1 Benchmarking UK productivity performance

Overview

The UK is making progress on boosting productivity growth and narrowing the long-standing productivity gap with its key competitors. Recent data suggests that the UK:

- has significantly narrowed the productivity gap with the G7 countries, on both an output per worker and an output per hour basis, over the past decade;
- has closed the output per worker gap with Germany;
- has experienced trend productivity growth of an estimated 2.44 per cent per year, on an output per hour basis, between 1997 and 2001 – higher than productivity growth of 2.05 per cent over the previous economic cycle;
- has achieved these improvements against a background of rising employment, with nearly 1.7 million more people in work since Spring 1997; but
- still lags behind the G7 as a whole by around 13 percentage points, and the US by around 27 percentage points, in terms of the amount of output produced, on average, by each worker.

Benchmarking the UK's productivity performance over time can be complex. This chapter sets out the existing methodology used to monitor the productivity gap over time, and explores a complementary methodology for monitoring relative productivity performance.

INTRODUCTION

1.1 In the long term, it is only increases in productivity that can raise wages, profits and ultimately overall prosperity. But the UK has historically been weak at generating productivity growth. A productivity gap opened up between the UK and the US at the beginning of the 20th Century, and with France and Germany by the 1970s, as illustrated by Table 1.1. If the UK is to grow and maintain relative living standards then it needs to address the long-standing structural problems that stop the UK from using all of its available resources effectively. It is only by meeting this challenge that the Government can achieve its long-term ambition, and HM Treasury and DTI's joint PSA target, to raise productivity growth and narrow the gap with our major competitors. This chapter considers recent performance towards achieving this goal.

Table 1.1: Relative labour productivity levels, G7, 1870-1999

Ranking	1870	1913	1950	1973	1999
1	**UK**	US	US	US	US
2	US	**UK**	Canada	Canada	Canada
3	Germany	Canada	**UK**	Germany	Japan
4	France	Germany	France	France	Germany
5	Canada	France	Germany	**UK**	France
6	Italy	Italy	Italy	Japan	**UK**
7	Japan	Japan	Japan	Italy	Italy

Source: Crafts (2002)

1.2 Assessing progress towards achieving this target can be complex. In particular, a key challenge is how to monitor the UK's productivity performance against its main competitors over time. The International Comparisons of Productivity methodology, published by the Office for National Statistics (ONS), is currently used to monitor the size of the productivity gap over time.[1] This chapter examines this methodology and considers a complementary approach to assessing progress. No approach is perfect, and each has different merits and limitations. **The Government welcomes your views on the approaches outlined in this chapter for benchmarking the UK's productivity performance.**

THE PRODUCTIVITY PSA TARGET

1.3 There are two main elements to the productivity PSA target, that the Government should demonstrate progress in:

- raising the rate of productivity growth over the economic cycle; and
- narrowing the productivity gap with the US, France and Germany.

The Government's key focus is on improving living standards. Therefore, labour productivity is used as the central measure of productivity performance as it is closely related to earnings and economic welfare. Box 1.2 sets out the various measures of productivity in more detail.

[1] Further information on the data used and the methodology for compiling international comparisons is presented in Economic Trends 577, Richardson (2001).

1.4 Complementary to this target, the Government also has an objective to improve the quality and cost-effectiveness of public services.[2] The non-market nature of most government services can make valuing publicly provided goods and services (output), and therefore improvements in public sector productivity, difficult. The National Statistician announced on 4 December 2003 that Sir Tony Atkinson had been asked to undertake a review of the future development of measures of government output, productivity and associated price indices so as to advance methodologies. The objective of this review is set out in more detail in Box 1.1.

Box 1.1: Measuring real government output

The Atkinson Review is reviewing the measurement of UK government output and productivity. Sir Tony Atkinson from Nuffield College, Oxford, is leading a team from the Office for National Statistics, HM Treasury and the Bank of England.

A key objective is to advance methodologies for the measurement of government output, productivity and associated price indices in the context of the National Accounts, recognising:

- the full scope of government outputs;
- differences in the nature and quality of these outputs over time;
- the relationship between government outputs and social outcomes;
- the need for comparability with measures of private sector services outputs and costs;
- the existing work of the ONS; and
- the appropriate measurement of inputs, including quality and the distinction between resource and capital so that, together with the measurement of output, light can be thrown on developments in government productivity.

An interim report will be published in July 2004. This will include general principles and recommendations for measurement of government output as well as more specific recommendations for the two most important government functions (in terms of expenditure), health and education. This interim report will draw on consultations with experts and stakeholders both in and outside the ONS. After a further period of consultation, the final review report is due to be published in January 2005.

Raising the rate of productivity growth over the cycle

1.5 The intensity with which firms use capital and labour varies over the economic cycle. Recruiting and training new workers is costly, and consequently firms may be slow to hire new workers when demand increases, or at least until they are confident that the upturn will last. Conversely, the cost associated with losing the skills and experience of existing workers means that firms may be reluctant to shed workers when demand slows. A similar pattern can be expected with capital inputs. As a consequence, output will adjust more rapidly to changes in demand than employment (or physical capital), and productivity (output per worker) will vary over the economic cycle. For example, holding onto workers in an economic downturn, when actual output growth is below the trend rate, will reduce labour productivity growth.

[2] HMT (2003), 'Public services: meeting the productivity challenge', www.hm-treasury.gov.uk/

1.6 Productivity growth will also be affected by structural changes in the employment rate. An influx of new workers into the workplace is likely to dampen productivity growth as new workers will tend to take time to learn the job-specific skills that are required to raise their labour productivity to the average level.

1.7 In order to monitor underlying improvements in productivity, it is therefore important to strip away the distorting effects of the economic cycle and employment growth. Estimates of underlying trend productivity growth, which adjust actual productivity growth to take account of employment growth and the economic cycle, are published in the Budget and Pre-Budget Reports.[3]

1.8 The most recent data, published in the 2003 Pre-Budget Report, suggest that the UK is making progress in boosting its productivity performance. Actual productivity growth (trend output per hour worked) is estimated to have been 2.44 per cent over the recent past (1997H1-2001Q3), higher than growth of 2.05 per cent over the previous economic cycle (1986Q2–1997H1).[4] Furthermore, this improvement in the UK's relative productivity performance has been achieved against a background of rising employment; UK employment growth has been consistently high with nearly 1.7 million more people in work since Spring 1997. Adjusting for the effect of employment growth, it is estimated that the underlying rate of productivity growth was 2.65 per cent over the recent past (1997H1–2001Q3) compared to 2.22 per cent over the previous economic cycle (1986Q2-1997H1).[5]

[3] The full methodology is outlined in HMT (2002), 'Trend Growth: Recent Developments and Prospects'

[4] The last complete economic cycle ran from 1997H1 to mid-1999. As this was a very short cycle, the Treasury uses a longer period comprising one and a half economic cycles (between the on-trend points in 1997H1 to 2001Q3) to estimate trend output growth over the recent past and, accordingly, reports progress over this period. Over the short cycle between 1997 and 1999, the estimated actual and underlying trend productivity growth rates were also higher than those estimated over the 1986 to 1997 cycle, showing encouraging signs of progress regardless of the choice of reporting period.

[5] Estimates of the underlying rate of productivity adjust actual productivity on the assumption that new workers are 50 per cent as productive as existing workers.

Box 1.2: Measuring productivity

Productivity is a key determinant of national living standards. It indicates how well an economy uses the resources it has available by relating the quantity of inputs to outputs. High productivity countries manage to generate more wealth for the amount of inputs (such as labour and capital) that they have available. There are several measures of this relationship. Their main characteristics, and the differences between them, are set out below.

Labour productivity looks at output produced per unit of labour input. The most common indicators are output per worker and output per hour worked:

- **Output per worker** has the advantage of being easy to calculate because the data, namely total output and employment, are readily available.
- **Output per hour** adjusts the output per worker measure for labour intensity, reflecting differences in hours worked, holiday entitlements and the flexibility of the labour market in including part-time and other alternative work patterns.

Output per person of working age, whilst not a measure of productivity, indicates how efficiently an economy includes all of its potential workers in productive employment. This measure therefore captures two fundamental government objectives: to increase the employment rate, and to improve productivity performance.

The measures above are denominated by only one factor of production, namely labour. Capital is also an input into the economy, and some other measures of productivity take this into account.

In particular, ***total factor productivity*** (*tfp*) attempts to measure output per unit of inputs, where inputs are generally labour and capital. It measures how efficiently capital and labour are used together and captures a range of factors such as skills, technology, organisation, competition and economies of scale. In principle this is a more appealing measure of an economy's efficiency. It is, however, very difficult to calculate accurately due to data limitations, particularly for capital inputs and, in practice, is subject to measurement error.

Each of the measures above has advantages and disadvantages, and all give different insights into the nature of productivity. The Government's focus is on labour productivity, rather than *tfp*, as this relates directly to improving prosperity.

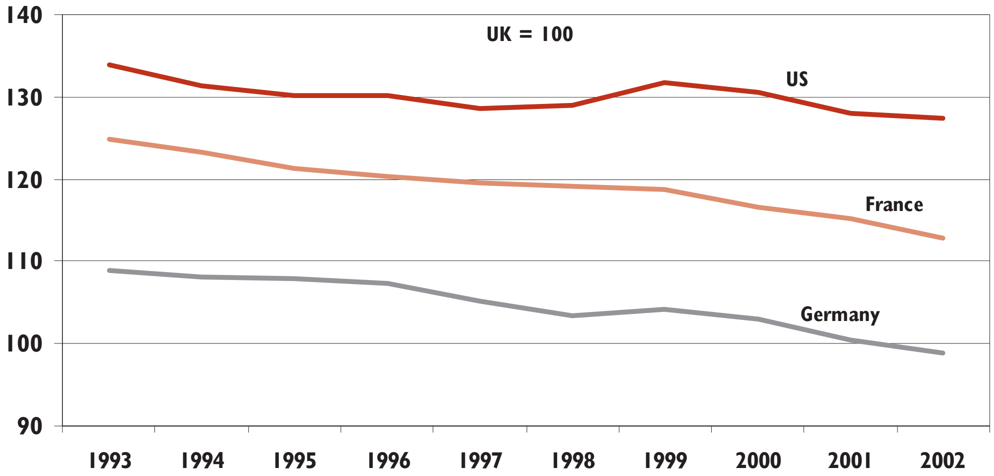
Narrowing the productivity gap

1.9 However, increasing the trend rate of productivity growth alone is not sufficient to meet the Government's ambitions. In order to narrow the productivity gap, the UK must demonstrate faster productivity growth than that experienced in comparator countries. The size of the output per hour and per worker productivity gap is currently monitored by the International Comparisons of Productivity (ICP) published by the ONS.

1.10 The size of the productivity gap between countries is also affected by the relative position of the economic cycle and by changes in employment. As with domestic productivity performance, these factors should be taken into account when assessing relative productivity performance. Analysis suggests that the UK, Germany, France and the US were at a similar point on the economic cycle in 1995, and have been at similar cyclical points between 2000 and 2002, as measured by output gap estimates published by the Organisation of Economic Co-operation and Development (OECD). These are therefore appropriate years between which to compare relative productivity performance in order to minimise the distorting effects of the economic cycle.

1.11 Recent statistical revisions show that progress over the recent past has been stronger than had previously been thought.[6] Chart 1.1 shows that the UK is making progress in narrowing the output per worker gap. The latest data suggests that, since 1995, the output per worker gap with France has narrowed from around 21 per cent to 13 per cent in 2002, and that the gap with Germany has closed.

Chart 1.1: International comparisons of productivity, GDP per worker

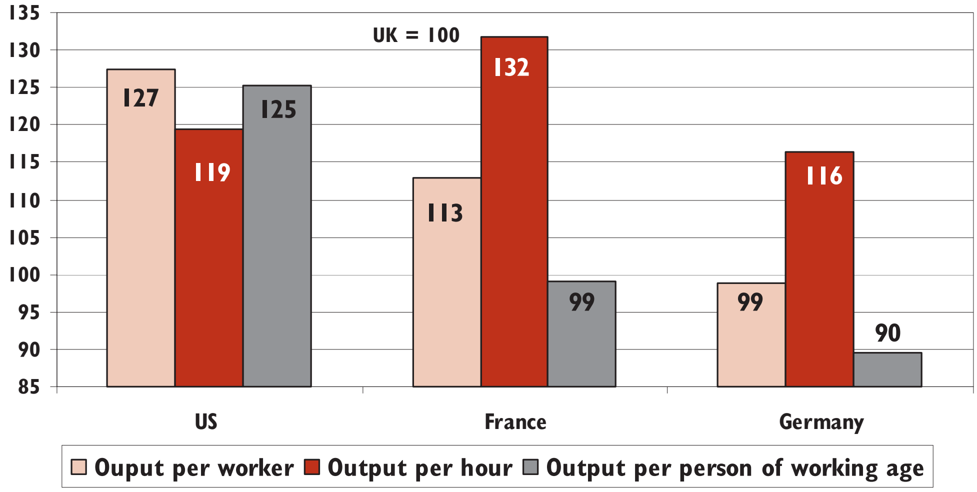


Source: ONS
Note: 2002 data is provisional

1.12 The latest data also suggests that the UK is making progress in narrowing the output per hour gap; the output per hour gap with Germany narrowed from around 23 per cent in 1995 to 16 per cent in 2002. The gap with the US is also smaller on a per hour basis (around 19 per cent) as US workers tend to work more hours, on average, and have less holiday entitlement than their European counterparts. However, Chart 1.2 also shows that, as French workers tend to work fewer hours, on average, than their UK counterparts, a considerable productivity gap remains with France on a per hour basis (around 32 per cent).

[6] The revisions to the ICP series primarily reflects recent work done by Eurostat to revise its Purchasing Power Parities for 1995-2000, due to the step-by-step introduction of the most recent version of the European System of Accounts (ESA95). Some other pricing inaccuracies were also corrected at the same time, and Eurostat Purchasing Power Parities for 2001 and 2002 were revised in line with their usual revisions timetable. The ONS source most data from the OECD who, in turn, source much of their Purchasing Power Parity data from Eurostat.

Chart 1.2: International Comparisons of Labour Efficiency, 2002



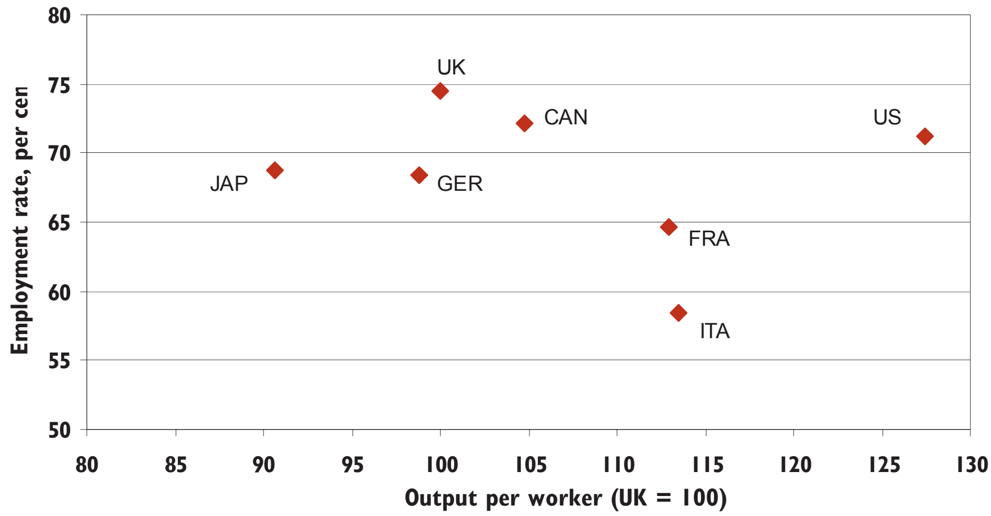
Source: Output per worker and output per hour (experimental) measures are ONS estimates, output per person of working age is HMT estimate based on ONS/OECD data.
Note: 2002 data is provisional

1.13 Chart 1.2 also shows that the UK performs relatively well in terms of output per person of working age, a measure which reflects both employment and productivity performance. Although this is not a measure of labour productivity, and is closer to a measure of overall prosperity, it does indicate how efficiently an economy uses all of its potential labour resources by including as many workers as possible in productive employment.[7] UK performance on this measure is significantly stronger than in Germany (by around 10 per cent) and similar to performance in France. This reflects relatively strong employment performance in the UK; the UK has the highest employment rate in the G7 with 74.5 per cent of the working age population in employment, compared to 71.2 per cent in the US, 65 per cent in France and 68.4 per cent in Germany.[8]

[7] Output per person of working age represents the average amount of income that is 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 these two measures reflect demographic make-up. For example, a country that fares well on measures of output per person of working age, but has a relatively high dependency ratio (which reflects the number of potential workers to non-working age 'dependents'), will perform less well on measures of GDP per capita. Neither of these measures capture the distribution of income, or relative living standards, between groups or regions, however.

[8] Latest ONS figures based on the ILO. For the UK those aged 16-59/64, for EU countries those aged 15-59/64 and for the US 15-64.

Chart 1.3: Comparisons of Employment and Productivity for the G7



Source: Most recent data: output per worker, ONS, Employment, published by the ONS

1.14 Although the gap between the UK and the US, whilst still substantial, narrows on the output per person of working age measure (to around 25 per cent) the US position (Chart 1.3) demonstrates that it is possible to achieve high levels of productivity alongside strong rates of employment. A considerable challenge remains to boost UK labour to promote sustainable increases in productivity growth in the UK, whilst maintaining strong employment, in order to narrow the gap with the US.

Question 1.1: In your view, is it useful to consider relative employment performance when benchmarking productivity performance for monitoring purposes?

Question 1.2: Is 'output per person of working age' a useful indicator to monitor to assess overall UK performance on employment and productivity?

