Office for National Statistics

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## About us

### The Office for National Statistics

The Office for National Statistics (ONS) is the executive office of the UK Statistics Authority, a non-ministerial department which reports directly to Parliament. ONS is the UK government's single largest statistical producer. It compiles information about the UK's society and economy, and provides the evidence-base for policy and decision-making, the allocation of resources, and public accountability. The Director-General of ONS reports directly to the National Statistician who is the Authority's Chief Executive and the Head of the Government Statistical Service.

### The Government Statistical Service

The Government Statistical Service (GSS) is a network of professional statisticians and their staff operating both within the Office for National Statistics and across more than 30 other government departments and agencies.

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# Economic & Labour Market Review

**Volume 5, Number 2**
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# In brief

## Profiles of foreign–born population in UK regions and countries

A new study shows that in most regions and countries in the UK a smaller percentage of foreign–born adults claim state benefits compared with their UK–born counterparts. Also, the largest employment group for the foreign–born population in most regions and countries is either elementary or professional occupations.

These figures are set out in a study released on 20 January 2011 by the Office for National Statistics, *Regional characteristics of foreign–born people living in the United Kingdom*. The study covers all nine English regions as well as Wales, Scotland and Northern Ireland in 2009. The key findings are:

- the proportion of married/civil partnered people is greater in the foreign–born population than the UK–born population for the majority of regions and countries
- the largest ethnic group for the foreign–born population is White in all regions and countries except the West Midlands, where the largest ethnic group is Asian

The London region has the largest percentage of foreign–born population comprising 34 per cent of its population, with the West Midlands and South East second at 11 per cent. The smallest are the North East and Wales with 5 per cent of their populations defined as foreign–born; whilst the South–East, Scotland and Northern Ireland have foreign born populations of 6 per cent.

In most regions there are a larger percentage of married/civil partnered persons in the foreign–born population than for the UK population. The difference is greatest in the West Midlands and London where the percentage of the foreign–born population who are married/civil partnered is at least 17 per cent higher than for the UK–born population.

The ethnic breakdown of the foreign–born population differs in regions and countries. For the majority of regions and countries White is the largest ethnic group, the exception to this is the West Midlands where 32 per cent are White, while 40 per cent are Asian. The report also covers the religious breakdown of the English regions and UK countries with the categories Christian, Buddhist, Hindu, Jewish, Muslim, Sikh, other religion and no religion. The South West has the highest percentage of the foreign–born population designating themselves as Christian (72 per cent), the highest percentage of Hindu followers is in the East (13 per cent), and the West Midlands has the highest percentage of foreign–born Muslims and Sikhs (29 per cent and 9 per cent respectively).

The largest employment group for the foreign–born population in many regions and countries is in elementary occupations (such as labourers and couriers). This is the case in the East Midlands (24 per cent of the foreign–born working population), the North West (21 per cent), Yorkshire and the Humber (21 per cent), Wales (19 per cent), West Midlands and Scotland (both 17 per cent). There

are also sizeable percentages of foreign–born workers in professional occupations (such as engineers and chemists), notably in the North East (23 per cent) and South East (19 per cent).

The percentage of foreign–born population with degrees also differs by region and country. In the North East 34 per cent of the foreign–born population hold degrees while in the East Midlands only 18 per cent had such a qualification.

A smaller percentage of the foreign–born population claimed state benefits or tax credits than the UK–born population in many of the regions and countries of the UK. The exceptions to this are in London and the West Midlands where the difference between the two populations is negligible.

**Further information**
The report *Regional Characteristics of foreign–born people living in the United Kingdom* can be found at www.statistics.gov.uk/cci/article.asp?ID=2601

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## South East population projected to grow to 10 million by 2033

The population of the South East is projected to grow to just over 10 million by 2033, an increase of 20 per cent on 2008 and 2 percentage points more than England as a whole. The article, *Portrait of the South East*, published on 20 January 2011 by the Office for National Statistics shows that in mid–2009 the population of the South–East stood at 8.4 million, more than any other UK country or region. The portrait also includes a host of key facts and figures on unitary and local authorities within the region's seven counties of Buckinghamshire, East Sussex, Hampshire, Kent, Oxfordshire, Surrey and West Sussex. Besides population, the publication also takes an in–depth statistical look at other aspects of the region for example the economy, employment, earnings and house prices.

The number of people living in the South East increased by 1.07 million (15 per cent) between 1984 and 2009. Between 2008 and 2009, the population of the region increased by 0.8 per cent (about 67,000 people). This represented a slightly higher percentage increase than nationally. Only London and the East had higher percentage increases over this period.

In 2009, the South East's population density was 440 people per square kilometre, the third highest of the nine English regions and substantially higher than the population density for the UK and England (255 and 398 people per square kilometre respectively). Within the region, the highest population densities, more than ten times the average for the region, were found in the urban authorities of Portsmouth and Southampton (5,100 and 4,800 people per square kilometre respectively). Portsmouth has the highest population density of any unitary/local authority outside London. Both Chichester and West Oxfordshire have population densities that are less than a third of the regional average (143 per square kilometre), reflecting the rural character of these areas.

Higher proportions of older people are found in the southern and coastal parts of the South East. The local authority districts of Rother (East Sussex, 33 per cent) and Arun (West Sussex, 31 per cent) had substantially higher proportions of older people than the regional average (20 per cent).

Milton Keynes had the fastest growing population in England in the 25 years to 2009, growing by 65 per cent (94,000). Bracknell Forest and Ashford (Kent) were the next fastest with increases of 33 and 29 per cent respectively.

Other key findings of the report include:

- There are nearly 3.5 million households in the South East and this is expected to increase by about 1 million over the next 25 years.
- Housing in the region is among the least affordable in England with a median price of £203,000 in 2009, 19 per cent above the England average.
- Average earnings in the South East were £514 per week in 2009, £25 (5 per cent) above the UK average.
- Nearly one in five of people in employment in the region were managers or senior officials.
- In Elmbridge (Surrey) more than half of the working–age population were qualified to NQF level 4 or above, whereas in Swale (Kent) the proportion was less than one in five (17 per cent).

**Further information**
The full ‘Portrait of the South East’ article can be downloaded at www.statistics.gov.uk/CCI/article.asp?ID=2619

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## Jobs, health and family top the list of what matters to the UK's well–being

The Office for National Statistics (ONS) is presently leading the debate on how to measure national well–being. Over 2,000 responses have been received in the first stage of the public consultation 'what matters to you?' Job security, family relationships and health topped the list, with over 88 per cent of respondents stating that these things matter the most to them in life.

The National Well–being project aims to provide a fuller picture of 'how society is doing' than given by traditional economic indicators. Some interesting themes emerging from the latest consultation are:

- people are more interested in their children having a better life and a nice place to live
- job security, not just wealth
- health
- freedom of society, and
- spiritual and religious beliefs

The debate will run until April 2011, and the findings will inform the development of the measures that will be used to track the nation's well–being. A group of 40 people from a range of backgrounds in business, universities, government and the voluntary sector have been drafted in by ONS to help. The National Well–being forum was convened by the National Statistician to discuss the main themes emerging from the national debate and provide advice on how to deliver credible measures of subjective well–being, and of wider national well–being, to meet policy and public needs.

**Further information**
Visit the ONS website to take part in the debate – www.ons.gov.uk/wellbeing or follow on www.twitter.com/statisticsONS

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## Addition of remaining public banks raises public sector net debt by £1,300 billion

The Office for National Statistics and HM Treasury jointly publish estimates of the Public Sector Finances (PSF). The release published on 25 January 2011 includes, for the first time, data for the Lloyds Banking Group (LBG) and the Royal Bank of Scotland (RBS).

In the period up to September 2007, before the classification of Northern Rock to the public sector, the level of public sector net debt (PSND) largely reflected central government's net debt. By the end of December 2008, the classification to the public sector of, first, Northern Rock and subsequently Bradford & Bingley added around £130 billion to PSND. Including Lloyds Banking Group and RBS in the public sector finances, adds around a further £1,300 billion to PSND.

The classification of RBS and LBG to the public sector has a significant impact on the public sector finance statistics. Provisional estimates show that the public sector has in December 2010:

- current budget deficit of £11.8 billion including interventions
- current budget deficit of £13.5 billion excluding interventions
- net borrowing of £15.5 billion including interventions
- net borrowing of £16.8 billion excluding interventions

And at the end of December 2010:

- net debt of £2,322.7 billion including interventions, equivalent to 154.9 per cent of gross domestic product
- net debt of £889.1 billion excluding interventions, equivalent to 59.3 per cent of gross domestic product

The estimates are published both including and excluding any temporary effects of the financial interventions. The measures excluding temporary effects of financial interventions are used by HM Treasury for the purpose of fiscal policy and are the measures that are forecast by the Office for

Budget Responsibility. These effects are considered temporary as the Government has made clear its intention to return these banks to the private sector, so in the long run the impact on PSND is unlikely to be permanent. These measures are not materially affected by the full inclusion of data for LBG and RBS.

Particular care should be taken when interpreting the revised figures for PSND. This series is calculated as financial liabilities less liquid assets and shows the extent to which the public sector's liabilities are matched by assets which can be realised quickly. It includes most liabilities but excludes considerable amounts of illiquid assets held by public sector banking groups including lending to businesses, mortgages and holdings of corporate bonds.

**Further information**
O'Donoghue J and Szary A (2011) 'Inclusion of Royal Bank of Scotland and Lloyds Banking Group in the Public Sector Finances', available at www.statistics.gov.uk/articles/nojournal/rbs-lbg-article.pdf

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## New and improved ONS website to launch 30 April 2011

The Office for National Statistics (ONS) is developing a new website, with a focus on putting users' needs first. When it goes live on 30 April 2011 the new ONS website will deliver the following improvements:

- quicker and easier to find information, including better search and navigation
- easier to use the information, by downloading data, charts and graphs
- improved accessibility to ONS content for users with sight or other impairments
- prompt release of outputs at 9.30am sharp

After the initial launch, there will be further developments to the new website. These include:

- an online data explorer tool, allowing users to customise, interact with and download datasets
- an Application Programming Interface, enabling re–use of ONS data by others

**Further information**
Details of how to be involved in user testing are available from the Web Development page on the ONS website: www.ons.gov.uk/about/what-we-do/programmes---projects/web-development/index.html

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web.development.programme@ons. gov.uk

## Pensioner job rates hold up, but 2 out of 3 work part–time

Employment rates of pensioners held up during the 2008–09 recession and have risen in 2010 according to an updated chapter of *Pension Trends* released on 2 February 2011 by the Office for National Statistics (ONS). However, two out of every three pensioners in employment work part–time.

The employment rate for men aged 65 and over was 10.7 per cent in April–June 2008. It remained above 10 per cent during the 2008–09 recession and in September–November 2010 it reached 11.7 per cent. The employment rate for women aged 60 and over reached 13.5 per cent in September–November 2010, compared with 12.3 per cent in April–June 2008.

However, part–time work is more common at older than younger ages. In April–June 2010, 59 per cent of employed men aged 65 and older and 68 per cent of employed women aged 60 and over worked part–time. By contrast, 12 per cent of employed men aged 50 to 64 and 43 per cent of employed women aged 50 to 59 were doing part–time jobs.

Men and women are also working longer before retiring. Retirement is difficult to measure using surveys because when older people become economically inactive they may give different reasons for the change, even though their situations are similar. Instead, ONS uses an indicator known as 'average age of withdrawal from the labour market.' Examining the age at which older people stop working is an alternative and arguable more useful approach than identifying when somebody 'retired'. ONS has recently made improvements to its methodology for calculating average age of withdrawal from the labour market (see Guled and Mitchell 2010). The improved indicator, which can be calculated from 2004 onwards, shows that:

- men's average age of withdrawal from the labour market increased from 63.8 years in 2004 to 64.5 in 2009; and
- women's average age of withdrawal rose from 61.2 years in 2004 to 62.0 years in 2009

**Further information**
www.statistics.gov.uk/pensiontrends
Guled G and Mitchell H (2010) 'Average age of withdrawal from the labour market', available at www.statistics.gov.uk/cci/article.asp?ID=2598

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## People moving home hit a record low during recession

In 2008/09, only 9 per cent of all households in England (2.0 million) had moved to their current homes within the previous 12 months, the lowest number since records began in 1994/95. This is according to a recent chapter of *Social Trends*, published on 10 February 2011 by the Office for National Statistics (ONS).

Between 2007 and 2008 the number of property sales over £40,000 in the UK fell by 44 per cent from 1.6 million to 900,000 due to the recession. The picture was similar across the English

regions and Wales with property transactions falling by between 42 per cent and 48 per cent. However, the number of transactions in Scotland fell by less (33 per cent), while in Northern Ireland they fell by more (61 per cent).

In 2009 the average price paid for a dwelling in the UK was £194,235, down 8.1 per cent on 2008. Changes in average price paid for a dwelling over the same period varied a little between England and Wales, at 8.4 per cent and 8.2 per cent respectively. However, Scotland saw a smaller decrease (2.6 per cent), while Northern Ireland a much larger one (15.7 per cent).

British Bankers' Association figures highlighted in the chapter show that in the last 12 years the number of loans approved for house purchase peaked in March 2002 at 92,912. The number of loans approved in July 2007, the month immediately prior to the start of the credit freeze, was 62,363. However, approvals fell rapidly to reach a new low of 17,421 in November 2008.

The average value of mortgages for house purchase peaked in June 2007 in the UK at £159,600 before decreasing to a low of £116,100 in December 2008.

The number of repossessions reached its peak in 1991 when 75,500 properties were repossessed. Repossessions then fell to reach a low in 2004 of 8,200. Since 2004 repossessions have increased nearly six–fold to 47,900 in 2009. The rise in repossessions though has been lower than in the previous recession, due in part to lower interest rates and unemployment this time round.

Despite increases in repossessions, a Flash Eurobarometer report in 2010 found that 57 per cent of UK adults felt there was no risk at all of falling behind with either rent or mortgage payments, while 37 per cent felt that there was either a low or moderate risk and just 6 per cent a high risk.

**Further information**
The latest *Social Trends* chapter on housing is available at www.statistics.gov.uk/cci/article.asp?ID=2635

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## 98 per cent of music singles tracks now bought online

Almost all single music tracks are now purchased digitally instead of in physical formats in the UK. A recent chapter of *Social Trends* on lifestyles and social participation, published by the Office for National Statistics (ONS) on 27 January 2011, reports that digital sales increased by 92 per cent between 2007 and 2009 and now stand at 98 per cent of all singles sold.

Overall, sales volume of singles has grown. In 2007 consumers purchased 87 million physical and digital singles: by 2009 this had increased 76 per cent to reach 153 million. However, there has been a decrease of 7 per cent of the number of albums sold, from 145 million in 2007 to 135 million in 2009. While there was an increase of 160 per cent in the sale of digital albums between 2007 and 2009, digital sales are still much lower than for singles. Digital accounted for just 12 per cent of

all album sales in 2009 – when 16 million were sold digitally compared to 119 million sold physically. The sale of albums in a physical format dropped 14 per cent between 2007 and 2009. These figures show that downloading is now overwhelmingly the most popular way for music fans to purchase songs, but when buying an entire album a physical product is clearly still preferred.

As well as music, the chapter also looks at book sales. Between 2007 and 2009 UK publishers' net unit sales fell by around 6 per cent from 492 million to 463 million units. However, total publisher's sales of digital products are on the rise, reaching just over £150 million in 2009. Overall, digital sales represented around 4 to 5 per cent of the combined physical and digital sales of UK publishers in 2009.

Between 2005/06 and 2009/10 there was a steady decrease in the proportion of adults aged 16 and over visiting a public library in England, from 48 per cent to 39 per cent. Overall the number of books issues by public libraries in England has fallen from 279 million in 2004/05 to 264 million in 2008/09. There were 10 million active borrowers (those who visit the library for the purpose of borrowing books) using public libraries in England in 2008/09, a decline of 10 per cent from 2004/05.

**Further information**
The latest *Social Trends* chapter on lifestyles and social participation is available at www.statistics.gov.uk/cci/article.asp?ID=2630

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## Fewer journeys made during the recession

There was a big fall in the number of journeys made by all modes of transport between 2008 and 2009 according to the transport chapter of *Social Trends*. This was published by the Office for National Statistics on 3 February 2011. A total of 58.6 million trips were made abroad by UK residents in 2009, a decrease of 15.1 per cent on 2008. The total number of trips made by air decreased by 16.6 per cent, travel through the Channel Tunnel decreased by 8.3 per cent and travel by sea decreased by 6.2 per cent. Between 2007 and 2009 in Great Britain there was a 9.6 per cent decrease in the number of business trips and a 9.1 decrease in the number of commuting trips made.

The number of international passengers at UK airports decreased from a high of 192 million in 2007 to 176 million in 2009. The largest part of this decrease, 13 million passengers or 7.1 per cent, was between 2008 and 2009. The number of domestic air passengers fell from a high of 25 million passengers in 2005 to 21 million in 2009. Again the largest fall was between 2008 and 2009.

In 2009 around 1.9 billion tonnes of freight was lifted within Great Britain, over 80 per cent of which was by road. Between 2008 and 2009 total freight decreased by 15 per cent. Road freight fell by 17 per cent, rail freight by 16 per cent and water freight by 11 per cent. In 2009 UK airports moves

a total of 2.0 million tonnes of freight, a decrease of 10 per cent from 2008. International freight handled decreased by 10.4 per cent while domestic freight handled decreased by 6.7 per cent.

The chapter also highlights recent changes in the price of petrol and diesel. On 1 January 2011 a government fuel duty change resulted in petrol and diesel prices increasing by 0.76p per litre. This, together with the increase in VAT from 17.5 per cent to 20 per cent on 4 January 2011, has meant further rises in the cost of fuel. Last month, average UK petrol price reached their all time high of 127.9 pence a litre for premium unleaded petrol and 132.3 pence a litre for diesel. These are double the prices of January 1999.

**Further information**
The latest *Social Trends* chapter on transport is available at www.statistics.gov.uk/cci/article.asp?ID=2634

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## More than half of adults regularly give to charity

More than half of adults donated to charity each month in 2009/10, according to the *Social Trends* chapter on lifestyles and social participation published on 27 January by the Office for National Statistics (ONS). The chapter reports that, in a typical month in 2009/10, 56 per cent of adults in the UK donated to charitable causes. While the proportion of adults donating had returned to pre–recession levels, the amount donated remained lower. In 2009/10 estimated donations were £10.6 billion compared to the record of £11.3 billion in 2007/08 and £10.2 billion in 2008/09, after adjusting for inflation.

During the same period, informal volunteering in England decreased, with the proportion of adults volunteering at least once a year falling from 62 per cent in 2008/09 to 54 per cent in 2009/10. There was also a fall in those who volunteered informally at least once a month from 35 per cent to 29 per cent.

The chapter also reveals that 82 per cent of adults in England and Wales in 2008/09 said they belonged to a religion. Although Christianity was by far the most followed, only 32 per cent of those who said they were Christians actively practised their religion while 80 per cent of Muslims and 70 per cent of Hindus actively practised theirs. In 2008/09, 30 per cent of those who followed a religion said that religion influenced their choice of school and 18 per cent said that it affected where they live.

**Further information**
The latest *Social Trends* chapter on transport is available at www.statistics.gov.uk/cci/article.asp?ID=2634

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## Local unemployment and employment rates

On 31 January 2011 the Office for National Statistics (ONS) published its latest set of statistical indicators on local area labour markets. Particular interest lies in how unemployment and employment rates vary between different local authorities in the same and across different regions of Great Britain.

In the 12 months ending June 2010, the highest unemployment rate in Great Britain was in Kingston–upon–Hull at 14.1 per cent followed by Blaenau Gwent in Wales at 13.8 per cent. Of the five areas with the lowest unemployment rates, three were found in North Scotland with the remaining two in Cumbria. The lowest was in the Orkney Islands at 2.9 per cent, followed by Eden in Cumbria at 3.3 per cent. The next three were in South Lakeland, the Shetland Islands and Aberdeenshire all at 3.4 per cent.

Differences in unemployment rates in local areas within regions are generally greater than differences between regions. In the 12 months ending June 2010, the region with the greatest contrast between local authorities was Yorkshire and the Humber with 9.8 percentage points between Kingston–upon–Hull at 14.1 per cent and Ryedale at 4.3 per cent. The region with the narrowest spread of unemployment rates was the South West, with 4.7 percentage points between East Devon at 4.1 per cent and Torbay at 8.8 per cent. At regional level, there was just 3.8 percentage points between the lowest unemployment rate at 6.1 per cent for the South East, and the highest unemployment rate at 9.9 per cent for the North East.

In the 12 months ending June 2010, the local authority with the lowest employment rate in Britain was Nottingham, with a rate of 55.5 per cent. The local authorities with the highest employment rate in Great Britain were Ryedale in North Yorkshire and the Shetland Islands, both at 86.0 per cent.

Differences in employment rates in local areas within regions were also greater than differences between regions. In the 12 months ending June 2010 there were 7.9 percentage points between the region with the highest employment rate – 74.2 per cent in the South East – and the lowest – 66.3 per cent in the North East. The region with the greatest contrast between local authorities was the East Midlands. Here, the employment rate in North West Leicestershire at 80.8 per cent was 25.3 percentage points higher than in Nottingham at 55.5 per cent. The region with the narrowest spread of employment rates was Wales, with 13.4 percentage points between Flintshire and Wrexham at both 71.8 per cent and Blaenau Gwent at 58.4 per cent.

**Further information**
Local area labour markets: statistical indicators January 2011 available at www.statistics.gov.uk/StatBase/Product/asp?vlnk =14160

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## The jobless rate for new graduates doubles over recent recession

The unemployment rate for new graduates was 20 per cent in the third quarter of 2010, almost double the rate in the last quarter before the recent recession. This is according to new figures published by the Office for National Statistics (ONS) on 26 January 2011 – which mark the highest unemployment rate for new graduates for over a decade. Almost one in five recent graduates who were looking and available for work was unable to find any. The rate before the start of the recession, in the first quarter of 2008, stood at 10.6 per cent.

During the recession unemployment increased faster for new graduates compared with the UK as a whole. Just before the start of the recession the unemployment rate for new graduates was around twice that of the UK as a whole (10.6 per cent compared to 5.2 per cent). By the end of the recession the rate for new graduates was 2.3 times higher (18.5 per cent compared to 7.9 per cent). However, for those who graduated between two and six years ago, the unemployment rate rose more slowly than for recent graduates.

**Further information**
More details on graduate unemployment can be found at
www.statistics.gov.uk/StatBase/Product/asp?vlnk =14160
A video podcast explaining these figures is available at www.youtube.com/user/onsstats

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# Updates

## Updates to statistics on www.statistics.gov.uk

14-Jan

**Producer prices**

*Factory gate inflation rises 4.2%*

www.statistics.gov.uk/cci/nugget.asp?id=248

18-Jan

**Inflation**

*CPI inflation 3.7%, RPI inflation 4.8%*

www.statistics.gov.uk/cci/nugget.asp?id=19

19-Jan

**Average weekly earnings**

*Regular pay growth unchanged*

www.statistics.gov.uk/cci/nugget.asp?id=10

**Employment**

*Rate falls to 70.4%*

www.statistics.gov.uk/cci/nugget.asp?id=12

21-Jan

**Retail sales**

*Snow dampens retail sales growth*

www.statistics.gov.uk/cci/nugget.asp?id=256

25-Jan

**GDP growth**

*UK output decreases by 0.5%*

www.statistics.gov.uk/cci/nugget.asp?id=192

**Public sector finances**

*Monthly: record for net borrowing*

www.statistics.gov.uk/cci/nugget.asp?id=206

**Index of services**

*1.5% annual rise into November*

www.statistics.gov.uk/cci/nugget.asp?id=558

26-Jan

**Never worked households**

*352,000 households never worked*

www.statistics.gov.uk/cci/nugget.asp?id=1163

**Graduates in the labour market**

*Unemployed graduates double*

www.statistics.gov.uk/cci/nugget.asp?id=1162

31-Jan

**Local unemployment**

*Rates vary between 2.9% and 14.1%*

www.statistics.gov.uk/cci/nugget.asp?id=1606

**Local employment**

*Rates vary between 55.5% and 86.0%*

www.statistics.gov.uk/cci/nugget.asp?id=252

09-Feb

**UK Trade**

*Deficit widened to £4.8 billion in December*

www.statistics.gov.uk/cci/nugget.asp?id=199

10-Feb

**Index of production**

*Production: 3.6% annual rise*

www.statistics.gov.uk/cci/nugget.asp?id=198

**Travel and tourism**

*Visits abroad fall further*

www.statistics.gov.uk/cci/nugget.asp?id=352

# Forthcoming releases

**Future statistical releases on www.statistics.gov.uk**

11-Feb

**Output and employment in the construction industry – December 2010**

**Producer price index – December 2010**

15-Feb

**Consumer price indices – January 2011**

**International comparisons of productivity – Revised 2009**

**Financial statistics – February 2011**

16-Feb

**Labour market statistics - February 2011**

**Average weekly earnings – December 2010**

18-Feb

**Retail sales – December 2010**

**Turnover and orders in production and services industries – December 2010**

22-Feb

**Health Statistics Quarterly – Spring 2011**

**Public sector finance – January 2011**

23-Feb

**Services producer price indices – Q4 2010**

**Sickness absence in the labour market – February 2011**

24-Feb

**Migration statistics quarterly report – February 2011**

**Social Trends – Spotlight on subjective well-being**

25-Feb

**UK output, income and expenditure – Q4 2010**

**Index of services – December 2010**

**Business investment provisional results – Q4 2010**

**Annual survey of hours and earnings pension tables – 2010**

01-Mar

**Mergers and acquisitions involving UK companies – Q4 2010**

02-Mar

**Older workers in the labour market - March 2011**

03-Mar

**Regional Trends - Portrait of the North West**

04-Mar

**New orders in the construction industry - Q4 2010**

09-Mar

**UK Trade - January 2011**

10-Mar

**Overseas travel and tourism – January 2011**

**Index of production – January 2011**

11-Mar

**Producer price index – February 2011**

**Output in the construction industry – January 2011**

15-Mar

**Financial Statistics – March 2011**

**CPI and RPI: the 2011 basket of goods and services**

# Economic Indicators

| PRICES AND INFLATION | Value | Period | Monthly change | Annual change | Release date |
|---|---|---|---|---|---|
| Consumer Prices Index (CPI) (2005=100) | 116.8 | Dec-10 | 1.0 | 3.7 | 18-Jan-11 |
| Retail Prices Index (all items) (Jan 1987=100) | 228.4 | Dec-10 | 0.7 | 4.8 | 18-Jan-11 |
| RPI excluding mortgage interest (RPIX) (Jan 1987=100) | 227.5 | Dec-10 | 0.7 | 4.7 | 18-Jan-11 |
| Producer Prices Index - Output (2005=100) | 121.1 | Jan-11 | 1.0 | 4.8 | 11-Feb-11 |
| Producer Prices Index - Input prices (materials and fuel) (2005=100) | 158.4 | Jan-11 | 1.7 | 13.4 | 11-Feb-11 |

| LABOUR MARKET | Value | Period | Change on 3 months | Change on 1 year | Release date |
|---|---|---|---|---|---|
| Employment rate (%) | 70.4 | Sep-Nov 10 | -0.3 | -0.1 | 19-Jan-11 |
| Unemployment rate (%) | 7.9 | Sep-Nov 10 | 0.2 | 0.1 | 19-Jan-11 |
| Average Weekly Earnings - total pay (%) | 2.1 | Sep-Nov 10 | 0.4 | 1.4 | 19-Jan-11 |
| Average Weekly Earnings - regular pay (%) | 2.3 | Sep-Nov 10 | 0.3 | 1.2 | 19-Jan-11 |
| Claimant count (Jobseeker's Allowance) (Thousands) (2005=100) | 1,456.6 | Dec-10 | -12.5 | -144.0 | 19-Jan-11 |
| Vacancies (Thousands) | 480 | Oct-Dec 10 | 18 | 14 | 19-Jan-11 |

| NATIONAL ACCOUNTS ECONOMIC ACTIVITY | Value | Period | Quarterly change | Change on 1 year[3] | Release date |
|---|---|---|---|---|---|
| UK Gross Domestic Product (chained volume measure £ billion) | 329.6 | Q4 10 | -0.5 | 1.7 | 25-Jan-11 |
| Private Non-Financial Corporations Net Lending (£ billion) | 15.8 | Q3 10 | | | 22-Dec-10 |
| Household Saving Ratio (%) | 5.0 | Q3 10 | | | 22-Dec-10 |
| Public Sector current budget (£ billion) | -13.5 | Dec-10 | | | 25-Jan-11 |
| Public Sector net debt as a % of GDP | 58.0 | Nov-10 | | | 21-Dec-10 |
| Public Sector net borrowing (£ billion) | 10.3 | Oct-10 | | | 25-Jan-11 |
| Public Sector net cash requirement (£ billion) | 16.8 | Dec-10 | | | 25-Jan-11 |
| Public sector net borrowing (excluding financial interventions) (£ billion) | 59.3 | Dec-10 | | | 25-Jan-11 |

| | | | | | |
|---|---|---|---|---|---|
| Public sector net debt as a % of GDP (excluding financial interventions) | 59.3 | Dec-10 | | | 25-Jan-11 |

| **BALANCE OF PAYMENTS AND TRADE** | **Value** | **Period** | **Change on 3 months** | **Change on 1 year** | **Release date** |
|---|---|---|---|---|---|
| UK's trade balance (£ billion) | -£4.8 | Nov-10 | | | 9-Feb-11 |
| Balance of Payments current account - (£ billion) | -£9.6 | Q3 10 | | | 22-Dec-11 |
| of which: EU | -£12.8 | | | | |
| non-EU | £3.2 | | | | |
| Goods export volumes - excluding oil and erratics (2006=100) | 89.5 | Dec-10 | | | 9-Feb-11 |
| Goods import volumes - excluding oil and erratics (2006=100) | 96.1 | Dec-10 | | | 9-Feb-11 |

| **SHORT TERM INDICATORS** | **Value** | **Period** | **Change on 3 months[1]** | **Change on 1 year[2]** | **Release date** |
|---|---|---|---|---|---|
| Retail Sales (2006=100) (chained volume, seasonally adjusted) | 107.7 | Dec-10 | 0.2 | 0.4 | 21-Jan-11 |
| Index of Manufacturing (2006=100) | 91.9 | Dec-10 | 1.2 | 5.4 | 10-Feb-11 |
| Index of Production (2006=100) | 90.4 | Dec-10 | 0.8 | 3.5 | 10-Feb-11 |
| Productivity - Whole economy (2005=100) | 99.6 | Q3 10 | 0.1 | 1.7 | 23-Dec-10 |
| Productivity - Manufacturing (2005=100) | 106.6 | Q3 10 | 0.8 | 8.0 | 23-Dec-10 |
| Index of Services (2006=100) | 102.4 | Nov-10 | 0.5 | 1.9 | 25-Jan-11 |

Notes:

1. Three months on previous three months
2. Three months on corresponding period one year ago
3. Quarter on corresponding period one year ago

# Economic Review

**February 2011**

Graeme Chamberlin
**Office for National Statistics**

## Summary

**Gross Domestic Product fell by 0.5 per cent in the final quarter of 2010 according to preliminary estimates. The Office for National Statistics judges that this contraction was mainly due to disruption caused by severe weather conditions in the run up to Christmas. However, even allowing for the effects of bad weather, GDP would otherwise have been broadly flat on the quarter – marking a slowdown in growth from earlier in the year – particularly in the services sector. In the calendar year 2010, public sector net borrowing excluding the impact of government intervention in the financial sector fell below 10 per cent of GDP. However, the current budget balance was broadly unchanged from 2009, with the fall in net borrowing reflecting a fall in public sector investment. Public sector net debt measures now include the liabilities of RBS and Lloyds Banking Group (LBG) – and in December 2010 totalled 154.9 per cent of GDP. Excluding the government's interventions in the financial sector, public sector net debt was significantly lower at 59.3 per cent. Consumer prices inflation rose to 3.7 per cent in December, and continue to be driven by indirect taxes, energy prices and food prices.**

## Gross Domestic Product falls in the final quarter of 2010

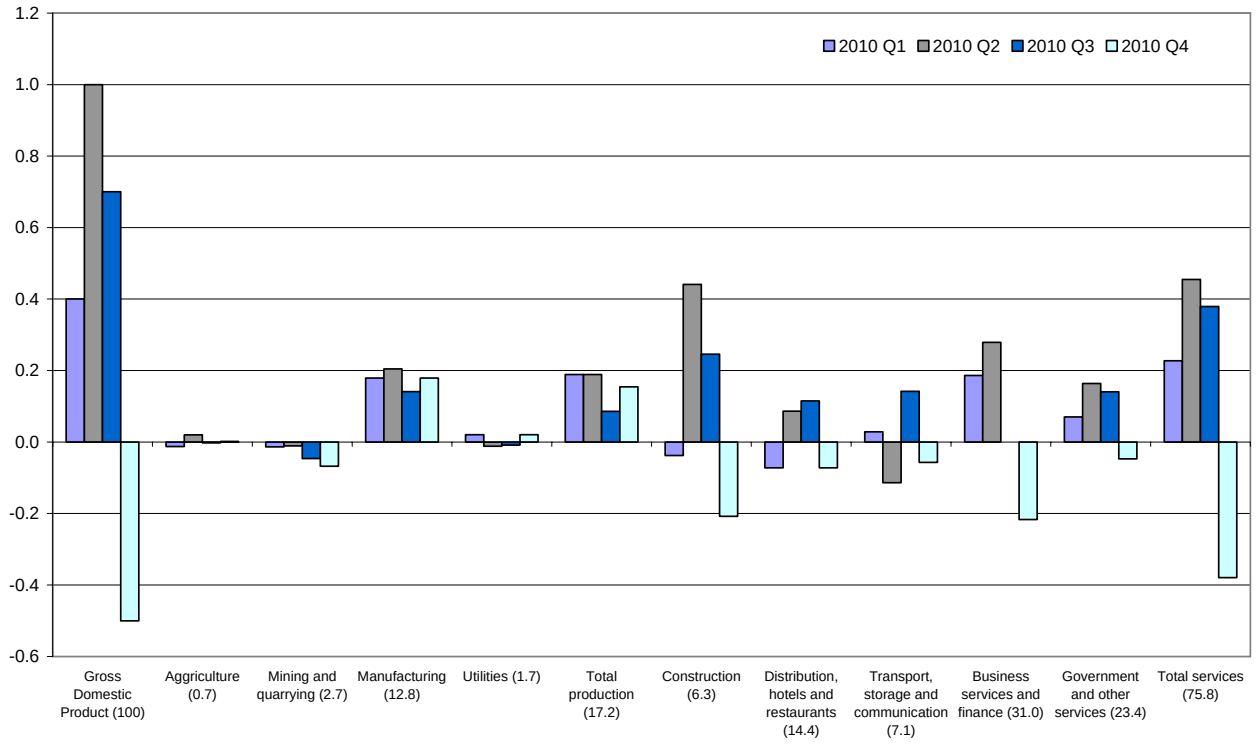
Preliminary estimates of Gross Domestic Product (GDP) show that the UK economy contracted by 0.5 per cent in the final quarter of 2010 (**Figure 1**). This brings to an end a run of four successive quarters of positive growth after GDP fell to a trough in the third quarter of 2009. The decline in output largely reflects disruption caused by bad weather conditions in December. The Office for National Statistics (ONS) judge that this subtracted about 0.5 percentage points from the fourth quarter growth rate. Without this negative impact, GDP would otherwise have been flat over the quarter.

Due to the rapid publication of preliminary estimates, at around 23 days after the reference period, missing or incomplete data have to be filled with forecasts and imputations in order to present a full set of accounts. Information is particularly limited for the third month of the quarter – in this case December – which created additional forecasting problems as this just happened to be when the bad weather hit. In response, compilers have looked to use more information for the third month of the quarter than usual by bringing forward response chasing and undertaking more analysis in the industries most likely to be adversely affected, such as hotels and restaurants and transport. The

impact of the bad weather in January 2010 and the effects of the Ash Cloud in April were also used to help guide the forecasting process as previous examples of when economic activity had been affected by random and unpredictable shocks. Naturally, this is a difficult issue and due to the added uncertainty faced by ONS, preliminary estimates may be subject to greater revision than usual.

## Figure 1 Contributions to economic growth by industry[1] in 2010

Percentage points




1. Industry weights shown in brackets

Source: GDP preliminary estimate, Office for National Statistics

Figure 1 also shows the contributions to growth by each main type of industry. Whilst manufacturing growth has continued to grow robustly in 2010 Q4, construction and services output fell. This differential pattern of growth was echoed by business survey data. Purchasing Managers Index (PMI) data and the British Chambers of Commerce (BCC) *Quarterly Economy Survey* both recorded relatively strong activity in UK manufacturing compared to construction and services towards the end of the year.

In 2010 Q4, manufacturing output expanded by 1.4 per cent on the quarter adding 0.2 percentage points to overall GDP growth. Manufacturing output has now grown at or above 1.0 per cent for five successive quarters and is 6.7 per cent higher than its trough in 2009 Q3. However, it is worth noting that manufacturing output is still 8.8 per cent lower than its pre–recession peak in 2008 Q1. This shows the extent to which manufacturing output fell during the recession and therefore its capacity to rebound alongside the global recovery. PMI, BCC and Confederation of British Industry

(CBI) surveys all report relative strong growth in UK manufacturing output in the final quarter of 2010, and especially in exports/foreign orders.

Following two quarters of relatively strong growth, construction output fell by 3.3 per cent in the latest published quarter, reducing overall GDP growth by 0.2 percentage points. ONS estimated that the impact of the bad weather in the construction industry was to lower GDP growth by 0.1 percentage points. PMI data covering the UK construction industry also reported a weather–related fall in output in December, especially in the residential sector.

Services account for around three–quarters of all UK economic activity so it is not surprising that these usually exert the biggest influence on GDP figures. Total services output was estimated to have contracted by 0.5 per cent in quarter four of last year, reducing GDP growth by around 0.4 percentage points. ONS judges that this fall was entirely down to weather–related factors. But even accounting for the effects of the snow, services growth has slowed in the second half of the year.

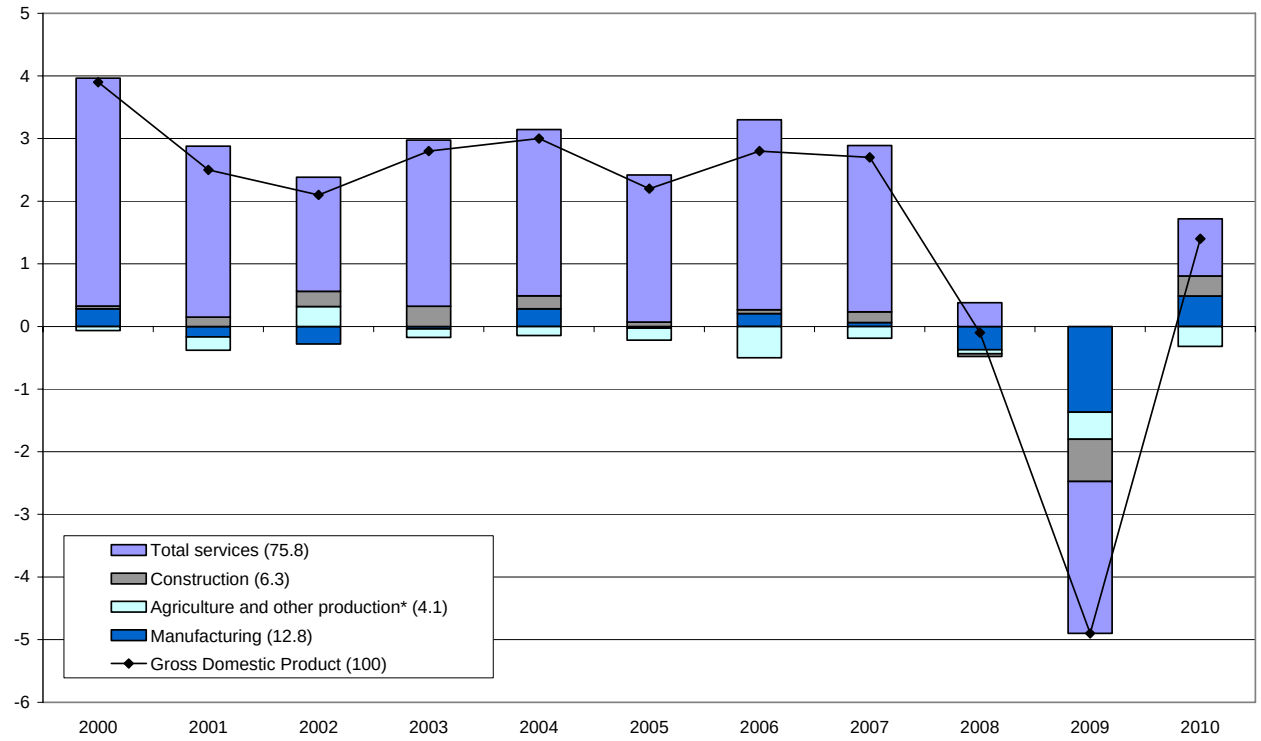
All the main sub–sectors of the services industry are estimated to have contracted in 2010 Q4. Distribution, hotels and restaurants saw output fall by 0.5 per cent, transport, storage and communications by 0.8 per cent, business services and finance by 0.7 per cent and government and other activity by 0.2 per cent. The services PMI for December also concluded that poor weather was responsible for a marginal fall in activity, especially in the distribution, transport and personal services industries. Although the BCC *Quarterly Economic Survey* was conducted before the snowfall in mid–December, it too reported weaker balances for services activity, especially stemming from home orders.

Now that preliminary data are available for 2010 Q4 it allows a first estimate of economic growth for 2010 as a whole to be produced. As **Figure 2** shows, after contracting by 0.1 per cent in 2008 and 4.9 per cent in 2009, GDP expanded by 1.4 per cent in 2010. If GDP growth in 2010 Q4 had been flat instead of a weather–affected -0.5 per cent, then growth for 2010 as a whole would have been 1.5 per cent. A weaker final quarter meant that actual GDP growth in 2010 was lower than the 1.8 per cent forecast made by the Office for Budget Responsibility (OBR) at the end of November. In their Economic and Fiscal Outlook, OBR predict GDP growth will be 2.1 per cent in 2011 and 2.6 per cent in 2012. This would mark a slower recovery compared to previous recessions, reflecting the protracted impact of the financial crisis on credit conditions, an extended period of private sector deleveraging and a significant fiscal contraction.

Of the 1.4 per cent increase in GDP, manufacturing accounted for 0.5 percentage points, services for 0.9 percentage points, construction for 0.3 percentage points, and agriculture and other production for -0.3 percentage points.

## Figure 2 UK economic growth[#], 2000–2010

Per cent




# Industry shares reported in brackets

* Agriculture and other production also includes the basic price adjustment and any rounding errors

Source: GDP preliminary estimate, Office for National Statistics

## Weak services growth in October and November 2010

Preliminary estimates for the final quarter of 2010 show a fall in service sector activity. Even accounting for the disruptive impact of bad weather, services output would have otherwise been flat marking a slowdown in growth during the second half of the year. This slowdown is also reported by business survey data.

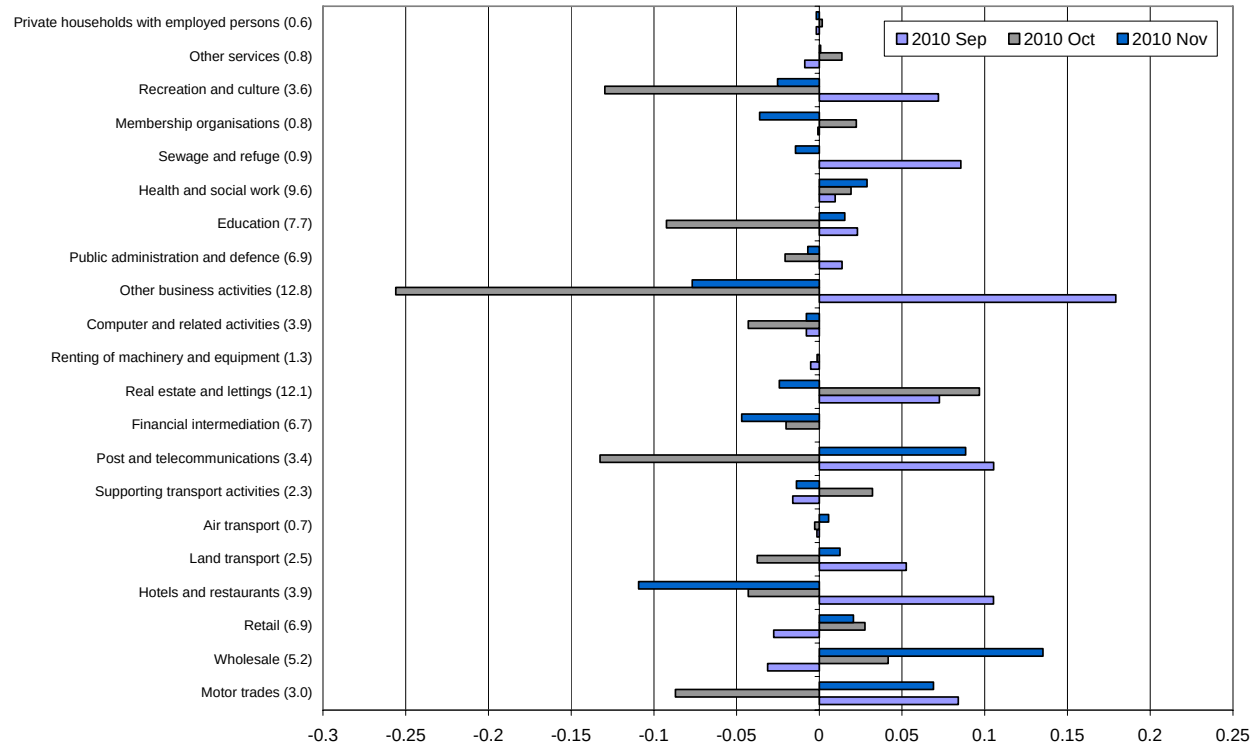
To explore this further, **Figure 3** looks at monthly changes in the Index of Services by industry between September and November 2010 – the most up–to–date figures currently available. These show that month–on–month growth was negative in October (-0.6 per cent) and flat in November. An overall contraction in the first two months of the quarter suggest that, even without the predicted impact of the weather disruption in December, fourth quarter services growth had weakened. For example, if service sector output was to increase in line with the consensus forecast of 0.5 per cent for 2010 Q4, then providing the October and November Index of Services remained unchanged, it would require a 1.5 per cent increase in the December index. Since the start of the time series in 1995, month–on–month growth in the Index of Services has only exceeded 1.5 per cent on one occasion. This was in July 2002, when output increased by 1.9 per cent following a contraction of 2.1 per cent in June 2002 due to an extra public holiday to celebrate the Queen's Golden Jubilee.

As Figure 3 also shows, the monthly contraction in October partly reflects fairly strong growth in the previous month. In September 2010, the Index of Services was 0.7 per cent higher than in August. It is noticeable that many of the industries that contracted in the October index had exhibited strong growth in the September index, for example other business activities. The total Index of Services was flat in November, mainly because positive month–on–month growth in some sub–sectors (motor trades, wholesale, retail and post and telecommunications) was offset by contractions elsewhere.

Slower service sector growth towards the end of the year may reflect a number of factors, including the start of a significant fiscal tightening and higher inflation eroding real incomes. Other factors likely to weigh on demand include a weakening in the housing market and ongoing credit constraints.

## Figure 3 Contributions by industry* to monthly services growth, September to November 2010

Percentage points, month on previous month




* Industry weights in brackets

September month on month growth = 0.7 per cent

October month on month growth = -0.6 per cent

November month on month growth = 0.0 per cent

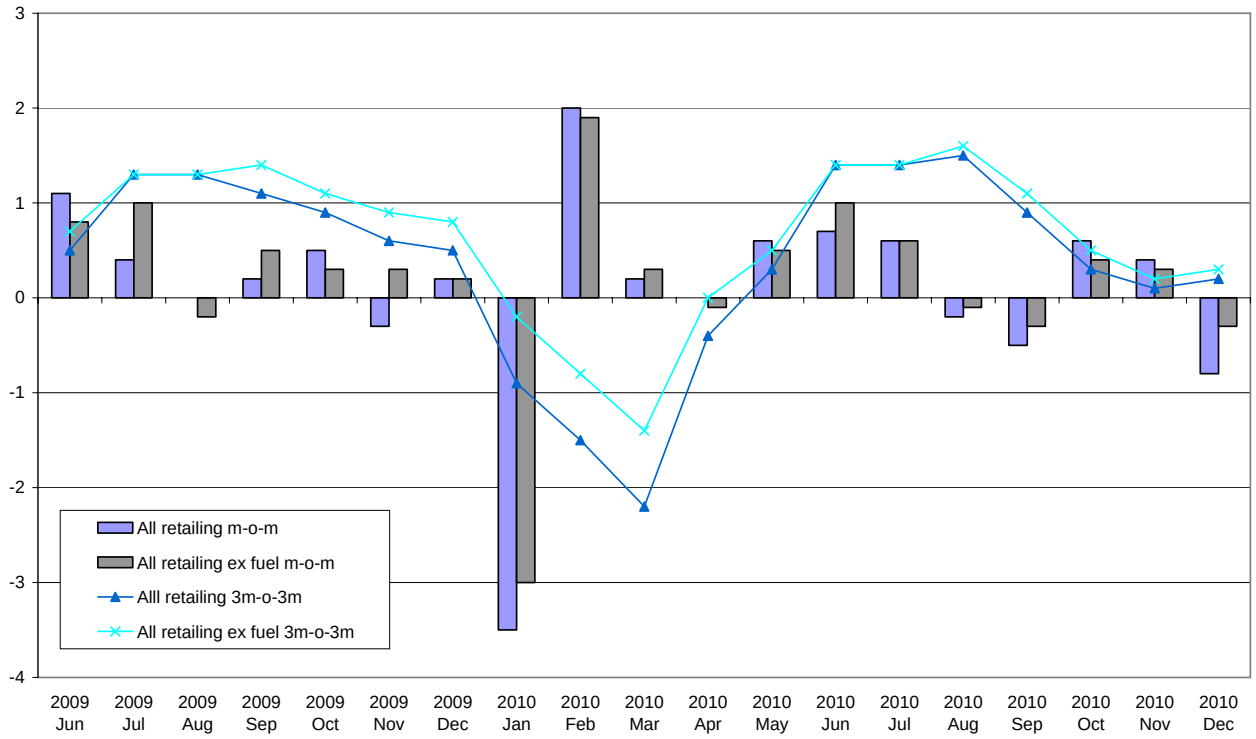
Source: Index of Services, Office for National Statistics

## Bad weather hits December's retail sales

Retail sales fell by 0.8 per cent in December 2010 (**Figure 4a**). Excluding automotive fuel, the contraction was smaller at 0.3 per cent. These figures confirm the expected negative impact of the pre–Christmas snowfall, both on road transport and footfall through shopping centres and down high streets. Figure 4a also shows that the decline in retail sales was smaller than in January 2010, which was also adversely affected by winter weather conditions. However, in January 2010 the snowfall occurred towards the beginning of the month, compared towards the middle and end in December. It is also clear that retail sales rebounded strongly in February 2010. Whether such a rebound happens in January 2011 is difficult to predict. Some anecdotal evidence suggests that postponed Christmas shopping is unlikely to be redone at a later date. The rise in the rate of VAT in January 2011 also complicates matters, as ordinarily this would be expected to shift some consumption forward to December.

Figure 4a **Retail sales growth**

Per cent



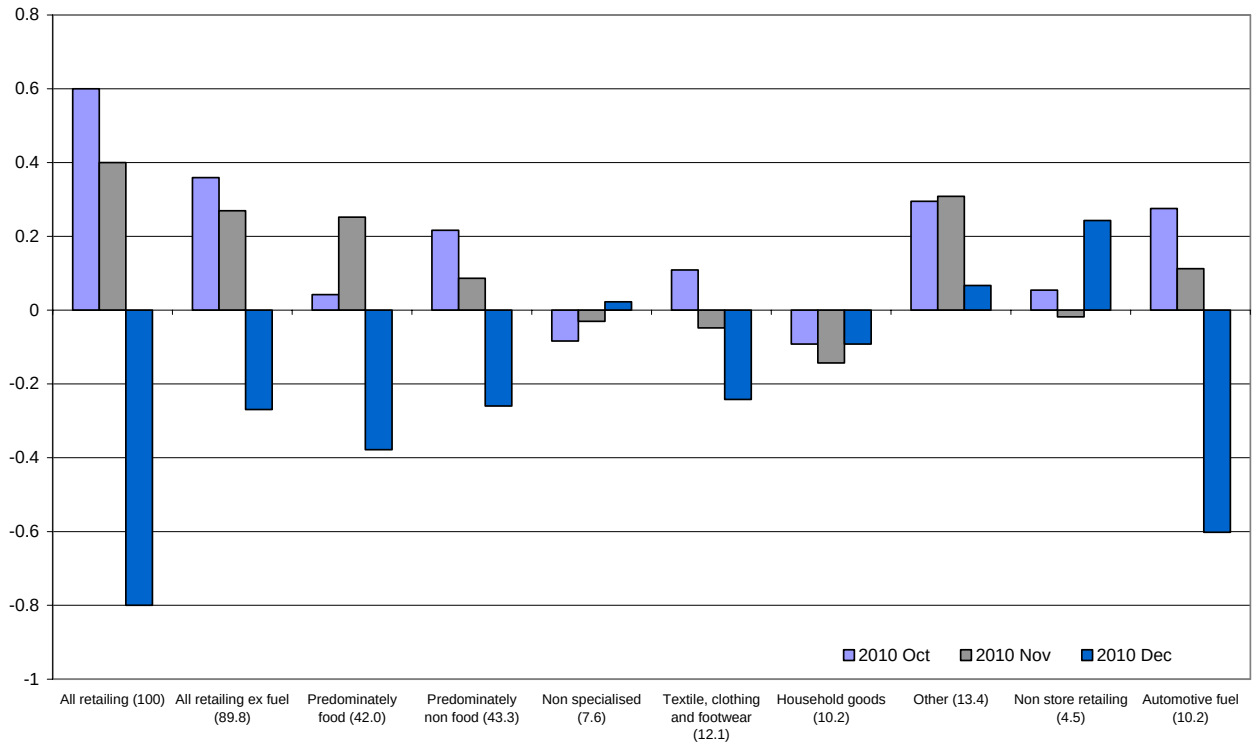

Source: Retail Sales, Office for National Statistics

**Figure 4b** presents the contributions to month–on–month retail sales growth in the final three months of the year. Clearly the largest negative contribution came from automotive fuel, a reflection of the impact of bad weather on travel. It is notable that the sector making the largest

positive contribution to growth in December was the non–store sector, which predominantly includes catalogue and internet retailers. This may partly reflect a growing trend, but also a reaction to the bad weather with more shopping done online or through mail order than in person.

## Figure 4b Contributions* to retail sales growth, October – December 2010

Percentage points




* Weights are in brackets

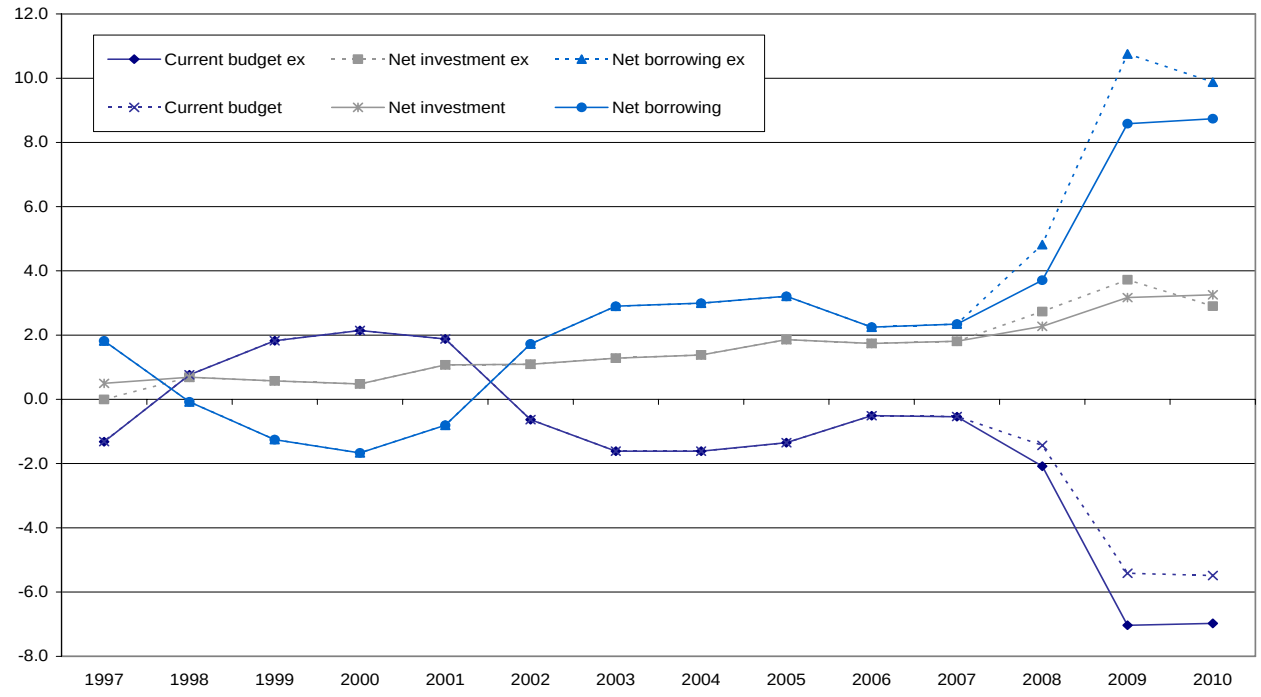
Source: Retail Sales, Office for National Statistics

## Public sector net borrowing falls to below 10 per cent of GDP in 2010

Public sector net borrowing (PSNB) reflects the difference between public sector revenues and public sector consumption and investment expenditures. Excluding the effects from government interventions in the financial sector (PSNB ex), in the calendar year 2010 the public sector recorded a current budget deficit of 7.0 per cent of GDP, broadly unchanged from 2009. Public sector investment, as a share of GDP fell from 3.7 per cent to 2.9 per cent, and as a consequence, total net borrowing declined from 10.8 per cent of GDP to 9.9 per cent of GDP (**Figure 5**).

## Figure 5 Public sector finances, main balances

Per cent of GDP




Source: Public Sector Finances, Office for National Statistics

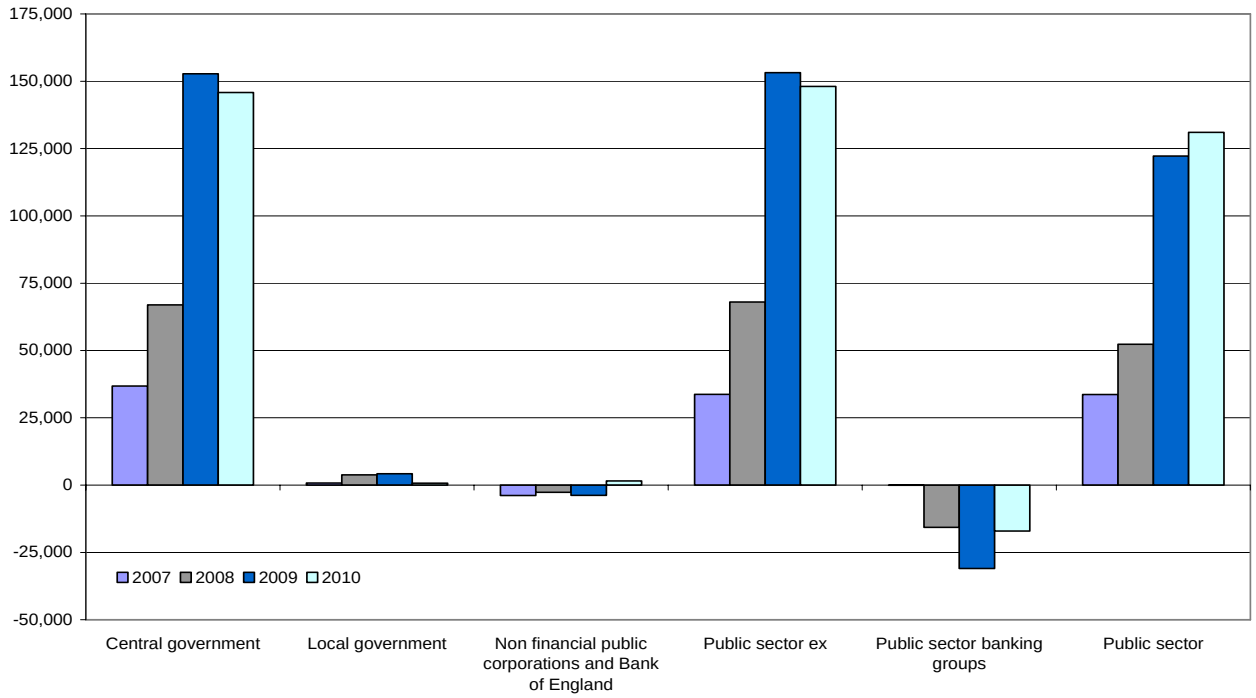
Including the impact of the government's interventions in the financial sector, public sector net borrowing does not look quite so bad. On this basis, the current budget balance is around 5.5 per cent of GDP and net borrowing (PSNB) lower at 8.7 per cent of GDP. This is because the government's interventions have resulted in it owning financial assets, such as shares in RBS and Lloyds Banking Group (LBG). Any positive income from these assets and the net profits of the publicly owned banks would then be scored to the current budget balance. As the government intends to ultimately return these asset and bank holdings to the private sector, their impact on the public sector finances is regarded as temporary and excluded from the underlying measure PSNB ex.

