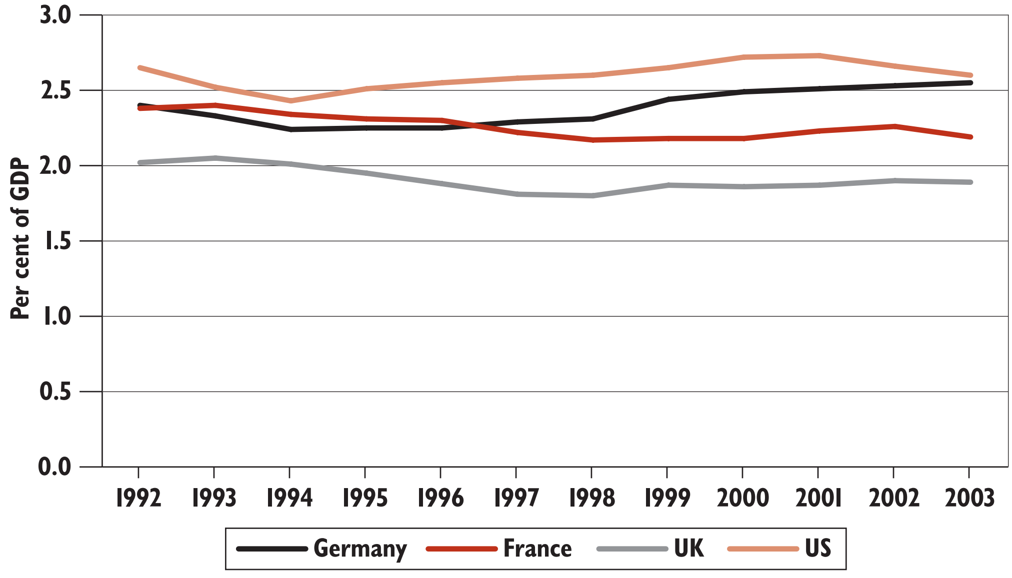
5.22 The UK has made strong progress against a number of indicators:

- The UK remains second only to the US in global scientific excellence as measured by citations, and leads the G7 in the productivity of its research base, with the highest level of citations per head of population. With just 1 per cent of the world's population, the UK undertakes 5 per cent of the world's research, publishes over 12 per cent of all cited papers and almost 13 per cent of papers with the highest impact[1]. UK scientists claim around 10 per cent of internationally recognised scientific prizes every year;
- UK institutions continue to be world class, a recent study ranked Oxford and Cambridge universities as 5th and 6th in the world, while London proves itself a global centre for higher education, with four institutions in the top 50 worldwide; and
- Knowledge transfer activity from universities has increased dramatically, between 1999-00 and 2002-03 university income from businesses increased by 42 per cent and the number of university patents granted and licenses and options granted increased by 47 per cent.

Increasing investment in science

5.23 Chart 5.3 shows that gross domestic expenditure on R&D as a percentage of GDP has been flat up to 2003. This R&D measurement is constituted by both business investment in R&D and public sector investment. As set out above, the Government is committed to maximising the impact of the additional public investment in science on the economy, by ensuring that the right structures and policies are in place to deliver the benefits of this investment. It will take time for the additional funding and new policy measures introduced in the *Science and Innovation Investment Framework 2004-14* to have their full impact on key performance indicators.

Chart 5.3: Gross domestic expenditure on R&D Comparison, 1992-2003



Source: OECD

[1] Source: PSA *target metrics for the UK research base,* OST 2004, available at: http://www.ost.gov.uk/research/psa_target_metrics.htm.

5.24 There have been nearly 20,000 claims for R&D tax credits, representing nearly £1.5 billion in support to R&D activity and R&D spending has risen as share of total business investment. Spending by small and medium sized enterprises on R&D spending rose faster than for other firms between 2000-2002 when the SME credit was in operation.

Looking Forward

5.25 While substantial progress has been made significant challenges remain. UK business investment in R&D remains low as a proportion of GDP in international comparisons. Although it has increased by 20 per cent in real terms since 1997, real GDP has been growing at a faster rate, and the business R&D to GDP ratio has consequently remained broadly flat.