METHODOLOGY FOR BENCHMARKING PRODUCTIVITY PROGRESS

1.15 In order to make international comparisons of labour productivity it is necessary to compare the real value of output produced, on average, by each worker, or each worker hour, over time. Differences in price levels and inflation rates can make this difficult. There are a number of options for taking account of differences in prices between countries and over time, in order to compare underlying productivity progress, some of which are set out in Box 1.3. This section outlines the current methodology used to measure the productivity gap, the 'current Purchasing Power Parity approach', and considers a complementary methodology, the 'constant Purchasing Power Parity approach'. **The Government welcomes your views on these approaches, and the best way for benchmarking the UK's productivity progress performance over time.**

Box 1.3: Adjusting GDP for price effects

Gross Domestic Product (GDP) is the aggregate used most frequently to represent the economic size of countries and, on a per capita basis, the economic well-being of their residents. There are three methods of estimating GDP: the production approach, the income approach and the expenditure approach. The production approach estimates the value of an output (goods or services), less the value of inputs used in that output's production process. The income approach measures the incomes earned by individuals (e.g. wages) and corporations (e.g. profits) in the production of outputs (goods or services). The expenditure approach measures total expenditure on finished or final goods and services produced in the domestic economy. Values of GDP (current price GDP) are then made up of two components: price and volume.

In observing national GDP over time, it is often more useful to look at pure volume changes, which means removing the effect of national price changes. This is done by applying price deflators to the various components of current price GDP, to remove the effect of changes in prices and arrive at a volume measure of GDP **(real GDP)**.

National GDP deflators measure how national prices have changed over time by tracking the prices of a basket of goods over time. They are then used to separate changes in current price GDP into price changes and volume changes.

Hedonic pricing is a method of adjusting GDP for changes in quality as well as changes in price. Its effect is most significant in pricing products that have undergone major quality and price changes in recent years, such as hi-tech goods. If, for example, the price of the average computer had not changed over a year, but the quality was estimated to have doubled, then hedonic pricing would record this as a 50 per cent fall in price.

In order to compare productivity between countries, it is also necessary to compare volumes of output. In order to compare GDP between countries, data expressed in different currencies must be translated into a common unit. This is usually done using purchasing power parities (PPPs).

Purchasing power parities (PPPs) measure relative prices between countries in any one year, adjusted for the typical baskets of goods consumed in both countries in that year. Therefore, they enable international comparisons of real GDP in any one year.

Current Purchasing Power Parity approach

1.16 The methodology that the Government currently uses to calculate relative productivity levels involves adjusting current price Gross Domestic Product (GDP) using 'current Purchasing Power Parities (PPPs)'. These PPPs are used to remove the effect of price differences between countries to allow analysts to identify how much a unit of one country's GDP would buy in a comparator country. This measure of output is then divided by employment to get output per worker for each country.[9] Relative progress is assessed by comparing the most up-to-date estimates of PPP-adjusted productivity in order to measure the evolution of the productivity gap over time.

1.17 This is the best method for measuring the size of the productivity gap at a point in time, as PPPs are specifically designed to generate comparable volume measures of output between countries. As this method uses current price GDP, it also has the advantage of removing the need for using national deflators, which are often calculated in different (and not necessarily comparable) ways.

1.18 However, one disadvantage of this approach is that it relies on the availability of PPPs, which appear with a lag. PPPs are subject to routine revision up to two years after the year in which data were collected; for example, PPPs for 2002 will be fully updated in December 2004. PPP data can also be affected by less frequent but more substantial revisions which, as the recent revisions show, can affect the size and pattern of the productivity gap.

Constant Purchasing Power Parity approach

1.19 A complementary approach is to fix relative price differences between countries at a baseline year, according to estimates of 'current PPPs' in that year, and extrapolate 'constant PPPs' by using national GDP deflators to adjust the PPP estimates over time for national inflation rates. These 'constant PPPs' can then be used to convert current price GDP in national currencies into real GDP, which is comparable between countries, and from which changes in the productivity gap can be monitored over time. This method could provide useful information on relative productivity growth and, therefore, the evolution of the gap over time. However, the estimated size of the productivity gap in any year will be influenced by the choice of base year, and will become increasingly inaccurate further away from the base year.[10]

[9] Further information on the data used and the methodology for compiling international comparisons is detailed in Economic Trends 577, Richardson (2001).

[10] For further information, please refer to the OECD paper, 'GDP per capita volume indices based on constant and current PPP's in OECD's Main Economic Indicators'.

1.20 This approach would provide more timely evidence on productivity growth.[11] However, a disadvantage is that it relies on estimates of national deflators to remove the effect of price changes over time. Differences in the sample of goods surveyed to identify prices, and in the way in which GDP is deflated, will therefore distort some of the movements. For example, the US generally makes greater use of 'hedonic' price deflation than other countries (see Box 1.3).

1.21 Both of the approaches to monitoring relative productivity performance, set out above, are subject to disadvantages. These disadvantages mean that there are limitations associated with focusing exclusively on either of these headline measures of productivity. This is one reason why the Government is looking to develop a more focussed set of intermediate indicators – structured around the 'five drivers' of productivity – which monitor progress on the underlying conditions needed to bring about an improvement in productivity.

Question 1.3: What are your views of the relative advantages and disadvantages of:

- the 'current Purchasing Power Parity' approach
- the 'constant Purchasing Power Parity' approach?

Question 1.4: What, in your view, is the best way to monitor the UK's productivity performance in relation to its main competitors?

[11] For example, first estimates of GDP in the UK for the year are produced in the month following the year end and are based on at least some survey evidence. In contrast, first estimates for PPP for the year are only based on the price survey data 12 months after the year in which the data was collected. The greater timeliness of real GDP data will still be constrained by the employment data used in the estimation of productivity growth. Employment data is drawn from the OECD's Annual Labour Force Survey, which is published yearly in August.

2 SELECTING A FOCUSSED SET OF PRODUCTIVITY INDICATORS

Overview

The Government is considering moving towards a more focussed set of productivity indicators to present a clear picture of the UK's productivity performance and to assist with monitoring progress towards the productivity PSA target. The indicators would be organised around the five drivers of productivity – investment, innovation, skills, enterprise and competition. This chapter sets out a set of criteria to help guide selection for a focussed set of indicators.

INTRODUCTION

2.1 Making the transition to a more productive economy is a long-term process. When assessing progress towards enhancing productivity in the UK, it is useful to look for changes in the performance of the underlying factors which influence productivity performance.

2.2 The Government has identified 'five drivers' of productivity which provide the analytical framework for thinking about the determinants of productivity growth, the drivers are:[1]

- encouraging **investment**, to increase the stock of physical capital through stronger, more efficient capital markets;
- supporting science and **innovation**, to promote the development of new technologies and more efficient ways of working;
- raising **skills** levels, to create a more flexible and productive workforce;
- promoting **enterprise**, through measures aimed at removing barriers to entrepreneurship and developing an enterprise culture; and
- improving **competition**, which promotes flexible markets and increases business efficiency and consumer choice.

The Government is considering moving towards a more focussed set of productivity indicators organised around these drivers that will assist with monitoring progress towards the productivity PSA target.

2.3 This approach may have several advantages.[2] A more focussed set of indicators relating to areas that are the most important for productivity potentially makes it easier to present a clear picture of the UK's position relative to its major competitors. Furthermore, a more focussed set of indicators that remains the same over time may be easier to understand and interpret. But there are also some risks associated with a more focussed set of indicators: while these can capture the most important areas for productivity, they will not be able to cover all aspects. Finally, irrespective of the number of indicators, determining the exact relationship between productivity and intermediate indicators will always be complex.

[1] HMT (2000), 'Productivity in the UK 1: the evidence and the Government's approach', www.hm-treasury.gov.uk/

[2] The European Commission is also proposing a shortlist of 14 structural indicators to allow for an assessment of progress towards the Lisbon objectives in the Commission's Spring Report. A communication from the Commission, available at http://europa.eu.int/eur-lex/en/com/cnc/2003/com2003_0585en01.pdf, outlines several perceived advantages with this approach.

Question 2.1: Do you agree that a more focussed set of national productivity indicators is desirable to assist the Government with monitoring progress towards the productivity Public Service Agreement target?

FRAMEWORK FOR SELECTING INDICATORS

2.4 Chapters 3-7 of this document propose indicators that might be included in such a more focussed set. A set of criteria has been identified to help guide selection. These are based on Office for National Statistics (ONS) guidance on statistical quality and modified to meet the specific need of this consultation.[3] The criteria are as follows:

Relevance

The indicator is clearly linked to the driver or considered to be an important aspect of the driver. The indicator is straightforward for users to interpret.

Timeliness

The indicator is based on data that relates to a recent reference period. The data should ideally be released annually to allow changes to be tracked as regularly as possible.

Comparability

The indicator is based on data that is available over time and for other countries as well as the UK to permit progress in the UK's performance to be compared with progress in other countries.

Reliability

The indicator is based on accurate data from reliable sources. For the purpose of these indicators, this means data that:

- is closely correlated to the variable in question;
- is not highly volatile;
- is based on an adequate sample size when using surveys; and
- exists in the public domain, and is expected to continue to be published in the foreseeable future.

Completeness

The set of indicators under each driver reflects the key aspects of the driver.

[3] ONS (2004), 'Guidelines for Measuring Statistical Quality', www.statistics.gov.uk/

2.5 It will not be possible to find a complete set of indicators from existing data that satisfy all five criteria. Trade-offs exist between different criteria. For example, indicators where the data is available quickly are subject to greater future revisions, and may be less comprehensive than indicators based on less timely data.

Question 2.2: The indicators in this document, where possible, benchmark the UK's performance with that in the US, France and Germany, because these are the countries specified in the productivity Public Service Agreement target. Do you believe there is additional benefit in benchmarking UK's performance with other countries? If so, which countries are most relevant?

3 Investment

Overview

By increasing the amount of machinery and equipment available to each worker, and by bringing new technology to the production process, investment in physical capital increases productivity levels and growth.

The Government proposes the following indicators to monitor the UK's investment performance:

- Hurdle rates – *required rate of return for a business to invest*
- Business investment as a per cent of GDP
- Government investment as a per cent of GDP
- Perceptions of the quality of infrastructure

Rates of investment in the UK have been somewhat lower than those of its main competitors for a significant period of time. Establishing a stable macroeconomic environment encourages businesses to feel confident about undertaking greater investment, planned over a longer time-horizon. The UK has made progress in this area, but it takes time for these wider structural improvements to be reflected in business decision-making. The UK's relatively poor labour productivity performance, in part, reflects years of under-investment in both the public and private sectors.

INTRODUCTION

3.1 Physical capital is an essential determinant of economic growth and productivity. By increasing the quantity and quality of machinery and equipment available to each worker, investment can directly increase labour productivity. Investment in new capital is also one way of incorporating new technology into the production process, improving firm efficiency.

3.2 US and German workers have access to over 45 per cent more capital, and French workers to over 75 per cent more capital, than their UK counterparts.[1] This suggests that low levels of physical capital are constraining labour productivity in the UK, and that it is therefore important to reverse historically low levels of investment. However, the impact of investment takes time to feed through, and cannot be expected to have an immediate impact on productivity growth.

[1] O'Mahony & De Boer (2002)

INVESTMENT AND PRODUCTIVITY

3.3 The amount of physical capital in an economy has long been recognised as a central driver of economic growth, and numerous empirical studies have assessed the importance of physical capital to growth.[2] Research by the OECD, for example, finds a significant and robust correlation between investment and productivity.[3] This result is supported by a European Commission study that estimates the long-run effect of a one percentage point increase in total investment to be a 0.05 percentage point increase in the long-run annual growth rate of labour productivity.[4]

3.4 New investment is required to replace, update and increase the capital stock. This investment impacts on productivity growth and levels through two channels:

- capital deepening; and
- incorporating new technology.

3.5 By increasing the average amount of plant and machinery each worker in the economy has to operate, capital deepening can lead to a direct improvement in labour productivity levels. Technological advances can also be brought into the production process through new physical capital. Providing that the wider environment supports innovation – that workers are equipped with the relevant skills to take advantage of new equipment, for example – new physical capital should lead to both an increase in labour productivity and *total factor productivity (tfp)*.

3.6 A focussed set of indicators might take as a starting point the macroeconomic climate, since this influences business investment decisions. The main sources of increases in the capital stock are business sector and government sector investment rates. Infrastructure investment may be particularly important for complimenting private sector investment and boosting productivity. Hence the Government is considering a set of indicators which cover the following areas of investment:

- investment environment for business;
- investment rates in the economy; and
- investment in infrastructure.

> Question 3.1: Do you agree that a focussed set of investment indicators should cover the following areas: investment environment for business, investment rates in the economy, and investment in infrastructure? Are there any other areas that should be captured?

[2] The Solow-Swan growth model established the importance of physical capital to per capita economic growth. Numerous empirical studies have looked at the relationship between physical capital and growth, including an influential paper by DeLong and Summers (1991). See also Rowthorn (1999) on the role of physical capital in growth.

[3] OECD (2003)

[4] European Commission (2003b)

INVESTMENT ENVIRONMENT

3.7 It is widely understood that volatility in the macro-economy tends to lead to lower investment rates as businesses demand greater expected returns from their investments. OECD research supports this, finding that high inflation tends to dampen businesses' incentives to invest, while highly volatile prices tend to lead to a shifting of resources away from riskier projects.[3] It is these riskier projects, with potentially high returns, which can deliver high economic and productive benefits. 'Hurdle rates' are one way of capturing how the macroeconomic environment impacts on investment decisions.

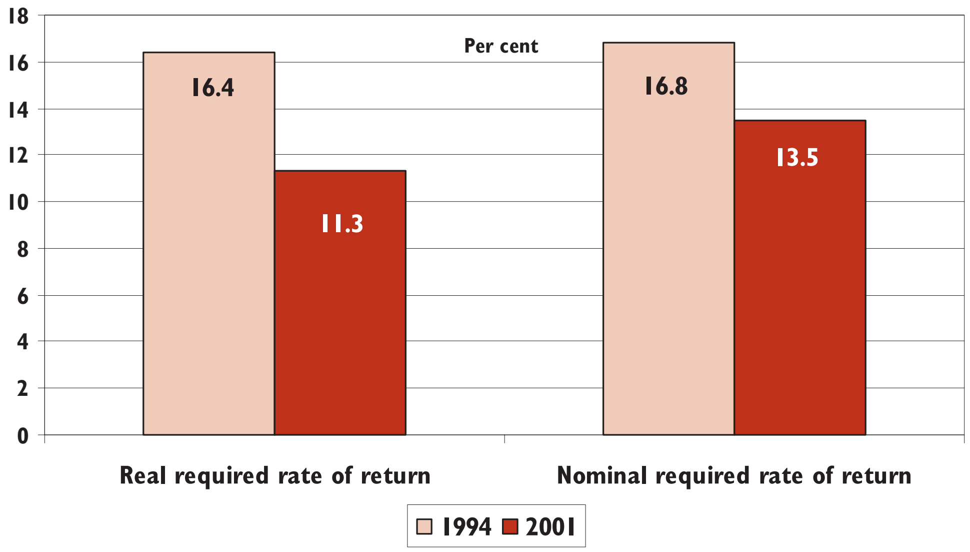
Hurdle rates

3.8 Hurdle rates refer to the expected rate of return firms require on their investment for the project to proceed. Firms use an array of methods to make this calculation. During periods of greater demand and inflation certainty, the hurdle rate would be expected to fall. The opposite would be expected in a more volatile environment. When hurdle rates are low, more investment proposals are likely to be realised.

3.9 The Confederation of British Industry (CBI) has conducted two surveys in the UK investigating hurdle rates (1994 and 2001). The 2001 CBI survey notes that hurdle rates are only one among a number of factors that influence business investment decisions, and that firms may use different methodologies for estimating their required rate of return.[5] It is also worth highlighting that the survey primarily covers the manufacturing sector. Nevertheless, the measure can point towards improving or deteriorating business perceptions of the macroeconomic climate and the resultant effect on their investment decisions. There may thus be value in monitoring this measure if it is produced regularly.

[5] Godden (2001)

Chart 3.1: Hurdle rates, UK



Source: CBI

Definition and methodology

The 2001 survey targeted finance directors primarily within the UK manufacturing industry to ascertain the type of assessment they use to determine whether to proceed with an investment project. Those using quantitative assessments were asked about the methods used, and the rates of return (or length of payback period) they look for. Firms may use one or more of these types of assessment.

Normal Industrial Trends Survey procedures were used to weight the results, to take into account the size of each firm responding, and to reflect the importance of their sub-sector to manufacturing as a whole. The results should therefore be read as percentages of the weighted response. The survey size was 337 in 2001 and 438 in 1994.

UK performance

3.10 The results from the CBI's survey show that for firms using a nominal required rate of return, the required return fell between 1994 and 2001, which is consistent with falling inflation expectations. More interestingly, for those using a real required rate of return, the rate they required also fell during the period, suggesting that there has been an improvement in business' perceptions of the investment climate over and above a mere inflation effect

Alternative indicators

3.11 An alternative approach could be to look at variation in macroeconomic variables directly. Complications that would need to be overcome to do this include identifying which macroeconomic variable(s) to focus on, and how to gauge uncertainty. For instance the DTI's Productivity and Competitiveness Indicators 2003 considered volatility in GDP growth, exchange rate movements, inflation and short-term interest rates over a period of 10 years.

Question 3.2: Do you agree that hurdle rates (the rate of return required for an investment project to proceed) are the best available indicator of the investment environment? If not, what alternative would you suggest?

INVESTMENT RATES IN THE ECONOMY

3.12 The empirical evidence suggests that business investment is the most important component of investment in terms of boosting productivity. This is not surprising, as business investment accounts for approximately two-thirds of gross fixed capital formation (an overall measure of total investment) in the UK. The Government also has a key role to play through investing in infrastructure and ensuring the health and education of the population. Together, business investment and government investment account for more than 70 per cent of gross fixed capital formation. The remainder comes largely from private investment in housing.