**Figure 6a** shows that public sector net borrowing is mainly centred in the central government sector. Other parts of the public sector make a fairly minimal contribution to PSNB. Figure 6a also shows that public sector banking groups are net lenders, hence reducing PSNB relative to PSNB ex.

**Figure 6b** highlights the impact of the recent recession on central government's net borrowing position. Whilst central government expenditure has continued rising, receipts have levelled off. The fall in 2009 was largely driven by a temporary reduction in the rate of VAT. This was restored to the higher rate in 2010, but receipts continued to reflect weaker revenues from income and wealth taxes. For example, in 2010, income and wealth tax revenues were over 8 per cent lower than in 2008 in current prices.

## Figure 6a Public sector net borrowing

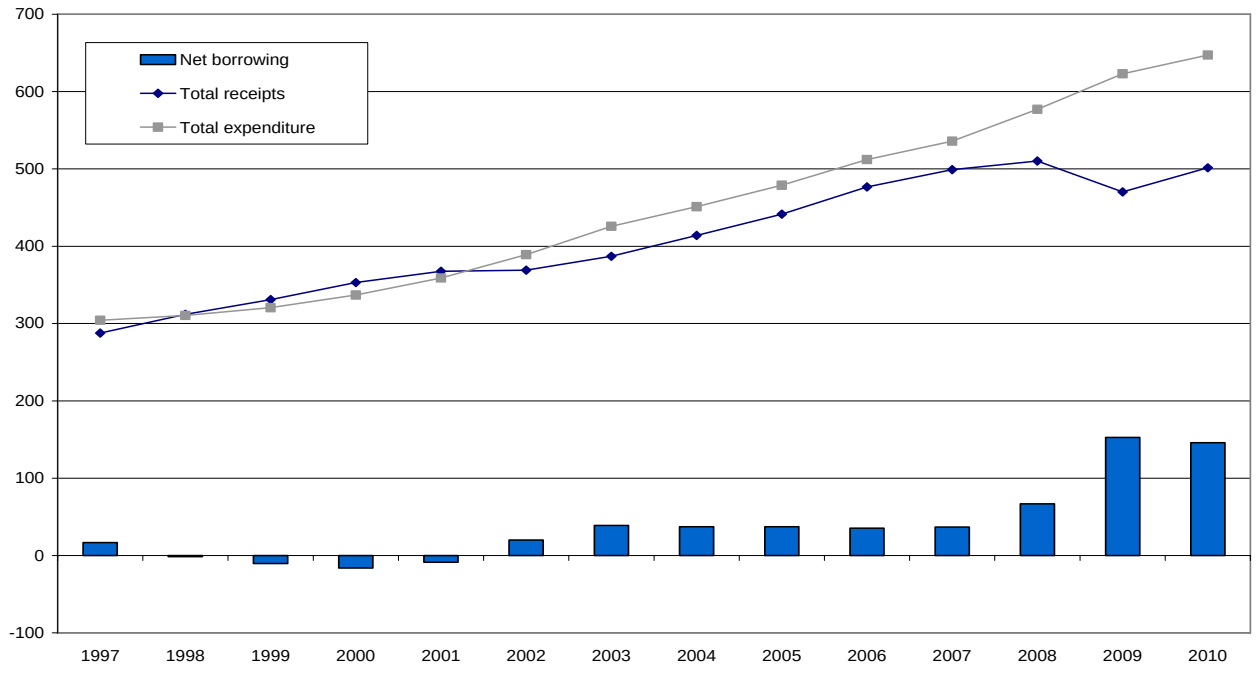
£ millions




Source: Public Sector Finances, Office for National Statistics

## Figure 6b Central government net borrowing

£ billions




Note: Total expenditure equals current spending, public sector investment, depreciation and capital transfers

Source: Public Sector Finances, Office for National Statistics

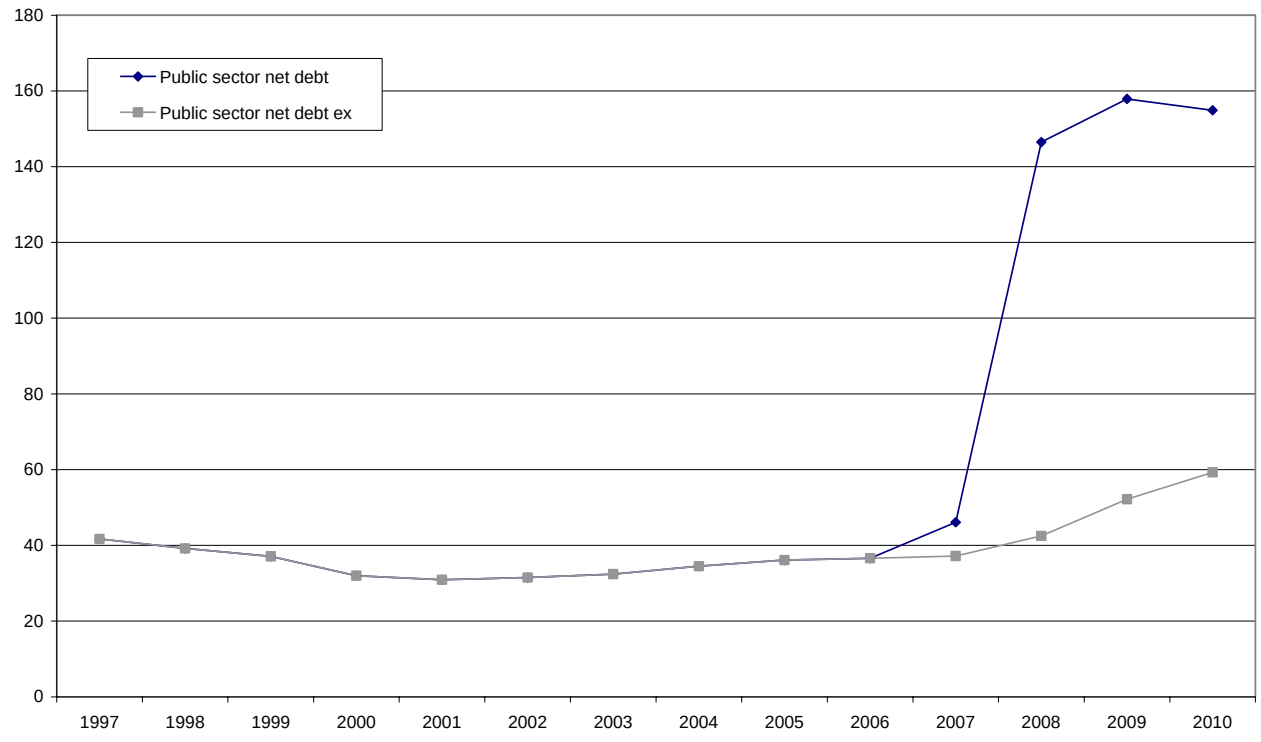
## Public sector net debt over 150 per cent of GDP as RBS and LBG liabilities now included

ONS publishes two measures of public sector net debt (PSND) – both including and excluding financial sector interventions (**Figure 7**). Including interventions in the financial sector, public sector net debt was 154.9 per cent of GDP in December 2010. This is largely due to the liabilities of the public sector banks that are included on the public sector's balance sheet, now including RBS and LBG (which added approximately £1,300 billion to PSND) . This measure though does not include the majority of these bank's assets, including mortgages, commercial paper and loans to businesses because these are deemed as being insufficiently liquid to be realised quickly and hence not scored against net debt.

Excluding the government's intervention, public sector net debt was 59.3 per cent of GDP, up from 52.2 per cent the previous year and 37.2 per cent before the crisis started in 2007. The rise in this measure of net debt is a result of the surge in public sector net borrowing shown in Figures 5, 6a and 6b reflecting the weakening in the government's current budget balance through the recession.

### Figure 7 Public sector net debt

Per cent of GDP



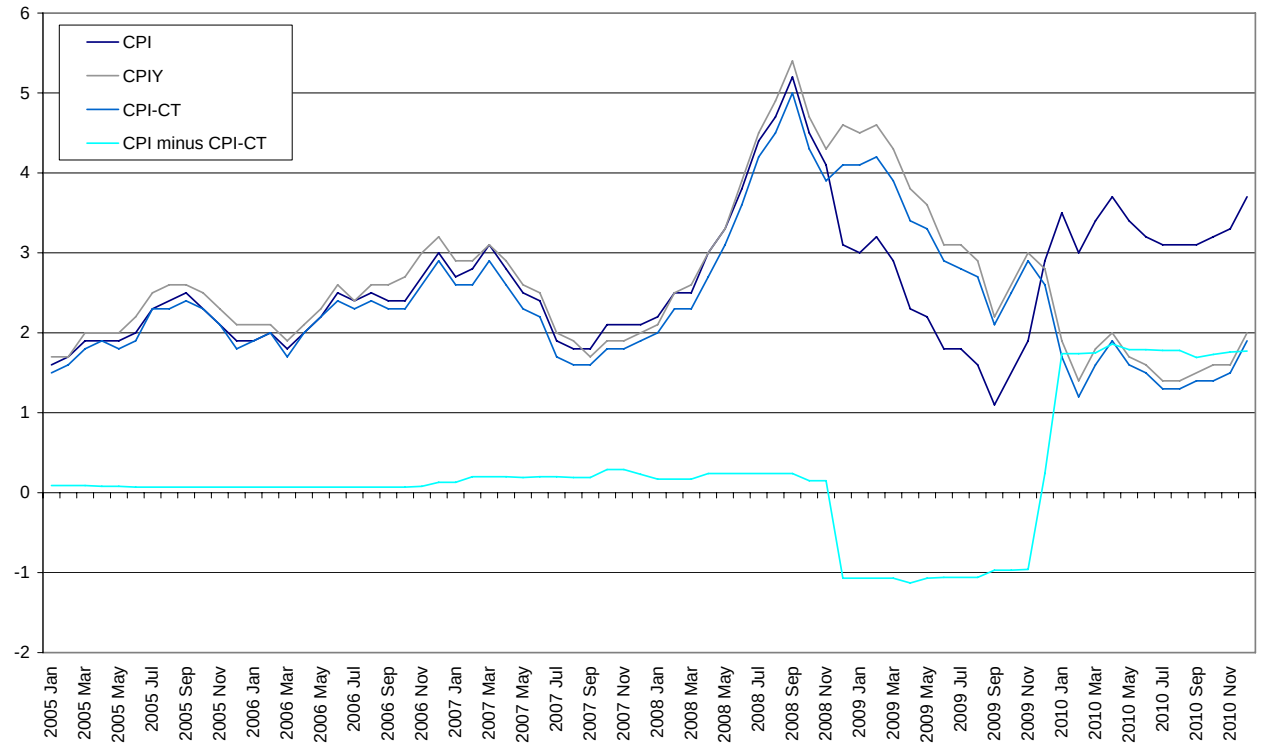

Source: Public Sector Finances, Office for National Statistics

## Taxes, energy and food are the main contributors to consumer prices inflation

Inflation, as measured by Consumer Prices Index (CPI) stood at 3.7 per cent in December, up from 3.3 per cent in November. Air transport and rising petrol, diesel, gas and food prices are the most significant drivers of the increase in annual inflation between November and December. These factors are also, with indirect taxation, the longer run sources of the increase in CPI inflation rate, which has been at or above 3.0 per cent throughout 2010 despite being as low as 1.1 per cent in September 2009 (**Figure 8**).

### Figure 8 Consumer prices inflation including and excluding indirect taxes

Per cent




Source: Consumer price indices, Office for National Statistics

ONS publishes two measures of CPI inflation that account, in different ways, for the impact of indirect taxes on inflation. CPIY excludes indirect taxes altogether, whereas CPI–CT keeps indirect taxes in the equation, but holds them at constant values. Both these measures in Figure 8 show the impact of indirect tax changes, specifically Value Added Tax (VAT) on CPI inflation over the last two years. In December 2010, the difference between CPI and CPI–CT annual inflation measures was 1.77 percentage points.

Increases in food and global energy prices are also feeding through to inflation, with their impact likely to have been extenuated by the 25 per cent depreciation in sterling in the second half of 2008

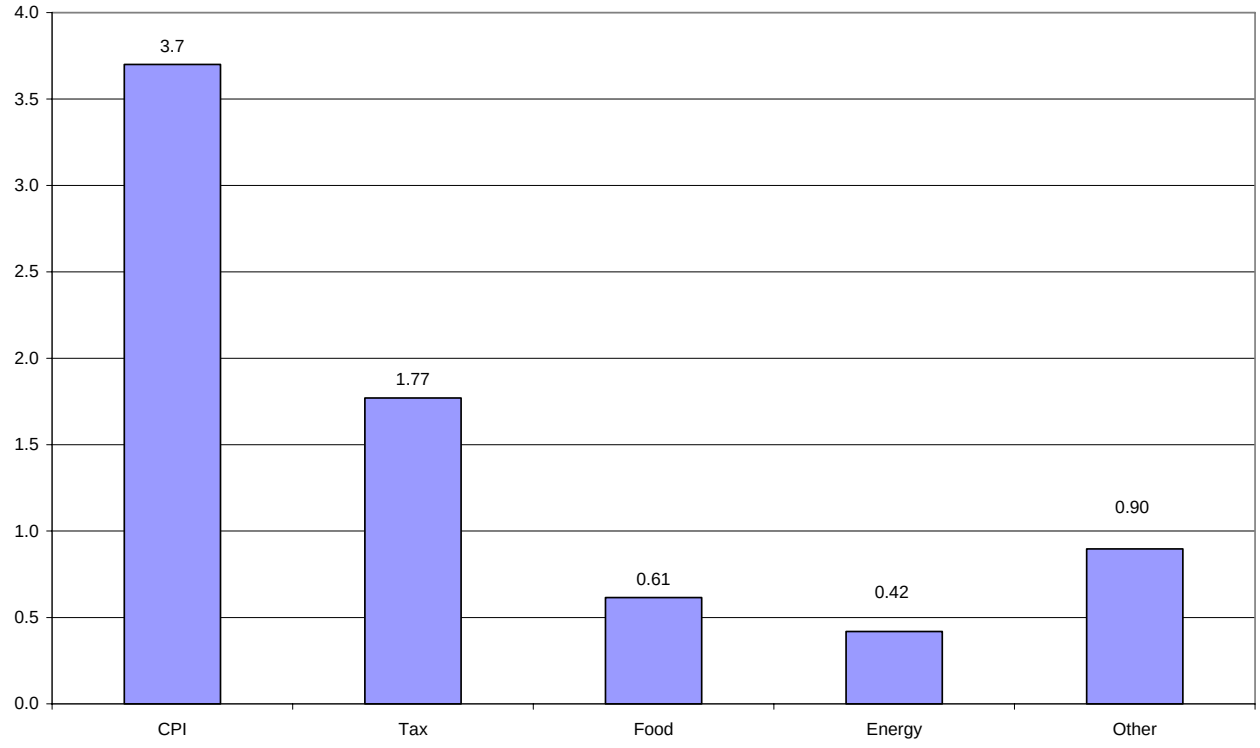
leading to higher import prices. Inflation in energy, food, alcohol and tobacco was 6.4 per cent in December 2010, and excluding this category from the all–items CPI would lower the annual rate of inflation from 3.7 per cent to 2.9 per cent. However, this will also include an element of an increase in indirect taxes.

**Figure 9** attempts to identify the respective contributions to the December CPI inflation rate of 3.7 per cent from indirect taxes, food and energy. Author's calculations show that these percentage point contributions are 1.77, 0.61 and 0.42 respectively, leaving 0.9 percentage points accounted for by the other components of the all–items CPI.

Figures 8 and 9 therefore show, that although inflation has been above the Bank of England's upper ceiling of 3.0 per cent, this is largely due to changes in indirect taxes and global inflation in food and energy prices. Underlying inflation pressures may not be so strong once these factors are stripped out of the calculation. In January, VAT will rise to 20 per cent, and subject to the degree of pass–through to consumer prices, would be expected to put further upward pressure on the rate of inflation. This too though would only impact on the inflation rate for one year before falling out of the annual comparison in the event of no further tax changes.

## Figure 9 CPI inflation, contributions in December 2010

Percentage points




Source: Consumer price indices, Office for National Statistics

## Contact

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# The impact of the recession on different sized firms

**A view from the micro–data**

Tullio Buccellato and Eric Scheffel
**Office for National Statistics**

## Summary

**This article uses quarterly data on turnover to analyse the performance of small, medium and large firms between 2001 and 2009. The analysis draws on two firm–level datasets which are the *Monthly Inquiry into Distribution and Services Sector* (MIDSS) and the *Monthly Production Inquiry* (MPI). For the services sector, it is found that small firms were hardest hit by the downturn, followed by medium–sized firms, which in turn have done worse than large firms. For the manufacturing sector the opposite results were reported. The turnover of large firms fell the most, followed by medium–sized firms, with smaller firms contracting the least. In both the services and production sector, volatility in turnover has increased during the sample period and in the run up to the recession – a reflection of greater price and output fluctuations in the last three years.**

## Introduction

This article presents new analysis of the UK economy during the recent recession. Micro–data reporting on quarterly turnover at the firm–level have been used to look at the relative performance of different sized firms between 2000 and 2009. Firms have been categorised into three size–bands according to employment. These are: small (0–49), medium (50–249) and large (250+). The raw micro–data were sourced directly from two monthly business surveys. The *Monthly Inquiry into Distribution and Services Sector* (MIDSS) for the services sector and the *Monthly Production Inquiry* (MPI) for the manufacturing sector.

The three main findings from this study are:

- For the service sector (MIDSS), small firms have been hit by the crisis worse than medium–sized firms, which in turn have done worse than large firms.
- For the manufacturing sector (MPI), large firms have been hit by the crisis worse than medium–sized firms, which in turn have performed worse than small firms.

- For both MIDSS and MPI surveys, volatility in all of the turnover series – regardless of firm size – has increased during the sample period.

Micro–data allows a more detailed analysis of the economy to be undertaken, based on firm–level characteristics, than simply looking at the published aggregates. However, some care should be taken in interpreting these results. Although monthly business surveys have been aggregated into quarterly figures so as to be presented on a similar basis to the published macro–data, it does not allow for a direct comparison. Therefore, before the main results are reported, the next section of this article puts the micro–data into proper context. The final section concludes.

## Putting micro–data into context

Although micro–data inform the production of economic time series published by ONS they are rarely directly comparable. This is because micro–data

- undergo a number of qualitative adjustments as they move along the data production chain, and
- are balanced against other data sources. For example, monthly business surveys will be benchmarked against larger annual surveys and administrative data sources, and made coherent with data on income and expenditure through input–output analyses

Adjustments to micro–data are typically made to correct (or remove) outliers and level–shifts. These often result from methodological changes in the data collection process, but other important sources of irregularity that frequently require attention include:

- Milestones payments of big firms – very large increases in turnover for a particular firm may be further investigated by ONS staff in order to clarify the exact nature of any large milestone payments. If such a payment is associated with the provision or production of goods or services which have been in the making for many months or perhaps even years, then this figure clearly needs to be spread through time appropriately to reflect this.
- Big firms entering or leaving the sample – large mergers or takeovers, or perhaps significant business re–locations between the rest of the world and the UK can result in structural breaks in turnover and employment data. These may need to be accounted for so as to reflect what is really happening to economic activity in the UK.

A fuller description of the MIDSS and MPI data and collection methodologies is provided in **Box 1**.

**Figure 1** shows a comparison of MIDSS and MPI growth rates with that of Gross Domestic Product (GDP) at market prices. Clearly the 'raw' micro–data time series are more volatile than published GDP, but the timing of the recession in each is broadly the same. Given that MIDSS and MPI, together, only cover around half of all economic activity in GDP, an exact correspondence would not necessarily be expected.

Despite the issues surrounding micro–data, ONS does currently publish a near completely unadjusted data series based on MIDSS and MPI – namely the Turnover and Orders in Production and Services Industries (TOPSI)[2]. Barring some small adjustments to the data, these exhibit very similar time series behaviour to the micro–data series constructed for this study (see **Figure 2**). For

instance, the main difference between MPI micro–data and TOPSI manufacturing is the inclusion of non–manufacturing production industries such as extraction (mining and quarrying) and utilities (water, gas and electricity generation) in the former but not the latter. This data gives users access to raw data on turnover and orders (both home and export) for a variety of industries, but unlike in this study, breakdowns according to individual firm characteristics are not included.

## Box 1 Methodology underlying MIDSS and MIPS data collection

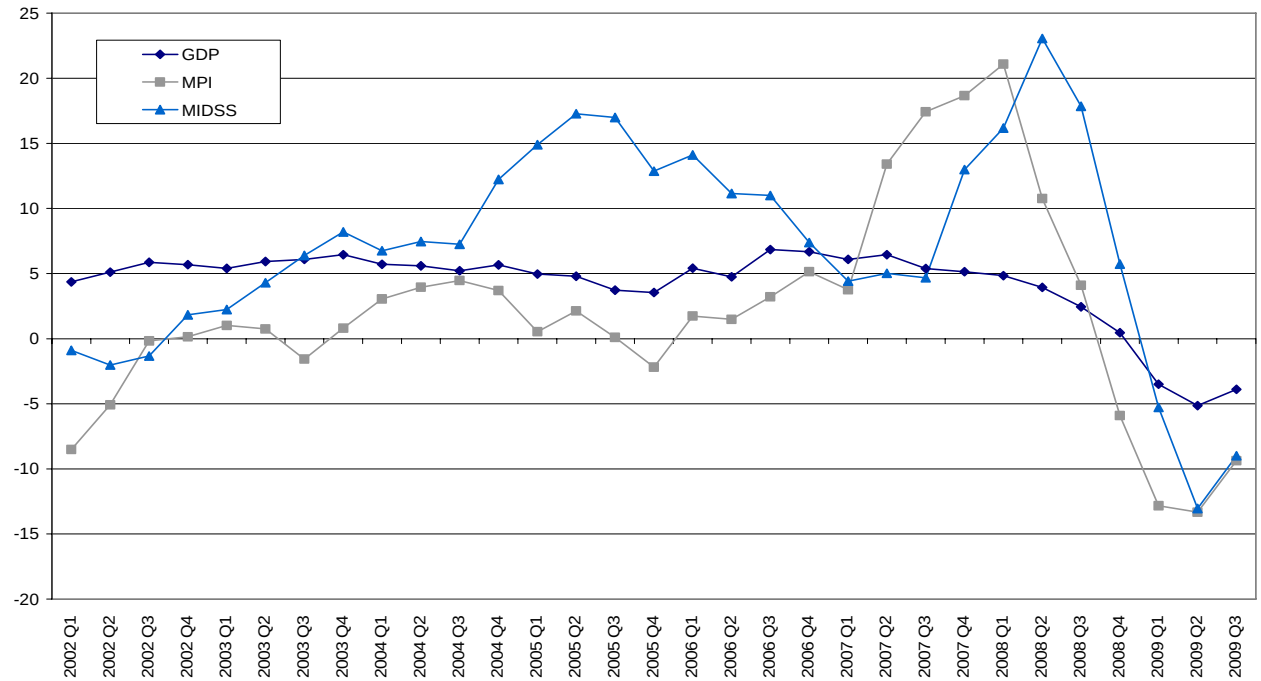
This study employs micro–data consisting of responses to the *Monthly Production Inquiry* (MPI) and the *Monthly Inquiry into Distribution and Services Sector* (MIDSS). These surveys are very similar in terms of the questions posed to individual business, but obviously differ in the businesses they target. Responses obtained through the MPI are primarily related to business activity occurring in the primary and secondary sectors of the UK economy (based on the Standard Industrial Classification (SIC) scheme this roughly corresponds to codes 1,2 and 3 at the 1–digit SIC level) whereas responses given to the MIDSS survey relate to the tertiary sector of the economy (which corresponds to codes 5,6,7,8 and 9 at the 1–digit SIC level).

Both surveys inquire into firms' turnover, their employment as well as other useful figures, such as the amount of turnover generated as a result of exported products and services. Typically – with the exception of MIDSS for which employment data is only sampled quarterly, all of the three categories of variables – that is turnover, export value and employment – are available at monthly frequency. The micro–data pertaining to these surveys held in the Virtual Micro–data Laboratory (VML)[1] contains additional finer breakdowns, such as the number of full– and part–time male and female employees, but such detailed breakdowns are only requested from firms at quarterly intervals.

Both of the surveys are carried out using a methodology of stratified sampling, which uses ONS's standard business register, the Inter–Departmental Business Register (IDBR), as the main sampling frame. Stratification is carried out based on a (frozen) level of employment which is usually updated each new year. Smaller firms occupying the lower strata of the sample are usually sampled on a rotating principle, resulting in smaller firms being repeatedly sampled for 15 consecutive months, after which they are replaced with a newly chosen stratum. Large firms belonging to the upper stratum are sampled indefinitely (or until they cease trading). Any firm which does not survive its initially allotted sampling spell, is replaced with a new firm which embodies characteristics close to the ones of the firm dropped out as a result of ceasing trading.

## Figure 1 MIDDS, MPI and GDP growth rates

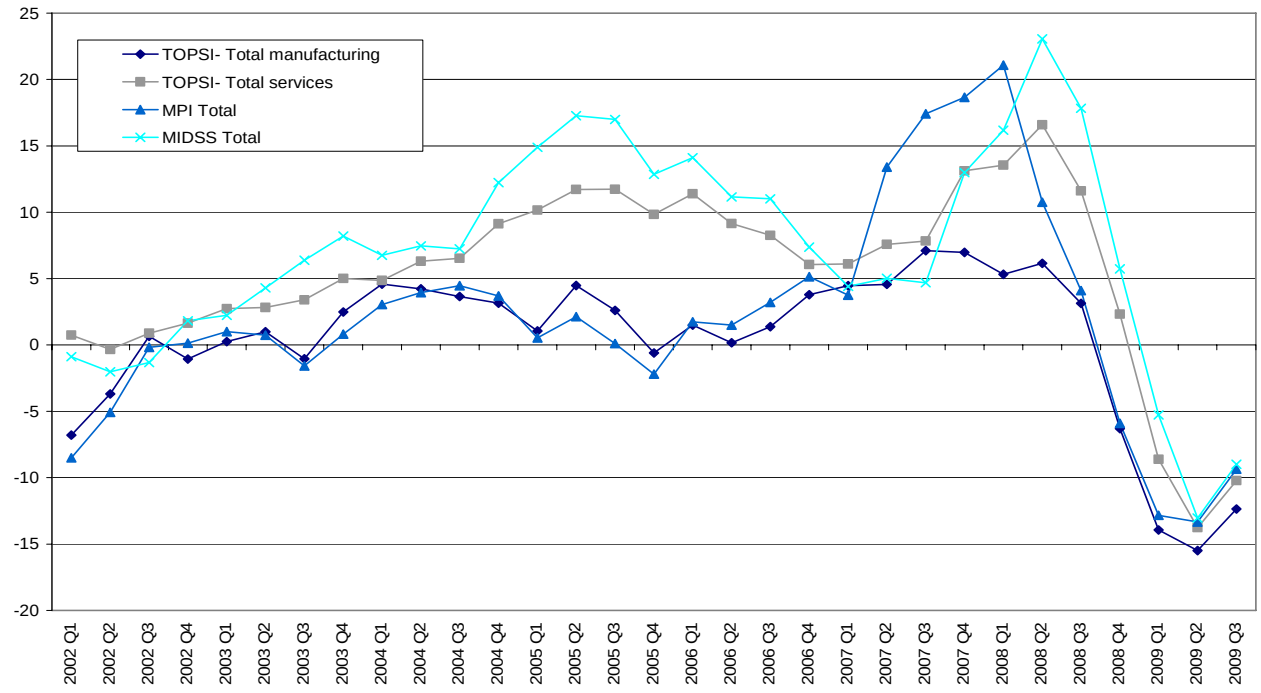
Per cent – quarter on same quarter one year ago




Source: Office for National Statistics

## Figure 2 MIDSS, MPI and TOPSI

Per cent, quarter on same quarter one year ago




Source: Office for National Statistics

## Analysis of MIDSS and MPI micro–data by firm size

This section presents summary statistics and graphs showing growth rates of turnover in small, medium and large firms from MIDSS and MPI micro–data. This includes a comparison of mean growth rates, the volatility of growth and peak–to–trough changes through the recent recession. The peak–to–trough analysis is based on both seasonally unadjusted and seasonally adjusted data[3]. The monthly turnover data reported in MIDSS and MPI is in current market prices so will reflect both price and volume changes. Also, it has been aggregated up to a quarterly basis to be more comparable with headline published data which is also published quarterly. However, the same analysis on monthly data is presented in the **Annex** to this article.

### MIDSS micro–data on turnover by firm size

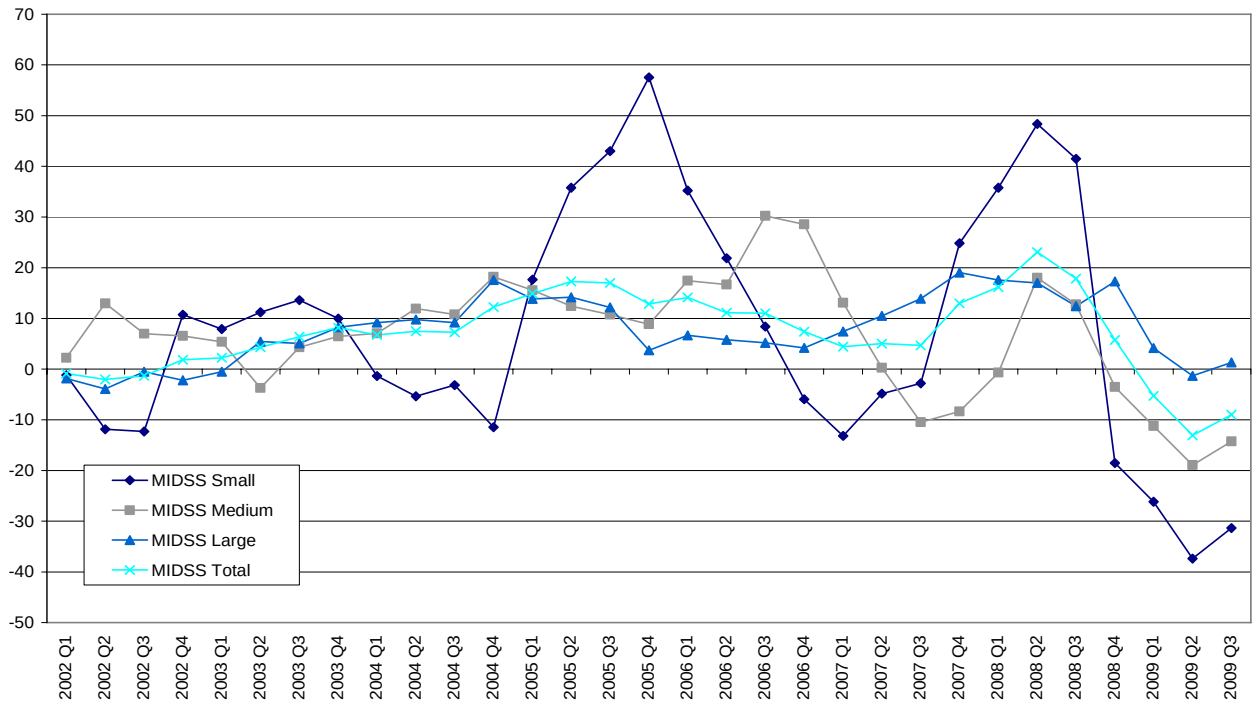
Turnover growth of different–sized firms in MIDSS between 2002 Q1 and 2009 Q3 is shown in **Figure 3** and the key summary statistics are provided in **Table 1a**. Over the sample as a whole, small and large firms experienced similar average (four–quarter) growth rates of 7.6 per cent and 7.8 per cent respectively. This was faster than medium–sized firms, which expanded at an average rate of 6.7 per cent. However, comparing average growth rates in the first half of the sample with the second half of the sample shows significant slowdowns for small and medium firms, whilst large firms actually experienced an increase in average growth rates. These patterns are corroborated by the peak–to–trough analysis in **Table 1b**, which clearly shows that during the recession small firms experienced the severest fall in turnover, followed by medium firms and then large firms.

This suggests that larger service–sector firms showed a greater resilience through the recession than smaller service–sector firms. This may reflect different patterns of activity by firm–size – with smaller firms concentrated in the provision of specialist or boutique services (such as pubs and restaurants) which are especially vulnerable to a fall in discretionary demand – and larger firms in areas of service provision where demand is more stable (such as large food retailers). Large service–sector firms may also have shown greater resilience to the downturn due to the advantages of scale and diversification that result from being big. For example, large firms are less likely to be dependent on selling a particular product to a particular regional or country market.

Volatility in turnover growth rates, as measured by the standard deviation in Table 1a, is seen to fall with firm size. This is also apparent in Figure 3, where the turnover growth of small firms shows more fluctuation than medium–sized firms and, in turn, large firms. Turnover volatility was also greater in the second half of the sample than the first half. This may reflect higher volatility in commodity and energy prices and also the impact of the financial crisis and subsequent recession on volumes, after a long period of relatively low inflation and steady growth in the UK economy[4].

## Figure 3 MIDSS quarterly growth rates in turnover: by firm size

Per cent, quarter on same quarter one year ago




Source: Office for National Statistics

## Table 1a MIDSS turnover data: summary statistics

| Variable | Number of time series observations | Mean growth rate, quarter on same quarter one year ago (%) | Standard deviation |
|---|---|---|---|
| **2002 Q1 – 2009 Q3** | | | |
| Small | 31 | 7.6 | 24.1 |
| Medium | 31 | 6.7 | 11.7 |
| Large | 31 | 7.8 | 6.6 |
| Total | 31 | 7.1 | 8.2 |
| **2002 Q1 – 2005 Q4** | | | |
| Small | 16 | 10.0 | 20.3 |
| Medium | 16 | 8.5 | 5.4 |
| Large | 16 | 6.2 | 6.6 |
| Total | 16 | 7.2 | 6.3 |
| **2006 Q1 – 2009 Q3** | | | |
| Small | 15 | 5.0 | 28.0 |
| Medium | 15 | 4.6 | 15.9 |
| Large | 15 | 9.4 | 6.5 |
| Total | 15 | 7.1 | 10.0 |

Source: Office for National Statistics

## Table 1b MIDSS turnover data: peak–to–trough analysis

| | Raw 'unadjusted' data | | Seasonally adjusted data | |
|---|---|---|---|---|
| | Timing of the recession | Peak–to–trough (%) | Timing of the recession | Peak–to–trough (%) |
| Small | 2008 Q2–2009 Q1 | -37.5 | 2008 Q2–2009 Q2 | -37.6 |
| Medium | 2006 Q4–2009 Q2 | -20.5 | 2008 Q2–2009 Q2 | -19.1 |
| Large | 2008 Q4–2009 Q2 | -11.1 | 2008 Q4–2009 Q2 | -3.4 |
| Total | 2008 Q2–2009 Q2 | -13.0 | 2008 Q3–2009 Q2 | -10.9 |

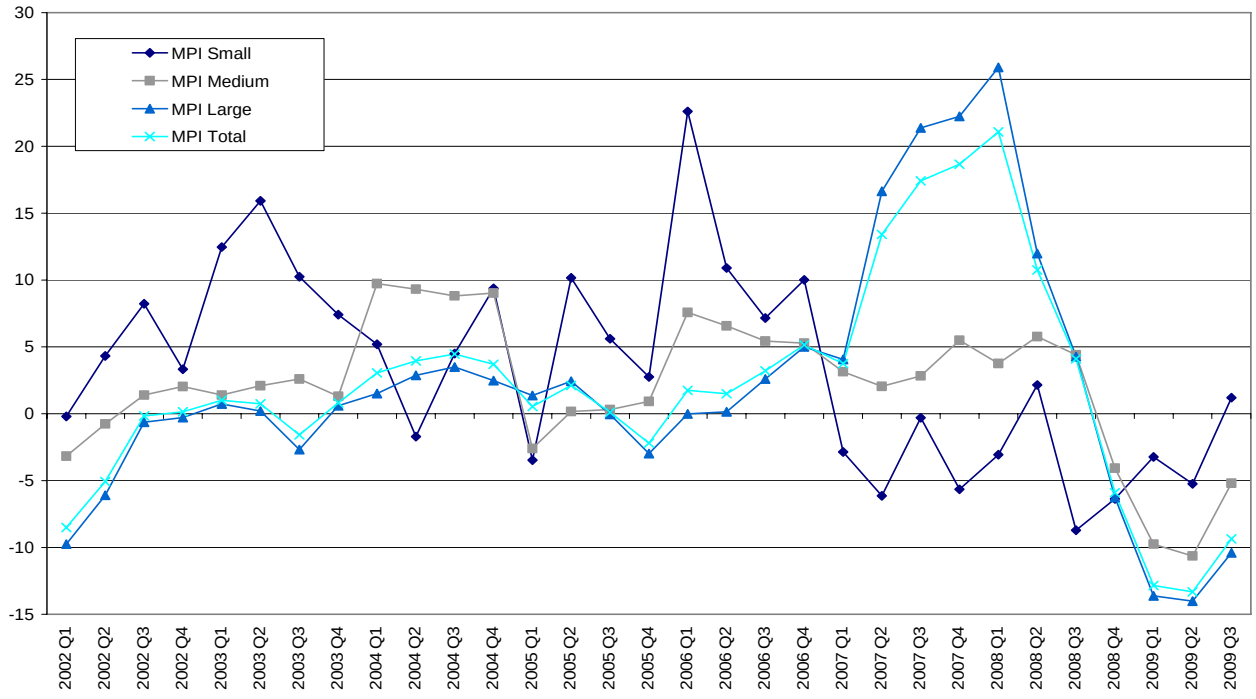
Source: Office for National Statistics

### MPI micro–data on turnover by firm size

**Figure 4** presents firm turnover by size from the MPI with corresponding summary statistics in **Table 2a**. Between 2002 Q1 and 2009 Q3, small firms experienced the fastest average growth rates at 3.4 per cent compared to 2.1 per cent for medium–sized firms and 2.0 per cent for larger firms. A particularly striking feature of the data is the acceleration in turnover growth rates in 2007 and the first quarter of 2008 for medium and large firms, followed by a sharp contraction up until 2009 Q2. This is reflected in the peak–to–trough falls in turnover reported in **Table 2b**, which were correspondingly greater for large than small firms.

## Figure 4 MPI quarterly growth rates in turnover: by firm size

Per cent, quarter on same quarter one year ago




Source: Office for National Statistics

These turnover movements partly reflect the rise and fall in energy and other commodities prices over this period. This turnover pattern is likely to be driven by large firms in the (extraction, energy and processing industries). However, it is also clear that the recession impacted strongly on the manufacturing sector, and there is reason to believe that larger firms were the most severely affected.

Smaller manufacturers operating in niche markets may have been able to absorb the crisis better than larger, more globally orientated producers such as car makers or intermediate capital goods producers. The sharp reduction in global trade as a result of a world–wide recession, the downswing in the stocks cycle, and a sharp fall in investment spending would be expected to have a strong knock–on effect on UK manufacturing, especially larger firms that are more likely to be export orientated. These factors have also been represented in figures on the volatility of turnover growth, where larger firms have exhibited greater volatility in growth rates than medium and small firms. Furthermore, this volatility was once again greater in the second half of the sample, coinciding with the sharp rise and fall in energy and commodity prices and the downturn in GDP between 2008 and 2009.

## Table 2a **MPI turnover data: summary statistics**

| Variable | Number of time series observations | Mean growth rate, quarter on same quarter one year ago (%) | Standard deviation |
|---|---|---|---|
| **2002 Q1 – 2009 Q3** | | | |
| Small | 31 | 3.4 | 7.4 |
| Medium | 31 | 2.1 | 5.1 |
| Large | 31 | 2.0 | 9.5 |
| Total | 31 | 2.0 | 8.1 |
| **2002 Q1 – 2005 Q4** | | | |
| Small | 16 | 5.9 | 5.2 |
| Medium | 16 | 2.7 | 4.2 |
| Large | 16 | -0.4 | 3.5 |
| Total | 16 | 0.2 | 3.4 |
| **2006 Q1 – 2009 Q3** | | | |
| Small | 15 | 0.8 | 8.5 |
| Medium | 15 | 1.5 | 5.9 |
| Large | 15 | 4.7 | 12.9 |
| Total | 15 | 4.0 | 11.0 |

Source: Office for National Statistics

Table 2b **MPI turnover data: peak–to–trough analysis**

| | Raw 'unadjusted' data | | Seasonally adjusted data | |
|---|---|---|---|---|
| | Timing of the recession | Peak–to–trough (%) | Timing of the recession | Peak–to–trough (%) |
| Small | 2006 Q4–2009 Q1 | -15.3 | 2006 Q4–2008 Q4 | -10.4 |
| Medium | 2008 Q2–2009 Q1 | -12.3 | 2008 Q2–2009 Q2 | -10.1 |
| Large | 2008 Q2–2009 Q1 | -17.0 | 2008 Q1–2009 Q2 | -14.3 |
| Total | 2008 Q2–2009 Q1 | -16.1 | 2008 Q1–2009 Q2 | -13.4 |

Source: Office for National Statistics

## Conclusion and possible directions for further research

This article uses micro–data to analyse the impact of the recession on different sized firms. Interesting results have been reported on the different experiences of small, medium and large firms in the UK production and services sectors. Size is not the only firm–level characteristic and micro–data could be used to analyse a variety of other characteristics against performance. Micro–data also supports other potentially interesting analyses, such as the survival rates of different firms, precise turning points in sectors and industries, as well as informing the revisions process of GDP estimates.

### Acknowledgements

The authors would like to thank Chris Davies, Felix Ritchie and Peter Patterson for their comments on an earlier draft of this paper. Advice and support from Pete Pring, Ab Day, Harry Duff and the VML team are also gratefully acknowledged.

### Notes

1. The Virtual Micro–data Laboratory (VML) is a facility within ONS which enables secure access to restricted data for research purposes. A number of different dataset are available – covering economic, social and financial aspects of the UK economy. More information on the VML can be found at www.ons.gov.uk/about/who-we-are/our-services/vml/index.html

2. Turnover and Orders in the Production and Services Industries (TOPSI) provides monthly current price estimates of turnover and orders based on SIC 2007. Most services and production activities are covered. The publication provides data on:

- total turnover with production and services (excluding construction, retail and financial services)
- export and home turnover for manufacturing industries (some exclusions)

- export and home orders for manufacturing industries (some exclusions)

More information on TOPSI is available at www.statistics.gov.uk/StaBase/Product.asp?vlnk=15359

3. Seasonal adjustment is undertaken using the X-11-ARIMA programme.

4. Between 1993 and 2008 the UK economy expanded for 63 successive quarters, its longest peacetime expansion. Combined with low and steady inflation, this period has been referred to as 'The Great Moderation'. Since 2008 inflation and output volatility has re–emerged. Commodity prices have gone through a strong cycle since 2008 impacting on inflation rates, and following the global financial crisis in 2008, the global economy experienced its deepest post–War recession.

## Contact

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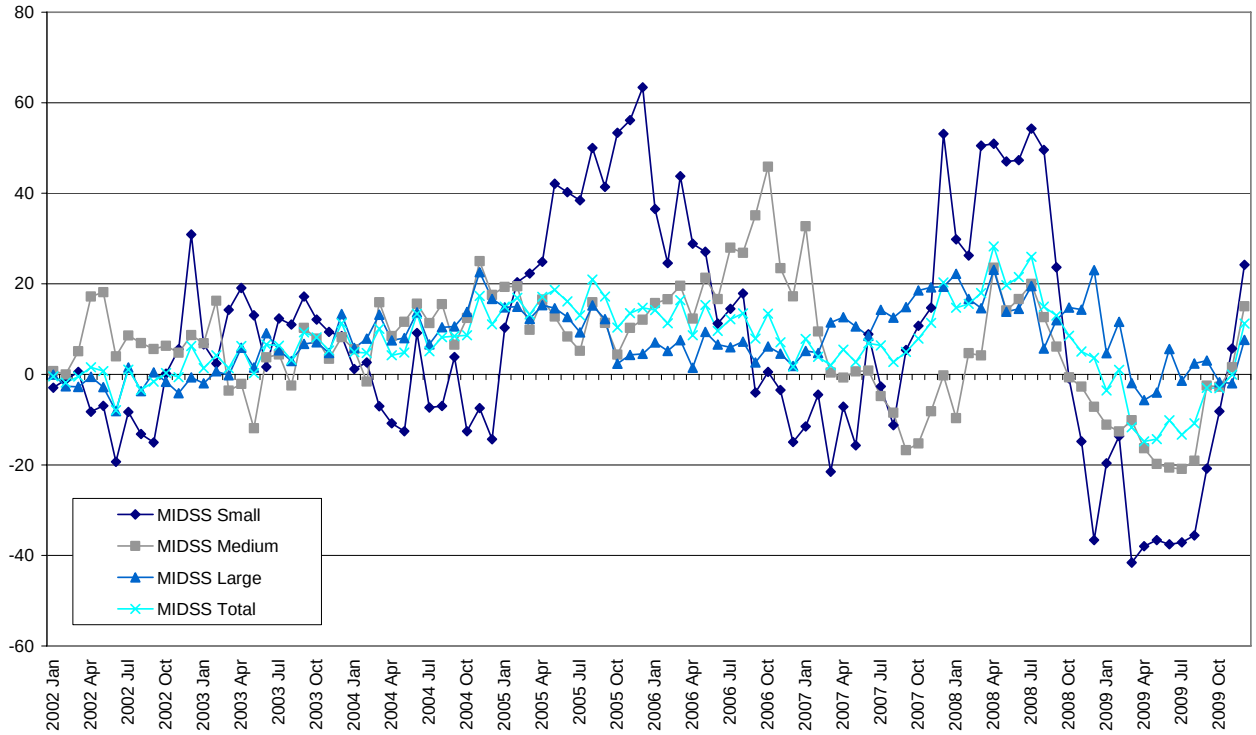
## Annex – Turnover by firm size using monthly data

These additional figures and tables replicate the analysis on MIDSS and MPI micro–data presented in this article using monthly data.

### Figure A1 MIDSS monthly growth rates in turnover: by firm size

Per cent, month on same month one year ago




Source: Office for National Statistics

### Table A1a MIDSS turnover data (monthly): summary statistics

| Variable | Number of time series observations | Mean growth rate, month on same month one year ago (%) | Standard deviation |
|---|---|---|---|
| **2002 M1 – 2009 M9** | | | |
| Small | 93 | 7.9 | 25.2 |
| Medium | 93 | 6.8 | 12.8 |
| Large | 93 | 7.8 | 7.2 |
| Total | 93 | 7.2 | 8.7 |
| **2002 M1 – 2005 M12** | | | |
| Small | 48 | 10.2 | 20.8 |
| Medium | 48 | 8.7 | 7.1 |
| Large | 48 | 6.2 | 6.9 |
| Total | 48 | 7.2 | 6.7 |

| | | | |
|---|---|---|---|
| **2006 M1 – 2009 M9** | | | |
| Small | 45 | 5.5 | 29.2 |
| Medium | 45 | 4.8 | 16.8 |
| Large | 45 | 9.5 | 7.2 |
| Total | 45 | 7.2 | 10.4 |

Source: Office for National Statistics

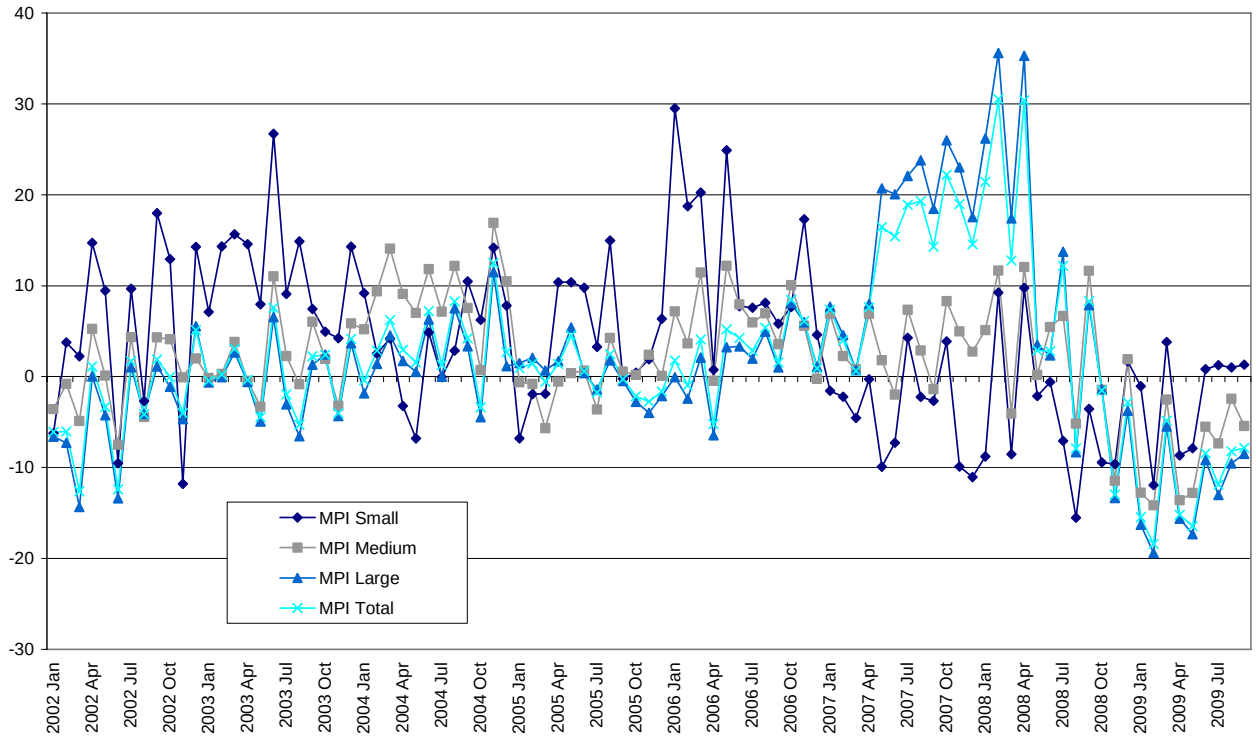
## Table A1b MIDSS turnover data (monthly): peak–to–trough analysis

| | Raw data | | Seasonally adjusted data | |
|---|---|---|---|---|
| | **Timing of the recession** | **Peak–to–trough (%)** | **Timing of the recession** | **Peak–to–trough (%)** |
| Small | 2008 M6–2009 M3 | -49.7 | 2008 M6–2009 M5 | -38.1 |
| Medium | 2006 M10–2009 M8 | -33.0 | 2008 M5–2009 M6 | -20.0 |
| Large | 2008 M12–2009 M5 | -17.9 | 2008 M11–2009 M5 | -4.4 |
| Total | 2008 M3–2009 M5 | -12.0 | 2008 M6–2009 M5 | -11.8 |

Source: Office for National Statistics

## Figure A2 MPI monthly growth rates in turnover: by firm size

Per cent, month on same month one year ago




Source: Office for National Statistics

## Table A2a MPI turnover data (monthly): summary statistics

| Variable | Number of time series observations | Mean growth rate, month on same month one year ago (%) | Standard deviation |
|---|---|---|---|
| **2002 M1 – 2009 M9** | | | |
| Small | 93 | 3.6 | 9.3 |
| Medium | 93 | 2.2 | 6.4 |
| Large | 93 | 2.1 | 10.6 |
| Total | 93 | 2.1 | 9.3 |
| **2002 M1 – 2005 M12** | | | |
| Small | 48 | 6.1 | 7.9 |
| Medium | 48 | 2.7 | 5.4 |
| Large | 48 | -0.4 | 4.8 |
| Total | 48 | 0.3 | 4.7 |
| **2006 M1 – 2009 M9** | | | |
| Small | 45 | 1.0 | 10.0 |
| Medium | 45 | 1.6 | 7.3 |
| Large | 45 | 4.8 | 14.1 |
| Total | 45 | 4.1 | 12.2 |

Source: Office for National Statistics

## Table A2b MPI turnover data (monthly): peak–to–trough analysis

| | Raw data | Seasonally adjusted data | Raw data | |
|---|---|---|---|---|
| | Timing of the recession | Peak–to–trough (%) | Timing of the recession | Peak–to–trough (%) |
| Small | 2006 M11–2008 M8 | -28.2 | 2006 M7–2008 M11 | -10.0 |
| Medium | 2008 M9–2009 M1 | -21.5 | 2008 M3–2009 M4 | -10.3 |
| Large | 2008 M9–2009 M1 | -24.9 | 2008 M2–2009 M6 | -16.9 |
| Total | 2008 M9–2009 M1 | -24.1 | 2008 M3–2009 M9 | -14.7 |

Source: Office for National Statistics

# Median and mean income analyses

**Their implications for material living standards and national well–being**

Blessing Chiripanhura
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## Summary

**This paper argues that median income analysis should be used to complement mean income analysis because median analysis gives a better indication of the level of economic well–being of the 'typical' household. Since the income distribution is positively skewed, mean analysis is influenced by extreme observations at the top end of the distribution, resulting in the mean exceeding the median. The paper shows that micro (household) data gives a better indication of national economic well-being than macro (National Accounts) data. It argues that final household income may be a preferable income variable for assessing material well-being because it includes all earned income and benefits paid in kind.**

## Introduction

A country's standard of living is often measured by income (Gross Domestic Product (GDP)) per person, with higher per person income indicating higher living standards. Alternative measures used by development practitioners include the Human Development Index, and accessibility and quality of education and health. The Commission on the Measurement of Economic Performance and Social Progress (CMEPSP) (2009) defines well–being as a multi–dimensional concept concerned with not only income, but also non–economic aspects of life like political voices and governance, social networks and relationships, the environment and security. The multi–dimensionality means there is no single indicator to summarise it, thus requiring the establishment of a system that captures all the relevant dimensions.

The question of whether or not GDP is a good indicator of national economic well–being has been debated frequently in economic analysis (Nordhaus and Tobin, 1973; Zolotas, 1981; Boarini et al, 2006). The topic has been addressed in a vast research literature (Nordhaus and Kokkelenberg, 1999; CMEPSP, 2009; Chiripanhura, 2010), resulting in proposals to develop and emphasise other measures of national economic well–being. GDP is criticised as a poor indicator of a nation's economic well–being (though it was never designed for that (Vanoli, 2005) because it does not measure some activities inside the production boundary well, and it excludes some determinants of welfare that are outside the production boundary (Allin, 2007).

Mean analysis of National Accounts indicators, such as consumption, income and wealth, to indicate economic well–being suffers from the drawback that it masks distributional differences, thus creating an impression of improving material living standards of all members of society, which may not be the case. To overcome this limitation, CMEPSP (2009) (Recommendation 4) proposed the increased use of median analysis to supplement mean analysis. This is because the median is not sensitive to extreme values (very large or small values) at either end of the income distribution. Two numerical examples in **Box 1** illustrate this point.

## Box 1 Illustration of median and mean income calculations

The median household is the one whose income sits in the middle of a ranked household income distribution, with the same number of (household) incomes on either side.

Assuming five households with incomes £10, £20, £30, £40 and £50.

Mean income is given by: $\frac{10+20+30+40+50}{5} = \frac{150}{5}$ = £30

Median income is also £30 (that is, the income in the middle after ranking the incomes).

Suppose that another five households have incomes £10, £20, £30, £40 and £200.

Mean income is given by: $\frac{10+20+30+40+200}{5} = \frac{300}{5}$ = £60

Median income is, again, equal to £30.

A change in income at the top of the distribution has caused the mean to double while the median remains the same. The median more accurately reflects the income of a ‘typical’ household.

This paper examines the different pictures of material living standards presented by mean and median income measures. It uses real GDP per person as the benchmark and compares this with household mean and median incomes. It builds on the statistical reasons why the median may be better than and/or need to supplement the mean by arguing that when measuring the level of national economic well-being, focus should be on the ‘typical’ rather than the ‘average’ household. It may also be essential to have both average analyses in order to get a fuller picture of living standards.

The paper is structured as follows. The next section explains the concepts applied in the analysis and also describes the data sources. This is followed by comparative analysis of mean and median incomes from an international perspective and from a single country (UK) perspective. The article also explores disaggregated household income data. It concludes that final income median analysis best indicates the level of economic well–being of the ‘typical’ household.

## Concepts and data sources

The paper uses the household as the main unit of analysis, in line with the CMEPSP's recommendation to emphasise the household perspective. A household is defined as a single person or a group of people who have the same address as their only or main residence, and who either share one meal a day and/or share the living accommodation (McCrossan, 1991; GSS, 1996). A household with more than one person enjoys lower consumption, housing, and other costs per person. This is because average fixed costs decline as the household size increases. For example, the price of a television licence is fixed irrespective of the number of persons living in a house, but the price per person falls as the number of people increases. A household adjusted for declining cost per person is called a consumption unit. It can be argued that consumption unit analysis gives a more accurate image of national economic well–being than per person analysis.

This article examines 'equivalised' household income. 'Equivalisation' means that household income is adjusted for household size and composition. This accounts for households of different sizes and/or composition requiring different levels of income to achieve the same standard of living. Although households may have the same equivalised income, it does not necessarily mean that they enjoy similar living standards. This is because they may differ in other characteristics. An example is whether or not the households own or rent their accommodation (Barnard, 2010), an issue not taken into account by equivalisation.

Two equivalisation scales are used. The McClements equivalence scale is applied to UK–only data, before housing costs are deducted (ONS, 2004; OECD, 2009; Anyaegbu, 2010). This scale takes into account household composition, size, and age. Total household income is divided by the equivalence number to get the equivalised household income. The Square Root equivalisation scale is applied to international household Luxembourg Income Survey (LIS) data: the equivalised household disposable income is obtained by dividing unadjusted household income by the square of the number of persons in a household, irrespective of household members' demographic characteristics[1].

Five different income variables are analysed and **Box 2** shows how each is calculated.

The income values are converted to real values using the implied GDP deflator (2008 = 100) for Household Final Consumption Expenditure from the UK National Accounts as a way of removing price effects. GDP data is seasonally adjusted and is a chain–linked volume measure. In line with the income variables in described in Box2, there are five possible median and mean analyses.

### Data sources

The analysis uses National Accounts GDP data as a benchmark. International GDP data is obtained from the Organisation for Economic Co–operation and Development (OECD) database. It is measured in current US dollar prices and current purchasing power parity[2]. International equivalised median household disposable income data comes from the LIS. This is data from micro datasets that has been weighted to reflect national income levels. For the detailed UK case study, National Accounts chain–linked volume measured GDP data is used. In addition, the most

recent wave of the Living Costs and Food (LCF) Survey, known as the Expenditure and Food Survey before 2009, is used. The LCF survey collects data on household incomes and expenditures and it covers approximately 6,000 private households in the UK each year. The data is weighted with census–based data. Barnard (2010) discusses the weighting procedures and limitations of the LCF survey. The LCF is chosen over other data sources like the Family Resources Survey because the former allows for the examination of more stages of household income (see Box 2), as it contains both income and expenditure data. This makes it possible to fully explore why median income analysis should complement mean income analysis.

## Box 2 Definitions of income variables

**Earnings**

*plus* Investment income

*plus* Occupational pension income (all before taxes)

*equals* **Original Income**

*plus* Cash benefits paid by the state (such as retirement pensions, child benefits)

*equals* **Gross income**

*less* Direct taxes

*less* Compulsory Social Insurance contributions

*less* Local taxes

*equals* **Disposable income**

*less* Indirect taxes paid by households

*equals* **Post-tax income**

*plus* Benefits paid in kind

*equals* **Final income**

## International comparisons of the economic well–being implications of mean and median income analyses

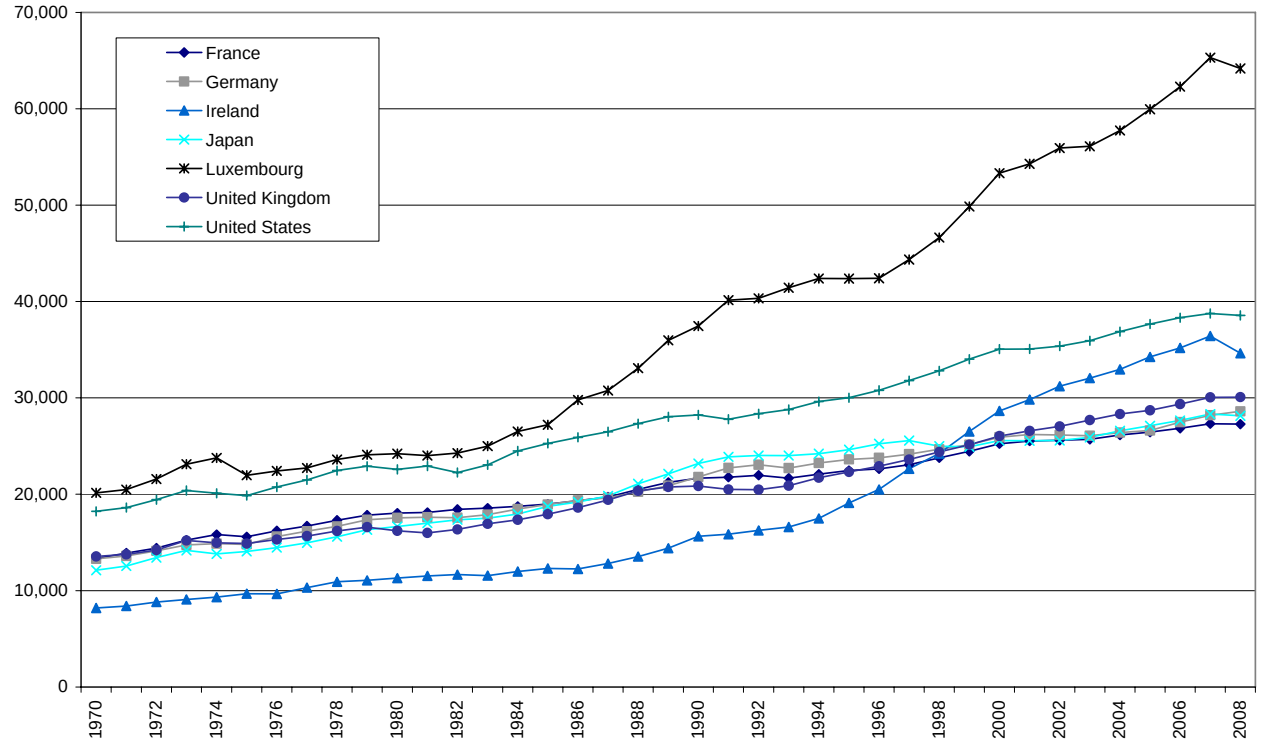
Given the limitations of mean income analysis (GDP per person) mentioned previously, analysis per consumption unit gives a better picture of material well–being, and median analysis gives important supplementary information to mean analysis (CMEPSP, 2009). The advantage of using

household data is that it can be adjusted for composition (because males and females have different resource demands and usages) and size (because there are economies of scale in consumption which reduce average costs). Median income analysis allows for the incorporation of demographic and distributional issues in the analysis of the economic well–being of the 'typical' household. CMEPSP (2009) notes that median analysis may be difficult in a National Accounts context because it is difficult to derive the median, and also because macro data comes from a range of different sources, some of which include institutions not classified as households. However, it is possible to carry out median income analysis using weighted micro level survey data.