5.26 The *Science and Innovation Investment Framework 2004-14* will continue to provide a platform for future productivity growth and public service delivery through innovation in the UK.

5.27 The Government is also considering how further reforms can be made to improve:

- the strategic coordination of investment in science and innovation;
- the responsiveness of the science base to the needs of industry; and
- the supply of science, technology, engineering and mathematics (STEM) students.

A discussion document on the next steps for the science and innovation investment framework is being published alongside Budget 2006.

5.28 Intellectual property is an increasingly important element to Britain's success in the knowledge economy. Globalisation and technological change have both raised tensions in the existing system. The Government has launched an independent review led by Andrew Gowers to examine the UK's intellectual property framework. The review will assess the intellectual property framework to ensure it balances the need to encourage firms and individuals to innovate and invest in new ideas and creative works with the need to ensure that markets remain competitive and that future innovation is not impeded.

INVESTMENT

Increasing capital inputs

5.29 Physical investment is closely correlated with productivity performance, as it directly influences how much labour can produce. Increased investment will generally increase labour productivity by increasing the capital each worker can utilise.

5.30 As well as direct investment by firms, there is substantial economic evidence, as set out in Chapter 4, that infrastructure investment can have significant positive effects on economic growth.

5.31 At the most basic level infrastructure is a necessary pre-condition to economic activity, through provision of basic utility services. More widely, transport and communication infrastructure can directly improve productivity by facilitating trade and competition in goods and services, allowing physical or electronic access to clusters of economic and social activity and influencing the location decisions of business.

The Government's strategy

5.32 The Government's overall objective is to ensure an efficient level of investment in the economy, by removing barriers and tackling market failures, which supports productivity growth through:

- preserving macroeconomic stability to give domestic and foreign firms the long-term certainty they need to invest the UK;
- reforming the tax system to encourage investment;
- improving the efficiency of capital allocation in the investment chain; and
- ensuring that there is sufficient well targeted public sector investment to provide necessary infrastructure and support wider public services, many of which impact on productivity growth, for example education.

Implementing the strategy

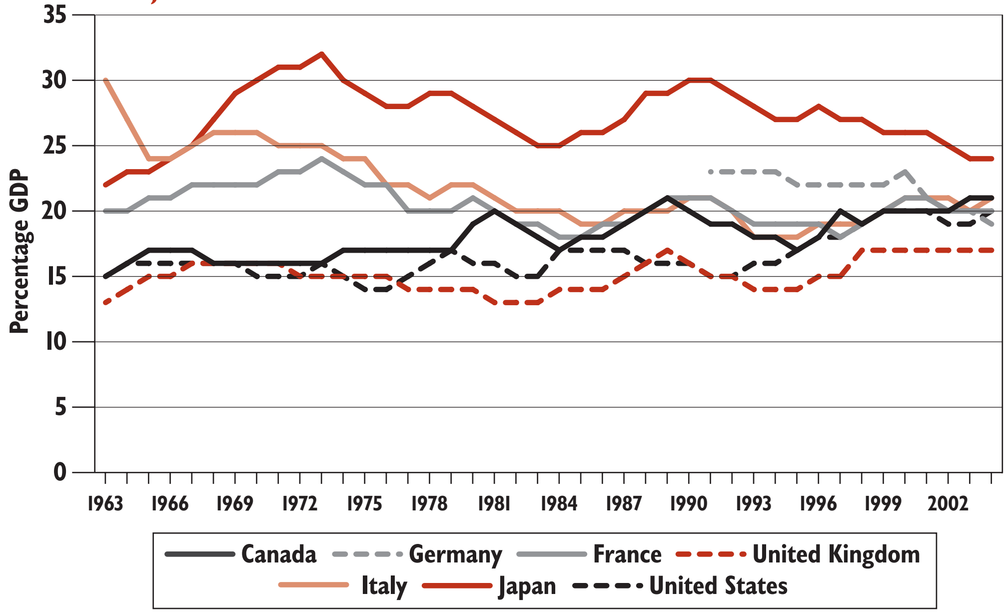
5.33 The Government has implemented the following interventions to deliver these objectives:

