

Economic & Labour Market Review

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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 which provides evidence for policy and decision-making and in the allocation of resources.

The Director of ONS is also the National Statistician.

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Contacts

This publication

For information about this publication, contact the Editor, David Harper, tel: 020 7014 2036, email: elmr@ons.gsi.gov.uk

Other customer and media enquiries

ONS Customer Contact Centre
Tel: 0845 601 3034
International: +44 (0)845 601 3034
Minicom: 01633 812399
Email: info@statistics.gsi.gov.uk
Fax: 01633 652747
Post: Room 1015, Government Buildings,
Cardiff Road, Newport, South Wales NP10 8XG

www.statistics.gov.uk

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In brief

New Code of Practice for Official Statistics

The new *Code of Practice for Official Statistics* was published by the UK Statistics Authority on 6 January 2009. The Authority has statutory responsibility under the *Statistics and Registration Service Act 2007* to prepare and publish this Code after due consultation.

The Code, along with a statement of the procedures that will be followed in assessing statistics against it, was the subject of a 12-week public consultation between July and September 2008. Only those sets of statistics the Authority judges to be produced in compliance with the Code will be allowed to carry the National Statistics designation in future.

Alongside the Code of Practice and the formal report on the consultation exercise, the Authority is publishing a further report which lists some 340 sets of official statistics not currently designated as National Statistics. The report identifies some of these statistics the Authority believes should be brought within the scope of the Code and assessed against it, with a view to designation as National Statistics. The Authority has a statutory duty to notify government ministers of such cases and will be following them up with the relevant government departments.

The Authority made critical comment before Christmas on a Home Office statement on knife crime statistics issued on 11 December. The Authority's analysis of this case appears in a paper prepared at the time for the Authority Board, and was published on 6 January on the Authority's website. It draws out the respects in which the Home Office statement was inconsistent with the Code of Practice.

The Authority's Head of Assessment, Richard Alldritt, is responsible for assessing whether official statistics are compiled, released, and presented in a way that is consistent with the Authority's Code of Practice for Official Statistics, and whether to designate official statistics that have been assessed against the Code as National Statistics.

More information

Code of Practice
www.statisticsauthority.gov.uk/assessment/code-of-practice/index.html

Reports on the consultation exercise and on the priorities for designation as National Statistics
www.statisticsauthority.gov.uk/reports---correspondence/reports/index.html

Individual responses to the consultation
www.statisticsauthority.gov.uk/reports---correspondence/consultations/closed-consultations/index.html

Monitoring and assessment note statement on knife crime statistics, 11 December 2008
www.statisticsauthority.gov.uk/assessment/monitoring-and-assessment-notes/published-notes.html

Contact

Mark Pont
 ☎ 01633 455642
 ✉ mark.pont@ons.gsi.gov.uk

Labour Market Review 2009

Next month the Office for National Statistics will publish an update to information published in the former *Labour Market Review* publication.

The update will include more recent labour market statistics and reweighted data issued in May 2008, including:

- the labour market and the wider economy – comparing the UK with other areas of the world
- labour demand – hours worked, jobs, vacancies, job separations, skills and productivity
- labour supply – demographic trends, employment, families and work, qualifications, occupations, self-employed, unemployment, inactivity, sickness absence and work/worklessness among households
- labour costs – non-wage costs, earnings, gender pay gap and estimates of jobs paid below the National Minimum Wage

More information

www.statistics.gov.uk/labourmarketreview

Contact

Jamie Jenkins
 ☎ 01633 455840
 ✉ jamie.jenkins@ons.gsi.gov.uk

Public consultation on proposed changes to construction statistics publications

Responsibility for the collection and publication of construction statistics transferred from the Department for Business, Enterprise & Regulatory Reform (BERR) to the Office for National Statistics (ONS) on 1 March 2008.

The main outputs involved are:

- New Orders in the Construction Industry, published monthly
- Output in the Construction Industry, published quarterly
- Construction Statistics Annual

Following the transfer, ONS is examining the construction surveys in order to bring statistical processes and procedures in line with ONS processes and procedures and to make methodological improvements. ONS has also taken the opportunity to examine the statistics published on the construction industry and its use in order to ensure the dataset meets user needs.

A proposal for changes to the outputs of construction surveys has been developed. This proposal was developed using information from previous consultations carried out by BERR and a number of consultations carried out by ONS following the transfer with known users.

Public consultation on the proposed changes to construction statistics publications started on 12 January 2009. The consultation document includes information on how to respond.

This consultation will be held in line with National Statistics protocols and be open for 12 weeks. While known users have been involved in the development of these proposals, ONS is eager for all users to examine the proposed changes and consider their impact. A formal response to consultation will be published on the ONS website describing the changes to be made.

During the most recent user consultations, a number of respondents requested information outside the scope of the current construction data collection. It was found that many of the requests were for information that was already available from other sources, for example,

information on stocks and earnings. As a result, ONS published 'Construction statistics: Sources and outputs' in order to highlight the available information to users

More information

New Orders in the Construction Industry
www.statistics.gov.uk/statbase/product.asp?vlnk=720

Output in the Construction Industry
www.statistics.gov.uk/statbase/product.asp?vlnk=725

Construction Statistics Annual
www.statistics.gov.uk/statbase/product.asp?vlnk=284

Consultation document
www.ons.gov.uk/about/consultations/index.html

Construction statistics: Sources and outputs
www.statistics.gov.uk/cci/article.asp?id=2101

Contact

Catrin Ormerod

☎ 01633 456344

✉ catrin.ormerod@ons.gsi.gov.uk

Eighteenth International Conference of Labour Statisticians

The International Conference of Labour Statisticians is organised by the International Labour Organisation (ILO) Bureau of Statistics and has historically met roughly every five years. Participants include experts from governments, mostly appointed from ministries responsible for labour and national statistical offices, as well as from employers' and workers' organisations.

Recommendations on selected topics of labour statistics are made in the form of resolutions and guidelines for approval

by the governing body of the ILO before becoming part of the set of international standards on labour statistics. These standards usually relate to concepts, definitions, classifications and other methodological procedures which are agreed as representing 'best practice' in the respective areas and which, when used by national producers, will increase the likelihood of having internationally comparable labour statistics as well as comparability across time within a country.

The 18th International Conference of Labour Statisticians took place in Geneva from 24 November to 5 December 2008 and officials from the Office for National Statistics represented the UK on a range of topics relating to labour market statistics. The main items on the agenda at the conference were to discuss and adopt international statistical standards on two topics: child labour statistics and the measurement of working time. Other areas of discussion included the updating of the International Standard Classification of Occupations, measuring and monitoring decent work, indicators of labour underutilisation and measurement of volunteer work. An update of the recent statistical work of the ILO and a proposed future work programme was also presented and discussed. It is likely that the conference will be held at three-yearly intervals in the future and be of shorter duration.

More information

www.ilo.org/global/what_we_do/statistics/events/icls/lang--en/index.htm

Contact

Debra Prestwood

☎ 01633 455882

✉ debra.prestwood@ons.gsi.gov.uk

UPDATES

Updates to statistics on www.statistics.gov.uk

8 December

Producer prices

Factory gate inflation falls to 5.1% in November

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

9 December

Index of production

Manufacturing: 2.0% three-monthly fall to October

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

UK trade

Deficit widened to £3.9 billion in October

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

11 December

Environmental taxes

Taxes up 7.4% in 2007

www.statistics.gov.uk/cci/nugget.asp?id=152

Natural resource and products use

A small rise between 2006 and 2007

www.statistics.gov.uk/cci/nugget.asp?id=158

Oil and gas values

Reserves total £246 billion at end of 2007

www.statistics.gov.uk/cci/nugget.asp?id=149

12 December

Local GVA

Inner London contributes highest GVA

www.statistics.gov.uk/cci/nugget.asp?id=582

Regional GVA

Highest in London and South East in 2007

www.statistics.gov.uk/cci/nugget.asp?id=420

16 December

Inflation

November: CPI down to 4.1%; RPI down to 3.0%

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

17 December

Average earnings

Pay growth steady in the year to October

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

Public sector employment

Employment increase in Q3 2008

www.statistics.gov.uk/cci/nugget.asp?id=407

Unemployment

Unemployment rate rises to 6.0% in three months to October

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

18 December

Public sector

November: £13.0 billion current budget deficit

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

Retail sales

Modest underlying growth in November

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

19 December

Business investment

1.3% down in third quarter of 2008

www.statistics.gov.uk/cci/nugget.asp?id=258

Net investment

Institutional net investment £21.4 billion in Q3 2008

www.statistics.gov.uk/cci/nugget.asp?id=396

23 December

Balance of payments

2008 Q3: UK deficit widens

www.statistics.gov.uk/cci/nugget.asp?id=194

GDP growth

Economy contracts by 0.6% in Q3 2008

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

Index of services

0.2% three-monthly fall into October

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

Productivity

Fall in productivity in Q3 2008

www.statistics.gov.uk/cci/nugget.asp?id=133

FORTHCOMING RELEASES

Future statistical releases on www.statistics.gov.uk

7 January

Consumer credit business – November 2008

MQ5: Investment by insurance companies, pension funds and trusts – Q3 2008

9 January

Producer prices – December 2008

Index of production – November 2008

13 January

MM22: Producer prices – December 2008

UK trade – November 2008

14 January

MM19: Aerospace and electronics cost indices – October 2008

Profitability of UK companies – Q3 2008

15 January

New construction orders – November 2008

16 January

Monthly review of external trade statistics – November 2008

Publication of Phase 3 ASHE 2008 tables

19 January

Business spending on capital items survey – 2007

Digest of engineering turnover and orders – November 2008

MM17: Price Index Numbers for Current Cost Accounting – December 2008

20 January

Civil Service statistics 2008

Consumer price indices – December 2008

21 January

Labour market statistics – January 2009

Public sector finances – December 2008

22 January

Public and private breakdown of labour disputes

23 January

Gross domestic product (GDP) preliminary estimate – Q4 2008

Index of services – November 2008

Retail sales – December 2008

SDM28: Retail sales – December 2008

26 January

Distributive and service trades – November 2008

Focus on consumer prices – December 2008

Public sector finances: supplementary (quarterly) data

28 January

Average weekly earnings – November 2008

30 January

Local area labour market statistical indicators – January 2009

UK business enterprise research and development first release and MA14 Business Monitor

Economic review

January 2009

Graeme Chamberlin

Office for National Statistics

SUMMARY

The UK economy contracted in the third quarter driven by falls in household consumption and fixed investment. Household spending fell but retail sales were surprisingly higher, perhaps being supported by internet retailing and further discounting. Fixed investment, where dwellings fell sharply and business investment continued to slow, appears to be main contributor to the downturn so far. Unemployment continues to rise as redundancies pick up and self-employment contracts. Consumer price inflation remains above the Bank of England target rate but is falling back due to reductions in petrol prices.

GROSS DOMESTIC PRODUCT

Growth contracts in the third quarter

According to the latest estimates the UK economy contracted by 0.6 per cent in the third quarter of 2008. Although many commentators and analysts had been predicting negative growth, following the slowdown in the first half of the year, these official numbers were initially surprising as being a greater contraction than expected.

The third quarter was also a particularly

volatile period in the financial markets. September saw the collapse of the investment bank Lehman Brothers, the bailout of AIG (American Insurance Group) and the nationalisation of Fannie Mae and Freddie Mac which between them guaranteed roughly half of the US mortgage market. In the UK the government nationalised the mortgage book of Bradford and Bingley and in October outlined a £400 billion rescue plan for the banking sector. This ultimately saw the government take a substantial stake in a number of financial institutions including 60 per cent in the Royal Bank of

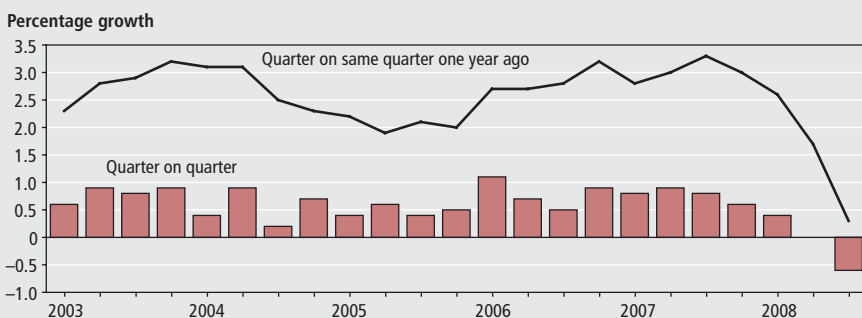
Scotland and 40 per cent in the amalgamated Lloyds-TSB and HBOS bank.

The turmoil in the financial sector further eroded already fragile confidence. At the beginning of September the FTSE 100 share index stood at 5602. Six weeks later it had fallen by a third to a trough of 3861 in mid October. Falling equity markets reflected the increased intensity of the financial crisis and the growing perception of its negative impact on the rest of the economy. Weaker than expected growth figures for 2008 quarter three simply confirmed the view that the UK was heading towards recession.

Since then, a large number of private sector forecasts, along with those published by the Bank of England in its November Inflation Report and the Treasury in its Pre-Budget Report, have been revised to reflect the increasingly gloomy outlook. The consensus view is that the UK economy will be in recession throughout the rest of 2008 and during all of 2009. It is generally accepted that an economy is in a technical recession if it posts two successive quarters of negative growth. Therefore preliminary fourth quarter estimates of Gross Domestic Product (GDP) due to be published at the end of January are likely to attract attention.

The extent of the current UK economic slowdown is shown in **Figure 1**. During 2007 the economy grew by over 3 per cent which is consistent with an average quarterly growth rate of just under 0.8 per cent. However, in the first quarter of 2008 growth had slowed to just 0.4 per cent and in the second quarter output was flat. This brought an end to a sequence of 64 successive quarters of positive growth, the longest peacetime expansion of the UK economy on record. Output is now only 0.3 per cent higher than it was in the same quarter a year ago, the lowest four-quarter growth rate since 1992 when the economy was last in recession. Even during the softer growth patches in late 2001 and early 2005, when both times there was talk of a possible UK recession, the four-quarter growth rate did not fall significantly below 2 per cent. This time the evidence is undoubtedly pointing towards a more substantial downturn.

Figure 1
UK economic growth



Fixed investment and household consumption lead the economic slowdown

The recently published Quarterly National Accounts provides updated information on the main expenditure components of GDP. Analysing these data may provide a useful perspective on the main drivers of the current slowdown.

Figure 2 shows the four-quarter growth rates for the three main parts of domestic demand which are household consumption, fixed investment, and government consumption spending.

Fixed investment is generally the most volatile and procyclical component of demand. Whereas consumption expenditures tend to be smoothed over the business cycle, investment expenditure, because it is often lumpy and irreversible, is more sensitive to credit conditions, sentiment and the economic outlook. By the end of the third quarter of 2008 fixed investment in the UK was 5.3 per cent lower than a year before. During 2006 and 2007 fixed investment had grown strongly, so the latest data indicates a sharp reversal of recent trends.

Household consumption accounts for around half of total spending. Growth has

been negative for the past two quarters, pulling down the four-quarter growth from 3.7 per cent in 2007 quarter three to just 0.7 per cent in 2008 quarter three. Although the slowdown has not been as dramatic as in fixed investment the data clearly show a contraction in household spending.

Growth in general government consumption (which excludes public sector investment) has actually picked up during the last year which might partly reflect the workings of automatic stabilisers. When economic growth slows, with obvious repercussions for unemployment and household income, spending on certain income – and job – related benefits rises as a matter of course. In the third quarter of 2008 general government spending was 3.8 per cent higher than in the same quarter a year earlier.

These trends are evident in **Figure 3** where the quarterly growth rates of GDP are disaggregated by the relative contribution of each expenditure component. Here, the ‘other’ category mainly consists of net-trade, that is the difference between exports and imports, and movements in the holdings of inventories.

Falling investment has been the principal driver in the current slowdown making a negative contribution to total growth in each of the last three quarters. Although

the slowdown in household spending has not been so marked, due to its large share of total spending, it too has pulled down growth in the last two quarters. General government spending, on the other hand, has continued to offset these declines. So the overall picture emerging from the data is that the contraction in GDP is being led by fixed investment and to a lesser extent household consumption.

Net-trade contributes to growth

In the last four months the value of sterling has fallen sharply relative to the US dollar and the euro. For most of 2008 sterling traded close to \$2, but from August onwards it depreciated steadily and ended the year at \$1.44. Depreciation against the euro has been more recent, with sterling's value falling from €1.27 at the end of October to almost parity at €1.02 by the end of December.

Sterling's fall has almost certainly been caused by strong expectations in financial markets of UK interest rate cuts. Consensus forecasts suggest the UK economy, with its large financial services sector and high levels of household debt, may face a relatively deeper recession, hence interest rates are likely to fall quicker and by more than elsewhere. The UK also has a relatively high and persistent trade deficit. In 2008 quarter three the UK current account was in deficit to the tune of £7.7 billion or 2.1 per cent of GDP. Therefore, given the weakness of the UK's external position, a depreciation of sterling has been predicted for some time as a necessary condition of rebalancing the UK economy away from domestic consumption to trade.

But this has also raised hopes that the economy may be supported by an improvement in net-trade. Recovery from the last UK recession in 1992 was significantly helped by a large depreciation in sterling and a cut in interest rates following the withdrawal from the European Exchange Rate Mechanism.

Figure 4 shows the contribution of net-trade to the UK economy over the last five years. The two lines show the weighted contributions of exports and imports to overall growth. Naturally it should be considered that that imports detract from growth so this line should be negative, but is presented in this way to enable an easier comparison with the contribution of exports. The difference between the two represents the overall impact of net-trade on growth. Obviously this could improve

Figure 2
Domestic demand

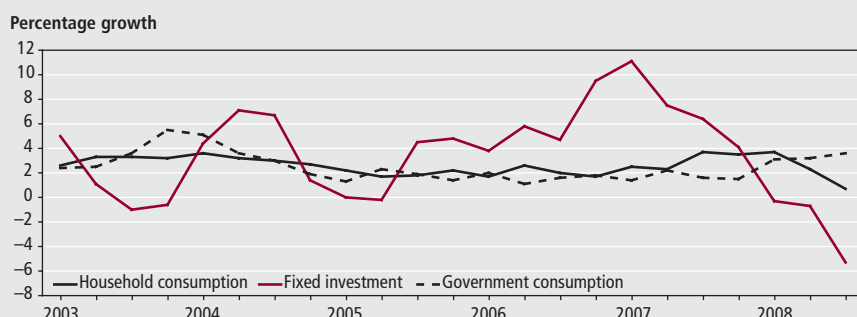


Figure 3
Contributions to quarterly economic growth

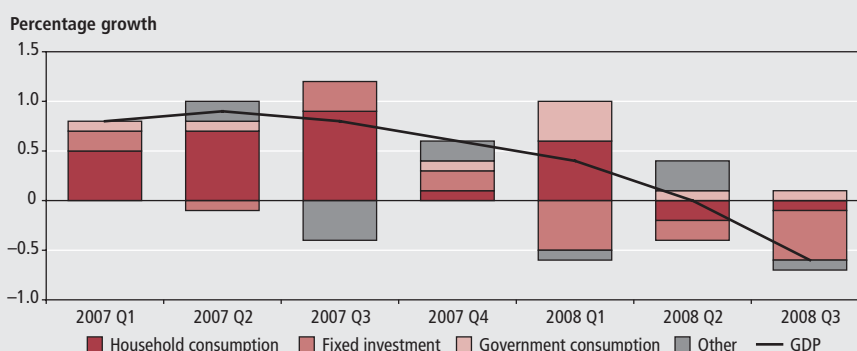


Figure 4
Net trade and its contribution to growth



through either an increase in exports or a fall in imports.

For most of the period shown in Figure 4, growth in weighted imports has exceeded growth in weighted exports implying that the contribution of net-trade to overall economic growth has been negative. However, it is noticeable that in the latest quarter for which the data is available net-trade made a positive contribution to growth. Figure 4 also shows that net-trade made a positive contribution during late 2005 and early 2006 which reflects the relative slowdown in imports as the economy underwent a softer period of growth. Therefore, net-trade may help overall economic growth in 2009 due to the competitiveness effect from a weaker exchange rate and falling imports from a retrenchment in household demand. Offsetting these potential gains though is a possible slowdown in exports due to the weakening global economy. Although net-exports played an important part in the recovery from the early nineties recession growth in the rest of the world at the time was certainly more buoyant.

HOUSEHOLD CONSUMPTION

Spending falls as the housing market weakens

As the largest part of aggregate demand, consumer spending is a key barometer of the overall condition of the economy. Figure 5 shows recent trends in this data and clearly there has been a strong slowdown, especially when compared to the robust growth last year. During the second and third quarters of 2008 household spending fell by 0.3 per cent and 0.2 per cent respectively while over the previous five years it grew by an average of 0.75 per cent each quarter. The last two quarters have had a large impact on the four-quarter growth rate which fell to just 0.7 per cent in 2008 quarter three compared to a rate of over 3.5 per cent at the end of

2007. The current slowdown is expected to be particularly tough on the household sector.

House prices have fallen considerably throughout the last year. According to the indices published by the Nationwide and Halifax, UK house prices respectively fell by 15.9 per cent and 16.2 per cent in 2008. In addition the outlook for 2009 remains downbeat with forecasters predicting a further 5-25 per cent fall. There are a number of ways in which falling house prices can impact on household spending. First, a lower turnover in the housing market would be expected to reduce spending on household goods such as furniture and carpets. Second, falling wealth may erode consumer confidence and lead to an increase in precautionary saving if households were using their accumulated equity as a potential buffer against unforeseen income shocks. Finally, there is less scope for spending to be supported by equity withdrawal or for housing wealth to be used as collateral for consumer loans.