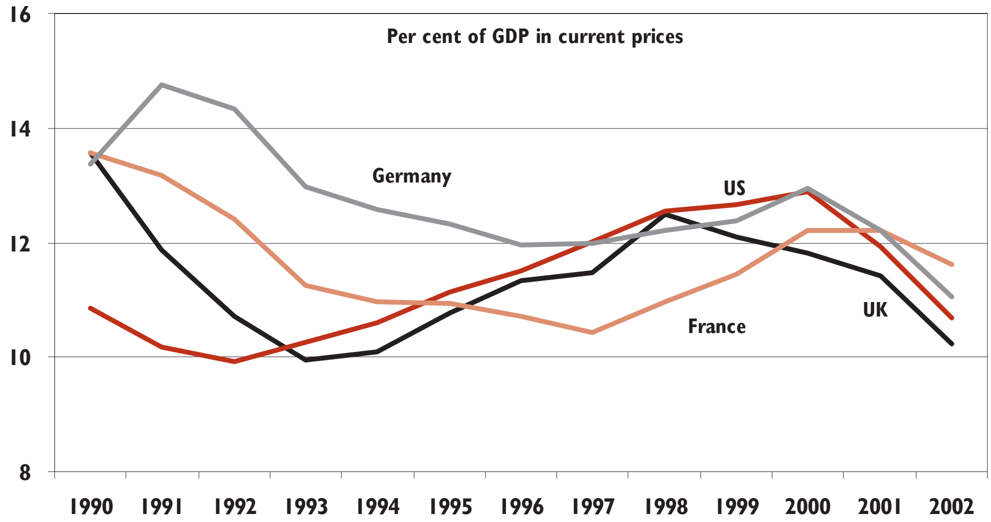
3.13 Two indicators are considered below: **business investment** and **government investment**. The two measures are compatible, and drawn from related OECD series (data is released twice yearly). The indicators are presented here in current prices as a per cent of GDP as they are straightforward to calculate.[6] The one disadvantage is that if investment prices are declining relative to whole economy prices, then this ratio will tend to decrease over time. This can be misinterpreted as demonstrating weak investment in a country when real investment growth may have performed well.

Business investment

3.14 Business investment directly impacts on the amount of capital and technology available to each worker, and is strongly correlated with productivity growth. It is therefore a highly relevant indicator. However, when interpreting this indicator it is important to remember that comparison between countries can be misleading because of classification issues and cyclical effects.

[6] Since the introduction of chain-linked accounts it is not possible to express constant price, or real, investment as a proportion of GDP. For greater detail on the chain-linking methodology see Whelan (2000).

Chart 3.2: Business Investment



Source: OECD Economic Outlook

Definition and methodology

Business investment per cent of GDP = Gross fixed capital formation, business sector (narrow definition) / GDP, market prices

Gross fixed capital formation, business sector (narrow definition) = total fixed investment (excluding stockbuilding) – government investment – investment in housing

The System of National Accounts (SNA) 93 describes gross fixed capital formation as the acquisition less disposal of fixed assets. Fixed assets are produced assets (e.g. machines and buildings) that are used continuously in production over several accounting periods.

UK performance

3.15 Despite relatively low levels of physical capital in the UK, and falling hurdle rates, UK business investment has generally been relatively weak over the past decade. The cyclical effects from the world economic slowdown in 2001 and continued uncertainty throughout 2002 will have subdued business investment in the UK and its main competitor countries. However, part of the downward trend in business investment reflects the declining relative price of business investment to all prices in the economy.[7]

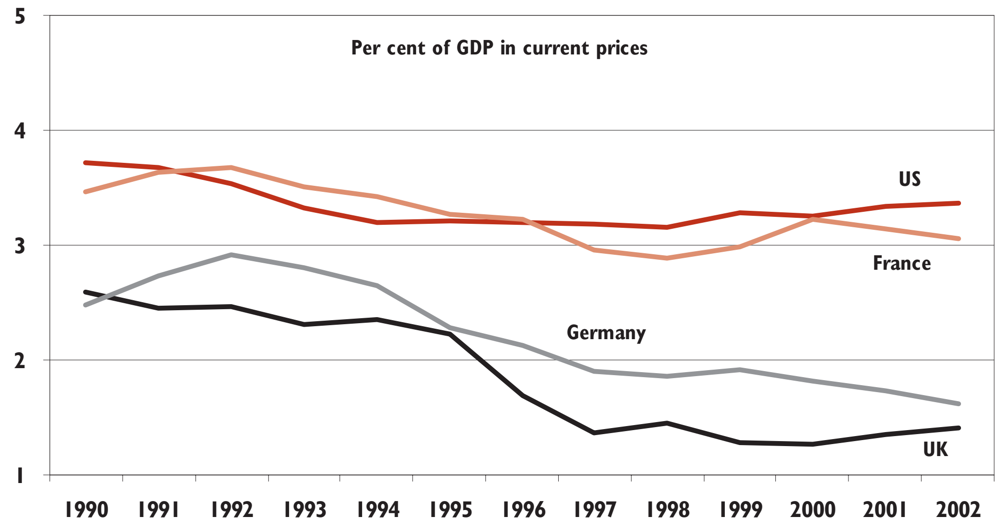
[7] See Annex A of 2003 Pre-Budget Report

Government Investment

3.16 Government investment is also a significant contributor to the economy's capital stock, especially through infrastructure. The public sector is also responsible for health, education and some housing provision. These services have direct impacts on the quality of life of UK citizens, which has indirect effects on productivity and the attractiveness of the UK as a location to live, work and invest.

3.17 As with business investment, comparisons of the level of Government investment across countries should be treated with care, but this indicator should generally be less susceptible to the business cycle.

Chart 3.3: Government Investment



Source: OECD Economic Outlook

Definition and methodology

Government investment share of GDP = Government investment / GDP, market prices

The OECD measure of public investment includes, wherever possible, fixed capital formation by both general government and government-owned and controlled enterprises. The definition and coverage of the latter may vary between countries.

UK performance

3.18 Following a long period of decline, government investment in the UK is now beginning to increase as a proportion of GDP. Nevertheless the UK remains a long way behind government investment rates observed in the US and France.

Alternative indicators

3.19 Measures of business investment and government investment should be sufficient to capture growth in the key elements of the capital stock over time, and to benchmark performance across countries. However, comparisons across countries can be difficult, due in part to the differences in classification of the various types of investment. Moreover the size and scope of government activity in the economy will, for historic reasons, vary across countries. One way around this would be to track gross fixed capital formation – a measure of total investment – as this avoids many of the classification issues. A further limitation is that although these measures capture the quantity, they do not account for the quality of the new additions to the capital stock.

3.20 The OECD is releasing its Productivity Database in Spring 2004. This will contain, among other data, an internationally comparable measure of capital services. The Government will consider this indicator as part of this consultation.

Question 3.3: Do you agree that indicators of business and government investment are sufficient as indicators of investment rates in the economy?

Question 3.4: In a focussed set of indicators do you believe that it would be worthwhile to break down aggregate investment measures by sector?

INFRASTRUCTURE

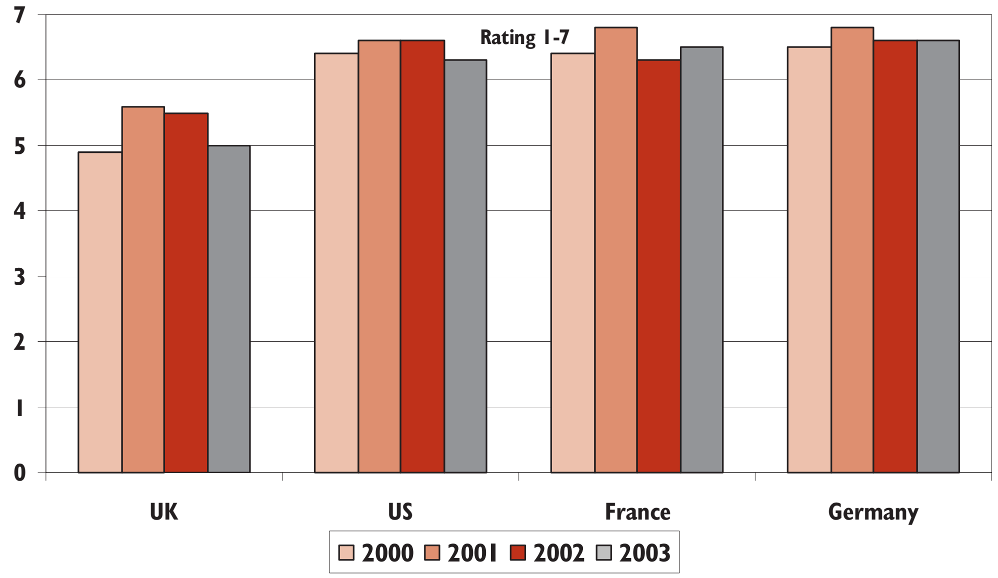
3.21 One area where government investment can directly influence productivity is through improvements to infrastructure. For example, good transport infrastructure, such as effective roads, railways and airports, can improve productivity by lowering transport costs, permits greater specialisation and economies of scale. It also allows workers to travel more easily, increasing labour market flexibility and facilitating easier access to a range of employment opportunities. It may also have an indirect impact by influencing incentives for the private sector to invest.

Overall infrastructure quality

3.22 The Global Competitiveness Report produces annual data relating to the quality of infrastructure. This data is based on survey evidence collected by Global Competitiveness Report. It should capture not only the investment that is going into infrastructure, but also how demand for infrastructure is changing.

3.23 The data is comparable across countries and over time. Despite the small sample sizes the results remain stable over a number of years – as would be expected from this indicator. The Report argues that this suggests that the results are not driven by individual biases.[8]

Chart 3.4: Overall Infrastructure Quality



Source: Global Competitiveness Report

Definition and methodology

Survey questions where respondents were asked to rate the country out of 7 (where 1 = infrastructure is poorly developed and 7 = infrastructure is among the best in the world). The chart represents the rating that a country receives (not the rank).

UK performance

3.24 The indicator of infrastructure quality suggests that France, Germany and US receive similarly high scores, but the UK is some way behind. This is not surprising and, in part, reflects historically lower rates of government investment.

Alternative indicators

3.25 An alternative to the Global Competitiveness Report's survey of infrastructure quality could be actual levels of investment in infrastructure. The Department for Transport (DfT) produce estimates of public and private transport spending in the UK. This is an objective measure and shows clearly how infrastructure spending is progressing. But, as noted above, it is difficult to know the quality of the additional spending. Furthermore if the quality of the existing stock is relatively poor then higher investment rates would be expected.

[8] Porter et al. (2001)

Question 3.5: Do you believe that the Global Competitiveness Report's survey-based measure of infrastructure quality is sufficiently reliable to indicate infrastructure quality?

Question 3.6: Do you believe that the Department for Transport's measure of transport spending is a better of measure of infrastructure quality than the Global Competitiveness Report's survey-based measure?

4 INNOVATION

Overview

Productivity growth relies on a continual stream of innovative technologies, new products and processes, as well as novel services and means of delivery. The Government proposes the following indicators to monitor the innovation driver:[1]

- Publications and citations of research in academic journals
- Business Enterprise Research and Development as a per cent of GDP
- Triadic Patents – *patents granted in the US, and patents applied for in the EU and Japan*
- Proportion of enterprises with co-operation arrangements on technological innovation activities with other enterprises or institutions
- Proportion of sales accounted for by new or improved products

These indicators show that the UK science base is highly productive, leading the G7 in the publication of high-quality research. But the UK is less effective at translating this scientific excellence into new products, services and processes that people want to buy – the latest data shows that the share of turnover in UK businesses accounted for by new products was lower than the European Union average. UK firms are undertaking less R&D than in Germany and the US, and remain relatively weak in terms of patenting performance, although there are signs of improvements in recent years.

INTRODUCTION

4.1 Innovation – the successful exploitation of new ideas – is one of the main engines of long-term economic growth.[2] It can result in new technologies, new products and processes, as well as novel services and means of delivery. Continual improvements in the innovation process are essential for gains in productivity, the creation of jobs, economic growth and higher standards of living.

4.2 Growth accounting studies estimate that differences in innovation performance, as proxied by investment in R&D, account for a quarter of the productivity gap with the US and a sixth of the gap with France.[3] If the UK is to succeed in closing the productivity gap with France, Germany and the US, it needs to improve its innovation performance.

[1] These indicators are consistent with those that form the monitoring framework for the DTI's Public Service Agreement target to, "Improve the relative performance of the UK's science and engineering base, the exploitation of the science base, and the overall innovation performance of the UK economy".

[2] OECD (2003)

[3] Crafts and O'Mahony (2001). There are measurement difficulties with this type of study, and so results have to be interpreted with caution. It is likely that growth accounting studies underestimate the impact of differences in innovation performance, because innovation-related effects are also captured in the residual (unexplained) part of the productivity gap.

INNOVATION AND PRODUCTIVITY

4.3 The empirical literature has consistently shown a positive relationship between innovation indicators and measures of economic performance, such as productivity.[4] Innovation provides opportunities for productivity growth through the development of more valuable products or services, or through the development of new processes that increase efficiency.

Box 4.1: **The seven 'critical success factors' for strong innovation systems**

The DTI has recently conducted a comprehensive review of the UK's innovation performance and the factors that help to explain it.[5] To provide a framework for analysing the strengths and weaknesses, as well as a guide for policy formation, the DTI's Innovation Report identifies a small number of 'critical success factors' that determine the strength of innovation systems:[6]

The capacity to absorb and exploit knowledge – firms have to build the capacity to make the most of external sources of knowledge.

The regulatory framework – affects the possibilities and incentive structures for innovation.

The competition regime and entrepreneurship – competitive pressures can spur firms to innovate, while entrepreneurial behaviour is needed to spot opportunities and turn them into profit.

Access to finance – because all investments in new products, services or processes have to be financed.

Sources of new technological knowledge – new knowledge, resulting from investments in science, technology, engineering and design has an important role in shaping innovation systems.

Networks and collaboration – firms rely on a variety of types of collaboration and relationships with many new partners.

Customers and suppliers – create demand for innovative products and services.

The systems approach used in the Innovation Report necessarily generates a wide range of 'critical success factors' which, given the inter-linked nature of the economy, overlap with the overall five drivers framework. In order to retain focus and avoid duplication, the areas of overlap, such as skills, enterprise and competition are covered in their own chapters, rather than under the innovation driver.

[4] For a survey, see Griliches (1995)

[5] DTI (2003), 'Competing in the Global Economy – the Innovation Challenge'. The evidence underpinning this report was published in a companion document: DTI (2003), 'Competing in the Global Economy – the Innovation Challenge', *DTI Economics Paper No. 7*, www.dti.gov.uk/

[6] Innovation systems are a set of actors, for example firms, institutions, markets and networks that jointly and individually contribute to the development and diffusion of new technologies. DTI (2003), 'Competing in the Global Economy – the Innovation Challenge', *DTI Economics Paper No. 7*, www.dti.gov.uk/

4.4 The DTI's recent Innovation Report reveals that a wide variety of factors influence the ability of an innovation system to generate innovation and economic growth (see Box 4.1). Key elements underpinning this driver are sources of new technological knowledge, and networks and collaboration. Successful innovation requires a stream of new information for development into new scientific and business ideas which entrepreneurs and firms can exploit to create new products, processes or services. Networks play a key role by helping firms to access information and ideas. Ultimately innovation performance must be assessed by the capacity to translate new ideas into new and commercially successful products and services.

4.5 Successful innovation is founded on an economic environment that successfully:

- develops **sources of new technological knowledge**;
- builds **networks and collaboration**; and
- translates new ideas into a **new product, process or service** (innovation outcomes).

> Question 4.1: Do you agree that a focussed set of innovation indicators should cover the following areas: sources of new technological knowledge, networks and collaboration and innovation outcomes (such as new products, processes and services)? Are there any other areas that should be covered?

SOURCES OF NEW TECHNOLOGICAL KNOWLEDGE

4.6 New knowledge has an important role in shaping innovation systems. Three important sources are the **science and engineering base**, **research and development**, and **patents**.[7]

Science and engineering base

4.7 Potential innovators can draw upon the new information and ideas generated by the science and engineering base. The science base also provides the training ground for the scientists and technologists of the future.

R&D

4.8 Similarly, expenditure on research and development (R&D) is used to develop new ideas and technologies, and is an important way of securing the capability to understand new technologies developed outside the firm.[8] Work by the OECD has demonstrated that R&D carried out by businesses across different sectors has a large impact on productivity.[9] Estimates of the contribution of a firm's own R&D effort to productivity growth are typically high – private annual rates of return to R&D tend to be estimated at around 10-15 per cent, although some studies have placed them as high as 30 per cent.[10]

[7] The Government published on 16 March 2004 a consultation document, 'Science and Innovation: working towards a ten-year investment framework'.

[8] The Frascati manual defines R&D as, "Creative work undertaken on a systematic basis, in order to increase the stock of knowledge, including knowledge of man, culture and society and the use of this stock of knowledge to devise new applications".

[9] Guellec and van Pottelsberghe de la Potterie (2001)

[10] Hall (1996)

Patents **4.9** Successful R&D may result in a patent application. Patents also act as a source of new technological information. In return for a period where they can recoup a return from their investment unchallenged by competitors, innovators are forced to disclose the underlying technology related to the invention, which subsequent inventors can then exploit. Improved productivity and market value are associated with taking out patents or trademarks, especially if the patents are highly cited by others taking out patents.[11]

4.10 The indicators proposed to capture **sources of new technological knowledge** are therefore:

- Publications and citations of research in academic journals
- Business Enterprise Research and Development as a per cent of GDP
- Triadic Patents – *patents granted in the US, and patents applied for in the EU and Japan*

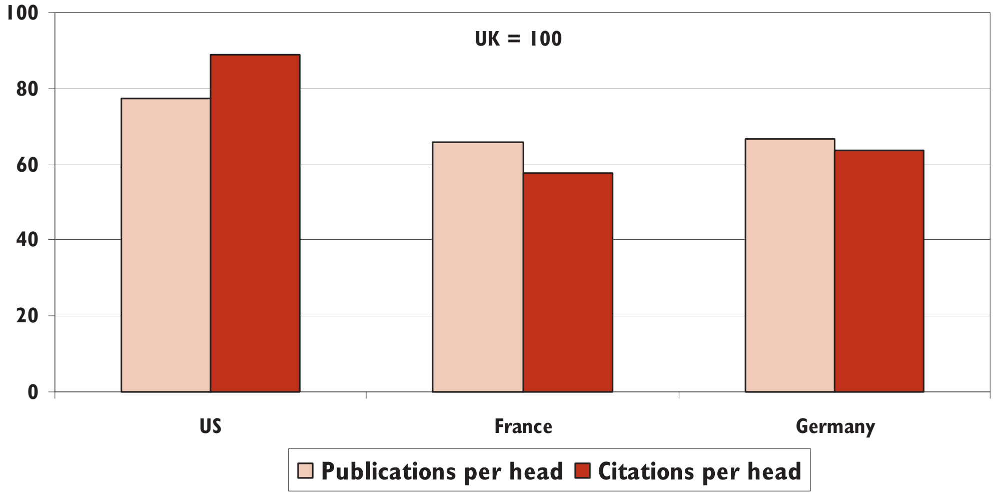
Publications and citations in academic journals

4.11 The number of publications and citations in academic journals is proposed as an indicator of the effectiveness of the science base. The publication of articles in academic journals is an important output of the science base, albeit not the only one. The number of publications provides an indication of the volume of knowledge produced, and the number of citations gives an indication of the quality of that knowledge, because highly esteemed articles are more likely to be widely cited.