- a new macroeconomic framework designed to ensure lasting stability based on the principles of transparency, responsibility and accountability, including reforms to the fiscal and budgeting framework designed to safeguard long-run capital investment;
- reform of the corporate tax system to encourage long-term investment and radical reform of the Capital Gains Tax (CGT) regime to reward long-term entrepreneurial investment;
- improvements in the functioning of the investment chain to ensure efficient allocation of private sector capital. Reforms have been made through the Myners, Sandler, Higgs and Morris Reviews to ensure the chain operates more transparently and enhances accountability to ultimate owners, for example, by improving pension trustee decision-making processes, increasing the independence and accountability of directors, enhancing the quality and shareholder engagement and improving the quality of and transparency of information flows through accounting and audit reform, thus increasing the pressures for more efficient allocation of capital;
- promotion of inward investment, through maintaining the UK's trend leading position as a destination for FDI;
- increases in public investment, from just 0.6 per cent of GDP in 1997-1998 to 1.6 per cent in 2004-05, on track to reaching 2.25 per cent by 2007-2008 to reverse historically low levels of public investment as a result annual expenditure on transport will, by 2007-08, be over 60 per cent higher in real terms than the equivalent level of spend a decade earlier. Capital investment in schools will rise to £6.3 billion by 2008, from a level of £700 million in 1997;
- implementation of Kate Barker's review of housing supply, so there is adequate investment in new housing to ensure a stable and responsive housing market. Further reforms of the housing planning system will enable 200,000 net new additions of housing per year; and
- legislative reform to the wider planning system to ensure it is simple, responsive and efficient.

Evidence of progress

5.34 Chart 5.4 illustrates that there has been an increase in total real fixed investment as a proportion of real GDP. Business investment has risen by over a third since 1997 – more than twice the rate of growth seen in the preceding eight years. While public sector investment in the UK has historically been low, by 2007-2008 the UK's level of investment will be broadly in line with the G7 average. Overall there are positive signs, with whole economy investment in 2005 being 37 per cent higher than in 1997.

Chart 5.4: Total real fixed investment as a proportion of real GDP, G7 economies



Source: Economic Outlook No.77 OECD.

5.35 The UK has high levels of inward FDI as a percentage of GDP compared to comparator countries and the emerging economies of China and India. Between 1997 and 2004, the UK saw $US519 billion of inward investment inflows. Its stock of FDI stood at $US771.7bn in 2004 (36.3 per cent of GDP) – second only to the US[2]. Indeed, US companies have made more cumulative investments in the UK than in any other country in the world. Chinese and Indian companies are more likely to invest in UK than any other European country[3].

5.36 The Planning and Compulsory Purchase Act of 2004 has introduced a more flexible framework for planning in the form of Regional Spatial Strategies and Local Development Frameworks and the Planning Delivery Grant has increased the percentage of decisions at local authority level made in 8 and 13 weeks. 55 per cent of local authorities now meet their target for determining major applications within 13 weeks, up from around 20 per cent in 2003.

[2] UNCTAD (2005): *World Investment Report*.

[3] Ernst & Young (2005): *European Investment Monitor.*

Looking forward

5.37 Private sector investment has improved in recent years, however, because of historically low levels there remains a gap in the capital stock. This underlines the importance of maintaining a stable macroeconomic environment so that firms can invest with confidence and certainty.

5.38 As set out above, there has been significant progress since the introduction of the reformed fiscal and public expenditure frameworks to address the historically low levels of public investment across the public services. The Government is now looking to enhance investment in the public sector, transport and planning to meet the new set of economic and demographic challenges facing the UK. Facing these challenges requires long-term commitments from Government, therefore the public capital stock and public investment will be the subject of renewed focus to ensure that the public sector asset stock is utilised in the most effective and efficient way and that increases in public investment are targeted to where they are most likely to be effective and are linked, where necessary, to reform.

5.39 In addition, the Government has asked Sir Rod Eddington, former Chief Executive of British Airways, to advise the Chancellor and Secretary of State for Transport on the long-term impact of transport decisions on the UK's productivity, stability and growth. The Study is currently examining how transport improvements may bring productivity benefits through a series of microeconomic drivers

5.40 The Government has also asked Kate Barker to consider whether further reforms of the planning system are necessary to ensure planning policy and procedures can better deliver economic growth and prosperity alongside other sustainable development goals. An interim report will be published in summer 2006.