Taking GDP per person as the starting point, **Figure 1** shows the evolution of the series for seven OECD countries since 1970[3]. The figure shows that Luxembourg has consistently had the highest GDP per person. Over the period, the rankings of most countries changed little, with growth in France, USA, Germany, UK and Japan averaging around two per cent per annum. Luxembourg's growth accelerated from 1982, and Ireland's from 1994, giving the two countries overall growth of nearly three per cent and four per cent per annum respectively. Taking GDP per person to indicate the level of material living standards[4], Figure 1 implies that Luxembourg has consistently had higher living standards, followed by the USA.

## Figure 1 Volume GDP per capita in selected countries, 1970–2008

$ US (2000 constant purchasing power parities)




Source: OECD database

A better indication of the state of economic well–being for citizens of a particular country may be obtained from micro rather than macro data. However, there is a challenge to international

comparative analysis arising from the lack of a consistent household dataset across countries. Fortunately though, the LIS puts together reasonably comparable international household disposable income data from micro data sources. Data for the years 2000 and 2004 clearly show the different pictures that emerge using median and mean analysis[5].

**Table 1** shows that, using median household income to show the level of material living standards, the highest level, in 2000, was for Luxembourg followed by USA, Germany, UK, Ireland and France. Using mean income, Germany and the UK swap places. Luxembourg experienced the highest disposable median income growth, followed by the UK, and for both countries median disposable income growth was higher than that of GDP per person. This may be indication of declining inequality.

## Table 1 GDP per person and equivalised median household disposable income for six OECD countries in 2000 and 2004

| Country | Equivalised median household disposable income in US dollars, current PPPs | | | | | | GDP per person in US dollars, current PPPs | | |
|---|---|---|---|---|---|---|---|---|---|
| | 2000 | | 2004 | | Percentage change | | 2000 | 2004 | Percentage change |
| | Mean | Median | Mean | Median | Mean | Median | | | |
| Luxembourg | 31,079 | 27,507 | 39,235 | 34,995 | 26.2 | 27.2 | 53,383 | 64,967 | 21.7 |
| USA | 28,981 | 24,094 | 32,195 | 26,672 | 11.1 | 10.7 | 35,051 | 40,267 | 14.9 |
| Germany | 20,245 | 18,051 | 23,316 | 20,646 | 15.2 | 14.4 | 25,952 | 29,895 | 15.2 |
| UK | 20,599 | 17,028 | 26,384 | 21,563 | 28.1 | 26.6 | 26,074 | 31,785 | 21.9 |
| Ireland | 19,122 | 17,010 | 24,365 | -- | 27.4 | -- | 28,647 | 36,445 | 27.2 |
| France | 18,386 | 16,067 | -- | -- | -- | -- | 25,276 | 28,269 | 11.8 |

Source: LIS for household data and OECD database for GDP data

The rank order of the countries changes if one uses GDP per person to measure the level of material living standards. Luxembourg, USA and France retain their positions as before, but Ireland climbs two positions to become third highest, and Germany falls two places to become fifth. Between 2000 and 2004, Ireland experienced the highest GDP per person growth (27.2 per cent), followed by the UK. Overall, GDP per person gives the impression of higher material living standards than equivalised median household income. By construction, GDP figures tend to overstate the current level of economic well–being and hence also give the wrong comparative image between some countries[6]. Thus, household income analysis gives a better picture of well–being. Although disposable incomes data (Table 1) may be readily available for some countries, disposable income tends to underestimate the actual level of household economic well–being because it does not include benefits paid in kind that are an important component of household resources in some countries. Final income would be preferable, but national data on benefits paid in kind is scarce and fraught with valuation challenges, limiting the scope for international comparative analysis.

## Table 2 Trend in mean and median real household incomes

| | Average annual change mid-1980s to mid-1990s | | | Average annual change mid-1990s to mid-2000s | | |
|---|---|---|---|---|---|---|
| | Median | Mean | Deviation in growth (Median - Mean) | Median | Mean | Deviation in growth (Median - Mean) |
| Australia | .. | .. | .. | 2.2 | 2 | 0.2 |
| Austria[1] | 2.8 | 2.7 | 0.1 | -0.6 | -0.6 | 0 |
| Belgium[1] | 0.4 | 0.8 | -0.4 | 1.2 | 1.5 | -0.3 |
| Canada | -0.2 | -0.1 | -0.1 | 1.1 | 1.4 | -0.3 |
| Czech Republic | .. | .. | .. | 0.5 | 0.6 | -0.1 |
| Denmark | 0.9 | 0.9 | 0 | 0.9 | 1.1 | -0.2 |
| Finland | 0.8 | 1.2 | -0.4 | 2.5 | 2.9 | -0.4 |
| France | 0.5 | 0.3 | 0.2 | 0.8 | 0.8 | 0 |
| Germany | 1.2 | 1.4 | -0.2 | 0.6 | 0.7 | -0.1 |
| Greece | 0.3 | 0.1 | 0.2 | 2.9 | 2.9 | 0 |
| Hungary | .. | .. | .. | 1.1 | 1.1 | 0 |
| Ireland[1] | 3.2 | 3.1 | 0.1 | 8.2 | 6.6 | 1.6 |
| Italy | 0.6 | 0.8 | -0.2 | 1 | 1.3 | -0.3 |
| Japan | 1.8 | 1.9 | -0.1 | -1 | -1.1 | 0.1 |
| Luxembourg | 2.4 | 2.7 | -0.3 | 1.5 | 1.6 | -0.1 |
| Mexico | 1.1 | 2.6 | -1.5 | -0.2 | -0.4 | 0.2 |
| Netherlands | 2.8 | 3 | -0.2 | 2 | 1.8 | 0.2 |
| New Zealand | -0.6 | 0.3 | -0.9 | 2.3 | 1.9 | 0.4 |
| Norway | 0.4 | 0.5 | -0.1 | 3.8 | 4.3 | -0.5 |
| Portugal[1] | 6.2 | 7.3 | -1.1 | 4.2 | 4.3 | -0.1 |
| Spain [1] | 3.2 | 3 | 0.2 | 5.5 | 5.1 | 0.4 |
| Sweden | 0.9 | 0.9 | 0 | 2.2 | 2.3 | -0.1 |
| Turkey | -0.8 | 0.4 | -1.2 | -0.3 | -1.9 | 1.6 |
| United Kingdom | 1.9 | 2.8 | -0.9 | 2.1 | 1.9 | 0.2 |
| United States | 1 | 1.4 | -0.4 | 0.4 | 0.7 | -0.3 |
| OECD-22[2] | 1.4 | 1.7 | -0.3 | 1.9 | 1.8 | 0.1 |
| OECD-20[3] | 1.5 | 1.7 | -0.2 | 2.1 | 2.1 | 0 |

1. Changes over the period mid-1990s to around 2000 for Austria, the Czech Republic, Belgium, Ireland, Portugal and Spain (where 2005 data, based on EU-SILC), are not deemed to be comparable with those for earlier years.

2. OECD-22 refers to the simple average for all countries with data spanning the entire period (i.e. excluding Australia, the Czech Republic and Hungary, as well as Iceland, Korea, Poland, the Slovak Republic and Switzerland).

3. OECD-20 refers to all countries mentioned above except Mexico and Turkey. Income flows have been deflated with each country's consumer price index.

*Source*: Adapted from CMEPSP, 2009, page 119.

Similar results, save for Luxembourg, emerge using data from a larger sample of countries in **Table 2**. Starting with the fact that income distribution is positively skewed; higher median income growth over mean may be indication that income distribution is becoming more equal. Equality between mean and median income growth may indicate no change to the distribution, and higher mean over median growth may indicate growth in income inequality. Table 2 shows real household mean and median incomes growth for 22 OECD countries between mid–1980s and mid–2000s.

Although the figures in the table are not directly comparable to figures from National Accounts because they are from micro data sources, they indicate international differences in material well–being that may not be discernible from National Accounts. For most of the countries, median income growth was less than mean income growth in the 1980s, implying possible growth in inequality, and mean analysis overstating living standards for the 'typical' household. Between 1990 and 2000, fewer countries had mean income growth greater than median income growth, suggesting greater change towards more equitable distribution. Higher growth of median income indicates growth in income of the 'typical' household, which may be associated with improving living standards.

Data problems (such as frequency and availability and differences in collection methods) limit the extent and depth of international median income comparative analysis. Single country micro data analysis provides a good window through which to see the pictures presented by mean and median income analysis. With micro data, both mean and median incomes can be equivalised, thus isolating distributional issues. It is also possible to incorporate in–kind benefits offered by the government since they play an important role in households' well–being status. In the following section, LCF survey data is analysed to provide insights into the level of well–being in the UK.

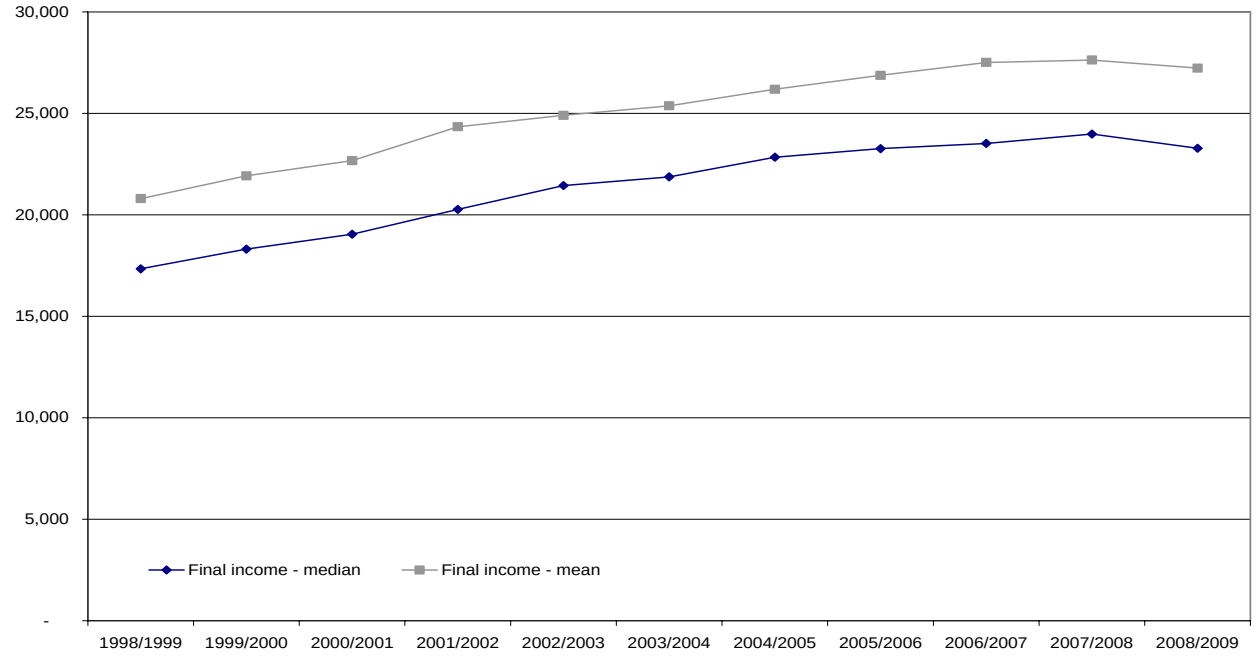
## LCF survey mean and median analyses

The UK's LCF survey data for the period 1998 to 2008, in line with the previous discussion, supports the idea that mean analysis must be supplemented with median analysis to get a fuller picture of material living standards. **Figure 2** plots final household income data. Equivalised mean final household income grew by an average of nearly three per cent between 1998 and 2008. In this case, mean household income gives a better picture of material living standards and hence the level of economic well–being than GDP per person because the former has been equivalised. Yet again, mean household income is problematic because it overstates material living standards (because it is influenced by extreme values). More information is gained by examining median household income. Median income grew by an average three per cent per annum between 1998 and 2008. Both averages declined between 2007 and 2008 because of the economic downturn, but more so for median income.

The absolute difference between mean and median household final income changed gradually between 2002 and 2008. Although mean income remained higher than median income over the period, median income grew at a faster rate. It is possible to gain additional insight into the different pictures emerging from mean and median income analyses by analysing the two averages in index form, as shown in **Figure 3**.

## Figure 2 Equivalised mean and median real final household incomes in the UK, 1998–2008

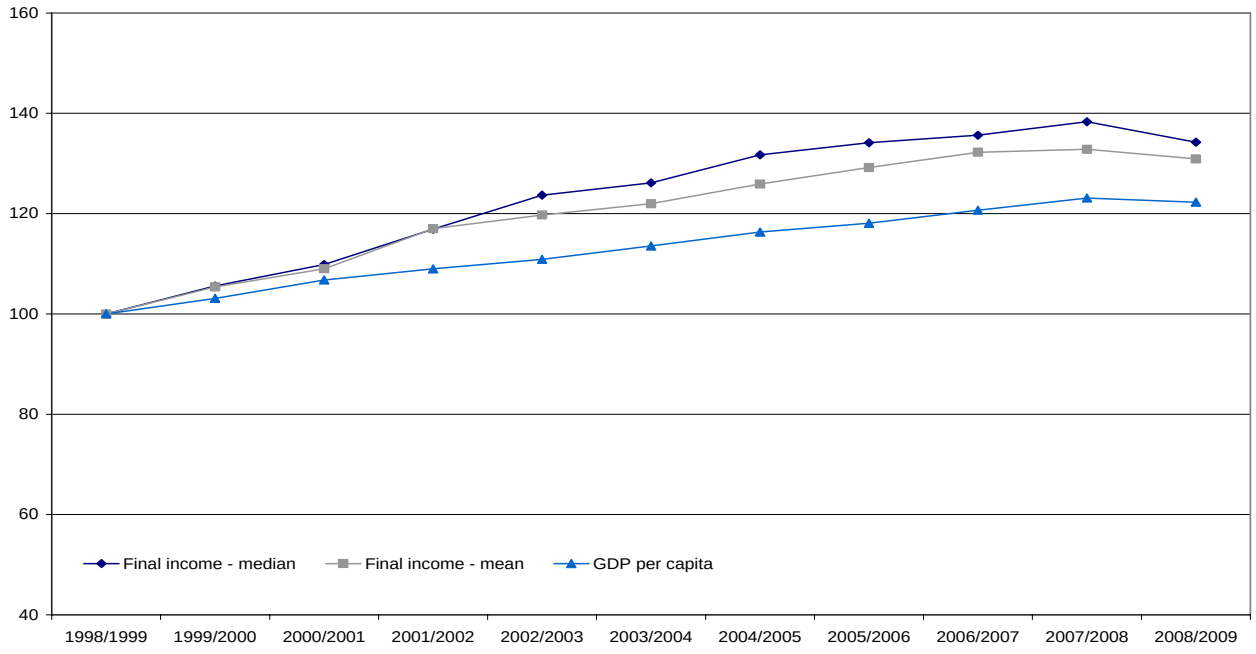
£




Source: Office for National Statistics

## Figure 3 Indices of GDP per capita and median and mean real final household income in the UK, 1998–2008

Index (1998/99 = 100)




Source: Office for National Statistics

The figure confirms that median income grew at a faster rate than mean income, indicating positive change towards improved economic well–being and greater equality. However, it declined at a faster rate than mean income between 2007 and 2008 because of, among other reasons, the weak growth of income for low paid workers, rising unemployment, and growth in inequality.

## Mean and median income analyses of other income variables

This section explores the income variables in Box 2. For all the income variables, the mean is greater than the median, confirming the arguments developed already, including that median income gives a better indication of the standard of living of the 'typical' household.

The original, gross and disposable income variables show stability over time, indicating no notable change in the income distribution, but an upward trend in the standard of living (see the **Annex**). The post–tax and final income variables also show an upward trend, but taxes and in–kind benefits ensured that median income grew at a faster rate than mean income, causing inequality to decline over time.

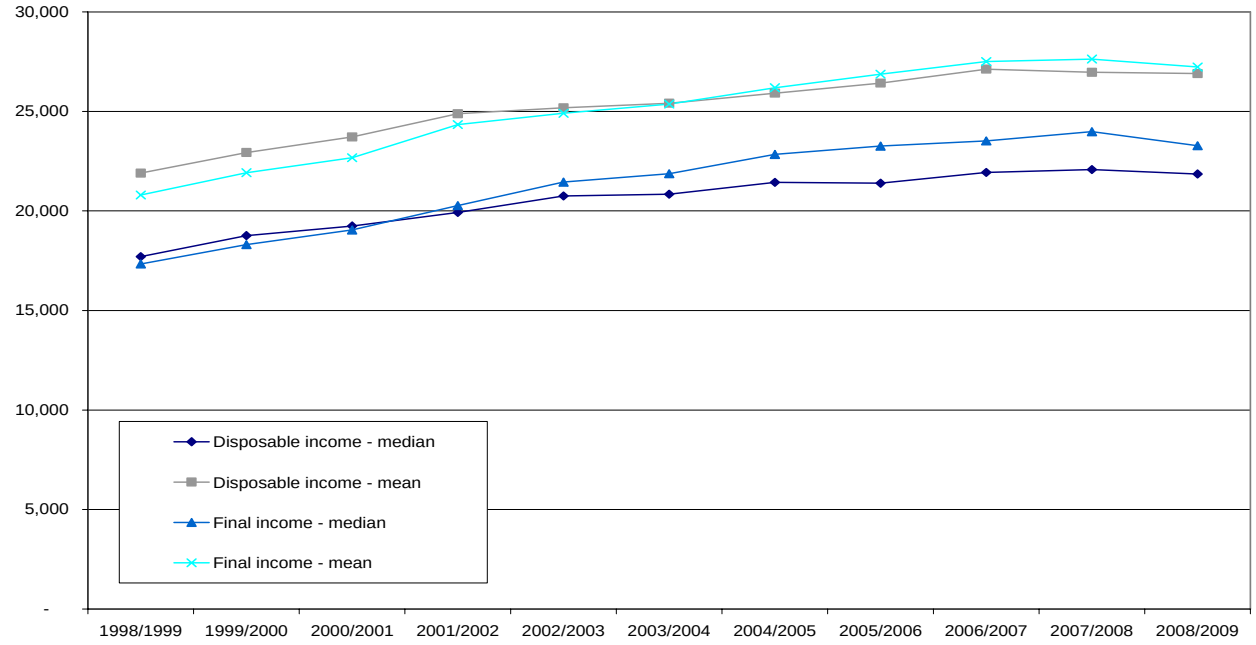
Since both mean and median incomes are equivalised, the difference between the series is a reflection of the structural composition of the income variables as well as the positive skewness of the distributions. The implications of mean and median income analysis on economic well–being are clear: mean analysis gives the impression that households have higher economic well–being than median analysis, but this may not necessarily be the case. Contemporaneous analysis of the two averages gives a full picture of the state of living standards. The implication of income composition on economic well–being is illustrated by disposable and final incomes as shown in **Figure 4**. The figure shows that from 2000 onwards, the level of median disposable income increased at a lower rate than that of median final income. Final income is obtained by subtracting indirect taxes from disposable income and adding in–kind benefits. The faster growth in the median final income series was driven more by increases in in–kind benefits than by declining indirect taxes.

This implies that the measure of income that one uses to assess economic well–being is very important for the conclusions reached. The same picture emerges from mean analysis too, but the difference between disposable and final income means is much less pronounced. Final income is preferable to other income measures because it includes both labour income and benefits paid in kind. It is therefore used for the following disaggregated household income analysis.

Calculating the ratio of the mean to median income provides further insights into why it may be important to simultaneously consider the two measures. **Figure 5** shows the ratios for original, gross, disposable and final household incomes. The higher the ratio (that is, ratio > 1), the more skewed the income distribution is, meaning that mean income analysis likely gives the impression of a higher level of national economic well–being. The figure shows that the original income ratio increased between 1998 and 2008, but the final income ratio declined during the same period. The difference between the two shows that income distribution in the UK narrowed between 1998 and 2008.

## Figure 4 UK median and mean real household disposable and final incomes, 1998–2008

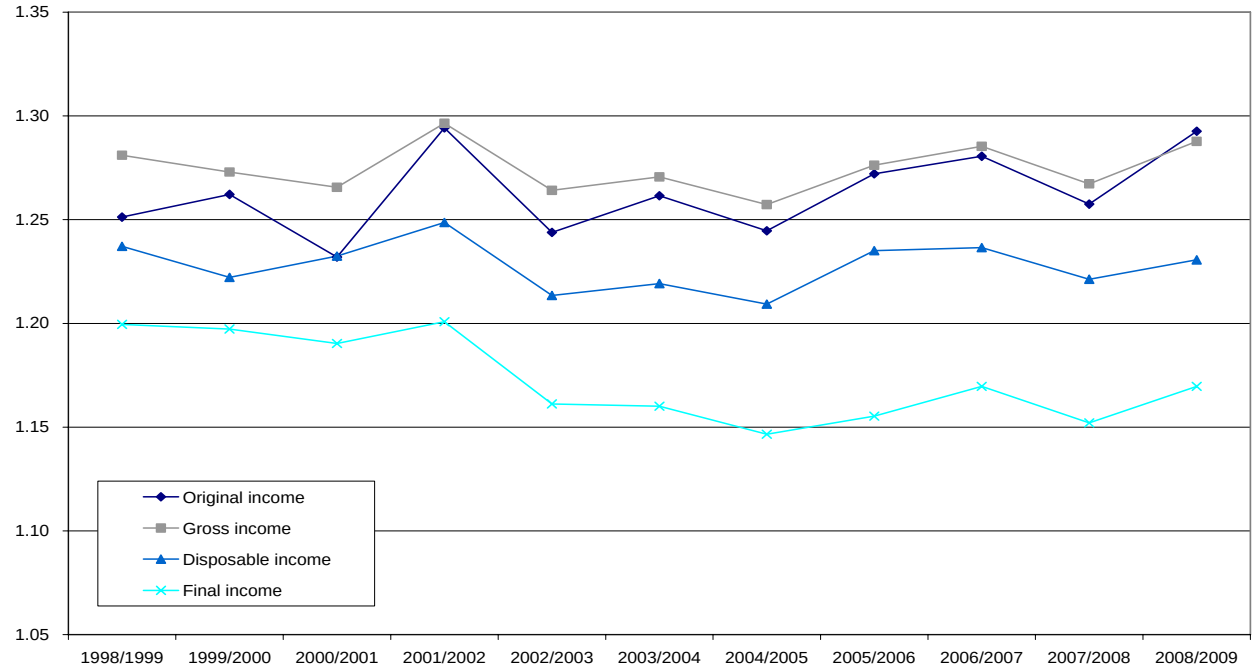
£




Source: Office for National Statistics

## Figure 5 Ratio of mean to median real household income in the UK, 1998–2008

Mean: median ratio




Source: Office for National Statistics

The conclusions from the figure are mixed: the final income ratio shows that there has been movement towards more equality in the income distribution and therefore better economic well–being for the 'typical' household. There was also slight progress in the same direction on the basis of disposable income analysis since 2001. However, the original income ratio shows that, over time, there has been growth in inequality. But this is not the preferred measure of income because it does not take into account taxes and benefits.

These results are confirmed by another measure of inequality – the Gini coefficient (Barnard, 2010), which is usually used to complement average income analysis. The Gini coefficient is a measure of the degree of income inequality between different groups of households. It is calculated from the Lorenz curve of household income distribution which plots the cumulative share of household income against the cumulative share of households. The Gini coefficient ranges from 0, representing complete equality (that is, all households having an equal share of the income), to 1, representing complete inequality (that is, one household owning all the income). **Table 3** shows the Gini coefficients of different income variables.

## Table 3 Gini coefficients for all households, 1998–2008

| | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Equivalised original income | 52.7 | 52.5 | 51.3 | 52.6 | 51.2 | 51.7 | 50.6 | 51.8 | 51.6 | 51.7 | 52.1 |
| Equivalised gross income | 38.3 | 38.3 | 37.5 | 39.0 | 37.1 | 37.4 | 36.1 | 37.3 | 38 | 37.5 | 37.6 |
| Equivalised disposable income | 35.0 | 35.3 | 34.6 | 36.0 | 33.5 | 33.7 | 32.3 | 33.6 | 34.5 | 34.2 | 34.2 |
| Equivalised post-tax income | 39.0 | 39.6 | 38.9 | 40.4 | 37.4 | 37.8 | 36.1 | 37.4 | 38.6 | 38.1 | 37.7 |

Source: Office for National Statistics

The table shows that the Gini coefficients declined between 2001 and 2004, indicating greater equality, and remained largely stable thereafter. Generally, the Gini coefficient tends to increase (that is, inequality increases) during periods of growth, and it records very small changes during recessions. Similar trends were obtained and published in the Department for Works and Pensions' Households Below Average Income publication (DWP, 2010).

Another way to analyse the income variables is to examine their mean and median income growth rates and compare them to GDP growth. For all income variables, mean and median income growth rates show a downward trend between 1998 and 2008 (see Appendix 1). Median income growth was more volatile than (GDP and) mean income growth. Median income growth was counter cyclical to GDP growth up to 2006/2007, after which both growth rates declined.

Over the past decade, GDP growth was generally higher than the growth in mean and median incomes. Assuming that national income is distributed between workers (wages and earnings) and owners of capital (profits, rents and so on), this may be indication that at national level, the income distribution became increasingly unequal in favour of owners of capital. Under these

circumstances, national economic well–being may not have increased at the same rate as national income as may be implied by GDP analysis.

## Disaggregated household income analysis

Further micro data analysis allows for the examination of inter–household distribution issues, which are not discernible from National Accounts data. This section assesses the well–being of households categorised by income level, and again by work status.

Disaggregating household income data by quintile further illustrates the differences in the level of economic well–being between groups (**Table 4**). The table takes the difference between the median and the mean and divides by the median. The result is expressed as a percentage. For the first quintile, the median exceeds the mean, and this was greatest in 1998, 1999 and 2001. This shows that income distribution in this quintile is negatively skewed. This quintile is also the biggest beneficiary of income redistribution. For the second, third and fourth quintiles mean income is greater than median income. This confirms the story already mentioned before. On average, there is greater inequality (larger difference between the median and the mean) in the second quintile, followed by the fourth and third respectively. Compared to the other quintiles, the fifth quintile has the largest difference between the mean and the median, the latter being smaller. This shows that there is greater inequality among households in the top quintile, even though they are better off than the rest. Thus, for the second, third, fourth and fifth quintiles, material living standards of a 'typical' household will be overstated if one uses the mean to measure economic well–being. For the first quintile, median income is greater than the mean, implying that material living standards of a 'typical' household at this point in the income distribution will be understated if one uses the mean to measure economic well–being.

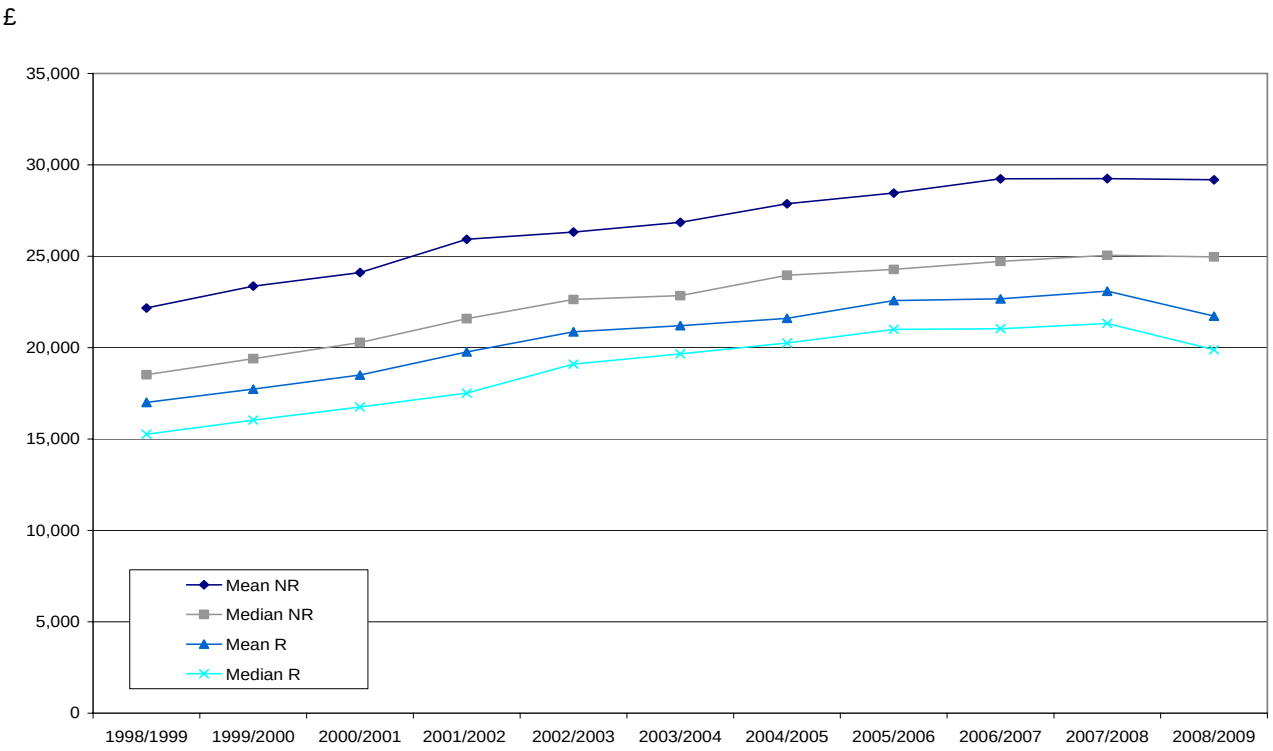
Table 4 **Quintile median–mean real income differences, 1998–2008**

| Year | 1st Quintile | 2nd Quintile | 3rd Quintile | 4th Quintile | 5th Quintile |
|---|---|---|---|---|---|
| 1998/1999 | 3.8 | -1.4 | -1.1 | -0.8 | -19.5 |
| 1999/2000 | 4.2 | -1.5 | -0.6 | -0.8 | -20.4 |
| 2000/2001 | 2.0 | -1.1 | -1.2 | -2.2 | -17.5 |
| 2001/2002 | 3.8 | -2.0 | -1.2 | 1.1 | -24.6 |
| 2002/2003 | 2.7 | -2.2 | -1.3 | -1.9 | -16.2 |
| 2003/2004 | 0.8 | -1.6 | -1.4 | -1.4 | -21.2 |
| 2004/2005 | 0.7 | -1.9 | -1.5 | -3.2 | -16.2 |
| 2005/2006 | 0.7 | -2.0 | -3.0 | -3.2 | -16.4 |
| 2006/2007 | 0.6 | -3.4 | -2.7 | -2.3 | -19.1 |
| 2007/2008 | 1.0 | -2.9 | -2.5 | -2.5 | -16.0 |
| 2008/2009 | 2.3 | -1.4 | -0.6 | -1.1 | -16.2 |

Source: Author's calculations based on Office for National Statistics data

Further disaggregation of LCF data by household work status produces two groups – retired and non–retired households. For both groups, mean income is greater than median income, as shown in **Figure 6.** Again, using mean income to measure material living standards will give the impression of higher economic well–being, but this may not be true. Comparing the means and medians of the two groups shows that the mean and median for the non–retired are greater than those for the retired.

Figure 6 **Equivalised mean and median real incomes of the UK's retired and non–retired households, 1998–2008**




Source: Office for National Statistics

Within–group analysis shows that there is greater divergence between the mean and median for the non–retired than for the retired. This indicates that there is greater skewness and hence inequality in the non–retired households' income distribution than in retired households. The lower difference between the mean and median for the latter indicates greater equality. These distributional outcomes are confirmed by disposable income Gini coefficients, as shown in **Table 5**.

The table shows that for non–retired households, the Gini coefficient was nearly constant between 2006 and 2008. The Gini coefficient for retired households was lower, and declined marginally between 2006 and 2008. Overall inequality declined between 2001 and 2004.

In index form, from 2001, the retired households' median income index grew at a faster rate than that for non–retired households until 2008 when the former declined markedly while the latter remained constant. The same applies to mean income. These trends are shown in **Figure 7**.

## Table 5 Equivalised real household disposable income Gini coefficients, 1998–2008

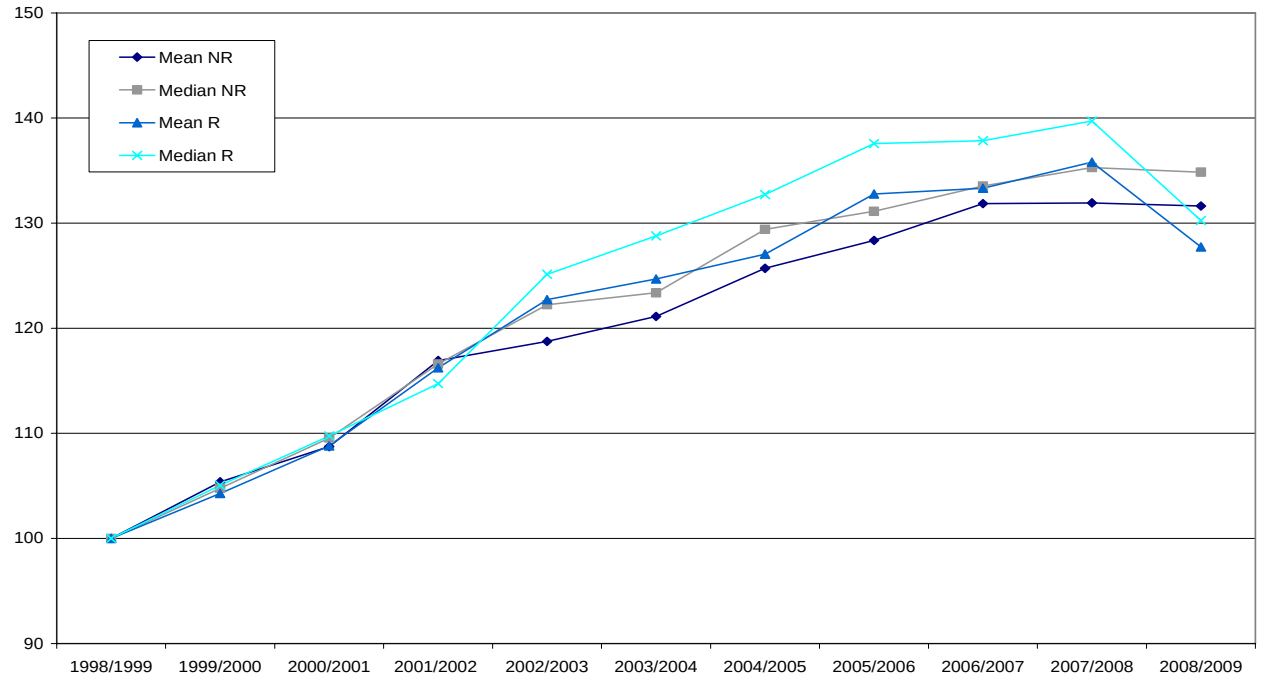
| | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| All | 35 | 35.3 | 34.6 | 36 | 33.5 | 33.7 | 32.3 | 33.6 | 34.5 | 34.2 | 34.2 |
| Non–retired | 34.9 | 35.2 | 34.1 | 35.5 | 33.4 | 33.9 | 32 | 33.8 | 34.5 | 34.2 | 34.4 |
| Retired | 28.1 | 27.6 | 28.8 | 29.2 | 26.5 | 25.5 | 25 | 25.8 | 26.9 | 26.9 | 26 |

Source: Office for National Statistics

The deviation of the retired median income index from the non–retired median income index signifies the amount of transfers and benefits paid in kind received by retired households. The transfers and benefits could be in the form of items provided without charge such as television licences and bus passes, and subsidies such as the fuel allowance. The higher demand for health services by retired households also increases the deviation.

## Figure 7 Indices of real final incomes for retired and non–retired households, 1998–2008

Indices (1998/99 = 100)




Source: Office for National Statistics

Between 2007 and 2008, mean and median final incomes for both retired and non–retired households declined, but marginally so for the latter. The decline was possibly driven by fall in investment income (due to declining interest rates) and new retirees receiving lower pensions (because of the impact of the financial crisis on equity values and the sharp reduction in interest

rates). Increases in council tax and national insurance also reduced household disposable incomes. In comparison to non–retired households, the larger percentage decline in the median final income for retired households, leads to declining economic well–being.

## Future work

Despite the discussion about mean and median income in this article, it should be borne in mind that income, at best, indicates the short term status of material living standards and well–being. Income is subject to short term fluctuations, as are living standards, but such fluctuations may be self–correcting over time. This makes income a less appropriate measure of long term material living standards and well–being since it does not capture wealth. To gain insights into the state of long term national economic well–being, it may be important, therefore, to analyse household wealth and income together.

Further, although it is useful to complement mean income analysis with median analysis, there is still lack of information on the nature and structure of intra–household resource receipts and distribution, and how these change with size. These issues have important implications for material living standards and well–being and need to be explored. Current work being conducted by the ONS involves measuring distributions within a National Accounts framework. Finally, the next wave of the ONS's Wealth and Assets Survey should make it possible to jointly analyse household wealth and income.

## Conclusion

This article has highlighted the importance of using median income analysis to supplement mean income analysis when examining material living standards and national economic well–being. It uses GDP data as a benchmark, and LIS and LCF data to explore the different pictures shown by mean and median income analyses. Median income is the income available to the household in the middle of the income distribution; thus it represents the standard of living of the 'typical' household. It has been shown that in most instances, median income is lower than mean income, and that rising inequality causes median income to lag behind mean income. The latter is influenced by high values at the top of the income distribution, thus giving an impression of high living standards even though this may not be the case. It has been argued that, under these circumstances, mean analysis needs to be complemented with median analysis in order to get a more informed picture of the standard of living. It has been acknowledged that each average measure has strengths and weaknesses, and that, depending on the distribution of income, relying on any one of measure may result in wrong conclusions about living standards and economic well–being.

The article has argued that household income data at the micro level give an enhanced picture of the state of household economic well–being than National Accounts data because the former can be equivalised and can easily indicate the 'typical' household. Using various measures of household income, it has been shown that one needs to be careful in choosing and interpreting mean and median income data. It has been argued that, compared to other income measures, final

income has the advantage that it takes into account the receipt of benefits paid in kind which have an important impact on material living standards and well–being, especially for retired households. Further, inequality analysis using the Gini coefficient showed that inequality declined between 2001 and 2004 and stabilised thereafter, a result confirmed by the mean to median ratios of disposable and final incomes.

It has been shown that economic recession resulted in both mean and median final income declining. The decline was more marked for retired than non–retired households, in part because of declining returns to investments and reduced pension entitlements to the retiring. The Gini coefficient for non–retired households has been shown to be higher, while that of retired households is lower and declined marginally towards the end of the study period. Quintile analysis also showed that mean and median income analyses may have different standard of living implications for the first and second, and the fourth and fifth quintiles. Such difference can only be shown using household rather than National Accounts data, with more knowledge gained from supplementing mean analysis with median analysis.

## Acknowledgements

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## Notes

1. The standard method used by both UK and international studies is now the modified-OECD equivalisation scale as discussed in Anyaegbu (2010).

2. Purchasing power parity (PPP) is the theory that estimates the exchange rates between national currencies in long-term equilibrium when their purchasing power is the same in each of the countries. The PPP exchange rate will thus be equal to the ratio of the countries' price level of a fixed basket of goods and services.

3. Only seven countries have been chosen because of their close economic links with the UK, and to avoid congesting the graph. The countries also clearly illustrate the points discussed.

4. Other measures are sometimes used to measure standard of living, including health (access and quality), education standards, and income inequality. Composite measures like the Human Development Index can also be used.

5. These are the years for which latest data is available for the countries.

6. The absolute GDP and household income values are not directly comparable because the disposable income estimates have been divided by the square of the household size, whereas the

GDP figures by just the population. However, focus here is on their implications for well–being between countries.

## Contact

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## Annex: Equivalised real household income (£), 1998/99-2008/99

| | Orig. median | Orig. mean | Gross median | Gross mean | Disp. median | Disp. mean | Post median | Post mean | Final median | Final mean |
|---|---|---|---|---|---|---|---|---|---|---|
| 1998/99 | 18,559 | 23,222 | 21,512 | 27,557 | 17,704 | 21,903 | 13,593 | 17,441 | 17,340 | 20,800 |
| 1999/00 | 19,241 | 24,285 | 22,610 | 28,781 | 18,765 | 22,933 | 14,432 | 18,319 | 18,309 | 21,921 |
| 2000/01 | 20,535 | 25,298 | 23,531 | 29,780 | 19,246 | 23,719 | 14,960 | 18,883 | 19,048 | 22,673 |
| 2001/02 | 20,584 | 26,641 | 24,118 | 31,268 | 19,927 | 24,882 | 15,687 | 20,243 | 20,269 | 24,340 |
| 2002/03 | 21,165 | 26,326 | 24,705 | 31,229 | 20,755 | 25,184 | 16,564 | 20,435 | 21,448 | 24,905 |
| 2003/04 | 21,272 | 26,834 | 25,057 | 31,837 | 20,841 | 25,409 | 16,494 | 20,603 | 21,871 | 25,372 |
| 2004/05 | 21,905 | 27,262 | 25,816 | 32,457 | 21,433 | 25,919 | 17,198 | 21,120 | 22,842 | 26,190 |
| 2005/06 | 21,866 | 27,814 | 25,983 | 33,161 | 21,392 | 26,421 | 17,214 | 21,605 | 23,261 | 26,873 |
| 2006/07 | 22,711 | 29,083 | 26,661 | 34,269 | 21,935 | 27,122 | 17,558 | 22,234 | 23,519 | 27,509 |
| 2007/08 | 22,820 | 28,696 | 26,877 | 34,060 | 22,079 | 26,964 | 17,828 | 22,241 | 23,984 | 27,631 |
| 2008/09 | 21,785 | 28,159 | 26,128 | 33,645 | 21,858 | 26,899 | 18,015 | 22,440 | 23,279 | 27,228 |

Definitions

Orig. mean = original income – mean;
Gross mean = gross income – mean;
Disp. mean = disposable income – mean;
Post mean = post-tax income – mean;
Final mean = final income – mean;

Orig. median = original income – median
Gross median = gross income – median
Disp. Median = disposable income – median
Post median = post-tax income – median
Final median = final income – median

# Education: public service output, input and productivity

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## Summary

**This article presents the latest estimates of publicly funded education productivity in the United Kingdom. From 1996 to 2009 productivity declined by 0.1 per cent, but this marginal fall overall masks three periods of greater change. From 1996 to 1999, productivity grew by 7.1 per cent, with an annual average increase of 2.3 per cent. In this period there was strong output growth, due to growth in the school age population, but only weak growth in inputs. From 1999 to 2007, productivity fell by 9.4 per cent, an annual average fall of 1.2 per cent. Growth in school attendance, once adjusted for quality, was outstripped by a sharp rise in inputs, mainly through the employment of more school support staff. From 2007 to 2009, productivity grew by 2.9 per cent, with an annual average increase of 1.4 per cent, as output grew faster than inputs, due mainly to relatively large improvements in pupil attainment at age 15/16 in England and Wales.**

## Introduction

This article presents the latest estimates of multi–factor productivity growth in publicly funded education services – which are equal to the growth in the ratio of the volume of output to the volume of inputs. The estimates presented in this article are constructed in the same way as those presented in *Total Public Service Output, Inputs and Productivity* (ONS 2010a) from 1997 to 2008, except that this article extends the scope of Further Education coverage from those aged under–19 to all ages. It also presents more detailed analysis and provides estimates from 1996 to 2009 using the latest data.

It is unlikely that a single measure of productivity change will ever capture all the costs and benefits of education. The methods give approximations to a complex reality and estimates therefore need to be interpreted carefully. The *Atkinson Review* (2005) recommends that a process of triangulation is undertaken when new output and productivity figures are produced for government services. This involves presenting independent corroborative evidence to provide a context for estimates of output (in terms of quantity and quality) and inputs. Therefore, this article also

provides an update of triangulation evidence previously presented *in Public Service Output, Input and Productivity*: *Education* (ONS 2009).

The article proceeds as follows. The next section looks at the measurement of education output in the UK – consisting of quantity and quality. Next, the focus turns to measuring the components of education inputs, before output and input estimates are combined to estimate productivity growth. The final section briefly discusses further development work planned for these statistics.

## Output of education in the UK

### Education quantity

Education output has two components:

- Quantity (which is adjusted by)
- Quality

This section considers the quantity component. Quantity is the sum of publicly funded education services delivered before quality adjustment and, as recommended by Eurostat (2001), is measured using pupil and student numbers. In this article, education quantity includes full–time equivalent (FTE), publicly funded pupils and students in:

- government–maintained primary, secondary and special schools, adjusted for attendance
- further education colleges
- pre–school education, including places procured from the private, voluntary and independent sector; and
- higher education studying for initial teacher training and health professional courses funded directly by government

In the previous education productivity article (ONS 2009) publicly–funded further education courses for those aged under–19 were included since it was logical to consider them with pupils aged sixteen to eighteen in school sixth forms in a measure of education productivity. This differed from National Accounts measures where, although publicly funded educational institutions up to the age of 16 are classified to the public sector, further education and sixth form colleges were classified in the Non–Profit Institutions Serving Households (NPISH) sector. ONS has recently reviewed the classification of further education institutions in the National Accounts, resulting in a decision to reclassify all further education institutions in the UK into the (public) general government sector (Stokoe 2010). Development work has also been completed so that further education for all ages can be included in this article. In the future National Accounts will have the same coverage as this article. The quantity measure for each of the components of education output is based on pupil or student numbers in each academic year. **Box 1** provides an overview on recent changes to the UK school age population.

**Table 1** summarises full–time equivalent pupil numbers by type of education and by country, on an academic–year basis.

## Table 1 Full-time equivalent pupil/student numbers by provider and country, 1995/96–2008/09

United Kingdom

Index numbers, 1995/96 = 100

| | 1995/96 | 1996/97 | 1997/98 | 1998/99 | 1999/00 | 2000/01 | 2001/02 | 2002/03 | 2003/04 | 2004/05 | 2005/06 | 2006/07 | 2007/08 | 2008/09 | *Pupil numbers in 1995/96*[5] | *Pupil numbers in 2008/09* | *Average annual % change* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ***By provider*** | | | | | | | | | | | | | | | | | |
| Maintained pre-school | 100.0 | 101.3 | 101.5 | 104.9 | 103.7 | 106.2 | 103.1 | 102.3 | 99.4 | 96.7 | 99.5 | 101.5 | 102.4 | 103.1 | 250,300 | 258,000 | 0.2 |
| PVI pre-schools | - | 100.0 | 102.8 | 118.8 | 163.2 | 251.3 | 320.7 | 419.7 | 439.7 | 446.4 | 452.6 | 473.7 | 480.5 | 487.0 | 55,900 | 272,400 | 14.1 |
| Primary School | 100.0 | 100.7 | 101.2 | 101.0 | 100.7 | 99.9 | 99.1 | 98.0 | 96.7 | 95.6 | 94.2 | 93.0 | 92.4 | 91.9 | 4,938,800 | 4,537,700 | -0.6 |
| Secondary Schools | 100.0 | 101.0 | 101.8 | 103.2 | 104.9 | 106.5 | 107.4 | 108.6 | 109.2 | 108.8 | 108.4 | 107.2 | 105.3 | 103.4 | 3,677,400 | 3,803,300 | 0.3 |
| Special Schools | 100.0 | 100.1 | 100.7 | 100.7 | 99.7 | 98.9 | 97.8 | 97.0 | 94.8 | 93.2 | 92.3 | 92.3 | 92.2 | 92.9 | 107,700 | 100,100 | -0.6 |
| CTC/ Academies[1] | 100.0 | 106.6 | 110.2 | 112.9 | 115.7 | 117.0 | 120.5 | 141.2 | 185.3 | 220.5 | 262.7 | 369.8 | 560.4 | 870.7 | 14,300 | 124,800 | 18.1 |
| Initial Teacher Training | 100.0 | 96.0 | 89.8 | 83.9 | 77.7 | 79.6 | 81.7 | 85.4 | 88.7 | 88.7 | 88.8 | 92.6 | 86.8 | 85.8 | 71,700 | 61,500 | -1.2 |
| Health Professional Activity | 100.0 | 107.3 | 116.4 | 129.8 | 142.7 | 155.5 | 168.0 | 185.9 | 204.7 | 219.7 | 227.1 | 224.6 | 208.4 | 201.6 | 53,000 | 106,800 | 5.5 |
| Further Education | 100.0 | 105.2 | 103.2 | 100.3 | 100.1 | 100.4 | 106.0 | 109.8 | 117.5 | 117.3 | 113.9 | 107.6 | 106.9 | 105.7 | 1,189,100 | 1,256,800 | 0.4 |
| ***By country*** | | | | | | | | | | | | | | | | | |
| England | 100.0 | 101.5 | 101.9 | 102.2 | 102.7 | 103.5 | 104.6 | 105.8 | 106.7 | 106.3 | 105.3 | 103.7 | 103.0 | 102.5 | 8,574,500 | 8,785,900 | 0.2 |
| Wales[2] | 100.0 | 100.5 | 101.1 | 101.0 | 101.6 | 102.2 | 102.2 | 103.2 | 102.8 | 101.6 | 100.8 | 99.4 | 98.2 | 97.1 | 555,700 | 539,600 | -0.2 |
| Scotland[3] | 100.0 | 100.6 | 100.0 | 101.4 | 103.3 | 105.0 | 105.3 | 104.8 | 104.0 | 102.5 | 101.5 | 101.3 | 99.5 | 98.3 | 848,500 | 834,000 | -0.1 |
| Northern Ireland[4] | 100.0 | 100.6 | 100.1 | 99.5 | 99.4 | 99.3 | 99.4 | 99.3 | 98.9 | 98.1 | 97.5 | 96.4 | 95.7 | 95.4 | 379,500 | 362,100 | -0.4 |
| UK | 100.0 | 101.4 | 101.7 | 101.9 | 102.6 | 103.4 | 104.4 | 105.4 | 106.0 | 105.4 | 104.4 | 103.0 | 102.2 | 101.6 | 10,358,200 | 10,521,500 | 0.1 |

1. City Technology Colleges from 1988 and Academies from 2002 in England only. Of the 15 original City Technology Colleges, 12 have now converted to Academy status.

2. Includes estimates for Wales for private, voluntary and independent sector pre–school numbers and to 1997/98 for health professional activity

3. Includes estimates for Scotland for maintained pre–school numbers from registration numbers and to 2002/03 for health professional activity

4. Northern Ireland private, voluntary and independent sector pre–school data for 1996/97

5. Includes private, voluntary and independent pre–school data for 1996/97

Source: Department for Education, Welsh Assembly Government, Scottish Executive, Northern Ireland Statistics and Research Agency.

Pupil numbers in primary, secondary and special schools throughout the UK and England–only city technology colleges (CTCs) and academies are adjusted for attendance, in order to reflect more accurately the quantity of education services delivered.

No attendance adjustments are currently made to the pupils/students in UK pre–school education, initial teacher training (ITT), health professional training and further education (FE). **Box 2** provides some further discussion on the adjustment for attendance.

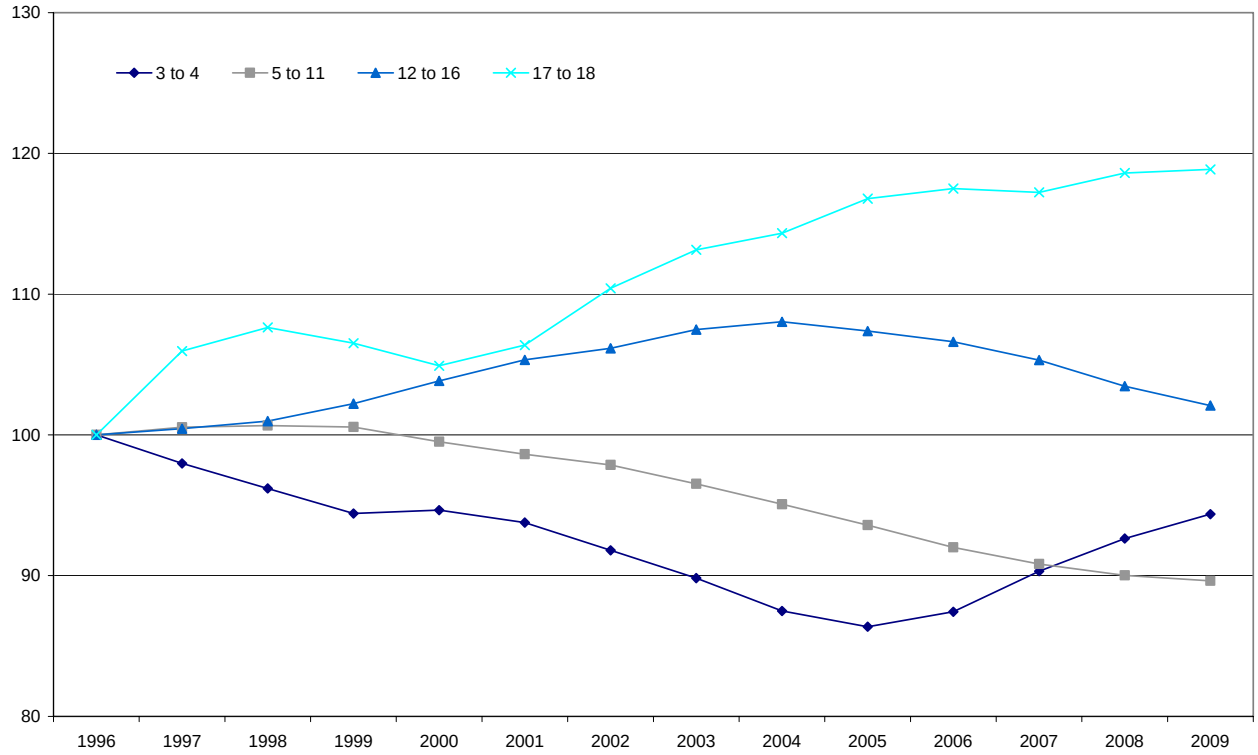
## Box 1 UK school age population

The quantity measure for education covers eight categories of publicly funded education including pre–schools, primary and secondary schools, further education and training places for health professionals and teachers. Pupils in compulsory schooling (aged 5–16) account for around four–fifths of the total. As school education is compulsory between the ages of 5 and 16, numbers attending primary and secondary schools are largely driven by population changes. Also, the introduction of grants for a number of pre–school education sessions per week has led to a rapid increase in users of nursery and pre–school places.

**Figure 1** in this box shows how numbers of children in different age groups have changed since 1996. There has been a marked increase in 17–18 year old children, but declines in numbers of pre–school and primary school age children.

### Figure 1 UK school–age population estimates by age group 1996—2009

Index numbers, 1996=100



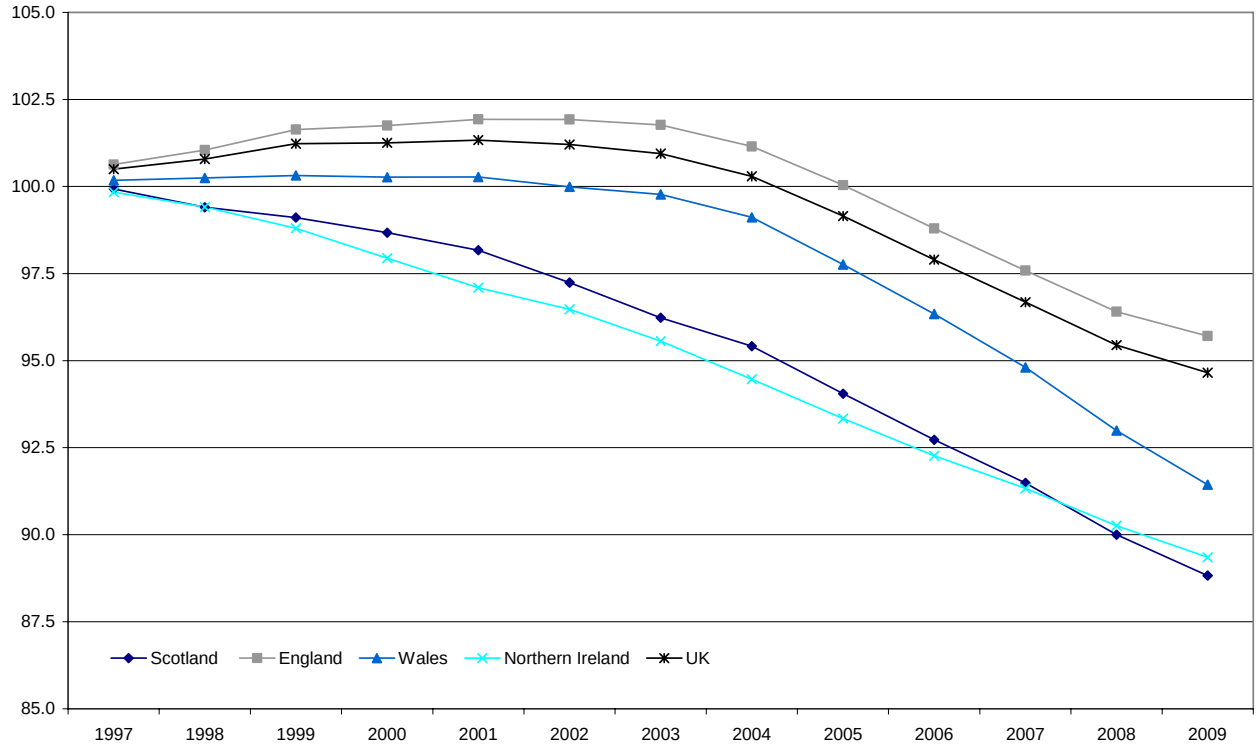

Source: Office for National Statistics

## Box 1 UK school age population

**Figure 2** shows how the population has changed within the UK. Overall, numbers of 5–16 year olds increased between 1996 and 2003, but by 2009 had declined to around 5 per cent below their 1996 level, with larger and steadier falls in Wales, Scotland and Northern Ireland.

### Figure 2 UK school–age (5–16) population estimates by country, 1996–2009

Index numbers, 1996 = 100




Source: Office for National Statistics

Going forward, the live birth rate has been increasing in all countries of the UK since 2003, making a positive impact on output growth from 2006 onwards when the first children became eligible for publicly funded nursery provision.

## Box 2 Are attendance–adjusted pupil numbers a good proxy for quantity?

Eurostat (2001) recommends that school education output should be measured either using pupil hours or alternatively, pupil numbers where hours of tuition are broadly consistent over time. The current ONS measure is based on pupil numbers but, following Atkinson (2005), adjusts these figures for attendance to more accurately approximate the amount of teaching services delivered. However, the measure still has the potential to miss variation in school output for two reasons:

- There is no legislation covering either the minimum or maximum number of teaching hours delivered by providers at each stage in any of the UK countries, only guidelines[1]
- The minimum number of half–day sessions (morning/afternoon) to be scheduled in each academic year is covered by legislation but the actual number delivered may vary due to external factors such as poor weather, industrial action, health–based closures or localised facility problems

### Evidence on teaching hours

Very few data are currently available allowing comparisons of teaching hours delivered by provider and by country. In guidelines for England, published in 1990, a small sample of then–recently inspected schools is included. This shows, on a weekly basis, a variation of up to 16 per cent in primary school lesson time, and up to 17 per cent in secondary schools. When including non–lesson time (such as assembly, registration and breaks), the respective maximum variations were lower – at 14 per cent and 9 per cent – but still large enough to imply potential error in the attendance–based estimates, although the age of the sample means that it is only illustrative at best.

### Evidence on half-day sessions delivered

All four UK countries collect academic year data on the total possible number of half–day sessions and the total number of half–day sessions attended in order to calculate attendance and absence rates. Total possible half–day sessions is affected by factors including those outlined before, while the proportion of half–day sessions attended is affected by authorised and unauthorised absences, but the formula means that it is possible to have the same absence rate in different years despite changes in the total number of half–day sessions offered.

For example, if a school with ten pupils provides 380 sessions per pupil, or 3,800 sessions in total, in 2008/09 of which the pupils attend 3,420, the absence rate is 10 per cent. If, however, in 2009/10 the school provides 370 sessions per pupil (3,700 in total) of which the pupils attend 3,330, the absence rate remains unchanged at 10 per cent. Using the current methodology, pupil numbers, pupil attendance ([1-absence] x pupil numbers) and therefore education quantity would have all remained static – despite a fall in total sessions delivered of around 3 per cent.