Credit availability has also been tightened considerably as banks and other financial institutions become more cautious about lending in the current environment. This would be expected to have a particularly large impact on big-ticket durable goods such as furnishings, home improvements and motor vehicles. Credit has also become more expensive, with those seeking

mortgages needing to save greater deposits than before in order to benefit from lower rates.

There has also been a general perception that the household sector has over-extended itself in recent years making future retrenchment highly probable if not, in fact, necessary. The UK household saving ratio has averaged just 0.3 per cent in the first three quarters of 2008 compared to a long-term average of close to 8 per cent. Household debt has grown substantially to £1.4 trillion or 130 per cent of household income, although most of this (approximately 80 per cent) is represented by the growth in secured borrowing (mortgages) associated with strong house price inflation over the last decade. As household incomes come under threat from a weakening labour market the pressures on household balance sheets are likely to intensify.

Given the bleak underlying conditions facing the household sector, several commentators have expressed surprise that the slowdown in consumer spending has not been more severe. This particularly relates to retailing where spending tends to be more discretionary and the full impact of the slowdown is most likely to be felt.

Spending on motor vehicles falls sharply but expenditure on audiovisual goods remains robust

A breakdown of consumer spending growth by COICOP (classification of individual consumption according to purpose) groupings is shown in Figure 6.

Net-tourist spending has made a positive contribution to total spending growth. Although it is too soon to suggest this is part of a sustained trend it might reflect recent movements in the sterling exchange rate leading to a substitution towards domestic spending.

Figure 5
Household consumer spending

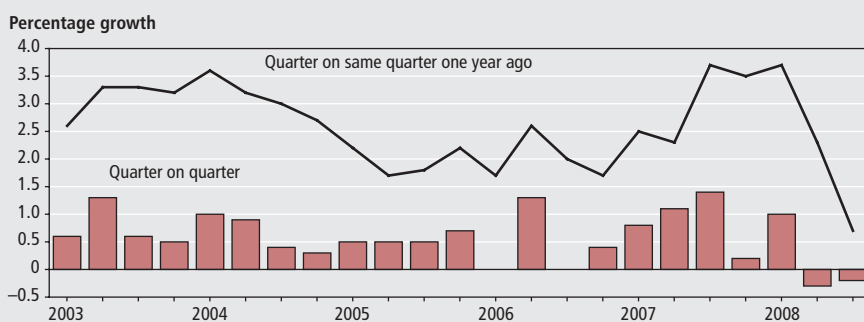


Figure 6
Breakdown of consumer spending growth

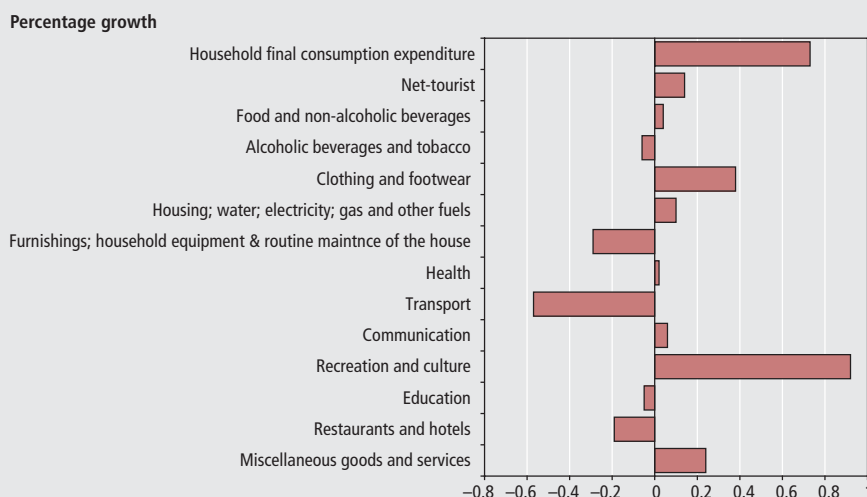
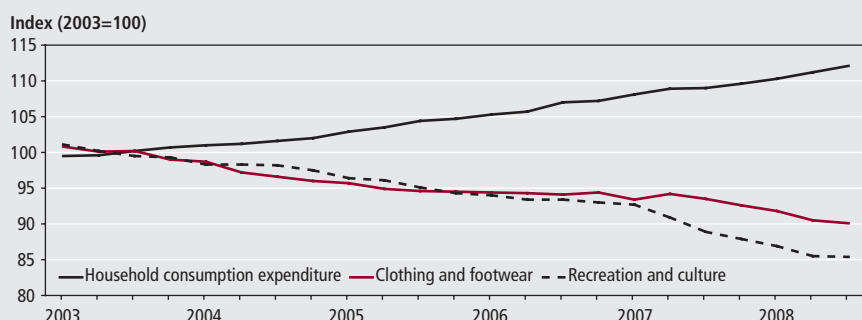


Figure 7
Household consumption deflators



The biggest positive contribution came from the recreation and culture component. Specifically, within this segment, the main driver was spending on audio visual, photographic and information processing equipment which grew by 16 per cent in the year to 2008 quarter three. Another significant positive contribution came from spending on clothing and footwear; in particular, clothing garments where the four-quarter growth rate was 6.6 per cent.

On the downside, the largest single contributor was the transport category where expenditure on motor vehicles during 2008 quarter three was over 8 per cent lower than the same quarter in 2007. A similar story is presented in statistics published by the Society of Motor Manufacturers and Traders (SMMT). They reported the number of new cars sold in the UK slumped by 11.3 per cent in 2008 representing a 12-year low. This collapse in spending is certainly consistent with the underlying weakness in household finances and restrictions in credit availability.

Spending on furnishing and household equipment also contracted strongly. This was mainly concentrated in furniture and

carpets, where consumption fell by over 10 per cent in the last year. Finally, household spending in hotels and restaurants has fallen sharply in the last two quarters.

Without the positive contributions from clothing, audiovisual, photographic and information processing components, the contraction in household consumption would have been far more substantial. It is worth noting that these two parts of household spending have grown robustly for many years and these trends may have been supported by falling prices. **Figure 7**

plots the overall household consumption deflator and those relating to the clothing and footwear and recreation and culture groups. Whereas the overall household consumption deflator has on average risen by 2.1 per cent each year since 2003, the prices of clothing and footwear have fallen each year by an average of 1.8 per cent and recreation and culture by an average 2.8 per cent each year.

RETAIL SALES

Surprise growth in the three months to November

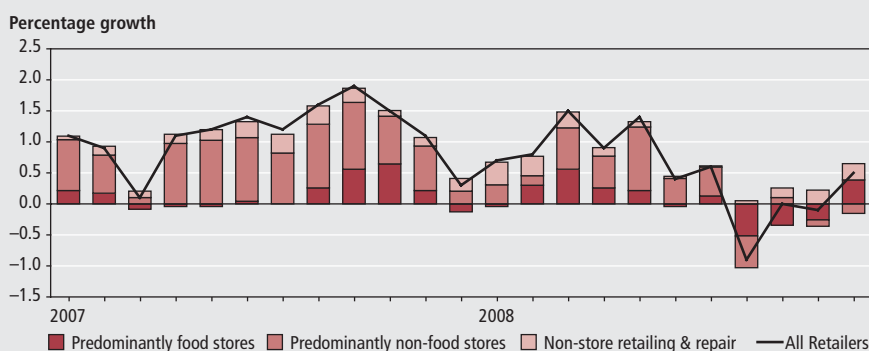
Although only a third of consumer spending is on goods from businesses classified as retailers, the monthly estimate of retail sales is regarded as an early indicator on consumer spending. Monthly changes in retail sales can be volatile so it is important not to read too much into these very short-run movements in the data. Instead, the rolling three-month on three-month growth rates may give a clearer interpretation of the actual trends.

Figure 8 presents this data for total retail sales and its main components.

In the three months to November 2008, retail sales grew by 0.5 per cent compared to the previous three month period (that is the three months to August 2008). From January 2007 until May 2008 retail sales grew on average by 1.1 per cent every three months so the latest data represents a significant downturn. Department stores were reported to have performed particularly badly, where the seasonally adjusted sales volume fell to its lowest level since records began in 1986.

Despite this, the official data have generally surprised by being on the upside. And the continued robustness has attracted criticism for insufficiently reflecting the reported gloom on the high street following the high profile collapses of Woolworths,

Figure 8
Retail sales



Zavvi, MFI and Adams, and announced store closures at Marks and Spencer.

Alternative figures on the health of the UK retail sector are published by the British Retail Consortium (BRC) and the Confederation of British Industry (CBI) and both have indicated a much sharper slowdown in activity. These findings have been supported by a number of commentators and analysts based on the tough conditions facing households alongside a forecast of severe recession in the UK economy. However, a number of arguments can be made in defence of the official data.

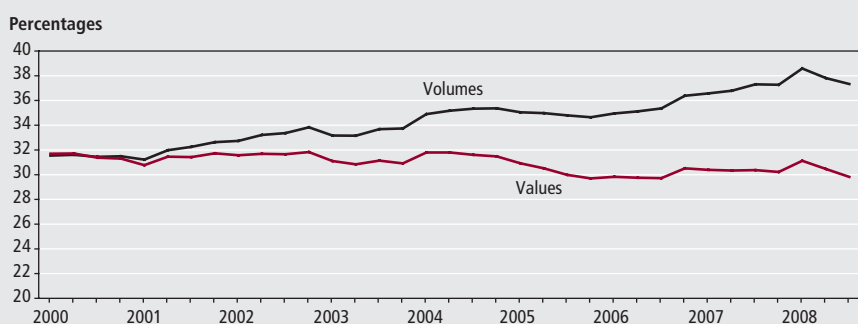
Most of the retail growth in the latest three months has been generated by the predominately food sector. This has occurred at a time when there has been a strong contraction in consumer spending in hotels and restaurants. So it could be the case that retail sales are being supported by a substitution away from other parts of consumer spending, and this is also consistent with households behaving more frugally.

Internet retailers report strong sales

Figure 8 also shows the non-store retailing and repair segment has consistently made a positive contribution to overall sales and its performance has been robust during the economic slowdown. Despite only accounting for a small part of the total it includes mail-order and internet retailers where sales have been exceptionally strong.

The Office for National Statistics (ONS) has recently published for the first time a separate estimate of the value of internet retail sales. Although the new experimental data show that internet sales represent 3.8 per cent of overall retail sales in Great Britain, between November 2007 and November 2008 they had surged by 12.8

Figure 10
Retail sales as a proportion of gross household disposable income



per cent in value terms. IMRG, the industry body for e-retailing, concurred with ONS by reporting a year on year increase of 16 per cent in November. The performance of online retailing appears to stand in stark contrast to recent activity on the high street. Over the Christmas period record internet sales were reported by Ocado, John Lewis and Debenhams whilst Next had to introduce a virtual queue system to manage online demand.

Non-food retail prices continue to fall

It has previously been suggested that growth in certain segments of consumer demand has been maintained by continuously falling prices. A similar story could hold true for retailing. The retail sales implied deflator is presented in Figure 9. Here it can be seen that the prices of non-food items have generally fallen in recent years whereas food price inflation is normally positive, especially during the second half of 2008. However, overall inflation in retail goods has been far below the growth in general price indices such as the Retail Prices Index (RPI). Therefore retail sales growth, particularly in the non-food sector, could have been and is continuing to be supported by falling prices.

Very different views of recent trends in

retail sales emerge depending on whether you are looking in terms of volume or value. These data, expressed as a proportion of gross household disposable income, are plotted in Figure 10.

In volume terms (both retail sales and gross disposable income in constant 2000 prices) retail sales as a proportion of disposable income rose steadily from 31.5 per cent in 2000 quarter one to 38.5 per cent in 2008 quarter one before falling back slightly in the last two quarters. This implies that the retail sector has enjoyed a long boom and, now that households face greater budgetary pressures, spending is likely to be cut back, perhaps sharply.

A different picture altogether arises when this ratio is expressed in value terms (retail sales and gross disposable income in current prices). As a proportion of gross household disposable income the value of retail sales was 31.5 per cent in 2000. Eight years later this ratio was pretty much unchanged at just over 31 per cent, before falling back slightly in the two most recent quarters. As the retail sales implied deflator has consistently grown at a slower rate than household disposable incomes it has enabled volumes to increase while retail spending maintained a fairly constant share of the household budget. Under these circumstances households may not view their past retail activity as particularly proliferate which might reduce the extent to which they cut back on current and future spending.

Of course it is not certain, and most unlikely, that retailers can keep discounting prices forever. But the parts of the retail sector that have tended to do well in recent times are those that have competed strongly on price. These include Tesco and ASDA which have also expanded away from their traditional grocery trade, low cost food stores such as Aldi and Lidl, and discount stores like Poundland which has announced it is to open 35 new stores.

At present the UK economy is yet to post

Figure 9
Retail sales implied deflator



two successive quarters of negative growth so, according to the technical definition, has not yet entered recession and may only be at the start of a protracted downturn. The view from the data points to a significant fall in consumer spending growth but the main driver thus far has been fixed investment. This is not inconsistent with the typical dynamics of an economic cycle. Investment is often regarded as a leading indicator and the component of aggregate demand that might be expected to move first. Although official estimates of retail sales are relatively robust vis-à-vis external data and independent forecasts it does not rule out a more severe contraction in the coming months.

FIXED INVESTMENT

Sharp falls in dwellings and business investment slows

In the third quarter of 2008 fixed investment expenditure contracted by 2.8 per cent. Quarter-on-quarter growth rates for this data can be particularly volatile so often a clearer picture emerges by looking at a four-quarter growth rate. This shows a more marked slowdown (Figure 11). Relative to the same quarter last year, UK fixed investment fell by 5.3 per cent in 2008 quarter three. This segment of spending also seems to be the principle factor in accounting for the overall slowdown in the UK economy.

A decomposition of the fixed investment figures by sector is also shown in Figure 11. Here general government investment has actually remained robust and increased its contribution towards growth. In 2008 quarter three it was over 19 per cent higher than in the same quarter in 2007, further evidence that the public sector is supporting growth. It is the other two components that explain the sharp fall. Business investment growth has only just moved into negative territory, contracting by 0.1 per cent on a four-quarter basis in 2008 quarter three. However, it has slowed down considerably from the high rates recorded in late 2006 and the majority of 2007 when four-quarter growth rates averaged in excess of 11 per cent. The sharp reversal in business investment appears to reflect growing uncertainty and pessimism over future demand.

The largest contribution to the fixed investment slowdown though is in the existing buildings and new dwellings sector. Although this started to slowdown in late 2007, the pace has accelerated of late. In

the third quarter of 2008 the four-quarter growth rate slumped to -25.5 per cent. Most of this contraction has been concentrated in the second and third quarters of 2008 where the respective quarter on quarter growth rates were -8.1 per cent and -9.5 per cent.

The same story emerges from the asset-breakdown of fixed investment in Figure 12. In line with the business investment, story capital spending on plant and machinery has slowed and once again investment in dwellings and new buildings account for the largest part of the contraction.

So a disaggregated view allows a refinement of the investment-led slowdown in the UK economy. Falling business investment has made a significant contribution, but it is fixed investment in dwellings and new buildings that is the largest culprit. This is consistent with many other aspects of the economy and particularly the collapse in property markets.

Demand for new dwellings and commercial property reflects the increasing anxiety of households and businesses regarding their future circumstances. Falling property prices have also been a discouraging factor, particularly because there is little certainty over how far prices might yet fall.

The sharp reduction in credit availability has served as a double whammy. In November, figures released by the British Bankers Association (BBA) showed the number of mortgage approvals for house purchases was 60 per cent lower than in the previous year. Furthermore, mortgage lenders are continuing to demand larger deposits as they ration home loans to their customers. The number of deals available for customers with deposits of 10 per cent or lower is at an all-time low. Only 21 mortgage products are now available for those with a deposit of 5 per cent or less compared to more than 1,200 in February 2008. At the other end of the scale, the number of deals that require a minimum deposit of 40 per cent has increased from 24 to 341 during this time, and this segment of the market now represents 25 per cent of all available mortgages.

The second part of the double whammy has been the impact of the credit crunch on the funding position of house builders who have found it harder and more expensive to rollover and finance debts. At the same time their balance sheets have been hurt by write-downs on property and land assets and falling sales. During the summer, after disappointing first half profits, almost all the major home builders including

Figure 11
Fixed investment by sector

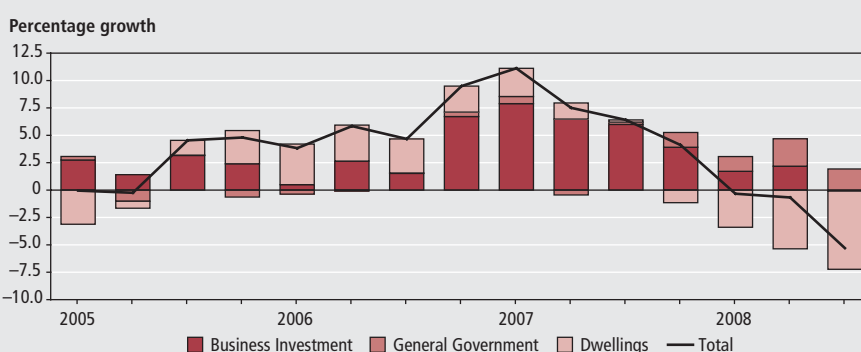
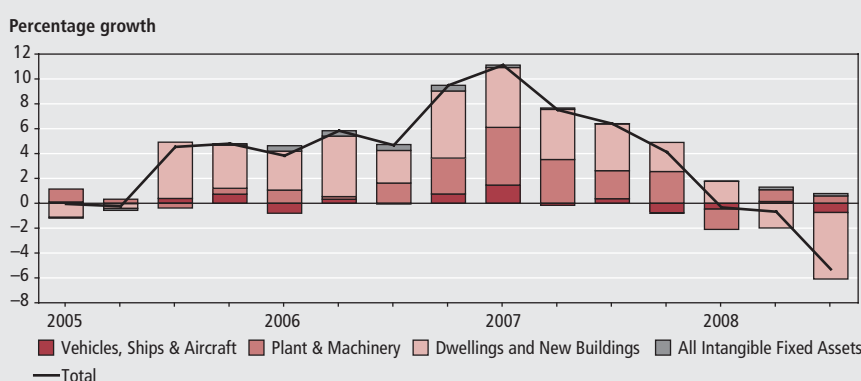


Figure 12
Fixed investment by asset



Bovis Homes, Taylor Woodrow, Barratt Developments, Persimmon and Taylor Wimpey announced major job cuts and office closures. Many have also suspended new developments while they have existing stocks of unsold properties.

THE LABOUR MARKET

Unemployment continues its upward path

Because firms typically face costs in adjusting the size of their workforce, the labour market tends to lag behind movements in output. Now that the labour market appears to be deteriorating in line with GDP and fixed investment, it is a clear indication firms are pessimistic about their economic outlook and a protracted downturn is expected. Unemployment, according to the Labour Force Survey (LFS), was recorded at just over 1.8 million in September. This represents an increase of 250,000 over the course of the year so far, resulting in a rise in the unemployment rate from 5.3 per cent to 6.1 per cent (Figure 13).

So far the economic slowdown has had little impact on inactivity rates. Often a depressed labour market might be expected to lead to growing inactivity as unemployed workers lose motivation and leave the jobs market. But, as also shown in Figure 13, inactivity rates have been fairly constant over the last two years.

Similar results are reported in the claimant count measure. As of November 2008 the number unemployed was 1,071,900 constituting a rate of 3.3 per cent. Since the start of the year the numbers have increased by 200,000 (from 2.5 per cent) passing the one million mark for the first time since January 2001.

Data on the flows in and out of the claimant count unemployment total are also available. These are useful as they give an indication of from where movements in unemployment are occurring. For example, an increase in the inflow numbers would suggest redundancies. Alternatively, a reduction in the outflow would imply lower job creation. Figure 14 suggests it is the first of these two. Whereas outflow numbers have remained fairly constant, inflow numbers have risen sharply from June onwards.

Similar conclusions can be drawn by looking at data on the redundancy rate and vacancy ratio. The redundancy rate is the ratio of the level of total redundancies to the number of employees in the previous quarter multiplied by 1000. The vacancy ratio is simply the number of vacancies per

100 employees in employment. Both these series are presented in Figure 15. While the vacancy ratio has remained fairly constant the redundancy rate has increased markedly between May and September of this year.

Self-employment contracts in the third quarter

The Workforce Jobs Survey (WFS) breaks down total UK employment into four main categories: employees, self-employment, government supported trainees and HM forces. The last two components are fairly small, so in Figure 16 where total quarterly employment growth is broken down by component, these two categories have been combined into 'other'.

Two main conclusions can be drawn from Figure 16. First, in 2008 quarter three total employment growth according to this survey was negative. This is the first time that employment has contracted since the first half of 1993. Second, the slowdown in employee growth has been important but, despite representing a relatively small part of the total workforce, self-employment numbers have had a fairly large impact on the overall growth rates of employment. In fact they account for a greater proportion of the latest contraction than employees. Self-employment growth tends to be very pro-cyclical.

In recent years the self-employed have made a significant contribution to total employment growth, even though over the sample period in Figure 16 they have on average represented only 13 per cent of all jobs. It is recognised that one of the key factors promoting self-employment is access to finance. The strong property market that has persisted in the UK over the last ten years has removed credit constraints by providing either increased collateral for loans or equity for extraction. As credit conditions tighten and house prices fall self-employment growth is likely to reverse. Furthermore, as these are generally small firms they are less likely to have the necessary cash reserves to survive a downturn in demand, especially if it is prolonged. It is worth noting that when the economy last went through a soft patch and saw moderation in house price growth during late 2004 and early 2005 self-employment growth was negative.