Skills

5.41 There is wide spread evidence that the overall level of education and skills in the workforce has a critical impact on productivity growth, particularly in more developed economies. Improved levels of skills can contribute directly to improved productivity – a trained bricklayer can produce more than an unskilled labourer; but improving skills and education can also have wider impacts helping to generate new innovations, technologies and ideas that benefit the wider economy. The effects of globalisation including greater international competition, accelerating technological change and changing patterns of consumer demand are likely to increase the demand for higher level skills.

The Government's strategy

5.42 The UK has historically had poor performance, in comparison to the other major industrialised economies. In particular the UK has suffered from having a relatively large proportion of the adult population with low or intermediate skills. Performance in higher level skills has generally been more impressive but, until recently, a relatively small proportion of the population entered higher education.

5.43 The Government's overall objective then has been to transform the UK into a high-skill economy. Specifically by:

- increasing the overall proportion of GDP invested in education;
- investing in and reforming the school system to ensure that new entrants into the workforce are properly equipped for the modern world;
- supporting further investment and expansion of the Higher Education sector to provide higher level skills for more of the population;
- ensuring there are effective technical and vocational training routes for young people such as apprenticeships to narrow the shortfall in skilled trades such as plumbers and electricians;
- increasing adult skills, 70 per cent of the UK's 2020 workforce are already over 16 years old; and
- encouraging skilled migration into the UK to meet specific short-term skills needs and expand the overall supply of highly skilled people.

Implementing the strategy

5.44 To deliver this strategy the Government has:

- increased UK education spending from 4.7 per cent of GDP in 1996-97 to a planned 5.6 per cent in 2007/08, from one of the lowest in the industrial world to one of the highest. Per pupil funding will rise to at least £5,500 by 2007-08, more than double the 1997 figure. Government support for capital investment in schools has risen from under £700 million in 1996-97 to £5.5 billion in 2005-06, and will reach £6.3billion by 2007-08;
- transformed teaching standards through the National Literacy and Numeracy strategies, taken tough measures to tackle weak and failing schools, and invested in reform of the workforce, with improved pay and incentives to boost teacher recruitment;

- strengthened routes into higher education which has increased the participation rate in higher education to 43 per cent of 18-30 year olds, with a target to increase participation towards 50 per cent by 2010;
- reformed and expanded the Apprenticeship programme, with the numbers of young people on Apprenticeships growing from 75 000 in 1997 to 255 000 in 2004/05. They are used by around a quarter of 14-19 year olds as part of their transition from school to work;
- implemented the National Employer Training Programme (NETP) to deliver training in the workplace for low skilled employees and tackle the adult skills gaps. By the end of 2005 the programme had engaged over 25,000 employers and 220,000 learners. When the programme reaches its full capacity in 2008 to will support 350,000 learners in 50,000 employers and deliver 175,000 first full level 2 qualifications each year alongside a range of other learning opportunities; and
- introduced the Highly Skilled Migrant Programme for migrants who can demonstrate they have the skills and experience to help the UK compete in the global economy. Between 2002 and the end of 2005, around 30,000 migrants successfully applied to this scheme.