## Box 2 Are attendance–adjusted pupil numbers a good proxy for quantity?

Half–day sessions time series data is available for England, Wales and Scotland, which has been used to create estimates of education quantity for primary and secondary schools, with existing estimates shown alongside for comparison (**Table 1**). Data are shown from academic year 2004/05 onwards as various definitional changes by country occurred in earlier years.

### Table 1 Half–day sessions for primary and secondary schools

Great Britain

Index numbers, 2004/05 = 100

| | England | | Scotland | | Wales | |
|---|---|---|---|---|---|---|
| | Sessions measure | Attendance-adjusted pupil numbers | Sessions measure | Attendance-adjusted pupil numbers | Sessions measure | Attendance-adjusted pupil numbers |
| **Primary** | | | | | | |
| 2004/05 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| 2005/06 | 97.5 | 98.3 | 97.7 | 98.0 | 98.8 | 97.4 |
| 2006/07 | 96.8 | 97.8 | 95.6 | 96.2 | 97.4 | 96.0 |
| 2007/08 | 94.7 | 97.2 | 94.6 | 94.4 | 95.3 | 95.0 |
| 2008/09 | 93.7 | 96.8 | 92.2 | 93.2 | 92.7 | 92.4 |
| **Secondary** | | | | | | |
| 2004/05 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| 2005/06 | 99.8 | 99.3 | 99.4 | 99.3 | 97.2 | 97.4 |
| 2006/07 | 98.9 | 98.5 | 98.2 | 98.4 | 95.9 | 96.0 |
| 2007/08 | 96.8 | 97.2 | 97.6 | 97.3 | 93.5 | 95.0 |
| 2008/09 | 96.0 | 95.5 | 95.9 | 95.6 | 91.7 | 92.4 |

Source: Office for National Statistics

The comparison shows that, in general, there are only slight differences between sessions–based and attendance–based quantity measures, but that differences are more pronounced at primary level, particularly for England, which is the largest single component of total quantity.

The current methodology therefore still appears to be reasonably accurate overall. But, while the data above only cover a short period, they suggest that further work is needed. If data can be adjusted to allow longer comparisons over time the evidence can then be used to decide whether or not there is a need to adjust not only for attendance, but changes in the underlying amount of education services being delivered.

1. For example see: http://www.teachernet.gov.uk/management/atoz/l/lengthofschoolday/

**Table 2** summarises the unweighted quantity indices for each education component, which are the indices shown in Table 1, adjusted where applicable for attendance (figures in bold), and converted from academic to calendar years.

## Table 2 Full-time equivalent pupil/student attendances by provider and country, 1995/96–2008/09

United Kingdom

Index numbers, 1995/96 = 100

| | 1995/96 | 1996/97 | 1997/98 | 1998/99 | 1999/00 | 2000/01 | 2001/02 | 2002/03 | 2003/04 | 2004/05 | 2005/06 | 2006/07 | 2007/08 | 2008/09 | *Pupil numbers in 1995/96*[5] | *Pupil numbers in 2008/09* | *Average annual % change* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ***By provider*** | | | | | | | | | | | | | | | | | |
| Maintained pre-schools | 100.0 | 101.3 | 101.5 | 104.9 | 103.7 | 106.2 | 103.1 | 102.3 | 99.4 | 96.7 | 99.5 | 101.5 | 102.4 | 103.1 | 250,300 | 258,000 | 0.2 |
| PVI pre-schools | - | 100.0 | 102.8 | 118.8 | 163.2 | 251.3 | 320.7 | 419.7 | 439.7 | 446.4 | 452.6 | 473.7 | 480.5 | 487.0 | 55,900 | 272,400 | 14.1 |
| **Primary School** | **100.0** | **101.2** | **101.5** | **101.7** | **101.6** | **100.4** | **99.8** | **98.6** | **97.6** | **96.6** | **94.8** | **94.2** | **93.5** | **93.0** | **4,621,600** | **4,295,800** | **-0.6** |
| **Secondary Schools** | **100.0** | **101.4** | **102.3** | **103.8** | **105.9** | **107.0** | **108.2** | **110.0** | **110.8** | **110.8** | **109.9** | **109.1** | **107.7** | **105.9** | **3,322,300** | **3,518,700** | **0.4** |
| **Special Schools** | **100.0** | **100.5** | **101.0** | **101.2** | **100.8** | **99.0** | **98.5** | **97.8** | **96.1** | **94.5** | **93.4** | **93.4** | **93.4** | **94.0** | **95,200** | **89,500** | **-0.5** |
| **CTC/ Academies**[1] | **100.0** | **107.1** | **110.9** | **114.0** | **116.6** | **117.6** | **121.1** | **141.9** | **183.8** | **219.5** | **259.4** | **362.4** | **551.3** | **856.8** | **13,400** | **114,500** | **18.0** |
| Initial Teacher Training | 100.0 | 96.0 | 89.8 | 83.9 | 77.7 | 79.6 | 81.7 | 85.4 | 88.7 | 88.7 | 88.8 | 92.6 | 86.8 | 85.8 | 71,700 | 61,500 | -1.2 |
| Health Professional Activity | 100.0 | 107.3 | 116.4 | 129.8 | 142.7 | 155.5 | 168.0 | 185.9 | 204.7 | 219.7 | 227.1 | 224.6 | 208.4 | 201.6 | 53,000 | 106,800 | 5.5 |
| Further Education | 100.0 | 105.2 | 103.2 | 100.3 | 100.1 | 100.4 | 106.0 | 109.8 | 117.5 | 117.3 | 113.9 | 107.6 | 106.9 | 105.7 | 1,189,100 | 1,256,800 | 0.4 |
| ***By country*** | | | | | | | | | | | | | | | | | |
| England | 100.0 | 101.9 | 102.3 | 102.7 | 103.5 | 103.9 | 105.3 | 106.8 | 108.0 | 107.7 | 106.3 | 105.1 | 104.5 | 104.0 | 8,016,100 | 8,337,800 | 0.3 |
| Wales[2] | 100.0 | 101.0 | 101.4 | 101.5 | 102.4 | 102.6 | 102.9 | 103.7 | 103.4 | 102.1 | 100.9 | 100.1 | 99.0 | 97.9 | 515,900 | 505,100 | -0.2 |
| Scotland[3] | 100.0 | 101.0 | 100.6 | 102.3 | 104.7 | 106.1 | 106.7 | 106.3 | 106.0 | 104.3 | 103.4 | 103.5 | 101.7 | 100.6 | 783,800 | 788,500 | 0.0 |
| Northern Ireland[4] | 100.0 | 100.9 | 100.3 | 99.7 | 99.7 | 99.6 | 99.9 | 99.6 | 99.4 | 98.7 | 97.9 | 96.8 | 96.2 | 96.1 | 356,700 | 342,600 | -0.3 |
| UK | 100.0 | 101.8 | 102.0 | 102.5 | 103.4 | 103.8 | 105.1 | 106.3 | 107.3 | 106.8 | 105.4 | 104.4 | 103.7 | 103.1 | 9,672,400 | 9,974,100 | 0.2 |

1. City Technology Colleges from 1988 and Academies from 2002 in England only. Of the 15 original City Technology Colleges, 12 have now converted to Academy status.

2. Includes estimates for Wales for private, voluntary and independent sector pre–school numbers and to 1997/98 for health professional activity

3. Includes estimates for Scotland for maintained pre–school numbers from registration numbers and to 2002/03 for health professional activity

4. Northern Ireland private, voluntary and independent sector pre–school data for 1996/97

5. Includes private, voluntary and independent pre–school data for 1996/97

Source: Department for Education, Welsh Assembly Government, Scottish Executive, Northern Ireland Statistics and Research Agency.

Looking at each component:

- The largest observed increase was in CTCs and academies, due to a rapid policy–driven expansion since 2000 although most of this increase came from the conversion of existing English secondary schools.
- Health professional training grew rapidly mainly through an increase in the number of trainee nurses, particularly at degree level.
- Pre–school education also grew rapidly following the introduction of a policy to provide a number of hours of free childcare per week for three– and four–year–olds.
- There was a small increase in further education quantity, with a rise in the number of students taking qualifications suitable for entry into higher education mostly offset by a decline in adult education courses.
- A decrease in the five–to–eleven–year–old population led to a fall in primary school quantity.
- Special schools quantity reduced due to the integration of many children with special needs into mainstream schools.
- The quantity of ITT also fell, primarily due to a shift in demand from three– to one–year courses which reduced the number of students.

**Table 3** summarises the relative shares of expenditure on each of the education components over the period 1996 to 2009.

## Table 3 Expenditure–based education weights, 1996–2009

United Kingdom

| | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Pre-schools | 1.8 | 1.8 | 1.8 | 2.1 | 2.9 | 3.8 | 3.9 | 4.9 | 4.7 | 5.0 | 5.7 | 5.7 | 5.7 | 5.7 |
| Primary Schools | 39.4 | 39.1 | 40.1 | 38.5 | 37.6 | 37.4 | 37.0 | 36.3 | 35.5 | 35.2 | 35.2 | 35.2 | 35.2 | 35.2 |
| Secondary Schools | 33.5 | 33.7 | 33.3 | 35.9 | 37.6 | 37.6 | 37.7 | 37.6 | 37.4 | 37.3 | 37.4 | 37.4 | 37.4 | 37.4 |
| Special Schools | 6.6 | 6.9 | 6.9 | 7.0 | 6.3 | 5.3 | 5.5 | 4.8 | 5.3 | 5.8 | 5.7 | 5.8 | 5.8 | 5.8 |
| CTC / Academies | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.3 | 0.4 | 0.4 | 0.6 | 0.8 | 0.8 | 0.8 |
| Initial Teacher Training | 1.2 | 1.2 | 1.0 | 0.9 | 0.8 | 0.7 | 0.7 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 |
| Health Professional Training | 1.6 | 1.8 | 1.9 | 1.8 | 1.8 | 1.7 | 1.7 | 1.8 | 2.0 | 2.1 | 2.0 | 1.9 | 1.9 | 1.9 |
| Further Education | 15.7 | 15.4 | 14.8 | 13.5 | 12.9 | 13.2 | 13.3 | 13.7 | 14.0 | 13.6 | 12.9 | 12.6 | 12.6 | 12.6 |
| Total | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |

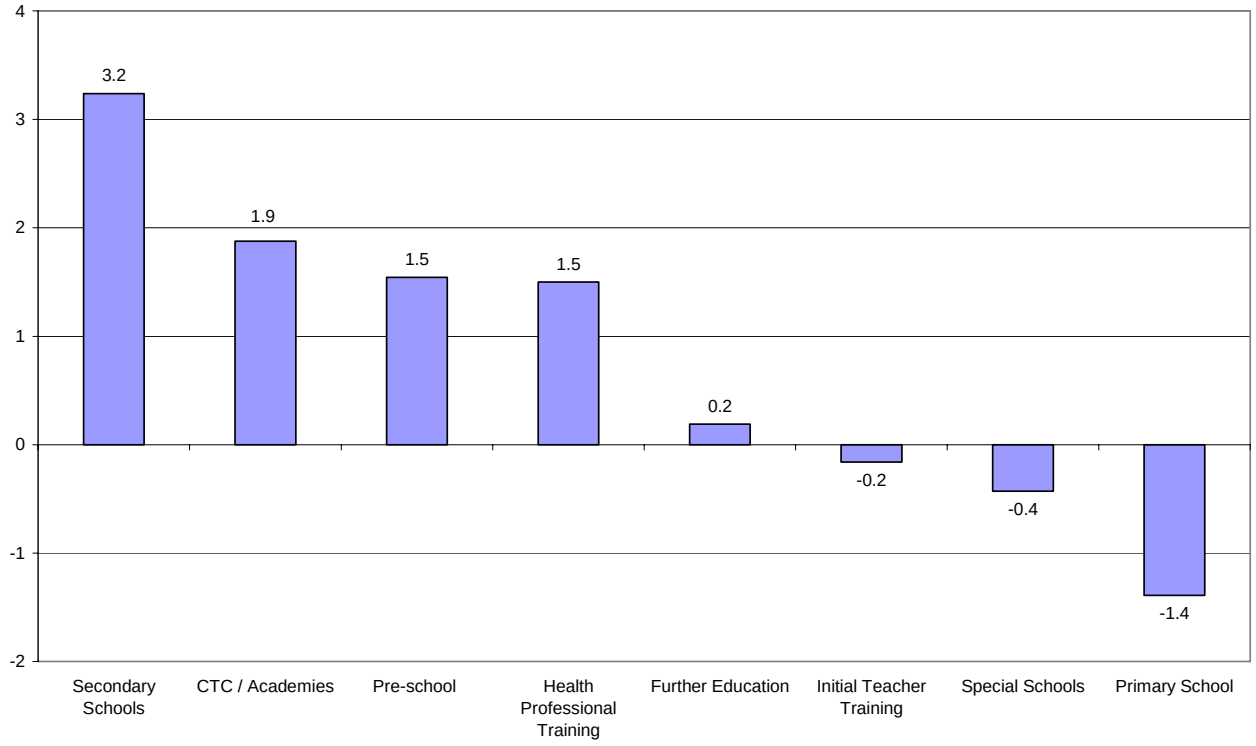
Source: Office for National Statistics

Schools constitute the largest proportion of expenditure, accounting for around four–fifths of the total in 2009. Between 1996 and 2009, the proportion of expenditure on primary schools, special schools, further education and ITT decreased as the numbers attending fell. Conversely, the proportion of expenditure on pre–schools, secondary schools, CTCs and academies and health professional training increased, as the numbers attending rose. The proportion of expenditure on further education decreased as the increase in publicly funded under–19 courses was offset by a decline in adult education.

Education quantity is created by weighting together the components in Table 2 by their respective costs. **Figure 1** illustrates contributions to total annual quantity growth by component of education in terms of percentage points over the period 1997 to 2009. Between 1997 and 2009 education quantity grew by 6.4 per cent. This growth was driven by positive percentage point contributions of 3.2 from secondary schools, 1.9 from CTCs and academies, 1.5 from pre-school, 1.5 from health professional training and 0.2 from further education. These were partially offset by negative percentage point contributions of 1.5 from primary schools, 0.4 from special schools and 0.2 from initial teacher training. CTCs and academies have made an increasing positive contribution to education quantity growth since academies were established in 2000, although this is largely a substitution effect for the secondary schools they have replaced.

## Figure 1 Contributions to education quantity growth, 1997–2009

United Kingdom
Percentage points contribution to total 6.4 per cent growth*




* Figures may not sum due to rounding

Source: Office for National Statistics

## Education quality

Eurostat (2001) and Atkinson (2005) recommend that public service output should be measured in a way that adjusts for quality change. Currently primary schools, secondary schools, CTCs and academies and ITT are quality adjusted. At present there are no quality adjustments for further education, health professional training, special schools and pre–schools.

The current schools adjustment uses the change in the uncapped average points score (APS) of GCSE and equivalent qualifications in England and Wales and Standard Grades and equivalent qualifications in Scotland to estimate quality change for government–maintained primary and secondary schools and CTCs and academies. A time series of GCSE scores for Northern Ireland is not readily available so the change in APS in Northern Ireland has been approximated by the change in APS in England. Until 2003/04 both the England and Wales APS are calculated using GCSE and GNVQ results only. From 2003/04 onwards, points scores in England and Wales have been published on a wider basis, which includes a range of additional equivalent qualifications. Further information on the quality adjustment for schools output can be found in Methods for public service productivity: quality adjusting school education output, September 2007 (ONS 2007).

The APS for GCSE and equivalent qualifications relates to the attainment of pupils aged 15/16 at the end of Year 11. It is the best current measure for the annual change in the quality of output . It rests on the assumptions that the change in the APS used to approximate quality:

- should be applied to all pupils in primary and secondary schools (from reception class to the end of the sixth form) in the UK and CTCs and academies in England; and
- is an adequate approximation for all education outcomes, for example attainment after 16 and development of wider outcomes such as citizenship

**Figure 2** shows the APS used for quality adjustment for schools in England, Wales and Scotland, in academic years. Between 1995/96 and 2008/09, APS in England grew by 46.6 per cent, with an average annual increase of 3.0 per cent. Over the same period, APS in Wales grew by 41.5 per cent, with an average annual increase of 2.7 per cent, and APS in Scotland grew by 16.4 per cent, with an average annual increase of 1.2 per cent. APS in England, Wales and Scotland all grew in 2008/09 when compared to 2007/08, by 6.8, 6.5 and 2.9 per cent respectively.

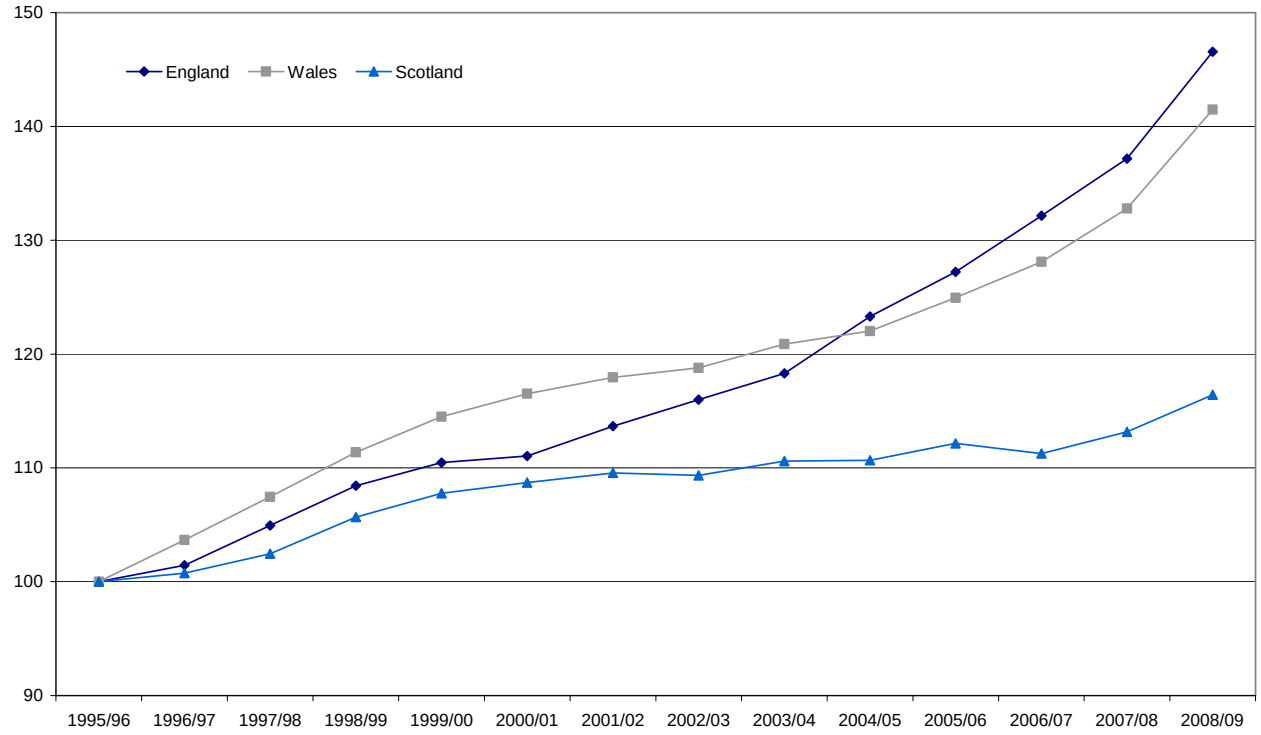
The differences in APS between England, Wales and Scotland may result from different policy drives. In addition to any actual change in quality of education service being delivered, the differences could reflect:

- relative starting point
- different floor and ceiling effects in the way the APS scores are calculated
- differences in the inclusion of vocational qualifications in the statistical definition
- differences in the range of qualifications being offered and studied within schools
- changes in modes of assessment (for example modularisation)
- changes over time in assessment standards

Growth in APS in England and Wales has in been higher in general since 2003/04, when a wider measure of GCSE and equivalent attainment was introduced, and was particularly strong in 2007/08 and 2008/09. Attainment data for Wales is available on both a narrow and wide basis from 2003/04 to 2007/08, which show that growth in each academic year has been considerably higher on the wider measure which includes more qualifications designated as equivalent to GCSEs and GNVQs. It is not known at this stage whether this is a volume effect, through pupils studying for increasing numbers of qualifications, a grade effect, where attainment in the wider equivalent qualifications has been increasing more rapidly than for GCSEs and GNVQs, or a combination of the two.

## Figure 2 Average Point Scores at age 15/16, 1995/96–2008/09

Great Britain
Index numbers, 1995/96=100




| | 1995/96 | 1996/97 | 1997/98 | 1998/99 | 1999/00 | 2000/01 | 2001/02 | 2002/03 | 2003/04 | 2004/05 | 2005/06 | 2006/07 | 2007/08 | 2008/09 | Average annual % change | APS in 1995/96 | APS in 2008/09[1] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| England | 100.0 | 101.5 | 104.9 | 108.4 | 110.5 | 111.0 | 113.7 | 116.0 | 118.3 | 123.3 | 127.2 | 132.2 | 137.2 | 146.6 | 3.0 | 34.4 | 50.4 |
| Wales[2] | 100.0 | 103.7 | 107.4 | 111.4 | 114.5 | 116.5 | 118.0 | 118.8 | 120.9 | 122.0 | 124.9 | 128.1 | 132.8 | 141.5 | 2.7 | 32.7 | 46.3 |
| Scotland | 100.0 | 100.8 | 102.5 | 105.7 | 107.8 | 108.7 | 109.6 | 109.3 | 110.6 | 110.7 | 112.1 | 111.3 | 113.2 | 116.4 | 1.2 | 153.8 | 179.0 |

1. APS values in England and Wales from 2003/04 onwards were based on a new scale. Values were converted back to the old scale to allow comparison.

2. APS scores for Wales are only available from 1997/98 onwards and the quality index is estimated for 1995/96 and 1996/97

Source: Department for Education, Welsh Assembly Government, Scottish Executive

In addition to compulsory schooling, ITT is also adjusted for quality using the change in the proportion of final–year students who attain Qualified Teacher Status (QTS) in England. Data are available from 2001/02 and these have been used to construct a quality adjustment that is applied to the whole of the UK. The proportion attaining QTS has increased slightly to around nine in ten, such that the quality adjustment increases ITT output by 0.2 per cent overall between 2001 and 2009.

The validity of using formal examination performance at GCSE level and equivalents as a measure of the quality of education output is often debated. Wider issues of wellbeing for children, such as health and overall personal development are also clearly important. Therefore **Table 4** provides triangulation evidence for some wider outcomes of education not fully captured by the use of exam performance.

## Table 4 Wider outcomes from education

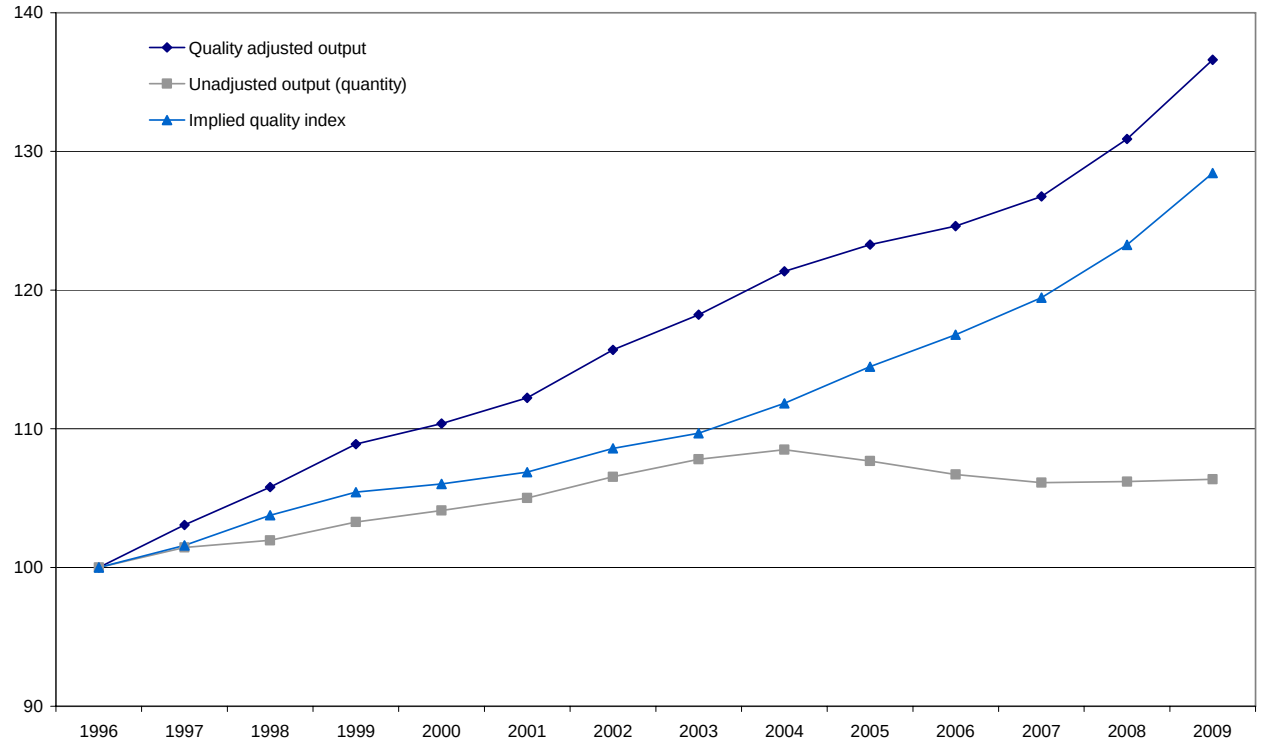
| Indicator | Likely influence of education sector (attribution) | Key commentary | Agreement with input, quantity or quality changes? | Source |
|---|---|---|---|---|
| Further Education and Apprenticeship success rates | High – measure relates directly to education services received | The success rate for all levels of FE and apprenticeships rose between 2005/06 and 2008/09 in England.<br><br>The overall learning activity success rate for FE in Wales rose between 2006/07 and 2008/09. | Further education quality not yet measured but suggests positive link | The data service; Welsh Assembly Government |
| Time spent on physical activity by children | High – activity in non-school sports likely linked to school sports participation | The total curriculum time that pupils in all years spent on physical education in England increased between 2004/05 and 2008/09, except for Year 10 where it remained unchanged. | Uncertain. Sport has strong impact on health but impact on achievement unclear | Department for Children, Schools and Families |
| Bullying | High – schools have key impact on prevalence of bullying | The proportions of boys and girls aged 11, 13 and 15 years old reporting having been bullied at least twice in the previous two months in 2005/06 broadly fell with age | Uncertain. Positive impact on inputs through targeted resources; no time series evidence to corroborate changes in bullying with changes in output | Health Behaviour in School-aged Children (WHO collaborative study) |
| Proportion of young people not in employment, education or training | Medium/high – dependent not only on level of educational achievement but also socio-economic factors | The proportion of 16 to 18-year-olds in England not in education, employment or training (NEET) fell between 1996 and 2009 | Agreement with output figures -improvements in attainment imply fall in NEETs. However, state of economy has a key impact on labour demand. | Department for Children Schools and Family |
| Truancy rates | Medium – schools can have an impact on rates of unauthorised absence. However, other factors also likely to play a role (socio-economic background) | Between 2007 and 2009, the rates of unauthorised absence increased slightly in primary and secondary schools in England | Partial disagreement with quality measure. Children who have higher unauthorised absence rates also tend to have lower levels of academic achievement, however the impact maybe small due to smaller proportions. | Department for Children, Schools and Families |
| Diet and obesity | Low – diet and exercise are only partly influenced by education or school meals | The proportion of overweight or obese children in England increased between 1995 and 2008 for both boys and girls | Uncertain. Targeted resources may increase inputs but effects on outcomes not clear | The NHS information centre for Health and Social Care |
| Pupils who regularly or occasionally smoke | Low – social factors likely to play larger influence than schools | The percentage of pupils who regularly or occasionally smoke in England has fallen by almost half between 2001 and 2009. | Uncertain. Only small proportion of school population. Targeted resources increase inputs but effects on outcomes unclear | The NHS information Centre for Health and Social Care |
| Alcohol and substance abuse | Low–- social factors likely to have more influence than schools | The proportion of pupils in England who have taken any drug has fallen between 2001 and 2008. The proportion of pupils who reported that they drank alcohol at least once a week fell between 2001 and 2009 in England. | Uncertain. Targeted resources may increase inputs but only small part of school population | The NHS information centre for Health and Social Care |
| Reported teenage pregnancies | Very low – social factors likely to play much larger influence than schools | The number of reported teenage pregnancies in England and Wales fell between 1998 and 2008 | Uncertain. Small positive impact on input through targeted resources but minimal impact on outcomes as affects few pupils | Office for National Statistics |

## Impact of quality–adjustments on education quantity

**Figure 3** illustrates the impact of quality–adjustments on education quantity over the period 1996 to 2009.

### Figure 3 Impact of education quality–adjustments, 1996–2009

United Kingdom
Index numbers, 1996=100




| | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | *Average annual % change* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Quality adjusted output | 100.0 | 103.1 | 105.8 | 108.9 | 110.4 | 112.2 | 115.7 | 118.2 | 121.3 | 123.3 | 124.6 | 126.8 | 130.9 | 136.6 | 2.4 |
| Unadjusted output (quantity) | 100.0 | 101.4 | 102.0 | 103.3 | 104.1 | 105.0 | 106.5 | 107.8 | 108.5 | 107.7 | 106.7 | 106.1 | 106.2 | 106.4 | 0.5 |
| Implied quality index | 100.0 | 101.6 | 103.8 | 105.4 | 106.0 | 106.9 | 108.6 | 109.7 | 111.8 | 114.5 | 116.8 | 119.5 | 123.3 | 128.4 | 1.9 |

Source: Office for National Statistics

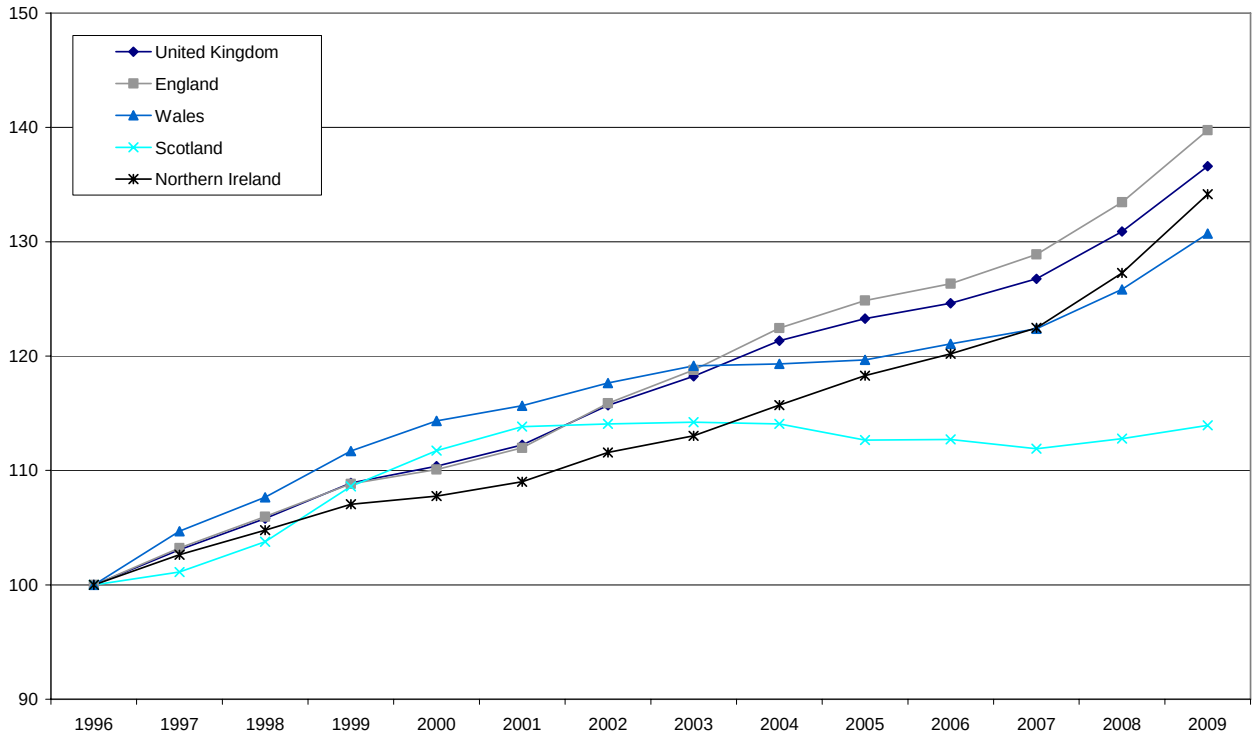
When quality adjustments are applied to education quantity, the overall growth over the period 1996 to 2009 increases from 6.4 to 36.6 per cent, with the average annual percentage change increasing from 0.5 to 2.4 per cent. This difference illustrates the sensitivity of education output to quality adjustment and highlights the importance of selecting the most appropriate adjustment indicator(s). Average annual implied quality growth averaged 1.6 per cent from 1996 to 2007, but more than doubled to 3.7 per cent on average in 2008 and 2009, driven by strong increases in attainment in England and Wales. Other key results include that:

- output grew by 4.4 per cent in 2009
- growth was strongest between 2007 and 2009, averaging 3.8 per cent annually
- the rise in output is driven by changes in attendance, largely as a result of demographic change, and increases in attainment at age 15/16, particularly in 2008 and 2009
- output growth over the full period was strongest in England, at 39.7 per cent (see **Figure 4**)

## Figure 4 Growth in the volume of education output by country, 1996–2009

United Kingdom

Index numbers, 1996=100




| | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | *Average annual % change* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| United Kingdom | 100.0 | 103.1 | 105.8 | 108.9 | 110.4 | 112.2 | 115.7 | 118.2 | 121.3 | 123.3 | 124.6 | 126.8 | 130.9 | 136.6 | *2.4* |
| England | 100.0 | 103.2 | 106.0 | 108.8 | 110.1 | 112.0 | 115.9 | 118.8 | 122.4 | 124.9 | 126.3 | 128.9 | 133.5 | 139.7 | *2.6* |
| Wales | 100.0 | 104.7 | 107.6 | 111.7 | 114.3 | 115.7 | 117.6 | 119.2 | 119.3 | 119.7 | 121.1 | 122.4 | 125.8 | 130.7 | *2.1* |
| Scotland | 100.0 | 101.1 | 103.8 | 108.6 | 111.7 | 113.8 | 114.1 | 114.2 | 114.1 | 112.7 | 112.7 | 111.9 | 112.8 | 114.0 | *1.0* |
| Northern Ireland | 100.0 | 102.6 | 104.8 | 107.0 | 107.8 | 109.0 | 111.6 | 113.0 | 115.7 | 118.3 | 120.2 | 122.5 | 127.3 | 134.2 | *2.3* |

Source: Office for National Statistics

# Education inputs

## Components of education inputs at current prices

Education inputs have three components: labour (for example teaching staff), goods and services (for example learning materials and electricity), and capital services (for example the flow of services provided by a vehicle or building in a given period).

Expenditure on labour and goods and services is measured in current prices (what was actually paid). Figures for capital services are estimates of the value of the flow of services from education capital. While they do not form an explicit part of publicly funded education expenditure, they represent the annual input provided by capital assets owned and are therefore included alongside actual current expenditure.

**Table 5** summarises changes in expenditure on education over the period 1996 to 2009.

### Table 5 Education input components, current prices, 1996–2009

United Kingdom

| | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | Annual average % change |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Labour | 20.8 | 21.4 | 22.1 | 23.4 | 25.3 | 28.3 | 30.8 | 33.3 | 35.6 | 37.7 | 39.4 | 41.2 | 42.3 | 43.5 | 5.8 |
| Goods and Services | 6.9 | 6.7 | 7.0 | 8.0 | 8.4 | 8.8 | 10.2 | 11.2 | 12.4 | 13.6 | 14.6 | 15.9 | 17.8 | 18.4 | 7.9 |
| Capital Services | 3.3 | 3.0 | 3.5 | 3.6 | 3.7 | 4.3 | 4.5 | 4.1 | 3.7 | 4.7 | 5.7 | 6.1 | 7.6 | 8.9 | 8.0 |
| Total | 30.9 | 31.1 | 32.6 | 35.0 | 37.4 | 41.4 | 45.6 | 48.6 | 51.7 | 55.9 | 59.7 | 63.2 | 67.7 | 70.8 | 6.6 |

Source: Office for National Statistics

Data for the latest year, 2009, are provisional estimates (revised figures will be published in future articles). Education inputs totalled just under £71 billion in 2009, including approximately £7.3 billion on further education inputs. In a revision to previous productivity articles this is the first measure of education inputs to incorporate expenditure on further education for all age groups. This explains the upward revision to education expenditure throughout the time series from previously published data.

In 2009, education was the second largest component of General Government Final Consumption Expenditure (GGFCE), after healthcare. Total education input as defined here makes up around 5 per cent of the expenditure measure of Gross Domestic Product.

The labour and goods and services components are based on:

- GGFCE estimates for education expenditure in the National Accounts
- estimates of expenditure on further education from national further education skills councils and the devolved administrations

The current price capital component is calculated as part of the experimental Volume Index of Capital Services (VICS) developed by ONS. For further information, see *Volume of Capital Services: Estimates for 1950 to 2008* (ONS 2010b).

Labour costs are the largest component of education expenditure. In 2009, at current prices, labour expenditure was £43.5 billion, approximately two–thirds of the total expenditure that year. Teachers' pay is the largest element of labour costs. Teacher numbers were relatively stable from 1996 to 2009 but expenditure on support staff, particularly teaching assistants, has increased sharply. This was largely driven by government policies and reforms to reduce unpaid overtime worked by teachers by employing additional support staff. Support staff numbers more than doubled between 1996 and 2005. Labour costs also include expenditure on indirect support services, such as staff time on policy development, standards setting, finance and training.

In 2009, £18.4 billion was spent on goods and services, approximately one–quarter of total expenditure on education inputs. This component consists of the goods and services procured from the outside the education sector that are consumed in the production of education services in any given year. This includes items or services such as teaching aids, electricity, building maintenance and transport. Government purchases of initial teacher training, health professional courses and private nursery places are part of the goods and services component.

The smallest component of education inputs is capital services, estimated at £8.9 billion in 2009, about one–eighth of the total. Goods such as IT equipment and buildings are medium– to long–term investments that can be used for a number of years, and are hence classified as capital items. Capital services quantify the flow of inputs from the capital stock into production, through estimates of rental payments.

## Measuring the volume of education inputs

In current prices, total expenditure on education inputs increased by just under 130 per cent between 1996 and 2009. However, this includes effects caused by pay and price changes. Productivity measurement requires that education inputs are measured in volume terms. Inputs can be measured directly, for example, using hours worked or a measure of staff numbers in the case of labour inputs. Where data do not allow for a direct measure of inputs, a volume measure can be derived by dividing current price spending figures by an appropriate estimate of price (the deflator).

Measuring Productivity, OECD Manual (OECD 2001) recommends that labour inputs should be measured directly. In these estimates, 94 per cent of education labour inputs (by expenditure weight) in the UK are measured in this way. The calculation method uses a breakdown of full–time–equivalent teaching and support staff numbers (teachers are also adjusted for actual hours worked) and weighted together by average salary. The remaining 6 per cent of labour inputs are measured indirectly, by dividing current price expenditure by an appropriate pay deflator. As this small part is a measure of the inputs of central government staff working in education, the most appropriate pay deflator is the public sector Average Earnings Index (AEI) including bonuses.

Goods and services inputs are measured indirectly, using appropriate deflators to remove the effect of price changes. Expenditure on goods and services in the UK can be split into expenditure by local authorities (around four–fifths) and central government (around one–fifth). Specific price deflators have been derived for each component using ONS producer, retail and service sector price data.

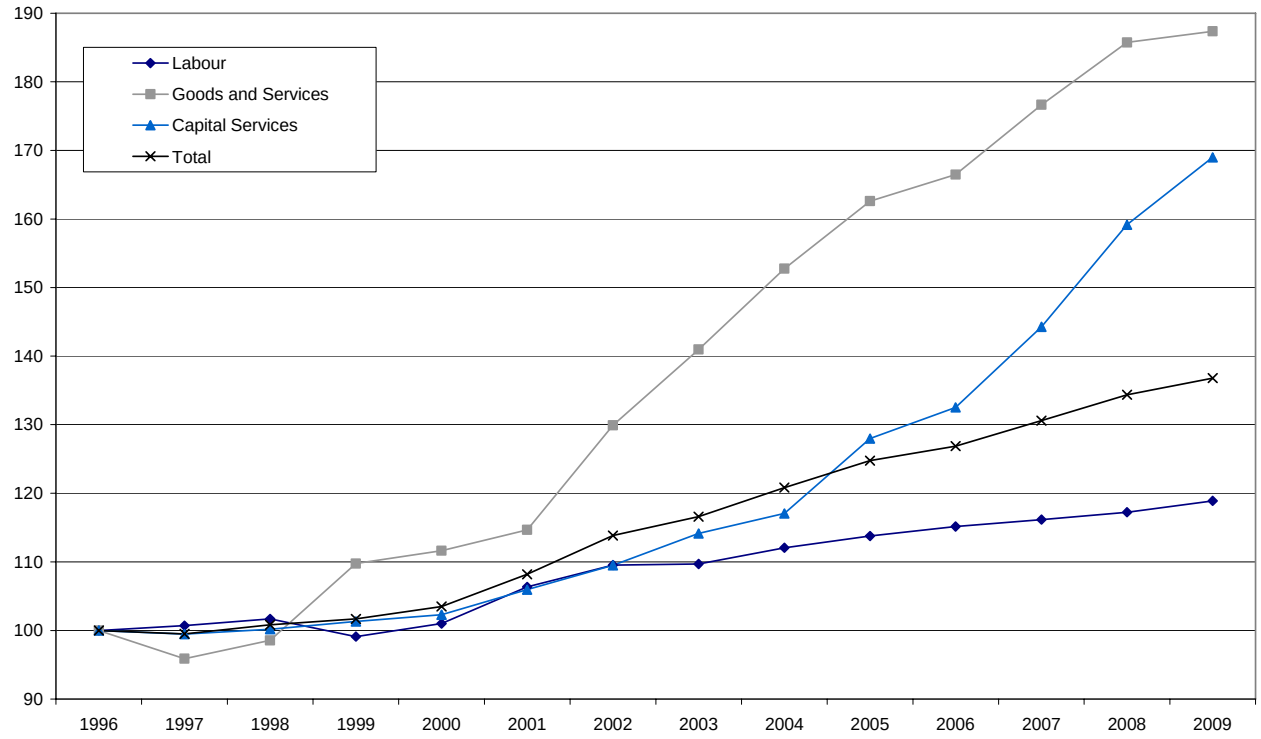
The capital component is measured using the VICS for local authority and central government education. Further details can be found in ONS (2010b).

**Figure 5** summarises changes in the volume of education inputs by component over the period 1996 to 2009.

## Figure 5 Volume of education inputs by component, 1996–2009

United Kingdom

Index numbers, 1996 = 100




| | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | Annual average % change |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Labour | 100.0 | 100.7 | 101.7 | 99.1 | 101.0 | 106.4 | 109.5 | 109.7 | 112.1 | 113.8 | 115.1 | 116.2 | 117.3 | 118.9 | 1.3 |
| Goods and Services | 100.0 | 95.9 | 98.6 | 109.8 | 111.6 | 114.7 | 129.9 | 141.0 | 152.7 | 162.6 | 166.5 | 176.7 | 185.7 | 187.4 | 4.9 |
| Capital Services | 100.0 | 99.5 | 100.2 | 101.3 | 102.3 | 106.0 | 109.5 | 114.1 | 117.1 | 128.0 | 132.5 | 144.3 | 159.2 | 169.0 | 4.1 |
| Total | 100.0 | 99.5 | 100.8 | 101.7 | 103.5 | 108.2 | 113.9 | 116.6 | 120.8 | 124.8 | 126.9 | 130.6 | 134.4 | 136.8 | 2.4 |

Source: Office for National Statistics

Latest estimates of inputs, in volume terms, show that:

- between 1996 and 2009, inputs grew by 36.8 per cent, with an annual average increase of 2.4 per cent
- between 2008 and 2009, inputs grew by 1.8 per cent
- between 1996 and 2009, labour inputs grew by 18.9 per cent. Growth in labour inputs contributed 13.5 percentage points to the overall growth in total inputs. The biggest driver of growth in the volume of labour inputs has been the increase in support staff numbers
- between 1996 and 2009 goods and services inputs grew by 87.4 per cent, contributing 17.1 percentage points to the growth in total inputs. Over the same period expenditure in current prices on goods and services increased by 167 per cent
- between 1996 and 2009 and capital services inputs by 69.0 per cent. However due to its relatively small share of total education expenditure capital services only contributes 6.2 percentage points to the overall growth in the volume of inputs.

**Table 6** provides some triangulation evidence by discussing four education inputs, how they have changed over time, and whether the strength and direction of the change agree with the education inputs and output figures in this article.

## Productivity of education in the UK

This article updates the estimates of change in productivity of publicly funded education services published alongside estimates for other public services in June 2010 (ONS 2010a).

Latest estimates show that (see **Figure 6**):

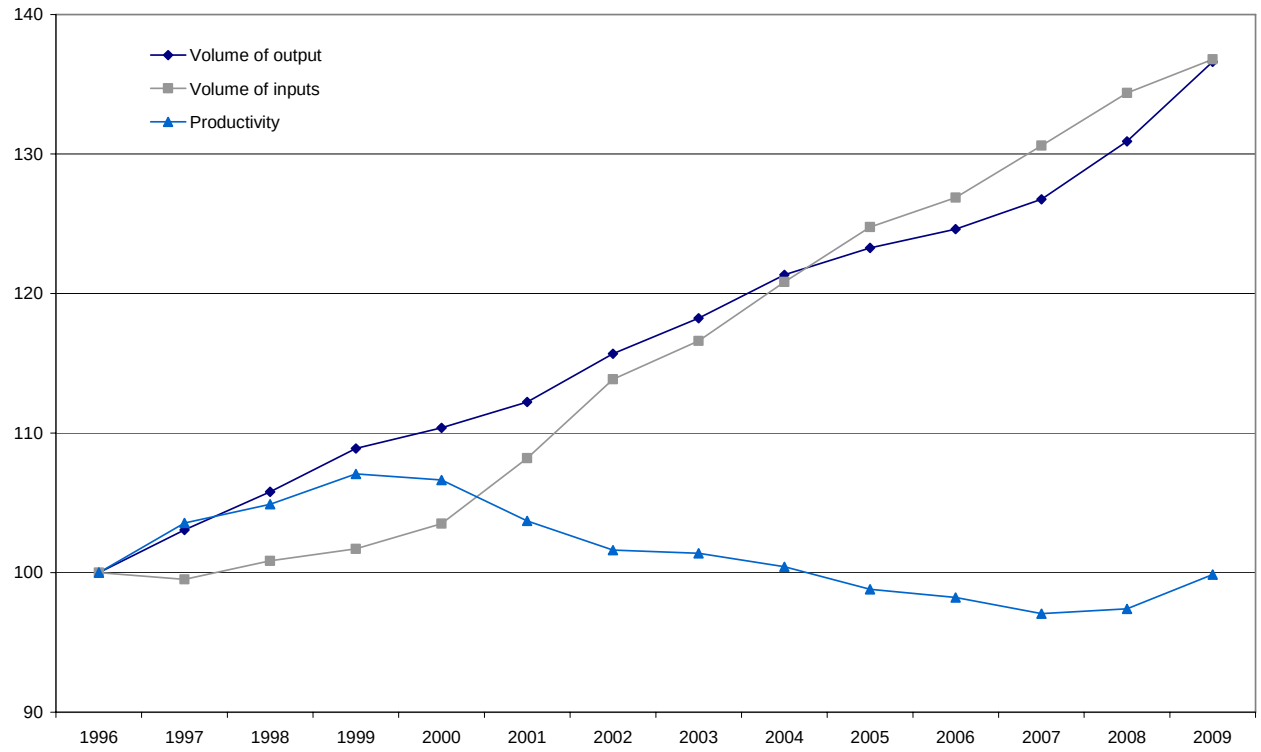
- productivity grew by 2.5 per cent in 2009, following growth of 0.4 per cent in 2008
- productivity was 0.1 per cent lower than it was in 1996; this is because over the whole period
- output grew by 36.6 per cent, with an annual average increase of 2.4 per cent, and
- inputs grew by 36.8 per cent, with an annual average increase of 2.4 per cent

## Table 6 Inputs to education – other evidence

| Indicator | Likely influence of education sector (attribution) | Key commentary | Agreement with input, quantity or quality changes? | Source |
|---|---|---|---|---|
| Teaching standards | Very high – measure relates directly to schools | Between 2005/06 and 2008/09, the proportion of primary and secondary schools in which teaching was rated 'good' or above increased in both England and Wales. | Corroborates increases in school quality measures and increase in quality-adjusted output | England – Ofsted Annual Report 2008/09<br><br>Wales – Estyn Annual Report |
| Class sizes, pupil-teacher ratios and pupil-adult ratios | High – class sizes and ratios can adjust to reflect changes in the school-aged population | Between 2000/01 and 2006/07, class sizes for primary schools in England, Wales, Scotland and Northern Ireland fell; class sizes for secondary schools in England and Wales fell between the same period; between 1995/96 and 2008/09 pupil-teacher ratio for all schools in the UK fell. Between 2000/01 and 2008/09 the pupil-adult ratio fell in England, Wales and Scotland for primary and secondary schools. | Evidence from literature on the impact of class size and pupil ratios on attainment unclear; Corroborates rise in inputs through increase in teachers and support staff | Department of Education and Skills; Welsh Assembly Government; Scottish Government; Northern Ireland Department of Education |
| Pupil-computer ratios | Medium– schools can have an impact on availability of computers; however, access at home is also likely. | The number of pupils per computer has fallen between 2000 and 2009 for primary and secondary schools in England | Positive impact on input growth via procurement. Some new studies have shown a positive relationship between technology and learning outcomes. For instance, a study by the Institute for Fiscal Studies shows that computer and internet access at home is important in explaining the achievement gap, and plays a role in some behaviour outcomes. | Becta Review, Department for Education and Skills |
| Special Education Needs | Medium - Reflects the level of additional support required from schools | Since 2003, the proportion of pupils with a statement of special education needs has slightly decreased. However, there is an increase in numbers requiring School Action/School Action Plus to 18.2% (from 14% in 2003). Reports of some problems with quality of additional support given to children and a lack of evaluation of effectiveness. Some evidence of poor overall teaching and pastoral support leading to unnecessary SEN interventions. | Supports increase in inputs. | Ofsted review of special educational needs and disability, 2010 |

## Figure 6 Growth in education output, inputs and productivity estimates, 1996–2009

United Kingdom
Index numbers, 1996=100




| | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | *Annual average % change* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Volume of output | 100.0 | 103.1 | 105.8 | 108.9 | 110.4 | 112.2 | 115.7 | 118.2 | 121.3 | 123.3 | 124.6 | 126.8 | 130.9 | 136.6 | 2.4 |
| Volume of inputs | 100.0 | 99.5 | 100.8 | 101.7 | 103.5 | 108.2 | 113.9 | 116.6 | 120.8 | 124.8 | 126.9 | 130.6 | 134.4 | 136.8 | 2.4 |
| Productivity | 100.0 | 103.6 | 104.9 | 107.1 | 106.6 | 103.7 | 101.6 | 101.4 | 100.4 | 98.8 | 98.2 | 97.1 | 97.4 | 99.9 | 0.0 |

Source: Office for National Statistics

## Productivity change in detail

From 1996 to 2009, publicly funded education productivity in the UK declined by 0.1 per cent. But this marginal fall overall masks three periods of greater change:

- from 1996 to 1999, productivity grew by 7.1 per cent, with an annual average increase of 2.3 per cent. In this period there was strong output growth, due to growth in the school age population, but only weak growth in inputs

- from 1999 to 2007, productivity fell by 9.4 per cent, an annual average fall of 1.2 per cent. Growth in school attendance, once adjusted for quality, was outstripped by a sharp rise in inputs, mainly through the employment of more school support staff
- from 2007 to 2009, productivity grew by 2.9 per cent, with an annual average increase of 1.4 per cent, as output grew faster than inputs, due mainly to relatively large improvements in pupil attainment at age 15/16 in England and Wales

The pattern of productivity change in the UK, which is dominated by changes in England, reflects a number of factors including:

- changes in the secondary–school–age population in the UK, which increased from 1996 to 2004 then declined from 2005 to 2009, and changes in the UK primary school age population, which fell sharply from 1998 to 2009. These changes reduced education quantity. Where it was not locally feasible to close schools or reduce the number of classes, measured productivity will have fallen if fixed and semi–fixed input costs were spread over fewer pupils
- improved attendance rates in the UK from 1996 to 2009, and improvements in GCSE and equivalents and Standard Grades. These changes increased education output as they more than offset the decline in the school age population; particularly in the case of attainment which grew relatively rapidly in England and Wales in 2008 and 2009. Attainment growth in both countries was higher in general from 2003/04 onwards, when measures were widened to include additional equivalent qualifications
- a large increase in the number of support staff between 1996 and 2009, which in recent years was likely influenced by the agreement in 2003 between UK governments, employers organisations and unions of a work reform package, intended to reduce teacher workload. This change has increased education inputs
- Rapid expansion in both publicly funded nursery provision and health professional students. Publicly funded nursery provision increased following the introduction of policies in UK countries providing a number of hours of free childcare per week for three– and four–year–olds, while the rise in health professional students has been driven mainly by trainee nurses, particularly at degree level

Productivity change may also reflect:

- increases in inputs, such as greater support staff numbers or initiatives to improve well–being, that may improve the quality of education in ways not currently captured by the quality adjustment. For example, through support helping the integration of pupils with special needs
- the extent to which inputs are targeted at lower–achieving pupils and other groups on equity grounds. This may affect productivity change if it is harder or easier to achieve improvements for these groups
- time lags, which mean that some changes in resources, including expansion in pre–school education, may not yet have had any impact on the current quality measure

## Next Steps

ONS plans to continue work with Department for Education (DfE), the Department for Business, Innovation and Skills (BIS), education departments in the devolved administrations and others on a number of developments.

**Improvements to the quantity measure**

- gather and compare more comprehensive data on school sessions and hours of education services delivered in order to improve on, if possible, the accuracy of the current attendance-based quantity measure
- identify publicly funded output from higher education institutions, accounting for the fee and transfer arrangements in each of the devolved administrations and the publicly funded research work that universities undertake, as well as the number of students they teach

**Improvements to the quality adjustment**

- review, alongside external evidence, the use of GCSEs and equivalent qualifications, and Standard Grades, to quality–adjust primary and secondary education quantity
- present, in the next education productivity article, a potential quality adjustment for Further Education based on retention and achievement (success) data

**Improvements to the measure of the volume of inputs**

- improve the inputs measure of further education, for example by investigating whether expenditure data are available for the three components of further education inputs, which deflators may be appropriate and whether a direct labour measure could be calculated
- periodically review and improve the inputs measures, as required

## Contact

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# Measuring the accuracy of the Retail Sales Index

Joseph Winton and Jeff Ralph
**Office for National Statistics**

## Summary

**A measure of the accuracy of the Retail Sales Index (RSI) has been produced by estimating the standard errors of index movements. This article reports on the calculation of standard errors for one–month and 12–month movements in the RSI. It provides an overview of standard errors and their meaning in the context of the RSI.**

## Introduction

The Retail Sales Index (RSI) is a monthly index published by the Office for National Statistics (ONS) measuring the value and volume of retail sales in Great Britain. A method for estimating the standard errors of movement for indices over any fixed period has been developed by ONS and applied to a number of ONS indices over the last few years, including the Index of Production (see Wood et al 2006) and the Producer Price Index (see Morris and Green 2007). The method has now also been adapted for the RSI. An indicative standard error for the whole retail sector for 2009 is estimated as 0.4 per cent for one–month movement and 0.7 per cent for 12–month movement.

## What is the RSI?

The RSI is derived from a monthly survey of 5,000 businesses in Great Britain. The sample represents the whole retail sector and includes all large retailers[1] and a representative sample of smaller businesses. Collectively all of these businesses cover about 95 per cent of the retail sector in terms of turnover. The main monthly output measures include movement in the value and volume of retail sales for the most recent month compared to the previous month and compared to the same month a year earlier.

The value, or current price, indices record the change since the base period in the value of sales before any adjustment for the effect of price change is taken into account. The volume, or constant price, indices are constructed by removing the effect of price change through the use of deflators taken from the Consumer Price Index.

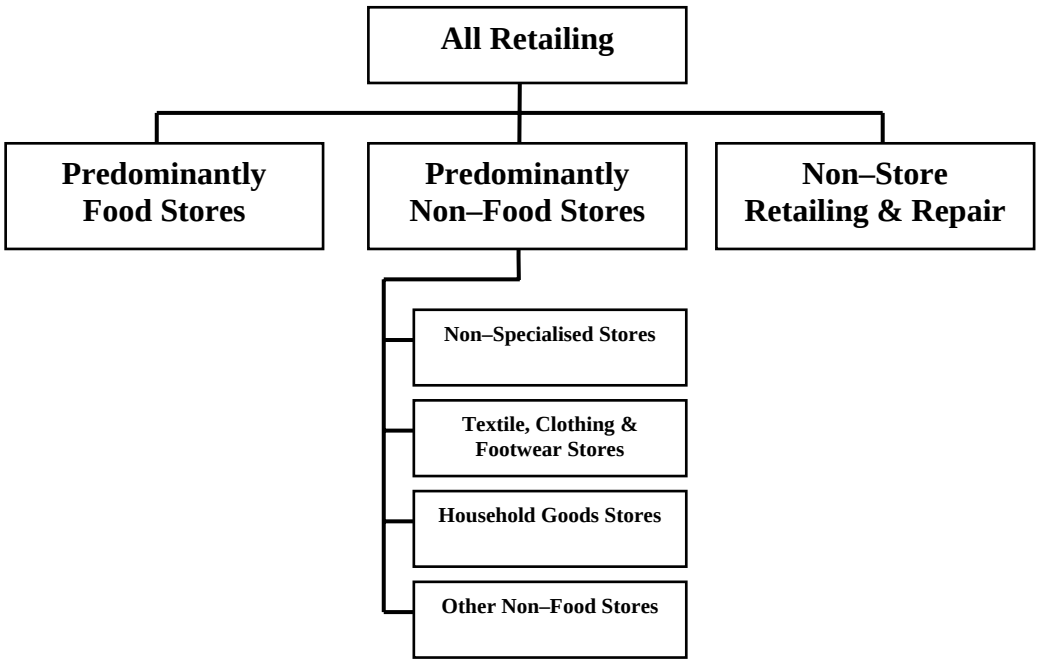
## Structure of the RSI

The RSI only covers sales from businesses registered as retailers according to the Standard Industrial Classification (SIC) – this is a way of categorising economic activity into a common structure. Retailing is defined as the sale of goods to the general public for household consumption and does not cover spending on services. The classification scheme is hierarchical, extending down to a five–digit classification at the lowest level, with the whole retail sector as one of the two–digit classifications. The data for the RSI is mainly collected at four–digit SIC level and then aggregated up to levels that are useful for users.

The SIC changes from time–to–time in order to accommodate the emergence of new industries and new products. The RSI was published according to SIC 2003 before February 2010, when it changed to SIC 2007. The analysis of standard errors in this paper was carried out using data from 2008 and 2009 and was therefore calculated under the SIC 2003 scheme.

Before the change to SIC 2007 in February 2010, the RSI Statistical Bulletin published movements of indices for eight different groupings of retail businesses; standard errors have been calculated for each of these groupings (see **Figure 1**).

Figure 1 **RSI publication structure**



## Estimating standard errors of movements in the RSI

The volume of sales in the RSI is derived by deflating the value of sales ('retail turnover') using the appropriate consumer price indices. When calculating the standard error of movement, the need to incorporate deflation leads to a contribution from consumer price indices as well as a contribution from the retail turnover.

The calculations have been made with non–seasonally adjusted data. The methodology needed to calculate the movement of indices for seasonally adjusted data would be very complex and is beyond the current level of technical development. However, the 12-month movement should not be subject to seasonality, so is unaffected by any complications of seasonal adjustment.

Using 2008 and 2009 retail sales data, the standard errors of the volume of sales for one–month and 12–month movements have been calculated for each month of the year 2009 (see **Box 1** for a description of standard error). These standard errors have then been averaged to provide an overall median standard error for one–month movement and 12–month movement. The standard errors do vary from month–to–month; however, there is no discernible pattern to the variation.

The method for estimating the standard error of index movements is based on the application of Taylor linearisation to the formula for the variance of the ratio of indices for two time periods. For more details on the method developed by the ONS, see Bucknall et al 2005 and Wood et al 2006.

### Box 1 What is a standard error?

When calculating the RSI, it would be ideal to collect complete information every month on retail sales for the whole population of retail businesses in Great Britain. The resultant index would be an exact measure of the average growth rate for sales. However, this would be extremely time consuming and expensive and would impose an unacceptable burden on businesses. For this reason, the RSI is based on the value of retail sales from a sample of businesses and is used to provide an estimate of the average growth rate for the population. If a different sample were selected, it would produce a different estimate of the same population growth rate. The difference between an estimate and its true population value is known as the sampling error. The actual sampling error for any estimate is unknown, but from the sample used one can estimate a typical error, known as the standard error.