4.12 Evidence Ltd, Thomson ISI produces data relating to publications and citations in academic journals. When interpreting this information it should be remembered that the number of citations might be biased towards English speaking countries – because English is usually the language of scientific discourse.

[11] Greenhalgh and Longland (2002); Bloom and Van Reenan (2002); Hall, Jaffe and Trajtenberg (2001)

Chart 4.1: Publications and Citations per head of population, 1997-02



Source: Evidence Ltd, Thomson ISI

Definition and methodology

Publications per head: The number of publications in a list of specified journals produced by authors from each country is counted and divided by the country's population. Journals incorporated into the list are widely perceived as high quality, and cover science, social science and medical fields.

Citations per head: The number of formal references in a journal paper or any other publication to the earlier work of an author from a given country is counted for each country.

It should be noted that joint authorship leads to duplication in counting, for both publications and citations. This should not affect the ability to compare the quality of the science base across countries, but will mean that the world total is less than the sum of national totals.

UK performance

4.13 Chart 4.1 shows that the UK has an excellent science base. When papers published and citations are adjusted for a country's population, the UK leads the US, France and Germany. This leaves the UK well placed to support the UK's wider innovation efforts.

Business Enterprise R&D

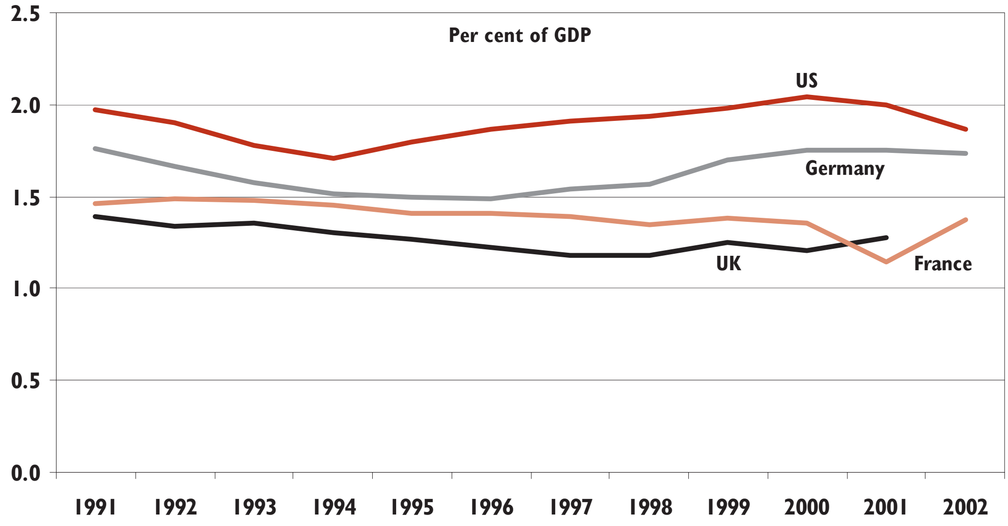
4.14 Business Enterprise R&D (BERD) is the total cost of R&D carried out in the business sector. The R&D activities executed in the business sector are essential for the innovative output of a country. Business sector R&D activities are ultimately innovative and profit-oriented for the purpose of increasing the competitiveness of firms.[12] The relative importance of business sector R&D efforts is indicated by the fact that BERD accounts for approximately two thirds of Gross Domestic Expenditure on R&D (GERD).[13]

[12] European Commission (2003a). This does not exclude the possibility that some R&D activities in the business sector are similar to basic research activities.

[13] Gross domestic expenditure on R&D (GERD) is the sum of business enterprise R&D (BERD), government expenditure on R&D (GOVERD), higher education R&D (HERD) and private not-for-profit R&D (PNPERD).

4.15 OECD data relating to R&D is firmly established and widely used as an internationally comparable measure of R&D. As the intensity of business R&D varies by sector, it is important to account for differences in industrial mix when comparing the level of BERD across different countries.

Chart 4.2: Business Enterprise R&D



Source: OECD ANBERD

Definition and methodology

The OECD ANBERD database collates the results of national R&D surveys. In the UK, the survey is conducted by the Office for National Statistics. The OECD ANBERD database does not yet include UK data for 2002.

UK performance

4.16 Chart 4.2 shows that UK BERD as a share of GDP has stabilised in recent years following a period of slow decline over much of the 1990s. However, it remains below the corresponding shares in US and Germany.

Alternative indicators

4.17 An indicator of Gross Domestic Expenditure on R&D (GERD) could also be included, as a measure of the total level of R&D carried out in a country. This would include R&D activity in the government, higher education and private not-for-profit sectors. For the sake of brevity in the overall set of indicators, it is provisionally proposed to exclude GERD and focus instead on BERD, which captures R&D activity in the business sector and can reasonably be expected to lead to the greatest increases in productivity.

Question 4.2: Do you believe that this set of innovation indicators should include:

- Business Enterprise R&D;
- Gross Domestic Expenditure on R&D;
- Business Enterprise R&D and Gross Domestic Expenditure on R&D;
- another R&D measure - please specify; or
- no R&D measure?

4.18 Aggregate measures of R&D do not reflect a) the source of finance of the R&D; or b) the variation of R&D intensity across business sectors.

Question 4.3: In a focussed set of indicators do you believe that it would be worthwhile to break down aggregate R&D measures by (a) source of finance and/or (b) by sector?

Triadic patents

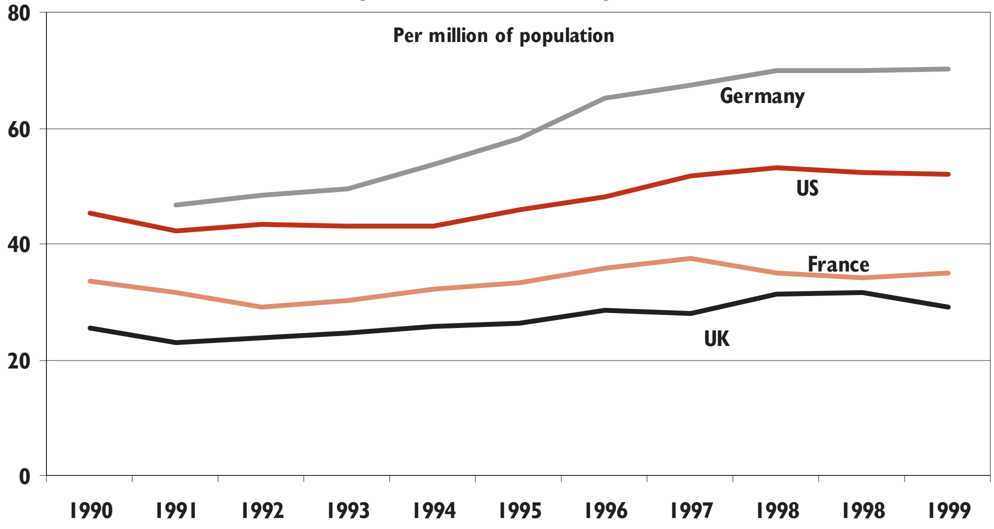
4.19 The OECD's 'triadic patents families' data relates to patents applied for at the European Patent Office (EPO) and the Japanese Patent Office (JPO) and patents granted by the US Patent & Trademark Office (USTPO).[14] Triadic patents have two main advantages over other measures of patenting. First, they correct for the 'home country bias' to patenting – the greater tendency for companies to patent in their own country.[15] For example, if the indicator related solely to patents granted by the USPTO, then it would bias towards US firms. Second, triadic patents tend to reflect high-value patents, since the patentee will only incur the additional costs and delay of applying to all three patent offices if it is deemed worthwhile.

4.20 The key drawback with a triadic patents indicator, however, is that the data is not timely. Currently the latest data available relates to 1999. Timeliness is a problem with all patent data due to the various administrative, legal and data processing delays, but is particularly severe with triadic patents, because of the number of different patent offices involved. At best, triadic patents data is unlikely to become available until two to three years after the reference date.

[14] A patent family is defined as a set of patents taken in various countries to protect a single invention.

[15] The 'home country bias' arises because, proportionate to their inventive activity, domestic applicants tend to file for more patents in their home country. For example, in 1999, the United States accounted for 53% of the total USPTO patent grants compared to 16% for the European Union, whereas for the patent applications to the EPO, the European Union accounted for 47% of total EPO applications, compared to 28% for the United States.

Chart 4.3: Number of patents in 'triadic' patent families



Source: OECD MSTI

Definition and methodology

The triadic patents families indicator relates to patents applied for at the European Patent Office and the Japanese Patent Office and patents granted by the US Patent & Trademark Office.

The triadic patent families are based on the following counting methods:

- Fractional counts – patents with inventors from different countries are partly attributed to each country.
- Counts by the inventors country of residence – to indicate the inventiveness of the local labour force.
- Computed with respect to the priority date – the initial date of filing of a patent application, so the date closest to the date of invention.

UK performance

4.21 Chart 4.3 shows that Germany and the US have a far greater number of triadic patents per million of the population than the UK. The UK and France have similar patenting performance.

Alternative indicators

4.22 Data from a single national patent office could be also used as the basis for an indicator of patenting performance. This would be more timely than the triadic patent data, but less accurate because it will not correct for the home advantage effect. Eurostat collect and publish data relating to patents applied for and granted at the USPTO and the EPO.

Question 4.4: Do you believe that the benefits of the more comprehensive triadic patent data (patents granted in the US, and patents applied for in the EU and Japan) outweigh the benefits of having more timely data available from national patent offices?

Question 4.5: Are there any other measures that could provide similar information as patent data but on a more timely basis?

NETWORKS AND COLLABORATION

4.23 Networking plays a pivotal role in innovation, and increasingly so as technologies become more complex. Firms rarely innovate alone.[16] They rely on a variety of organisations such as other firms, universities and educational bodies, Government laboratories, research and technology organisations, consultancy enterprises, suppliers and customers to augment their internal innovation activities.

4.24 Data relating to this type of knowledge transfer – and to innovative behaviour more generally – is typically less well established than data relating to, say, sources of new technological knowledge. However, the Community Innovation Survey (CIS) potentially provides a rich source of information on European businesses' innovation activities.

Box 4.2: The Community Innovation Survey

The Community Innovation Survey (CIS) is a periodic survey of businesses designed to measure innovation activity, sources of innovation, knowledge transfer, and the effects on innovation on business. It is a survey co-ordinated by the European Commission, although carried out by Member States. In the UK, the Office for National Statistics has carried this out on behalf of the DTI. There is some common content – which means that many of the results are in principle comparable across Europe.

The second CIS (CIS2) was carried out in 1997 and collected data for the period 1994-1996. This is the latest survey for which international comparisons are available. The third CIS (CIS3) was carried out in 2001 and collected data for the period 1998-2000. Care has to be taken in comparing the results of CIS2 and CIS3 because of differences in sample design and response rates.

The CIS is a survey of businesses. CIS3 collected data from just over 8,000 businesses with 10 or more employees. All sectors of the economy are covered apart from the public sector and retail distribution and hotels and catering.[17]

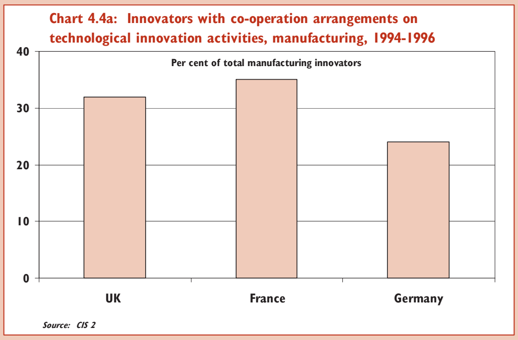
[16] Lundvall B-A (1992)

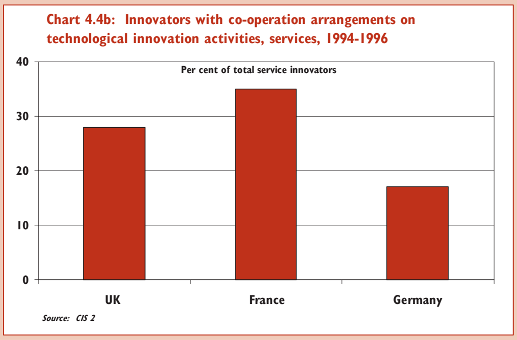
[17] Further information about the CIS can be found at www.dti.gov.uk/iese/science.htm. Analyses of CIS data can be found at www.dti.gov.uk/iese/ecslist.htm.

Co-operation agreements on innovation activities

4.25 The CIS asks enterprises to report if they have co-operation agreements on innovation activities with other enterprises or institutions. Innovation co-operation is defined widely, capturing a wide range of interactions.

4.26 Internationally comparable CIS data only becomes available with a significant time delay. The latest survey for which international comparisons are available, CIS2, relates to the period 1994-1996, although the results of CIS3 are expected very soon. Further, the CIS covers only European Community countries and so does not permit comparison with the US.





Definition and methodology

Businesses in each country surveyed were asked to respond to the following question:

Did your enterprise have any co-operation arrangements on technological innovation activities with other enterprises or institutions in the specified time period?

For the purposes of the survey, innovation co-operation is defined as, "active participation in joint R&D and other technological innovation projects with other organisations. It does not necessarily imply that both partners derive immediate commercial benefit from the venture. Pure contracting out work, where there is no active participation, is not regarded as co-operation."

UK performance

4.27 UK firms appear to have strong network relationships although there is variation between sectors. Innovative UK firms collaborate on innovation projects to a similar extent to firms in other large EU countries.[18]

Alternative indicators

4.28 Data relating to joint authorship of scientific and technical articles by universities and businesses is also potentially useful as an indicator of collaboration. It reflects one of the channels through which knowledge is passed between the science base and industry. However, the scope of collaboration captured is not as wide as that covered by the CIS, and at present the data is not constructed for any country besides the UK.

Question 4.6: What other sources of information besides the Community Innovation Survey and data relating to joint authorship of articles by universities and businesses could be used to develop indicators of the strength of network relationships?

[18] DTI (2003), 'Competing in the Global Economy – the Innovation Challenge', *DTI Economics Paper No. 7*, www.dti.gov.uk/

INNOVATION OUTCOMES

4.29 To innovate and enhance productivity, firms need to translate new ideas into new products, processes or services. A new process – including an improvement in business organisations – can enhance productivity by increasing the efficiency by which inputs are turned into outputs. And productivity can be increased through the development of new, more valuable products or services.

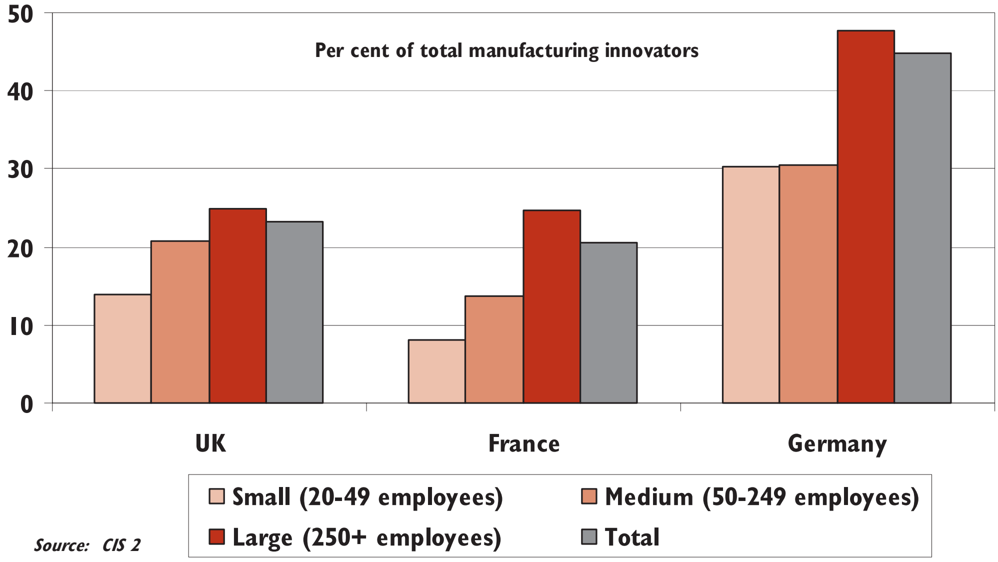
4.30 An indicator that captures the productive value of the range of innovation outcomes would ideally be included in this set. As with networks and collaboration, such internationally comparable data is not particularly well established, but the CIS is potentially valuable.

Proportion of sales from new or improved products

4.31 For example, the CIS asks firms to report the proportion of sales from new or improved products (goods and services). This permits analysis of the value of innovation to the firm. Results are available across countries, although they must be seen in the context of a country's industrial structure.

4.32 As already noted, the CIS does not cover the US and is not timely. The latest survey for which international comparisons are available (CIS2) relates to the period 1994-1996.