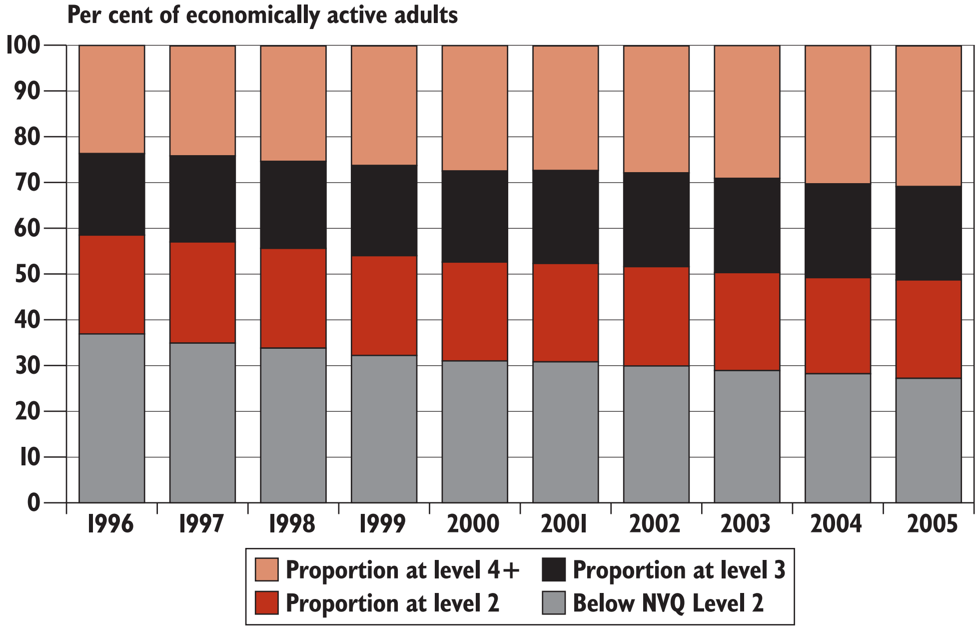
Evidence of progress

5.45 The UK compares relatively well internationally on the proportion of people with high qualifications, and is steadily reducing the proportion of people with low or no qualifications, as Chart 5.5 below shows. Recent data suggests[4] that the percentage of the workforce qualified to at least the equivalent of five good GCSEs grew at a higher rate in the UK than in France, Germany and the US in the period 1994-2003. 2005 results show the biggest year on year increase in the number of pupils achieving five good GCSEs in over a decade. 56.3 per cent of 15 year olds achieved 5 or more A*-C GCSEs or equivalent an 11.2 percentage point increase since 1997. The proportion of people in the UK qualified with intermediate level skills and above also rose faster in the UK than in Germany and the US, but slower than in France.

5.46 There are now more teachers than at any time since 1984, fewer schools failing, there are more and better learning choices post-16. Over 1 million adults have improved their reading writing and maths skills and more young people are benefiting from higher education. The aim for the UK now is to build on these successes by improving workforce training and narrowing the attainment gap between different social and economic groups.

[4] DfES/DTI (2004), 'International Comparisons of Qualifications: Skills Audit Update'.

Chart 5.5: Highest qualification, UK Comparison, 1996-2005



Source: UK Labour Force Survey.

Looking forward

5.47 Despite this progress the UK still lags most of its principal industrial comparators, who are, themselves, investing substantially in improving their skills bases. To take a long-term view of the UK's skills position and the likely challenges the Government has commissioned Lord Leitch to undertake an independent review of the UK's long-term skills.

5.48 The Leitch Review issued its interim report in December 2005, the analysis in this report suggested that even if the UK continues to meet its existing challenging targets for skills improvements the UK will not, in 2020, be a materially different comparative position internationally. To achieve world class standards of educational achievement will requirement substantially higher ambition.

ENTERPRISE

5.49 Enterprise – the drive of individuals to create and grow new businesses – plays a critical role in creating competition in markets. Enterprising firms bring new ideas, knowledge and skills into an economy and provide incentives for others to become more innovative. New entrants help market share to be *transfered* through market forces from lower productivity firms to more productive firms raising productivity at an aggregate level.

5.50 As discussed in Chapter 4 the principle role of Government is to create a supportive environment for enterprise and to tackle any specific market failures. Its role is not to subsidise or intervene where there is no market failure. There are a range of wider factors that can influence the enterprise environment such as the regulatory framework and intangible cultural factors that may affect the willingness of some groups in society to start a business.

The Government's strategy

5.51 The Government's objective for enterprise policy is to encourage the creation and growth of new firms and ensure that anybody with the potential to succeed in business should have the opportunity to do so.