CONSUMER PRICES

Inflation still above target but beginning to fall

The latest data on the Consumer Price Index (CPI) reports a 12-month inflation rate of 4.1 per cent in November. Although this is still considerably above the 2 per cent rate targeted by the Bank of England the

Figure 13
LFS unemployment and inactivity rates

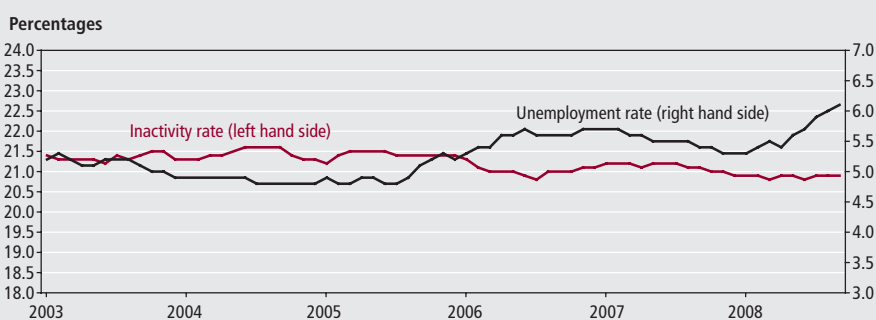


Figure 14
Claimant count unemployment

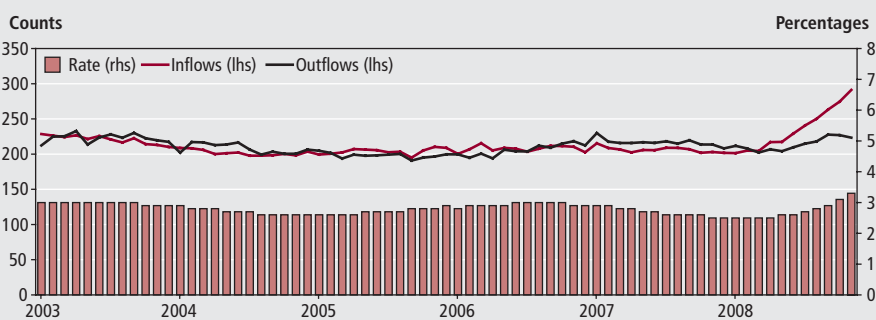


Figure 15
Vacancy ratio and redundancy rate

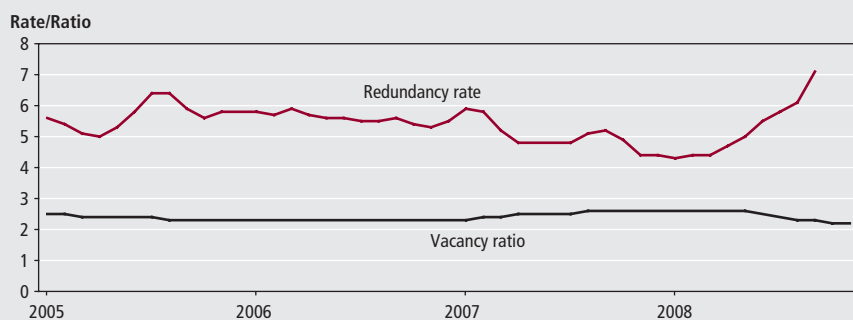


Figure 16
WFJ employment growth



inflation rate now appears to be on a downward trajectory having peaked at 5.2 per cent in September.

Figure 17 plots a break-down of the headline CPI. Three components have been of particular interest lately. Recent increases in food prices have been well-documented, with the food and non-alcoholic beverages component contributing 1.2 per cent of total inflation. The housing and household services components now contribute 1.7 per cent to CPI inflation, predominately from energy prices. Transport price inflation has been heavily affected by petrol prices, but the falling oil price now sees this part contribute just 0.2 per cent to the latest figures. This compares to around a 1.2 per cent contribution during the summer months.

The remaining items included in the CPI: alcohol, tobacco, clothing and footwear, furnishing and household goods, education, communication (post and telecoms), health, recreation and culture, hotels and restaurants and other miscellaneous goods and services made a combined 1.1 per cent contribution to the overall inflation rate. This is clear evidence that the UK inflation rate has, in recent months, been driven by cost pressures arising from the volatility in food and energy prices. However, as global growth slows these price increases are rapidly reversing. Oil prices, which peaked

at \$145 per barrel in July had fallen by over 60 per cent to around \$40 per barrel by the end of December. So the general outlook is for inflation to fall back sharply and below the Bank of England target rate in 2009.

Further downward pressure on UK inflation is expected to come from policy announcements in the November Pre-Budget Report. The standard rate of Value-Added Tax (VAT) has been temporarily cut from 17.5 per cent to 15 per cent, but excise duty on road fuel, alcohol and tobacco would be raised to maintain the indirect tax-take on these items. The ONS estimates that the combined effect of these policy changes would be to lower the 12-month CPI rate by 1.3 per cent and the RPI by 0.9 per cent starting from December 2008.

CPI inflation remains above RPI inflation

Another interesting story in the inflation data has been the correspondence between the CPI and the RPI. For the last three months RPI inflation (3 per cent in the year to November) has been below the CPI rate. **Figure 18** presents a breakdown of the differences.

The formula effect normally imparts a positive wedge between the RPI and CPI inflation rates. The RPI is calculated as an arithmetic mean whereas the CPI is calculated as a geometric mean. Simple mathematics shows that, for the same data, an arithmetic mean will never be less than a geometric mean. This explains why the Bank of England inflation target was reduced from 2.5 per cent to 2 per cent when the price index being targeted changed from the RPI to the CPI in 2003. The coverage and weights effect refers to differences in the representative baskets of goods and service used to compile the two indices and the difference in weights attached to the same item. On the whole this effect has been fairly small. The coverage effect tends to raise the CPI relative to the RPI, but is then largely offset by the weight effect.

The majority of the difference between CPI and RPI inflation rates is due to housing components that are excluded from the CPI. These include housing depreciation costs, which are modelled as a function of house prices, and mortgage interest payments. The combined effect of falling house prices and falling interest rates will have a profound impact on the RPI but not on the CPI. The total housing effect in November lowered the RPI by 1.4 per cent relative to the CPI.

Figure 17
Consumer Price Index

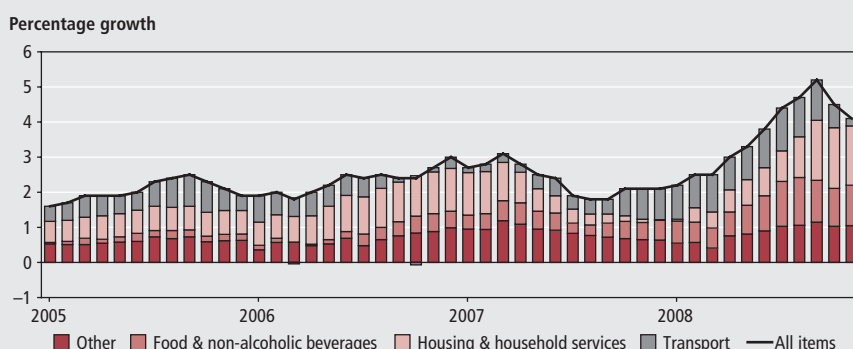
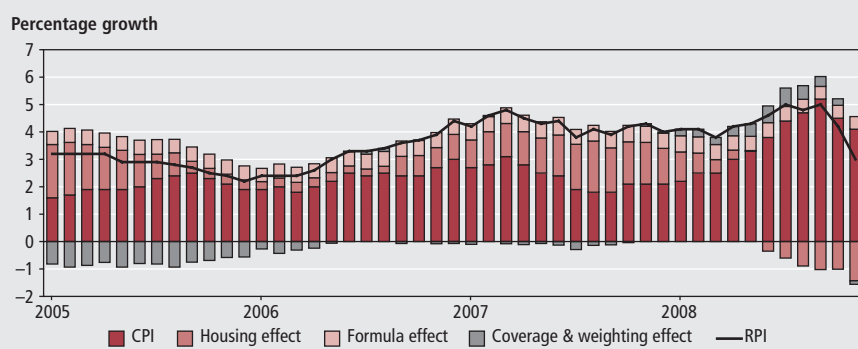


Figure 18
Correspondence between CPI and RPI inflation



Independent forecasts

December 2008

UK forecasts

The tables below supplement the Economic Review by providing a forward-looking view of the UK economy. The tables show the average and range of independent forecasts for 2008 and 2009 and are extracted from HM Treasury's Forecasts for the UK Economy.

2008

	Average	Lowest	Highest
GDP growth (per cent)	0.8	0.6	1.0
Inflation rate (Q4, per cent)			
CPI	4.0	3.2	4.9
RPI	3.3	2.6	5.5
Claimant count (Q4, million)	1.05	0.95	1.14
Current account (£ billion)	-38.9	-55.0	-23.5
Public Sector Net Borrowing (2007-08, £ billion)	73.7	54.9	90.0

2009

	Average	Lowest	Highest
GDP growth (per cent)	-1.5	-2.6	-0.1
Inflation rate (Q4, per cent)			
CPI	0.8	-1.1	2.3
RPI	-0.8	-3.2	1.7
Claimant count (Q4, million)	1.60	1.11	1.90
Current account (£ billion)	-37.4	-102.3	-3.0
Public Sector Net Borrowing (2009-10, £ billion)	112.8	59.8	130.0

Notes

Forecast for the UK economy gives more detailed forecasts, and is published monthly by HM Treasury. It is available on the Treasury's website at: www.hm-treasury.gov.uk/economic_data_and_tools/data_index.cfm

Selected world forecasts

The tables below supplement the Economic Review by providing a forward-looking view of the world economy. The tables show forecasts for a range of economic indicators taken from *Economic Outlook* (June 2008), published by OECD (Organisation for Economic Co-operation and Development).

2008

	US	Japan	Euro area	Total OECD
Real GDP growth (per cent)	1.4	0.5	1.0	1.4
Consumer price (percentage change from previous year)	3.6	1.4	3.4	3.3
Unemployment rate (per cent of the labour force)	5.7	4.1	7.4	5.9
Current account (as a percentage of GDP)	-4.9	3.8	-0.4	-1.5
Fiscal balance (as a percentage of GDP)	-5.3	-1.4	-1.4	-2.5

2009

	US	Japan	Euro area	Total OECD
Real GDP growth (per cent)	-0.9	-0.1	-0.6	-0.4
Consumer price (percentage change from previous year)	1.2	0.3	1.4	1.7
Unemployment rate (per cent of the labour force)	7.3	4.4	8.6	6.9
Current account (as a percentage of GDP)	-3.9	4.3	-0.1	-1.1
Fiscal balance (as a percentage of GDP)	-6.7	-3.3	-2.2	-3.8

Notes

The OECD *Economic Outlook* is published bi-annually. Further information about this publication can be found at www.oecd.org/eco/Economic_Outlook

Key indicators

The data in this table support the Economic review by providing some of the latest estimates of Key indicators.

Seasonally adjusted unless otherwise stated									
	Source CDID	2006	2007	2008 Q1	2008 Q2	2008 Q3	2008 Sep	2008 Oct	2008 Nov
GDP growth – chained volume measures (CVM)									
Gross domestic product at market prices	ABMI	2.8	3.0	0.4	0.0	–0.6	..	..	..
Output growth – chained volume measures (CVM)									
Gross value added (GVA) at basic prices	ABMM	2.9	3.0	0.4	0.0	–0.6	..	..	..
Industrial production	CKYW	0.7	0.4	–0.5	–0.9	–1.5	–0.3	–1.6	..
Manufacturing	CKYY	1.8	0.6	0.1	–1.0	–1.5	–1.0	–1.3	..
Construction	GDQB	1.0	2.8	1.0	–0.5	–0.2	..	..	..
Services	GDQS	3.7	3.6	0.6	0.3	–0.5	..	..	..
Oil and gas extraction	CKZO	–8.9	–2.4	–3.4	0.0	–0.7	9.1	–7.4	..
Electricity, gas and water supply	CKYZ	–0.6	1.1	–2.0	–0.4	–0.6	–1.2	1.2	..
Business services and finance	GDQN	5.9	5.6	0.8	0.5	–0.6	..	..	..
Household demand									
Retail sales volume growth	EAPS	3.2	4.3	1.5	0.4	0.0	–0.6	–0.2	0.3
Household final consumption expenditure growth (CVM)	ABJR	2.0	3.0	1.0	–0.3	–0.2	..	..	..
GB new registrations of cars (thousands) ¹	BCGT	2,340	2,390	675	557	542	329	128	101
Labour market^{2,3}									
Employment: 16 and over (thousands)	MGRZ	29,030	29,222	29,499	29,505	29,407	29,377	..	..
Employment rate: working age (%)	MGSU	74.6	74.6	74.8	74.7	74.4	74.2	..	..
Workforce jobs (thousands)	DYDC	31,257	31,471	31,643	31,661	31,527	..	..	..
Total actual weekly hours of work: all workers (millions)	YBUS	928.5	936.6	948.1	939.9	940.9	937.9	..	..
Unemployment: 16 and over (thousands)	MGSC	1,669	1,653	1,624	1,685	1,825	1,864	..	..
Unemployment rate: 16 and over (%)	MGSX	5.4	5.3	5.2	5.4	5.8	6.0	..	..
Claimant count (thousands)	BCJD	944.7	863.3	796.5	826.5	908.3	944.4	996.2	1,071.9
Economically active: 16 and over (thousands)	MGSF	30,698	30,875	31,123	31,190	31,232	31,241	..	..
Economic activity rate: working age (%)	MGSO	78.9	78.9	79.1	79.1	79.1	79.1	..	..
Economically inactive: working age (thousands)	YBSN	7,859	7,940	7,871	7,872	7,887	7,899	..	..
Economic inactivity rate: working age (%)	YBTL	21.0	21.1	20.9	20.9	20.9	20.9	..	..
Vacancies (thousands)	AP2Y	597	658	687	649	602	602	585	562
Redundancies (thousands)	BEAO	138	127	111	127	156	180	..	..
Productivity and earnings annual growth									
GB average earnings (including bonuses) ³	LNNC	..	..	4.0	3.5	3.3	3.3	3.3	..
GB average earnings (excluding bonuses) ³	JQDY	..	..	3.8	3.7	3.6	3.6	3.6	..
Whole economy productivity (output per worker)	A4YN	..	..	1.0	0.7	–0.2	..	..	..
Manufacturing productivity (output per job)	LOUV	..	..	..	..	..	0.5	–0.1	..
Unit wage costs: whole economy	LOJE	..	..	1.5	2.2	3.0	..	..	..
Unit wage costs: manufacturing	LOJF	..	..	..	..	..	2.4	3.1	..
Business demand									
Business investment growth (CVM)	NPEL	–7.2	9.9	–2.2	1.2	–1.3	..	..	..
Government demand									
Government final consumption expenditure growth	NMRY	1.6	1.7	2.0	0.7	0.6	..	..	..
Prices (12-monthly percentage change – except oil prices)¹									
Consumer prices index	D7G7	2.3	2.3	2.4	3.4	4.8	5.2	4.5	4.1
Retail prices index	CZBH	3.2	4.3	4.0	4.4	5.0	5.0	4.2	3.0
Retail prices index (excluding mortgage interest payments)	CDKQ	2.9	3.2	3.5	4.4	5.3	5.5	4.7	3.9
Producer output prices (excluding FBTP) ^{4,5}	PLLV	1.8	1.9	2.9	5.2	5.9	5.6	5.0	5.1
Producer input prices ⁵	RNNK	9.5	3.0	20.7	29.9	28.2	24.0	15.4	7.5
Oil price: sterling (£ per barrel)	ETXR	35.93	36.11	48.72	62.35	61.64	56.15	43.45	34.50
Oil price: dollars (\$ per barrel)	ETXQ	66.11	72.44	96.47	122.87	116.89	100.92	73.68	54.75

Seasonally adjusted unless otherwise stated									
	Source CDID	2006	2007	2008 Q1	2008 Q2	2008 Q3	2008 Sep	2008 Oct	2008 Nov
Financial markets¹									
Sterling ERI (January 2005=100)	BK67	101.2	103.5	95.6	92.9	91.6	89.9	89.3	83.4
Average exchange rate /US\$	AUSS	1.8429	2.0018	1.9789	1.9705	1.8918	1.7986	1.6900	1.5338
Average exchange rate /Euro	THAP	1.4670	1.4619	1.3212	1.2615	1.2586	1.2531	1.2718	1.2041
3-month inter-bank rate	HSAJ	5.26	5.95	5.95	5.88	6.15	6.15	5.85	3.85
Selected retail banks: base rate	ZCMG						5.00	3.00	3.00
3-month interest rate on US Treasury bills	LUST	4.89	3.29	1.36	1.87	0.90	0.90	0.44	0.01
Trade and the balance of payments									
UK balance on trade in goods (£m)	BOKI	-76,312	-89,253	-23,270	-23,379	-23,578	-7,359	-7,750	..
Exports of services (£m)	IKBB	132,749	149,355	40,471	41,025	40,923	13,383	13,454	..
Non-EU balance on trade in goods (£m)	LGDT	-44,921	-47,788	-12,380	-13,260	-14,580	-4,580	-4,359	..
Non-EU exports of goods (excl oil & erratics) ⁶	SHDJ	118.0	116.5	125.7	127.5	128.9	125.8	124.4	..
Non-EU imports of goods (excl oil & erratics) ⁶	SHED	124.4	131.6	133.1	132.2	135.5	131.1	129.1	..
Non-EU import and price index (excl oil) ⁶	LKWQ	103.9	104.2	109.9	113.3	115.8	118.1	120.7	..
Non-EU export and price index (excl oil) ⁶	LKVX	101.5	102.5	106.4	108.1	109.8	111.3	113.3	..
Monetary conditions/government finances									
Narrow money: notes and coin (year on year percentage growth) ⁷	VQUU	5.1	5.8	6.7	5.7	5.1	5.1	5.9	6.8
M4 (year on year percentage growth)	VQJW	13.0	12.7	11.7	11.4	12.2	12.2	15.3	16.4
Public sector net borrowing (£m)	-ANNX	30,494	34,574	-990	22,357	14,429	8,463	3,284	15,997
Net lending to consumers (£m)	RLMH	13,276	13,206	4,147	3,190	2,201	330	754	751

External indicators – non-ONS statistics

		2008 May	2008 Jun	2008 Jul	2008 Aug	2008 Sep	2008 Oct	2008 Nov	2008 Dec
Activity and expectations									
CBI output expectations balance ¹	ETCU	0	2	-7	-13	-16	-31	-42	-42
CBI optimism balance ¹	ETBV			-40			-60		
CBI price expectations balance	ETDQ	29	29	39	30	25	13	3	5

Notes:

Source: Office for National Statistics

- 1 Not seasonally adjusted.
- 2 Annual data are the average of the four quarters except for workforce jobs (June).
- 3 Monthly data for vacancies and average earnings are averages of the three months ending in the month shown. Monthly data for all other series except claimant count are averages of the three months centred on the month shown.
- 4 FBTP: food, beverages, tobacco and petroleum.
- 5 Now derived from not seasonally adjusted series.
- 6 Volumes, 2003 = 100.
- 7 Replacement for series M0 which has ceased publication.

Further explanatory notes appear at the end of the Key times series section.

FEATURE

Karen Dunnell
Office for National Statistics

National Statistician's article: measuring regional economic performance

SUMMARY

Improving the understanding of regional economic performance has become increasingly important in the UK. Gross Value Added (GVA) per head is one of the headline indicators used in UK regional policy. This article aims to inform the discussion about the limitations of GVA per head in measuring the productivity of a region and the income of its residents. It proposes a series of indicators which can help to measure regional productivity and income more robustly and inform regional policy more widely.

Improving the understanding of regional economic performance has become increasingly important in the UK. In *Meeting the economic challenges in every region* (HMT 2008), the Government says that it

is committed to narrowing the gap between the highest and lowest performing regional economies. The Government's understanding of regional economic performance is enriched by an appreciation of the underlying drivers of regional growth and the spatial levels at which they operate.

Indicators on the economic performance of regions and areas within regions are necessary for effective regional policymaking.

Gross Value Added (GVA) per head is one of the headline indicators used in UK regional policy. More specifically, it is used for measuring progress of the Government's Regional Economic Performance Public Service Agreement (REP PSA), which aims to improve the economic performance of all English regions and reduce the gaps in economic growth caused by differences in productivity across regions. This article aims to inform the discussion about the limitations of GVA per head in measuring the productivity of a region and the income of its residents. It proposes a series of indicators which can help to measure regional productivity and income more robustly and inform regional policy more widely.

At an international regional policy level, the European Union (EU) and the Organisation for Economic Co-operation and Development have started discussions on the future direction of regional policies. The need to use better and more wide-ranging indicators has been identified and future regional policy is likely to focus on enabling all regions to realise the full potential of their assets, as well as helping the poorest performing regions to close the gap with the better performing regions.

This article:

- states that GVA is a good measure of the economic output of a region
- proposes that GVA per head, which divides output of those working in a region by everybody living in the region, should not be used as an indicator of either regional productivity or income of residents
- promotes the use of GVA per hour worked and GVA per filled job as productivity measures and Gross Disposable Household Income (GDHI) per head as an indicator of the welfare of residents living in a region
- promotes the use of productivity, income and labour market indicators to give a more complete picture of regional and subregional economic performance
- describes – by using productivity, income and labour market indicators – the key differences in regional economic performance

- discusses the causes of regional disparities by investigating differences in some key drivers of productivity at the regional level

National Statistics and regional policy

National Statistics on the overall UK economy document a period of sustained economic growth, averaging 3 per cent per year, between 1992 Q3 and 2008 Q1. Over the past year, however, following major problems in financial markets and a sharp increase in energy prices, growth has fallen sharply. In 2008 Q2 the UK economy experienced zero Gross Domestic Product (GDP) growth compared with the previous quarter. Estimates for 2008 Q3 indicate negative GDP growth of 0.6 per cent. In terms of the labour market, the UK has seen a steady improvement from 1995 up to early 2008, with the working-age employment rate having increased and the working-age unemployment and economic inactivity rates having declined. Estimates for 2008 Q3 show a slight decline in the employment rate, an increase in the unemployment rate and a further decline in the economic inactivity rate compared with a year earlier.