Chart 4.5: Sales from new or improved products, 1994-1996



Source: CIS 2

Definition and methodology

Businesses in each country surveyed are asked to respond to the following question:

Please estimate how your turnover was distributed between products (goods or services) introduced during the specified time period which were:

- New to your firm
- Significantly improved
- Unchanged or only marginally modified

UK Performance

4.33 Chart 4.5 shows that the share of turnover in UK businesses accounted for by new or significantly improved products was slightly higher than that in France, but lower than that in Germany

Alternative indicators

4.34 Alternatively, the CIS asks enterprises to report if they have brought new products or services to market, or have developed new process technologies. An indicator of innovation outcomes based on responses to this question would have the advantage of including process innovation, but would fail to capture the productive value of the innovation.

Question 4.7: In your view, which of the following serves as a better indicator of the extent to which firms are developing new commercially successful products, processes or services:

- The proportion of sales in businesses accounted for by new or improved products (goods and services); or
- The proportion of enterprises that have brought new products or services to market, or have developed new process technologies?

Question 4.8: What other sources of information besides the Community Innovation Survey could be used to develop indicators of innovation outcomes?

The Government is also interested in your views more generally on the suitability of the Community Innovation Survey as a data source for constructing indicators of innovation for the purposes of this exercise.

Question 4.9: Is the Community Innovation Survey sufficiently timely to be exploited as a data source for constructing indicators of innovation for the purposes of this exercise?

Question 4.10: To what extent does the fact that the Community Innovation Survey does not cover the US undermine its usefulness as a data source for constructing indicators of innovation for the purposes of this exercise?

Question 4.11: Should the Community Innovation Survey or other surveys be adapted, or made more regular, to provide information for the purposes of this exercise?

5 SKILLS

Overview

Skills play a vital part in supporting productivity growth. Higher skill levels allow workers to generate new ideas, adapt to the changing economic environment and facilitate the implementation of new technology. The Government proposes the following indicators to monitor the skills driver:

- International comparisons of the overall level of qualifications
- Highest qualification of economically active adults in the UK
- Business executive perceptions of management quality

Although the UK generally has lower levels of human capital than our main competitors, there has been progress in recent years, with a reduction in the proportion of unskilled workers, and an increase in the proportion of graduates. This story also seems to be true in the special case of management skills, where despite improvements since the mid 1990s, international business executives currently rank the quality of UK managers behind those in Germany, France and the US.

INTRODUCTION

5.1 Higher skill levels allow workers to generate new ideas and adapt to the changing economic environment. Without access to a skilled workforce, firms are unable to implement new technology or affect organisational change. As a result, low levels of human capital act as a brake on economic performance:

> *"Over the past two decades there has been a consistent recognition of the importance of skills for productivity, growth and sustainable employment. But we have still not cracked the problem of providing effective action to tackle skills needs…there is a legacy of adults in the workforce with low skills which we must address if we are to remain competitive."*
>
> Rt. Hon Charles Clarke (Secretary of State for Education and Skills), March 2003[1]

SKILLS AND PRODUCTIVITY

5.2 The link between higher skill levels and higher productivity is firmly established. A wide range of studies has considered the returns to education across many countries. These clearly demonstrate that higher levels of education are associated with higher productivity.[2]

[1] Charles Clarke was speaking at the Learning and Skills: Delivering Results conference at the Hilton London Metropole

[2] Using higher earnings as a proxy for higher productivity. A useful review of the literature is contained in Walker & Zhu (2001)

5.3 This is supported by research into individual firms, which finds that firms employing higher skilled workers tend to be more productive than firms with lower skilled employees.[3] New developments in economic growth theory also point to the important role human capital can have on the sustainable long-term growth rate of the economy.[4]

5.4 When seeking to benchmark the UK's progress in improving the contribution of skills to productivity, an appropriate starting point is an indicator of the **stock of skills** in an economy. But this picture can change as firms and workers respond to technological change and the demands of the knowledge economy, and invest in continuing education and training. A measure that captures this **flow of skills**, either directly or indirectly through training investments is also desired. Finally the productivity of a company – and ultimately the economy – is intertwined with the quality of **management**.

5.5 A focussed set of skills indicators should therefore ideally cover:

- the stock of skills;
- the flow of skills; and
- management skills.

> Question 5.1: Do you agree that a focussed set of skills indicators should cover the following areas: the stock of skills, the flow of skills, and management skills? Are there any other areas that should be covered?

STOCK OF SKILLS

5.6 A recent report found that up to a fifth of the UK's productivity gap with France and Germany is a direct consequence of lower skill levels in the UK.[5] Lower skill levels also play an indirect part in much of the remaining gap. For example, capital investment relies on workforce skills for its effective use, and innovation is an expression of workforce skills. Given the importance of skills in explaining the UK productivity gap, it is important to monitor how the overall level of skills in the UK compares with that of our competitors, and how this stock of skills changes over time.

5.7 Benchmarking the stock of skills in the UK requires an internationally comparable time series. International comparisons of skills are available – for example, the OECD publishes measures of skills using qualifications as a proxy – but such approaches tend to be fraught with cross-country classification problems (see Box 5.1). More accurate measures are available for the UK, but these measures are not internationally comparable. The Government is therefore considering using an OECD based measure to indicate the UK's relative position with its main competitors, and supplementing this with UK Labour Force Survey (LFS) data to gain a richer picture of UK trends.

[3] For example, Haskel & Hawkes (2003)

[4] A good review of this literature is provided by Sianesi & Van Reenen (2002)

[5] O'Mahony & De Boer (2002)

Box 5.1: International comparisons of qualifications

It is difficult to make direct comparisons of qualifications and skills levels between countries. National education systems vary considerably and so applying an international standard inevitably results in a certain loss of national specificity. Nevertheless the OECD, UNESCO and Eurostat classify national qualifications using an internationally agreed framework: the International Standard Classification of Education (ISCED).[6] There are six broad ISCED categories ranging from pre-primary education (ISCED 0) to advanced tertiary education (ISCED 6).

The UK qualification system is based around the National Vocational Qualifications (NVQs).[7] Two important stages in the UK education system, NVQ level 2 (equivalent to 5 or more GCSEs at A*-C) and NVQ level 3 (2 or more A-levels), are together classified as intermediate qualifications. Using the broad ISCED classification this distinction is obscured. Hence the Government maps the ISCED categories across to a high, medium and low framework, this is detailed in the table below.

Low/medium/high	ISCED framework	NVQ framework
Low	ISCED 0 – 3c short	NVQ 1 (GCSE – below grade C)
Medium	ISCED 3c long/3b/3a	NVQ 2 (GCSE – 5 or more A*-C) NVQ 3 (A-level – 2 or more)
High	ISCED 4 and above	NVQ 4 (First degree or equivalent) NVQ 5 (higher degree)

The high/medium/low framework based on the ISCED is not perfect. For example, there remains a problem with comparable data for France (the nature of the classification ascribes France with a large proportion of low qualified workers). In addition since OECD numbers are based on the labour force/population aged between 25-64 then there is a considerable time lag before policy changes show up in the data (UK data is based on 16-59/64). However, the main advantages of using this framework are that it allows a meaningful comparison of international education levels from the UK's perspective, it is based on an internationally agreed framework, and it is updated annually.

Overall level of qualification

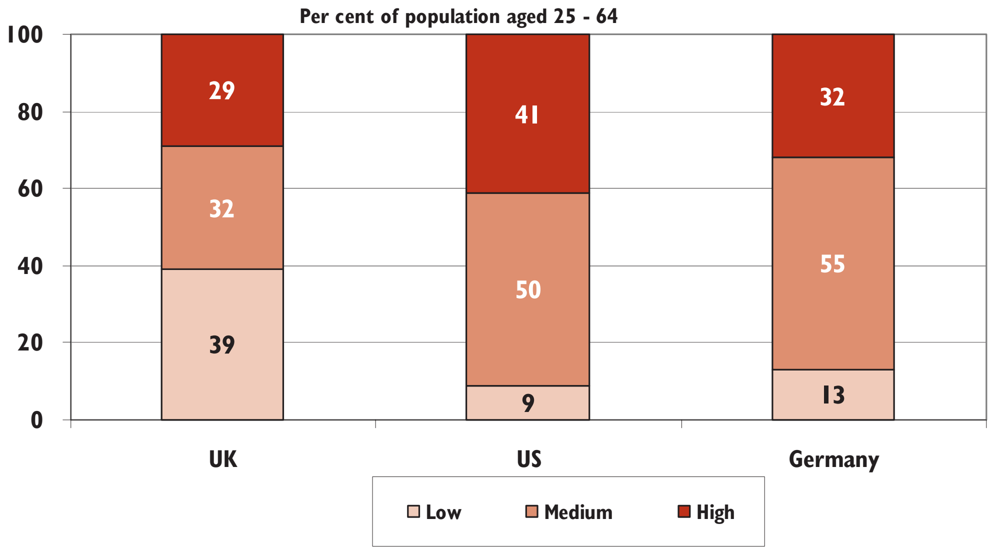
5.8 The OECD publication *Education at a Glance* is updated annually and provides data on educational attainment across seventeen countries in the OECD. While there are some difficulties in accurately comparing education attainment across countries due to differences in education systems and the way countries collect and record data, this publication generally provides a good comparison of education and training across countries.

5.9 OECD data is based on the ISCED classification system, and has been mapped to a high/medium/low framework, as outlined in Box 5.1.

[6] http://www.unesco.org/education/information/nfsunesco/doc/isced_1997.htm

[7] http://www.dfes.gov.uk/nvq/

Chart 5.1: Distribution of highest level of education, 2001



Source: OECD (Education at a glance)

Definition and methodology

Education at a glance is an annual publication, which compares education and training statistics in both OECD and non-OECD countries. The OECD education indicators provide comparable and up-to-date measures on the functioning, development and impact of education – from early childhood through formal education to learning and training throughout life. It does not cover France.

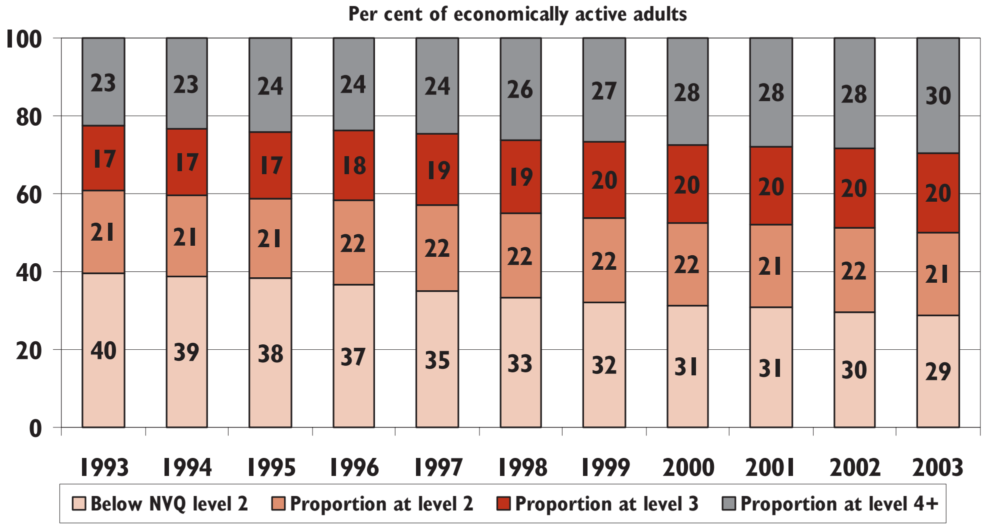
UK performance

5.10 The UK generally has a lower level of human capital than the US or Germany, with a higher proportion of low skilled workers. The performance at higher levels is stronger, but the UK has a particular gap at intermediate level. Although annually updated, the effects of skills and education policy directed towards young people will only be observed with a lag because the data measures the 25-64 age group, so recent improvements in UK school attainment and higher education participation will not yet be recorded.

Highest qualification of economically active adults

5.11 The Labour Force Survey (LFS) data shows the proportion of economically active adults qualified to each NVQ equivalent level. The data is published annually and provides a useful way of monitoring changes in the overall level of skills in the UK over time.

Chart 5.2: Highest qualification, UK



Source: Labour Force Survey

Definition and methodology

The LFS is a quarterly sample survey of 60,000 households living at private addresses in Great Britain. The survey seeks information on respondents' personal circumstances and their labour market status during a specific reference period, normally a period of one week or four weeks (depending on the topic) immediately prior to the interview. Figures are provisional pending re-weighting as a result of the 2001 Census.

The discrepancy between Charts 5.1 and 5.2 in 2001 reflects the different age groups that are used in each measure, specifically Chart 5.1 = 25-64 year olds; Chart 5.2 = 16-59/64 year olds.

UK performance

5.12 The time series data shows encouraging progress from the late 1990s, with a gradually rising proportion of workers possessing higher qualifications. There has been a falling proportion of low skilled workers (below level 2), and a rising proportion of graduates (level 4 and above). This suggests that the UK's absolute position on Chart 5.2 should improve over the next few years.

FLOW OF SKILLS

5.13 Technological change means that firms and workers wishing to retain their human capital need to invest in training throughout their working lives. Increasing demand in the workplace for individuals who are good at using and interpreting knowledge flexibly can only partially be addressed through curriculum changes in schools and universities, at least in the short term. Continuing education and training, outside compulsory formal education, also allows individuals to refresh or complement previous education and training. Research suggests that job-related training can have a significant impact on productivity.[8]

[8] Dearden, Reed & Van Reenen (2000)

Indicators of life-long learning

5.14 There are three potential sources from which to obtain an indicator relating to life-long learning or training: The European Labour Force Survey; OECD's International Adult Literacy Survey; and Continuing Vocational Training Survey. But each has significant drawbacks that limit their usefulness in regular productivity benchmarking.

5.15 The **European Labour Force Survey** (ELFS) captures adult participation in education and training. The ELFS is updated annually and provides data across EU countries. Unfortunately, the ELFS does not permit comparison with the US. In addition, it is likely to be influenced by how respondents define 'training'. If workers in the UK regard basic induction and health and safety orientation as training, while workers in other countries do not, then the UK's position may tend to be overstated. While this problem will affect relative levels, these country-specific effects may have less influence on trends over time.

5.16 The **OECD's International Adult Literacy Survey** (IALS) also provides data on the extent of adults' job-related training in OECD countries, but the IALS is not regularly updated and so is less suitable for tracking change over time. This survey is not repeated on an annual basis and at present it is unclear when the next survey will be carried out.

5.17 The **Continuing Vocational Training Survey** (CVTS) provides valuable contextual information only. For example, the CVTS shows that while the UK has a high proportion of workers in training, the average length of each training episode is comparatively low.

Question 5.2: Do you agree that the measures based on the European Labour Force Survey, the Adult Literacy Survey or the Continuing Vocational Training Survey are not currently sufficiently timely or precise to monitor lifelong learning as part of this exercise?

Question 5.3: Are there any other useful approaches or sources of information that could be used to develop a reliable, timely and internationally comparable indicator of lifelong learning?

MANAGEMENT SKILLS

5.18 Management and leadership are vital drivers of organisational performance. They are pivotal to investment, productivity and the delivery of high quality service. Improved management and leadership capability is an essential prerequisite to workforce development and the creation of organisational cultures that can grasp the opportunities to innovate, change and grow. This is especially true in the context of rapid technological change and applies equally in the private, public and voluntary sectors.

5.19 A number of recent studies confirm the link between management quality and productivity. For example, in his study of UK competitiveness, Professor Michael Porter recently identified management skills as an area for improvement, particularly at lower and middle management level.[9,10]

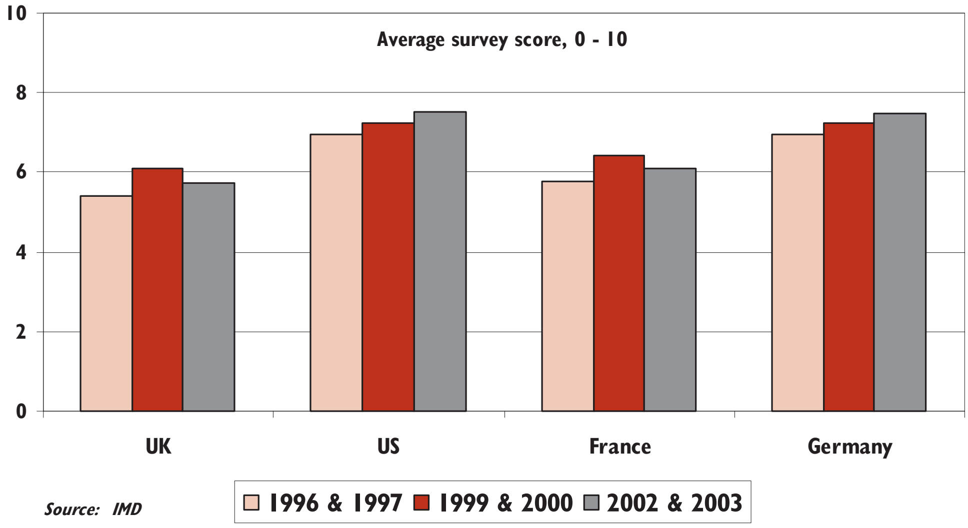
[9] Porter & Ketels (2003)

[10] Bloom et al

Business executive perceptions of the quality of management

5.20 The International Institute for Management Development (IMD) conducts an annual survey of business executives, asking for their perceptions of management quality in their country. While a more objective measure of management skills is preferable, internationally comparable data of this type is not available. This survey also has the virtue of comprising the views of senior managers themselves, especially managers with experience in more than one country.

Chart 5.3: Business executive perceptions of the quality of management



Source: IMD

Definition and methodology

This indicator is a weighted average of the following indicators in the International Institute for Management Development's World Competitiveness Yearbook:

- Availability of competent senior managers
- International experience of management
- Priority that managers give to employee training

UK performance

5.21 The IMD survey suggests that in common with the US, France and Germany, there has been progress since the mid 1990s. However, it also implies that there is scope in the UK to increase the supply of competent senior managers and improve their international experience.

Question 5.4: Do you believe that the International Institute for Management Development's survey of business executive perceptions of management quality adequately captures management performance?

Question 5.5: Are you aware of any other existing indicators of management skills?