5.52 The Government's strategy is built around five key areas:

- addressing market failures in access to finance for small and expanding businesses;
- targeting Government failures by reducing regulatory burdens, to allow businesses to spend time more productively and reduce the barriers to entry to particular markets;
- addressing information failures to ensure that all people, regardless of background, have the opportunity, if they have the potential, to start a business;
- ensuring entrepreneurs have the broad range of skills necessary to start and grow their business;
- creating a business tax environment in which businesses can thrive.

Implementing the strategy

5.53 To implement this strategy the Government has:

- introduced the Small Firms Loan Guarantee (SFLG) targeted at firms with viable business propositions who are unable to obtain debt finance due to lack of collateral or track record, providing loan guarantees for over 4,000 business loans every year, and enabling access to equity finance for potentially high-growth small firms by introducing Enterprise Capital Funds alongside measures such as Regional Venture Capital Funds;
- established the nine Regional Development Agencies (RDAs) to take leadership in formulating regional economic strategies, supported by a single funding pot. RDA's now deliver free, impartial and comprehensive advice to small business through the Business Link network;
- encouraged an enterprise culture in all areas of the UK, through Enterprise Week and support for the Community Development Finance Initiative sector, invested in enterprise education to ensure that every child has some experience of business and enterprise and supported enterprise in disadvantaged areas by providing £126m over three years to support the Local Enterprise Growth Initiative;
- continued to take a leading global role in establishing modern risk-based approach to regulation. The Government has implemented major reforms to reduce regulatory burdens including through establishment of the Better Regulation Executive and the Panel of Regulatory Accountability and is taking a leading role in the EU in advancing proposals to reduce overall regulatory flow;

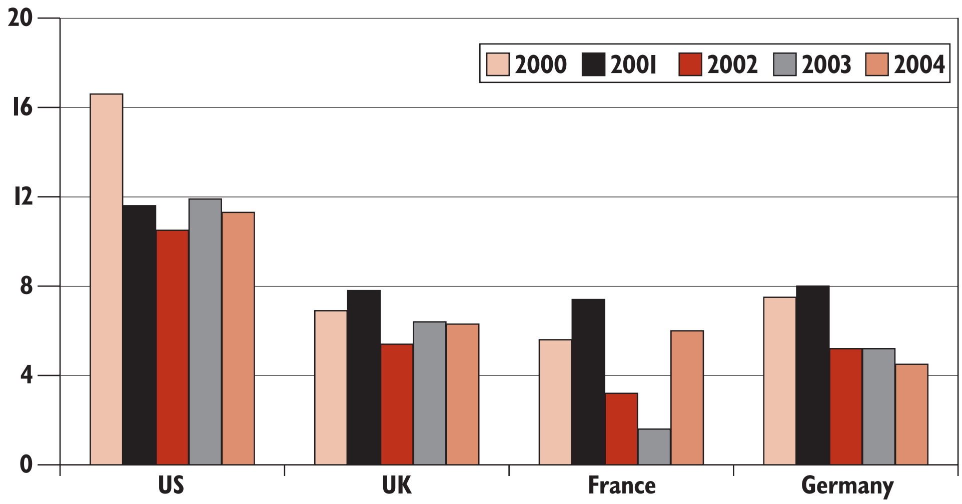
- cut the main and small companies' rates of corporation tax to the lowest ever levels (30 and 19 per cent) and reformed the tax treatment of capital gains on business assets meaning to help to create one of the most favourable CGT regimes in the world; and
- maintained the Enterprise Investment Scheme (EIS) to provide tax incentives for individuals to invest directly in higher-risk small trading companies and the Venture Capital Trust (VCT) scheme to offers tax incentives to individuals investing in professionally managed portfolios.

Evidence of progress

5.54 Enterprise indicators show some improvement in the UK. As shown in Chart 5.6 below entrepreneurial activity in the UK as measured by the Total Entrepreneurial Activity index[5] is stronger than in France and Germany. Total early stage entrepreneurial activity in the UK is the third highest rate of the G7 economies behind the US and Canada.