The developments in the national economy reflect the average economic performance of UK regions. However, at the regional level, there are large divergences from the national picture. Productivity – the driving force behind economic growth – the income of residents of a region and the performance of regional labour markets varies substantially between regions and even more so between subregions.

To address the economic performance of regions, UK regional policy has been

focused on a more devolved approach since 1997. To achieve high and stable rates of economic growth and employment in each region, Public Service Agreements (PSAs) were introduced following the 1998 Comprehensive Spending Review. The REP PSA deals with the economic performance of all English regions. To promote growth in Wales, Scotland and Northern Ireland, the Government works in partnership with the Devolved Administrations. At the international regional policy level, EU Structural Funds, which are aimed at speeding up the economic convergence of less-developed regions within the EU, are allocated at the EU's Nomenclature of Units for Territorial Statistics (NUTS) level 2 (see **Box 1** and **Map 1**). The rest of this article uses 'regions' when referring to NUTS1 regions and 'subregions' when referring to NUTS2 and 3 areas.

Indicators used in regional policy and alternatives

To deliver the goals set out in the REP PSA (see **Box 2**), GVA is an important measure. For the allocation of EU Structural Funds at an international regional policy level, GDP per head is used as a headline measure, which shows the same relative differences between regions as those shown using GVA per head (see **Box 1**). The rest of this article only refers to regional GVA, but the issues apply equally to regional GDP.

Policymakers frequently use GVA per head as a headline indicator of regional productivity and of regional incomes and, therefore, the welfare of people living in a region, when comparing and benchmarking regions that differ in geographical size, economic output and population. However,

productivity and income are very different, as shown in **Table 1**.

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. To measure productivity, however, GVA should be divided by the labour input (jobs or hours worked) used to create it. The difficulty with GVA per head is that it has a workplace-based numerator (GVA) and a residence-based denominator (population).¹ This means that 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
- different labour market structures across regions, such as full- and part-time working arrangements

These factors lead to inconsistencies which make GVA per head unsuitable as a productivity measure. For example, areas with strong inward commuting have high GVA generated by incoming workers, divided by a much lower resident population.

For similar reasons, GVA per head is also a poor measure of income. For example, while GVA per head in a region might be low, residents might commute outside the region to work and therefore derive their incomes from economic activity in another region. They may also have sources of income which are unrelated to current work, such as pensions and investment incomes.

Box 1

Technical box

Regional geographies

For the purposes of European regional statistics, geographical distinctions are made according to the EU's Nomenclature of Units for Territorial Statistics (NUTS), allowing comparison of EU regions. There are three NUTS levels in the UK:

- NUTS level 1: 12 areas – Northern Ireland, Scotland, Wales and the nine Government Office Regions of England. There is a 13th 'region' known as Extra-region which accounts for economic activity that cannot be assigned to any specific region. For the UK this consists mainly of offshore oil and gas extraction and the activities of UK embassies and forces overseas. When talking about NUTS level 1 areas, this article refers to regions
- NUTS level 2: 37 areas within the UK, generally groups of unitary authorities and counties

- NUTS level 3: 133 areas, generally individual counties and groups of unitary authorities or districts, also known as local areas

GVA and GDP

Gross Value Added (GVA) provides a measure of the value added to materials and other inputs in the production of goods and services by resident organisations before allowing for depreciation or capital consumption. It is equal to GDP plus subsidies less taxes on products. To estimate regional GDP, these taxes and subsidies are regionally allocated. On a UK regional level, GVA per head is used when comparing regional economic performance while, on a European level, GDP per head is used to compare EU countries and regions. This does not affect comparison of regions within a country, as relative differences between regions are the same on both bases.

Map 1
NUTS levels 1 and 2



Box 2

Policy box

Regional Economic Performance Public Service Agreement

The Regional Economic Performance Public Service Agreement aims to improve the economic performance of all English regions and reduce the gap in economic growth caused by differences in productivity across regions.

Four headline performance indicators are used to measure progress. Beneath these headline indicators a series of supporting indicators that measure regional performance in terms of the drivers of productivity are being used:

- indicator 1: regional GVA per head trend growth rate
- indicator 2: regional GDP per head levels indexed to EU15 average
- indicator 3: regional employment rate of working-age people
- indicator 4: regional productivity measured by GVA per hour worked indices

EU Structural Funds

The allocation of EU Structural Funds is guided by the economic and social cohesion policy that was introduced in the 1986 Single

European Act and adopted in the EC Treaty in 1992. Its aim is to achieve balanced development throughout the EU, reducing structural disparities between regions and promoting equal opportunities for all by redistributing funds. These funds are primarily allocated at NUTS level 2.

For the 2007 to 2013 budgetary cycle, Structural Funds have three main objectives:

- Convergence objective: speeding up the economic convergence of the less-developed regions. Every region whose GDP per head is below 75 per cent of the EU27 average is eligible. A phasing-out support will be granted to those regions whose GDP per head is above the 75 per cent figure due solely to the statistical effect of EU enlargement
- Regional Competitiveness and Employment objective: giving support to all regions that are not covered by the Convergence objective, and
- European Territorial Co-operation objective: giving support to all regions that lie along internal land borders and certain external land borders, as well as some regions lying on sea borders

Table 1
Productivity and income

Productivity	Income
Productivity describes the ability to produce outputs, taking into consideration the amount of inputs (labour, capital, materials and any other necessary inputs) used to produce them. High productivity means producing as much output as possible using as little input as possible. Productivity is defined as the ratio between output and input, with labour (jobs or hours worked) being the most common input measure.	Income is a key determinant of welfare, which can be described as the general wellbeing and prosperity of the residents living in a region. Unlike productivity, which is a workplace-based measure, welfare can be measured on a residence-basis and is estimated by household income.

To measure regional productivity and income, as the key determinant of welfare in a region, indicators other than GVA per head should be used.

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 each job or the number of jobs, used to create it.

Figure 1 highlights the differences between productivity measures and GVA per head. On the basis of GVA per hour worked and GVA per filled job, regional disparities in productivity are smaller than those estimated by GVA per head.

Regional productivity (GVA per filled job

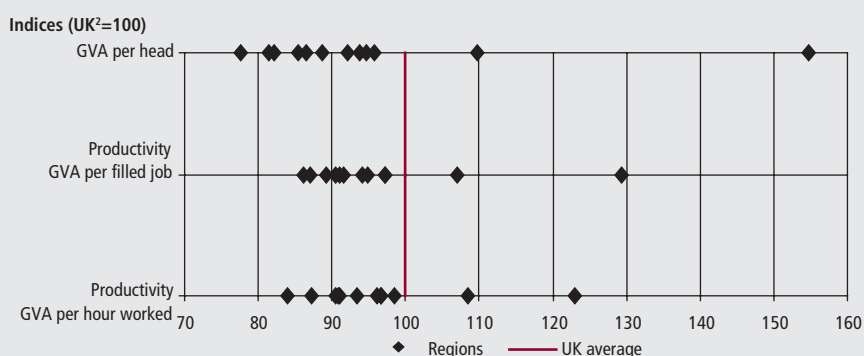
and GVA per hour worked) estimates for 2007 are being published in February 2009 and were not available at the time of writing this article. Therefore, the rest of this article

focuses on 2006 estimates for regions and 2005 estimates for subregions. To ensure consistency, Figure 2 and Figure 3 also make use of previously published 2006 GVA per head estimates.² The data for the latest year or any revisions to earlier years do not affect the conceptual issues discussed in this article.

Income of residents

While productivity is a workplace indicator, income is a residence-based indicator, serving as a key determinant of the welfare of residents living in a region. GDHI represents the amount of money available to

Figure 1
Comparing productivity and GVA per head: by region, 2006¹

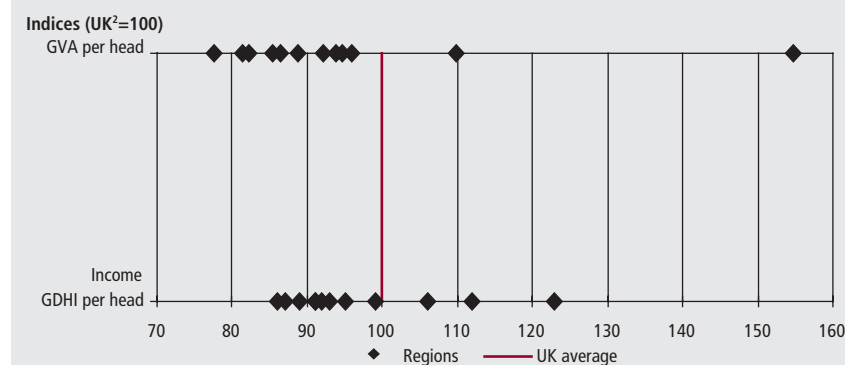


Notes:

- 1 Provisional.
- 2 UK less Extra-regio.

Source: Office for National Statistics

Figure 2
Comparing welfare and GVA per head: by region, 2006¹

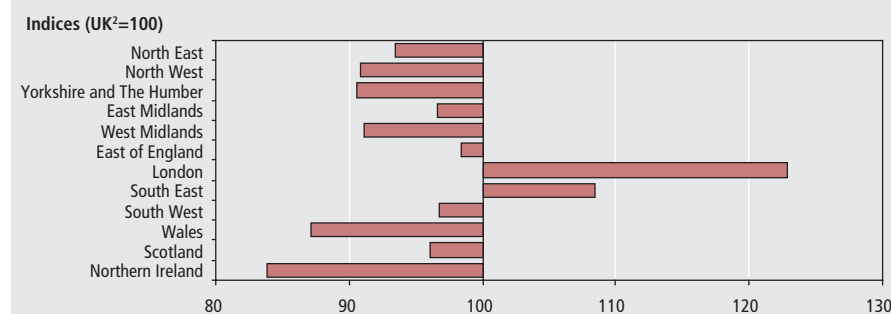


Notes:

- 1 Provisional.
- 2 UK less Extra-region.

Source: Office for National Statistics

Figure 3
Productivity (GVA per hour worked): by region, 2006¹



Notes:

- 1 Provisional.
- 2 UK less Extra-region.

Source: Office for National Statistics

households after taxes, National Insurance and pension contributions, property costs and other interest payments have been deducted. To make comparisons across regions, household income per head of the resident population is used.

Figure 2 shows that GDHI per head displays a more balanced picture of welfare compared with the catch-all indicator of GVA per head. In 2006, the income of residents in UK regions varied between 86 and 123 per cent of the UK total. Most UK regions had a household income per head below the UK average in 2006, which is mainly due to the relatively high levels of household income in London, the South East and the East of England, which dominate the UK average.

Assessing overall regional performance

No single indicator can provide a sufficient basis for assessing a region's economic performance. The productivity of those working in a region can be high, while household income of residents might be low due to relatively large numbers of people

who are either unemployed, or inactive due to other reasons. This can include young people in education, retired persons, or disabled individuals. These groups may have forms of income other than earnings, such as social security benefits and investment incomes. To get a more complete picture of regional economic performance, it is therefore also important to look at labour

market statistics, which are covered later in this article.

Productivity: differences between regions and changes over time

Differences between regions – a snapshot view

Figure 3, which shows a 2006 snapshot of productivity (GVA per hour worked) relative to the UK average, illustrates the dominance of London and the South East in terms of relative productivity. The East of England, the East Midlands, the South West and Scotland performed just below the UK average. Northern Ireland had the lowest relative productivity, at 84 per cent of the UK average, followed by Wales, at 87 per cent.

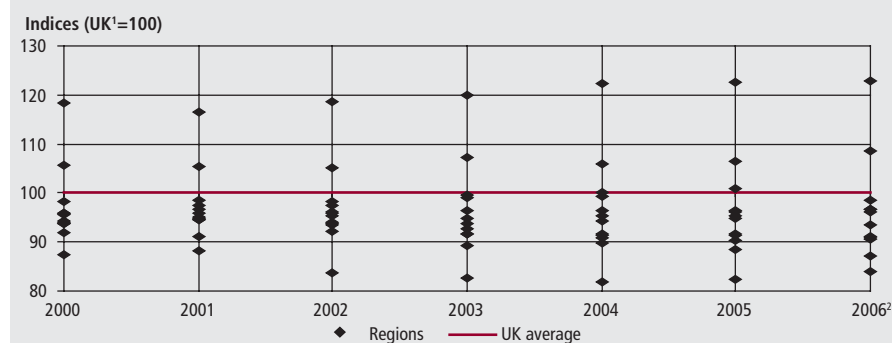
Differences between regions – changes over time

While the snapshot view indicates the position of regions at a certain point in time, productivity time trends are important in terms of regional policy to assess whether the objective of improving the performance of all English regions and reducing the gap in economic growth caused by differences in productivity across regions has been achieved.

It needs to be noted that the GVA estimates used in productivity figures are in nominal, not real, terms, as regional price deflators do not yet exist. By using nominal estimates, it is not possible to isolate volume changes from price changes.

Figure 4 shows productivity of all UK regions from 2000 to 2006 and demonstrates that there has been a widening of productivity differences between regions. In 2000, the spread between the lowest and the highest was 87 to 118 per cent of the UK

Figure 4
Productivity (GVA per hour worked): by region



Notes:

- 1 UK less Extra-region.
- 2 Provisional.

Source: Office for National Statistics

Table 2

Ranking of regional productivity (GVA per hour worked) relative to the UK average

	2000	2006 ¹
1	London	London
2	South East	South East
3	East of England	East of England
4	South West	South West
5	North East	East Midlands (+)
6	Scotland	Scotland
7	North West	North East (-)
8	East Midlands	West Midlands (+)
9	Yorkshire and The Humber	North West (-)
10	West Midlands	Yorkshire and The Humber (-)
11	Wales	Wales
12	Northern Ireland	Northern Ireland

Note:

1 Provisional.

Source: Office for National Statistics

average. In 2006, this had widened to 84 to 123 per cent. This shows that the objective of reducing the gap in economic growth caused by differences in productivity across regions has not yet been achieved.

Table 2 shows the ranking of UK regions in 2006 and indicates the change in ranks over the period 2000 to 2006. While the East Midlands, the West Midlands and the South West improved their relative performance due to a stronger growth in productivity compared with other regions, the three Northern regions (the North East, the North West and Yorkshire and The Humber) grew slower in terms of productivity compared with other UK regions. The ranking of the top and bottom performing regions remained unchanged from 2000 to 2006.

Income of residents: differences between regions and changes over time**Differences between regions – a snapshot view**

Figure 5 shows that, in 2006, the only regions with gross disposable household income (GDHI) per head above the UK average were London, the South East and the East of England. The North East was the only region that had a level of GDHI lower than £12,000 per head, which was 86 per cent of the UK average. Northern Ireland and Wales also had household incomes per head below 90 per cent of the UK average in 2006.

Differences between regions – changes over time

To see whether regions with low household incomes per head have grown faster than others and therefore converged towards the UK average, Table 3 shows the change between 2000 and 2006. The North East,

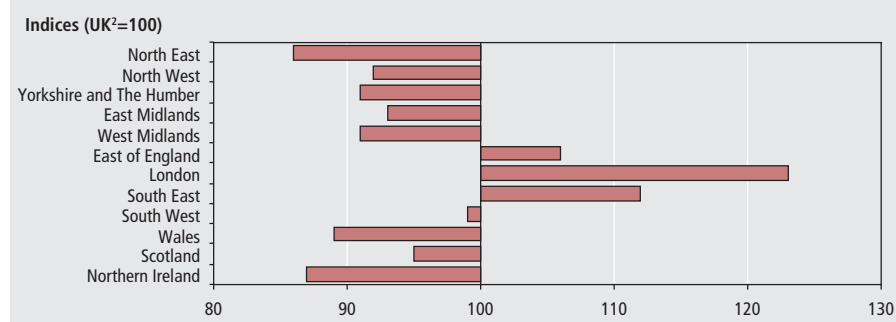
which had the lowest household income per head in 2006, had the second largest growth of all English regions. Northern Ireland and Wales also had low household incomes per head and experienced the strongest growth of all UK regions.

London, the South East and the East of England, the regions with the highest household incomes per head in 2006, had growth rates of income per head equal to or below the UK average growth. Therefore, the South East and the East of England have converged towards the UK average.

Ranking the UK's 12 regions in 2000 and 2006 reveals little change. The North East replaced Northern Ireland as the lowest performer on this indicator. Household income per head in the West Midlands grew faster than in Yorkshire and The Humber, therefore improving its ranking in 2006.

Figure 6 graphically shows the convergence of household income per head towards the UK average, particularly of regions below the UK average. This includes the impacts of tax and benefit changes, as well as changes in investment incomes, employment and self-employment incomes. The incomes of those living in London have remained far above the UK average.

Figure 5

Headline gross disposable household income per head: by region, 2006¹**Notes:**

1 Provisional.

2 UK less Extra-regio.

Source: Office for National Statistics

Table 3

Headline gross disposable household income per head: by region

Ranking 2006		£ thousand per head		Average annual percentage growth 2000–2006 ¹	Ranking changes
		2000	2006 ¹		
1	London	13.4	16.9	4.0	
2	South East	12.5	15.4	3.5	
3	East of England	11.7	14.6	3.8	
	United Kingdom²	10.9	13.8	4.0	
4	South West	10.8	13.7	4.0	
5	Scotland	10.2	13.1	4.2	
6	East Midlands	10.0	12.9	4.3	
7	North West	10.0	12.7	4.0	
8	West Midlands	10.0	12.5	3.9	(+)
9	Yorkshire and The Humber	10.0	12.5	3.8	(-)
10	Wales	9.4	12.3	4.5	
11	Northern Ireland	9.3	12.0	4.4	(+)
12	North East	9.3	11.8	4.2	(-)

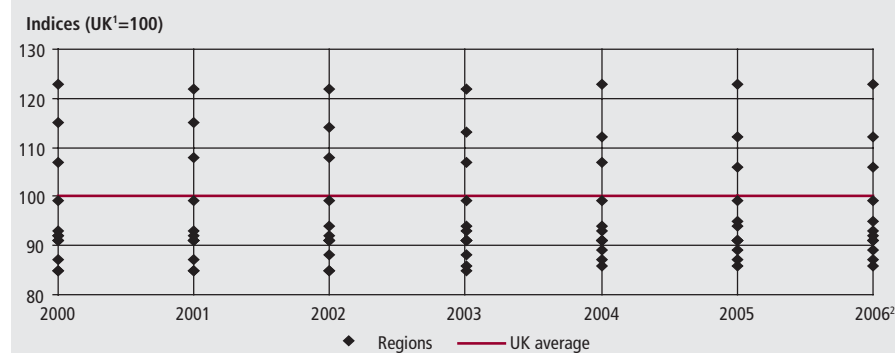
Notes:

1 Provisional.

2 UK less Extra-regio.

Source: Regional Accounts, Office for National Statistics

Figure 6

Headline gross disposable household income per head: by region**Notes:**

- 1 UK less Extra-regio.
2 Provisional.

Source: Office for National Statistics

However, the other two regions that are above the UK average, the South East and the East of England, have grown less strongly than the UK average.

Labour market statistics – recent developments and changes over time

Regional labour markets also play a significant role in determining the economic performance of regions.

Recent developments

Table 4 shows the latest developments in working-age employment, unemployment and economic inactivity rates. In terms of employment rates in 2008 Q3, the South East and the South West had the highest employment rates, while Northern Ireland and the North East had the lowest rates. Northern Ireland's rate has remained the same compared with a year earlier, while

the North East has seen the strongest annual decline.

In terms of working-age unemployment rates, the North East and London had the highest rates in 2008 Q3. This was followed by the North West, Yorkshire and The Humber, the West Midlands and Wales. The South West and Northern Ireland had the lowest unemployment rates in 2008 Q3.

In terms of economic inactivity, Northern Ireland had the highest rate, far above the relatively high rates for Wales, the North East and London in 2008 Q3. This is related to the region's high proportion of sick and disabled people and a relatively high proportion of young adults. The South East, the South West and the East of England had the lowest economic inactivity rates in 2008 Q3. London experienced the largest fall in activity rates compared with a year earlier.

Changes over time

To facilitate comparisons with productivity and regional welfare indicators, such as household income, discussed earlier, Figure 7 shows the key developments in regional labour markets in terms of regional employment rates from 2000 to 2006. Northern Ireland, Scotland and the North East saw the strongest increases over this time period. The strongest declines in employment rates were seen in the South East and the East of England.

Regional economic performance

This section looks at the relationship between the different measures. It highlights that a series of indicators is necessary to gain a more complete picture of regional economic performance.

Differences between regions – a snapshot view

Table 5 shows a ranking of the productivity, income and employment rate for each region (1 being top, 12 being bottom). Regions differ to varying degrees in their performance compared with the UK average. Using a catch-all indicator cannot account for the varying regional performances on productivity, income and labour market issues. Table 5 shows that, in 2006, the North East, Yorkshire and The Humber and London displayed the largest ranking differences.