The standard error of an index movement is a measure of the spread of possible estimates of that movement likely to be obtained when taking a range of different samples of the same size. This provides a means of assessing the accuracy of the estimate: the lower the standard error, the more confident one can be that the estimate of movement is close to the true population value. An approximate 95 per cent confidence interval for the index movement is roughly twice the standard error.

## Analysis and results

As the standard errors are estimates, they are subject to error; to reduce this error, standard errors have been averaged over the 12–month period ending in 2009.

**Table 1** shows the 12–month movement for 'All Retailing' as well as the published sector breakdown in December 2009 together with the corresponding standard errors. The second column shows the median standard errors over all months of 2009. This information is also displayed in **Figure 2**.

The median standard error for 12–month movement of retail sales is 0.7 percentage points. This is heavily influenced by the relatively low standard error of 0.5 percentage points in the 'Predominantly Food Stores' sector which is the dominant sector within 'All Retailing'.

There is a particularly high standard error of movement of 'Non–Store Retailing & Repair' due to large differences in trading patterns which change monthly in this sector. There is also a high standard error of 3.2 percentage points in the 'Other Stores' sector of 'Predominantly Non–Food Stores'. This is influenced by the large range of different stores included in the sector, which can lead to disparities in volume movements.

### Table 1 12–month movements and standard errors

| Sector | Twelve 12-month movement December 2009 (percentage change) | Standard error of the 12- month movement, 2009 median (percentage points) |
|---|---|---|
| **All Retailing** | **2.1** | **0.7** |
| **Predominantly Food Stores** | **2.8** | **0.5** |
| **Predominantly Non-Food Stores** | **0.7** | **1.2** |
| - Non-Specialised Stores | 1.5 | 1.2 |
| - Textile, Clothing and Footwear Stores | 4.7 | 1.0 |
| - Household Goods Stores | 0.4 | 1.8 |
| - Other Stores | -3.0 | 3.2 |
| **Non-Store Retailing and Repair** | **9.4** | **2.9** |

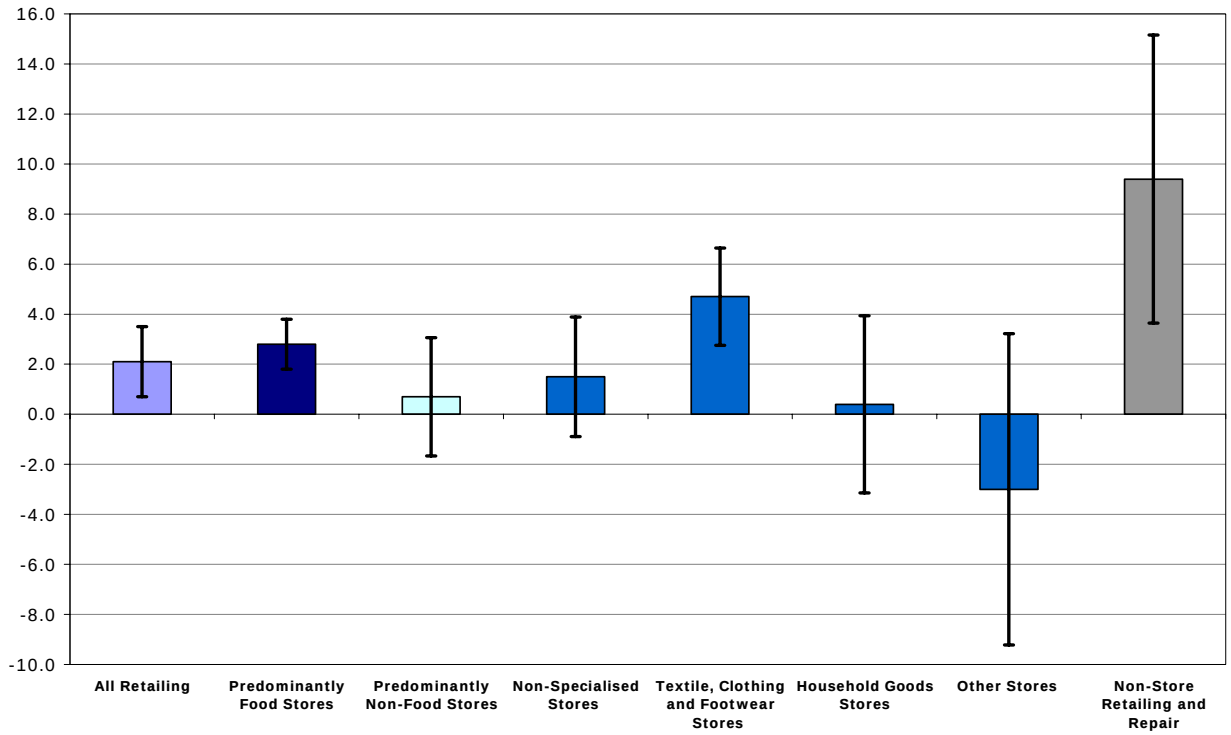
Source: Office for National Statistics

**Table 2** and **Figure 3** display the one–month movement of retail sales for December 2009 (movements are generally biggest from November to December) the published sector breakdown as well as the corresponding standard errors. The median standard error of one–month movement in retail sales is 0.4 percentage points.

The sector breakdown shows a similar breakdown to Table 1, with a relatively low standard error in the 'Predominantly Food Stores' and large standard error in 'Other Stores' and 'Non–Store Retailing & Repair'.

## Figure 2 12 month movements, December 2009

Percentage change with 95% confidence intervals




Source: Office for National Statistics

The standard error for the one–month movement for 'All Retailing' is a similar size to the December movement in the index; this indicates that for this period it is difficult to distinguish any real one month movement from random noise. However, the 'All Retailing' 12–month movement (see Table 1) is three times the standard error suggesting that there is some distinguishable movement and therefore the annual movement is more clearly identified.

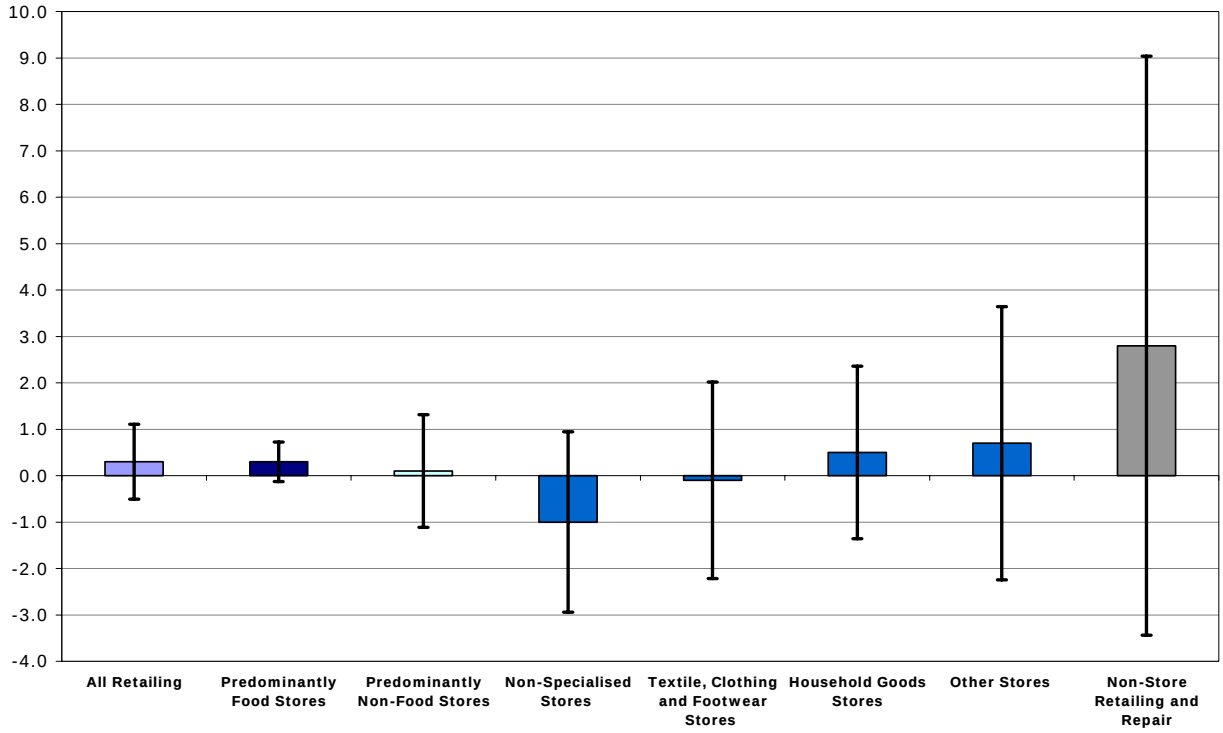
## Table 2 One-month movements and standard errors

| Sector | One-month movement December 2009 (percentage change) | Standard error of the one-month movement, 2009 median (percentage points) |
|---|---|---|
| **All Retailing** | **0.3** | **0.4** |
| **Predominantly Food Stores** | **0.3** | **0.2** |
| **Predominantly Non-Food Stores** | **0.1** | **0.6** |
| - Non-Specialised Stores | -1.0 | 1.0 |
| - Textile, Clothing and Footwear Stores | -0.1 | 1.1 |
| - Household Goods Stores | 0.5 | 0.9 |
| - Other Stores | 0.7 | 1.5 |
| **Non-Store Retailing and Repair** | **2.8** | **3.2** |

Source: Office for National Statistics

## Figure 3 One–month movements, December 2009

Percentage change with 95% confidence intervals




Source: Office for National Statistics

The analysis presented in this paper will be updated to SIC 2007 once sufficient data are available on that basis.

## Acknowledgements

The authors wish to thank Markus Šova, Phil Lewis and Gareth Howell for their significant contributions to this work.

## Note

1. These are retailers with employment exceeding a hundred; also, retailers with smaller employment but turnover exceeding £60 million. There are 900 large retailers.

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# The development of the Monthly Business Survey

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## Summary

**The Monthly Business Survey (MBS) brings together the Office for National Statistics' (ONS) short term surveys on different sectors of the economy. The Monthly Production Inquiry and the Monthly Inquiry into the Distribution and Services Sector have been integrated into one survey. Surveys of the construction sector remain separate but have been redesigned in a similar way to MBS. The Retail Sales Inquiry has also remained separate, but by re–branding as the MBS it paves the way for future integration. By standardising survey deigns and harmonising methodologies ONS hopes to achieve a number of benefits. This article reports on the development of the MBS to date – including the scope of the survey and various aspects of the survey redesign.**

## Introduction

The Office for National Statistics (ONS) launched the Monthly Business Survey (MBS) in January 2010, bringing together short term surveys that cover different sectors of the economy. The quarterly employment only survey (formally known as Gaps) was also re–branded as the Quarterly Business Survey (QBS) and has been extended to cover all production and service industries. The introduction of MBS had close links with a number of other projects that were conducted internally within ONS. These included the Standard Industrial Classification (SIC) 2007 implementation project, Telephone Data Entry (TDE) project, Workforce Jobs Redevelopment (Barford 2010), Construction Statistics (Sharp 2010) and the Eden project on selective editing. It was recognised that the development work associated with the implementation of MBS could be achieved by using resources from these other projects. Therefore, ONS took the opportunity of delivering the benefits associated with the introduction of MBS at the same time as delivering these existing projects.

Information on the implementation of Standard Industrial Classification 2007 (SIC 2007) has been provided in other articles (Hughes 2009; Hughes 2010). A new sample design with strata based on SIC 2007 codes, was implemented for many short term business surveys at the start of 2010. Although a change in SIC does not necessarily prompt a survey redesign (results on the new SIC

can still be derived from a survey stratified on the old SIC), ONS has reviewed the design and implemented a new one for each of the surveys. In the case of the Monthly Production Inquiry (MPI) and the Monthly Inquiry into the Distribution and Services Sector (MIDSS), ONS decided to go one stage further and integrate these surveys to produce the MBS. This paper focuses on what this development work included. Although MPI and MIDSS were the only two surveys that were fully integrated, information on other surveys that fell into scope of the developments has been provided in this article.

## Background – short term surveys prior to January 2010

Prior to January 2010, ONS conducted a number of short term surveys that had a monthly or quarterly periodicity. Although these surveys generally covered different parts of the economy, the information on the questionnaires collected was similar. Whilst trying to deliver genuine improvements within resources of existing projects, it was important to remain pragmatic about what could be achieved in a short space of time. Therefore, the initial stages of the MBS project focused on only a few specified short term surveys. However, the project was set up in such a way that it will be possible to extend MBS to encompass other surveys in the future.

The surveys under consideration for the initial phase of the MBS project were:

- *Monthly Inquiry into the Production Industries (MPI).* A monthly survey of 8,000 businesses in the production sector. It collected total turnover, export turnover and employment information, as well as a few other variables (such as value of orders) in some SICs. A few industries received an employment–only (where the collection of turnover was not required) MPI questionnaire, as other sources of information were used to obtain turnover/output information for National Accounts. Turnover estimates form the main input to the Index of Production (IoP), itself used in the output measure of Gross Domestic Product (GDP). Employment data are used to compile Workforce Jobs.
- *Monthly Inquiry into the Distribution and Services Sector (MIDSS)*. A monthly survey of 25,000 businesses in the distribution and other services sectors. It collected information on turnover on a monthly basis from the entire sample, and employment information from a sub–sample every third month (to give quarterly estimates). Turnover estimates form the main input to the Index of Services (IoS), itself used in GDP. Employment data are used to compile the estimate of Workforce Jobs.
- In contrast to the production sector, a separate survey was run on a quarterly basis to collect employment information from businesses in the service sector where the collection of turnover data was not required. The survey was commonly known at ONS as Gaps. The data were used to compile the estimate of Workforce Jobs.
- *Retail Sales Inquiry (RSI)*. A survey of 5,000 businesses in the retail sector, where the RSI 'month' refers to either a four– or five–week period. It collects total retail sales (as opposed to total turnover) each period; and employment questions were asked to the whole sample every third period (that is quarterly). Sales estimates are the main input to the Retail Sales Index; employment data are used to compile the estimate of Workforce Jobs.

- *Construction statistics.* New surveys were being developed by ONS to cover the construction industry; the industry was previously surveyed by another government department. Data were to be published in their own right, as well as forming part of the output measure of GDP.

Each of the surveys listed had developed independently. Therefore, each survey had its own design, and differences existed in the details of the methodology. However, the same processing software was used for each survey, and the underlying aims and outputs were all similar. Thus, it was seen that large benefits could be obtained by standardising the designs and harmonising the methodology.

## What has been achieved – survey redesign

The main outcome of the MBS project has been that MPI and MIDSS were merged into one survey from January 2010. This includes the data collection right through to the operational processing of the survey – meaning only one database instead of two separate databases is now used. Due to the operational difficulty of combining different periodicity (four or five week periods instead of a calendar month) into a single survey, RSI has remained separate. However, the RSI questionnaires are now headed 'Monthly Business Survey', paving the way for future integration. The construction surveys also remain separate, but have been redesigned in a similar way to MBS. The Quarterly Business Survey (QBS) is now the name of the survey that collects employment information only, and its scope includes industries from both the production sector and the services sector.

### Scope of the survey

One of the most important and lengthy tasks of the redesign was to first agree upon the scope of the surveys, in terms of which SIC 2007 codes would be included. It was then important to agree upon the SIC code aggregations that would be used for publication of outputs, which in turn would form the sampling strata in most cases. The views of the main internal customers were key (such as National Accounts), and external customers were consulted via the output managers.

When deciding the scope of MBS, the predecessor surveys (MPI and MIDSS) provided a good initial basis for decisions on strata where industries that existed separately under SIC 2003 continued to do so under SIC 2007. However, there were some new industries to consider for inclusion. For example landscape gardening moved from Agriculture (previously out of scope) to Services. Other industries that were more or less out of scope under SIC 2003 before but contained moderate numbers of businesses in scope under SIC 2007 were also carefully considered. In addition, there had been a long–standing desire from key customers to bring into our short term surveys some industries (such as veterinary activities) for which data had previously been sourced from elsewhere, but the direct collection of turnover would be preferred. Some of these SICs were included in the MBS sample from January 2010. Other SICs were introduced in

July 2010 following cognitive testing of the questions by the data collection methodology team. This ensured that collection of data from businesses in these previously unsampled industries were feasible.

A final influencing factor was to reduce some of the detail that existed. There had previously been too many strata (especially in the production sector) to allow a truly optimal design for the limited sample size available. Accommodating possibly smaller sample sizes also increased the desire for fewer strata. For RSI, the number of SIC strata has stayed approximately the same at 27. For the collection of both turnover and employment, just over 300 SIC strata in MPI and MIDSS have been reduced to approximately 150 in MBS. For the employment–only industries, about 40 in MPI and Gaps have been reduced to approximately 30 in QBS.

## Survey redesign

The development work associated with the survey redesign can be separated into a number of sub–categories along the Statistical Value Chain (SVC).

### Questionnaire design

One of the overall aims of the redesign was to present a single, standardised survey to respondents. Since the project did not fully integrate all short term surveys, a decision was taken to standardise the survey name for a number of short term surveys as a minimum. The rationale behind the decision to remove the activity of the contributor in the title of the survey was:

- there were a few oddities with the names of the short term surveys prior to January 2010. For example, RSI was sent out under the banner of MIDSS
- a number of SICs moved between services, manufacturing, retail and construction as a result of moving towards SIC 2007. It was felt that it could be potentially confusing for respondents who are sent a different questionnaire as a result of the change, for example MPI instead of MIDSS. Therefore, it was felt that sending out all short term surveys under a MBS banner may help the transition period; and
- the potential of expanding MBS in future years. Since all the proposals for the initial MBS project needed to be achieved within the resource of existing projects, a pragmatic approach to the scope was taken. Therefore, it was agreed that only MPI and MIDSS would be truly integrated. However, as the vision for the office is to reduce the number of our surveys, renaming all short term surveys was seen as paving a way for this future development.

It was agreed that the title of the surveys would become the Monthly Business Survey, or Quarterly Business Survey for those SICs that asked only employment questions on a quarterly basis. This name change occurred at a similar time to the name change of the ONS's structural business survey, which was renamed as the Annual Business Survey. These name changes have provided some consistency to the branding of our business surveys.

A separate review and consultation about employment statistics had concluded that employment data only needed to be collected quarterly, a change for the production sector in which it had previously been collected monthly on MPI. Only a sub–sample of businesses in MIDSS were also asked the employment questions, and this practice has been retained on MBS and also extended to RSI. This approach reduces burden on businesses, but still produces employment estimates of acceptable quality (employment data tend to be less variable than turnover data, especially since strata sizebands are defined by employment).

There has been a large reduction in the number of different questionnaire types for MBS compared to the combined total for MPI and MIDSS. This is largely the result of a Triennial Review conducted by the Short Term Turnover Inquiries (STTI) team, who run the MBS and formally MPI and MIDSS. The review identified several questions that were redundant following consultation with users. The reduction in the number of distinct questionnaire types has enabled the Telephone Date Entry project to be rolled out in a more simplified manner. There are now 26 different questionnaire types covering all MBS industries, compared with the 65 questionnaire types that were previously used for MPI and MIDSS.

**Sample design**

Each of the short term surveys were stratified as a cross–classification of SIC and employment sizeband. For MPI, RSI, MIDSS and Gaps, four employment sizebands were used in each SIC with the largest businesses being completely enumerated. In RSI and MIDSS there was an additional band comprising businesses in the middle two employment sizebands, but with turnover exceeding a given threshold (these businesses were also completely enumerated). Different sets of sizeband boundaries were used in each survey, and in some surveys there was more than one set of sizebands in use.

This meant there was no one obvious set of sizebands to use for MBS. Although operationally more convenient, it soon became apparent that just one set of sizebands would not be appropriate for use throughout MBS. As an example, the largest businesses in production sector industries tend to be smaller than the largest ones in the services sector. Therefore, it was decided that a limited number of sets of sizebands would be used, and that the most appropriate set of sizebands would be chosen on an industry–by–industry basis.

Different methods for choosing the stratum sizebands boundaries were tested on both turnover and employment data. After determining ‘optimal’ boundaries within each SIC industry stratum, a compromise was reached which best served both turnover and employment, subject to the boundaries coming from a limited set of options. In contrast to having several sizebands within MBS, the same set of sizebands was used for all SIC strata in RSI. However, these have changed from the sizebands under SIC 2003 following investigations that a revision to the boundaries would give a more efficient sample. In RSI, previous 0–9, 10–19 and 20–99 bands were replaced with 0–4, 5–9 and 10–99, with complete enumeration of 100+ employment businesses remaining the same.

ONS operates a policy of limiting the burden on businesses with under 10 employment, by imposing a maximum time in sample of 15 months or five quarters. Although it has traditionally

been the case that a 0–9 sizeband has been used, investigations into the mechanics of sample selection and rotation revealed that this policy could still be applied, even with a 5–19 size band that straddles the threshold on burden applied in MBS industries. Inconsistencies in sample rotation rates between the production and services sectors have been removed.

### Sample allocation

The main principle for allocating a sample in ONS business surveys is to follow Neyman optimal allocation, for which the population size and standard deviation of the data in each stratum must be known or estimated. The population sizes are easily obtained from the business register, but getting a robust estimate of the standard deviation is a more challenging operation. To ensure a robust allocation, weighted standard deviations for the new strata were calculated from data collected on the old designs over a period of 12 recent months, and then averaged. In the cases of SICs that were new to the survey, modelled estimates of standard deviations were used, and the allocations will be reviewed in the future in light of the data collected.

The sample was allocated in a way that not only aimed to give good precision at the overall level of aggregation, but also met target values for the coefficient of variation at various sub–aggregates levels, usually the main groups used for publication. There has been no change in the overall sample size, but the sample has been allocated across the combined production and services sectors. Previously, these had always been considered separately when reviewing the samples with fixed sample sizes in each sector.

### Data editing and imputation

Editing rules are used to validate data returned by respondents. Any rules used that were SIC–specific were reviewed and changed to accommodate SIC 2007. The opportunity was also taken to remove any redundant rules. A new strategy for editing is also being introduced at ONS, and will be applied to the short term surveys in the near future. Changes made to the procedures on the introduction of MBS were applied in a way that would allow future changes to be applied more easily. Indeed, the Eden principles of selective editing were successfully implemented in RSI in July 2010 and MBS in August 2010.

In cases where a business fails to respond to the survey, values are imputed based upon information that is available. In most cases ratio imputation is used, based upon information from responding businesses in the same imputation class in the same period. This approach minimises the potential for bias from differential non–response. However, MPI and MIDSS had different ways of forming imputation classes. MPI used an industry–based approach to imputation, while MIDSS used a sampling-stratum–based approach. The processing systems were constrained such that only one method of imputation could be applied to the whole survey, and so a decision was required for MBS – that is whether to follow MPI practice or MIDSS practice (or to do something else). Testing was carried out to determine the effect on historical data of switching either survey to the other method of imputation, and the conclusion was that the MPI approach was better and

would be used in the new MBS. It was both more robust and less prone to error when compared to the MIDSS approach.

There were also a number of smaller changes required to the editing process to enable MPI and MIDSS to be integrated. For example, the treatment of partial non–response and the date adjustments methodology was inconsistent. In both cases an investigation was undertaken and a consistent approach was taken for MBS following methodological advice.

### Estimation

The surveys use ratio estimation for both turnover and employment, calibrating to known population totals on the business register. The estimator of turnover (and similar variables) uses register turnover as the auxiliary variable and employment type variables use register employment. However, whereas MIDSS used separate ratio estimation with calibration taking place within each sampling stratum, MPI used combined ratio estimation where the non–completely enumerated sizebands within each SIC stratum were considered as one for calibration. RSI had a mix of these two methods, with some SICs using separate ratio estimation and some combined ratio estimation.

It was decided to apply the best estimator for each SIC on a case–by–case basis for MBS – that is deciding whether to use separate or combined ratio estimation based upon the characteristics of each SIC. Following general advice, the default position was to use separate ratio estimation. However, where there was a good reason to use combined ratio estimation (mainly small sample sizes and no obvious difference in the model parameter estimate between the size bands), then this method was chosen. Empirical investigations were used to decide on the estimator to be used in each case.

### Changes to the processing system

An off–line test version of the processing system was configured. This was based on the combination of the sample design and allocation, choice of estimator, questionnaire type and changes to the editing and imputation rules. This meant that full testing could be carried out in advance of the test system becoming the live system from January 2010.

In terms of practicality, MPI and MIDSS were merged into one database (processing system). Whereas the production and services parts of the system were previously operated separately, they would now operate as one, although the teams that operated the former MPI and MIDSS were already located in the same division. Combining the surveys necessitated a number of changes in operation, and opportunities were taken to eliminate inconsistencies in timing and methods of delivery of turnover data to National Accounts.

Some of the changes in operation that have led to a consistent approach to SICs in production and services are:

- a harmonised approach has been adopted to a number of results processing functions. This includes the generation of a Scottish Government extract, the generation of data to inform early

estimates of GDP (this was only previously carried out on the services SICs) and a consistent approach to revising results across all MBS SICs

- a harmonised delivery has been established to the Economic Labour and Social Analysis Directorate for production and services; and
- a new briefing strategy covering both growth and revisions has been introduced and adapted for SIC 2007 introducing consistency across production and services industries

These changes removed inconsistencies and paved the way for the MPI and MIDSS surveys to be processed as MBS.

**Publications**

A new publication called Turnover, Orders in Production and Services Industries (TOPSI) was introduced for January 2010 data, first published in March 2010. This is published at a mixture of two and three digit SIC 2007 industry levels. TOPSI integrated and replaced the Engineering, Turnover and Orders Digest (ETOD) and Distribution of Services Turnover (DST) release, making several extensions to their industry coverage:

- UK turnover figures have been extended beyond 'Engineering' to include other 'Production' industries such as 'Mining and quarrying', 'Manufacture of food products' and 'Manufacture of rubber and plastic products'
- Export turnover has been extended to cover most of 'Manufacturing'
- Turnover figures for 'Services' (formerly called 'Distribution and Services') are still on a Great Britain (GB) basis and now include 'Publishing
- New orders figures previously only published for 'Engineering' have also been extended to cover other 'Manufacturing' industries such as 'Manufacture of textiles' and 'Manufacture of chemicals and chemical products'. The Orders on hand figures are no longer published

Continuous SIC 2007 time series on a consistent basis are required to maintain comparability of estimates over time. To ensure this, the following approaches were used for individual time series:

- for historical data from January 1998 to December 2008 a conversion matrix has been used. This method apportions industry–based estimates for businesses under SIC 2003 and then re–aggregates the estimates to form SIC 2007 estimates. The proportions used are obtained from dual–coded data on the ONS business register. This method was used by the ONS at the last major change in classification and is widely used by other National Statistics Institutes
- for data from January 2009 to December 2009, micro–data (individual survey responses) have been re–weighted and aggregated to form the estimates for SIC 2007 based domains. The results using this domain estimation method have been calibrated to the appropriate population totals. This is a standard statistical method, which is expected to give improved estimates compared to the use of conversion matrices, and to match closely to estimates derived from the actual survey data

- from January 2010 onwards, survey estimates are calculated using data obtained from the redesigned sample. This is the standard survey approach and follows previously used statistical methods.

It is important to remove differences based on method changes as any changes between estimates need to reflect real world changes rather than changes in methodology. To ensure consistent estimates over time, any differences between the converted and domain estimates at January 2009 are taken into account through a linking process. This ensures there is no discontinuity between the data produced using the conversion matrix and domain estimation methods. The movements at the current end of the series reflect the new sample design from January 2010 onwards and have been checked against December 2009 data for possible discontinuities.

## Contact

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# Okun’s Law revisited

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## Summary

**The relationship between changes in output and the unemployment rate is of significant interest around times of recession and economic recovery. This article looks at various aspects of this relationship over time, across various constituents of the labour market and across different countries. The article also explores the interactions between changes in the unemployment rate with the household population, economic activity rate, average hours and labour productivity in accounting for recent output movements in the UK economy and how these compare to previous recessions and recoveries.**

## Introduction

Empirical relationships regarding unemployment have long fascinated economists. For instance, the Phillips curve started life as a simple observed trade–off between unemployment and inflation. But as the theory caught up with the evidence, the Phillips curve emerged as the most important relationship in the way economists viewed the supply–side of the economy and is embedded in all the key macroeconomic models driving policy today.

Another relationship of interest to economists is that between output and unemployment. In 1962, Arthur Okun noted two empirical relationships

- quarterly changes in the unemployment rate were related to quarterly growth in real gross domestic product (GDP)
- deviations in the unemployment rate were related to deviations in GDP from its potential

These have come to be known as the *difference* and *gaps* versions of Okun’s Law.

Over the years, Okun's Law has been predominantly used as a rule of thumb to predict how changes in output will feed through to the labour market. Conventional wisdom said 'that for every 2 per cent drop in real gross domestic product (GDP) below trend leads to a 1 percentage point rise in the unemployment rate'. However, this relationship has proved to be unstable over time. But whilst the breakdown in the Phillips curve during the stagflation of the 1970s lead to the development of its theoretical underpinning, the same did not happen for Okun’s Law.

Simply put, Okun's Law is regarded as a statistical relationship rather than a structural feature of the economy. And like any type of statistical relationship it can be subject to structural breaks or

regime shift. For instance, structural changes in the labour market leading to shifts in the non–accelerating inflation rate of unemployment (NAIRU) are considered to change the equilibrium level of unemployment and alter the inflation–output trade–off. Although these supply–side shocks are increasingly integrated into economic theory, structural breaks in the relationship between output and unemployment limited the use of Okun's Law as a forecasting rule and interest waned.

However, there is nothing like a recession to reawaken interest in the relationship between output movements and the unemployment rate – especially due to the severity of the recent downturn in the UK and across most of the world's advanced and emerging market economies. These worries continue into the period of economic recovery. In past UK recessions unemployment has continued to rise even as the economy returns to growth. The last two US recessions have both lead to 'jobless recoveries'. Here, unemployment is likely to be the key issue driving the economic and political landscape for the foreseeable future. So in many ways, the relationship between output and unemployment is as much of key interest today as ever before.

This article looks at various aspects of Okun's Law. Firstly the difference and gap versions are applied to the UK and the stability of the relationship between output and unemployment movements investigated over time. Next of all, differences in the relationship between male and female unemployment and that of different age cohorts in the UK is analysed along with cross–country comparisons. The final section accepts that the relationship between output and unemployment is more complex than implied by Okun's Law. The production function approach also looks at the impact of other factors such as productivity, participation and activity rates and population growth on the relationship between the two variables.

## Output and unemployment in the UK

### Difference version of Okun's Law

**Figure 1** is a scatter plot of quarterly changes in the unemployment rate and growth in GDP between 1973 Q1 and 2010 Q3. This shows reasonable evidence of an inverse relationship between the two variables.

The difference version of Okun's Law is based on the following regression which captures the contemporaneous correlation between output growth and movements in the unemployment rate.

Change in unemployment rate = a +b*real output growth

The results, recorded in **Table 1**, confirm that the relationship between the two variables is negative and significant. This is also the equation of the regression line shown in Figure 1.

The regression coefficient ( b = -0.1381) is often referred to as Okun's coefficient and is ordinarily expected to be negative. The ratio -a/b gives the rate of output growth consistent with a stable unemployment rate, or how fast the economy would typically have to grow in order to maintain the existing unemployment rate. In this case -a/b = 0.096/-0.1381 = 0.7. Therefore the UK economy

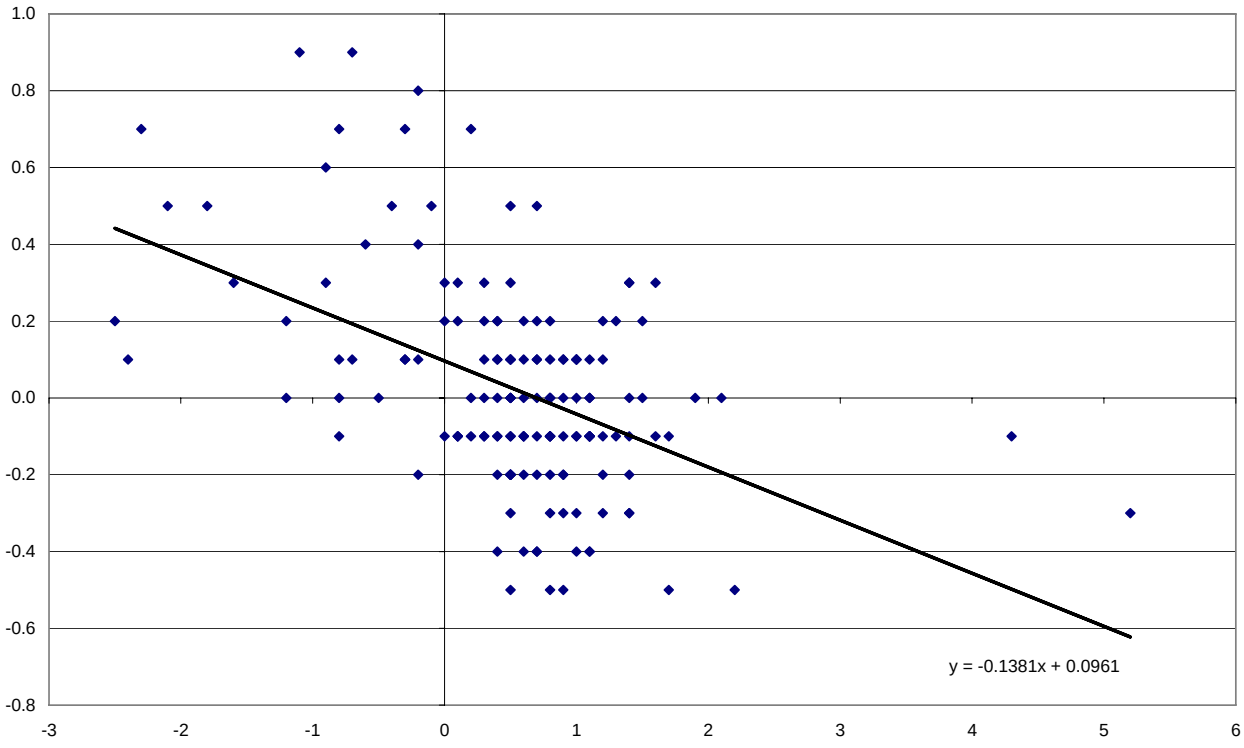
would ordinarily need to grow at 0.7 per cent each quarter for the unemployment rate to remain constant which is close to its long–term average or trend growth rate.

## Table 1 Difference version of Okun's Law

| **Dependent variable:** | **Change in unemployment rate** | | | |
|---|---|---|---|---|
| Sample: | 1973 Q1 to 2010 Q3 | | | |
| **Variable** | **Coefficient** | **Standard error** | **t-statistic** | **Probability** |
| Constant | 0.0961 | 0.0230 | 4.1825 | 0.0000 |
| GDP growth | -0.1381 | 0.0208 | -6.6374 | 0.0000 |
| R-squared | 0.2282 | | | |
| Adjusted R-squared | 0.2230 | | | |

## Figure 1 GDP and unemployment in the UK

Quarterly change in unemployment




GDP: Quarterly growth rate

Note: Dummying out the two outliers in 1973 Q1 and 1979 Q2 only marginally changes the slope of the regression equation, and both dummies are found to be insignificant at the 5% level.

**Gap version of Okun's Law**

This version of the law connects changes in the unemployment rate to the gap between actual output and trend or potential output. So if output falls below potential, opening up a negative output gap, unemployment would be expected to an increase. Vice–versa, when actual output is above trend or potential and a positive output gap emerges unemployment is expected to fall. Like the difference version of the law, this emphasises the importance of the economic cycle in determining changes in unemployment, but recognises that trend growth may not be stable over time. In terms of a regression model something like the following would typically be estimated:

Unemployment rate = a +b*(gap between potential output and actual output)

However, there is not a universal definition of what constitutes 'trend' or 'potential' output, but it is usually thought to be the level of output once cyclical and idiosyncratic measures have been removed. In this sense it is an equilibrium level of output where the economy can grow without experiencing inflationary or deflationary pressures. Another way of putting this is to define trend output as that level of output consistent with unemployment being at its NAIRU. When output rises above trend unemployment falls below its NAIRU and vice–versa.

Trend output though is not a directly observable macroeconomic statistic and any construction of it requires judgement. Here, an estimated trend is calculated using a Hodrick–Prescott (HP) filter, although many other forms of statistical filter or economic method could be viably used. Most trends work on the basis of smoothing out the short–run (cyclical and idiosyncratic) innovations in the data by essentially using a moving average approach. It is important that this is centred, so that the trend estimate for a particular quarter is averaged over preceding and proceedings observations. If not, and based only on past observations, trend movements will lag the actual data – a problem known as phase shifting. For the most part this is not a problem, but towards the end of the sample there are an insufficient number of forward observations to fit a reliable trend. Usual practise is to forecast the series forward in order to provide sufficient observations, and here this has been done by using the GDP forecasts recently published by the Office for Budget Responsibility (OBR).

There are two main ways in which the gaps version of Okun's Law may differ from the trend version.

First, periods of falling output and below trend output are unlikely to coincide exactly. This is because output is likely to fall towards trend at the beginning of a downturn, so negative growth is experienced before below trend output. Also, in the early stages of a recovery, output is likely to be growing towards trend, so GDP growth will become positive before output is above trend.

Second, trend estimates in output are affected by supply–side factors. Therefore it is possible for output to be above trend even if actual output is falling if trend output happens to be falling even faster.

For the most part these factors will mainly result in temporal differences between the two approaches but this cannot be taken for granted.

Regression results are presented in the first panel of **Table 2** showing a significantly negative relationship between the output gap and changes in unemployment. Note though that R–squared is slightly lower than compared with the difference version in Table 1 indicating a slightly poorer fit.

This may be because of an asymmetry in the way unemployment and output is treated in the basic gap version of Okun's Law. Trend output is allowed to change over time but not trend unemployment, even though the two are arguably related through the NAIRU. Therefore a modified version of the gap model is to estimate

Unemployment gap = b*output gap

Where the unemployment gap is the difference between the actual unemployment rate and an estimate of the NAIRU. Like potential output, NAIRU is not a directly observable time series and an estimate has been constructed using a HP filter and forecasts published by the OBR in order to provide sufficient end of sample observations. As the dependent variable is different it is incorrect to use R–squared to compare good of fit, but the results presented in the second panel of Table 2 show the alternative model does fit fairly well.

## Table 2 Gap versions of Okun's Law

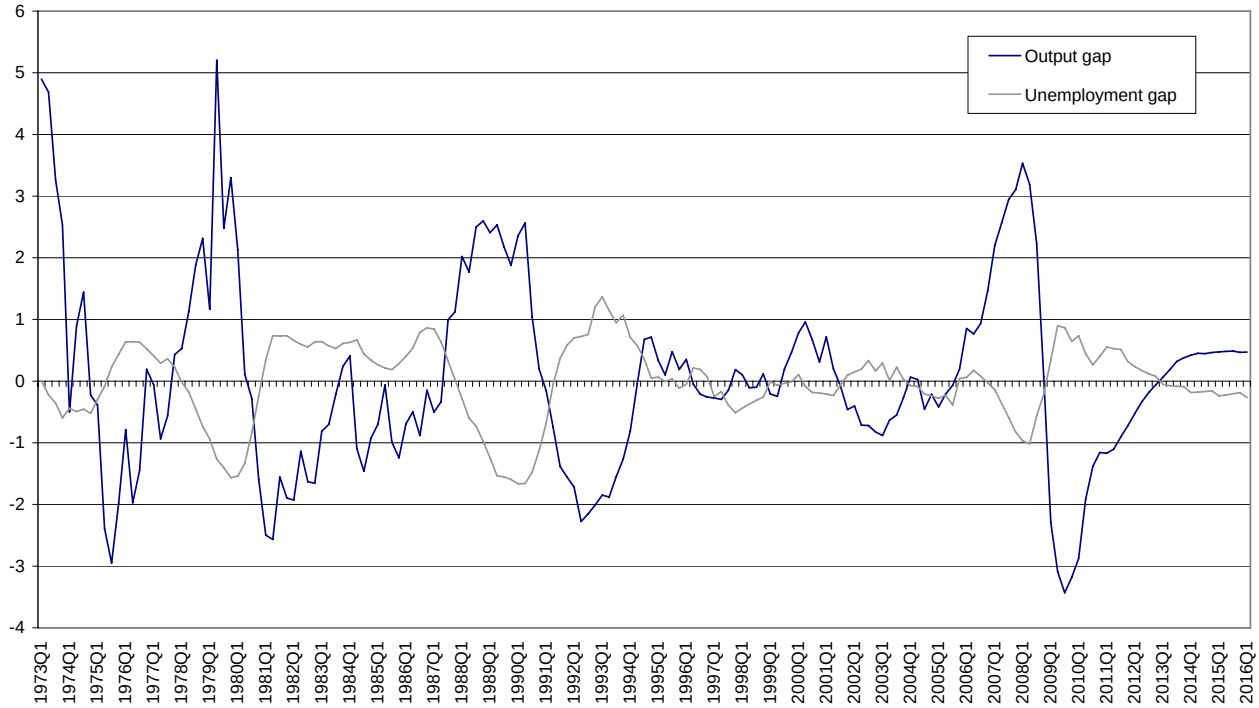
| **Dependent variable:** | **Change in unemployment rate** | | | |
|---|---|---|---|---|
| Sample: | 1973 Q1 to 2010 Q3 | | | |
| **Variable** | **Coefficient** | **Standard error** | **t-statistic** | **Probability** |
| Constant | 0.0270 | 0.0211 | 1.2839 | 0.2012 |
| Output gap | -0.0685 | 0.0128 | -5.3340 | 0.0000 |
| R-squared | 0.1603 | | | |
| Adjusted R-squared | 0.1547 | | | |

| **Dependent variable:** | **Unemployment gap** | | | |
|---|---|---|---|---|
| Sample: | 1973 Q1 to 2010 Q3 | | | |
| **Variable** | **Coefficient** | **Standard error** | **t-statistic** | **Probability** |
| Output gap | -0.2851 | 0.0225 | -12.6911 | 0.0000 |
| R-squared | 0.5174 | | | |
| Adjusted R-squared | 0.5174 | | | |

The statistically significant and inverse relation between the unemployment gap and the output gap is plain to see in **Figure 2** where both estimates are plotted. This emphasises the importance of cyclical movements in driving changes in the unemployment rate, but also that longer run changes in the trend growth rate of the economy and the equilibrium rate of unemployment are also important factors.

## Figure 2 Gap[1] version of Okun's Law

Per cent




1. The output gap is expressed as a percentage of GDP, whereas the unemployment gap is expressed as a percentage point difference from the NAIRU. The estimates extent to 2016 Q1 by making use of OBR forecasts.

### Dynamic versions of Okun's law

The difference and gaps versions of Okun's Law shown in Tables 1 and 2 reflect the contemporaneous relationship between GDP and the labour market – that is the immediate impact of the economic cycle on the unemployment rate. In reality, the relationship between the two, specifically the pass through from output to unemployment, is unlikely to be contemporaneous and more gradual.

It is generally assumed that firms face costs in changing the size of their workforce. These hiring and firing costs reflect the severance costs of making workers redundant; and the search, recruitment and training costs of hiring new workers. There are also secondary, more indirect costs. Making workers redundant could impact on the morale of the existing workforce, and the firm will lose any firm–specific skills inherent in those workers which would need to be replaced if

the firm decided to hire again. Hiring new workers also creates extra liability should the workforce need to be cut at some point in the future. Hiring and firing costs therefore create rigidities and inertias that prevent the rapid pass through of output changes to unemployment.

These are likely to be compounded by the degree of uncertainty over the economic outlook faced by firms who will not know for sure the size and duration of output movements in any direction. A rational response would be a 'wait and see' approach, where firms adjust their workforces gradually whilst expectations are formed adaptively about the true state of the economy. These extra dynamics can be estimated by adding lags of GDP growth to the right hand side of the difference version. As shown in the first panel in **Table 3**, not only the contemporaneous change in GDP is significant, but also four lags. A notable improvement to the goodness of fit over the basic difference version estimated in Table 1 is shown by the improvement in adjusted R–squared from 0.22 to 0.53.

Adding lags of the change in the unemployment rate to the right hand side of the equation may also add more information. This suggests that the recent history of unemployment matters as a determinant of current unemployment – reflecting the importance of rigidities and inertia in the labour market in leading to a gradual adjustment in the unemployment rate to output movements. Linking current unemployment to past unemployment may also reflect persistent changes in unemployment (often known as hysteresis) that are related to changes in the equilibrium unemployment rate or NAIRU.

In the second panel of Table 3, lags of unemployment changes are found to be positive and significant, implying that unemployment usually moves in the same direction as past changes. The goodness of fit of the equation is also improved as adjusted R–squared rises to 0.67, implying that both cyclical and structural factors are key drivers of the unemployment rate.

## Table 3 Dynamic versions of Okun's Law

| **Dependent variable:** | **Change in unemployment rate** | | | |
|---|---|---|---|---|
| Sample: | 1973 Q1 to 2010 Q3 | | | |
| **Variable** | **Coefficient** | **Standard error** | **t-statistic** | **Probability** |
| Constant | 0.2163 | 0.0216 | 9.9935 | 0.0000 |
| GDP growth | -0.0990 | 0.0170 | -5.8153 | 0.0000 |
| GDP growth (-1) | -0.0874 | 0.0170 | -5.1477 | 0.0000 |
| GDP growth (-2) | -0.0833 | 0.0167 | -4.9788 | 0.0000 |
| GDP growth (-3) | -0.0511 | 0.0167 | -3.0549 | 0.0027 |
| GDP growth (-4) | -0.0420 | 0.0167 | -2.5178 | 0.0129 |
| R-squared | 0.5493 | | | |
| Adjusted R-squared | 0.5337 | | | |

| Dependent variable: | Change in unemployment rate | | | |
|---|---|---|---|---|
| Sample: | 1973 Q1 to 2010 Q3 | | | |
| **Variable** | **Coefficient** | **Standard error** | **t-statistic** | **Probability** |
| Constant | 0.0738 | 0.0176 | 4.2043 | 0.0000 |
| GDP growth | -0.0784 | 0.0142 | -5.5121 | 0.0000 |
| GDP growth (-1) | -0.0462 | 0.0155 | -2.9930 | 0.0032 |
| Change in unemployment rate (-1) | 0.4048 | 0.0789 | 5.1275 | 0.0000 |
| Change in unemployment rate (-2) | 0.2526 | 0.0717 | 3.5218 | 0.0006 |
| R-squared | 0.6793 | | | |
| Adjusted R-squared | 0.6705 | | | |

## Has Okun's Law been stable over time?

A long time series of economic data is likely to include a number of structural breaks. These would be expected to lead to fundamental changes in the relationship between variables and estimating a simple regression model, as in Table 1, would average over all of these shifts. Extended versions of the difference and gap versions of Okun’s Law suggest both cyclical and structural factors are important determinants of the unemployment rate.

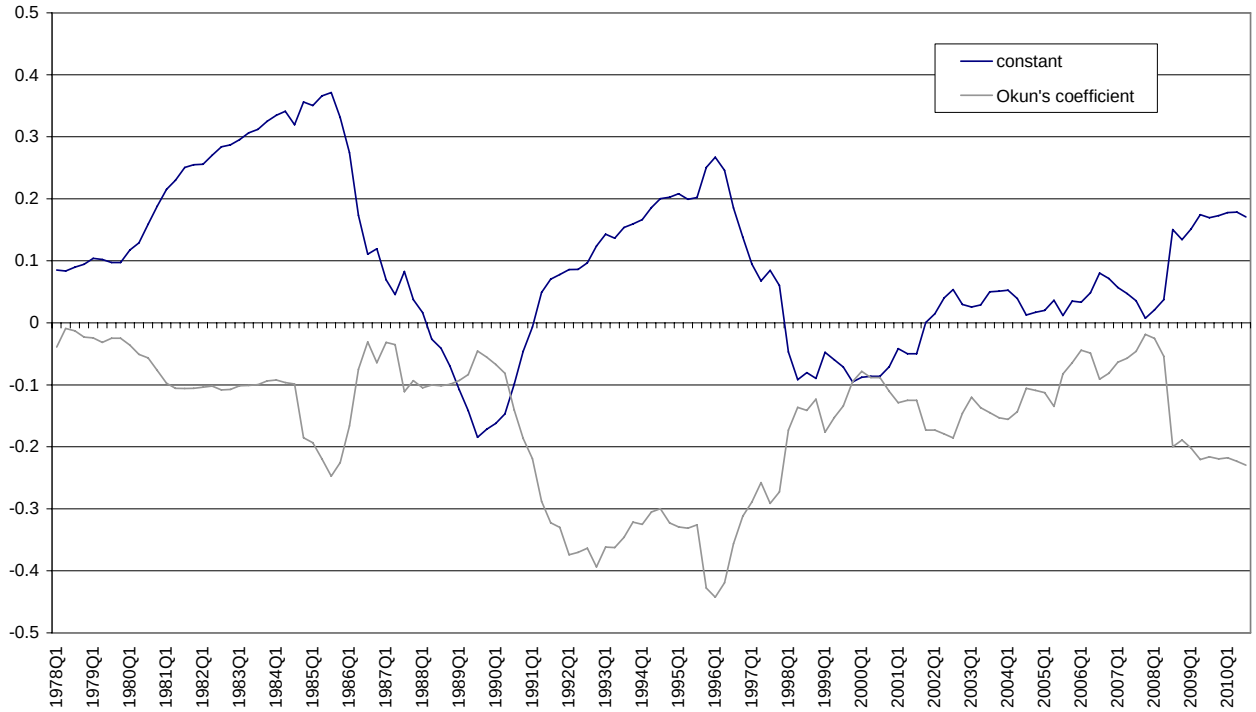
The structural stability of Okun's Law can be assessed by using rolling regressions. These break–down the sample into overlapping windows of a given period and by estimating the difference version of the law in each it is possible to see how the coefficients change over time. Judgements need to be made on the size of these windows. The smaller the observation window the more quickly structural instability in the regression coefficients will be detected, but the lower number of degrees of freedom compromises the power of the tests.

**Figure 3** shows how the constant and regressor (Okun's) coefficients change in a rolling 20 quarter sample between 1973 Q1 and 2010 Q3. Analysis based on 20 quarters of data is chosen to more speedily capture cyclical changes in the regression coefficients and it is clear that the constant and Okun's coefficients tend to be much stronger in periods in and around recessions. These include the early 1980s, early 1990s and the most recent downturn in 2008–09.

**Table 4** looks at various aspects of the change in unemployment during the last four UK recessions. The first panel in the table shows the rise in the unemployment rate relative to the peak to trough fall in output, and Okun's coefficient here describes the ratio of the two – that is the percentage point rise in the unemployment rate given each per cent drop in GDP.

## Figure 3 Rolling regressions of Okun's Law[1]

Coefficient values




1. Based on a 20 quarter window.

## Table 4 Okun's Law and recessions

| Peak to trough (GDP) | Fall in output (per cent) | Rise in the unemployment rate (percentage points) | Okun's coefficient |
|---|---|---|---|
| 1973 Q2 to 1975 Q3 (R1) | -2.5 | 1 | -0.40 |
| 1979 Q2 to 1981 Q1 (R2) | -5.9 | 3.6 | -0.61 |
| 1990 Q2 to 1992 Q2 (R3) | -2.5 | 2.9 | -1.16 |
| 2008 Q1 to 2009 Q3 (R4) | -6.5 | 2.7 | -0.42 |

| Below trend (GDP) | Rise in the unemployment rate (percentage points) | Trough to peak unemployment rate | Rise in the unemployment rate (percentage points) |
|---|---|---|---|
| 1974 Q4 to 1977 Q3 (X1) | 2.0 | 1973 Q4 to 1977 Q3 | 2.3 |
| 1980 Q3 to 1987 Q3 (X2) | 3.1 | 1979 Q2 to 1984 Q2 | 6.6 |
| 1991 Q1 to 1994 Q2 (X3) | 1.7 | 1990 Q2 to 1993 Q1 | 3.7 |
| 2009 Q1 - (X4) | 0.6 | 2008 Q1 to 2010 Q2 | 2.8 |

This shows a number of differences across recessions, notably that despite the large fall in output in the recent recession, the rise in the unemployment rate was relatively small. During the early 1990s recession the rise in the unemployment rate was broadly similar, but the contraction in GDP was far less. The recession of the early 1980s was closer in terms of the peak to trough fall in output, but the increase in the unemployment rate was more marked.

Differences between the recent and past recessions are also apparent when looking at the second panel showing the total trough to peak rise in the unemployment rate. Whereas in the latest recession, the rise in unemployment stabilised relatively quickly following the fall in output, in each of the two previous recessions unemployment continued to increase further. This second panel also shows the rise in unemployment in the period in which GDP was adjudged to be below trend. Here, the rise in the latest recession also appears smaller than in both the early 1980s and 1990s – although it must be borne in mind that according to OBR estimates output is presently and likely to remain below trend for a little while yet, and combined with the possible impact of the government's fiscal austerity programme further rises in the unemployment rate cannot be ruled out.

This analysis suggests two things. First, the relationship between output and unemployment is stronger around periods of economic turmoil like recessions, when output movements can change abruptly. Second, the relationship also differs from recession to recession – so experiences from past downturns may not necessarily provide a good indication of what will happen now.

Dummy variables can be used to test the impact of recessions on the relationship between output and unemployment. In the first panel in **Table 5**, the dummies R1, R2, R3 and R4 relate to the peak to trough periods in Table 4 and can be applied to the constant and regressor coefficients in the difference version of Okun's Law to see if recessions have level or proportional effects respectively on the relationship.

These are generally found to be insignificant, apart from the notable exception of R2 and R3 which suggest a level shift in the level of unemployment in the early 1980s and early 1990s recessions. In the second panel of Table 5 the dummies X1, X2, X3 and X4 correspond to the below trend output periods also shown in Table 4. Here there appears to be an impact of the downturn on both the level and slope coefficients in Okun's Law for each recession apart from the latest.

The actual and fitted values from these two regressions are shown in **Figure 3** and this helps to explain the results reported in Table 4. The second model, based on below trend output rather than peak to trough output falls tends to perform better, and this is mainly because a significant part of the rise in unemployment associated with the early 1980s and 1990s recessions occurred after GDP had stopped falling and began a modest recovery. This model though does not work quite so well for the latest downturn. Unlike previous recessions, the increase in the unemployment rate has strongly coincided with the period in which output fell from peak to trough, and although output is judged by both OBR and the Bank of England to still be below trend, further increases in the unemployment rate are yet to emerge. Of course, this should also be taken as a preliminary conclusion, as both the OBR and Bank of England emphasise the uncertainty over the immediate economic outlook.

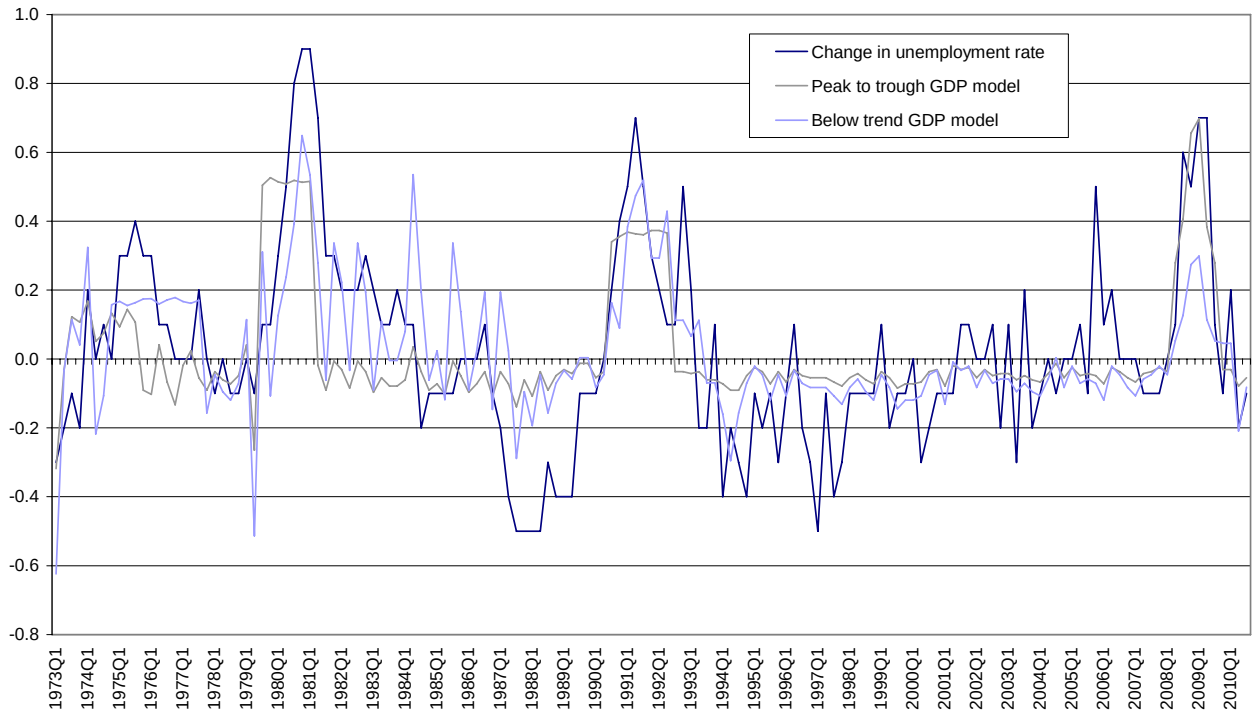
## Table 5 Recessions and the difference version of Okun's Law

| Dependent variable: | Change in unemployment rate | | | |
|---|---|---|---|---|
| Sample: | 1973 Q1 to 2010 Q3 | | | |
| **Variable** | **Coefficient** | **Standard error** | **t-statistic** | **Probability** |
| Constant | -0.0065 | 0.0305 | -0.2148 | 0.8303 |
| GDP growth | -0.0600 | 0.0281 | -2.1354 | 0.0345 |
| R1 | 0.1079 | 0.0828 | 1.3031 | 0.1947 |
| R2 | 0.5265 | 0.1146 | 4.5935 | 0.0000 |
| R3 | 0.3773 | 0.1057 | 3.5705 | 0.0005 |
| R4 | 0.2230 | 0.1584 | 1.4073 | 0.1615 |
| R1*GDP growth | 0.0335 | 0.0648 | 0.5175 | 0.6056 |
| R2*GDP growth | 0.0666 | 0.0872 | 0.7634 | 0.4465 |
| R3*GDP growth | 0.0855 | 0.1986 | 0.4307 | 0.6673 |
| R4*GDP growth | -0.1491 | 0.1166 | -1.2793 | 0.2029 |
| R-squared | 0.4148 | | | |
| Adjusted R-squared | 0.3774 | | | |

| Dependent variable: | Change in unemployment rate | | | |
|---|---|---|---|---|
| Sample: | 1973 Q1 to 2010 Q3 | | | |
| **Variable** | **Coefficient** | **Standard error** | **t-statistic** | **Probability** |
| Constant | 0.0158 | 0.0253 | 0.6261 | 0.5323 |
| GDP growth | -0.1230 | 0.0215 | -5.7290 | 0.0000 |
| X1 | 0.1492 | 0.0693 | 2.1526 | 0.0331 |
| X2 | 0.3203 | 0.0603 | 5.3164 | 0.0000 |
| X3 | 0.3222 | 0.0770 | 4.1831 | 0.0001 |
| X4 | 0.1569 | 0.2556 | 0.6139 | 0.5403 |
| X1*GDP growth | 0.1293 | 0.0605 | 2.1377 | 0.0343 |
| X2*GDP growth | -0.1609 | 0.0561 | -2.8673 | 0.0048 |
| X3*GDP growth | -0.3292 | 0.1113 | -2.9592 | 0.0036 |
| X4*GDP growth | -0.1952 | 0.3290 | -0.5931 | 0.5540 |
| R-squared | 0.4365 | | | |
| Adjusted R-squared | 0.4006 | | | |

Figure 3 **Recessions and changes in the unemployment rate**[1]

Percentage points




1. Quarterly changes in the actual unemployment rate and the fitted values from the two models reported in Table 5

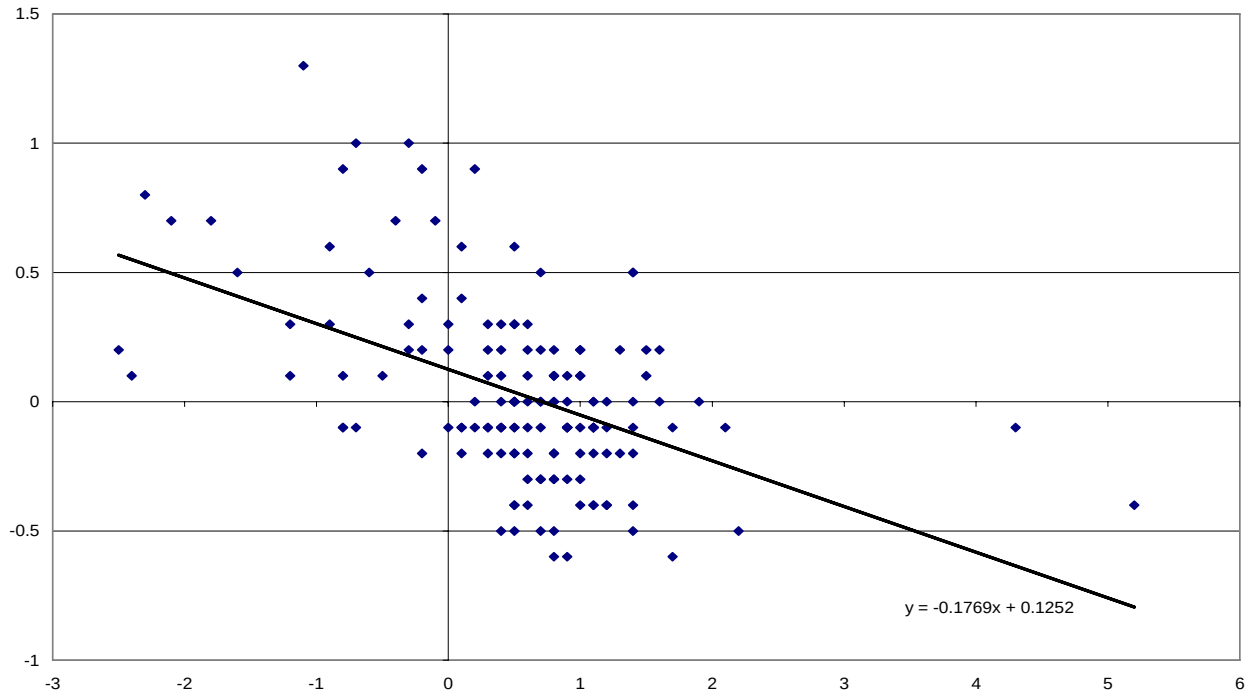
## Okun's Law by gender

ONS routinely publishes male and female unemployment rates enabling the significance of Okun's Law to be investigated by gender. **Figures 4a** and **4b** show scatter graphs, on the same scale, for the difference version of Okun's Law for men and women. The trend lines in each have been estimated, with the respective regression results shown in **Table 6**. Clearly the negative relationship is stronger for men than women (-0.177 compared to -0.076). Changes in male unemployment are therefore more strongly related to output movements than female unemployment.