Chart 5.6: Business start-ups
Total Entrepreneurial Activity (TEA) Index, 200-2004

Per cent of the labour force either (i) actively involved in starting a new business or (ii) owner or manager of a business that is less than 42 months old

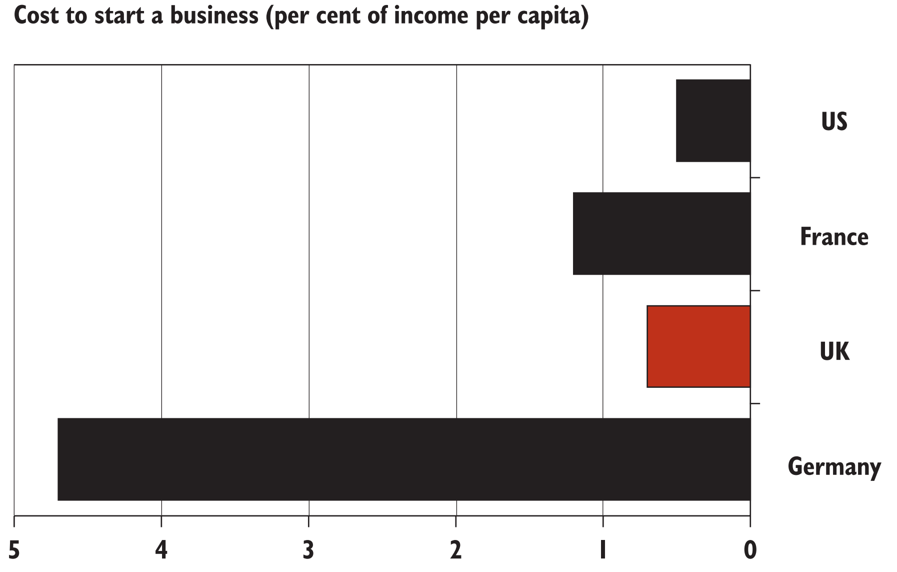


Source: Global Entrepreneurship Monitor 2004 Executive Report.

[5] This index identifies the proportion of adults of working age who are either setting up or have been running a business for less than 42 months. GEM UK 2005.

5.55 The costs and time associated with starting a business are indicators of the administrative burdens faced by start-up firms. The UK does well in terms of the cost of starting up a business (see Chart 5.7 below), but is less strong on start-up times. In addition to low start-up costs the UK has relatively well developed capital markets.

Chart 5.7: Cost to start a business
Comparison, 2005



Source: World Bank.

5.56 The OECD has rated the UK as having the lowest barriers to entrepreneurship of any major economy. Overall UK has performed well under the enterprise driver but still lags the USA.

LOOKING FORWARD

5.57 To take advantage of the opportunities afforded by globalisation and continue to tackle remaining barriers to enterprise the Government will:

- continue to encourage the use of risk-based regulatory enforcement to reduce burdens on business, as recommended by the Hampton Review *Reducing Administrative Burdens: effective inspection and enforcement*. The Legislative and Regulatory Reform Bill, currently before the House of Commons, contains powers to entrench the Hampton enforcement principles in UK law through a Code of Practice. A draft of this Code is being published on Budget day;
- support UK businesses in taking greater advantage of the UK's creative capabilities by taking forward the recommendations made to the public sector by the Cox Review of Creativity in Business, including changes to the R&D tax credit scheme and steps to make the Design Council's Design for Business programme available across the country; and
- improve support for high growth potential businesses through the introduction of Enterprise Capital funds aimed at providing small amounts of risk capital (of up to £2 million) to small businesses, and rolling out targeted high growth business coaching across all nine regions from spring 2006.

PUBLIC SECTOR PRODUCTIVITY

5.58 The preceding sections in this chapter have focused on the Government's strategy for addressing the underlying causes of historically low private sector productivity in the UK.

5.59 The Government is also committed, in parallel, to improving the productivity and efficiency of the public sector. These two goals are inter-dependent. As this document has set out the public sector has a key role to play in supporting productivity growth through provision of key public services such as education, infrastructure and the public science base. If these services do not receive adequate investment or are delivered ineffectively then they will have direct impact on the growth potential of the whole economy. More widely increasing productivity across the public sector plays a key role in ensuring that the economy's resources and capacity are efficiently utilised and also deliver high quality public services.