Differences between regions – changes over time

The following discusses changes over time in the North East and London – two regions with large differences in rankings – and the

Table 4

Employment rates, unemployment rates and economic inactivity rates: by region

	Employment rates ^{1,2}					Unemployment rates ¹					Economic inactivity rates ¹				
	2007					2008					2007				
	Jul–Sep	Oct–Dec	Jan–Mar	Apr–Jun	Jul–Sep	Jul–Sep	Oct–Dec	Jan–Mar	Apr–Jun	Jul–Sep	Jul–Sep	Oct–Dec	Jan–Mar	Apr–Jun	Jul–Sep
United Kingdom	75	75	75	75	74	6	5	5	6	6	21	21	21	21	21
North East	72	72	70	70	70	6	6	7	8	8	23	24	25	24	23
North West	72	73	72	72	72	6	6	6	7	7	23	23	23	23	23
Yorkshire and The Humber	73	74	74	73	73	6	5	5	6	7	22	22	22	22	21
East Midlands	76	76	76	76	76	6	5	6	6	6	20	20	19	20	19
West Midlands	73	73	73	73	72	7	6	7	7	7	22	22	22	22	23
East of England	77	78	78	78	77	5	5	5	5	5	19	18	19	19	19
London	71	70	71	72	71	6	7	7	7	8	25	24	24	23	23
South East	79	79	80	79	79	5	5	4	4	5	17	17	17	17	17
South West	79	79	79	79	79	4	4	4	4	4	18	18	18	18	18
Wales	71	72	72	73	71	6	5	6	5	7	25	25	24	24	24
Scotland	77	77	77	77	76	5	5	5	4	5	19	19	20	20	20
Northern Ireland	70	70	70	70	70	4	4	5	4	4	27	27	27	27	27

Notes:

- 1 Includes all people of working age, males aged 16 to 64 and females aged 16 to 59.
2 Includes employees, self-employed, participants on government-supported training schemes and unpaid family workers.

Source: Labour Force Survey, Office for National Statistics

Figure 7
Employment rates for people of working age: by region



Notes:

- 1 Data for 2000 and 2002 are measured from March to February.
- 2 Data for 2004 and 2006 are measured from January to December.

Source: Annual Labour Force Survey and Annual Population Survey, Office for National Statistics

Table 5
Ranking of all indicators: by region, 2006¹

	Productivity	Income	Employment rate ²
North East	7	12	10
North West	9	7	8
Yorkshire and The Humber	10	9	6
East Midlands	5	6	4
West Midlands	8	8	7
East of England	3	3	3
London	1	1	11
South East	2	2	1
South West	4	4	2
Wales	11	10	9
Scotland	6	5	5
Northern Ireland	12	11	12

Notes:

- 1 Data for productivity and income is provisional.
- 2 For persons of working age. Working age includes females aged 16 to 59 and males aged 16 to 64.

Source: Office for National Statistics

East of England, which is ranked the same on each indicator.

The North East

Figure 8 shows that the North East experienced a relative improvement on income and employment from 2000 to 2006, while productivity grew slower than the UK average and therefore relatively declined. The employment rate has relatively improved, which aligns with the region's household income per head having relatively increased from its low level. The relative decline in productivity from 2000 to 2006 alongside a relative improvement in employment rates could reflect people taking jobs which are less productive in terms of GVA per hour worked, reducing the productivity relative to the UK average.

London

London was ranked top in terms of productivity and income of its residents, with relative productivity increasing from 2000 to 2006. **Figure 9** shows that the

income of residents in London grew at the UK average rate, therefore remaining roughly constant with respect to the UK average. In terms of the labour market, London ranked low on the employment rate and also experienced a relative decline on this indicator.

The East of England

The East of England was ranked third on each indicator. **Figure 10** reveals that productivity has been close to the UK average, growing roughly at the same rate as UK average productivity. In terms of labour market indicators, the employment rate was above average, however, relatively declining and converging to the UK average. This coincides with a slight relative decline in household income per head.

Productivity differences within regions

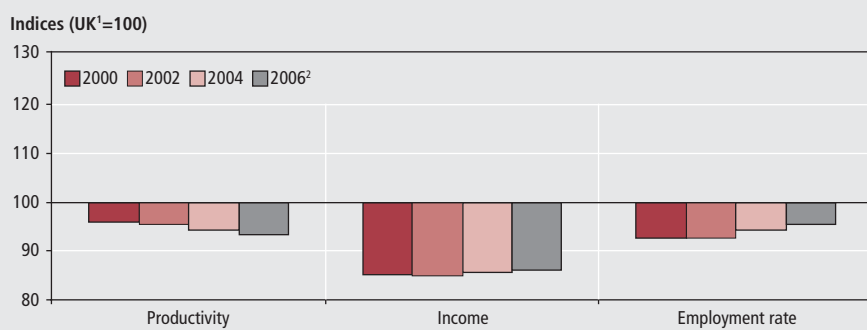
The above has shown that there can be great differences in regional economic performance. Variation is even stronger within regions – between smaller administrative areas, between the different types of rural and urban areas, or between city regions.

Figure 11 shows London and its five smaller NUTS3 areas. Overall, London had a far above average productivity index in 2005. However, within the region, there were large differences, with Inner London – West being much higher above the UK average and Outer London – East and North East being below the UK average.

Concerning urban-rural productivity differences, the study 'Experimental estimates of rural-urban productivity' by the Office for National Statistics (ONS) and the Department for Environment, Food and Rural Affairs found that productivity differences are significant between:

- major urban areas, which are defined as districts with either 100,000 people or 50 per cent of their population living in urban areas with a population of more than 750,000, and

Figure 8
The North East: comparison of productivity, income and employment rate



Notes:

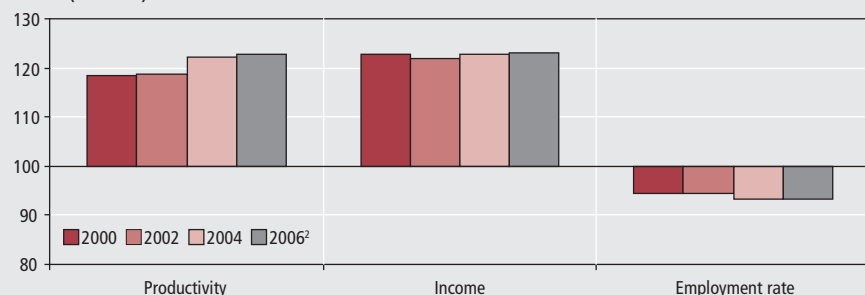
- 1 UK less Extra-region for productivity and welfare estimates.
- 2 Provisional data for productivity and income.

Source: Office for National Statistics

Figure 9

London: comparison of productivity, income and employment rate

Indices (UK=100)

**Notes:**

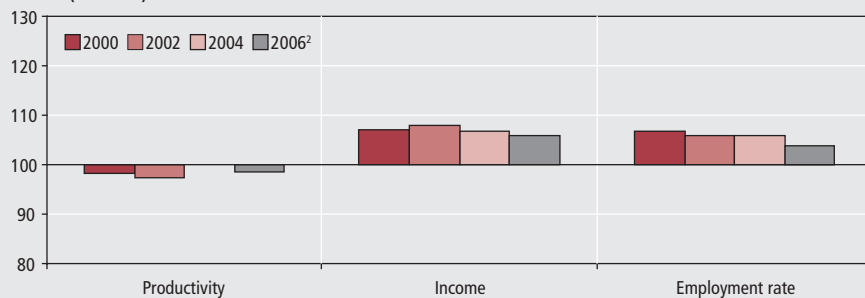
- 1 UK less Extra-region for productivity and welfare estimates.
- 2 Provisional data for productivity and income.

Source: Office for National Statistics

Figure 10

The East of England: comparison of productivity, income and employment rate

Indices (UK=100)

**Notes:**

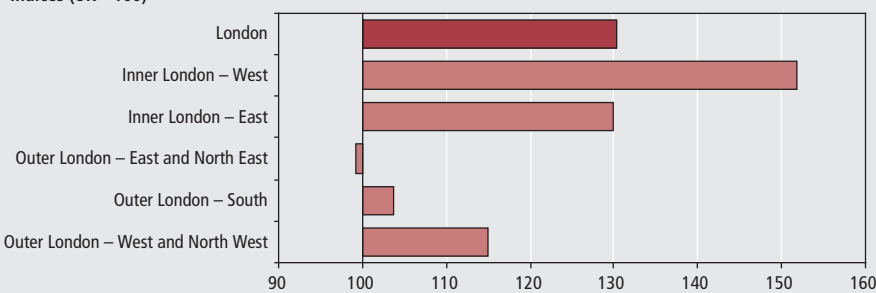
- 1 UK less Extra-region for productivity and income estimates.
- 2 Provisional data for productivity and income.

Source: Office for National Statistics

Figure 11

Productivity (GVA per filled job) in London and its subregions, 2005

Indices (UK=100)

**Note:**

- 1 UK less Extra-region.

Source: Office for National Statistics

- rural 80 areas, which are defined as districts with at least 80 per cent of their population in rural settlements and larger market towns.

The study also found that when London, which consists only of major urban areas, is separated from the other major areas, the only significant productivity gap exists between London and the rest.

The concept of the city region (CR)

allows regional policy to be implemented at a geography representing everyday life rather than administrative boundaries. They are 'enlarged territories from which the core urban areas draw people for work and services'. Eight core English cities and their wider city regions are targeted as key areas of economic growth.³

In 2005, Liverpool CR and Sheffield CR were significantly below the UK average productivity, while Bristol CR performed

significantly above the productivity average. From 2002 to 2005, Liverpool CR experienced a relative decline in its productivity, while the productivity of Sheffield CR and Bristol CR grew roughly at the same rate as the UK average and had an unchanged relative performance.

Regional drivers of productivity and growth

In addition to measures of productivity, income and labour market performance for regions, policymakers also need regional measures of policy levers, or drivers, which can be used to influence regional economic performance.

The five drivers of productivity highlighted in national policy – skills, innovation, enterprise, investment and competition – all have important regional and Devolved Administration aspects.

Skills

Skills are a key dimension of labour available in an economy, and an essential part of labour market measurement. They complement physical capital and are needed to take advantage of new technologies and organisational structures. Skills of workers strongly influence productivity. This section investigates the skills of the working-age population of each region.

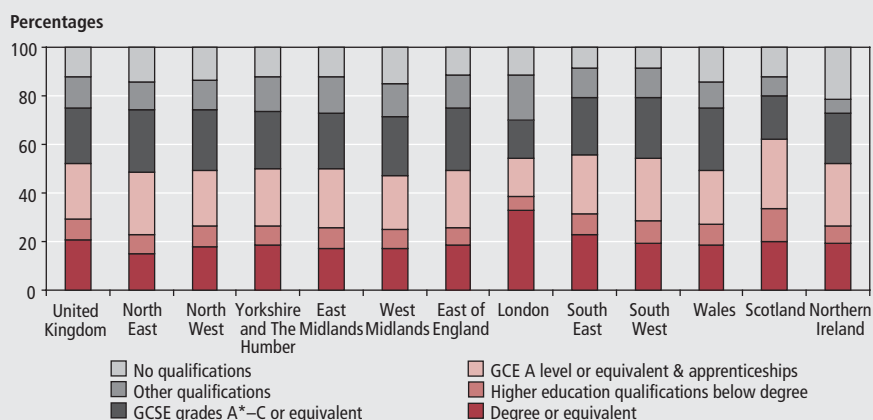
Measuring skills of resident populations as a driver of productivity has an important weakness in that it does not account for workers moving between regions, and so does not accurately capture the input of workers' skills to regional GVA and productivity. A residence-based measure is, however, relevant to policymakers seeking to raise skill levels in their regions.

Figure 12 presents the distribution of qualifications – a strong proxy for skills. In terms of working-age population with a degree or equivalent qualification, London is far ahead of other regions: 33 per cent of the working-age population has a degree or equivalent qualification, compared with a UK average of 21 per cent.

This is a key reason for the productivity and income gaps between London and other regions. The political, business and financial concentration in and around London draws in highly-skilled workers. This gap increased in absolute terms between 2000 Q3 and 2008 Q3. However, all UK regions have increased their proportion of workers with a degree or equivalent.

Another sign of a broad improvement in skill levels is the general fall in the percentage of regional working-age populations with no qualification since 2000 Q3. Between 2000

Figure 12

Working-age population:¹ by highest qualification² and region, 2008 Q3**Notes:**

Source: Labour Force Survey, Office for National Statistics

- 1 Males aged 16 to 64 and females aged 16 to 59.
- 2 For summary of qualifications and equivalents see www.statistics.gov.uk/statbase/product.asp?vlnk=836

Figure 13

Percentage of people in work who undertook job-related training, 2008 Q3

Source: Labour Force Survey, Office for National Statistics

Q3 and 2008 Q3, Scotland experienced the steepest fall of almost 15 percentage points, compared with a fall in the UK average of 6 percentage points.

A further indicator of investment in skills is shown by job-related training. **Figure 13** shows the percentage of all people working in a region who undertook any job-related training in the 13 weeks prior to their Labour Force Survey interview in 2008 Q3. Measured on a workplace basis, this provides information on employee skills development. All regions, except Northern Ireland, perform close to the UK average of 25 per cent.

Innovation

Innovation is the successful exploitation of new ideas, in the form of new technologies, new products or new processes and ways of working. However, innovative activity undertaken in a particular region will not necessarily feed

through to increased productivity in that region – the knowledge may be developed and brought to market anywhere in the UK, or abroad.

Research and development (R&D) expenditure by firms provides one indicator for innovation. **Figure 14** shows that, in 2006, the East of England, which includes the high technology cluster in Cambridge, spent a far greater proportion of GVA on R&D (3.6 per cent) than any other region. London and Yorkshire and The Humber had the lowest rates of R&D expenditure in 2006.

Low levels of R&D expenditure in London may reflect its industrial structure, dominated by services. The gap between London's R&D expenditure and high productivity may partly be explained by the fact that research done in other regions is often exploited in London.

HM Treasury, in conjunction with ONS and academics, has shown that 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, and shows their contribution to productivity. More work is needed before these factors can be measured effectively at regional level.

Enterprise

Enterprise is defined as the realisation of new business opportunities by both start-ups and existing firms. New enterprises compete with existing firms by exploiting new ideas and technologies to increase their comparative advantage, and therefore competition.

New VAT registrations provide an indicator of business start-ups. **Figure 15** presents the number of VAT registrations per 10,000 resident adults in each region, for 2000 and 2007. The rate was highest in London, at 68 per 10,000 people in 2007, compared with a UK average of 42 per 10,000. The combination of a workplace-based numerator and residence-based denominator may inflate the figure for London and depress it for other regions, if entrepreneurs living elsewhere consider it advantageous to register businesses in London. **Figure 15** shows that, since 2000, all regions experienced increases in VAT registrations.

Another indicator for enterprise is provided by the Global Entrepreneurship Monitor (GEM), an academic research program which measures total early-stage entrepreneurial activity (TEA). TEA includes nascent entrepreneurs, from the point at which they commit resources to starting a business until the point at which they have been paying wages for three months, and new business owner-managers who have been paying salaries for between three and 42 months. TEA measures activity before a business is launched, an 'early warning' of entrepreneurial activity. The GEM survey is relatively small, with limited coverage; **Figure 16** presents annual average rates of TEA for the period 2002 (the year the survey began) to 2007.

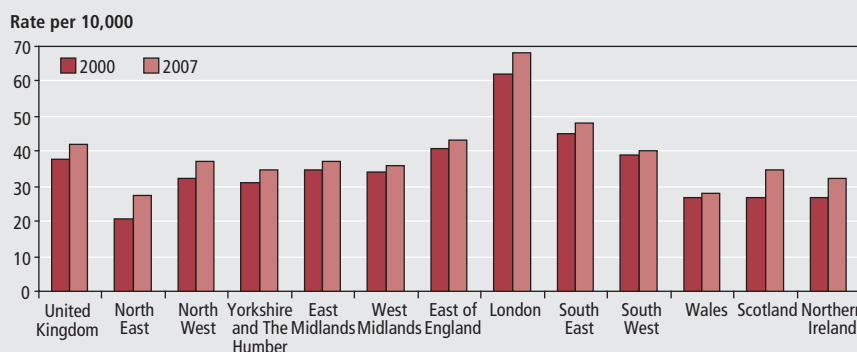
London had the highest average annual rate between 2002 and 2007, with 7.6 per cent of the adult population engaged in entrepreneurial activity. Both VAT registrations per head and rates of entrepreneurial activity are above the UK average in the South West, the South East and the East of England, and lowest in the North East.

Figure 14
Expenditure on R&D as a percentage of workplace-based GVA:
by region



Source: Office for National Statistics

Figure 15
VAT registrations per 10,000 resident adults: by region



Source: Office for National Statistics and Department for Business, Enterprise & Regulatory Reform

Figure 16
Percentage of adult population engaged in early-stage
entrepreneurial activity: by region, average 2002 to 2007



Source: Global Entrepreneurship Monitor

workers. The region receiving most FDI projects relative to its workforce was London, with 6.2 per 100,000 workers, followed by the North East (at 5.3). The South West and Yorkshire and The Humber had the lowest rates (at 1.7 and 1.8, respectively).

On this indicator of attracting foreign investment, the North East, Northern Ireland and Wales, which have relatively low productivity and high unemployment rates, also have relatively high numbers of FDI projects. It is possible that foreign firms are choosing to locate in these regions to take advantage of the untapped labour force or regional assistance programmes.

Competition

Competition can improve productivity by creating incentives to innovate. Measuring competition in a region is, however, difficult.

One indicator is the proportion of VAT-registered businesses that export, derived from HM Revenue & Customs returns. Exports do not represent competition within a region and do not include services. However, the indicator does show how many firms are international in their outlook, and able to face global competition.

Figure 18 presents a count of firms exporting as a percentage of total VAT-registered businesses, by region, in 2000 and 2007. London had the highest rate of companies exporting, at 5 per cent, compared with a UK average of 4 per cent, suggesting a stronger competitive capability, as well as proximity to transport links with mainland Europe. All other regions increased the proportion of firms exporting between 2000 and 2007. The fall in the figure for London over the period reflects the exclusion of services from this measure. Wales had the lowest share of exporting companies in 2007. Those parts of the UK which score lowest on this indicator are furthest from the major South East links with mainland Europe.

Other regional drivers of productivity and growth

Additional factors influencing regional productivity have been identified in research and feature in regional economic strategies. These drivers include agglomeration, industrial structure and region-specific assets. Academic research on these topics often uses firm-level information accessed confidentially through ONS's secure Virtual Microdata Laboratory.

Agglomeration refers to a clustering of economic activity, usually around an

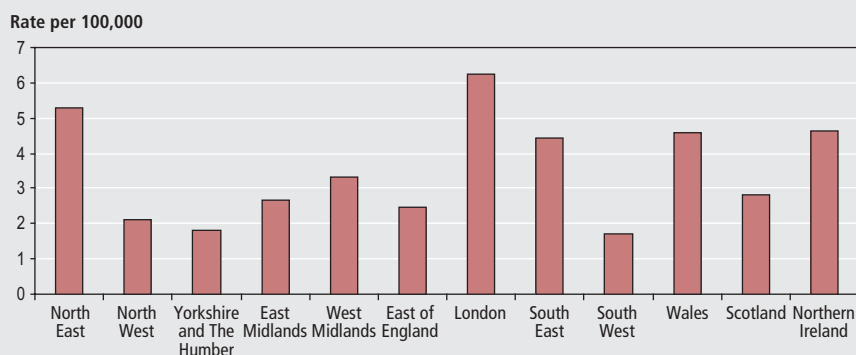
Investment

Investment in physical capital – machinery, equipment and buildings – enables workers to produce more and higher quality output, and so raises productivity. As data on investment are collected at the level of the enterprise, rather than at the local level, accurate apportionment to regions is difficult. However, UK Trade & Investment (UKTI) collects data on inflows of foreign

direct investment (FDI) projects and estimated numbers of associated jobs by region. FDI does not cover all investment in a region, and there is no requirement to notify UKTI when undertaking FDI. Therefore, the estimates must be interpreted with caution, but can provide an indicator of regional investment activities.

Figure 17 shows the number of FDI projects undertaken by region, per 100,000

Figure 17

Foreign direct investment projects per 100,000 workers: by region, annual average 2000/01 to 2006/07

Source: UK Trade & Investment and Department for Business, Enterprise & Regulatory Reform

Figure 18

Exporting companies as a percentage of business stock: by region

Source: HMRC trade statistics and Office for National Statistics

urban core. Certain types of businesses benefit from being in close proximity to direct competitors. They can make use of a greater pool of suppliers, a larger customer base and access to local networks, which can facilitate knowledge and technology spillovers. Specialisation might occur, which further improves productivity.

Each region has its own specific strengths in terms of industrial structure, which is likely to influence productivity directly or through other productivity drivers discussed in this article. If a regional economy has a high representation of 'less productive' sectors such as agriculture and low grade services, overall, the region can appear to be below the UK productivity average even though the region's productivity in a particular sector may be relatively high.

Region-specific assets include the regional environment, culture, creativity, brand and identity. These assets take account of the impact of the unique physical environment of a region and account for intangible assets as drivers of productivity. Intangible assets include experience and associations attached to regions and the

impact of a cohesive regional brand that helps to unite a region and to create a sense of purpose while acting as an attractor of investment and thus as a driver of productivity.

Looking to the future

The aim of this article is to improve the understanding of regional economic performance and the indicators used to measure it. The article highlights the shortcomings of GVA per head in measuring the productivity of a region and the income of its residents. It proposes a series of indicators which more accurately measure relative differences in regional productivity and incomes.

The article suggests using GVA per hour worked and GVA per filled job as measures of productivity, and household income per head as an indicator of the welfare of residents living in a region. Using these productivity and income measures alongside labour market indicators creates a better evidence base for regional economic policy. The article also stresses the importance of understanding the drivers of productivity that cause regional disparities to emerge.

To improve regional productivity and income indicators, ONS is taking forward the recommendations given in the Allsopp report *Review of Statistics for Economic Policymaking*. More reliable data need to be made available at subregional level to be able to provide policymakers with a sound evidence base. Furthermore, the recommendation for ONS to develop a production-based measure of regional GVA in real terms is being taken forward.