This can also be seen in **Table 7** which shows the changes in male and female unemployment in the last four recessions. The increase in the unemployment rate for men has been at least double than for women. Okun's coefficient show that in the latest recession, a 1 per cent fall in GDP led to a 0.54 percentage point rise in the male unemployment rate but only a 0.26 percentage point rise in the female unemployment rate. Therefore the economic downturn impacted twice as strongly on male unemployment than female unemployment, a pattern that is also seen in previous recessions.

## Figure 4a **Output and male unemployment**

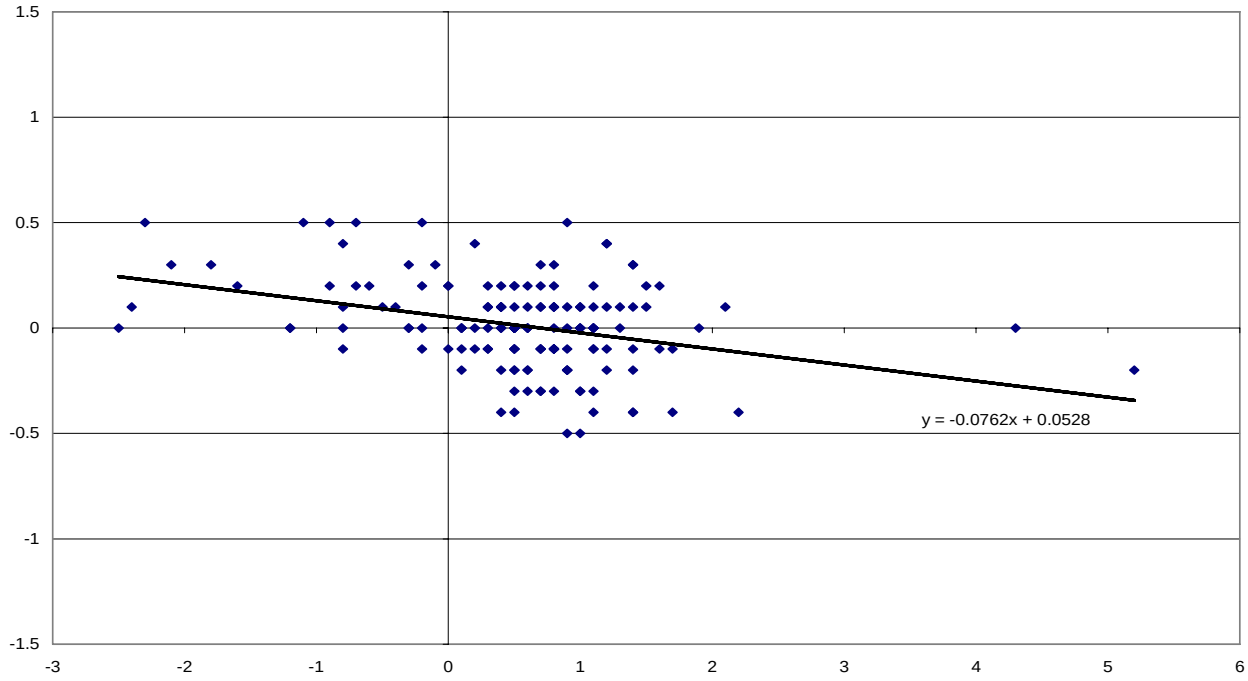
Quarterly change in unemployment




GDP quarter on quarter growth rate

## Figure 4b **Output and female unemployment**

Quarterly change in unemployment




GDP quarter on quarter growth rate

## Table 6 Okun's Law by gender

| Dependent variable: | Change in unemployment rate (Men) | | | |
|---|---|---|---|---|
| Sample: | 1973 Q1 to 2010 Q3 | | | |
| **Variable** | **Coefficient** | **Standard error** | **t-statistic** | **Probability** |
| Constant | 0.1252 | 0.0284 | 4.4129 | 0.0000 |
| GDP growth | -0.1769 | 0.0257 | -6.8855 | 0.0000 |
| R-squared | 0.2414 | | | |
| Adjusted R-squared | 0.2363 | | | |

| Dependent variable: | Change in unemployment rate (Women) | | | |
|---|---|---|---|---|
| Sample: | 1973 Q1 to 2010 Q3 | | | |
| **Variable** | **Coefficient** | **Standard error** | **t-statistic** | **Probability** |
| Constant | 0.0528 | 0.0186 | 2.8363 | 0.0052 |
| GDP growth | -0.0762 | 0.0169 | -4.5191 | 0.0000 |
| R-squared | 0.1205 | | | |
| Adjusted R-squared | 0.1146 | | | |

## Table 7 Changes to male and female unemployment rates during recessions

| Peak to trough (GDP) | Fall in output (per cent) | Rise in the male unemployment rate (percentage points) | Rise in the female unemployment rate (percentage points) | Okun's coefficient[1]- men | Okun's coefficient[1]- women |
|---|---|---|---|---|---|
| 1973 Q2 to 1975 Q3 | -2.5 | 1.3 | 0.3 | -0.52 | -0.12 |
| 1979 Q2 to 1981 Q1 | -5.9 | 4.5 | 2.2 | -0.76 | -0.37 |
| 1990 Q2 to 1992 Q2 | -2.5 | 4.4 | 0.9 | -1.76 | -0.36 |
| 2008 Q1 to 2009 Q3 | -6.5 | 3.5 | 1.7 | -0.54 | -0.26 |

1. Here Okun's coefficient describes the percentage point change in the unemployment rate following a one percentage point change in GDP.

These results are most likely due to the different patterns of male and female employment across industries and the respective cyclical movements in the output of each. In short, unemployment by gender acts as a proxy for unemployment by industry. Manufacturing and construction, where

output tends to exhibit particularly strong cyclical movements, also happen to have very high concentrations of male employment. Furthermore, employment in these industries consists of relatively high numbers of temporary and contractual workers, who are easier to dispose of when demand falters. On the other hand, female employment tends to be more strongly concentrated in the public services, especially in areas such as education and health services where employment is far more stable. As a result, recessions tend to hit female unemployment less hard – although if the government's fiscal austerity programme leads to public sector job reductions this may fall more significantly on women.

Female inactivity rates have fallen markedly in the last two decades, but rates are still higher than for men. Although no evidence is presented in this article, it is a reasonable assumption that female workers are more likely to move into and out of inactivity, also cushioning the impact of the cycle on unemployment.

## Okun's Law by age

The rise and fall in GDP over the last decade and a half also seems to have impacted differently on the unemployment rates of different age groups. Unemployment rates by age are only available from 1992 onwards which slightly limits the analysis as only one recession is included, but **Table 8** shows how unemployment rates by age changed during the period of 'Great Moderation' (1993 Q1 to 2008 Q1) and the following recession (2008 Q1 to 2010 Q1).

There does not appear to be an age–related pattern regarding the fall in unemployment rates during the sustained period of economic growth between 1993 and 2008. However, the increase in unemployment rates in the recent downturn is clearly inversely related to age – impacting the strongest on the younger cohorts and the least on the older cohorts. These results are confirmed when looking at the difference version of Okun's Law for the six age cohorts which are presented in **Table 9** and summarised in **Figure 5**. Over the sample in question, cyclical changes in output have affected the unemployment rates of younger age groups by more than older age groups.

The disproportionate impact of the recent recession on the unemployment of younger people has been widely reported. The smaller rise in unemployment rates during the recession may have resulted from labour hoarding – reducing the need for firms to make new hires. The uncertain economic outlook would also reduce the willingness of firms to take on new workers. A sharp reduction in job vacancies and the suspension of graduate recruitment schemes would undoubtedly hit younger people the hardest.

### Table 8 Percentage point changes in unemployment rates by age

| | 16 to 17 | 18 to 24 | 25 to 34 | 35 to 49 | 50 to 64 | 65 and over | All |
|---|---|---|---|---|---|---|---|
| 1993 Q1 to 2008 Q1 | 4.5 | -5.7 | -6.2 | -4.2 | -6.3 | -2.3 | -5.4 |
| 2008 Q1 to 2010 Q1 | 11 | 5.7 | 3.5 | 2 | 1.9 | 1.3 | 2.8 |

## Table 9 Testing Okun's Law by age

| Dependent variable: | Change in unemployment rate (16-17 years) | | | |
|---|---|---|---|---|
| Sample: | 1992 Q3 to 2010 Q3 | | | |
| **Variable** | **Coefficient** | **Standard error** | **t-statistic** | **Probability** |
| Constant | 0.5541 | 0.1631 | 3.3983 | 0.0011 |
| GDP growth | -0.6265 | 0.1918 | -3.2661 | 0.0017 |
| R-squared | 0.1306 | | | |
| Adjusted R-squared | 0.1184 | | | |

| Dependent variable: | Change in unemployment rate (18-24 years) | | | |
|---|---|---|---|---|
| Sample: | 1992 Q3 to 2010 Q3 | | | |
| **Variable** | **Coefficient** | **Standard error** | **t-statistic** | **Probability** |
| Constant | 0.2978 | 0.0668 | 4.4612 | 0.0000 |
| GDP growth | -0.4855 | 0.0785 | -6.1816 | 0.0000 |
| R-squared | 0.3499 | | | |
| Adjusted R-squared | 0.3407 | | | |

| Dependent variable: | Change in unemployment rate (25-34 years) | | | |
|---|---|---|---|---|
| Sample: | 1992 Q3 to 2010 Q3 | | | |
| **Variable** | **Coefficient** | **Standard error** | **t-statistic** | **Probability** |
| Constant | 0.1274 | 0.0434 | 2.9378 | 0.0045 |
| GDP growth | -0.2984 | 0.0510 | -5.8478 | 0.0000 |
| R-squared | 0.3251 | | | |
| Adjusted R-squared | 0.3156 | | | |

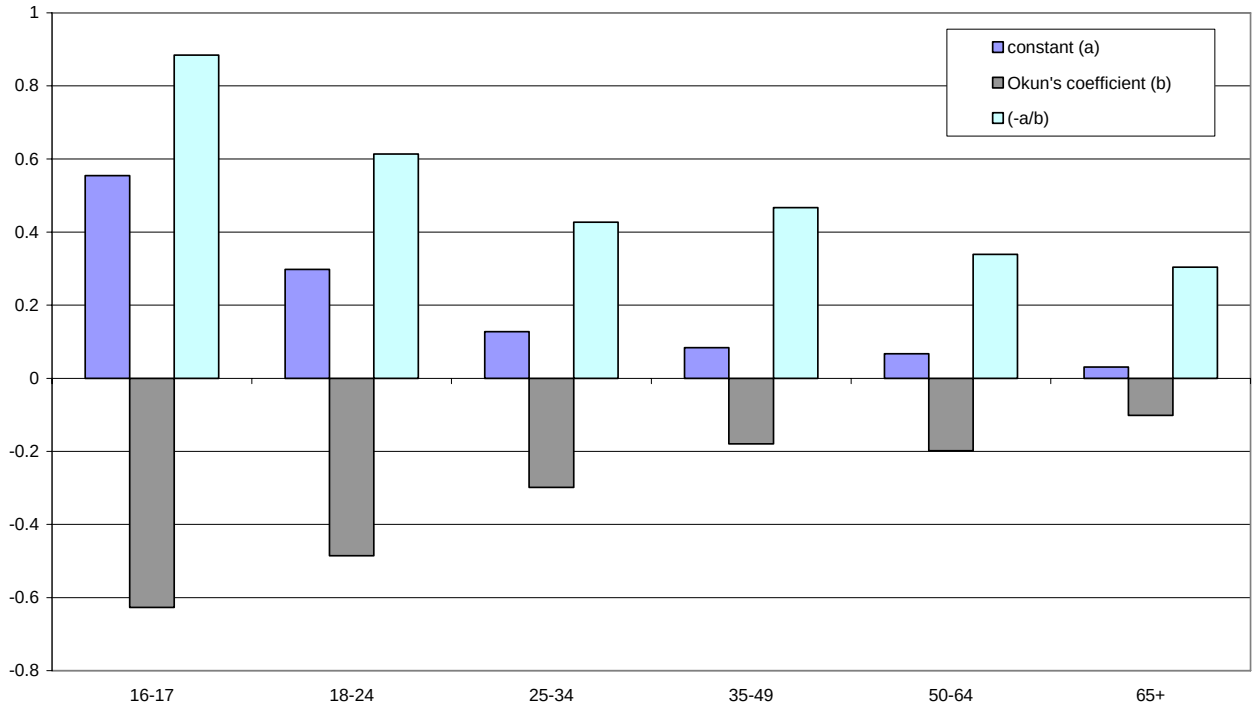
| Dependent variable: | Change in unemployment rate (35-49 years) | | | |
|---|---|---|---|---|
| Sample: | 1992 Q3 to 2010 Q3 | | | |
| **Variable** | **Coefficient** | **Standard error** | **t-statistic** | **Probability** |
| Constant | 0.0837 | 0.0290 | 2.8885 | 0.0051 |
| GDP growth | -0.1793 | 0.0341 | -5.2576 | 0.0000 |
| R-squared | 0.2802 | | | |
| Adjusted R-squared | 0.2701 | | | |

| Dependent variable: | Change in unemployment rate (50-64 years) | | | |
|---|---|---|---|---|
| Sample: | 1992 Q3 to 2010 Q3 | | | |
| **Variable** | **Coefficient** | **Standard error** | **t-statistic** | **Probability** |
| Constant | 0.0672 | 0.0327 | 2.0551 | 0.0436 |
| GDP growth | -0.1982 | 0.0385 | -5.1534 | 0.0000 |
| R-squared | 0.2722 | | | |
| Adjusted R-squared | 0.2620 | | | |

| Dependent variable: | Change in unemployment rate (65+ years) | | | |
|---|---|---|---|---|
| Sample: | 1992 Q3 to 2010 Q3 | | | |
| **Variable** | **Coefficient** | **Standard error** | **t-statistic** | **Probability** |
| Constant | 0.0308 | 0.0893 | 0.3455 | 0.7307 |
| GDP growth | -0.1015 | 0.1050 | -0.9662 | 0.3372 |
| R-squared | 0.0130 | | | |
| Adjusted R-squared | -0.0009 | | | |

## Figure 5 Okun's Law by age – summary[1]

Percentages




1. Coefficients are taken from the regression results reported in Table 8. (-a/b) gives an indication of how fast the economy needs to grow (in percent, quarter on quarter) to keep the unemployment rate in each age cohort constant. The sample is 1992 Q3 to 20010 Q3.

In contrast, unemployment rates in older age cohorts have exhibited much smaller percentage point increases. For example, between 2008 Q1 and 2010 Q1 the unemployment rates of those aged 50 to 64 and 65 and over increased by 1.9 percentage points and 1.3 percentage points compared to 2.8 percentage points for all , 5.7 percentage points for those aged 18 to 24 and 11 percentage points for those aged 16 to 17.

There are number of factors that may have reduced the impact of the downturn on older workers including:

- changes to accountancy regulations and deficits in company pension schemes which make it harder to 'pension off' older workers
- older workers increasingly working part time
- older workers can move into inactivity as well as unemployment

## Cross–country evidence on Okun's Law

Quarterly unemployment and GDP data collated by the OECD (Organisation for Economic Cooperation and Development) allows Okun's Law to be evaluated on a cross–section of the major

advanced economies between 1984 Q1 and 2010 Q3. The full set of regression results are reported in **Table 10**. The main findings are:

- Okun's coefficient, reflecting the reaction of the unemployment rate to changes in GDP is the lowest for Japan, followed by Italy and Germany
- Next comes France and the UK, with Okun's coefficient being the greatest for the USA

Conventional wisdom is that the cyclical response of unemployment rates is, in part, determined by the relative flexibility of the labour market. Where employment regulation is lower firms have greater ability to alter the size of their workforces in response to changes in demand. Therefore the highly institutionalised Japanese labour market sits at one end of the spectrum, and the deregulated labour market of the US at the other.

## Table 10 Testing Okun's Law across different countries

| **Dependent variable:** | **Change in unemployment rate (UK)** | | | |
|---|---|---|---|---|
| Sample: | 1984 Q1 to 2010 Q3 | | | |
| **Variable** | **Coefficient** | **Standard error** | **t-statistic** | **Probability** |
| Constant | 0.1058 | 0.0256 | 4.1330 | 0.0001 |
| UK GDP growth | -0.2357 | 0.0291 | -8.1070 | 0.0000 |
| R-squared | 0.3850 | | | |
| Adjusted R-squared | 0.3791 | | | |

| **Dependent variable:** | **Change in unemployment rate (Germany)** | | | |
|---|---|---|---|---|
| Sample: | 1984 Q1 to 2010 Q3 | | | |
| **Variable** | **Coefficient** | **Standard error** | **t-statistic** | **Probability** |
| Constant | 0.0400 | 0.0225 | 1.7774 | 0.0784 |
| Germany GDP growth | -0.1115 | 0.0209 | -5.3242 | 0.0000 |
| R-squared | 0.2126 | | | |
| Adjusted R-squared | 0.2051 | | | |

| Dependent variable: | Change in unemployment rate (France) | | | |
|---|---|---|---|---|
| Sample: | 1984 Q1 to 2010 Q3 | | | |
| **Variable** | **Coefficient** | **Standard error** | **t-statistic** | **Probability** |
| Constant | 0.1221 | 0.0248 | 4.9310 | 0.0000 |
| France GDP growth | -0.2240 | 0.0353 | -6.3494 | 0.0000 |
| R-squared | 0.2774 | | | |
| Adjusted R-squared | 0.2705 | | | |

| Dependent variable: | Change in unemployment rate (Italy) | | | |
|---|---|---|---|---|
| Sample: | 1984 Q1 to 2010 Q3 | | | |
| **Variable** | **Coefficient** | **Standard error** | **t-statistic** | **Probability** |
| Constant | 0.0259 | 0.0247 | 1.0467 | 0.2977 |
| Italy GDP growth | -0.0605 | 0.0334 | -1.8107 | 0.0730 |
| R-squared | 0.0303 | | | |
| Adjusted R-squared | 0.0210 | | | |

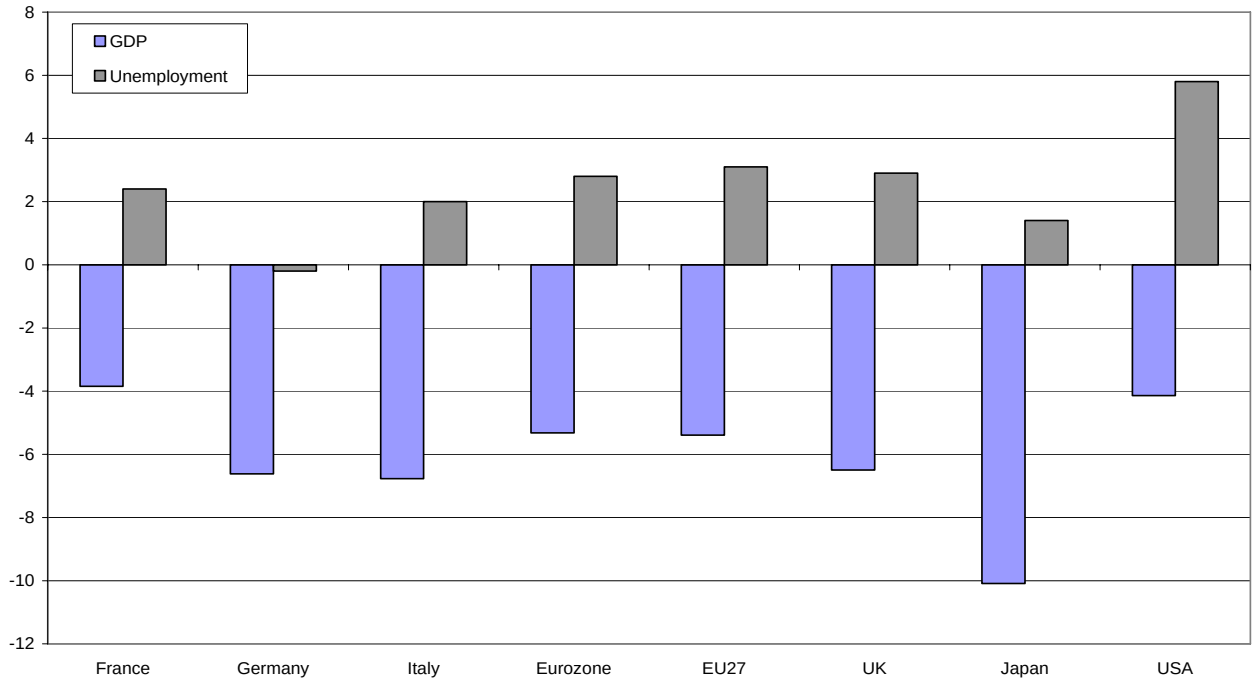
| Dependent variable: | Change in unemployment rate (Japan) | | | |
|---|---|---|---|---|
| Sample: | 1984 Q1 to 2010 Q3 | | | |
| **Variable** | **Coefficient** | **Standard error** | **t-statistic** | **Probability** |
| Constant | 0.0386 | 0.0151 | 2.5576 | 0.0120 |
| Japan GDP growth | -0.0300 | 0.0118 | -2.5552 | 0.0120 |
| R-squared | 0.0585 | | | |
| Adjusted R-squared | 0.0496 | | | |

| Dependent variable: | Change in unemployment rate (USA) | | | |
|---|---|---|---|---|
| Sample: | 1984 Q1 to 2010 Q3 | | | |
| **Variable** | **Coefficient** | **Standard error** | **t-statistic** | **Probability** |
| Constant | 0.2322 | 0.0308 | 7.5495 | 0.0000 |
| USA GDP growth | -0.3183 | 0.0330 | -9.6416 | 0.0000 |
| R-squared | 0.4696 | | | |
| Adjusted R-squared | 0.4645 | | | |

The relationships between peak to trough falls in output and increases in the unemployment rate during the latest recession are presented in **Figure 6**. This tends to confirm, as well as being a driver of, the regression results in Table 10. Italy, Japan and Germany, all of which have relatively large manufacturing sectors, experienced relatively large falls in GDP compared to the pick ups in unemployment rates. The smallest increase in unemployment was registered in Germany, where employment subsidies and short–term working arrangements had a significant effect in lessening the rise in unemployment rates.

## Figure 6 Peak to trough contractions[1] in GDP and the rise in unemployment rates across countries

Per cent




1. The exact timing of the peak to trough contraction in GDP through the recent recession differs slightly from country to country.

The percentage point increase in UK unemployment was similar to the EU27 and Eurozone country aggregates, despite a sharper fall in GDP and a larger increase in unemployment rates compared to major countries such as Germany, France and Italy. This partly reflects the very large increases in unemployment rates in Ireland and Spain during the recent recession (both over 10 percentage points), which are not shown in Figure 6. In Ireland, a major banking crisis resulted in a sharp contraction in the construction industry and a major fiscal tightening. In Spain, a large proportion of the workforce happened to be on temporary contracts, and therefore highly vulnerable to a contraction in demand.

The USA, despite experiencing a relatively small peak to trough fall in GDP, has suffered from a large increase in its unemployment rate. Furthermore, unemployment has continued to deteriorate even after the economy started to grow again – a problem widely diagnosed as a 'jobless recovery'. Undoubtedly, lower employment regulations make it easier for businesses to shed labour in a downturn, explaining the larger rise in unemployment rates, but the flip side of this is that unemployment should also fall more quickly in the recovery. Historically this has been the case, with US labour market generally rehabilitating itself much faster following a recession than in Europe, where increases in unemployment have been more persistent. However, this is the second successive jobless recovery in the USA, and the stubbornness of unemployment has become both a major economic and political issue.

The main problem appears to be that the strength of the economic recovery is insufficient to persuade firms to start hiring again. Instead, growing output is met from productivity increases, and usually following a recession businesses have available spare capacity in order to achieve this without employing more workers. Uncertainty over the voracity of the economic recovery and low business confidence may also dampen employment intentions – with businesses adopting a cautious approach to how much future capacity may be required in order to meet demand.

## Production function approaches

Okun's original relationship was based on the notion that more labour was required to produce more output of goods and services. Therefore, Okun's position was that the unemployment rate can serve as a useful summary of the amount of labour being used in the economy. Unemployment in this relationship is used as a proxy for idle resources, and these rise and fall depending on the level of output.

Employment (or lack of it measured in terms of unemployment) though is not the only input into production. The relationship between output and employment, often described by labour productivity, is also influenced by capital inputs and capacity utilisation. Employment inputs themselves are also determined by average working hours, participation rates and the size of the working population. Therefore, it is apparent that changes in output can result from a number of sources and not just limited to the degree of idle labour in the economy. A production function approach recognises this by relating changes in output to a broader array of inputs than just employment (or the part of the labour force that is not unemployed).

A production function approach allows the breakdown of GDP into a number of contributing factors – for all of which official data is published by ONS.

Output = Output per hour (labour productivity) * Average hours worked * 1-unemployment rate *

Activity rate * Household population

Working backwards, the activity rate multiplied by the household population gives the total economically active labour force. Multiplying this by 1-unemployment rate (employment rate) then gives the total level of employment in the economy. Multiplying through by average hours worked gives the total number of hours worked, and finally output per hour then gives the total output of the economy. Therefore changes in output can be decomposed into the contributions resulting from the household population, activity rate, unemployment rate, average hours and output per hour. All of these series can be found in the Labour Market Statistical Bulletin published each month by ONS.

Of course, all of these additional factors may show the same cyclical patterns as the unemployment rate, hence they can be approximated by the unemployment rate and re–establishing the significance of Okun's Law. For instance:

**Household population**: the Bank of England has suggested that migration flows into the UK, and hence the size of the household population is subject to cyclical influences as short–term migrants seek employment opportunities. It is noted that this has become more significant since the A8 accession of Eastern European economies to the European Union.

**Labour force participation rates**: may also move around over the cycle reflecting discouraged worker effects. Typically participation will fall in a recession as potential workers realise their prospects are weak and withdraw from the labour market to pursue other goals or through discouragement. Female inactivity rates may also be partly driven by opportunities in the labour market.

**Average hours per worker**: in recessions, hours worked generally fall as firms cut back on overtime or regular hours in response to lower demand. Reducing worker hours instead of worker numbers would lead to a different dynamic between output and unemployment, especially if larger cuts in hours reduce the need for job shedding.

**Labour productivity**: one of the key influences here is the rate of labour utilisation – with the intensity at which labour is used varying over the cycle. Productivity though is also driven by other factors such as technology and capital inputs which are harder to measure. Therefore, as is often the case, productivity tends to act as a residual between known inputs and known outputs.

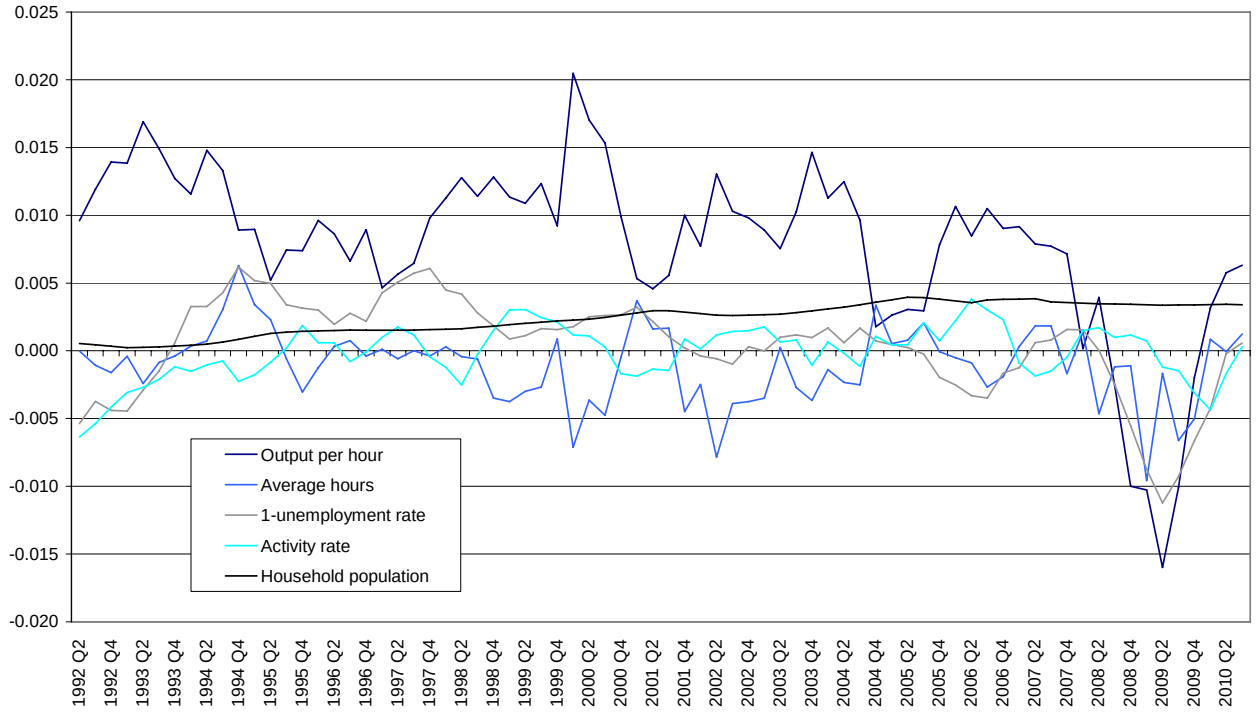
Unless these factors behave in exactly the same way as the unemployment rate the Okun's Law regressions presented in the article thus far will routinely suffer from missing variable bias.

The easiest way of decomposing output or GDP into these factors is to work in logarithms. In this case, a multiplicative relationship like that expressed here will become log–additive, making it easy to just add up the individual component contributions to output. Furthermore, the log change in a variable approximates a percentage change, so it is also easy to move from contributions to levels to contributions to changes in those levels (growth rates).

**Figure 7** shows the relative contributions to quarterly growth in GDP from output per hour, average hours, 1-unemployment rate, activity rate and the household population from 1992 Q2 to 2010 Q3. These dates reflect the period from when the economy started to recover from the recession of the early 1990s up to the present. It is clear that the main contribution to growth over this period has been labour productivity measured in terms of output per hour. It is also clear that during the recent recession a number of these components contributed negatively to GDP growth.

## Figure 7 Contributions to output growth, 1992 Q3 to 2010 Q3

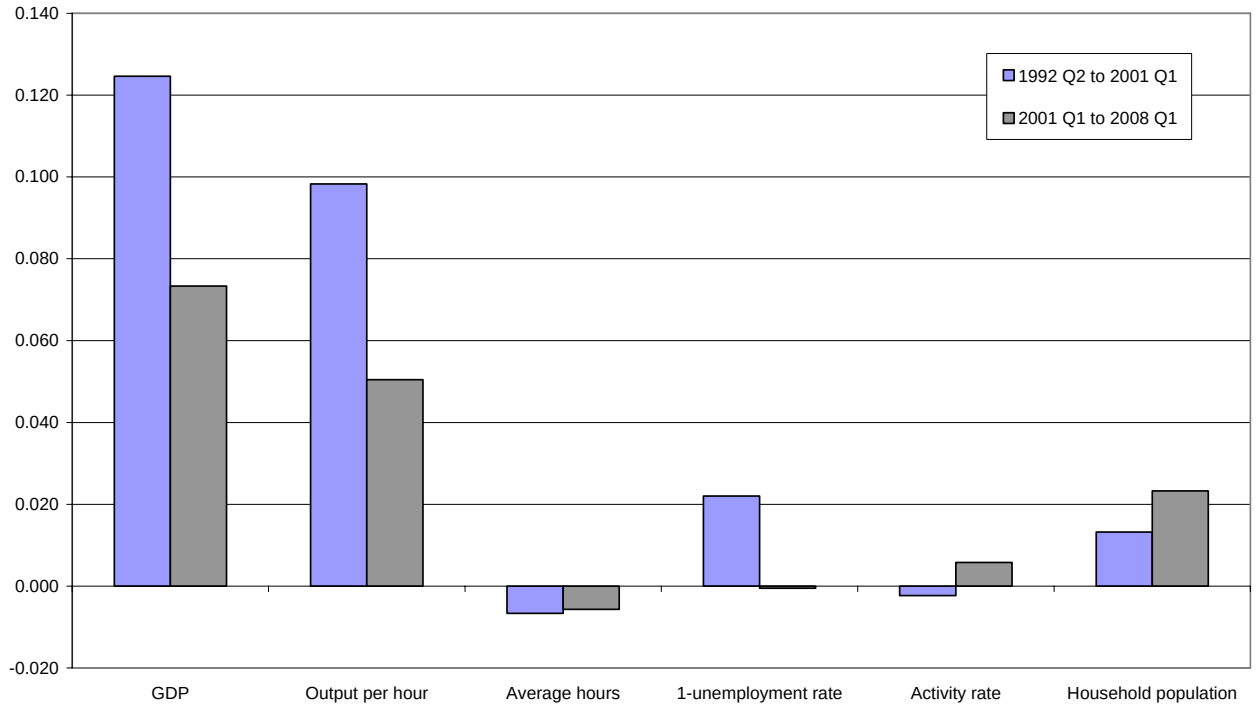
Log change: quarter on quarter




The period from 1992 Q2 to 2008 Q1 heralded the longest unabated economic expansion in the UK economy with 63 successive quarters of growth. Low inflation over this period has meant that it has come to be known as 'The Great Moderation' – reflecting the long continuation of price and output stability. **Figure 8** shows the contributions to each of these identified factors to growth during this period – which has also been split into roughly two halves consisting of 1992 Q2 to 2001 Q1 and 2001 Q1 to 2008 Q1.

## Figure 8 Contributions to output growth in 'The Great Moderation'

Log changes over each period




| | GDP | Output per hour | Average hours | 1-unemployment rate | Activity rate | Household population |
|---|---|---|---|---|---|---|
| 1992 Q2 to 2008 Q1 | 0.198 | 0.149 | -0.012 | 0.022 | 0.003 | 0.036 |
| 1992 Q2 to 2001 Q1 | 0.125 | 0.098 | -0.007 | 0.022 | -0.002 | 0.013 |
| 2001 Q1 to 2008 Q1 | 0.073 | 0.050 | -0.006 | 0.000 | 0.006 | 0.023 |

There are two main things to note form Figure 8. First, growth during 'The Great Moderation' was primarily driven by output per hour. Growing inputs also contributed to growth, but the main driver over that period was the efficiency or productivity at which they were used. Average hours made a negative contribution, reflecting a longer term trend to shorter working hours in line with employment legislation and individual preferences. Growth in household population was also fairly important, especially in the second half of the sample and driven predominantly by net inward migration.

Second, growth in the first half of the sample was faster than during the second, accounted for by higher growth in output per hour and a fall in the unemployment rate (increase in the employment rate). This partly reflects that growth in the first half of the sample period includes the recovery period from the previous recession, in which a pick up in capacity utilisation and a fall in unemployment would be expected. It is noticeable though that from 2001 Q1 to 2008 Q1 the contribution of the unemployment (employment) rate was negligible.

This is very interesting as a preamble, but the main interest in the relationship between unemployment and output is generally centred on periods of economic recession. Therefore **Figure 9** shows the contributions to the peak to trough falls in GDP in each of the last three recessions and a number of interesting similarities and differences are evident:

**Average hours**: it has been widely reported that the increase in unemployment has been relatively small in the latest recession compared to those previously – and one factor accounting for this has been a move to working reduced hours in order to maintain employment levels. Figure 9 disproves this, showing that the negative contribution of falling average hours to growth in the latest recession has not been much different than in previous downturns. In fact, falling average hours were an even more prominent feature of the early 1980s recessions than that recently. This is not altogether unsurprising as the sector of the economy most likely to move to shorter–time working in a downturn are the production industries – which contribute significantly less to total GDP now than they did three decades ago.

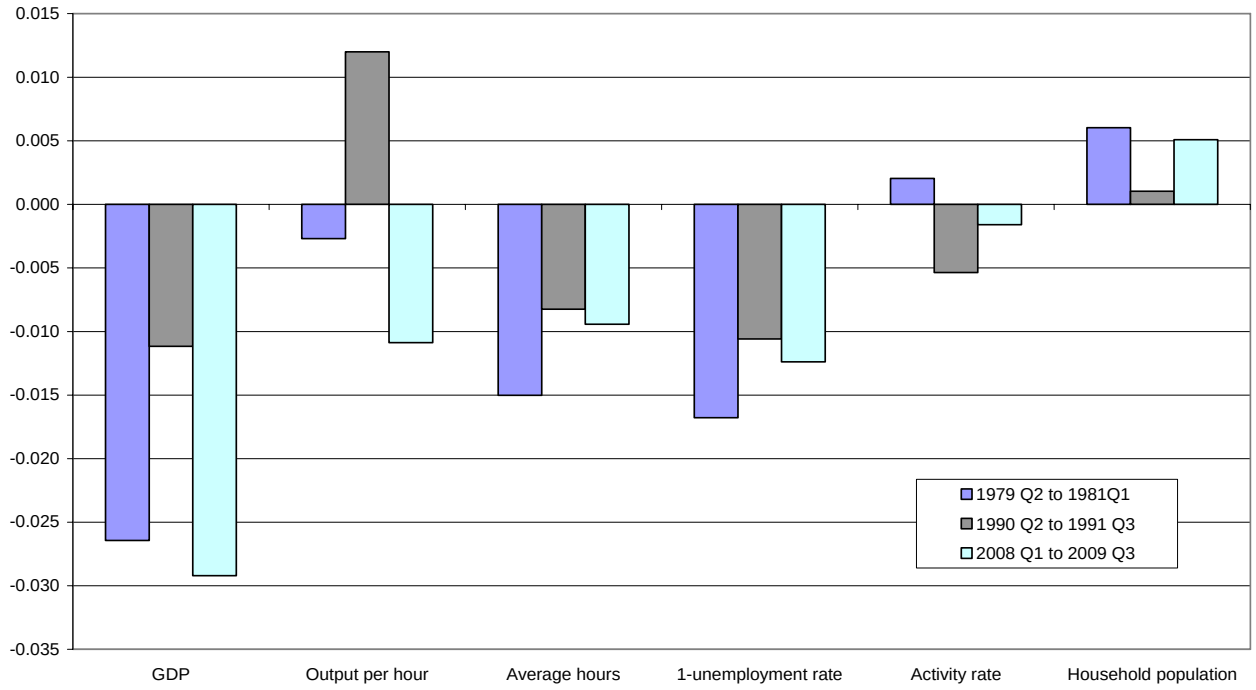
**Unemployment rate**: the actual contribution of an increase in the unemployment rate to the fall in GDP is also fairly similar across recessions. However this is over the period in which the peak to trough fall in output occurred. The latest recession appears to differ somewhat to those of the early 1980s and early 1990s in that unemployment continued to rise through the early recovery period in the previous two recessions, whereas unemployment appears to have stabilised once output stopped contracting in the more recent downturn.

**Output per hour**: This plays an important role in explaining the differences between falling output in the last three recessions. The contributions of an increase in the unemployment rate and a fall in average hours are the main contributing factors behind the falling labour input in a downturn. In the early 1980s recession, the contributions of a fall in average hours and an increase in the unemployment rate were slightly greater than in the latest recession, even though the overall peak to trough fall in GDP was lower. As a result, the contribution of falling output per hour has also been greater this time round. Compared to the recession in the early 1990s, the contributions of average hours and the unemployment rate were broadly similar, but the peak to trough fall in output was much greater in the recent recession. Therefore, whilst there was a fairly significant pick up in output per hour in the early 1990s recession, it fell quite considerably in the latest downturn.

Interest in the dynamics between output and unemployment is not only heightened during the period of falling output, but also in the period in which output begins to recover when hope turns to an improvement in the labour market outcomes. At present, GDP is still below its pre–recession (2008 Q1) level, so a complete analysis of the recovery is not yet possible, But **Figure 10** shows the relative contributions to the recovery in output from previous recessions and the most recent one so far.

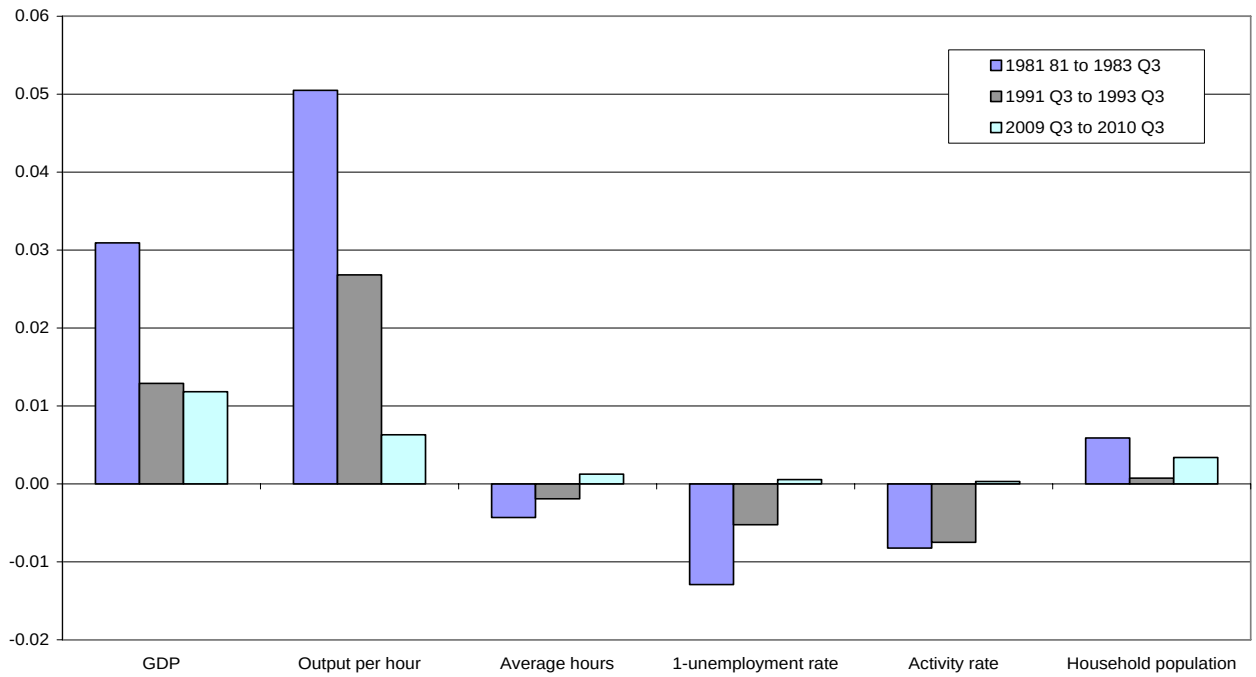
## Figure 9 Contributions to peak to trough output falls in the last three UK recessions

Log changes




## Figure 10 Contributions to the economic recovery from recessions

Log changes



Again, the most interesting difference between the latest recovery and those of the early 1980s and early 1990s is centred on output per hour, which contributes significantly less this time. This is partly because in both the two previous recessions the labour market continued to weaken even though GDP was growing, as evidenced by further increases in the unemployment rate and falls in the activity rate (discouraged worker effects). Rising unemployment and falling activity have stabilised earlier in the recent recession, but as a consequence, output per hour has contributed less.

As mentioned already, output per hour is rather like a residual in this growth accounting approach – it includes the elements that are unmeasured such as the contribution of capital to labour productivity and rates of labour utilisation. As capital inputs are quasi–fixed in the short run, the main driver of output per hour is therefore likely to be rates of labour/capacity utilisation. The evidence here suggests that lower increases in the rate of unemployment in the recent recession have been bought at the price of using labour less intensively.

This outcome tends to suggest that firms have been hoarding labour to a greater extent than in previous downturns. Labour hoarding is not a completely irrational response to an economic downturn, especially because businesses tend to invest significantly in firm–specific capital and certain skills are in limited supply – meaning that if a downturn is temporary businesses have more to lose by releasing valuable labour that it will require in the future than using this labour less productively in the short–term. Business' ability to hoard labour has been aided by low interest rates and relatively good profitability coming into the recession – reducing the imperative of firms to reduce labour costs in order to preserve cash flow. However, whilst this is undoubtedly a good thing, it does suggest that firms may have added scope to increase output via productivity gains rather than through employment increases, which could result in a muted employment response to a recovery in GDP.

## Concluding comments

The economic and social impacts of rising unemployment are of key concern to almost everybody. Therefore, during a recession, when output can often fall swiftly, the pass–through to the labour market becomes of paramount interest. This article has explored the relationship between output and unemployment by revisiting various aspects of Okun's Law.

It is clear that longer–term movements in the unemployment rate are driven by both cyclical and structural effects which has reduced the significance of Okun's Law as a forecasting rule of thumb. Due to structural changes in the relationship between output and unemployment over time, past experiences tend to be of limited value in explaining the present. However, on a short–term basis, looking at the differences in unemployment changes across different constituents of the labour market and across countries is still an interesting exercise.

The relationship between output and unemployment is more complicated or multi–faceted than Okun's Law allows for. This is shown in the production function approach in the final section of the article – where it is suggested that the weaker pass–through from the fall in GDP to the rise in the unemployment rate in the most recent recession compared to those of the early 1980s and early

1990s is due to lower labour productivity – or a sign of increased labour hoarding. This may have benefits in the short run by limiting the immediate rise in unemployment, but could lower the scope for future employment increases in the immediate future if businesses can produce more output by using existing labour more intensively.

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# Regional economic indicators

**with a focus on the relationship between skills and productivity**

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## Summary

**This quarter, the focus section of the Regional Economic Indicators article explores the influence of workforce skills on the economic performance of the NUTS 1 regions. The regular part of the article then gives an overview of the economic activity of UK regions in terms of their gross value added (GVA), GVA per head and labour productivity. This is followed by a presentation of headline indicators of regional welfare, other drivers of regional productivity and regional labour market statistics. The indicators cover the nine Government Office Regions of England and the devolved administrations of Northern Ireland, Scotland and Wales. These 12 areas comprise level 1 of the European Nomenclature of Units for Territorial Statistics (NUTS level 1) for the UK. The term 'region' is used to describe this level of geography for convenience in the rest of this article.**

## Introduction

Previous Regional Economic Indicators (REI) articles have shown significant and persistent differences in economic performance and incomes between and within the UK regions and identified some of the factors that might account for such differences. These factors included productivity differences, employment and activity rates and industry structure.

This article explores the influence of workforce skills on the economic performance of the regions. HM Treasury identified skills as one of the five key drivers of productivity which in turn impacts on the economic performance of a region. Skills can influence productivity in two ways. Skills of workers influence productivity directly, as they define the capabilities that the labour force can contribute to the production process, and indirectly, where the contribution of skill is mediated through other drivers, for example, enterprise and innovation.

To examine the link between skill and productivity, skill needs to be measured. However, the concept of skills include many elements such as personal characteristics, skills developed through formal education and training, and skills developed through work experience and informal training which makes the direct measurement difficult. In empirical work, qualifications and occupation are two commonly used proxies for skills. Each of these proxies has its limitations. In this paper, occupation (as defined in the Standard Occupational Classification (SOC)) is used as an indicator of the level of skill in the employed workforce (see **Box 1**). This is because occupation as a proxy for skill appears to be a more comprehensive measure of skill than formal qualifications only[1].

## Box 1 Skill levels in the Standard Occupational Classification

The Standard Occupational Classification is the classification of occupational information for the United Kingdom. Within the context of the classification occupations are classified into groups according to the concepts of 'skill specialisation' and 'skill level'.

Skill specialisation is defined as the field of knowledge required for competent, thorough and efficient conduct of the tasks. In some areas of the classification it refers also to the type of work performed (for example materials worked with, tools used, and so on).

Skill levels are approximated by the length of time deemed necessary for a person to become fully competent in the performance of the tasks associated with a job. This, in turn, is a function of the time taken to gain necessary formal qualifications or the required amount of work–based training. Apart from formal training and qualifications, some tasks require varying types of experience, possibly in other tasks, for competence to be acquired. Within the broad structure of the classification (major groups and sub-major groups) the sub–major groups have been aggregated into four skill–based occupation groups. (For detailed information, see (www.statistics.gov.uk/methods_quality/ns_sec/downloads/SOC2000_Vol1_V5.pdf).

The **first** skill level equates with the competence associated with a general education, usually acquired by the time a person completes his/her compulsory education and signalled via a satisfactory set of school–leaving examination grades. Competent performance of jobs classified at this level will also involve knowledge of appropriate health and safety regulations and may require short periods of work-related training.

Examples of occupations defined at this skill level within the SOC90 include postal workers, hotel porters, cleaners and catering assistants.

The **second** skill level covers a large group of occupations, all of which require the knowledge provided via a good general education as for occupations at the first skill level, but which typically have a longer period of work–related training or work experience. Occupations classified at this level include machine operation, driving, caring occupations, retailing, and clerical and secretarial occupations.

The **third** skill level applies to occupations that normally require a body of knowledge associated with a period of post–compulsory education but not to degree level. A number of technical occupations fall into this category, as do a variety of trades occupations and proprietors of small businesses. In the latter case, educational qualifications at sub–degree level or a lengthy period of vocational training may not be a necessary prerequisite for competent performance of tasks, but a significant period of work experience is typical.

The **fourth** skill level relates to what are termed 'professional' occupations and managerial positions in corporate enterprises or national/local government. Occupations at this level normally require a degree or equivalent period of relevant work experience.

## Skill structure of the employed workforce

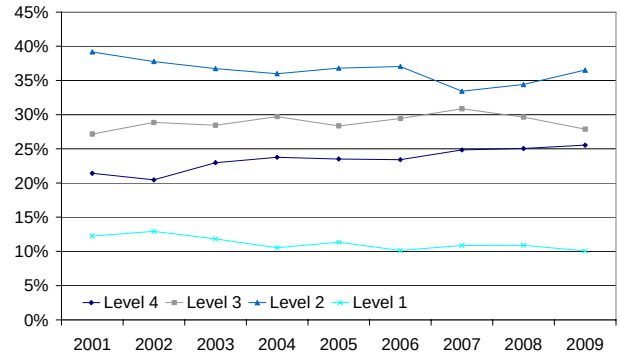
This section examines the skill structure of the employed workforce in the NUTS 1 regions and explores whether there are any systematic productivity differences between the regions that appear to be associated with the skill profile of their employed workforce. The analysis uses workplace based employment data, hours worked data and occupation data from the Labour Force Survey and covers a period between 2001 and 2009[2,3,4].

Skill structure can be defined in terms of percentage distribution of employment and hours worked across four skill groups discussed in the previous section. As the GVA per hour worked is the preferred indicator of productivity, the following analysis uses hours worked by the skill groupings.

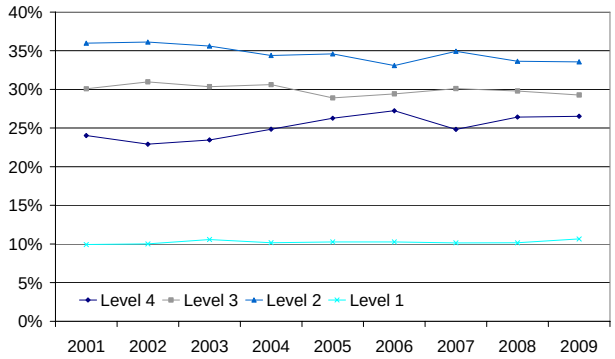
**Figure 1** presents the distribution of the hours worked by each skill level in NUTS 1 regions and the UK between 2001 and 2009. The figure reveals that in all regions hours worked by the lowest skill group (level 1) accounted for the lowest proportion of the workforce and its share remained fairly stable in all the regions between 2001 and 2009. It is also evident that between 2001 and 2009 the structure of the workforce moved away from the relatively lower skilled (level 2) employment and towards higher skilled employment, namely 'professional' and 'managerial, employment (level 4) across the UK.

### Figure 1 Skill share of total hours worked: NUTS 1 regions and the UK, 2001–2009

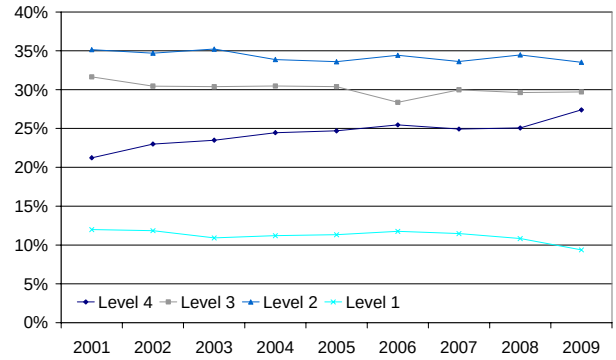
**North East**



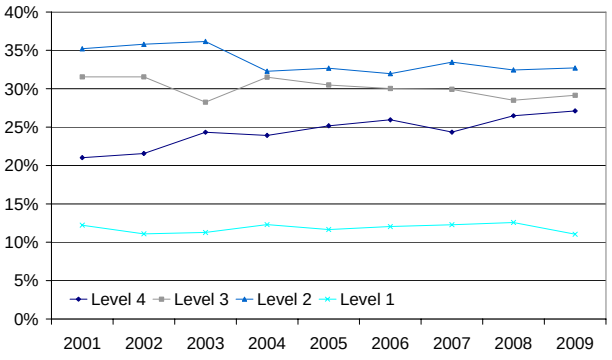

**North West**



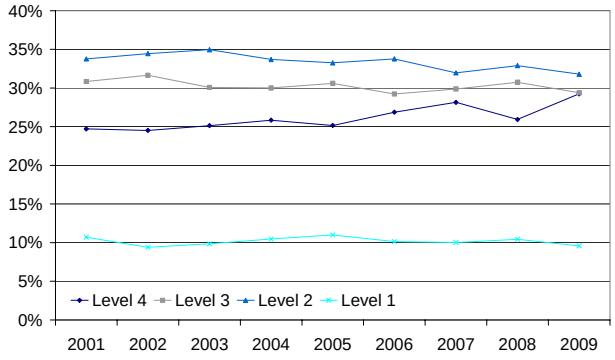

**Yorkshire and the Humber**



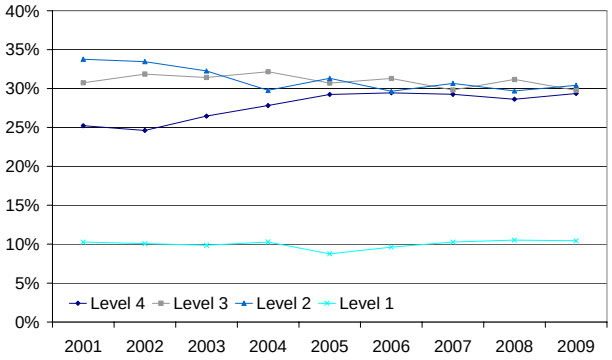

**East Midlands**



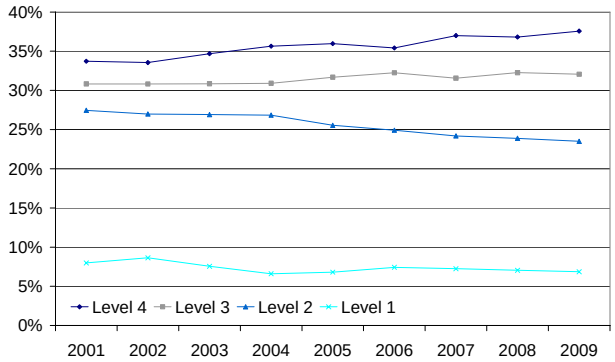
### West Midlands



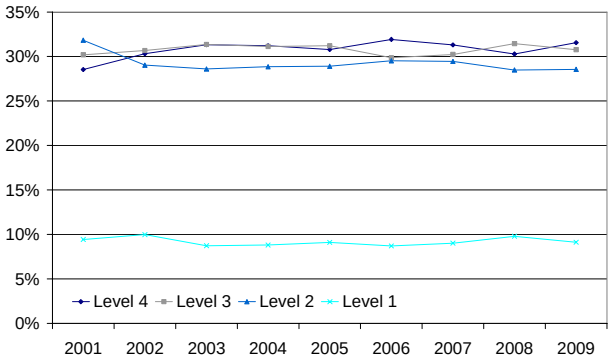

### East of England



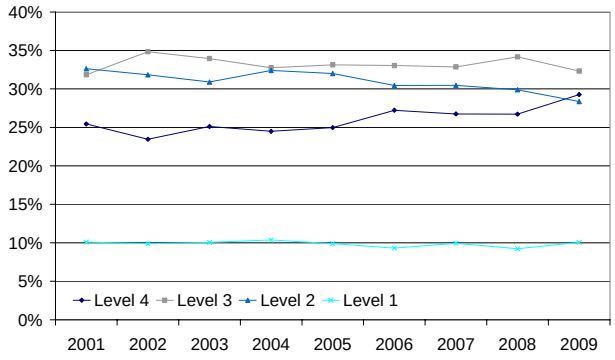

### London



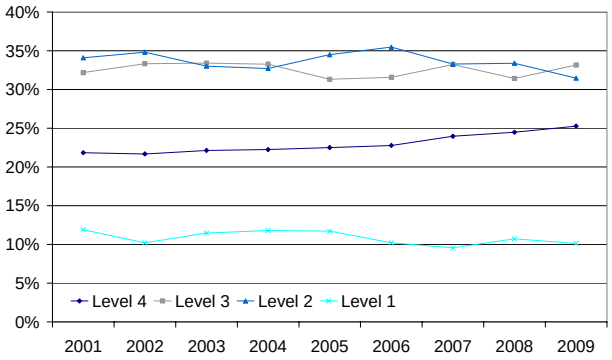

### South East



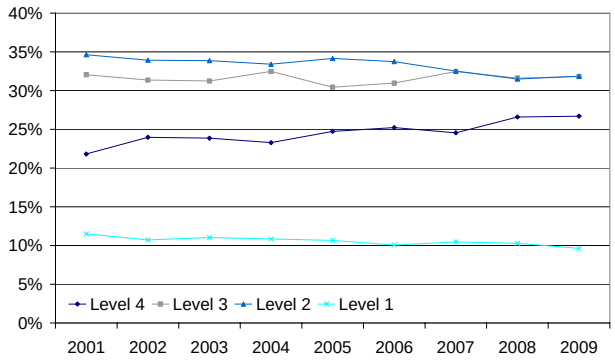

### South West



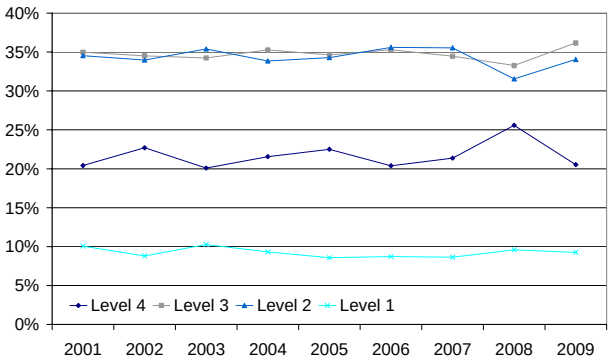

### Wales



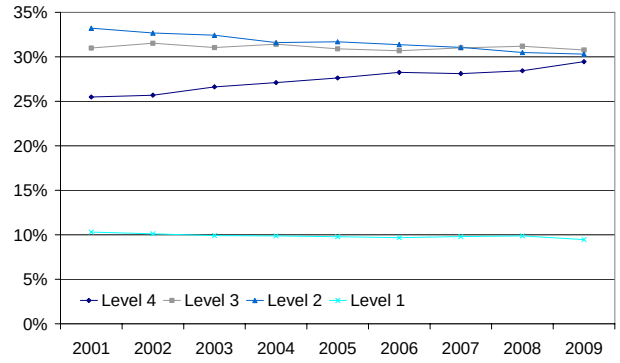

### Scotland




### Northern Ireland



**United Kingdom**




Source: Labour Force Survey

At the regional level, the general trend of faster growth in high skilled jobs occurred in every region, but the proportion of the hours worked in high skilled jobs increased faster in regions such as North East and Yorkshire and the Humber compared to the others. However, throughout the period London accounted for the largest share of hours with level 4 skills, followed by the South East. By 2009, the South West had the largest share of its hours accounted for by level 3 skills while the North East had the highest percentage of its workforce utilising level 2 skills over the same period

**Table 1** shows the correlation coefficients of the skill composition in all the regions compared to the UK between 2001 and 2009. A three year average is used to smooth out short–term fluctuations and highlight longer term trends in the series. The correlation coefficient represents how closely the overall skill composition of worked hours in a region is related to the national skill structure. A correlation coefficient of 1 represents very strong similarity between the skill structure in the region and the UK. The figure shows that throughout the period considered, London had the least similar skill structure to the UK. For the remaining regions, the similarity between their skill composition and the UK was fairly strong. Northern Ireland, North East and Wales were slightly less similar than the remaining regions but the difference was small.