6 Enterprise

Overview

The evidence shows that enterprise is important to productivity growth both directly through productive churn, and indirectly through competition and innovation. The Government proposes the following indicators to monitor the enterprise driver:

- Fear of failure preventing people from starting a business
- Venture capital investment as a per cent of GDP
- Cost and time to register a firm
- Total entrepreneurial activity
- Difference between the productivity growth of small and medium sized enterprises and of all firms

The indicators show that it is cheaper and quicker to start a business in the UK than it is in France and Germany, and there are relatively more opportunities for expansionary venture capital funding. Despite this entrepreneurial activity in the UK is only marginally stronger than in France and Germany and significantly behind the US. This suggests that the risk-averse, and negative, enterprise culture in the UK (and Europe) is a key obstacle inhibiting potential entrepreneurs.

INTRODUCTION

6.1 Enterprise has a critical role to play in a dynamic and flexible economy. New enterprises drive productivity growth by applying competitive pressure in the market place, bringing forward new products, and raising the incentives for established firms to invest, innovate and seek efficiency and quality improvements. Enterprise also plays an important role by generating employment and contributing to economic regeneration and social cohesion.

ENTERPRISE AND PRODUCTIVITY

6.2 Enterprise can be defined as the seizing of new business opportunities. Entrepreneurs are those individuals or groups who seek out and successfully exploit those opportunities.

6.3 International studies confirm the link between high levels of entrepreneurship and more rapid economic growth.[1] Evidence also shows that new firms and plants entering the market account for a significant part of *total factor productivity* (*tfp)* growth.[2]

[1] OECD (2001), Audretsch &Thurik (2001), see Carree & Thurik (2003) for a review of the literature

[2] Griffith (2001), Bartlesmann, Scarpetta & Schivardi (2002)

6.4 *Enterprising Britain: A modern approach to meeting the enterprise challenge* illustrates the mechanisms through which enterprise drives productivity and, consequently, economic growth.[3] The key linkages are: (i) **productive churn**, the process through which more productive firms replace less productive firms in the market place; (ii) **competition** or the threat of competition from new and growing firms; and (iii) **innovative** enterprises bringing new products and process to the market.

Productive churn

6.5 Enterprise directly drives productivity growth through the process of productive churn. Through the formation of new ventures and the injection of fresh ideas into the market place, enterprise transfers market share from lower-productive plants and firms to their more productive counterparts. Empirical evidence supports this: UK studies have found that this process, together with the resulting transfer of resources between existing establishments (firm sub-units), may have accounted for approximately half of labour productivity growth, and as much as 80-90 per cent of *tfp* growth in establishments between 1980 and 1992.[4] This process raises productivity at an aggregate level.

Competition and innovation

6.6 Competition and innovation are drivers of productivity in their own right. However, the inter-linkages with enterprise are vital. Studies show that new entrants, and the threat of new entrants, are critical for effective competition in a market, and that greater product market competition creates more rapid productivity growth.[5] Small and new firms can bring new innovations, knowledge and skills into an economy and, in doing so, they provide a spur to others to improve their efficiency and become more innovative.

6.7 For an economy to fully benefit from enterprise it needs to have a strong entrepreneurial culture and a business environment that is conducive to starting and growing a firm. There are four factors that can be considered to be important in assessing the degree to which an economy is successful at developing enterprise. These are:

- the presence of a positive **entrepreneurial culture**;
- ease of starting-up and overcoming the **barriers to enterprise**;
- a sustainable stock of **enterprise activity** in an economy; and
- the ability of **firms to grow**.

> Question 6.1: Do you agree that a focussed set of enterprise indicators should cover the following areas: enterprise culture, barriers to enterprise, entrepreneurial activity and firm growth? Are there any other areas that should be covered?

[3] HMT/SBS (2002), 'Enterprising Britain: A modern approach to meeting the enterprise challenge', www.hm-treasury.gov.uk/

[4] Disney et al. (2003)

[5] Nickell et al (1992), Nickell (1996), Nickell et al (1997), Disney et al (2000, 2003)

ENTERPRISE CULTURE

6.8 If society is not supportive of entrepreneurs and their activities, fewer people will be prepared to take the risks in business that have the potential to lead to large rewards. Cultural attitudes to failure are also important as entrepreneurs sometimes need to be able to learn from their mistakes before going on to establish successful businesses. This is particularly important for 'opportunity' entrepreneurs, who tend to have a greater impact on productivity then 'necessity' entrepreneurs.[6]

6.9 Evidence suggests that the UK is relatively risk-averse. A recent report by the Small Business Service (SBS) finds that fear of failure, in particular, is a significant barrier to enterprise in the UK and Europe relative to the US.[7]

Fear of failure

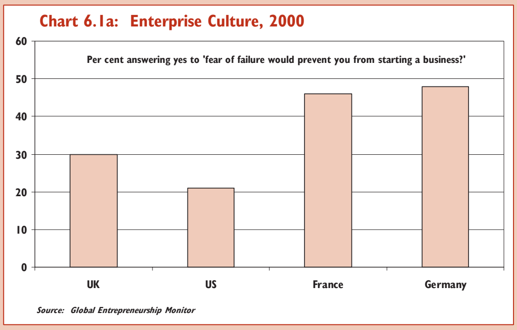
6.10 The 'fear of failure' indicator reflects personal attitudes towards taking risks. Reducing fear of failure should encourage more people to start up their own businesses, but it is not sufficient on its own. This indicator has to be interpreted alongside other indicators to give an overview of the enterprise and business environment.

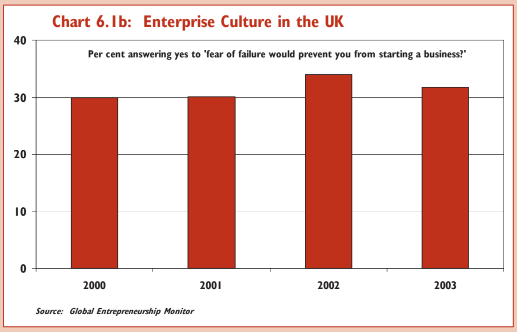
6.11 Survey data produced by Global Entrepreneurship Monitor (GEM) forms the basis of this indicator. This data is internationally comparable for 2000, but data for the UK is available up to 2003. The survey is repeated annually and does not tend to be strongly influenced by the business cycle.

6.12 GEM uses national experts in the area of enterprise to ensure that the survey is carried out in a consistent manner across countries. The 2000 GEM Adult Population Surveys – with sample sizes of just over 2000 in all countries surveyed – is considered here.

[6] An 'Opportunity entrepreneur', as defined by GEM are those who "perceive a business opportunity and take advantage of it, either independently or from paid employment". A 'Necessity entrepreneur' are those who "believe they have no better choices for work".

[7] SBS (2004), 'A government action plan for small business: The evidence base, www.sbs.gov.uk/





Definition and methodology

Survey based data. Figures represent per cent of the adult population that would answered yes to the following question:

'Fear of failure would prevent you from starting a business?'

UK performance

6.13 The indicator suggests that fear of failure acts as a greater obstacle to business start-ups in the UK than it does in the US. However, fear of failure appears to be a far greater obstacle to new business creation in France and Germany, where respondents were more likely to be prevented from setting up a business because of their fear of failure than in the UK or the US.

Alternative indicators

6.14 There are three main alternative sources from which an indicator of enterprise culture could be drawn: the Euro Barometer; the SBS Household Survey; and other indicators from GEM.

6.15 The Euro Barometer contains indicators, such as people's preferences to be self-employed rather than an employee, whether they have ever considered starting their own business, and their attitudes towards risk. The indicators in the Euro Barometer are relevant and are published annually, however the sample size of the data tends to be smaller than in GEM (approximately 500 for each country).

6.16 The SBS Household survey produces a measure of 'intention to go into business'. This may be considered a useful measure, although it could be more cyclically sensitive than fear of failure, and the data is not internationally comparable.

6.17 GEM provides alternative indicators that could be used to assess the entrepreneurial attitude of a country. These include questions such as whether people personally know an entrepreneur, and whether being self–employed is a respected career choice.

Question 6.2: Do you agree that 'fear of failure' is the best available indicator of enterprise culture? If not, which other measure(s) would you suggest?

BARRIERS TO ENTERPRISE

6.18 For an economy to exploit opportunities for growth, there needs to be a supportive environment that helps enterprises to start-up, survive and grow. Two critical barriers can impede this: **poor regulation** and poor **access to finance**.

Regulation

6.19 The OECD highlights the relatively low costs of start-up and regulation in the US, and notes that consequently entrepreneurs are more likely to test the market, and if successful, expand rapidly.[8] The OECD also recommends that, to boost productivity and medium term growth, regulation for firm entry should be eased, especially as many new firms are in high-technology industries, and these contribute substantially to productivity growth. (Chapter 7 considers indicators of the wider regulatory environment.)

Access to finance

6.20 In countries with well-developed capital markets, such as the UK, the majority of businesses have few problems in accessing finance to operate their business. Nevertheless, market imperfections mean that a minority face difficulties in raising finance they need to support the early stages of growth. Potentially high-growth small businesses seeking equity investment suffer most from these market failures, yet these firms contribute disproportionately to productivity growth.[9] Companies such as Intel, Microsoft and Cisco were all backed by venture capital and have had a phenomenal impact on the global economy.[10]

6.21 A set of indicators should ideally capture both regulation and access to finance as barriers to enterprise. The Government views the following indicators as useful:

- Cost and time to register a business
- Venture capital investment as a per cent of GDP

[8] OECD (2003)

[9] Access to finance is analysed in greater detail in HMT/SBS (2003), 'Bridging the finance gap: a consultation on improving access to growth capital for small businesses', www.hm-treasury.gov.uk/

[10] GEM (2000)

Cost and time to register a business

6.22 A reduction in the time and cost it takes to register a firm should, other things being equal, increase the number of entrepreneurs that test the market and thereby increase the productive churn in a market. Incorporation is an important transition for businesses seeking to grow, providing them with the flexibility to raise external finance and to invest, helping them to manage risk and to establish good corporate governance. To assist businesses oriented towards risk-taking, innovation and growth, the Government therefore believes that the time and cost involved in registering a business is low.

6.23 The World Bank provides an indicator of regulation based on a survey that asks companies about the time and cost involved in registering their business. The World Bank started producing this data in 2003 using established regulation methodology.[11] It will be repeated annually and is internationally comparable.

Chart 6.2a: Time to start a business, 2003

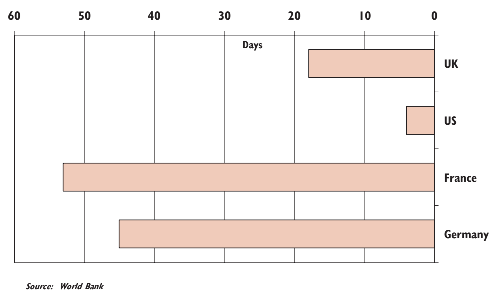
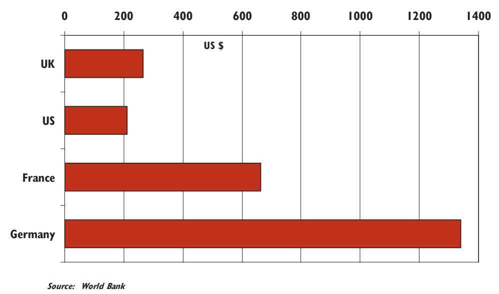


Chart 6.2b: Cost to start a business, 2003



Definition and methodology

Cost Measure – the text of the Company Law, the Commercial Code, or specific regulations are used as a source for the costs associated with starting-up a business, which are measured in US dollars.

Time Measure – time is recorded in calendar days. For the sake of uniformity, it is assumed for all countries that the minimum time required to fulfil a procedural requirement is one day. Therefore the shortest procedure lasts one calendar day. The time variable captures the average duration that incorporation lawyers estimate it necessary to complete a procedure.

UK performance

6.24 From this indicator it is clear that the UK has much more favourable conditions for starting a firm than France and Germany – particularly in terms of the time it takes to set-up a business. The US outperforms the UK on both the cost and time to set up a business.

Alternative indicators

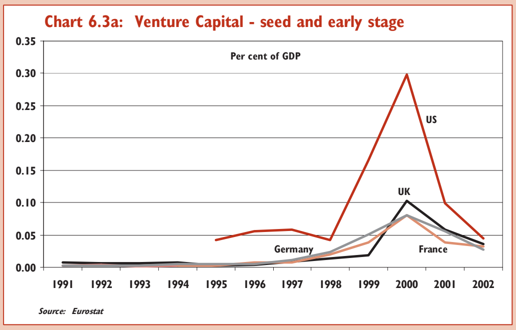
6.25 One off studies, such as the European Commission's paper '*Benchmarking the Administration of Business start-ups*', (2002) include alternative indicators, however the data is not at present reproduced over time.

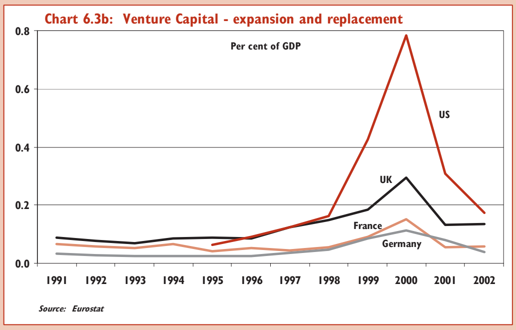
[11] Djankov, et al. (2002)

Venture capital investment as a per cent of GDP

6.26 This indicator reflects the amount of formal risk capital available.[12] Efficient risk capital markets are essential if high growth firms are to reach their potential. Recent outturns suggest that the amount of venture capital available is influenced by the business cycle, which should be borne in mind when interpreting the data.

6.27 Eurostat groups venture capital into two stages: 'seed and early stage' and 'expansion and replacement'.[13] The former considers finance available for ventures to initially start-up. The latter looks at funding for firm growth. It is proposed that both of these indicators are monitored.





Definition and methodology[14]

Venture capital investment is defined as private equity raised for investment in companies; management buyouts, management buyins and venture purchase of quoted shares are excluded.

The data is broken down into two investment stages: Early stage (seed + start-up) and expansion and replacement (expansion and replacement capital). Total venture capital investment is dominated by expansion capital.

UK performance

6.28 The spike in venture capital investment in 2000 and the subsequent decline reflects the impact of the dot-com bubble. Nonetheless, the most recent outturns indicate that European markets are stabilising, albeit at lower proportions of GDP than in the US. Interestingly the indicators show that the UK is relatively more inclined to invest in expansionary capital rather than early stage capital. This can be interpreted as another sign of the UK's aversion to risk, as early-stage investments tend to be more risky.

Question 6.3: Do you agree that the 'cost and time to register a firm' and 'venture capital' are the best available indicators of the key barriers to enterprise? If not, which measure(s) would you suggest?

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12 'Formal' finance is finance obtained through formal means, such as venture capitalists or bank finance. In contrast to this are 'informal' sources of funding, such as family and friends.

13 Full definitions are found on the Eurostat website, http://www.europa.eu.int

14 The data are provided by the European Private Equity and Venture Capital Association (EVCA). Data for the US are supplied by PricewaterhouseCoopers.

ENTREPRENEURIAL ACTIVITY

6.29 Fostering a supportive environment for new and small businesses is a precondition for greater entrepreneurial actively. Ultimately, it is through activity in the market that enterprise impacts on productivity – through the competition and new ideas it brings, and through the firms with growth potential.

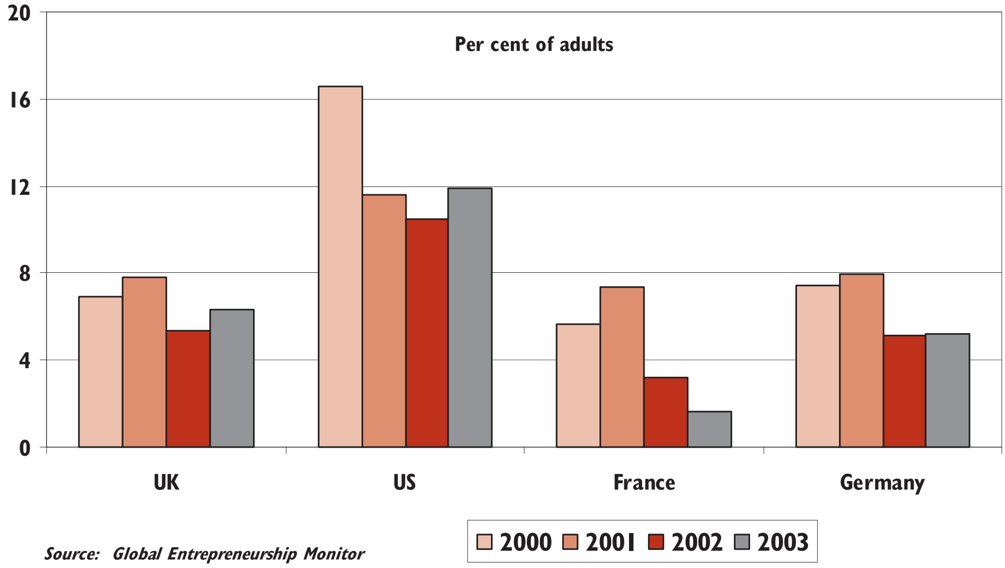
Total Entrepreneurial Activity (TEA)

6.30 The TEA Index is constructed by GEM and reflects survey based counts of those active in the start-up or gestation phase of a business or in managing a business up to 42 months old.

6.31 The TEA is an established indicator in the GEM for four years. Sample sizes have increased in most countries since it began, but they vary from country to country.[15] France, in particular, still has a limited sample, making the margins of error larger than those for the UK. The business cycle is an inevitable feature of this type of data. Opportunity entrepreneurs are particularly likely to enter the market when there is an upturn in the economy. In contrast, necessity entrepreneurs are more likely to enter the market when there is a downturn in the economy and an increase in unemployment.

[15] GEM (2002)

Chart 6.4: Entrepreneurial Activity



Source: Global Entrepreneurship Monitor

Definition and methodology

The TEA Index represents the proportion of adults that are either (i) actively involved in starting a new business (nascent entrepreneurs) or (ii) owner or manager of a business that is less than 42 months old.