ONS, including the Regional Statisticians based in the English regions, are playing a major role in working with the Regional Development Agencies and Devolved Administrations to improve the evidence base that supports regional strategies. To achieve improved quality of regional statistics and therefore effective regional policymaking, an in-depth knowledge of local and regional economic conditions is necessary. The increasing needs of regional and local areas for statistics to support regional strategies and local economic assessments have implications for the quality and range of information required. ONS will be meeting these challenges through better co-ordination of regional statistical activities carried out in headquarters, by statisticians in the regions, and also with members of the Government Statistical Service in other government departments.

Notes

- 1 Historically, ONS has produced a 'residence'- and a 'workplace'-based measure of GVA at the NUTS1 regional level. The two measures differ only in respect of London, the South East and the East of England, to allow for the very significant amount of commuting that takes place between these regions. However, GVA is a workplace-based concept, measuring the economic activity that takes place in the region. Until 2007, the Government's policy for English regions made use of residence-based GVA in the GVA per head indicator used to support the REP PSA. In the 2007 Comprehensive Spending Review, it was decided to switch to a workplace-based measure of GVA.
- 2 New estimates can be found at www.statistics.gov.uk/statbase/product.asp?vlnk=14650
- 3 The city regions are: Liverpool, Sheffield, Newcastle, Leeds, Nottingham, Birmingham, Manchester and Bristol.

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CONTACT

✉ elmr@ons.gsi.gov.uk

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FEATURE

Francis Jones, Daniel Annan and Saef Shah
Office for National Statistics

The redistribution of household income 1977 to 2006/07

SUMMARY

This is the second of two articles on changes to the UK income distribution over the last 30 years. It analyses the role that taxes and benefits played in changes to the income distribution over this period. The article considers the impact of both changes to the tax and benefit systems, and changes to the way in which those systems acted upon a changing population and income distribution. A companion article, 'The distribution of household income 1977 to 2006/07' (see References section), provides an analysis of changes to the income distribution. Both articles draw mainly on data published in the Office for National Statistics' annual article 'The effects of taxes and benefits on household income' which is also known as the Redistribution of Income (ROI) analysis.

Government intervention through taxes and benefits plays an important role in determining the distribution of household income, and the level of income inequality. However, over the last 30 years, changes in the income distribution have been caused predominantly by changes in the distribution of original income (income before taxes and benefits), rather than changes in the impact of taxes and benefits. This is despite many changes to the tax and benefits systems over this period.

Cash benefits reduce income inequality and between 1977 and 2006/07 their impact on income inequality did vary significantly over the short term. These variations were to a large extent related to economic cycles – payments of cash benefits increased when income from employment fell. In order to interpret statistics on the income distribution, it is important to understand these cyclical effects. Aside from cyclical variations, there is no evidence of any major underlying change in the impact of cash benefits on income inequality over the last 30 years.

Direct taxes also reduce income inequality. The extent to which they reduced inequality varied between 1977 and the mid-1990s and was then relatively unchanged after the mid-1990s. On average, direct taxes reduced inequality slightly more in this latter period compared with earlier years. However, in the context of the large increase in inequality of original income between 1977 and the mid-1990s, any greater equalising effect of direct taxes was limited.

Indirect taxes are regressive and so have

the opposite effect to direct taxes – they increase inequality. The extent to which they increased inequality grew gradually between the late 1970s and the start of the 1990s, and has been relatively stable since then. Direct taxes and indirect taxes have opposite effects on income inequality which tend to cancel each other out. Over the last 30 years, even the changes in their respective impacts on inequality worked in opposite directions and so tended to cancel each other out.

The state also provides benefits in kind to households, and the two most important that are considered here are health and education services. In this analysis, benefits in kind are valued by the costs of production which are allocated to households according to assumptions about households' use of these services. The allocation of benefits in kind to the bottom fifth of households increased over the last 30 years due to higher numbers of children living in households in this part of the income distribution.

The households which benefit most from redistribution are one-adult households with children and retired households. Households with children do better than households without children due to the additional benefits they receive, both cash benefits and benefits in kind. Over the last 30 years, there were some short-term variations in the extent to which different types of household benefited from redistribution, but over the longer term this underlying pattern has been relatively stable.

Analysing the redistribution of income

The ROI analysis

This article uses data from the Office for National Statistics' annual Redistribution of Income (ROI) analysis to assess the impact of the tax and benefit systems on the UK income distribution and income inequality over the last 30 years. The first section describes the framework which is used by the ROI analysis to measure the effect of taxes and benefits on household income. The subsequent sections of the article then follow the successive stages of this framework: cash benefits; direct taxes; indirect taxes; and benefits in kind. They assess changes in the impact of each stage of redistribution upon households in general, and upon the income distribution and income inequality.

The ROI is a longstanding analysis which is based on income and expenditure data from the Expenditure and Food Survey (EFS). Prior to 2001/02, it was based on the Family Expenditure Survey (FES), the predecessor of the EFS. The analysis has used a broadly consistent approach since 1987. By recalculating data for the years 1977 to 1986, a more consistent dataset has been produced to enable an analysis of changes in the effect of taxes and benefits over the last 30 years.

The ROI analysis has used the same framework for analysing the redistribution of household income for many years (**Figure 1**). Household members receive income from employment, occupational pensions, investments and from other non-government sources. This is referred to as original income. The first stage in the redistribution of income is the receipt of cash benefits provided by the state. Adding income from cash benefits to original income gives gross income. Households pay direct taxes out of gross income. Subtracting direct taxes from gross income gives disposable income.

When households purchase goods and services, they incur indirect taxes. The ROI analysis uses expenditure data to estimate each household's payment of indirect taxes. These are subtracted from disposable income to give an estimate of post-tax income. Households are also assigned nominal incomes to reflect their receipt of benefits in kind from the state, the most important being health and education services. These nominal incomes are estimated based on the cost of providing the services, and are added to post-tax income to give a measure of final income.

The unit of analysis is the household. Households are ranked by their equivalised

disposable income. Equivalisation is a standard methodology which is used to adjust incomes in order to take account of the demand on resources of households of differing size and composition. The ROI analysis uses the McClements scale for equivalisation (Jones 2008).

While households are ranked by their equivalised disposable income, the estimates of incomes, taxes and benefits within this framework are generally unequivalised. Unequivalised incomes are more appropriate for analysing the effects of individual taxes and benefits on household income although, over time, the estimates are affected to some degree by changes in average household size (see technical note 5). Equivalised versions of original, gross, disposable and post-tax income, which take account of changes in household size and composition, are used to assess the impact of each stage of redistribution upon the income distribution and income inequality. Final income is not equivalised since the equivalisation scale is not applicable to the nominal incomes representing benefits in kind.

Cash benefits

The purpose of most cash benefits is to provide a 'reasonable' standard of living to households who, for whatever reason, have little or no original income. Income from cash benefits increased in real terms (in 2006/07 prices) from £2,400 per household per year in 1977, to £4,600 in 2006/07. This growth in income from cash benefits was similar to the growth in gross household income over the same period, although growth in benefit income tended to be most rapid in years when gross income either grew slowly or fell.

Income from benefits increased most rapidly in the early 1980s, early 1990s, and to a lesser extent the early 2000s (**Figure 2**). The recessions of the early 1980s and early 1990s led to increased reliance on income from benefits for some households. In the early 2000s, the maturing of the earnings-related component of the state retirement pension and tax credits led to real increases in income from cash benefits.

There are two broad types of cash benefit: contributory benefits, which are paid from the National Insurance Fund, to which individuals (and their employers) make contributions while working; and non-contributory benefits, many of which are means tested. Contributory benefits include the state retirement pension, incapacity benefit, jobseeker's allowance, and widows' benefits. Non-contributory benefits

Figure 1
Stages of redistribution

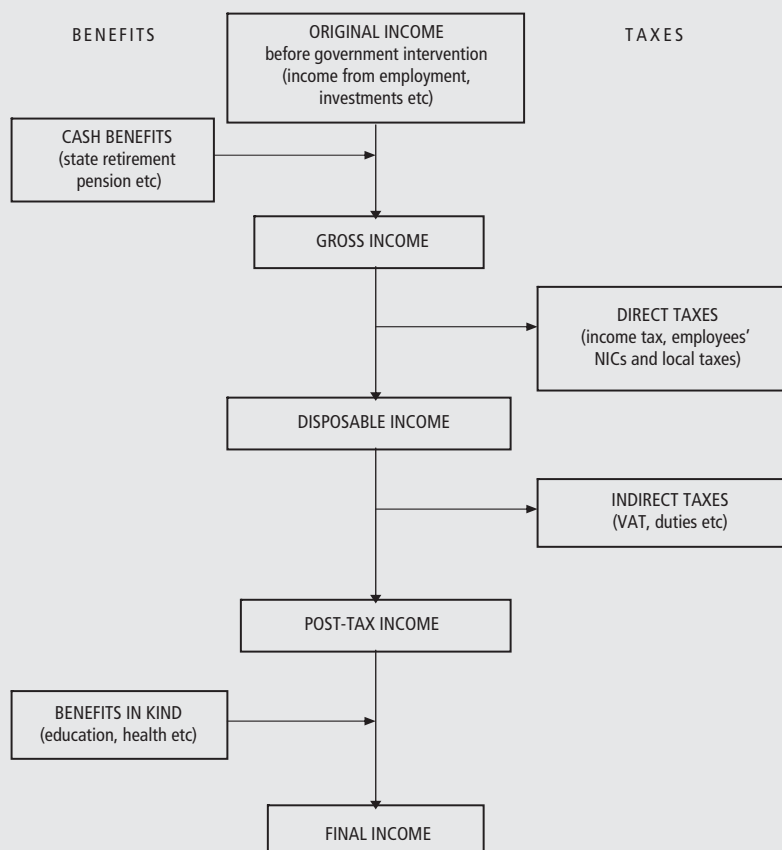
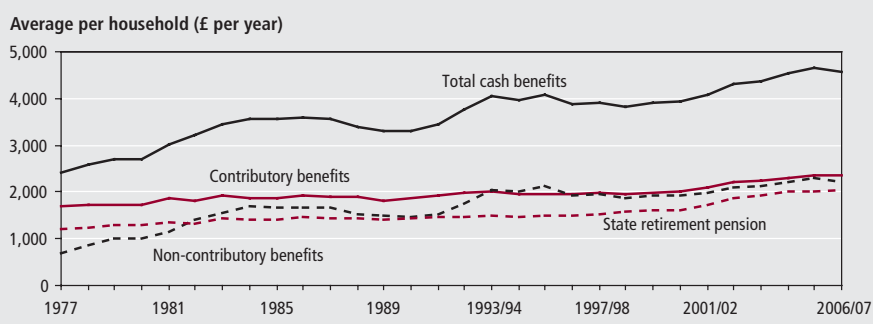


Figure 2
Income¹ from cash benefits in 2006/07 prices



Note:

1 Income before tax, unequivalised.

include housing benefit, income support, child benefit, various disability and carer's benefits and tax credits.

Income from contributory benefits

Income from contributory benefits grew relatively slowly in real terms increasing from £1,700 per household per year in 1977 to £2,360 in 2006/07, with over half of this increase occurring in the early 2000s. This largely reflects growth in income from the state retirement pension which is by far the largest contributory benefit. During the 1980s and early 1990s, the basic state pension was uprated in line with inflation, and so there was little real growth in income from this source. There was gradually increasing growth from 1996/97 onwards due to the maturing of the earnings-related component of the state pension (SERPS, replaced in 2002 by the state second pension). There were also above inflation increases to the basic state pension in the early 2000s. Over this whole period, the old age dependency ratio – the number of people of state pension age and over as a percentage of the working age population – remained roughly constant.

Total income from other contributory benefits remained at a roughly similar level between 1977 and the early 1990s, but then declined in real terms. Income from unemployment benefit was high in the early 1980s (Figure 3), as the claimant count rose to 3 million. However, during the 1980s, there were many changes to the unemployment benefit rules, many of which were to the disadvantage of the unemployed (Atkinson and Micklewright 1989). When in 1993 the claimant count again came close to 3 million, income from this source was lower than it had been in the early 1980s. In the late 1990s and early 2000s, income from jobseeker's allowance (which replaced unemployment benefit in 1996) declined due to the falling number of claimants.

Income from invalidity benefit and sickness benefit increased sharply in the early 1990s as the number of claimants increased from 1.5 million in 1990 to 2.4 million in 1995. In 1995, invalidity and sickness benefits were replaced with incapacity benefit which for some new claimants provided a lower level of income. There was also some decline in the number of people receiving income from incapacity benefit between 1995 and 2006/07.

Widows' benefits (or bereavement benefits from 2001), paid to those who are widowed and under pensionable age, declined in real terms throughout this period due to a falling number of claimants. Falling marriage rates, rising divorce rates and an increase in male life expectancy all combined to reduce the number of widows aged under 60 (House of Commons Library 1998).

Income from non-contributory benefits

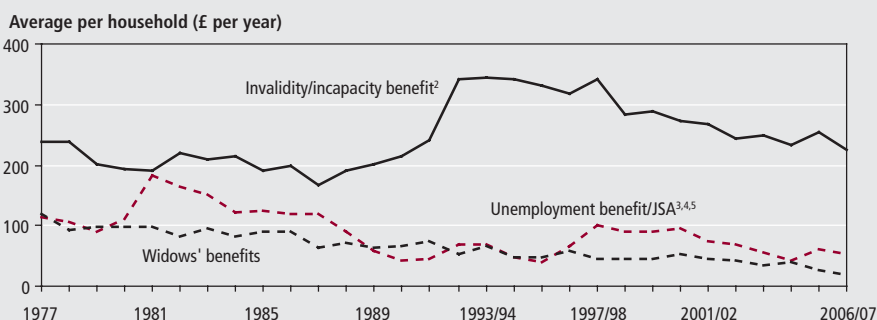
Income from non-contributory benefits increased more rapidly than income from contributory benefits in real terms, from

£700 per household per year in 1977 to £2,220 in 2006/07. The periods of most rapid increase were the early 1980s and the early 1990s although, as with contributory benefits, there was faster growth in income from non-contributory benefits in the early 2000s. In 1977, average income from non-contributory benefits was less than half that from contributory benefits but since the mid-1990s contributory and non-contributory benefits have accounted for roughly equal proportions of total benefit income. The increase in income from non-contributory benefits between 1977 and the early 1990s was mainly due to an increase in the number of non-retired households with no earner.

The increases in income from non-contributory benefits in the early 1980s and early 1990s were due primarily to increased income from income support (supplementary benefit before 1988/89) and housing benefit after its introduction in 1982–1983 (Figure 4). In addition to the effect of the recessions of the early 1980s and early 1990s, there was also an increase in the number of lone parents throughout this period. This would have resulted in a more long-term increase in the number of income support and housing benefit claimants. The introduction of housing benefit coincided with a fall in government subsidy of social housing (measured as a benefit in kind in the ROI analysis).

Income from non-contributory disability and carer's benefits gradually increased in real terms due to the increased number of claimants. Berthoud (1998) suggested that this was due to the increased length of time individuals remained on benefits, exclusion from the workplace, and some extension of payments further down the scale of severity of disability.

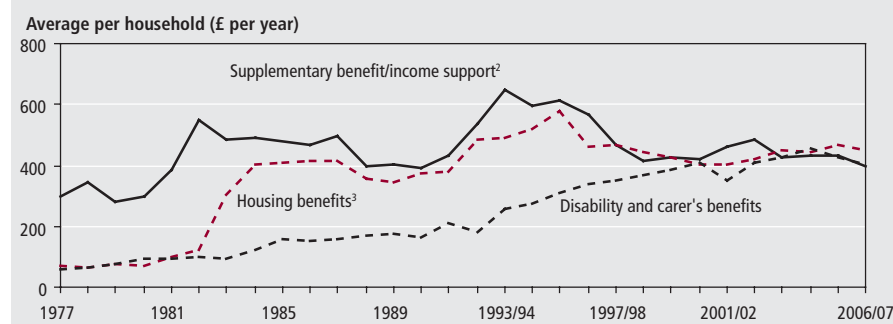
Figure 3
Income¹ from selected contributory benefits in 2006/07 prices



Notes:

- 1 Income before tax, unequivalised.
- 2 Invalidity and sickness benefit before 1995, incapacity benefit thereafter.
- 3 Unemployment benefit before October 1996, jobseeker's allowance (JSA) thereafter.
- 4 Includes both contribution and income-based JSA.
- 5 On its introduction, JSA replaced income support for some claimants.

Figure 4
Income¹ from selected non-contributory benefits in 2006/07 prices



Notes:

- 1 Income before tax, unequivalised.
- 2 Supplementary benefit before 1988/89, income support thereafter. Includes pension credit.
- 3 Includes council tax benefit and its predecessors until 1995/96 – see technical note 4.

The faster growth in income from non-contributory benefits in the early 2000s was due primarily to increased income from tax credits (**Figure 5**). Before the current child tax credit and working tax credit were introduced in 2003/04, there were a number of benefits aimed at working families with dependent children (including lone parents): working families tax credit (1999 to 2003), family credit (1988 to 1999), and family income supplement (before 1988). In the 1970s and 1980s, the number of claimants was low. However, from 2003/04 in particular, the increased generosity of the child tax credits resulted in them becoming an increasingly important source of income for many households with children. **Figure 5** shows only those tax credits treated as a benefit (some tax credits are treated as a negative tax – see technical note 1).

Income from child benefit declined in real terms during the late 1980s, then remained at roughly the same level during the 1990s and early 2000s. Child benefit was introduced in 1977 (replacing the family allowance) and there were large increases in the rates of this benefit in 1978 and 1979.

The impact of cash benefits on the income distribution

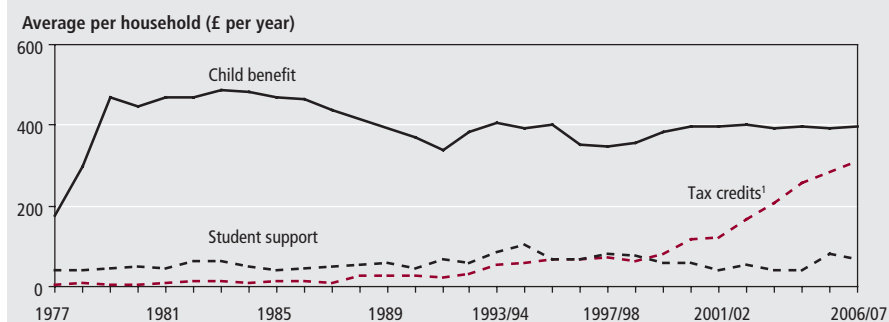
The impact of cash benefits on the income distribution can be illustrated by comparing the distributions of equivalised original and gross income (**Figure 6**). Cash benefits reduce income inequality, increasing the income share of the bottom two quintile groups and reducing the income share of the top two quintile groups. There were some changes in the impact of cash benefits on each quintile group over the last 30 years. For example, in more recent years, the bottom quintile group benefited less than in earlier years, while the second and third quintile groups benefited more. In recent years, the income share of the fourth

quintile group was reduced by less than in earlier years, but the share of the top quintile group was reduced by more.

These changes do not point unambiguously either to an increase or decrease in income inequality due to cash benefits. In fact they were due primarily to changes in the position of retired households in the income distribution, mainly between 1977 and 1996/97 (Jones *et al* 2008). Retired households receive a large proportion of total cash benefits (mainly due to the state pension), so the impact of cash benefits across the income distribution depends to quite a large extent on the position of retired households in the income distribution.

The ROI analysis also calculates Gini coefficients to measure inequality for

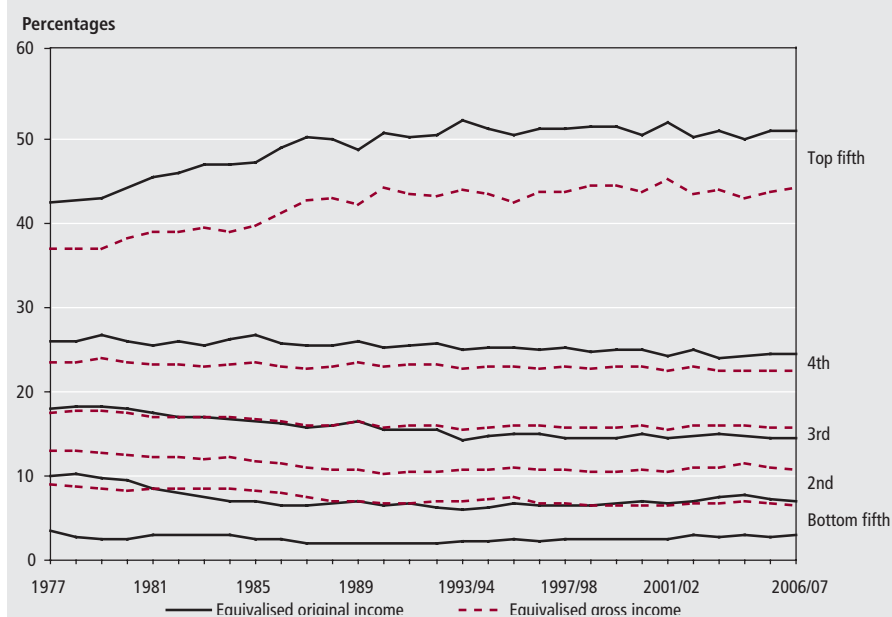
Figure 5
Income from child or education-related benefits in 2006/07 prices



Note:

- 1 Working families tax credit (1999 to 2003), family credit (1988 to 1999), family income supplement (before 1988).