5.60 The Government's overall objective has been to deliver world class public services by linking additional investment in key public services to their reform. To deliver that the Government has:

- established clear fiscal rules to ensure that spending is sustainable over the long-term;
- within these fiscal rules set out prudent long-term spending plans targeted towards priority public services, such as education, health and transport with the dividend from lower debt interest and social security payments re-invested in key services;
- linked these spending increases to reforms to increase the effectiveness of public services in achieving better outcomes by setting clear goals and establishing national standards, increasing accountability, giving front-line greater operational autonomy and support and providing services that are personalised to users' need;
- supported front-line professionals to allow them to spend more time on their core activities for example through recruitment of almost 90,000 teaching assistants since 1997 - allowing teachers to focus on teaching;
- implemented a radical efficiency programme - the Gershon review - to focus resources on the front line. This will achieve over £20 billion in savings by 2008. It is already generating savings through better procurement and has reduced posts in administrative and support functions by over 40,000; and
- reformed the public sector capital system to remove historic bias against investment and delivered a doubling of net public sector investment to address decades of under-investment in the infrastructure that supports both the private and public sectors. Transport investment will be 60 per cent higher in real terms by 2008. Capital investment in schools will have increased from £600m per annum to over £6 billion.

5.61 Together this investment, linked to reform, has delivered real improvements in public services which in turn support prosperity in the wider economy. For example:

- Schools in 2005 had the biggest year on year increase in the number of pupils achieving five good GCSEs in over a decade: 56.3 per cent of 15 year olds achieved 5 or more A*-C GCSEs or equivalent, 11.2 per cent higher than in 1997. Some of the biggest improvements this year can be seen in some of the most disadvantaged schools. There are now 112 schools with less than 25 per cent of pupils achieving 5+A*-C compared with 616 in 1997 – a reduction of over 80 per cent; and

- The NHS met its commitment to reduce the maximum wait for an operation from 18 months to 6 months by the end of 2005, 98 per cent of patients are seen, treated and admitted or discharged in A&E within 4 hours and a quarter of a million more people are now treated in hospital each year than in 2000. The death rate from cancer and coronary heart disease reduced by 12.2 per cent and 27.1 per cent respectively since 1996.

Looking Forward

5.62 Significant improvements have been achieved but more needs to be done to ensure the public services infrastructure provides strong foundations for a prosperous economy and fairness for all. The Government has set out its ambition of achieving over £20 billion worth of efficiencies by the end of 2007-08, in line with the recommendations of the Gershon Review.

5.63 The Government has announced its intention to undertake a Comprehensive Spending Review (CSR), reporting in 2007, to take stock of progress to date and review how spending can be targeted to drive further improvements to raise public sector productivity for the long term.

5.64 The Government will be taking forward a programme of work in 2006 to:

- take a zero based approach to assessing the effectiveness of Departments' existing spending in delivering the outputs to which they are committed;
- examine the key long-term trends and challenges that will shape the next decade and assess how public services will need to respond;
- look at how the public expenditure framework can best embed and extend ongoing efficiency improvements and support the long-term investments needed to meet these challenges; and
- extend and embed efficiency, building on the current Gershon programme. More details are set out in Chapter 6 of Budget 2006.

PREPARING FOR FUTURE OPPORTUNITIES IN THE GLOBAL ECONOMY

5.65 This chapter has set out the Government's key microeconomic reforms which aim to ensure that markets function efficiently and that the barriers to productivity growth are tackled. Alongside the Government's success in maintaining macroeconomic stability the Government's policy interventions under each of the five drivers have contributed to the success of the UK in closing the productivity gap with France and Germany and keeping pace with the US. As previous chapters have illustrated, productivity growth is the principal route to higher prosperity in the long-term.

5.66 While the success to date should be recognised, the rapid pace of change in the global economy, and the continued importance of improving productivity growth over the long-term means that there are more challenges ahead. The government will ensure that the UK meets these challenges to achieve high and stable rates of economic growth and employment. The five key areas that the Government has identified for future policy development are:

- meeting changing skills needs;
- strengthening science and innovation;
- reducing regulatory burdens on business:
- ensuring a responsive planning system; and
- improving transport infrastructure.

Meeting these challenges will ensure a continued drive for productivity and output growth in the UK.

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