For 2000, 2001 and 2002, GEM interviews identify individuals that:

- claim they are starting a new firm for themselves or their employer
- expect to own all or part of the new firm
- currently own and mange a firm
- have, in the past three years, personally provided funds for a new business.

UK performance

6.32 Despite the more favourable business environment in the UK, entrepreneurial activity in the UK is only marginally stronger than it is in France or Germany. All three European countries are some way behind the US on this measure.

Alternative indicators

6.33 An alternative to GEM's TEA Index is VAT registrations, which is often considered to be the most appropriate measure of small business activity in the UK. The data is released annually and is reliable. However, the measure excludes a large share of small and medium sized enterprises (SMEs) that are too small to pay VAT. It is also extremely difficult to make international comparisons based on this type of measure, since tax regimes differ between countries. Similarly, changes in the tax regime will lead to breaks in the data over time.

6.34 As well as firm start-ups, firm closures are also an important aspect of churning in the economy. However the data for firm's closure – VAT de-registrations – contain the same limitations as VAT registrations.

Question 6.4: Do you agree that the Total Entrepreneurial Activity Index is a better measure of entrepreneurial activity than VAT registrations?

Question 6.5: Do you agree that an indicator of firm closure would not add value to the set of enterprise indicators?

FIRM GROWTH

6.35 A rise in business activity will only lead directly to a rise in productivity if, over time, new businesses are more productive than average incumbents, and survive long enough to have an impact on the economy. To make a difference to productivity, firms therefore not only need to start-up, but also need to grow.

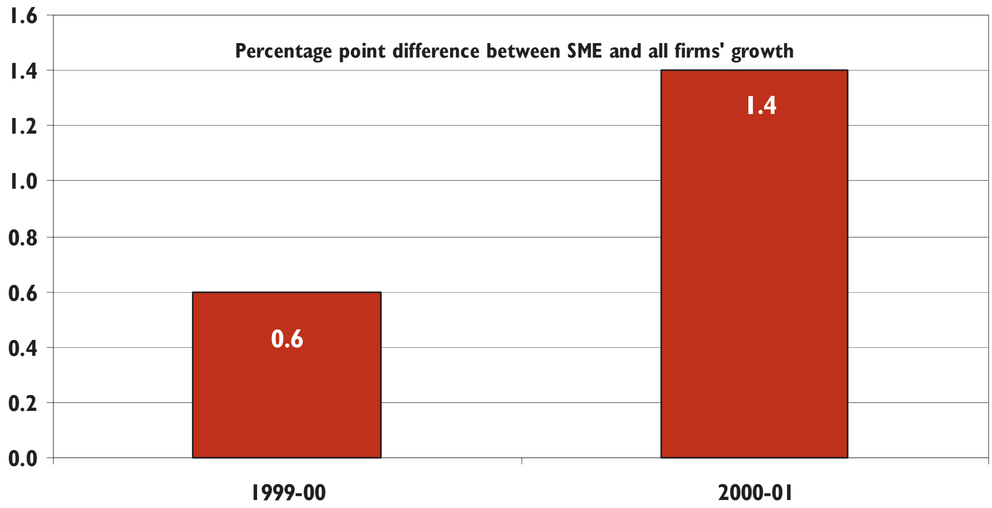
6.36 Evidence from the OECD shows that, on average, new firms starting in the US initially tend to be smaller, and in general less productive, than their European counterparts.[16] However, the firms that survive in the US tend to grow much faster to rapidly reach the minimum efficient scale. This is supported by a one-off study by Merrill Lynch that found that 7.2 per cent of US firms doubled their sales growth between 1995 and 1999, compared to 6.2 per cent of firms in the UK, 5.1 per cent in Germany and 4.5 per cent in France.

Difference between SME and all firms' growth

6.37 The indicator of firm growth presented in Chart 7.6 is a measure of the difference between SME productivity growth and the productivity growth of all firms. This data is drawn from the ONS Annual Business Inquiry, and is considered to be reliable, although it is not internationally comparable. As this indicator measures firm growth - or improvements in productivity over time - it is necessarily subject to a time lag.

[16] OECD (2003)

Chart 6.5: Firm Growth, UK



Source: ONS Annual Business Inquiry

Definition and methodology

The data is drawn from the ONS Annual Business Enquiry (ABI), a survey of around 70,000 businesses. Businesses with more than 250 employees are surveyed every year, however smaller businesses are surveyed less often to reduce the administrative burden.

This is measured as part of the DTI's PSA target 6 to improve the overall productivity of small firms. For this PSA measure, some industries are excluded where data is not comparable.[17]

UK performance

6.38 The chart shows that SMEs experienced faster productivity growth than all other firms (on average) in both time periods, and that the difference in relative growth rates has widened.[18] It can therefore be concluded that SMEs are improving their productivity at a faster rate than other firms. In 2001, SMEs were 96 per cent as productive as large firms, compared with 94 per cent in 2000 and 93 per cent in 1999.

Alternative Indicators

6.39 GEM has recently considered developing two measures to proxy firm growth: the Firm Entrepreneurial Activity index (FEA) and 'high growth potential businesses'.[19,20] At present the data has not been established in GEM. The Government will consider these measures as part of this consultation.

Question 6.6: Do you agree that a measure of firm growth is important to this set of indicators? If so, do you believe the difference between the growth of small and medium sized enterprises and the growth of all firms, provided by the ONS, is suitable? What other measure would you suggest?

[17] DTI (2003), 'Autumn Performance Report 2003', www.dti.gov.uk/

[18] SME productivity growth grew by 5.9 per cent between 2000 and 2001, in comparison to 4.5 per cent growth for all firms.

[19] GEM (2004)

[20] GEM (2003)

7 Competition

Overview

Vigorous competition enhances productivity by encouraging firms to innovate and to strive for greater efficiency. The Government proposes the following indicators to monitor the competition driver :

- Trade in goods and services as a per cent of GDP
- Product market regulation
- Competition regime peer review – *a survey of competition experts relating to the effectiveness of the competition regime in different countries*

The UK is a relatively open economy, well placed to take advantage of greater world trade and the opportunities this presents to enhance competition. Business competitiveness is supported by a light regulatory climate, and by an improved, strong competition framework. The most recent peer review of competition regimes ranks the UK joint second in the world behind the US.

INTRODUCTION

7.1 Competition lies at the heart of the Government's strategy to close the productivity gap. Intense rivalry between firms can lead to increased innovation and improvements in static and dynamic efficiency which, in turn, lead to increases in productivity.

7.2 Competitive markets encourage firms to strive for efficiency, which provides powerful incentives to reduce costs and prices, and to improve the quality and range, of their product or service. Competition delivers real benefits for consumers.

7.3 Competition also spurs firms to innovate. Firms may make incremental innovative improvements to a product or service to advance their position in an existing market. Or they may innovate more radically with the potential result of significantly changing competitive conditions in the current market, or creating entirely new economic markets in which to compete.[1]

[1] It should be noted that the relationship between competition and innovation is multi-faceted in practice. Whilst competition is a key driver of innovation, innovations can also be born out of non-profit seeking activities conducted by, for example, the public sector or charities.

COMPETITION AND PRODUCTIVITY

7.4 Through increasing firms' incentives to innovate and through encouraging firms to strive for gains in efficiency, competition enhances productivity.

7.5 Competition is a complex and multi-dimensional dynamic process. Broadly speaking, firms operating in the same economic market can compete on prices, quantities, product differentiation, innovation, or a mixture of these features.[2] There are limitations to the extent that indicators can capture these complex interactions, for reasons of both measurement and interpretation. The Government has therefore focussed on indicators of the policy environment when benchmarking the UK's performance in competition.

7.6 For example, **openness** to international trade increases competitive pressure and permits firms to specialise in line with their comparative advantage, and exploit economies of scale. Through these means, openness enhances competition, efficiency and productivity. Further, an **efficient regulatory system** that does not unnecessarily burden businesses or create unnecessary barriers to entry, enables firms to allocate resources to their most productive use, and to compete effectively. And finally, a **strong competition regime**, effectively enforced, provides the right incentives for firms to compete.

7.7 Whilst these are imperfect as direct indicators of the degree of competition between firms operating in the same economic market, they have the merit of being internationally comparable and directly under the influence of Government.

7.8 Ideally, the Government would consider an internationally comparable indicator of the intensity of competition in the UK economy vis-à-vis its major competitors. However, there are practical difficulties in achieving this; the final section of this chapter considers these.

7.9 The following sections therefore propose indicators of each of the following aspects of the competition driver:

- Openness
- Government regulation
- Competition regime

> Question 7.1: Do you agree that a focussed set of competition indicators should cover the following areas: openness, regulation and the competition regime?

[2] For example, in the Bertrand model of competition, firms set prices. In the Cournot model, firms set output levels. In Schumpeterian models, firms compete via innovation to gain transient market power.

OPENNESS

7.10 International trade and investment adds to the competitive intensity of an economy.[3] It permits specialisation in those goods and services that economies produce more efficiently, and access to larger markets permits the exploitation of economies of scale. Trade and foreign direct investment also generate wider benefits to the economy through knowledge spillovers, as domestic companies learn about new techniques and technologies from their international competitors.[4]

Trade in Goods and Services

7.11 The volume and value of trade in goods and services represents the importance of imports and exports to an economy and, therefore, serves as an indicator of openness to international trade.

7.12 Some caution should be applied when interpreting this indicator. Differences in the levels of trade experienced by different countries occur for many reasons, including differences in country size, industrial structure, consumer preferences and stage of economic development, as well as differences in trade and regulatory barriers.

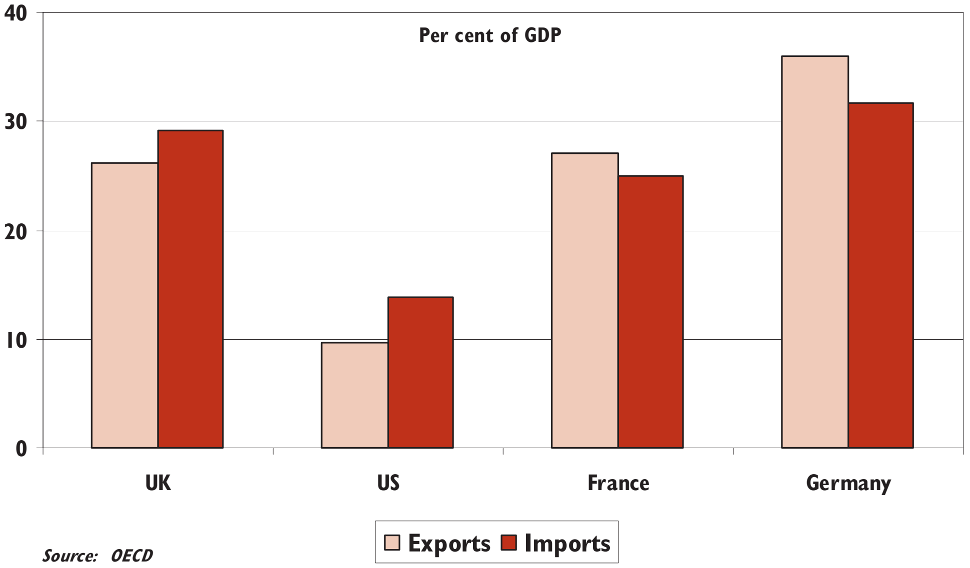
7.13 Adjusting the data for GDP partly normalises differences in country size, but it remains important to compare countries with similar characteristics.[5]

[3] Proudman & Redding (1998)

[4] Fujita, Krugman & Venables (1999)

[5] Even after controlling such characteristics, it is important to remember that differences in trade levels may well reflect differences in, for example, preferences rather than constraints on trade, and that the threat of imports can also ensure markets remain competitive.

Chart 7.1: Trade in goods and services, 2002



Source: OECD

Definition and methodology

Trade in goods is defined as covering general merchandise, goods for processing, repairs on goods, goods procured in ports by carriers, and non-monetary gold. Trade in services covers the provision of services by UK residents to non-residents and vice versa. Trade in services are disaggregated into eleven broad categories of services.[6]

UK Performance

7.14 Chart 7.1 shows that the UK is a relatively open economy. It has more exports and imports than the US, which is likely to be due in part to its smaller size. The UK experiences more imports than France, and less exports than Germany.

Alternative indicators

7.15 An alternative indicator of openness is a measure of the barriers to trade. Conceptually, this might be a superior measure to observed levels of trade, but the relevant data is more difficult to obtain. For example, tariff levels differ across products and according to the quantity transported. Moreover, tariffs within a free trade area such as the European Union are zero in principle. Non-tariff barriers – such as quotas and administrative hurdles – are typically difficult to quantify and data is not readily available. For these reasons, an indicator of barriers to trade has not been included.

7.16 The volume and value of foreign direct investment (FDI) can also be relevant when analysing openness and competition. UK competitiveness can also be reflected in decisions taken by a foreign firm to invest in the UK.

[6] The eleven broad categories of services are: transportation, travel, communications services, construction services, insurance services, financial services, computer and information services, royalties and license fees, other business services, personal, cultural and recreational services, government services.

7.17 However, models from 'new trade theory' suggest that overseas firms can undertake FDI in the UK for many different reasons, some of which only touch tangentially on the degree of competition.[7] For example, firms might favour FDI rather than exports because trade barriers are high. FDI in the form of cross-border mergers and acquisitions (M&A) activity can have ambiguous effects on competition. In addition, FDI flows are very sensitive to short-term fluctuations in interest rates and exchange rates. On balance, therefore, it is not proposed to include FDI as a leading indicator at this time.

> Questions 7.2: Do you agree that the level of trade in goods and services is the best available indicator of openness?

GOVERNMENT REGULATION

7.18 An efficient regulatory system that does not unnecessarily burden businesses frees them up to allocate resources to their most productive use and thus to compete effectively. According to the OECD's latest Economic Review of the UK, "Overly stringent product market regulations can have an impact on the strength of competition in domestic markets".[8]

7.19 There are three potential sources of indicators relating to government regulation: the World Bank's indicators of the effect of regulation on business, a survey of business executives' perceptions conducted by the International Institute of Management Development (IMD), and a composite indicator of product market regulation produced by the OECD. The Government views the OECD's composite indicator of product market regulation as likely to be the best available measure of regulatory environment.

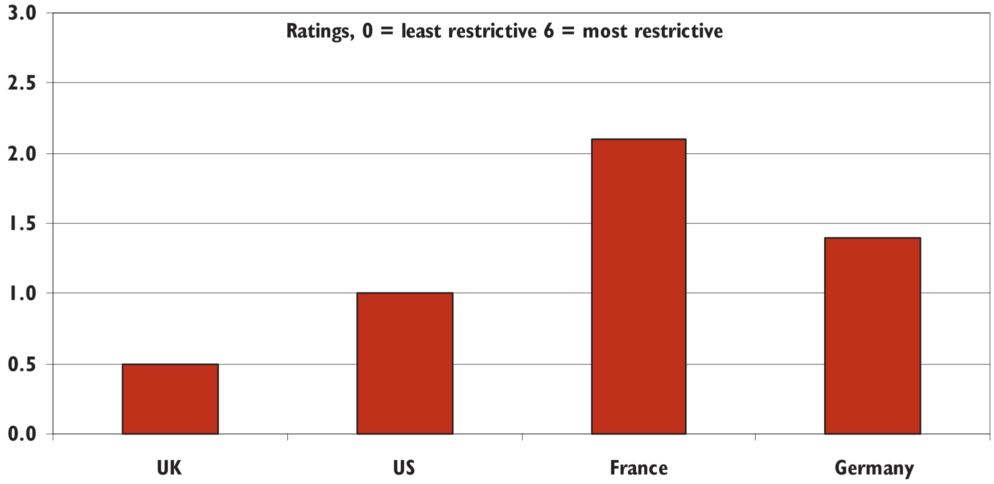
Product market regulation

7.20 The OECD has produced an economy-wide composite indicator of product market regulation, which covers economic regulation, administrative regulation and barriers to trade. A shortcoming of this data is that it is not, at present, regularly updated. The latest data available relates to 1998, but the OECD is currently updating this work. Nevertheless, it is an objective and internationally comparable measure.

[7] See, for example, Markusen, J and A. Venables (1998) and Markusen, J and A. Venables (2000)

[8] OECD (2004). Research by Nicoletti et al (2001) and Nicoletti and Scarpetta (2003) – suggests that the effect of liberalising product market regulation in economic performance is a) increasing competitive pressure among existing firms b) encouraging new entry, especially by entrepreneurs; and c) dissipating profits derived from market power, increasing efficiency. Also see these sources for details about the forms of product market regulation.

Chart 7.2: Product market regulation, 1998



Source: OECD

Definition and methodology:[9]

The regulatory stance is measured by a synthetic indicator ranging between 0 (least restrictive) and 6 (most restrictive).

The indicator is obtained by means of factor analysis in which each component of the regulatory framework is weighted according to its contribution the overall variance in the data. The principal components are:

- economic regulation;
- administrative burden; and
- barriers to trade.

UK performance

7.21 Chart 7.2 shows that the UK has a less restrictive regulatory stance than the US, France or Germany.

Alternative indicators

7.22 The World Bank produces internationally comparable indicators of the ease of compliance with certain regulations – for example, the cost and time to register a firm – but these do not tend to reflect the full range of regulatory effects. Those relating to barriers to starting up a firm are relevant to the Enterprise driver and are explored in more detail in Chapter 6.

[9] Nicoletti et al. (1999)

7.23 The IMD conducts annual surveys of business executives' perceptions of regulations. This covers views on a wide range of regulations, for example, environmental regulation, labour regulation, government price controls, competition laws and bureaucracy. However, survey data contains a large subjective element, which may be a particular problem in the area of regulation. For example it could include 'halo effects', where experience of one regulation affects perceptions of regulation in general, and lack of international comparability given that expectations vary from country to country. For these reasons, this indicator can only be considered as a partial proxy of the relative effectiveness of the institutional framework.

Question 7.3: Do you agree that the OECD's product market regulation indicator is the best available indicator of the regulatory environment, if it were updated regularly?

Question 7.4: What other sources of information or innovative approaches could be used to develop a reliable, timely and internationally comparable indicator of the regulatory environment?