Figure 6
Shares of total original and gross income by quintile group¹



Note:

- 1 Households are ranked by equivalised disposable income.

each measure of income. A comparison of the Gini coefficients for original and gross income also suggests that there was no long-term change in the effect of cash benefits on income inequality. In 1977, cash benefits reduced the Gini coefficient from 43 per cent for original income to 29 per cent for gross income. In 2006/07, although inequality had increased, the size of the

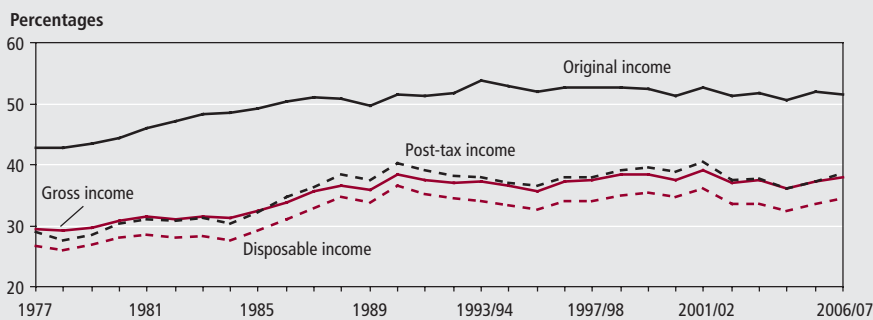
reduction was the same, from 52 to 38 per cent (**Figure 7**).

While there was no long-term change in the impact of cash benefits on income inequality, over the shorter term, the extent of redistribution through cash benefits is highly cyclical. This is apparent if the short-term trend in the Gini coefficient for original income is compared with that

for gross income (and the other income measures).

A good indicator of the extent of this redistribution through cash benefits is the proportion of total gross household income that they provide. During and following the recessions of the early 1980s and early 1990s, cash benefits contributed a substantially higher proportion of gross income than in other periods (**Figure 8**). Cash benefits accounted for 17 per cent of gross household income in 1984, and 16 per cent in 1993/94, compared with an average of 14 per cent over the whole period. In the early 2000s, there was a smaller increase in cash benefits as a proportion of household income. However, this was not the result of recession, but due to increased income from the state retirement pension and tax credits. In 2006/07, this proportion fell slightly compared with the previous year, and in fact was very close to its level in the late 1970s.

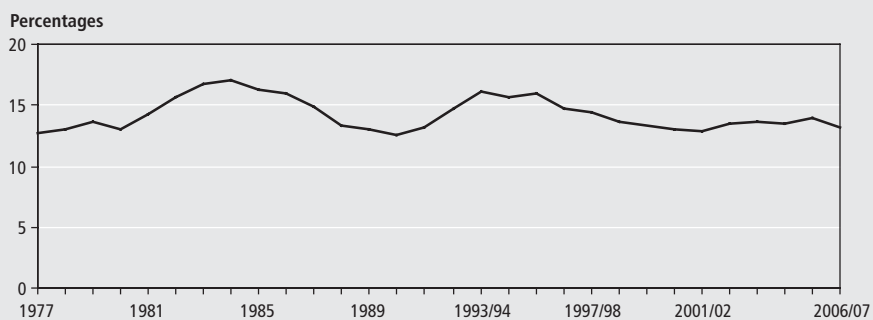
Figure 7
Gini coefficients¹



Note:

- 1 See technical note 6 for an explanation of the Gini coefficient.

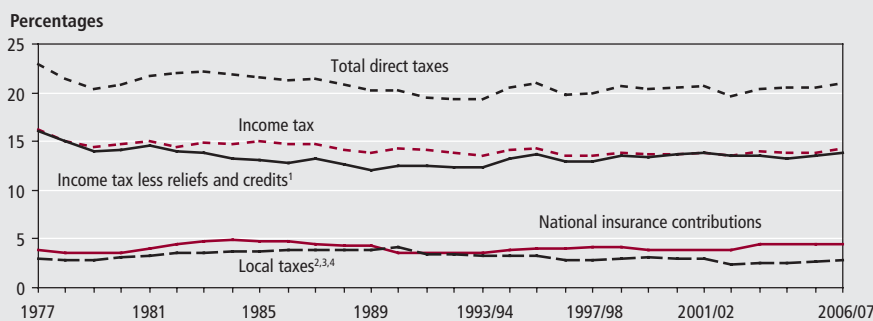
Figure 8
Income from cash benefits as a percentage of gross income¹



Note:

- 1 Unequalised.

Figure 9
Direct taxes as a percentage of gross income



Notes:

- 1 Reliefs and credits includes mortgage interest relief at source until 2000, and tax credits from 2003/04 – see technical note 1.
- 2 Includes domestic rates until 1990, community charge between 1989 and 1992, and council tax from 1993/94 onwards.
- 3 From 2002/03 onwards, there was a change in the treatment of water charges – see technical note 2.
- 4 From 1996/97 onwards, there was a change in the treatment of council tax benefit – see technical note 4.

Direct taxes

In the ROI analysis, direct taxes consist of income tax, national insurance contributions and local taxes. Over the last 30 years, direct taxes accounted for between 19 and 23 per cent of gross household income (**Figure 9**). Direct taxation as a proportion of gross income fell in the late 1970s due to income tax cuts, but then rose in the early 1980s due to rises in national insurance contributions. Then, through the late 1980s, direct taxes fell from around 22 per cent to below 20 per cent of gross household income at the start of the 1990s. This was due to cuts in both income tax rates and the rate for national insurance contributions. However, in the early 1990s, direct taxes increased again, to around 20 or 21 per cent of household income. This increase was partly due to restrictions on mortgage interest tax relief and then a further increase to the national insurance contribution rate. Major changes to direct taxes over this period are listed in **Box 1**.

Since the mid-1990s, direct taxes have remained around 20 or 21 per cent of household income. Since 2003/04, tax credits, some of which are treated as negative income tax, have reduced the effective rate of income tax by about 0.5 percentage points (technical note 1 describes the ROI's treatment of tax credits). Figure 9 shows a fall in average payment of total direct taxes in 2002/03 which was caused by a fall in local taxes. In fact this was largely due to a definitional change relating to water charges, which were no longer included in local taxes from 2002/03

Box 1

Major changes to direct taxes 1977 to 2006/07

Income tax

- Standard rate cut from 34 to 30 per cent, top rate cut from 83 to 60 per cent (1977/78 to 1979/80).
- Standard rate cut from 30 per cent to 25 per cent (1985/86 to 1988/89).
- Top rate of income tax reduced to 40 per cent (1988/89).
- Mortgage interest relief at source (MIRAS) restricted (1990s) then abolished (2000).
- Starting rate of 20 per cent introduced (1992/93), later reduced to 10 per cent (1999/2000).
- Standard rate cut from 25 to 22 per cent (1995/96 to 2000/01).
- Married couple's allowance abolished for people born after 1935 (2000/01).
- Decline in the value of the single person's allowance relative to earnings (mid-1980s to 2006/07).
- Introduction of working families' tax credit (1999/2000), children's tax credit (2001/02), which were then replaced with the child tax credit and working tax credit (2003/04).

National insurance contributions

- Employee contribution rate increased from 5.75 to 9 per cent of all earnings (1977/78 to 1983/84).
- Introduction of tiered lower rates of 5 and 7 per cent for low earners (1985/86).
- Tiered rates replaced with a rate of 2 per cent (the main contribution rate remained at 9 per cent) (1989/90).
- Main employee contribution rate increased to 10 per cent (1994/95).
- Employee contribution rate increased to 11 per cent and a new 1 per cent rate was introduced for all earnings above the upper earnings limit (2003/04).

Local taxes

- The community charge replaced domestic rates in 1989/1990 (except in Northern Ireland).
- The council tax replaced the community charge from 1993/94 (except in Northern Ireland).

onwards. Comparisons of tax payments before and after 2002/03 are therefore affected by this change, which is described in more detail in technical note 2.

Direct taxes by quintile group

The effect of at least some of the changes described above can be seen in the direct tax burden upon each quintile group (Figure 10). It should be remembered that changes in direct tax paid by each quintile group will reflect not only changes in the tax system but also changes in the underlying income distribution upon which the tax system acts. It is not possible to separate these two effects.

The income tax cuts of the late 1970s benefited the lowest quintile groups most. The direct tax cuts of the late 1980s benefited the middle and upper quintile groups. The cuts in the standard rate of income tax through the late 1980s reduced direct taxes as a proportion of household

income for households in the third and fourth quintile group, while the reduction in the top rate of tax in 1988/89 benefited the top quintile group in particular. However, the tax rises of the early 1990s worked in the opposite direction and the restrictions on mortgage interest tax relief, in particular, impacted most upon the upper three quintile groups (Table 1).

Over the period as a whole, there was a reduction in total direct taxes paid by households in the lower quintile groups as a proportion of their gross income, and only direct taxes for the top quintile group remained at about the same level. This steady reduction in the level of direct taxes for lower quintile groups took place between 1977 and the mid-1990s and was due primarily to falls in the payment of income tax (Table 1). Between the mid-1990s and 2006/07, the discontinuity in 2002/03 discussed above makes interpretation rather difficult. The

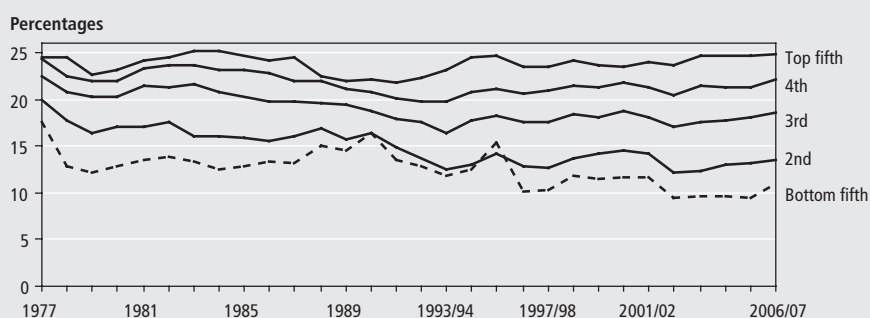
rate for national insurance contributions was increased from 2003/04 and this led to some increase in total direct tax payments mainly for the upper three quintiles.

The fall in the average proportion of gross income paid out in income tax by each of the lowest four quintile groups, which took place between 1977 and the mid-1990s, was due in part to reductions in income tax rates. For example, the standard rate of income tax was reduced from 34 per cent in 1977/78 to 24 per cent in 1996/97, with the largest cuts coming in the late 1970s, and the late 1980s.

The higher rates of income tax, paid mainly by people living in households in the upper part of the income distribution, were also cut substantially between 1977 and the mid-1990s. In 1977/78, taxable earnings over £24,600 (in 2006/07 prices) were taxed at 40 per cent, with tiered higher rates, the highest of which was 83 per cent applicable to all taxable earnings over £86,100 (in 2006/07 prices). After a major reduction in 1979/80, these tiered higher rates were reduced again in 1988/89 to a single top rate of income tax of 40 per cent. However, while higher rates of income tax were cut, there were increases in the number of higher rate taxpayers (HMRC 2008), and in the proportion of total household gross income subject to higher rate tax.

Whereas the proportion of gross income paid in income tax by households in lower quintile groups fell, that paid by households in the top quintile group remained about 18 or 19 per cent, and total direct tax as a proportion of gross income for the top quintile group was effectively the same in 2006/07 as in 1977.

Figure 10

Direct taxes as a percentage of gross income by quintile group¹

Note:

1 Households are ranked by equivalised disposable income.

Table 1
Direct taxes as a percentage of gross income by quintile group

	Income quintile groups of all households ¹					Percentages
	Bottom	2nd	3rd	4th	Top	All households
Income tax						
1977	9.1	12.4	15.3	17.6	18.6	16.2
1981	5.1	9.4	14.0	16.4	18.6	15.0
1986	3.7	7.3	12.4	15.8	18.9	14.7
1991	3.4	7.1	11.6	14.7	18.3	14.2
1996/97	3.8	6.4	10.6	13.5	17.9	13.5
2001/02	3.2	6.9	10.3	13.5	18.4	13.8
2006/07	4.3	7.7	11.3	14.2	18.6	14.3
less tax reliefs (including MIRAS and tax credits)²						
1977	0.1	0.2	0.2	0.1	0.1	0.1
1981	0.4	0.4	0.5	0.5	0.5	0.5
1986	0.9	1.2	1.9	2.0	2.1	1.9
1991	0.9	1.3	1.8	2.0	1.8	1.7
1996/97	0.5	0.5	0.6	0.6	0.5	0.6
2001/02	0.0	0.0	0.0	0.0	0.0	0.0
2006/07	0.7	1.3	0.8	0.4	0.1	0.4
Employees' national insurance contributions						
1977	2.5	3.6	4.2	4.3	3.8	3.9
1981	1.8	3.4	4.5	4.6	3.9	4.0
1986	1.5	3.1	5.0	5.7	4.8	4.7
1991	1.1	2.6	3.9	4.4	3.6	3.6
1996/97	1.3	2.7	4.2	5.0	4.2	4.0
2001/02	1.2	2.4	4.0	4.8	3.9	3.8
2006/07	1.6	3.1	4.6	5.6	4.5	4.4
Local taxes^{3,4,5}						
1977	6.2	4.1	3.1	2.6	2.1	3.0
1981	7.2	4.8	3.5	2.8	2.2	3.3
1986	9.1	6.4	4.2	3.3	2.4	3.9
1991	9.8	6.3	4.2	3.0	1.7	3.4
1996/97	5.6	4.3	3.4	2.7	1.8	2.8
2001/02	7.3	4.8	3.8	2.9	1.8	3.0
2006/07	5.7	4.0	3.5	2.7	1.7	2.8
Total direct taxes						
1977	17.6	20.0	22.4	24.4	24.4	22.9
1981	13.5	17.1	21.4	23.3	24.2	21.8
1986	13.4	15.5	19.7	22.8	24.1	21.3
1991	13.5	14.8	17.9	20.1	21.8	19.5
1996/97	10.2	12.9	17.6	20.6	23.4	19.8
2001/02	11.6	14.1	18.1	21.3	24.0	20.7
2006/07	10.9	13.5	18.5	22.2	24.8	21.0

Notes:

- Households are ranked by equivalised disposable income.
- Includes mortgage interest relief at source (MIRAS) and tax credits from 2003/04 onwards – see technical note 1.
- Includes domestic rates until 1990, community charge between 1989 and 1992, and council tax from 1993/94 onwards.
- There is a discontinuity in this series between 1995/96 and 1996/97 associated with the treatment of council tax benefit. See technical note 4 for more details.
- There is a discontinuity in this series between 2001/02 and 2002/03 associated with the treatment of water charges. See technical note 2 for more details.

Changes in payments of national insurance contributions and local taxes had less impact on the proportion of gross income paid in direct tax by each quintile group.

The result of changes in the distribution of gross income, combined with these changes in the proportion of gross income paid in direct tax, was that, over the period between 1977 and the mid-1990s, the proportion of total direct taxes paid by the

top quintile group increased significantly, while that paid by the other four quintile groups declined (**Figure 11**). These proportions remained relatively constant from the mid-1990s onwards.

The effect of direct taxes on the income distribution

The overall impact of direct taxes on the income distribution can be illustrated by a comparison of the distributions of

equivalised gross and disposable income, that is, income before and after payment of direct taxes (**Figure 12**). The progressive nature of direct taxes is clear. The income shares for the bottom and second quintile groups increase after taxation, while that for the top quintile group declines. It can be seen that the direct tax cuts of the late 1980s reduced this progressive effect of direct taxes, while the direct tax rises of the early 1990s had the opposite effect.

The impact of changes in the overall rate of direct taxation paid by each quintile group was small, compared with the impact of increased inequality of gross income. From 1992 onwards, direct taxes reduced the income share of the top quintile group by an average of 2.1 percentage points, compared with an average of 1.4 percentage points before 1992. Over the same periods, the income shares of the second and third quintile groups were very slightly greater due to these changes in the impact of direct taxes. There was no major change in the impact of direct taxes between 1996/97 and 2006/07.

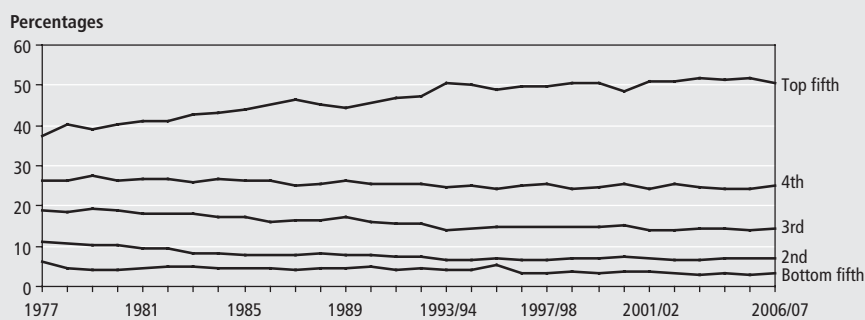
Taking into account the increase in inequality of gross income during this period, it becomes clear why the changes in tax rates described above had a relatively small effect on the income distribution. Between 1977 and 1996/97, real equivalised gross income of the bottom quintile group increased by 16 per cent, compared with 80 per cent for the top quintile group. In this context, the fact that direct taxes for the bottom quintile group fell more than those for the top quintile group (from 18 to 10 per cent compared with 24 to 23 per cent) made relatively little difference. While direct taxes did reduce income inequality slightly more from the mid-1990s onwards, changes in the distribution of gross income were much more important in explaining changes to the distribution of disposable income.

Indirect taxation

While most analyses of the income distribution are based on the distribution of disposable income, the ROI analysis additionally includes assessments of the impact of indirect taxes and benefits in kind on household income. Indirect taxes are those incurred by households when they purchase goods and services. Indirect taxes also include an estimate for payment of intermediate taxes, that is, indirect taxes incurred by businesses which are deemed to be passed onto consumers through the prices that they pay for goods and services.

Overall, indirect taxes account for

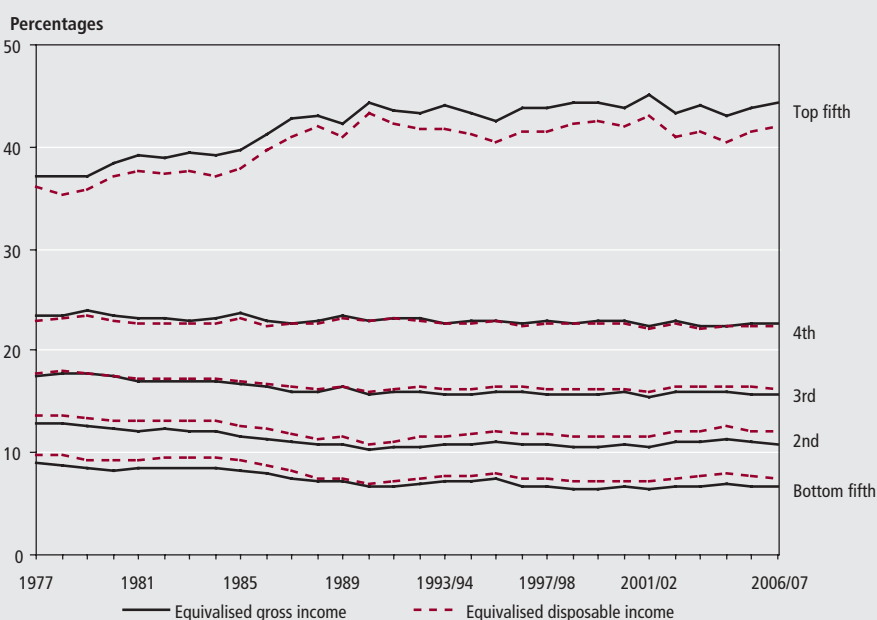
Figure 11
Shares of total direct tax payment by quintile group¹



Note:

1 Households are ranked by equivalised disposable income.

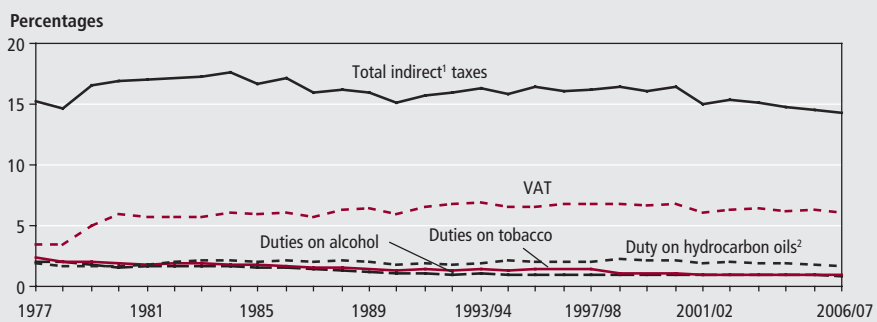
Figure 12
Shares of total gross and disposable income by quintile group¹



Note:

1 Households are ranked by equivalised disposable income.

Figure 13
Indirect taxes as a percentage of gross income



Notes:

- 1 Includes intermediate taxes – indirect taxes paid by businesses which are deemed to be passed onto consumers through the prices they pay for goods and services.
- 2 Includes vehicle taxes.

a slightly smaller proportion of gross household income than direct taxes. After the increase in the rate of VAT in 1979, indirect taxes accounted for around 17 per cent of gross household income, declining slightly to around 16 per cent in the late 1980s and remaining at a similar level during the 1990s (Figure 13).

In the early 2000s, estimates of indirect tax as a proportion of income fell further. The sudden fall in 2001/02 may be explained by a discontinuity introduced by the move from the FES to the EFS, when it appears there was a change in the relationship between estimates of income and expenditure. This change is described in more detail in technical note 3. However, in the years after 2001/02, for which estimates should be comparable, indirect taxes as a proportion of gross income continued to decline. Falls in duty payments on tobacco, alcohol, hydrocarbon oils and vehicle taxes all contributed to this decline.

VAT is the largest indirect tax and, in 2006/07, payments of VAT accounted for 6 per cent of gross household income. Payments of VAT increased after a new unified rate of 15 per cent was introduced in 1979, replacing the previous standard and higher rates of 8 and 12.5 per cent. The burden of VAT increased further in 1991 when the standard rate was increased to 17.5 per cent.