## Table 1 Correlations of skill shares of the total hours worked in the NUTS 1 regions with those in the UK

Average correlations

| | North East | North West | Yorkshire and Humber | East Midlands | West Midlands | East of England | London | South East | South West | Wales | Scotland | Northern Ireland |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2001–2003 | 0.91 | 0.98 | 0.97 | 0.96 | 0.99 | 1.00 | 0.87 | 0.96 | 0.99 | 0.97 | 0.98 | 0.96 |
| 2004–2006 | 0.93 | 0.98 | 0.97 | 0.98 | 0.99 | 0.99 | 0.89 | 0.97 | 0.99 | 0.94 | 0.98 | 0.93 |
| 2007–2009 | 0.95 | 0.97 | 0.97 | 0.97 | 0.99 | 1.00 | 0.88 | 0.99 | 0.99 | 0.96 | 0.98 | 0.93 |

Source: Labour Force Survey

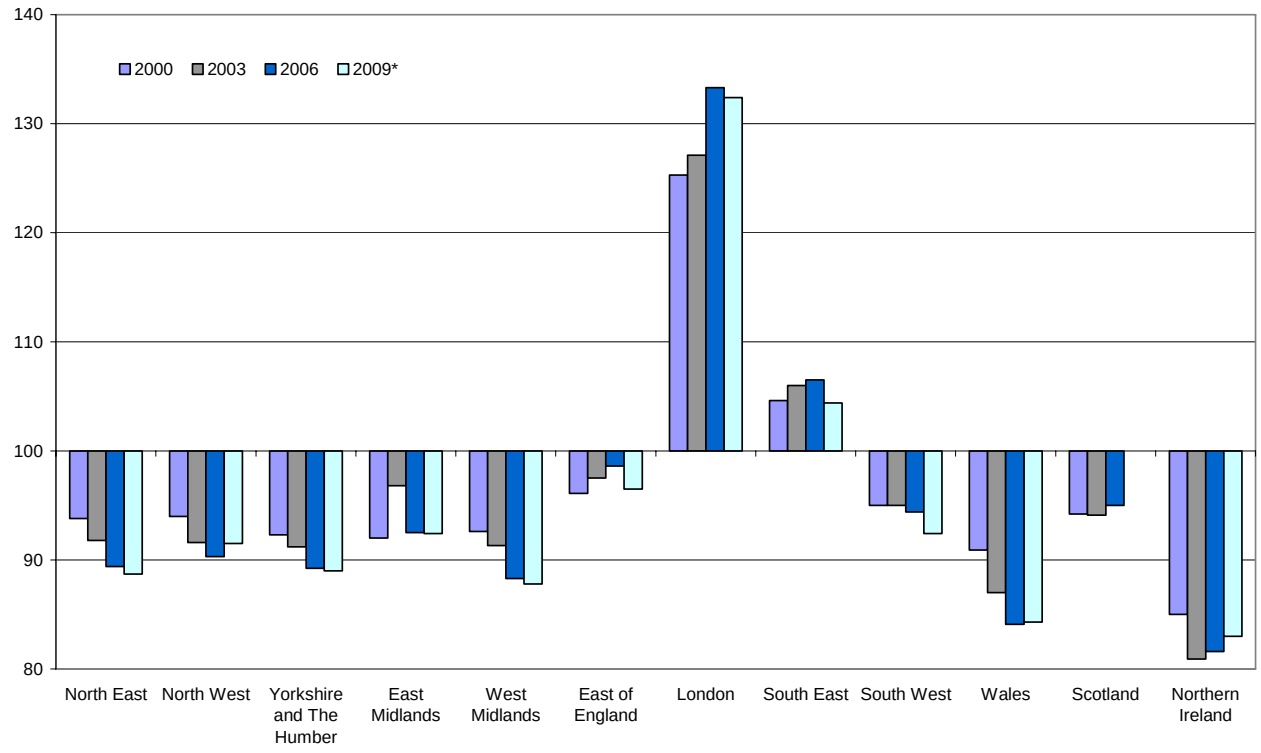
## Skills and productivity

To determine whether the skill distribution of the worked hours in high productivity regions differ systematically from the national average and from low productivity regions, the association between skills and productivity must be considered. This section therefore examines the relationship between skills (indicated by the composition of worked hours by skill group) and productivity (workplace based Gross Value Added (GVA) per hour worked). It is important to stress, however, that the article only examines correlations between productivity and the skills at an aggregate level and does not attempt to quantify the relationship or establish causal links[5].

**Figure 2** displays the GVA per hour worked index for NUTS 1 regions between 2001 and 2009. It shows that London, Northern Ireland and Wales had the largest differences from average national productivity throughout the period. Table 1 showed that these regions had less similar skill compositions compared to the UK average. Comparing the two tables it can be seen that London appears to be distinct from other regions in terms of both the high concentration of its workforce with high (level 4) skills and its high productivity performance. Northern Ireland and Wales, by contrast, had the lowest shares of level 4 skills and therefore a higher share of their workforce with either level 2 or level 3 skills (the share of level 1 skills was very similar across all regions).

### Figure 2 GVA per hour worked: by NUTS1 region

Indices (UK# = 100)



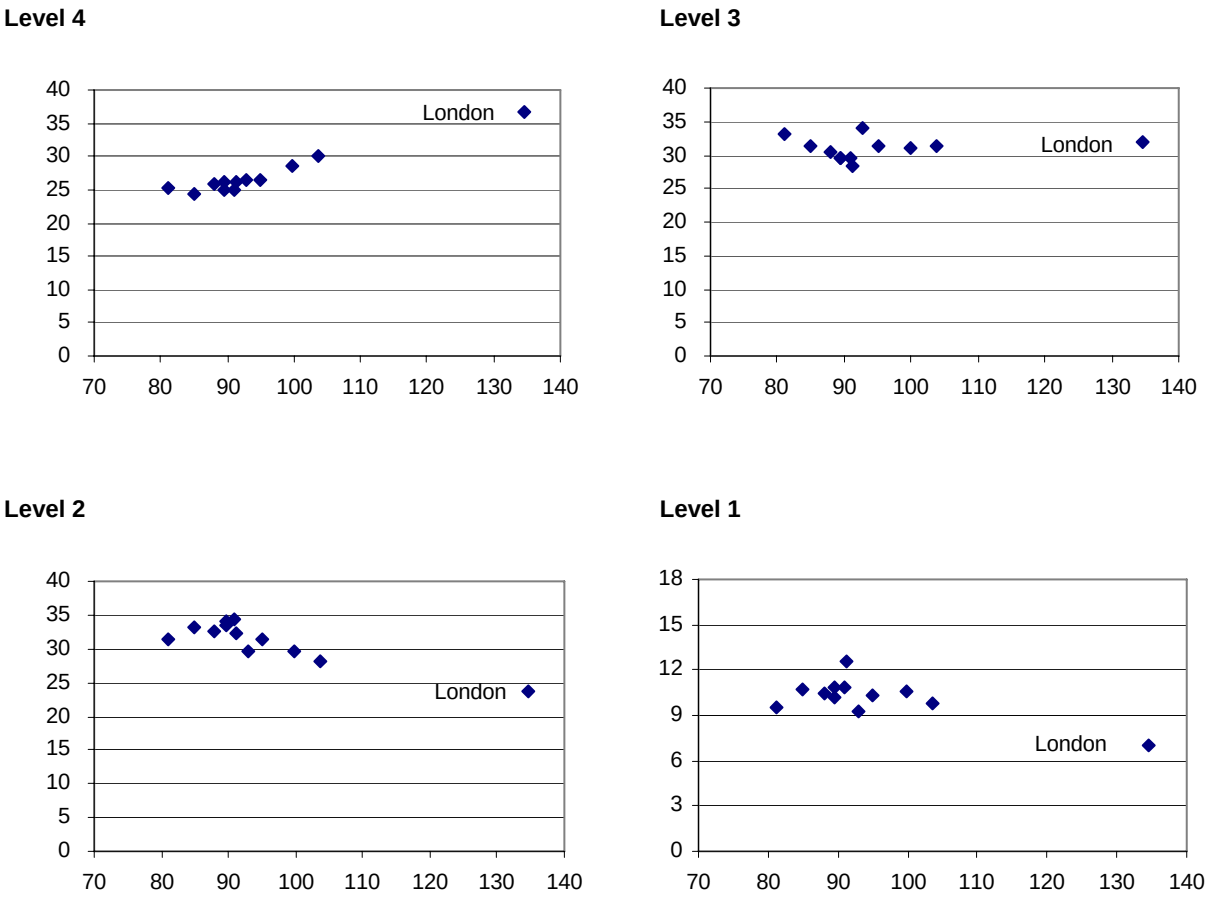

# UK less Extra-regio and statistical discrepancy

* Provisional

Source: Productivity Statistical Bulletin, Office for National Statistics

**Figure 3** shows the association between hours worked by each skill level and GVA per hour worked in all the regions in 2008. The figure reveals that regions with higher proportions of level 4 skills tend to have higher productivity levels. However, there is almost no relationship between level 3 skills and regional productivity. For example, South West had the highest proportion of hours worked by level 3 skills but it had a very similar GVA per hour worked to East Midlands which had the lowest share of level 3 skills in 2008. The figure also illustrates some negative correlation between productivity and lower level skills. However, excluding London, the relationship between the productivity and low skills is fairly weak. In particular, there is a considerable difference in productivity levels between regions which have similar proportions of hours worked by skill level 1. Similar results are obtained from the analysis of data between 2001 and 2007.

## Figure 3 Hours worked* by four skill levels and GVA per hour worked#: by NUTS1 region, 2008




* Vertical axis (hours worked, % share of regional total)

\# Horizontal axis (GVA per hour worked, UK = 100)

Source: Office for National Statistics

Overall, Figure 3 suggests that there is some evidence of association between the skill structure of a region and its productivity level. It appears that regions with greater proportions of high qualified (level 4) workers have higher productivity levels. There is also some correlation between low productivity in a region and having a relatively low share of level 4 skills. However, for most regions, aside from London and the South East, the skill distributions of their workforce as measured by its occupational composition are relatively similar and as such are only likely to be contributing a small impact on productivity differences between these regions. Other factors such as investment, innovation and competition will also be impacting on the region's productivity. A discussion of these other productivity drivers can be found in the regular part of this regional indicators article.

## Regional overview

Key figures on a regional basis indicate that:

- In 2009, London was the region with the highest productivity, in terms of GVA per hour worked, at 32 percentage points above the UK average. The South East was the only other region with a productivity performance above the UK average.
- Northern Ireland had the lowest productivity, at 17 percentage points below the UK average. Productivity was also greater than 10 percentage points below the UK average in Wales, West Midlands, North East, and Yorkshire and The Humber.
- In 2008, average Gross Disposable Household Income (GDHI) was above the UK average in three regions; London (by 28 per cent), the South East (by 13 per cent) and the East of England (by 4 per cent). The lowest average household incomes occurred in the North East where GDHI was 16 per cent below the UK average.
- In 2010, London residents had the highest gross median weekly pay, at £606.80, followed by the South East, at £547.80 and the East of England, at £523.30. These were the only regions above the UK average of £498.80. Residents of Northern Ireland (£442.20), and the North East (£443.10), recorded the lowest median earnings.
- The total value of goods exports increased year-on-year from all the UK regions in the nine months to September 2010 except for Wales (down by 3 per cent) and East Midlands (down by 1 per cent). West Midlands had the largest percentage increase in the value of goods exports (up by 33 per cent), followed by South West (up by 28 per cent) and North East (up by 24 per cent).
- The South East had the highest employment rate in the third quarter of 2010, at 75.2 per cent; Northern Ireland had the lowest rate, at 66.1 per cent, compared with the UK employment rate of 70.8 per cent.

## Headline indicators

In order to gain an overview of the economic performance of UK regions, this article discusses a selection of economic indicators. These include Gross Value Added (GVA), labour productivity, Gross Disposable Household Income (GDHI) and gross median weekly pay. The article then considers the drivers of regional productivity and finally a selection of regional labour market indicators.

### Regional performance

GVA is a good measure of the economic output of a region. In December 2010, ONS published GVA estimates for 2009 and revised estimates for previous years. **Table 2** shows the regional economic performance in terms of workplace-based GVA.

Table 2 **Workplace–based gross value added at current basic prices: by NUTS1 region**

| | UK# | North East | North West | Yorkshire and The Humber | East Midlands | West Midlands | East of England | London | South East | South West | Wales | Scotland | Northern Ireland |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **GVA (£ million)** | | | | | | | | | | | | | |
| 2000 | 842,400 | 28,200 | 84,700 | 61,400 | 52,600 | 68,300 | 72,400 | 169,000 | 123,400 | 64,100 | 31,700 | 67,100 | 19,400 |
| 2009* | 1,234,500 | 40,600 | 120,000 | 87,400 | 77,700 | 91,600 | 105,900 | 263,700 | 175,700 | 95,600 | 44,300 | 103,500 | 28,500 |
| **Share of UK# GVA (%)** | | | | | | | | | | | | | |
| 2000 | | 3.4 | 10.1 | 7.3 | 6.2 | 8.1 | 8.6 | 20.1 | 14.7 | 7.6 | 3.8 | 8.0 | 2.3 |
| 2009* | | 3.3 | 9.7 | 7.1 | 6.3 | 7.4 | 8.6 | 21.4 | 14.2 | 7.7 | 3.6 | 8.4 | 2.3 |

# UK less Extra-regio and statistical discrepancy

* Provisional

Source: Regional Accounts, Office for National Statistics

The estimates show that London had the highest regional GVA in 2009 at £263.7 billion and was responsible for 21.4 per cent of UK GVA. This share has risen from 20.1 per cent in 2000. As **Table 3** shows, London's industrial structure differs from other regions with 49 per cent of its GVA earned in the finance and business services sectors in 2008 compared to 23–35 per cent in finance and business services in other regions. Additionally only 6 per cent of London's GVA was derived from the production sectors whilst in other UK regions 13–21 per cent of output was earned across the production sectors. London also had the lowest share of its GVA earned via the public administration, education and health sectors.

## Table 3 Workplace–based gross value added by industry group: by NUTS1 region, 2008

| | UK[1] | North East | North West | Yorkshire and The Humber | East Midlands | West Midlands | East of England | London | South East | South West | Wales | Scotland | Northern Ireland |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Production[2] | 15% | 20% | 18% | 19% | 21% | 18% | 16% | 6% | 13% | 17% | 19% | 18% | 18% |
| Construction | 6% | 7% | 7% | 7% | 7% | 7% | 8% | 4% | 7% | 7% | 6% | 7% | 8% |
| Distribution, transport and communication[3] | 22% | 20% | 22% | 23% | 24% | 23% | 24% | 20% | 24% | 21% | 20% | 20% | 21% |
| Business services and finance[4] | 33% | 24% | 28% | 27% | 25% | 27% | 31% | 49% | 35% | 29% | 23% | 28% | 23% |
| Public administration, education, health[5] | 19% | 24% | 20% | 21% | 18% | 19% | 17% | 14% | 16% | 21% | 26% | 22% | 26% |
| Other Services | 5% | 4% | 4% | 4% | 4% | 5% | 5% | 7% | 5% | 5% | 6% | 4% | 4% |
| Total | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% |

1 UK less Extra-regio and statistical discrepancy

2 SIC 2003 sections A–E

3 SIC 2003 sections G–I

4 SIC 2003 sections J–K

5 SIC 2003 sections L–N

Source: Regional Accounts, Office for National Statistics

The second largest regional economy is the South East with GVA in 2009 of £175.7bn. Outside of London, the South East region has the highest share of output from finance and business services and the lowest share of its GVA from production sectors or from the public administration, education and health sectors. The South East's share of UK GVA has, however, declined over the 2000 – 2009 period from 14.7 per cent to 14.2 per cent.

The only regions, outside of London, that have increased their share of UK GVA over the 2000–2009 period are Scotland, the South West and East Midlands. The West Midlands, meanwhile, has witnessed the largest decline in share of UK GVA over this period with its share falling from 8.1 per cent in 2000 to 7.4 per cent in 2009.

An often used indicator of regional economic performance is Gross Value Added (GVA) per head. Policymakers frequently use GVA per head as a headline indicator of regional productivity and of regional incomes when comparing and benchmarking regions that differ in geographical size, economic output and population. However, as Dunnell (2009) has explained, productivity and income are very different concepts and GVA per head does not accurately measure either concept.

GVA per head is calculated as the simple ratio of the economic activity in a region divided by the number of people living in a region, while productivity is defined as the ratio of GVA divided by the labour input (jobs or hours worked) used to create it. GVA per head does not take account of:

- people commuting in and out of regions to work
- regional differences in the percentages of residents who are not directly contributing to GVA, such as young people or pensioners, and

- different labour market structures across regions, such as full- and part-time working arrangements

The net result is that GVA per head can often give a misleading picture of regional performance. For example, a region with a large amount of net out–commuting will usually have a relatively low GVA per head even if it has relatively high levels of labour productivity and average household incomes. Similarly, an urban area with a large amount of in–commuting may have a relatively high GVA per head that does not reflect the fact it actually has a low level of labour productivity and average household incomes.

Therefore, in assessing regional economic performance, ONS recommend that GVA per hour worked or GVA per filled job are used as productivity indicators and Gross Disposable Household Income (GDHI) per head is used as a measure of regional incomes.

## Labour productivity

To compare regions in terms of productivity, GVA per hour worked is the preferred indicator. At lower levels of geography, 'hours worked' estimates are not yet available and GVA per filled job should be used. These two measures of productivity divide GVA by the labour input, namely hours worked in all jobs or the number of jobs used to create it.

GVA per hour worked and GVA per filled job take account of commuting effects and different age profiles, and the former also accounts for variations in labour market structures, such as full– and part–time working arrangements and job share availability.

It needs to be noted that these indicators also depend on pricing thus productivity can fall/rise with decreasing/increasing prices. As regional price deflators do not yet exist, GVA estimates used in productivity figures are in nominal, not real terms, therefore it is not possible to isolate volume changes from price changes.

Productivity estimates for 2009 and revised estimates for previous years were published in December 2010. These estimates make use of the GVA figures presented in Table 3, and updated 'filled jobs' and 'hours worked' estimates.

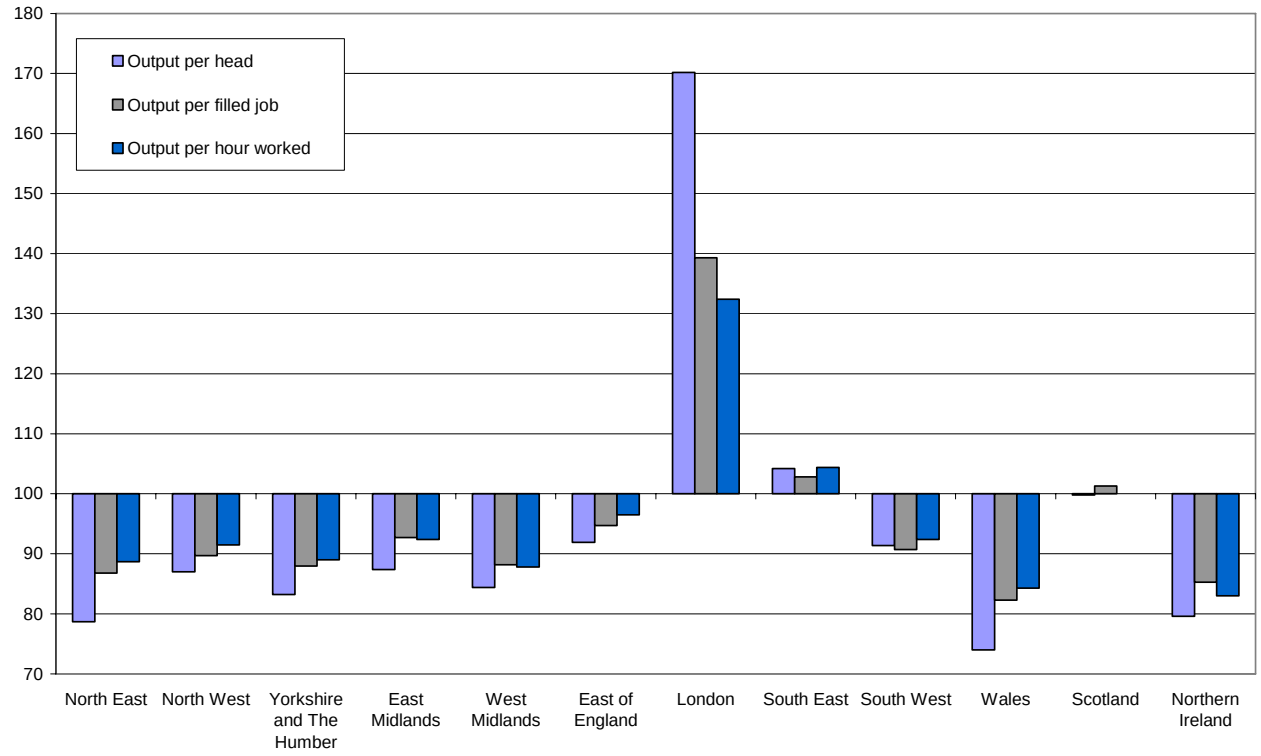
It should be noted that the productivity figures presented here use unsmoothed GVA as their output measure as opposed to headline GVA, which is calculated as a five-year moving average. The unsmoothed measure is used to ensure consistency with the labour input data (Dey–Chowdhury et al 2008).

**Figure 4** shows that in 2009 GVA per filled job and GVA per hour worked exhibited smaller differences from the UK average than the catch-all indicator GVA per head. This is mainly due to commuting patterns. London, for example, has a very high GVA per head, mainly due to incoming workers generating a high GVA, which is then divided by a much lower resident population. Productivity indicators, on the other hand, divide regional GVA by the jobs or hours worked used to create it.

In terms of GVA per hour, which is the recommended productivity measure, the 2009 data showed London to have an average productivity level 32 per cent above the UK average. The South East was the only other region to have average productivity above the UK average whilst productivity in Scotland was the same as the UK average. Productivity was lowest in Northern Ireland and Wales (17 per cent and 16 per cent below the UK average respectively).

## Figure 4 Comparison of regional economic indicators: by NUTS1 region, 2009*

Indices (UK# = 100)




# UK less Extra-regio and statistical discrepancy

* Provisional

Source: Office for National Statistics

Figure 2 in the previous section of this article shows the regional GVA per hour worked productivity index on a time series basis from 2000 to 2009. There have been mixed results across the regions. Some regions have seen their productivity decline relative to the UK average throughout the period, for example, the North East, Yorkshire and Humber and the West Midlands. Wales has also seen a large decline in its relative productivity performance over the 2000 to 2009 period, although its 2009 performance was a slight improvement over 2006.

Compared to 2000, London's productivity relative to the UK has improved significantly despite a decline over the 2006 to 2009 period. Meanwhile, Scotland has also improved its productivity performance since 2000 with a particular improvement occurring between 2006 and 2009.

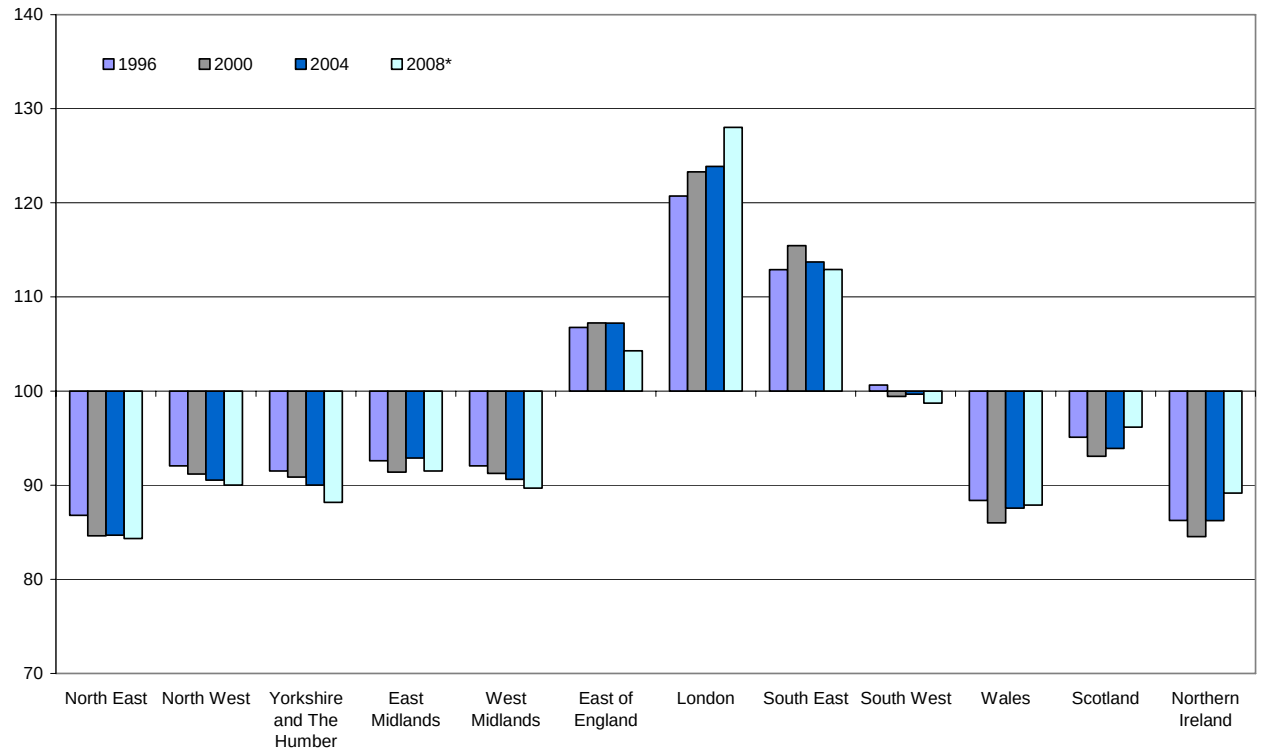
## Income of residents

Gross Disposable Household Income (GDHI) per head is a better measure of regional incomes than GVA per head. For example, due to commuting, residents might derive their incomes from economic activity in another region, which is not captured by GVA per head of their region. They may also have sources of income which are unrelated to current work, such as pensions and investment incomes. GDHI, therefore, is one of the determinants of the welfare of the people in the region.

**Figure 5** presents indices of GDHI per head for 1996, 2000, 2004 and 2008, showing movements in regional household income relative to the UK average over time. It is evident that the GDHI per head is above the UK average only in the regions of the 'Greater South East'. Of these regions, London has consistently had the highest GDHI per head since 1996 and is diverging from the national average. The South East and East of England, on the other hand, are getting closer to the national average as they experienced relatively lower growth in household income compared to the national average between 2000 and 2008. Most of the regions with relatively lower household income diverged further from the national average while improvements against national average are evident in the devolved administrations between 2000 and 2008.

### Figure 5 Headline gross disposable household income per head: by NUTS1 region

Indices (UK# = 100)




# UK less Extra-regio and statistical discrepancy

* Provisional

Source: Office for National Statistics

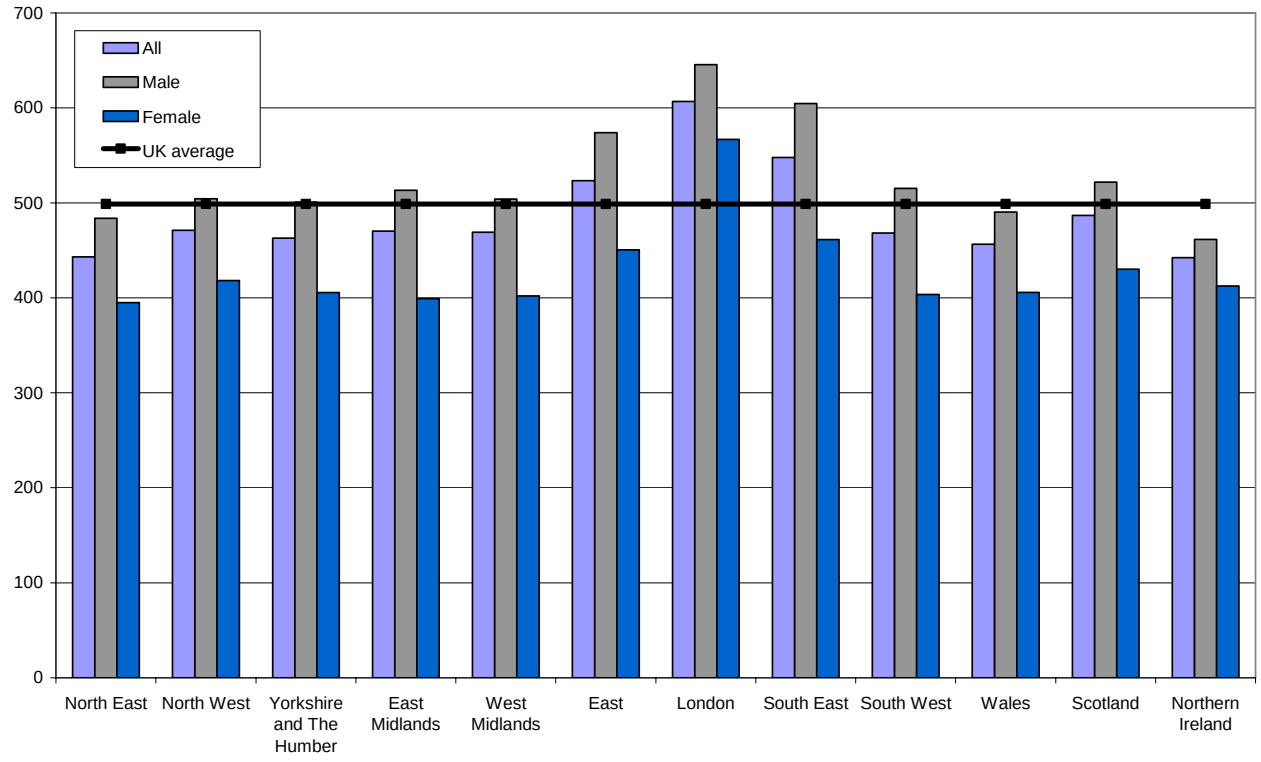
Gross median weekly earnings represent another indicator of regional welfare. **Figure 6** shows the gross median weekly pay for all full–time employees, split into female and male full–time employees, by region of residence in April 2010.

As in previous years, London residents had the highest gross median weekly pay, at £606.80, followed by the South East, at £547.80 and the East of England, at £523.30. These were the only regions above the UK average of £498.80. Residents of Northern Ireland (£442.20), and the North East (£443.10), recorded the lowest earnings in April 2010.

Females across the UK regions received lower pay than males. The discrepancy was smallest amongst residents of Northern Ireland and London, while it was largest for residents of the South East. However, in terms of annual average percentage growth over the four years to 2010, pay for females outperformed that for males in all UK regions.

## Figure 6 Gross median weekly pay of all full–time employees*: by NUTS1 region, April 2010

£




* Residents of the respective region

Source: Annual Survey of Hours and Earnings (ASHE), Office for National Statistics

## Drivers of productivity

HM Treasury and the Department for Business, Innovation and Skills (BIS) have identified five key drivers of productivity – investment, innovation, enterprise, competition and skills – that can help explain differences in productivity across regions.

Alongside these five key drivers, other factors, such as connectivity, industrial structure and region-specific assets can have a strong influence on regional productivity performance.

This article uses expenditure on Research and Development (R&D) by businesses as a measure of innovation; the numbers of business births and deaths and survival rates as an indicator for enterprise; UK regional trade in goods serves as a measure of competition; and the qualifications of the current working-age population and those of young people, who represent the future workforce, to provide an indicator for the skills driver.

### Innovation

Innovation is a necessary, although not sufficient, condition for economic success and is therefore recognised as an important driver of productivity. Innovation comprises, among others, the development of new technologies that increase efficiency and the introduction of new, more valuable goods and services. It also includes intangibles such as new methods of working and improvements to services.

R&D represents one of the determinants to the innovation process and is defined by the Organisation for Economic Co–operation and Development (OECD) in its Frascati Manual, which proposes a standard practice for surveys on 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 create new applications’. The OECD definition of R&D covers the following:

- basic research: experimental and theoretical work to obtain new knowledge of the underlying foundation of phenomena and observable facts, without any particular application or use in view
- applied research: work undertaken to acquire new knowledge, which is directed primarily towards a specific practical aim, and
- experimental development: systematic work, drawing on existing knowledge, which is directed at producing new materials, products or devices, installing new processes, systems and services, or at improving substantially those already produced or installed

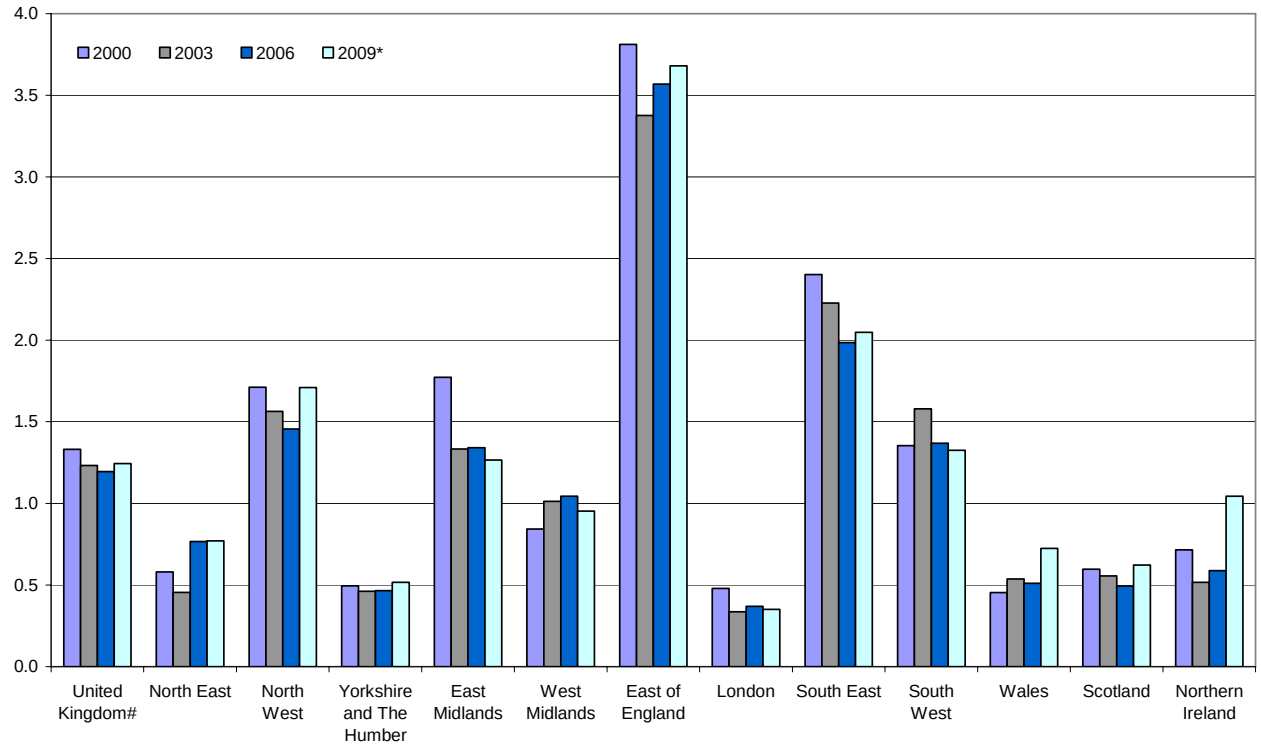
The OECD definition excludes education, training and any other related scientific, technological, industrial, administrative or supporting activities. However, innovation depends on a wider set of inputs than R&D, including skills training, design, software and organisational investment by firms. HM Treasury Economics Working Paper No. 1 quantifies these broader knowledge economy inputs at UK level; more work is needed before these factors can be measured effectively at regional level.

**Figure 7** presents statistics on Business Enterprise Research and Development (BERD), that were published in December 2010 and which are consistent with internationally agreed standards. It shows business expenditure on R&D as a percentage of workplace-based GVA. This is a measure commonly used in regional comparisons as it takes account of the size of regional economies. The figure shows that, since 2000, the East of England has been the region with by far the highest percentage of R&D expenditure, with spending equivalent to 3.7 per cent of its regional GVA in 2009. The South East region had the second highest percentage (2.0 per cent) followed by the North West (1.7 per cent). These three regions together accounted for 61 per cent of the total expenditure on R&D in the UK in 2009.

London had the lowest R&D expenditure as a share of its regional GVA in 2009 (0.4 per cent). Yorkshire and The Humber had the second lowest share in the UK in 2009, at 0.5 per cent. London's very low share of expenditure on R&D does not necessarily suggest low levels of innovation but may be due to it having a large concentration of service industries, which may be less R&D intensive (within the OECD definition) if, for example, they rely heavily on human capital. It may also reflect the choice businesses make over locating their R&D activities.

## Figure 7 Business expenditure on R&D as a percentage of workplace–based GVA: by NUTS1 region

Percentages




# UK less Extra-regio and statistical discrepancy

* Provisional

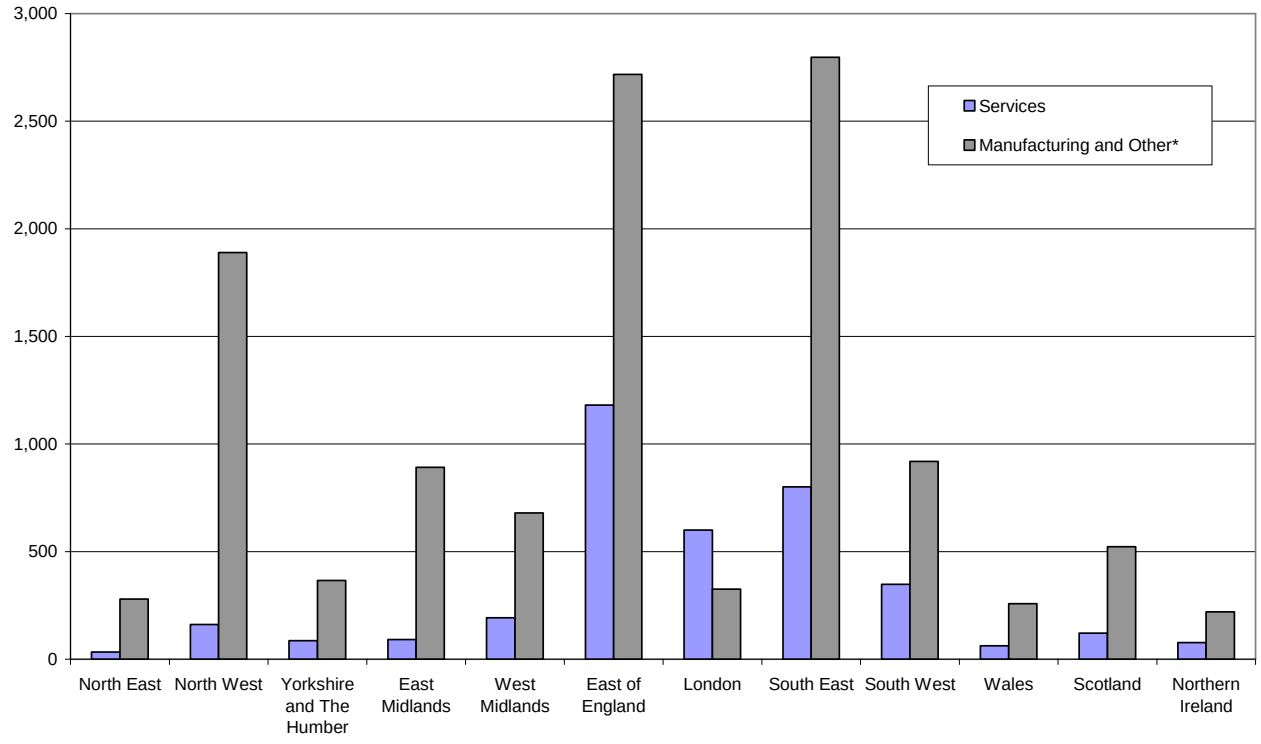
Source: Regional Accounts and Business Enterprise Research & Development, Office for National Statistics

Approximately three quarters of the R&D expenditure in the UK was made in the manufacturing sector in 2009. In the North West this share was 92 per cent and all other regions outside London had at least 69 per cent of R&D expenditure on manufacturing. **Figure 8** shows however that in London the majority of R&D expenditure was on service industries.

In absolute terms, the largest expenditure on services R&D occurred in the East of England whilst the largest expenditure on manufacturing R&D occurred in the South East.

## Figure 8 Business expenditure on R&D by NUTS1 region: broad industry groups, 2009

£ million




* Other includes agriculture, hunting and forestry, fishing, extractive industries, electricity, gas and water supply and construction. The expenditure on other industries across the UK was only 2 per cent of the total expenditure.

Source: Business Enterprise Research & Development, Office for National Statistics

## Enterprise

Enterprise is another driver of productivity. It is defined as the seizing of new business opportunities by both start–ups and existing firms. New enterprises can bring innovative processes and technologies to the market, forcing existing ones to improve their productivity in order to remain competitive. A relatively large proportion of enterprises joining and leaving the stock can be seen as desirable, as new enterprises entering the market are considered to bring innovative

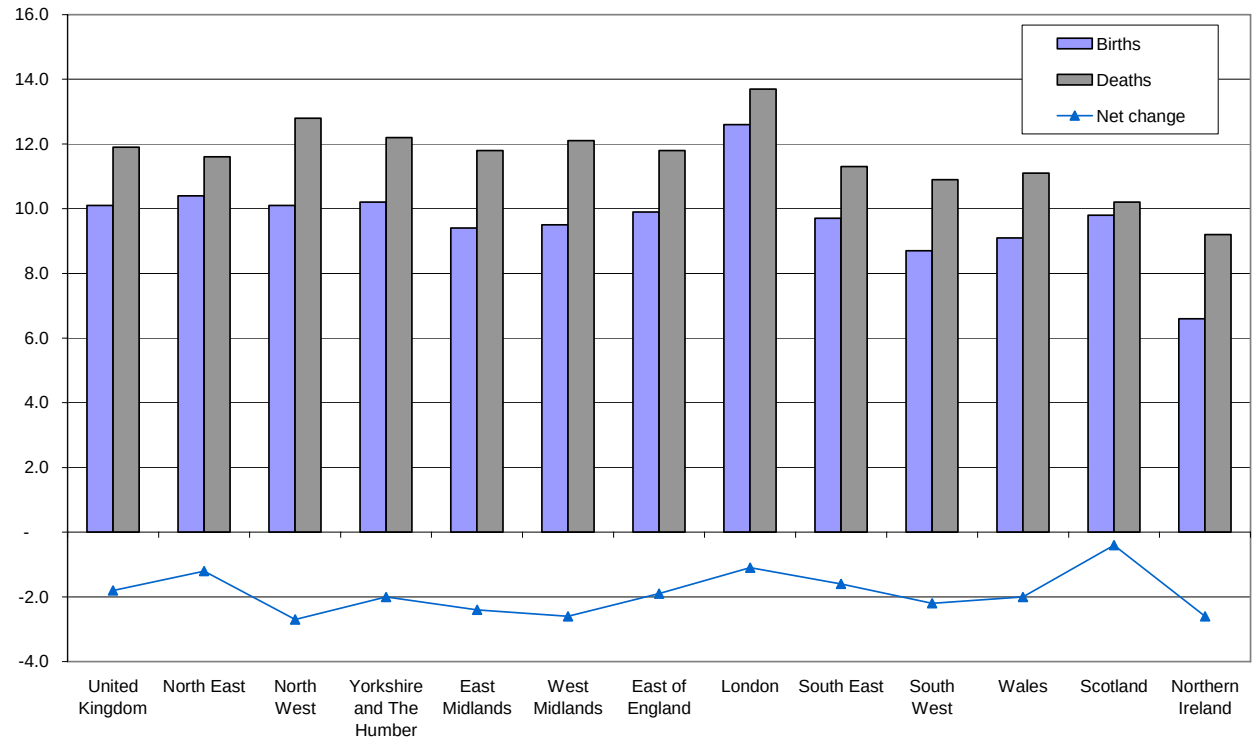
processes and technologies that drive up productivity and force unproductive enterprises to leave the market.

The ONS series of enterprise births and deaths includes enterprises registered for VAT *and* also those registered for pay–as–you–earn (PAYE). It needs to be noted that enterprise statistics relate to the place of registration of the enterprise, even though the enterprise may consist of more than one local unit, possibly in different regions.

**Figure 9** shows the number of births and deaths of enterprises as a proportion of the active enterprise stock in 2009. The difference between the two represents the net change, which is calculated as a proportion of total stock. In 2009, across all regions, the net changes were negative due to higher proportions of enterprises leaving the stock than joining it. This is the opposite of the case in most previous years and reflected the impact of the recession. The net decline was largest in the North West, West Midlands and Northern Ireland. The smallest net decline in 2009 was in Scotland. These rates were mainly driven by small enterprises with fewer than 5 employees which account for approximately 80 per cent of the total enterprise stock.

## Figure 9 Enterprise births, deaths* and net change as a percentage of enterprise stock: by NUTS1 region, 2009

Percentages




* Provisional

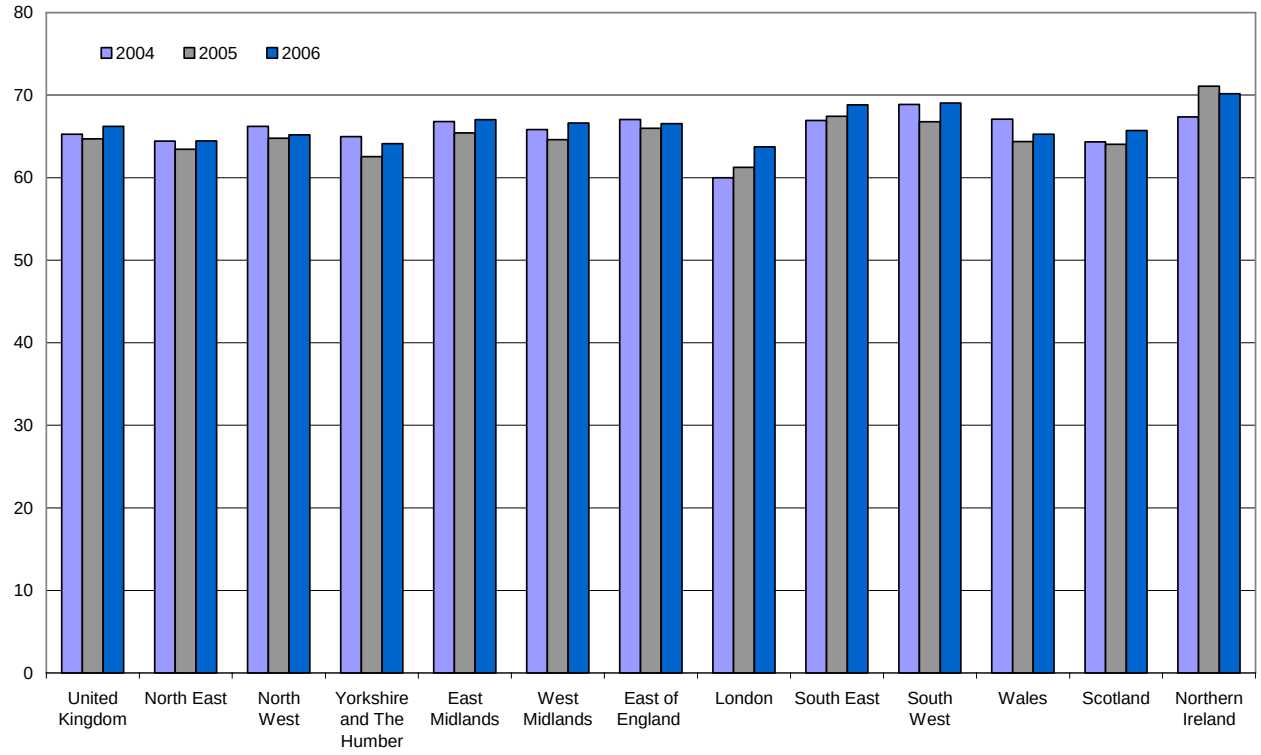
Source: Business Demography, Office for National Statistics

As well as analysing births and deaths of enterprises, it is useful to look at how long these enterprises survive. The Business Demography series contains data showing the number of years survived by enterprises born in the years 2004 to 2006.

**Figure 10** shows the proportion of enterprises born in 2004, 2005 and 2006 that survived for at least three years each. It shows that, overall in the UK, three-year survival rates fell from 65.3 per cent of enterprises born in 2004 to 64.7 per cent of those born in 2005 before increasing to 66.2 per cent of those born in 2006.

## Figure 10 Percentage of units surviving three years: by year of birth and NUTS1 region

Percentages




Source: Business Demography, Office for National Statistics

Northern Ireland had the highest three year survival rates for enterprises born in 2006 at 70.2 per cent. The South East and South West also had survival rates significantly above the UK average. London, by contrast, had the lowest three year survival rate at 63.7 per cent for enterprises born in 2006, as was the case in previous years. However, the gap between London and other regions was closer for enterprises born in 2006 than in previous years. Yorkshire and Humber and the North East had the next lowest survival rates for enterprises born in 2006.

## Competition

Vigorous competition enhances productivity by creating incentives to innovate and ensure that resources are allocated to the most efficient firms. It also forces existing firms to organise work more effectively through imitations of organisational structures and technology. One indicator of competition is the volume of exports. Even though exports do not represent competition within a region, they still provide an indication of how international regions are in their outlook, and how able they are to face global competition.

HM Revenue & Customs (HMRC) publishes statistics on regional trade in goods to the EU and non–EU destinations by statistical value. Trade in goods by definition excludes trade in intangibles and services. The statistical value of export trade is calculated as the value of the goods plus the cost of movement to the country's border.

**Table 4** presents the latest quarterly estimates up to the end of September 2010. The total value of UK goods exports to all destinations increased by 16.0 per cent between January–September 2009 and January–September 2010. The total value of goods exports increased in all the regions except in Wales (down by 3 per cent) and East Midlands (down by 1 per cent). West Midlands had the largest percentage increase in the value of goods exports (up by 33 per cent), followed by South West (up by 28 per cent) and North East (up by 24 per cent) during the same period.

As the European Union (EU) is the main export destination for UK goods, the Table separates exports to EU and non–EU destinations. For the UK as a whole, the value of exports to the EU was up by 13 per cent year–on–year in the nine months to September 2010 whilst exports to non–EU regions rose by 21 per cent. There was a particularly strong year–on–year increase in exports to non–EU regions from the West Midlands (59 per cent) and South West (65 per cent)

The number of exporters in the UK for the September 2010 quarter compared with the same quarter last year increased in all regions except Northern Ireland[6].

### Table 4 UK regional trade in goods – statistical value of exports*: by NUTS1 region

£ millions

| Exports | United Kingdom | North East | North West | Yorkshire and The Humber | East Midlands | West Midlands | East of England | London | South East | South West | Wales | Scotland | Northern Ireland |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **EU Exports** | | | | | | | | | | | | | |
| 2008 Q4 | 32,677 | 1,442 | 2,859 | 1,826 | 1,904 | 1,993 | 2,895 | 2,377 | 5,156 | 1,562 | 1,329 | 1,519 | 840 |
| 2009 Q1 | 31,224 | 1,334 | 3,094 | 1,611 | 1,907 | 1,797 | 2,824 | 2,445 | 4,911 | 1,671 | 1,187 | 1,331 | 791 |
| 2009 Q2 | 29,403 | 1,311 | 2,959 | 1,464 | 1,801 | 1,697 | 2,902 | 2,398 | 4,361 | 1,575 | 1,179 | 1,229 | 764 |
| 2009 Q3 | 30,364 | 1,352 | 2,901 | 1,473 | 1,703 | 1,642 | 2,951 | 2,818 | 4,558 | 1,453 | 1,163 | 1,342 | 720 |
| Jan to Sep 2009 | 90,991 | 3,996 | 8,954 | 4,547 | 5,412 | 5,135 | 8,677 | 7,660 | 13,830 | 4,700 | 3,530 | 3,902 | 2,276 |
| 2009 Q4 | 32,806 | 1,488 | 2,933 | 1,747 | 1,823 | 1,895 | 3,536 | 2,537 | 4,901 | 1,504 | 1,264 | 1,440 | 771 |
| 2010 Q1 | 34,753 | 1,532 | 2,833 | 1,799 | 1,787 | 1,898 | 3,284 | 3,031 | 4,868 | 1,647 | 1,149 | 1,230 | 746 |
| 2010 Q2 | 35,521 | 1,632 | 3,015 | 1,794 | 1,729 | 1,972 | 3,224 | 2,895 | 4,718 | 1,659 | 1,290 | 1,486 | 783 |

| Exports | United Kingdom | North East | North West | Yorkshire and The Humber | East Midlands | West Midlands | East of England | London | South East | South West | Wales | Scotland | Northern Ireland |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2010 Q3 | 32,194 | 1,437 | 2,765 | 1,720 | 1,735 | 1,849 | 3,088 | 2,792 | 4,410 | 1,486 | 1,211 | 1,266 | 751 |
| Jan to Sep 2010 | 102,468 | 4,601 | 8,613 | 5,313 | 5,251 | 5,719 | 9,596 | 8,718 | 13,996 | 4,792 | 3,650 | 3,982 | 2,280 |
| **Non–EU exports** | | | | | | | | | | | | | |
| 2008 Q4 | 28,181 | 1,112 | 2,807 | 1,522 | 2,089 | 1,900 | 2,252 | 3,749 | 5,430 | 1,306 | 1,297 | 2,224 | 806 |
| 2009 Q1 | 22,909 | 977 | 2,766 | 1,260 | 1,958 | 1,209 | 1,893 | 2,711 | 4,090 | 1,149 | 1,074 | 1,978 | 510 |
| 2009 Q2 | 24,812 | 881 | 2,540 | 1,263 | 1,995 | 1,504 | 2,002 | 2,934 | 4,722 | 1,164 | 1,241 | 2,337 | 606 |
| 2009 Q3 | 25,050 | 1,013 | 3,383 | 1,365 | 1,751 | 1,588 | 1,954 | 2,883 | 4,654 | 1,078 | 933 | 2,502 | 454 |
| Jan to Sep 2009 | 72,771 | 2,871 | 8,688 | 3,888 | 5,703 | 4,301 | 5,849 | 8,527 | 13,466 | 3,391 | 3,248 | 6,817 | 1,570 |
| 2009 Q4 | 28,686 | 1,273 | 3,272 | 1,510 | 1,786 | 2,268 | 2,328 | 3,172 | 5,910 | 1,122 | 967 | 2,809 | 525 |
| 2010 Q1 | 26,300 | 1,014 | 2,722 | 1,364 | 1,701 | 1,914 | 1,985 | 3,934 | 5,133 | 1,697 | 894 | 1,874 | 442 |
| 2010 Q2 | 30,082 | 1,345 | 3,209 | 1,795 | 1,913 | 2,391 | 2,337 | 3,711 | 5,734 | 1,842 | 1,009 | 2,318 | 564 |
| 2010 Q3 | 31,762 | 1,539 | 3,534 | 1,860 | 2,140 | 2,548 | 2,313 | 3,862 | 5,845 | 2,066 | 1,025 | 2,536 | 574 |
| Jan to Sep 2010 | 88,144 | 3,898 | 9,465 | 5,019 | 5,754 | 6,853 | 6,635 | 11,507 | 16,712 | 5,605 | 2,928 | 6,728 | 1,580 |
| **Total Exports** | | | | | | | | | | | | | |
| 2008 Q4 | 60,857 | 2,555 | 5,666 | 3,349 | 3,993 | 3,893 | 5,147 | 6,126 | 10,586 | 2,868 | 2,626 | 3,742 | 1,645 |
| 2009 Q1 | 54,133 | 2,311 | 5,860 | 2,870 | 3,865 | 3,006 | 4,717 | 5,155 | 9,001 | 2,820 | 2,262 | 3,309 | 1,302 |
| 2009 Q2 | 54,216 | 2,191 | 5,499 | 2,727 | 3,796 | 3,200 | 4,904 | 5,331 | 9,084 | 2,740 | 2,420 | 3,566 | 1,370 |
| 2009 Q3 | 55,415 | 2,365 | 6,283 | 2,838 | 3,454 | 3,230 | 4,905 | 5,700 | 9,211 | 2,531 | 2,096 | 3,844 | 1,175 |
| Jan to Sep 2009 | 163,764 | 6,867 | 17,642 | 8,436 | 11,115 | 9,437 | 14,526 | 16,187 | 27,296 | 8,091 | 6,778 | 10,719 | 3,846 |
| 2009 Q4 | 61,492 | 2,761 | 6,205 | 3,257 | 3,610 | 4,162 | 5,864 | 5,709 | 10,812 | 2,626 | 2,231 | 4,249 | 1,296 |
| 2010 Q1 | 61,052 | 2,546 | 5,555 | 3,163 | 3,488 | 3,812 | 5,269 | 6,965 | 10,001 | 3,344 | 2,043 | 3,104 | 1,188 |
| 2010 Q2 | 65,603 | 2,977 | 6,224 | 3,589 | 3,641 | 4,363 | 5,561 | 6,606 | 10,452 | 3,500 | 2,299 | 3,804 | 1,347 |
| 2010 Q3 | 63,956 | 2,976 | 6,299 | 3,580 | 3,875 | 4,397 | 5,401 | 6,654 | 10,255 | 3,552 | 2,236 | 3,803 | 1,325 |
| Jan to Sep 2010 | 190,611 | 8,499 | 18,078 | 10,332 | 11,004 | 12,572 | 16,231 | 20,225 | 30,708 | 10,396 | 6,578 | 10,711 | 3,860 |

*Components may not sum to totals as Regional Trade Statistics includes estimates made for EU trade below the Intrastat threshold which are included in the 'unknown' region and not displayed in this table.

Growth rates, Jan–Sep 2009 to Jan–Sep 2010

| | United Kingdom | North East | North West | Yorkshire and The Humber | East Midlands | West Midlands | East of England | London | South East | South West | Wales | Scotland | Northern Ireland |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| EU Exports | 13% | 15% | -4% | 17% | -3% | 11% | 11% | 14% | 1% | 2% | 3% | 2% | 0% |
| Non–EU exports | 21% | 36% | 9% | 29% | 1% | 59% | 13% | 35% | 24% | 65% | -10% | -1% | 1% |
| Total Exports | 16% | 24% | 2% | 22% | -1% | 33% | 12% | 25% | 12% | 28% | -3% | 0% | 0% |

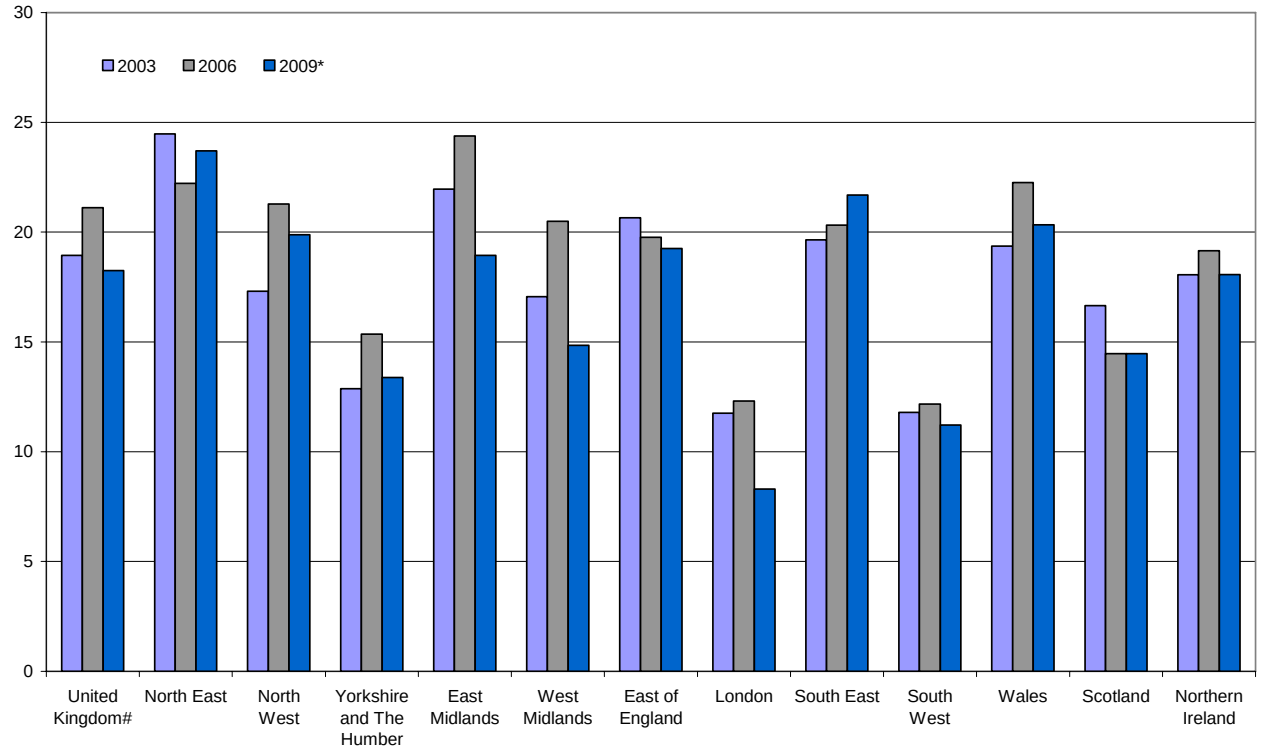
Source: Regional Trade Statistics, HM Revenue and Customs

**Figure 11** shows the value of exports of goods expressed as a percentage of workplace–based regional GVA in 2003, 2006 and 2009, therefore taking into account the differing sizes of the regional economies. In 2009, the value of goods exports relative to the size of the regional economy was greatest in the North East and lowest in London. It needs to be noted that these figures show exports of goods only and therefore are likely to underestimate the export performance of some regions with a large share of services industries such as London.