COMPETITION REGIME

7.24 When firms engage in anti-competitive behaviour, they distort competition in a market, making it more difficult for new entry to occur, and for efficient, productive firms to flourish.[10] Studies suggest that the costs of anti-competitive behaviour are significant, accounting for about 1 per cent of GDP.[11]

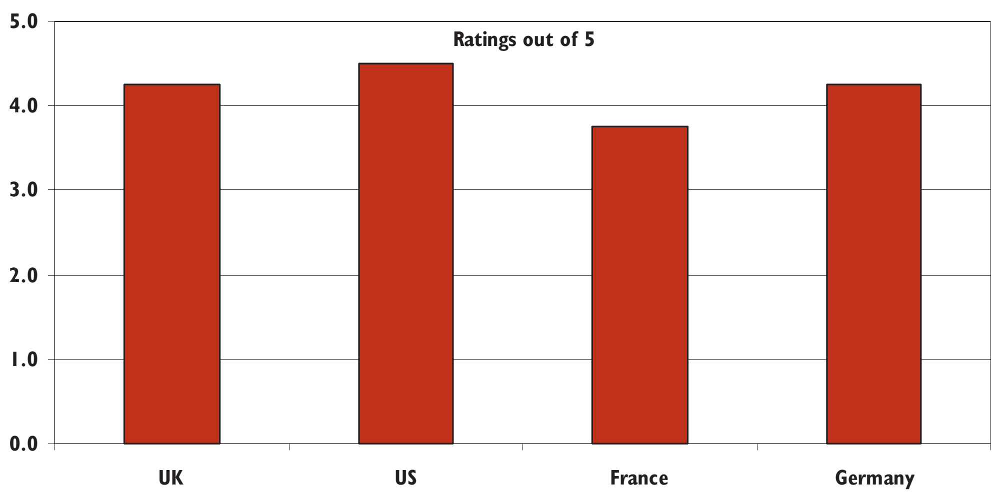
7.25 A strong and effective competition regime provides firms with the right incentives to compete, and thus a platform for increasing productivity. The Government uses 'peer reviews' to analyse the strengths and weaknesses of the UK's competition regime.

Competition Regime Peer Review

7.26 Peer reviews of competition regimes are independently commissioned surveys of competition experts, who are asked to rank the effectiveness of different competition regimes based on their experience. Each country's competition regime is assigned a score, and so the performance of different regimes can, in principle, be easily compared.

7.27 Peer reviews principally come from two main sources – the Global Competition Review (GCR) and consultancies commissioned by the DTI. Each is described briefly in the boxes below.

Chart 7.3: GCR rating of competition regimes, 2003



Source: Global Competition Review

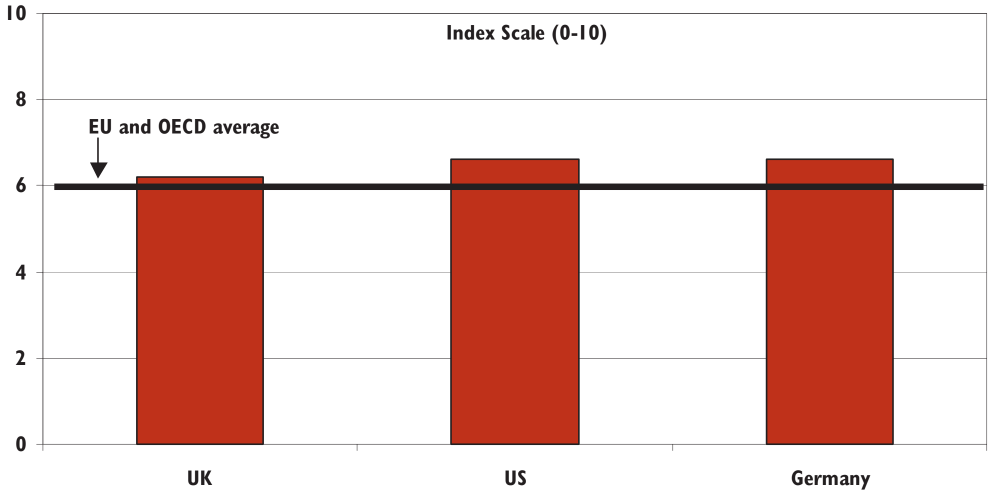
Definition and methodology

The Global Competition Review features an annual survey of competition experts – the principal aim of which is to assess the competition enforcement authority or authorities.

[10] Anti-competitive behaviour can take many forms, including collusion, predatory pricing, refusal to supply and vertical restraints.

[11] Davies & Majumdar (2002)

Chart 7.4: PwC ranking of competition regimes, 2001



Source: PricewaterhouseCoopers

Definition and methodology

DTI commissioned a comprehensive peer review of competition regimes from PricewaterhouseCoopers (PwC) in 2001. A follow-up review is currently being conducted by KPMG, the results of which will be available in Spring 2004. This latest study will cover the period when the Enterprise Act 2002 was enacted. The questions asked cover all aspects of the regime – comprising the DTI, the Competition Appeal Tribunal, the Office of Fair Trading and the Competition Commission.[12]

UK performance

7.28 The peer review conducted by PwC in 2001 placed the UK in the top half of its peers in the OECD, but behind Germany and the US. The weaknesses identified in the UK regime have since been addressed in the Enterprise Act 2002. Improvement is supported by the more recent GCR review, which ranks the UK regime joint second in the world. The results of the next DTI-commissioned study, expected in Spring 2004, will help to assess further the impact of the new legislation.

Questions 7.5: What do you believe are the relative strengths and weaknesses of the Global Competition Review and DTI-commissioned peer reviews of the competition regime?

Question 7.6: More generally, views are welcomed on how to assess the effectiveness of the UK competition framework.

[12] Strictly speaking, the competition regime also comprises sectoral regulators, but these are excluded from both PwC's and KPMG's studies.

MEASURING THE COMPETITIVE INTENSITY OF MARKETS

7.29 Ideally, a focussed set of competition indicators would include a direct measure of the extent to which firms are competing vigorously in the *markets* in which they operate. However, finding a measure of the intensity of the competitive process at the level of the national economy has always been found to be infeasible by researchers and practitioners. Nevertheless, the Government does consider it valuable to further explore ways of assessing the intensity of competition at the level of the economic market.

7.30 An initial complication when considering a national economy-level measure of the intensity of the competitive process is that competition takes place within economic markets whose geographic nature may be local, national or international. Given this, the geographic extent of these markets will often not correspond with national boundaries.[13]

7.31 Competition in these markets needs to be analysed on a case-by-case basis. Practitioners will typically use a number of different tools to help them understand the competitive intensity of a market at a given point in time. Two common ones are 'Herfindahl-Hirschmann Index' (HHI) and measures of profitability. These are explored below. Other tools that have been used include analysis of entry barriers, prices and switching costs.

Herfindahl-Hirschmann Index

7.32 HHI measures the degree of concentration within a market.[14] A higher HHI means that the supply in a market is more concentrated, that is, there are fewer and/or larger firms (in terms of market share) in that market. Indeed, once the HHI of a given market reaches 1000, the Office of Fair Trading (OFT) is likely to define it as being 'concentrated'. Once the HHI reaches 1800, this definition changes to 'highly concentrated'.

Advantages **7.33** HHIs provide a static view of the relative size of firms operating in a market. Competition authorities typically use an HHI as a preliminary screening device to help identify markets or cases that may require further detailed investigation.

Disadvantages **7.34** The relationship between market concentration and competition is not straightforward, as concentration is not a measure of the intensity of rivalry between firms. For example an HHI might fall in response to increased competition – either via the growth of existing smaller firms or via new entrants winning market share. But it might equally rise – since competition may force inefficient firms out of the market and/or grow the market shares of the existing larger firms.

[13] For information on market definition, see OFT Guideline 403 available from http://www.oft.gov.uk/News/Publications/Leaflet+Ordering.htm and/or the Competition Commission Guideline on Market Investigation References available from http://www.competition-commission.org.uk/rep_pub/rules_and_guide/index.htm.

[14] The HHI index is calculated by summing the squared market shares (expressed as percentages) of each firm in the market.

Measures of firm profitability

Advantages

7.35 In economic models of 'perfect competition', firms charge a price equal to the marginal cost of production and so, in theory, the extent to which firms can raise prices above marginal costs gives an indication of the extent of market power. In the first instance, profits can therefore be useful in gauging the degree of competition between firms.

Disadvantages

7.36 Measuring profits is not trivial – for example, it is often not possible to extract the relevant profit level, pertaining to the correct market, from company accounts.[15] Measures of profits can also rise or fall in response to greater competitive pressure. For example, in the static world, increased competition can drive high-cost firms out of the market – which would make average price-cost margins increase – or it can lead to lower prices – making average price-cost margins decrease.[16]

7.37 Hence there are limitations in terms of both measurement and interpretation associated with using measures of concentration and profitability as indicators of differences in the level and intensity of the competitive process across countries.[17]

Question 7.7: In light of these limitations, the Government believes that measures of structure and performance do not provide suitable indicators of the competitive intensity of national economies. Do you agree?

Question 7.8: What other evidence, or innovative approaches, can be used to help us assess the relative strength of UK competition for the purposes of this exercise?

7.38 The Government appreciates the importance of directing competition authority resources towards economic markets where competition may be restricted. It thus believes that there is value in exploring more innovative methods of assessing the degree of competition in economic markets. It is also committed to assessing the effectiveness of policy changes in this area.

7.39 The OFT is currently conducting research which aims to inform development of an empirically based method of identifying markets which may not be working well for consumers and/or businesses, such that a fuller investigation into these markets can then take place. The Government will take a close interest in this work.

Question 7.9: What other evidence, or innovative approaches, could be used to assess the relative strength of competition at the level of the economic market?

If the responses to this question and the OFT study provide potentially useful new approaches or sources of information, the Government proposes holding a seminar to discuss these with interested parties.

Question 7.10: How should the Government best assess the impact of the recent introduction of the Competition Act 1998 and the Enterprise Act 2002?

[15] See OXERA (2003)

[16] In a dynamic model of competition characterised by innovation, large increases in measured profitability are found as a direct result of the process of intense competition, as substantive innovation reshapes a market and allows the competitive innovator to recoup its investments in the form of short/medium term profits.

[17] Recent research notes, "direct measures of competition, such as indices of concentration or mark-ups, are plagued with problems of interpretation and accuracy". Nicoletti & Scarpetta (2003)

8 REGIONAL LEVEL PRODUCTIVITY INDICATORS

Overview

The increasing importance of the regional and devolution agenda means that the demand for regional data is ever increasing. That is why the Allsopp review recommended that this consultation would be good opportunity to consider indicators at a regional level. This chapter suggests a set of indicators, selected on a similar basis to the national indicators, which could be used to measure regional productivity performance.

THE REGIONAL AGENDA

8.1 The Government cannot meet its central long-term economic objective to raise the rate of sustainable growth unless every nation and region of the UK performs to its potential. That is why a strong regional policy is at the heart of the productivity and growth agenda, with the Government's analysis and approach first set out in *Productivity in the UK 3: the regional dimension*, published alongside Pre-Budget Report 2001.[1]

8.2 The Government's regional policy framework is based on strong local, regional and devolved institutions; policy design and implementation that is sensitive to the diverse needs of diverse regions; and a robust evidence base supported by relevant, timely and reliable data.

8.3 In Scotland, Wales and Northern Ireland, the Scottish Executive, Welsh Assembly Government and Northern Ireland Executive have extensive economic development powers. The Government works closely with the devolved administrations to promote improved growth and productivity, and during the period of suspension of devolution is promoting a strong Northern Ireland economy.

8.4 In England, Regional Development Agencies (RDAs) have been created as strategic drivers of growth in each region, with increasing flexibilities, responsibilities and funding. The 2002 Spending Review committed the Government to a new, ambitious Public Service Agreement (PSA) target to:

> *"Make sustainable improvements in the economic performance of all English regions and, over the long term, reduce the persistent gap in growth rates between the regions, defining measures to improve performance and reporting progress against these measures by 2006"*

assessed in terms of raising regional Gross Value Added (GVA) per head. HM Treasury and the Department of Trade and Industry (DTI), with the Office of the Deputy Prime Minister (ODPM), are jointly responsible for delivery.

[1] HMT (2001) Productivity in the UK 3: the regional dimension, www.hm-treasury.gov.uk/

REGIONAL STATISTICS AND ECONOMIC DATA

8.5 A substantial amount of regional and sub-regional data is already collected, by national organisations such as the Office for National Statistics (ONS) and the Regional Observatories (see Box 8.1).

Box 8.1: Sources of regional data

The ONS produces Regional Accounts, which are based on an ex-post allocation of national totals to the regions and sub-regions. The Regional Accounts consist of sub-national breakdowns of some of the key national accounts aggregates such as gross domestic product, household expenditure and individual consumption expenditure.

The ONS Regional Trends is a comprehensive annual source of official statistics for the Statistical Regions of the United Kingdom (Scotland, Wales, Northern Ireland and the Government Office Regions within England). It includes a wide range of demographic, social, industrial and economic statistics, covering aspects of life in the regions.

In addition, the ONS website contains Neighbourhood Statistics at a very small geographical level, including economic and social statistics from the 2001 Census.[2]

The DTI publishes a twice yearly Regional Competitiveness and State of the Regions report.[3] This publication covers statistical information on the factors that contribute to regional competitiveness to assist those responsible for developing regional and devolved economic strategies.

Regional Observatories have been established in the English regions by partnerships involving various regional bodies. Their main role is to provide intelligence to the RDAs and others by co-ordinating data and information and providing data analysis, including forecasting and research related to regional policy, as well as working to widen access to information.

The Allsopp Review

8.6 Nonetheless the increasing importance of the regional and devolution agenda means that demand for regional data is ever increasing. That is why, in 2003, the Chancellor of the Exchequer, the National Statistician, and the Governor of the Bank of England asked Christopher Allsopp to undertake a wide-ranging review of the information and statistics needed for economic policymaking.

8.7 The first report was published on 10th December 2003 and looks in particular at the statistics needed for regional policy.[4] The report made a number of recommendations to increase provision of regional data and to improve the provision of existing regional data, including closer integration of Regional and UK National Accounts. The report also recommended that this consultation would be a good opportunity to look at productivity indicators at the regional level.

[2] http://neighbourhood.statistics.gov.uk

[3] Latest report available at http://www.dti.gov.uk/sd/rci

[4] Allsopp (2003)

DEVELOPING REGIONAL PRODUCTIVITY INDICATORS

8.8 This consultation document has described why, at the national level, indicators of the underlying drivers of productivity growth are required to complement analysis of the headline national productivity figure, and has invited views on which such indicators to use to monitor progress towards the national productivity target. A similar argument applies at the regional level. That is, headline productivity figures for each region could usefully be complemented by indicators of the drivers of productivity.

8.9 The national productivity indicators, and the aspects of each driver on which they are based, provide a starting point for a set of regional indicators. However, some of the national indicators may be less relevant, less reliable or not available at the regional level. The principle of trading off the various selection criteria – relevance, timeliness, comparability, reliability and completeness – has to be re-applied.

8.10 For example, it is not presently possible to obtain a regional equivalent of the proposed hurdle rates indicator for investment, or for the measure of management skills. Patents data at the regional level will be influenced by 'head office effects', making it a less reliable basis for an indicator of innovation than national level patents data. There will also be spillover effects from input indicators (for example, R&D or training), which affect the strength of their relationship to productivity outcomes at a regional level.

8.11 At the same time, the ability to benchmark internationally is less important at a regional level than at a national level, as benchmarking can be done between regions. Therefore it is proposed to use the Labour Force Survey as the primary source for monitoring the stock of skills.

8.12 As explained in Chapter 7 of this consultation document, competition between firms needs to be assessed at the level of the market. Just as these markets do not necessarily concur with national boundaries, they are also unlikely to correspond with regional boundaries. Furthermore, the indicators of aspects of the competitive environment – trade, regulation and the competition regime – proposed at the national level, are either unavailable, or not applicable, at the regional level.

8.13 In light of these considerations, the Government is considering adopting a set of regional indicators that is largely, but not entirely, based on the proposed national set. A set is proposed in Box 8.2.

Box 8.2: Possible indicators of productivity in the regions

Investment

- Business investment (DTI Regional Competitiveness & State of the Regions)
- Government investment (ONS Regional Accounts)
- Overall infrastructure quality (ONS Regional Accounts)

Innovation

- Business Enterprise Research and Development (ONS Regional Trends)
- Networks and collaboration indicator (Community Innovation Survey)[5]
- Innovation outcomes indicator (Community Innovation Survey)

Skills

- Overall level of qualifications (Labour Force Survey)
- 16/21 and 19/21 yr olds educated to NVQ level 2/3 (DTI Regional Competitiveness & State of the Regions)
- Employees receiving training in last 3 weeks (Labour Force Survey)

Enterprise

- Business angels (Global Entrepreneurship Monitor)
- Total Entrepreneurship Activity (Global Entrepreneurship Monitor)
- Start-ups per 10,000 population (DTI Regional Competitiveness & State of the Regions)
- Business survival rates (DTI Regional Competitiveness & State of the Regions)

8.14 Indicators at the regional level would be used alongside other data, such as employment rates and GVA per capita itself, to monitor progress towards the regional growth PSA target. They should signal changes in performance and provide an early warning of where policy action is needed.

8.15 The UK's long-term growth depends on every region realising its economic potential. A strong regional policy requires analytical support at a regional level as at national level. Therefore, as part of this consultation, views are invited on the following questions.

[5] See DTI (2002), 'Regional Innovation Performance in the UK', www.dti.gov.uk/

Question 8.1: Do you believe that the concept of developing productivity indicators based around the 'five drivers' framework, in order to complement analysis of the headline productivity figure, is also relevant at a regional level?

Question 8.2: Do you believe that the list of regional indicators proposed in Box 8.2 provides a useful framework for measuring the drivers of growth at a regional level?

Question 8.3: Are there any additional indicators that may be relevant at a regional level, even if not at a national level?

Question 8.4:

1. Should Scotland, Wales and Northern Ireland be included in this exercise?
2. Are there additional indicators that should be considered for Scotland, Wales and Northern Ireland?