In terms of this indicator's change over time, exports relative to GVA were lower in all regions in 2009 compared to 2006 except for the South East and North East.

## Figure 11 Value of total export goods as a percentage of workplace–based GVA: by NUTS1 region

Percentages




# UK less Extra–regio and statistical discrepancy

* Provisional

Source: Office for National Statistics

## Skills

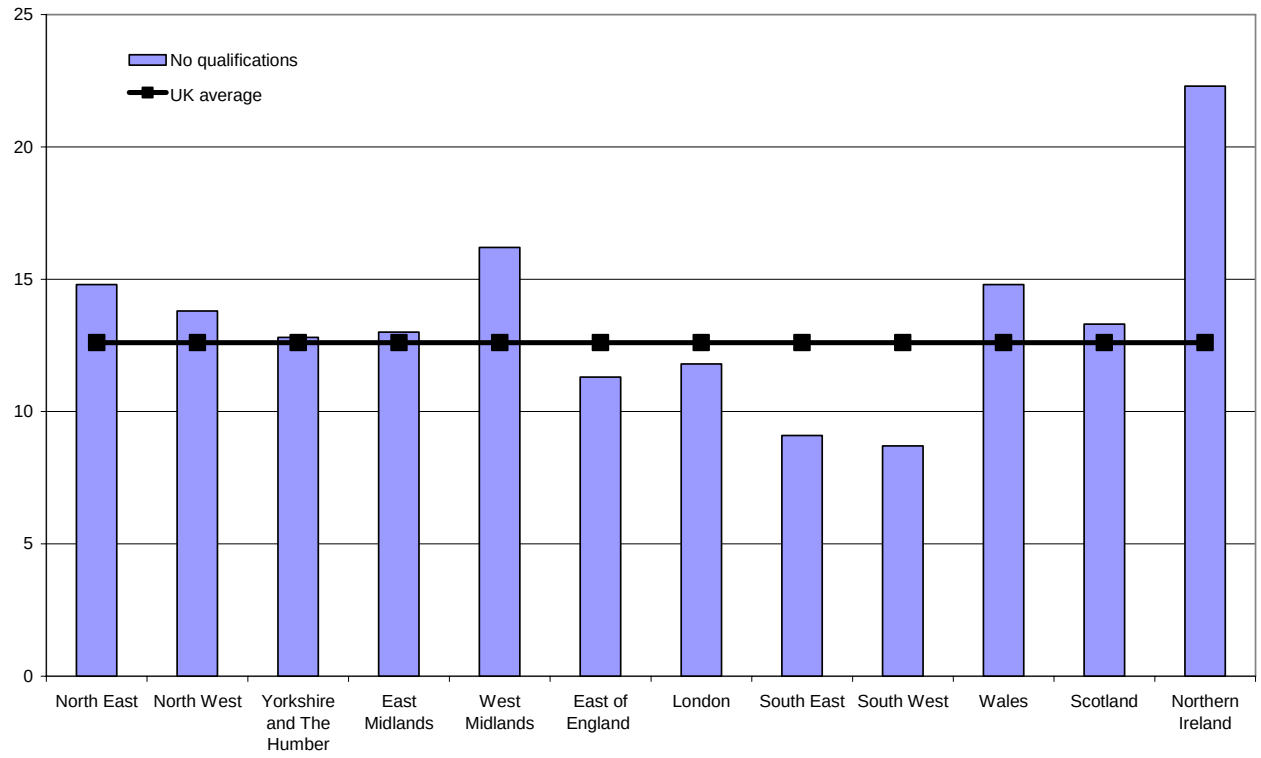
The focus section of this article explored the influence of skills on the productivity of the NUTS 1 regions using occupation as an indicator of the level of skill in the employed workforce. This section complements the analysis by considering qualifications as an indicator of skill. By examining the qualifications, such as degree or equivalent, of the current workforce as well as those of young people, who represent the future capabilities of the labour market, a view of how

skills are changing over time and their potential impact on productivity can be analysed. However, as characteristics of local economies dictate which labour skills are required, comparability between regions might be difficult. An alternative approach is to compare the percentage of the working–age population that has no recognised qualifications.

**Figure 12** shows the proportion of the working–age population in 2009 that had no qualifications in each region. Compared to the UK average of 12.6 per cent, Northern Ireland had the highest proportion of the population with no qualifications (9.7 percentage points above the UK average); whereas the South West and the South East had the lowest proportions, 3.9 and 3.5 percentage points below the UK average, respectively.

## Figure 12 Working–age# population with no qualifications: by NUTS1 region, 2009

Percentages




# Males aged 16 to 64 and females aged 16 to 59.

* For summary of qualifications and equivalents see www.statistics.gov.uk/statbase/Product.asp?vlnk=836.

Source: Labour Force Survey, Office for National Statistics

Above average proportions of working–age people without a qualification do not necessarily mean that regions have the most unqualified workforce. Due to differing regional skill requirements, people with recognised qualifications might migrate into other regions, where demand for their qualifications is high, while those without any recognised qualifications might migrate out of these other regions. Also, if employers have a strong demand for lower skills and a good supply of appropriate workers, a low skill equilibrium is created in a region.

Regional Skills Partnerships (RSPs) are groups brought together by Regional Development Agencies in each region of England in response to the National Skills Strategy. RSPs aim to strengthen regional structures to make skills provision more relevant to the needs of employers and individuals, covering private, public and voluntary sectors of the economy. They also aim to give regions the flexibility to tackle their own individual challenges and priorities.

**Table 5** presents the RSP core indicators, which help to monitor the health of regional and local labour markets and progress towards national skills targets such as those documented in the Leitch Report. These core indicators will be supported by local, more specific, indicators identified by individual RSPs. The choice of '19 to 64 year olds' for some of the indicators in Table 6 has been influenced by: the increased emphasis on education and training after the age of 16; the plan to raise the standard school leaving age to 18; and alignment with indicators specified in the Local Area Agreements.

## Table 5 Regional Skills Partnerships core indicators: by NUTS1 region

Percentages

| Skills outcome indicators | Time period | North East | North West | Yorkshire and The Humber | East Midlands | West Midlands | East of England | London | South East | South West | England |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Percentage of employers with business or training plan, or budget for training | 2007 | 70.6 | 69.2 | 69.6 | 67.9 | 67.5 | 67.3 | 70.0 | 70.6 | 68.4 | 69.1 |
| Percentage of staff with skill gaps | 2007 | 6.3 | 5.3 | 4.8 | 6.8 | 5.4 | 7.8 | 6.7 | 5.8 | 6.2 | 6.1 |
| Skill shortage vacancies (SSVI) as percentage of all vacancies | 2007 | 18.8 | 17.6 | 20.1 | 20.2 | 15.5 | 19.6 | 26.1 | 22.5 | 20.9 | 20.9 |
| Percentage of KS4 pupils achieving 5+ A* to C GCSE (inc Maths and English) | 2009/10 | 52.6 | 54.9 | 51.7 | 53.1 | 53.9 | 55.6 | 57.3 | 57.1 | 55.2 | 53.1 |
| Percentage of 19 year olds qualified to Level 2 or above* | 2008 | 75.9 | 74.3 | 73.2 | 73.1 | 74.9 | 77.0 | 77.0 | 79.6 | 77.0 | 76.7 |
| Percentage of 19 year olds qualified to Level 3 or above* | 2008 | 43.7 | 46.1 | 44.4 | 46.0 | 46.9 | 52.4 | 51.9 | 56.9 | 51.0 | 49.8 |
| Percentage of 19 to 64 year olds with Level 2+ | 2009 | 67.6 | 68.4 | 67.9 | 68.2 | 65.2 | 68.6 | 71.5 | 73.4 | 72.7 | 69.7 |
| Percentage of 19 to 64 year olds with Level 3+ | 2009 | 45.5 | 47.6 | 47.8 | 47.6 | 44.7 | 47.6 | 55.6 | 53.6 | 51.7 | 49.9 |
| Percentage of 19 to 64 year olds with Level 4+ | 2009 | 25.4 | 28.7 | 28.2 | 27.3 | 26.4 | 29.0 | 41.7 | 34.7 | 30.9 | 31.4 |
| Percentage of 19 to 64 year olds with no qualifications | 2009 | 14.4 | 13.6 | 12.6 | 12.7 | 15.9 | 11.0 | 11.4 | 8.6 | 8.2 | 11.7 |
| Percentage of working-age population who undertook job-related training in last 13 weeks | 2008 | 20.9 | 18.9 | 19.4 | 20.2 | 19.4 | 18.7 | 18.2 | 22.2 | 23.1 | 20.0 |
| Percentage of 17 year olds in education or work-based learning | 2008 | 80.0 | 80.0 | 76.0 | 77.0 | 80.0 | 79.0 | 89.0 | 79.0 | 79.0 | 80.0 |

* Provisional data from DCSF matched datasets

Source: Office for National Statistics; Labour Force Survey; Department of Business Enterprise and Regulatory Reform; Department for Children, Schools and Families; Department for Innovation Universities and Skills; National Employers Skills Survey 2007.

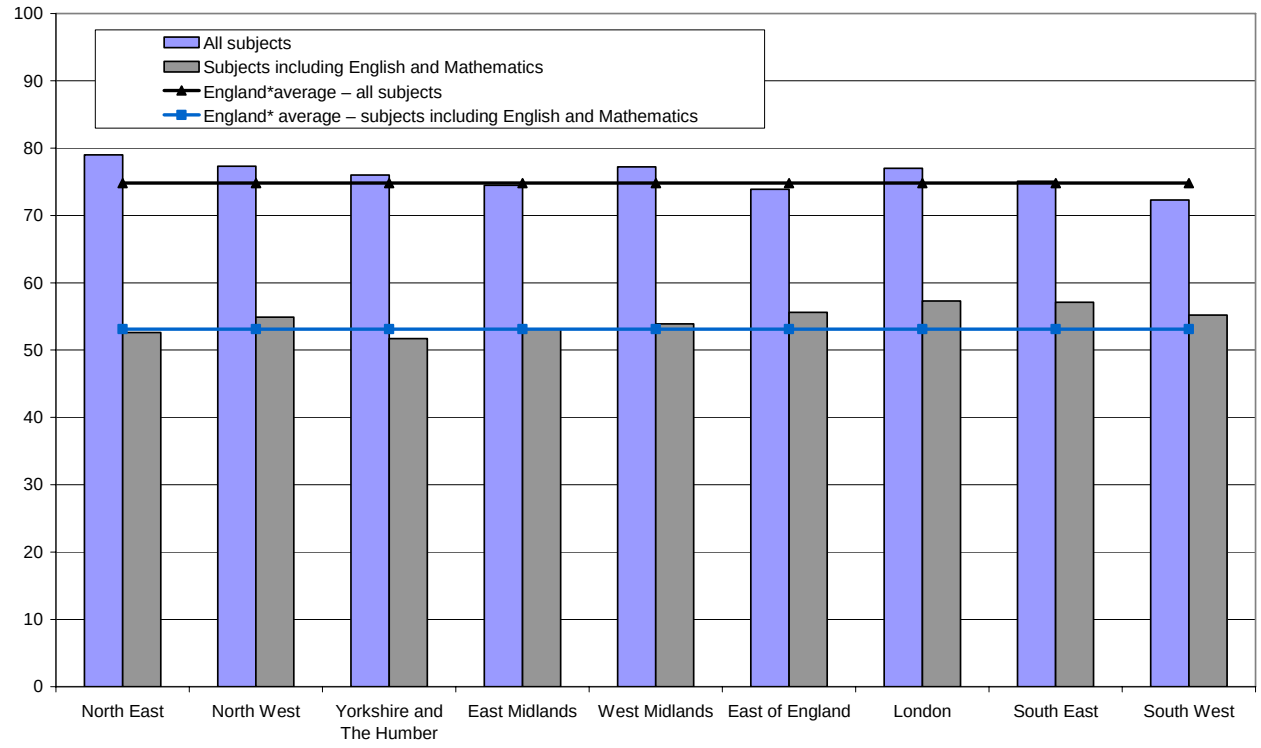
In order to assess the future capabilities of the labour force, the percentage of pupils achieving five or more grades A* to C at GCSE level or equivalent in each English region can be used as an indicator[2] or alternatively the percentage of pupils achieving five or more GCSEs grade A* to C in subjects including English and Mathematics can be used. **Figure 13** shows these results for 2009/2010[7].

The North East had the highest share of pupils achieving five or more A* to C grades across all subjects in 2009/2010 at 79.0 per cent. However, this did not reflect achievement in English and Mathematics as the North East had the second lowest rate of achievement of five or more GCSEs grade A* to C in subjects including English and Mathematics (52.6 per cent).

The highest rate of achievement of five or more GCSEs grade A* to C in subjects including English and Mathematics occurred in London (57.3 per cent) followed by South East (57.1 per cent). The lowest achievement rate occurred in Yorkshire and The Humber (51.7 per cent).

## Figure 13 Pupils achieving five or more grades A* to C at GCSE level or equivalent in (i) all subjects and (ii) subjects including English and Mathematics: by NUTS1 region, 2009/10#

Percentages




# Provisional data

* The England average includes all schools, not only local authority maintained schools.

Source: Department for Children, Schools and Families

## Investment

Investment in physical capital, such as machinery, equipment and buildings, enables workers to produce more and higher quality output. Therefore, investment can have a significant positive impact on productivity. Due to quality concerns regarding the regional allocations of investment, which is recorded at the level of the enterprise and not at the local level, this article does not currently include data on investment.

Nevertheless, as Dunnell (2009) has pointed out, inflows of foreign direct investment (FDI) projects and estimated numbers of associated jobs by region can serve as a narrow indicator of investment. However, FDI does not cover all investment in a region and there is no requirement to notify UK Trade & Investment when undertaking FDI.

# The labour market

**Table 6** shows the seasonally adjusted employment rate, the number of people aged from 16 to 64 in employment, expressed as a proportion of their population, from the Labour Force Survey (LFS).

## Table 6 Employment* rates for persons of working age: by NUTS1 region

Per cent, seasonally adjusted

| | | United Kingdom | North East | North West | Yorkshire and The Humber | East Midlands | West Midlands | East | London | South East | South West | England | Wales | Scotland | Northern Ireland |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2007 | Jul-Sep | 72.7 | 69.7 | 70.5 | 71.2 | 73.5 | 71.3 | 75.2 | 69.8 | 77.1 | 76.2 | 72.9 | 69.4 | 74.1 | 68.0 |
| | Oct-Dec | 72.9 | 69.6 | 70.9 | 71.8 | 73.3 | 71.4 | 76.0 | 69.4 | 77.2 | 77.0 | 73.1 | 69.4 | 74.2 | 67.9 |
| 2008 | Jan-Mar | 73.0 | 68.3 | 70.2 | 72.1 | 74.2 | 71.4 | 75.5 | 70.3 | 77.6 | 76.7 | 73.2 | 69.6 | 74.3 | 68.1 |
| | Apr-Jun | 72.9 | 68.4 | 70.1 | 71.4 | 73.5 | 70.6 | 75.6 | 70.8 | 77.7 | 76.5 | 73.1 | 70.1 | 74.3 | 68.6 |
| | Jul-Sep | 72.5 | 68.2 | 69.8 | 71.4 | 73.7 | 70.0 | 75.3 | 70.1 | 77.0 | 76.5 | 72.7 | 68.4 | 73.9 | 68.0 |
| | Oct-Dec | 72.2 | 68.0 | 69.3 | 70.4 | 73.8 | 69.7 | 75.5 | 70.4 | 76.5 | 76.0 | 72.4 | 68.6 | 73.3 | 66.6 |
| 2009 | Jan-Mar | 71.7 | 67.7 | 69.6 | 69.6 | 73.4 | 68.5 | 75.6 | 69.2 | 76.0 | 75.6 | 71.9 | 68.6 | 73.2 | 64.8 |
| | Apr-Jun | 70.9 | 65.2 | 69.1 | 69.1 | 73.2 | 68.4 | 74.9 | 67.9 | 75.4 | 74.4 | 71.1 | 67.7 | 72.1 | 64.0 |
| | Jul-Sep | 70.7 | 66.1 | 68.9 | 69.2 | 72.8 | 68.3 | 74.9 | 67.9 | 74.9 | 73.5 | 71.0 | 67.1 | 71.8 | 64.3 |
| | Oct-Dec | 70.5 | 67.0 | 68.4 | 68.8 | 72.2 | 68.8 | 73.8 | 67.9 | 75.1 | 73.4 | 70.8 | 67.0 | 71.5 | 65.5 |
| 2010 | Jan-Mar | 70.3 | 66.9 | 68.9 | 68.9 | 71.1 | 68.8 | 73.4 | 67.5 | 74.9 | 73.0 | 70.6 | 66.8 | 70.0 | 65.9 |
| | Apr-Jun | 70.5 | 67.8 | 69.1 | 69.7 | 71.0 | 69.3 | 73.4 | 68.0 | 74.6 | 73.8 | 70.9 | 66.7 | 70.2 | 66.4 |
| | Jul-Sep | 70.8 | 68.1 | 69.4 | 68.4 | 70.8 | 69.4 | 73.9 | 68.7 | 75.2 | 74.5 | 71.2 | 67.1 | 70.7 | 66.1 |

* Includes employees, self-employed, participants on government-supported training schemes and unpaid family workers.

Source: Labour Force Survey, Office for National Statistics

In quarter three (July to September) of 2010, the UK employment rate was 70.8 per cent, up 0.1 percentage points from a year ago and up 0.3 percentage points from quarter two (April to June) of 2010. Regional rates varied from 75.2 per cent in the South East to 66.1 per cent in Northern Ireland.

Seven out of the twelve UK regions experienced an annual increase in the employment rate, the largest of which was in the North East at 2.0 percentage points followed by Northern Ireland at 1.8 percentage points. Conversely the East Midlands and Scotland decreased by 1.9 and 1.1 percentage points respectively.

**Table 7** shows the unemployment rate (according to the internationally–consistent International Labour Organisation definition) for persons aged 16 and over from the LFS. The UK rate in the third quarter of 2010 was 7.7 per cent, down 0.1 percentage points from a year ago and down 0.1 percentage points from the last quarter. Regionally, the rates ranged from 9.0 per cent in the North East, Yorkshire and The Humber and London to 5.5 per cent in the South West.

Over the year the unemployment rate fell in seven of the twelve regions. The West Midlands had the largest decrease at 1.3 percentage points followed by the South West at 1.1 percentage points. Scotland increased by 1.2 percentage point and the East Midlands by 0.6 percentage points.

## Table 7 Unemployment rates for persons aged 16 and over: by NUTS1 region

Per cent, seasonally adjusted

| | | United Kingdom | North East | North West | Yorkshire and The Humber | East Midlands | West Midlands | East | London | South East | South West | England | Wales | Scotland | Northern Ireland |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2007 | Jul-Sep | 5.3 | 6.2 | 6.0 | 5.4 | 5.7 | 6.4 | 5.1 | 6.1 | 4.6 | 3.9 | 5.4 | 5.2 | 5.0 | 3.9 |
| | Oct-Dec | 5.2 | 5.7 | 5.8 | 5.4 | 5.3 | 5.9 | 4.4 | 6.7 | 4.4 | 3.7 | 5.3 | 5.1 | 4.9 | 4.3 |
| 2008 | Jan-Mar | 5.2 | 6.5 | 6.0 | 5.0 | 5.4 | 6.2 | 4.5 | 6.8 | 3.9 | 3.7 | 5.3 | 5.2 | 4.7 | 4.5 |
| | Apr-Jun | 5.3 | 7.5 | 6.4 | 6.1 | 5.6 | 6.2 | 4.6 | 6.7 | 4.1 | 3.8 | 5.5 | 5.2 | 4.2 | 3.9 |
| | Jul-Sep | 5.9 | 8.2 | 6.7 | 6.8 | 5.8 | 6.6 | 4.8 | 7.3 | 4.7 | 4.2 | 6.0 | 6.6 | 4.8 | 4.2 |
| | Oct-Dec | 6.4 | 8.4 | 7.8 | 6.7 | 6.3 | 8.0 | 5.5 | 7.3 | 5.0 | 4.8 | 6.5 | 7.1 | 5.3 | 5.3 |
| 2009 | Jan-Mar | 7.1 | 8.2 | 7.9 | 8.0 | 7.1 | 9.3 | 6.0 | 8.2 | 5.3 | 5.9 | 7.2 | 7.6 | 5.9 | 6.2 |
| | Apr-Jun | 7.8 | 9.9 | 8.6 | 8.9 | 7.3 | 10.6 | 6.4 | 8.9 | 5.8 | 6.4 | 7.9 | 7.8 | 7.0 | 6.5 |
| | Jul-Sep | 7.9 | 9.6 | 8.6 | 8.7 | 7.4 | 10.0 | 6.4 | 9.1 | 6.2 | 6.5 | 7.9 | 8.8 | 7.3 | 7.1 |
| | Oct-Dec | 7.8 | 9.2 | 8.5 | 9.1 | 7.2 | 9.3 | 6.5 | 9.2 | 6.2 | 6.4 | 7.8 | 8.6 | 7.6 | 6.0 |
| 2010 | Jan-Mar | 8.0 | 9.4 | 8.6 | 9.7 | 7.3 | 9.3 | 6.6 | 9.1 | 6.3 | 6.2 | 7.9 | 9.3 | 8.1 | 6.8 |
| | Apr-Jun | 7.8 | 9.4 | 8.1 | 9.1 | 7.4 | 8.3 | 6.8 | 9.3 | 6.1 | 6.1 | 7.7 | 9.0 | 8.4 | 6.6 |
| | Jul-Sep | 7.7 | 9.0 | 8.1 | 9.0 | 8.0 | 8.7 | 6.6 | 9.0 | 6.2 | 5.5 | 7.7 | 8.1 | 8.5 | 7.0 |

Source: Labour Force Survey, Office for National Statistics

**Table 8** shows economic inactivity rates for persons aged from 16 to 64 from the LFS. The UK rate in the third quarter of 2010 was 23.2 per cent, down 0.2 percentage points from the previous quarter and down 0.1 percentage points on a year earlier. Across the regions, rates varied from 19.8 per cent in the South East to 28.8 per cent in Northern Ireland.

Compared with a year earlier, six regions had a decrease in the inactivity rate, and thus a corresponding increase in the activity rate. Northern Ireland and the North East both had the largest annual fall of 1.8 percentage points. Five regions had an increase in the economic inactivity rate over the year. The largest annual rise was in the East Midlands at 1.5 percentage points. West Midlands' rate was unchanged on the year.

## Table 8 Economic inactivity rates for persons of working age: by NUTS 1 region

Per cent, seasonally adjusted

| | | United Kingdom | North East | North West | Yorkshire and The Humber | East Midlands | West Midlands | East | London | South East | South West | England | Wales | Scotland | Northern Ireland |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2007 | Jul-Sep | 23.2 | 25.6 | 25.0 | 24.7 | 22.0 | 23.7 | 20.7 | 25.7 | 19.1 | 20.6 | 22.9 | 26.7 | 22.0 | 29.2 |
| | Oct-Dec | 23.1 | 26.1 | 24.6 | 24.0 | 22.5 | 24.1 | 20.4 | 25.5 | 19.2 | 20.0 | 22.8 | 26.9 | 22.0 | 29.0 |
| 2008 | Jan-Mar | 23.0 | 26.9 | 25.2 | 24.0 | 21.5 | 23.7 | 20.8 | 24.5 | 19.3 | 20.4 | 22.7 | 26.6 | 22.1 | 28.6 |
| | Apr-Jun | 22.9 | 26.0 | 25.0 | 24.0 | 22.1 | 24.6 | 20.7 | 24.0 | 19.0 | 20.4 | 22.6 | 25.9 | 22.4 | 28.5 |
| | Jul-Sep | 23.0 | 25.6 | 25.1 | 23.3 | 21.6 | 25.0 | 20.8 | 24.3 | 19.2 | 20.1 | 22.6 | 26.7 | 22.4 | 29.1 |
| | Oct-Dec | 22.8 | 25.7 | 24.7 | 24.5 | 21.2 | 24.2 | 20.0 | 23.9 | 19.5 | 20.2 | 22.5 | 26.0 | 22.5 | 29.6 |
| 2009 | Jan-Mar | 22.8 | 26.1 | 24.3 | 24.2 | 20.9 | 24.3 | 19.5 | 24.5 | 19.6 | 19.6 | 22.4 | 25.7 | 22.1 | 30.8 |
| | Apr-Jun | 23.1 | 27.6 | 24.4 | 24.1 | 21.0 | 23.3 | 19.8 | 25.4 | 19.9 | 20.5 | 22.7 | 26.5 | 22.4 | 31.4 |
| | Jul-Sep | 23.2 | 26.8 | 24.6 | 24.1 | 21.4 | 23.9 | 19.9 | 25.3 | 20.1 | 21.3 | 22.9 | 26.3 | 22.5 | 30.6 |
| | Oct-Dec | 23.4 | 26.1 | 25.1 | 24.2 | 22.1 | 24.0 | 21.0 | 25.2 | 19.9 | 21.5 | 23.1 | 26.5 | 22.5 | 30.2 |
| 2010 | Jan-Mar | 23.5 | 26.1 | 24.4 | 23.5 | 23.2 | 24.1 | 21.3 | 25.6 | 20.0 | 22.0 | 23.2 | 26.2 | 23.6 | 29.1 |
| | Apr-Jun | 23.4 | 25.0 | 24.7 | 23.1 | 23.2 | 24.3 | 21.2 | 25.0 | 20.5 | 21.3 | 23.0 | 26.5 | 23.2 | 28.8 |
| | Jul-Sep | 23.2 | 25.0 | 24.3 | 24.7 | 22.9 | 23.9 | 20.7 | 24.5 | 19.8 | 21.1 | 22.8 | 26.7 | 22.6 | 28.8 |

Source: Labour Force Survey, Office for National Statistics

**Table 9** shows the number of workforce jobs, seasonally adjusted, from the Employers Surveys. The number of UK workforce jobs in September 2010 was 30,703,000, an increase of 9,000 over the quarter.

Over the quarter there were decreases in three regions. The largest decrease was in London at 33,000 whilst the largest increase was in the South East at 18,000.

## Table 9 Workforce jobs*: by NUTS1 region

Thousands, seasonally adjusted

| | United Kingdom | North East | North West | Yorkshire and The Humber | East Midlands | West Midlands | East | London | South East | South West | England | Wales | Scotland | Northern Ireland |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sep 08 | 31,780 | 1,166 | 3,427 | 2,543 | 2,169 | 2,684 | 2,818 | 4,809 | 4,431 | 2,690 | 26,737 | 1,400 | 2,739 | 878 |
| Sep 09 | 30,997 | 1,174 | 3,355 | 2,485 | 2,092 | 2,610 | 2,803 | 4,788 | 4,280 | 2,649 | 26,236 | 1,350 | 2,545 | 840 |
| Dec 09 | 30,753 | 1,168 | 3,320 | 2,474 | 2,105 | 2,570 | 2,812 | 4,680 | 4,266 | 2,611 | 26,006 | 1,346 | 2,539 | 835 |
| Mar 10 | 30,730 | 1,164 | 3,305 | 2,484 | 2,099 | 2,557 | 2,803 | 4,684 | 4,267 | 2,610 | 25,973 | 1,372 | 2,518 | 841 |
| Jun 10 | 30,694 | 1,159 | 3,303 | 2,477 | 2,100 | 2,545 | 2,811 | 4,695 | 4,256 | 2,612 | 25,958 | 1,333 | 2,539 | 836 |
| Sep 10 | 30,703 | 1,141 | 3,318 | 2,477 | 2,101 | 2,535 | 2,813 | 4,662 | 4,274 | 2,614 | 25,935 | 1,348 | 2,553 | 840 |

* Workforce jobs figures are of a measure of jobs rather than people. For example, if a person holds two jobs, each job will be counted in the employee jobs total.

Source: Employer surveys

**Table 10** shows the claimant count rate (referring to people claiming Jobseeker's Allowance benefits as a proportion of the workforce).

## Table 10 Claimant count rates*: by NUTS1 region

Per cent, seasonally adjusted

| | | United Kingdom | North East | North West | Yorkshire and The Humber | East Midlands | West Midlands | East | London | South East | South West | England | Wales | Scotland | Northern Ireland |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2009 | Dec | 4.9 | 7.1 | 5.6 | 6.0 | 5.1 | 6.5 | 4.1 | 4.6 | 3.5 | 3.4 | 4.9 | 5.6 | 4.9 | 6.1 |
| 2010 | Jan | 5.0 | 7.2 | 5.7 | 6.1 | 5.1 | 6.5 | 4.2 | 4.7 | 3.5 | 3.4 | 4.9 | 5.6 | 5.0 | 6.2 |
| | Feb | 4.9 | 7.0 | 5.5 | 5.9 | 4.9 | 6.3 | 4.0 | 4.6 | 3.4 | 3.3 | 4.8 | 5.5 | 4.9 | 6.2 |
| | Mar | 4.8 | 6.8 | 5.3 | 5.8 | 4.8 | 6.2 | 4.0 | 4.5 | 3.3 | 3.2 | 4.7 | 5.4 | 4.9 | 6.2 |
| | Apr | 4.7 | 6.7 | 5.2 | 5.7 | 4.7 | 6.0 | 3.9 | 4.5 | 3.2 | 3.1 | 4.6 | 5.2 | 4.8 | 6.2 |
| | May | 4.6 | 6.5 | 5.1 | 5.6 | 4.5 | 5.9 | 3.8 | 4.4 | 3.1 | 3.0 | 4.5 | 5.1 | 4.8 | 6.2 |
| | Jun | 4.5 | 6.6 | 5.1 | 5.5 | 4.5 | 5.8 | 3.7 | 4.4 | 3.0 | 3.0 | 4.4 | 5.0 | 4.8 | 6.3 |
| | Jul | 4.5 | 6.6 | 5.1 | 5.5 | 4.5 | 5.8 | 3.7 | 4.4 | 3.0 | 2.9 | 4.4 | 5.0 | 4.9 | 6.4 |
| | Aug | 4.5 | 6.6 | 5.1 | 5.5 | 4.4 | 5.8 | 3.7 | 4.4 | 3.0 | 3.0 | 4.4 | 5.1 | 4.9 | 6.5 |
| | Sep | 4.5 | 6.7 | 5.1 | 5.5 | 4.4 | 5.8 | 3.8 | 4.4 | 3.0 | 3.0 | 4.4 | 5.1 | 4.8 | 6.5 |
| | Oct | 4.5 | 6.7 | 5.1 | 5.5 | 4.4 | 5.7 | 3.7 | 4.4 | 3.0 | 3.0 | 4.4 | 5.0 | 4.9 | 6.5 |
| | Nov | 4.5 | 6.6 | 5.0 | 5.5 | 4.4 | 5.7 | 3.7 | 4.4 | 2.9 | 3.0 | 4.4 | 5.0 | 4.9 | 6.5 |
| | Dec | 4.5 | 6.6 | 5.0 | 5.5 | 4.4 | 5.7 | 3.7 | 4.4 | 2.9 | 3.0 | 4.3 | 5.0 | 5.0 | 6.5 |

*Count of claimants of Jobseeker's Allowance expressed as a percentage of the total workforce - i.e. workforce jobs plus claimants.

Source: Jobcentre Plus administrative system

The UK rate was 4.5 per cent in December 2010, unchanged from November 2010, and down 0.4 percentage points on a year earlier. This national rate masks large variations between regions and component countries of the UK. For December 2010, the North East had the highest claimant count rate in the UK at 6.6 per cent. The North East was followed by Northern Ireland (6.5 per cent) and the West Midlands (5.7 per cent). The lowest claimant count was measured in the South East at 2.9 per cent. The claimant count rate was 5.0 per cent in Scotland, 4.3 per cent in England and 5.0 per cent in Wales.

Scotland (up by 0.1 percentage points) and Northern Ireland (up by 0.4 percentage points) are the only regions showing an increase in the claimant count rate compared with a year ago. The largest decrease was in the West Midlands at 0.8 percentage points.

## Notes

1. However, it should be noted that some occupation's classifications, particularly at high levels of aggregation, can embrace some heterogeneous skills. Variations in the tasks performed occur between one place of employment and another and consequently not all definitions can be expected to coincide exactly with specific jobs in a particular establishment or in a given locality and time.
2. The analysis used April-June data from the LFS for each year between 2001 and 2009.
3. Construction of a longer data series on occupation based skills was not possible due to changes in the classifications between SOC 1990 and SOC 2000.
4. Hours worked series consist of the sum of employee, self-employment, and Government supported trainees (GST) hours worked and do not include Her Majesty's Forces (HMF). Therefore, the sum of the hours worked estimates for all regions is not identical to the estimates produced in the national hours worked process.
5. As the analysis uses aggregate data, it only provides a basis for exploratory analysis. It establishes only a correlation between the skills and productivity and does not reflect the influence of other factors on productivity and/or skills. Consequently, it does not quantify what fraction of variation in productivity between the regions is associated with variation in skills. Without considering a full set of variables that may determine productivity and micro-level data such as firm level, it is not possible to isolate the specific effects of skills on productivity from other possible influences.
6. UK Regional Trade in Goods Statistics, Quarter 3 2010, HM Revenue and Customs at www.uktradeinfo.com/index.cfm?task=td_regstats_press
7. For a summary of all different levels of qualifications see ‘Notes and definitions’ at www.statistics.gov.uk/statbase/product.asp?vlnk=836

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*Business Expenditure on Research & Development by Government Office Region* at www.statistics.gov.uk/statbase/tsdataset.asp?vlnk=572

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# Key time series

## 1. National Accounts aggregates

Last updated 25/01/11

Seasonally adjusted

| | £ million | | Indices (2006 = 100) | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | At current prices | | Value indices at current prices | | Chained volume indices | | | Implied deflators[3] | |
| | Gross domestic product (GDP) at market prices | Gross value added (GVA) at basic prices | GDP at market prices[1] | GVA at basic prices | Gross national disposable income at market prices[2] | GDP at market prices | GVA at basic prices | GDP at market prices | GVA at basic prices |
| | YBHA | ABML | YBEU | YBEX | YBFP | YBEZ | CGCE | YBGB | CGBV |
| 2009 | 1,394,989 | 1,257,627 | 105.0 | 106.2 | 98.4 | 97.6 | 97.9 | 107.6 | 108.5 |
| 2010 | | | | | | 99.0 | 99.3 | | |
| 2008 Q3 | 361,466 | 325,041 | 108.8 | 109.8 | 103.8 | 102.6 | 102.6 | 106.1 | 107.1 |
| 2008 Q4 | 358,848 | 324,009 | 108.1 | 109.5 | 100.9 | 100.5 | 100.5 | 107.5 | 108.9 |
| 2009 Q1 | 349,801 | 317,113 | 105.3 | 107.2 | 99.5 | 98.2 | 98.4 | 107.2 | 108.9 |
| 2009 Q2 | 344,504 | 311,156 | 103.7 | 105.1 | 96.6 | 97.4 | 97.7 | 106.5 | 107.6 |
| 2009 Q3 | 348,081 | 313,018 | 104.8 | 105.8 | 98.3 | 97.2 | 97.5 | 107.9 | 108.5 |
| 2009 Q4 | 352,603 | 316,340 | 106.2 | 106.9 | 99.4 | 97.6 | 98.0 | 108.8 | 109.0 |
| 2010 Q1 | 358,941 | 320,297 | 108.1 | 108.2 | 98.7 | 97.9 | 98.3 | 110.4 | 110.1 |
| 2010 Q2 | 362,630 | 323,260 | 109.2 | 109.2 | 101.0 | 99.0 | 99.4 | 110.3 | 109.9 |
| 2010 Q3 | 365,920 | 326,192 | 110.2 | 110.2 | 100.6 | 99.7 | 100.1 | 110.5 | 110.1 |
| 2010 Q4 | | | | | | 99.2 | 99.6 | | |
| | | | Percentage change, quarter on corresponding quarter of previous year | | | | | | |
| | | | IHYO | ABML[4] | YBGO[4] | IHYR | ABMM[4] | IHYU | ABML/ABMM[4] |
| 2008 Q3 | 2.4 | 3.4 | 2.4 | 3.4 | 0.3 | -0.4 | -0.6 | 2.9 | 4.0 |
| 2008 Q4 | 0.5 | 1.6 | 0.5 | 1.6 | -5.2 | -2.7 | -2.8 | 3.3 | 4.6 |
| 2009 Q1 | -3.4 | -1.8 | -3.4 | -1.8 | -7.2 | -5.4 | -5.4 | 2.1 | 3.8 |
| 2009 Q2 | -5.2 | -3.9 | -5.2 | -3.9 | -8.2 | -5.9 | -5.8 | 0.8 | 2.0 |
| 2009 Q3 | -3.7 | -3.7 | -3.7 | -3.7 | -5.3 | -5.3 | -5.0 | 1.7 | 1.4 |
| 2009 Q4 | -1.7 | -2.4 | -1.7 | -2.4 | -1.6 | -2.8 | -2.5 | 1.1 | 0.1 |
| 2010 Q1 | 2.6 | 1.0 | 2.6 | 1.0 | -0.8 | -0.3 | 0.0 | 2.9 | 1.0 |
| 2010 Q2 | 5.3 | 3.9 | 5.3 | 3.9 | 4.6 | 1.6 | 1.7 | 3.6 | 2.1 |
| 2010 Q3 | 5.1 | 4.2 | 5.1 | 4.2 | 2.4 | 2.7 | 2.7 | 2.4 | 1.5 |
| 2010 Q4 | | | | | | 1.7 | 1.6 | | |

Notes

1. 'Money GDP'
2. This series is only updated once a quarter, in line with the full quarterly national accounts data set
3. Based on chained volume measures and current price estimates of expenditure components of GDP
4. Derived from these identification (CDID) codes.

# 2. Gross Domestic Product: by category of expenditure

Last updated 25/01/11

£ million, chained volume measures, reference year 2006, seasonally adjusted

| | Domestic expenditure on goods and services at market prices | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Final consumption expenditure | | | Gross capital formation | | | | | | | | |
| | Households | Non-profit institutions1 | General government | Gross fixed capital formation | Changes in inventories2 | Acquisitions less disposals of valuables | Total | Exports of goods and services | Gross final expenditure | less Imports of goods and services | Statistical discrepancy (expenditure) | Gross domestic product at market prices |
| | ABJR | HAYO | NMRY | NPQT | CAFU | NPJR | YBIM | IKBK | ABMG | IKBL | GIXS | ABMI |
| 2008 | 842,174 | 32,338 | 293,464 | 232,777 | 130 | 1,290 | 1,402,173 | 372,104 | 1,774,277 | 411,138 | 0 | 1,363,139 |
| 2009 | 814,666 | 32,281 | 296,306 | 196,997 | -16,012 | 1,222 | 1,325,460 | 334,601 | 1,660,061 | 362,026 | -1,346 | 1,296,689 |
| 2010 | | | | | | | | | | | | 1,314,867 |
| 2008 Q1 | 213,214 | 8,292 | 72,104 | 59,619 | 3,228 | 206 | 356,664 | 93,858 | 450,522 | 105,712 | 0 | 344,809 |
| 2008 Q2 | 211,525 | 8,183 | 73,334 | 59,779 | 872 | 440 | 354,134 | 94,284 | 448,418 | 104,550 | 0 | 343,868 |
| 2008 Q3 | 210,330 | 8,018 | 73,473 | 57,254 | 645 | 367 | 350,088 | 93,918 | 444,005 | 103,226 | 0 | 340,780 |
| 2008 Q4 | 207,105 | 7,845 | 74,553 | 56,125 | -4,615 | 277 | 341,287 | 90,044 | 431,332 | 97,650 | 0 | 333,682 |
| 2009 Q1 | 204,262 | 8,153 | 73,972 | 51,112 | -4,514 | 420 | 333,404 | 83,645 | 417,050 | 90,636 | -156 | 326,257 |
| 2009 Q2 | 202,792 | 8,078 | 74,089 | 48,858 | -3,796 | 239 | 330,260 | 82,166 | 412,426 | 88,581 | -260 | 323,585 |
| 2009 Q3 | 202,828 | 8,026 | 73,958 | 48,878 | -4,191 | 212 | 329,711 | 82,879 | 412,590 | 89,547 | -388 | 322,655 |
| 2009 Q4 | 204,784 | 8,024 | 74,287 | 48,149 | -3,511 | 351 | 332,085 | 85,911 | 417,995 | 93,262 | -542 | 324,192 |
| 2010 Q1 | 204,582 | 7,988 | 74,778 | 49,656 | -1,124 | 267 | 336,148 | 85,153 | 421,300 | 95,214 | -888 | 325,198 |
| 2010 Q2 | 206,251 | 8,050 | 75,239 | 50,164 | -762 | 369 | 339,310 | 87,763 | 427,073 | 97,162 | -1,031 | 328,881 |
| 2010 Q3 | 206,885 | 7,862 | 74,952 | 51,846 | 318 | 210 | 342,073 | 89,066 | 431,140 | 98,789 | -1,129 | 331,222 |
| 2010 Q4 | | | | | | | | | | | | 329,566 |
| | Percentage change, quarter on corresponding quarter of previous year | | | | | | | | | | | |
| 2008 Q1 | 2.9 | 0.1 | 0.8 | -1.9 | | | 1.8 | 3.7 | 2.2 | 3.1 | | 1.9 |
| 2008 Q2 | 1.4 | -1.5 | 1.9 | -1.4 | | | 1.2 | 2.7 | 1.5 | 3.1 | | 1 |
| 2008 Q3 | 0.1 | -4.1 | 1.2 | -6.0 | | | -1.3 | 0.5 | -0.9 | -2.5 | | -0.4 |
| 2008 Q4 | -2.1 | -6.9 | 2.5 | -10.5 | | | -4.4 | -2.7 | -4.1 | -8.4 | | -2.7 |
| 2009 Q1 | -4.2 | -1.7 | 2.6 | -14.3 | | | -6.5 | -10.9 | -7.4 | -14.3 | | -5.4 |
| 2009 Q2 | -4.1 | -1.3 | 1.0 | -18.3 | | | -6.7 | -12.9 | -8 | -15.3 | | -5.9 |
| 2009 Q3 | -3.6 | 0.1 | 0.7 | -14.6 | | | -5.8 | -11.8 | -7.1 | -13.3 | | -5.3 |
| 2009 Q4 | -1.1 | 2.3 | -0.4 | -14.2 | | | -2.7 | -4.6 | -3.1 | -4.5 | | -2.8 |
| 2010 Q1 | 0.2 | -2.0 | 1.1 | -2.8 | | | 0.8 | 1.8 | 1 | 5.1 | | -0.3 |
| 2010 Q2 | 1.7 | -0.3 | 1.6 | 2.7 | | | 2.7 | 6.8 | 3.6 | 9.7 | | 1.6 |
| 2010 Q3 | 2.0 | -2.0 | 1.3 | 6.1 | | | 3.7 | 7.5 | 4.5 | 10.3 | | 2.7 |
| 2010 Q4 | | | | | | | | | | | | 1.7 |

Notes

1. Non–profit institutions serving households
2. This series includes a quarterly alignment adjustment

# 3. Labour Market summary

Last updated 19/01/11

United Kingdom (thousands) seasonally adjusted

| | | | Headline indicators | | | | | |
|---|---|---|---|---|---|---|---|---|
| | **LFS household population[1]** | | Employment | | Unemployment | | Inactivity | |
| | | | Level | Rate[2] | Level | Rate[3] | Level | Rate[4] |
| | **All aged 16 & over** | **All aged 16 to 64** | All aged 16 & over | All aged 16 to 64 | All aged 16 & over | All aged 16 to 64 | All aged 16 & over | All aged 16 to 64 |
| **People** | MGSL | LF2O | MGRZ | LF24 | MGSC | MGSX | LF2M | LF2S |
| Sep–Nov 2008 | 49,197 | 39,654 | 29,365 | 72.3 | 1,947 | 6.2 | 9,062 | 22.9 |
| Sep–Nov 2009 | 49,580 | 39,870 | 28,905 | 70.6 | 2,460 | 7.8 | 9,296 | 23.3 |
| Dec–Feb 2010 | 49,679 | 39,921 | 28,843 | 70.3 | 2,486 | 7.9 | 9,389 | 23.5 |
| Mar–May 2010 | 49,777 | 39,972 | 28,980 | 70.5 | 2,469 | 7.8 | 9,346 | 23.4 |
| Jun–Aug 2010 | 49,873 | 40,021 | 29,158 | 70.7 | 2,448 | 7.7 | 9,280 | 23.2 |
| Sep–Nov 2010 | 49,965 | 40,064 | 29,089 | 70.4 | 2,498 | 7.9 | 9,369 | 23.4 |
| *Change on quarter* | 92 | 43 | -69 | -0.3 | 49 | 0.2 | 89 | 0.2 |
| *Change on quarter %* | 0.2 | 0.1 | -0.2 | | 2.0 | | 1.0 | |
| *Change on year* | 385 | 194 | 184 | -0.1 | 38 | 0.1 | 73 | 0.1 |
| *Change on year %* | 0.8 | 0.5 | 0.6 | | 1.5 | | 0.8 | |
| **Men** | MGSM | YBTG | MGSA | MGSV | MGSD | MGSY | YBSO | YBTM |
| Sep–Nov 2008 | 23,958 | 19,727 | 15,834 | 78.0 | 1,163 | 6.8 | 3,190 | 16.2 |
| Sep–Nov 2009 | 24,166 | 19,839 | 15,395 | 75.3 | 1,511 | 8.9 | 3,409 | 17.2 |
| Dec–Feb 2010 | 24,220 | 19,866 | 15,368 | 75.0 | 1,517 | 9.0 | 3,469 | 17.5 |
| Mar–May 2010 | 24,275 | 19,893 | 15,483 | 75.5 | 1,492 | 8.8 | 3,405 | 17.1 |
| Jun–Aug 2010 | 24,329 | 19,920 | 15,615 | 75.8 | 1,436 | 8.4 | 3,389 | 17.0 |
| Sep–Nov 2010 | 24,379 | 19,943 | 15,601 | 75.6 | 1,479 | 8.7 | 3,400 | 17.1 |
| *Change on quarter* | 50 | 23 | -14 | -0.2 | 43 | 0.2 | 11 | 0.0 |
| *Change on quarter %* | 0.2 | 0.1 | -0.1 | | 3.0 | | 0.3 | |
| *Change on year* | 213 | 103 | 206 | 0.3 | -31 | -0.3 | -9 | -0.1 |
| *Change on year %* | 0.9 | 0.5 | 1.3 | | -2.1 | | -0.3 | |
| **Women** | MGSN | LF2P | MGSB | LF25 | MGSE | MGSZ | LF2N | LF2T |
| Sep–Nov 2008 | 25,239 | 19,927 | 13,531 | 66.6 | 784 | 5.5 | 5,872 | 29.5 |
| Sep–Nov 2009 | 25,415 | 20,031 | 13,510 | 65.9 | 949 | 6.6 | 5,887 | 29.4 |
| Dec–Feb 2010 | 25,459 | 20,055 | 13,476 | 65.7 | 969 | 6.7 | 5,921 | 29.5 |
| Mar–May 2010 | 25,502 | 20,079 | 13,497 | 65.6 | 977 | 6.7 | 5,941 | 29.6 |
| Jun–Aug 2010 | 25,545 | 20,101 | 13,543 | 65.7 | 1,013 | 7.0 | 5,891 | 29.3 |
| Sep–Nov 2010 | 25,586 | 20,121 | 13,489 | 65.3 | 1,019 | 7.0 | 5,969 | 29.7 |
| *Change on quarter* | 41 | 20 | -54 | -0.4 | 6 | 0.1 | 77 | 0.4 |
| *Change on quarter %* | 0.2 | 0.1 | -0.4 | | 0.6 | | 1.3 | |
| *Change on year* | 172 | 90 | -22 | -0.6 | 69 | 0.5 | 82 | 0.3 |
| *Change on year %* | 0.7 | 0.5 | -0.2 | | 7.3 | | 1.4 | |

Notes

1. The Labour Force Survey (LFS) is a survey of the population of private households, student halls of residence and NHS accommodation.

2. The headline employment rate is the number of people aged 16 to 64 in employment divided by the population aged 16 to 64.

3. The headline unemployment rate is the number of unemployed people (aged 16+) divided by the economically active population (aged 16+). The economically active population is defined as those in employment plus those who are unemployed.

4. The headline inactivity rate is the number of people aged 16 to 64 divided by the population aged 16 to 64.

**Note on headline employment, unemployment and inactivity rates**

The headline employment and inactivity rates are based on the population aged 16 to 64 but the headline unemployment rate is based on the economically active population aged 16 and over. The employment and inactivity rates for those aged 16 and over are affected by the inclusion of the retired population in the denominators and are therefore less meaningful than the rates for those aged from 16 to 64. However, for the unemployment rate for those aged 16 and over, no such effect occurs as the denominator for the unemployment rate is the economically active population which only includes people in work or actively seeking and able to work.

**Note on headline employment, unemployment and inactivity levels**

The headline employment and unemployment levels are for those aged 16 and over; they measure all people in work or actively seeking and able to work. However, the headline inactivity level is for those aged 16 to 64. The inactivity level for those aged 16 and over is less meaningful as it includes elderly people who have retired from the labour force.

# 4. Prices

Last updated 11/02/11

**Percentage change over 12 months, Not seasonally adjusted**

| | Consumer prices | | | | | | Producer prices | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Consumer prices index (CPI) | | | Retail prices index (RPI) | | | Output prices | | Input prices | |
| | All items | CPI excluding indirect taxes (CPIY)[1] | CPI at constant tax rates (CPI-CT) | All items | All items excluding mortgage interest payments (RPIX) | All items excluding mortgage interest payments and indirect taxes (RPIY)[2] | All manufactured products | Excluding food, beverages, tobacco and petroleum products | Materials and fuels purchased by manufacturing industry | Excluding food, beverages, tobacco and petroleum products |
| | D7G7 | EL2S | EAD6 | CZBH | CDKQ | CBZX | | | | |
| 2009 Jan | 3.0 | 4.5 | 4.1 | 0.1 | 2.4 | 3.4 | 3.5 | 4.1 | 1.9 | 11.4 |
| 2009 Feb | 3.2 | 4.6 | 4.2 | 0.0 | 2.5 | 3.5 | 3.1 | 4.0 | 0.5 | 8.9 |
| 2009 Mar | 2.9 | 4.3 | 3.9 | -0.4 | 2.2 | 3.2 | 2.2 | 3.6 | -0.7 | 7.3 |
| 2009 Apr | 2.3 | 3.8 | 3.4 | -1.2 | 1.7 | 2.7 | 1.8 | 3.5 | -6.0 | 2.5 |
| 2009 May | 2.2 | 3.6 | 3.3 | -1.1 | 1.6 | 2.6 | 0.7 | 3.0 | -9.2 | -0.2 |
| 2009 Jun | 1.8 | 3.1 | 2.9 | -1.6 | 1.0 | 1.9 | 0.2 | 2.3 | -12.6 | -3.5 |
| 2009 Jul | 1.8 | 3.1 | 2.8 | -1.4 | 1.2 | 2.1 | -0.3 | 1.8 | -12.5 | -3.8 |
| 2009 Aug | 1.6 | 2.9 | 2.7 | -1.3 | 1.4 | 2.3 | 0.0 | 1.5 | -7.9 | -2.1 |
| 2009 Sep | 1.1 | 2.2 | 2.1 | -1.4 | 1.3 | 2.0 | 0.4 | 1.3 | -6.1 | -1.0 |
| 2009 Oct | 1.5 | 2.6 | 2.5 | -0.8 | 1.9 | 2.8 | 1.5 | 1.7 | 0.8 | 1.1 |
| 2009 Nov | 1.9 | 3.0 | 2.9 | 0.3 | 2.7 | 3.5 | 2.6 | 1.5 | 3.9 | 0.6 |
| 2009 Dec | 2.9 | 2.8 | 2.6 | 2.4 | 3.8 | 3.8 | 3.2 | 2.1 | 7.1 | 0.8 |
| 2010 Jan | 3.5 | 1.9 | 1.7 | 3.7 | 4.6 | 3.3 | 3.5 | 2.0 | 7.4 | 0.8 |
| 2010 Feb | 3.0 | 1.4 | 1.2 | 3.7 | 4.2 | 2.9 | 3.8 | 2.2 | 7.7 | 2.2 |
| 2010 Mar | 3.4 | 1.8 | 1.6 | 4.4 | 4.8 | 3.5 | 4.5 | 2.7 | 10.3 | 4.0 |
| 2010 Apr | 3.7 | 2.0 | 1.9 | 5.3 | 5.4 | 3.9 | 4.9 | 2.8 | 12.6 | 6.1 |
| 2010 May | 3.4 | 1.7 | 1.6 | 5.1 | 5.1 | 3.8 | 5.0 | 3.2 | 11.6 | 7.1 |
| 2010 Jun | 3.2 | 1.6 | 1.5 | 5.0 | 5.0 | 3.8 | 4.4 | 3.8 | 10.7 | 7.1 |
| 2010 Jul | 3.1 | 1.4 | 1.3 | 4.8 | 4.8 | 3.5 | 4.2 | 3.8 | 10.7 | 7.5 |
| 2010 Aug | 3.1 | 1.4 | 1.3 | 4.7 | 4.7 | 3.4 | 4.2 | 3.7 | 8.3 | 6.3 |
| 2010 Sep | 3.1 | 1.5 | 1.4 | 4.6 | 4.6 | 3.4 | 3.8 | 3.4 | 8.8 | 5.6 |
| 2010 Oct | 3.2 | 1.6 | 1.4 | 4.5 | 4.6 | 3.2 | 4.0 | 3.2 | 8.4 | 6.0 |
| 2010 Nov | 3.3 | 1.6 | 1.5 | 4.7 | 4.7 | 3.4 | 4.1 | 3.3 | 9.2 | 7.0 |
| 2010 Dec | 3.7 | 2.0 | 1.9 | 4.8 | 4.7 | 3.5 | 4.1 | 2.6 | 12.9 | 8.9 |
| 2011 Jan | | | | | | | 4.8 | 3.2 | 13.4 | 9.9 |

Notes

1 The taxes excluded are VAT, duties, insurance premium tax, air passenger duty and stamp duty on share transactions.

2 The taxes excluded are council tax, VAT, duties, vehicle excise duty, insurance premium tax and air passenger duty.

**Notes to tables**

### Identification (CDID) codes

The four-letter identification code at the top of each data column is the ONS reference for this series of data on our time series database. Please quote the relevant code if you contact us requiring any further information about the data.

### Conventions

Where figures have been rounded to the final digit, there may be an apparent slight discrepancy between the sum of the constituent items and the total as shown. Although figures may be given in unrounded form to facilitate the calculation of percentage changes, rates of change etc by users, this does not imply that the figures can be estimated to this degree of precision as they may be affected by sampling variability or imprecision in estimation methods.

The following standard symbols are used:

| | |
|---|---|
| .. | not available |
| – | nil or negligible (less than half the final digit shown) |
| P | provisional |
| — | break in series |
| R | revised |
| r | series revised from indicated entry onwards |

**Labour market statistics concepts and definitions**

### Labour Force Survey 'monthly' estimates

Labour Force Survey (LFS) results are three-monthly averages, so consecutive months' results overlap. Comparing estimates for overlapping three-month periods can produce more volatile results, which can be difficult to interpret.

### Labour force summary table

Economically active

People aged 16 and over who are either in employment or unemployed.

Economically inactive

People who are neither in employment nor unemployed. This includes those who want a job but have not been seeking work in the last four weeks, those who want a job and are seeking work but not available to start work, and those who do not want a job.

Employment and jobs

There are two ways of looking at employment: the number of people with jobs, or the number of jobs. The two concepts are not the same as one person can have more than one job. The number of people with jobs is measured by the Labour Force Survey (LFS) and includes people aged 16 or over who do paid work (as an employee or self-employed), those who have a job that they are temporarily away from, those on government-supported training and employment programmes, and those doing unpaid family work. The number of jobs is measured by workforce jobs and is the sum of employee jobs (as measured by surveys of employers), self-employment jobs from the LFS, people in HM Forces, and government-supported trainees. Vacant jobs are not included.

Unemployment

The number of unemployed people in the UK is measured through the Labour Force Survey following the internationally agreed definition recommended by the ILO (International Labour Organisation) – an agency of the United Nations. Unemployed people:

are without a job, want a job, have actively sought work in the last four weeks and are available to start work in the next two weeks, or

are out of work, have found a job and are waiting to start it in the next two weeks

## Other key indicators

Claimant count

The number of people claiming Jobseeker's Allowance benefits.

Earnings

A measure of the money people receive in return for work done, gross of tax. It includes salaries and, unless otherwise stated, bonuses but not unearned income, benefits in kind or arrears of pay.

Productivity

Whole economy output per worker is the ratio of Gross Value Added (GVA) at basic prices and Labour Force Survey (LFS) total employment. Manufacturing output per filled job is the ratio of manufacturing output (from the Index of Production) and productivity jobs for manufacturing (constrained to LFS jobs at the whole economy level).

Redundancies

The number of people who:

were not in employment during the reference week, and

reported that they had been made redundant in the month of, or the two calendar months prior to, the reference week

plus the number of people who:

were in employment during the reference week, and

started their job in the same calendar month as, or the two calendar months prior to, the reference week, and

reported that they had been made redundant in the month of, or the two calendar months prior to, the reference week

Unit wage costs

A measure of the cost of wages and salaries per unit of output.

Vacancies

The statistics are based on ONS's Vacancy Survey of businesses. The survey is designed to provide comprehensive estimates of the stock of vacancies across the economy, excluding those in agriculture, forestry and fishing. Vacancies are defined as positions for which employers are actively seeking recruits from outside their business or organisation. More information on labour market concepts, sources and methods is available in the *Guide to Labour Market Statistics* at www.statistics.gov.uk/about/data/guides/LabourMarket/default.asp

# Directory of online tables

**Weblink: www.statistics.gov.uk/StatBase/Product.asp?vlnk=14692**

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| Weblink: www.statistics.gov.uk/elmr/downloads/elmr1.pdf | |
| 1.01 National accounts aggregates | M |
| 1.02 Gross domestic product and gross national income | M |
| 1.03 Gross domestic product, by category of expenditure | M |
| 1.04 Gross domestic product, by category of income | M |
| 1.05 Gross domestic product and shares of income and expenditure | M |
| 1.06 Income, product and spending per head | Q |
| 1.07 Households' disposable income and consumption | M |
| 1.08 Household final consumption expenditure | M |
| 1.09 Gross fixed capital formation | M |
| 1.10 Gross value added, by category of output | M |
| 1.11 Gross value added, by category of output: service industries | M |
| 1.12 Summary capital accounts and net lending/net borrowing | Q |
| 1.13 Private non-financial corporations: allocation of primary income account | Q |
| 1.14 Private non-financial corporations: secondary distribution of income account and capital account | Q |
| 1.15 Balance of payments: current account | M |
| 1.16 Trade in goods (on a balance of payments basis) | M |
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| 2. Selected labour market statistics | |
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| 2.02 Employment by age | M |
| 2.03 Full-time, part-time and temporary workers | M |
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Weblink: www.statistics.gov.uk/elmr/downloads/elmr3.pdf

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| 3.01 Producer and consumer prices | M |
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| 4.07 Retail sales and credit business | M |

## 5. Selected financial statistics

Weblink: www.statistics.gov.uk/elmr/downloads/elmr5.pdf

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## 6. Further labour market statistics

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Notes
A Annual
Q Quarterly
M Monthly

## More information

- Time series are available from www.statistics.gov.uk/statbase/tsdintro.asp
- Subnational labour market data are available from www.statistics.gov.uk/statbase/Product.asp?vlnk=14160 and www.nomis.web
- Labour Force Survey tables are available from www.statistics.gov.uk/statbase/Product.asp?vlnk=11771
- Annual Survey of Hours and Earnings data are available from www.statistics.gov.uk/StatBase/Product.asp?vlnk=13101

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### August 2010

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- The labour market in the 1980s, 1990s and 2008/09 recessions
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- The global recession and its impact on tourists' spending in the UK
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### September 2010

- Total reward: pay and pension contributions in the private and public sectors
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- The relationship between hours worked in the UK and the economy
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- Multi–factor productivity: estimates for 1994 to 2008
- Revisions to Workforce Jobs

### October 2010

- The experimental tourism satellite account for the United Kingdom (E–UKTSA)
- A proposed methodology for nowcasting the demand and supply estimates of tourism activities
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- Quality adjusted labour input: new estimates for 1993 to 2008
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- Regional economic indicators: A focus on sub–regional GVA using shift–share analysis
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- Googling the present
- Producer prices and services producer prices: implementation of SIC 2007

### January 2011

- Employment characteristics of UK tourism industries in 2008
- Developing financial statistics for policy – Progress report January 2011
- Exploring the geographical distribution of wealth using the output area classification
- Employment and intangible spending in the UK's creative industries – A view from the micro–data

# Future articles

*List is provisional and subject to change*

- Enhancing the coverage of financial sector activity
- The rise of China and its impact on UK trade
- Small and medium enterprises
- Patterns of pay – ASHE 2010 results
- Real national income and economic welfare
- Taxes and benefits and their effects on the distribution of income
- Quality adjusted labour input (QALI)
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- Consumer prices – annual basket update