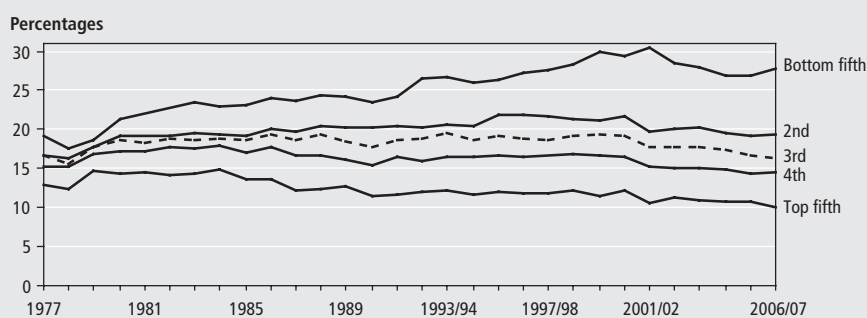
Between 1977 and 2006/07, payments of duties on tobacco gradually decreased from about 2 per cent of gross income to around 1 per cent. This decline was due to the fact that total consumption of tobacco fell by more than half over this period.

Duties on alcohol also declined as a proportion of household income over the same period, similarly from about 2 to 1 per cent. However, this fall was due to the fact that duties on alcohol have risen much more slowly than the prices of alcoholic drinks, and even more slowly than average incomes. In fact, the decline in the burden of alcohol duties would have been much greater were it not for the large increase in the volume of consumption of alcoholic drinks, which more than doubled between 1977 and 2006/07.

Duty on hydrocarbon oils and vehicle taxes accounted for approximately 2 per cent of gross income throughout this period, with duty on hydrocarbon oils accounting for the majority of this. Between 1998/99 and 2006/07, these duties fell from 2.3 per cent of gross income to 1.7 per cent, largely due to the demise of the fuel duty escalator in 2000.

Other indirect taxes included in the

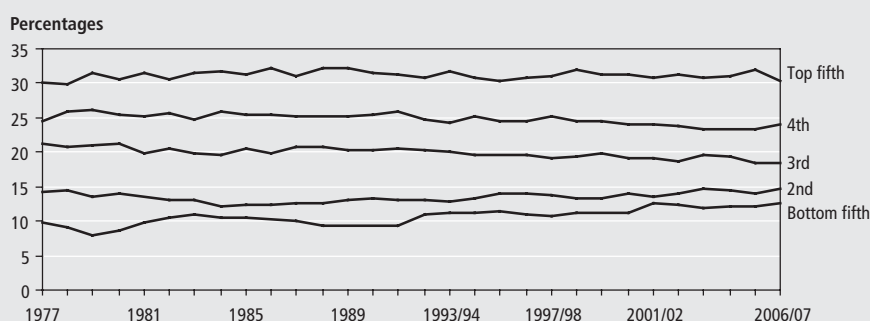
Figure 14
Indirect taxes as a percentage of gross income by quintile group¹



Note:

1 Households are ranked by equivalised disposable income.

Figure 15
Shares of total indirect tax payment by quintile group¹



Note:

1 Households are ranked by equivalised disposable income.

analysis are the TV licence, betting taxes, customs duties, stamp duty (all owner-occupier households are assigned a notional stamp duty liability), and intermediate taxes.

Indirect taxes by quintile group

In contrast to direct taxes, the overall impact of indirect tax is regressive, meaning that low-income households pay a higher proportion of their gross income in indirect taxes, compared with high-income households (**Figure 14**). In addition, the proportion of gross income paid in indirect taxes by low-income households has increased over the last 30 years, while that for high-income households has fallen.

Indirect taxes had an increasingly regressive effect because, while the distribution of gross and disposable income became more unequal, the proportions of total indirect tax paid by each quintile group changed much less, with the bottom quintile group actually paying a slightly increased share of total indirect tax (**Figure 15**).

The proportion of total indirect tax paid by the bottom quintile group increased partly due to a decline in the proportion of retired households in the bottom quintile group (Jones *et al* 2008). The non-

retired households which replaced them at the bottom of the income distribution would generally have had much higher expenditure, and therefore paid more indirect tax.

Households in the bottom quintile group paid an increasing proportion of VAT. They also paid higher proportions of total duties on alcohol, hydrocarbon oils and tobacco. In the case of alcohol and hydrocarbon oils, this was due to faster growth in consumption of these goods by households in the bottom quintile group, compared with those in higher quintile groups. In the case of tobacco, it was a due to a slower decline in consumption.

The proportion of total indirect tax paid by the top quintile group remained effectively unchanged. While the disposable incomes of these households increased, their expenditure did not increase as rapidly, and fell as a proportion of disposable income. In 1978, average expenditure by the top quintile group represented 85 per cent of disposable income compared with 73 per cent in 2006 (households ranked by unequivalised gross income – see also technical note 3). Households in the top quintile group also paid a declining proportion of total duties.

During the 1980s and 1990s, inequality of total expenditure increased less than inequality of income (Goodman and Oldfield 2004). This also helps to explain why payment of indirect taxes did not become more unequal. Goodman and Oldfield suggested several reasons why expenditure inequality increased less than income inequality including increased volatility of income over time for some households, and the increased use of credit to smooth expenditure over time.

Increased inequality of income also meant that payments of indirect tax represented a higher proportion of gross income for low-income households compared with high-income households, for example payments of VAT (**Table 2**). The burden of alcohol and tobacco duties fell much more slowly for low-income households while duties on hydrocarbon oil and vehicle taxes also became more regressive in their effect. Estimates of indirect tax as a proportion of gross income for the bottom quintile are affected by households for which expenditure exceeds disposable income – see technical note 7.

In the late 1970s and early 1980s, duties on alcohol were actually a progressive form of taxation – they accounted for a higher proportion of gross income for high-income households than for low-income households. Since the mid-1980s, duties on alcohol have been regressive, and gradually became more regressive.

The effect of indirect taxes on the income distribution

Like direct taxes, the impact of indirect taxes can be illustrated by comparing the distribution of equivalised disposable and post-tax income (**Figure 16**). This shows that, throughout the period, indirect taxes increased income inequality, and that, between 1977 and the early 1990s, they became a little more regressive in their impact. Between the early 1990s and 2006/07, their impact was relatively unchanged.

At the end of the 1970s, as a result of indirect taxes, the income share of the top quintile group increased by about 1 percentage point. This effect gradually increased and, from the early 1990s onwards, indirect taxes increased the income share of the top quintile group by at least 2 percentage points. Indirect taxes had no effect on the income share of the lower two quintile groups in the late 1970s, but from the early 1990s onwards indirect taxes reduced the income share of the bottom quintile group by about 1 percentage point,

Table 2
Indirect taxes as a percentage of gross income by quintile group

	Income quintile groups of all households ¹					Percentages
	Bottom	2nd	3rd	4th	Top	All households
VAT						
1977	3.9	3.6	3.8	3.6	3.3	3.5
1981	6.4	5.9	5.9	5.8	5.3	5.7
1986	7.3	6.4	6.7	6.4	5.4	6.1
1991	8.2	7.5	7.4	6.9	5.3	6.5
1996/97	10.2	8.4	7.7	7.0	5.5	6.8
2001/02	11.5	7.5	7.0	6.3	4.7	6.1
2006/07	11.0	7.6	6.7	6.3	4.5	6.1
Duty on alcohol						
1977	1.8	1.7	2.1	2.1	2.0	2.0
1981	1.5	1.5	1.7	1.8	1.6	1.7
1986	1.7	1.6	1.7	1.7	1.4	1.5
1991	1.3	1.3	1.2	1.2	0.8	1.1
1996/97	1.3	1.3	1.1	1.0	0.7	0.9
2001/02	1.6	1.0	1.0	0.9	0.6	0.9
2006/07	1.3	0.9	0.9	0.8	0.5	0.8
Duty on tobacco						
1977	4.1	3.3	2.9	2.3	1.5	2.4
1981	3.6	2.7	2.4	1.8	1.0	1.8
1986	4.3	3.1	2.2	1.7	0.8	1.7
1991	3.9	2.8	1.9	1.3	0.5	1.4
1996/97	4.1	2.9	1.8	1.2	0.5	1.4
2001/02	3.1	1.8	1.6	0.9	0.3	1.0
2006/07	2.5	2.0	1.2	0.8	0.3	0.9
Duty on hydrocarbon oils and vehicle taxes						
1977	1.8	1.9	2.1	2.0	1.7	1.9
1981	1.8	1.8	2.0	2.0	1.7	1.8
1986	2.1	2.1	2.5	2.3	1.8	2.1
1991	2.3	2.2	2.4	2.2	1.4	1.9
1996/97	2.7	2.4	2.4	2.2	1.5	2.0
2001/02	3.4	2.4	2.4	2.1	1.3	1.9
2006/07	3.0	2.3	2.1	1.9	1.2	1.7
Other indirect taxes						
1977	1.4	1.1	1.0	0.9	0.7	0.9
1981	1.6	1.3	1.1	1.0	0.8	1.0
1986	2.2	1.7	1.4	1.3	0.8	1.2
1991	2.1	1.6	1.3	0.9	0.6	1.0
1996/97	2.8	2.1	1.7	1.3	0.8	1.4
2001/02	2.9	2.0	1.7	1.3	0.9	1.4
2006/07	2.7	1.9	1.5	1.4	1.1	1.4
Intermediate taxes²						
1977	6.1	5.0	4.8	4.4	3.8	4.5
1981	7.3	5.9	5.3	4.8	4.2	5.0
1986	6.5	5.3	4.9	4.3	3.5	4.4
1991	6.4	5.1	4.6	3.9	3.0	3.9
1996/97	6.1	4.8	4.2	3.6	2.8	3.7
2001/02	8.0	5.1	4.2	3.7	2.7	3.7
2006/07	7.2	4.7	3.9	3.3	2.4	3.4
All indirect taxes						
1977	19.2	16.7	16.7	15.2	12.9	15.2
1981	22.1	19.1	18.2	17.2	14.5	17.0
1986	24.0	20.1	19.3	17.7	13.7	17.1
1991	24.2	20.4	18.7	16.4	11.7	15.7
1996/97	27.2	21.9	18.9	16.4	11.8	16.1
2001/02	30.4	19.8	17.8	15.2	10.5	15.0
2006/07	27.8	19.4	16.3	14.5	10.1	14.3

Notes:

- Households are ranked by equivalised disposable income.
- Indirect taxes paid by businesses which are deemed to be passed onto consumers through the prices they pay for goods and services.

and the second quintile group by about 0.5 percentage points. Between the early 1990s and 2006/07, the effect of indirect taxes on the income distribution remained relatively stable.

The combined impact of direct and indirect taxes

The combined impact of direct and indirect taxes can be seen by comparing the distributions of equivalised gross and post-tax income (**Figure 17**). Direct taxes reduce income inequality and their impact became a little stronger over the period between 1977 and the mid-1990s, remaining fairly constant thereafter. Indirect taxes increase income inequality, and their impact became slightly stronger between 1977 and the early 1990s, then remained relatively constant. So, direct and indirect taxes had opposite impacts, and even the ways in which those impacts changed over time largely cancelled each other out. The distribution of post-tax income was remarkably similar to the distribution of gross income over the last 30 years.

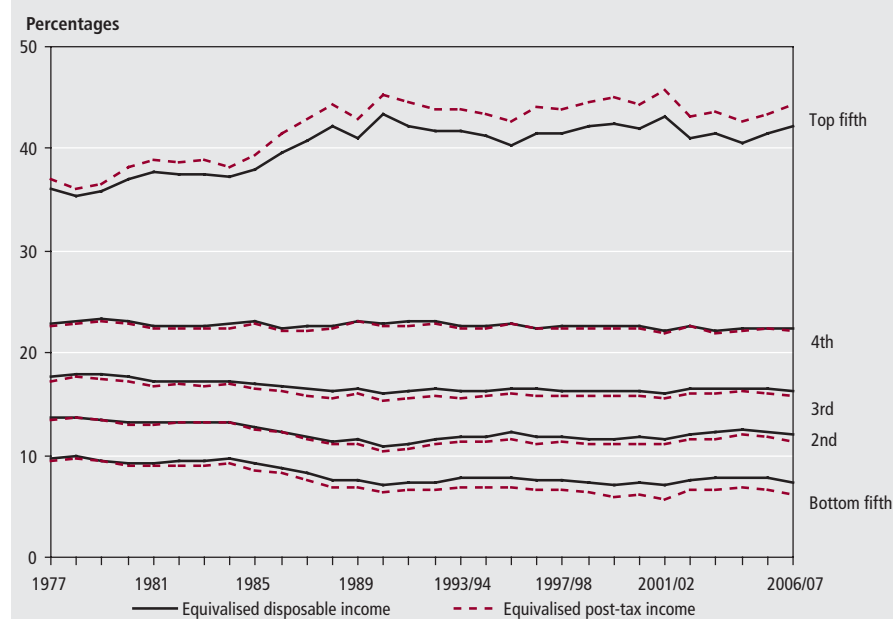
Benefits in kind

The final step in the ROI analysis is to estimate the value to households of services provided by the state either free or subsidised at the point of use. By far the most important services for which imputations are made are health and education services. Households are assigned nominal income to reflect their use of these services, based on the estimated cost of provision. So, for example, households with children in state education or students in universities are assigned a benefit in kind from the education service. All households are assigned a benefit in kind from the NHS, which is intended to reflect expected (rather than actual) use of NHS services, based on the age and sex characteristics of household members.

The estimation of these benefits in kind is based on limited information, and takes no account of changes in public sector productivity. As such they provide a broad indication of the way in which households in different parts of the income distribution are beneficiaries of government spending on these services, but are not an accurate measure of their real value to households.

The value of the NHS benefit increased more rapidly in real terms than that for education (**Figure 18**), reflecting real terms increases in government spending on the NHS, particularly since 2000. In 1977, the NHS and education benefits

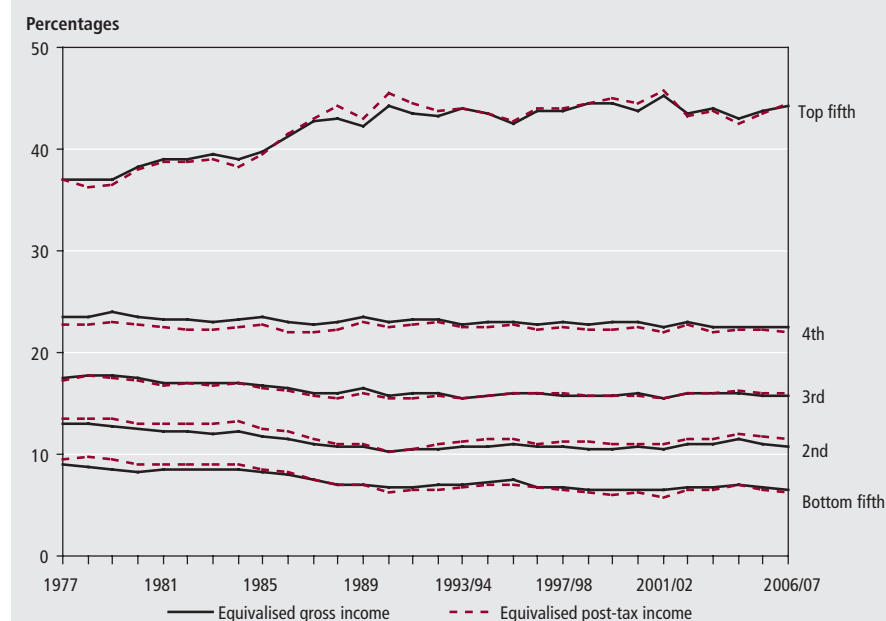
Figure 16
Shares of total disposable and post-tax income by quintile group¹



Note:

1 Households are ranked by equivalised disposable income.

Figure 17
Shares of total gross and post-tax income by quintile group¹



Note:

1 Households are ranked by equivalised disposable income.

each represented about 10 per cent of post-tax income on average. By 2006/07, the NHS benefit represented 15 per cent of post-tax income, compared with 9 per cent for the education benefit. Subsidy of public transport services is also allocated to households based on assumptions about the use of public transport. The real value of this subsidy has declined over this period. Public subsidy of social housing also fell in the early 1980s as government policy moved

away from subsidising rents directly. This coincided with the introduction of housing benefit through which payments were made directly to tenants, recorded in this analysis as part of cash benefits.

While the NHS benefit has increased, the way in which it is allocated across the income distribution has changed very little (Table 3). The lower two quintile groups receive between 22 and 24 per cent of the total NHS benefit, the third quintile group

about 20 per cent, the fourth 18 per cent and the top about 15 per cent.

The NHS benefit is estimated based on assumptions about the expected cost of providing health care to people of a given age and sex. The imputed benefit is highest for retired households, particularly where members of the household are above the age of 75. It is also higher for households with children. While there has been a decrease in the number of retired households in the bottom quintile group, their place has been taken, at least in part, by households with children. So this change in the composition of the income distribution had relatively little impact upon the way in which the NHS benefit was allocated across the income distribution.

The education benefit is allocated to households based on the number of children receiving state education in either special schools, or primary or secondary schools, and the number of students studying at universities. It is calculated based on the estimated cost per pupil (or student) of providing these services. The allocation of the education benefit reflects the position of children and university students within the income distribution. With the increase in the proportion of children in the bottom quintile group between 1977 and the mid-1990s, the education benefit was gradually directed more towards this part of the income distribution.

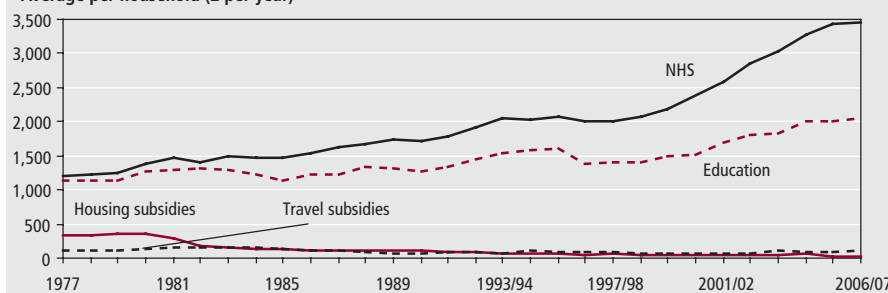
The ROI analysis does not calculate equivalised final income as equivalisation is not appropriate for nominal income from benefits in kind. However, an indication of the impact of benefits in kind is provided by a comparison of the shares of unequivalised post-tax and final income (Table 3). Benefits in kind appear to have slightly more of an equalising effect than was the case in the past. In 1977, benefits in kind increased the income share of the bottom quintile by 2.7 percentage points, while in 2006/07 they increased it by 4.1 percentage points. Conversely, in 1977, benefits in kind reduced the income share of the top quintile group by 4.3 percentage points, while in 2006/07 they reduced it by 6 percentage points.

Conclusion

The effect of each stage of redistribution on the Gini coefficient provides a useful summary indicator of the effect on the income distribution. Figure 19 shows the change in the Gini coefficient after each successive stage of redistribution (excluding

Figure 18
Income¹ from benefits in kind in 2006/07 prices

Average per household (£ per year)

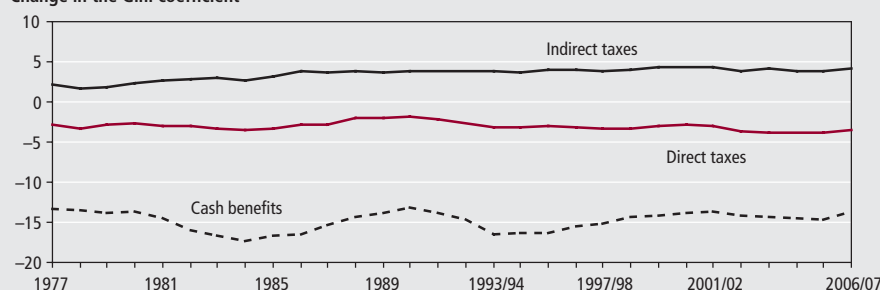


Note:

- 1 Nominal income assigned to households to reflect their use of services provided by the state either free or subsidised at the point of use.

Figure 19
Changes in the Gini coefficient¹ after each stage of redistribution

Change in the Gini coefficient



Note:

- 1 See technical note 6 for an explanation of the Gini coefficient.

the final stage, final income, for which no Gini coefficient is calculated).

Cash benefits have the largest impact on income inequality, reducing the Gini coefficient substantially. Their effect on inequality varied over time, mainly due to economic cycles, but there is no evidence of any underlying change in their impact on inequality over the last 30 years. Apart from cyclical variations, cash benefits contributed a similar proportion of total gross household income, and continued to go predominantly to low income households.

Direct taxes are generally progressive and so reduce income inequality, although less than cash benefits. On average, they reduced inequality slightly more from the mid-1990s onwards compared with earlier years. Indirect taxes tend to be regressive and so they increase income inequality. The extent to which they increased inequality grew between 1977 and the start of the 1990s, remaining relatively stable thereafter. Over the last 30 years, direct and indirect taxes had opposite effects on income inequality, which tended to cancel each other out. Therefore, the tax system as a whole played a relatively small role in changes to post-tax income inequality over this period.

Datasets

The data appearing in figures and tables in this article, and also the underlying datasets upon which the analysis is based, are available for download from www.statistics.gov.uk/statbase/product.asp?vlnk=10336

ACKNOWLEDGEMENTS

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Office for National Statistics 'The effects of taxes and benefits on household income' at www.statistics.gov.uk/statbase/product.asp?vlnk=10336

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TECHNICAL NOTE

1. When they were introduced in 2003/04, the new child tax credit and working tax credit were treated as negative income tax, but only to the extent that income tax less tax credits remained greater than or equal to zero for each family. So, for households paying relatively little or no income tax, tax credit payments are still regarded either partially or wholly, as cash benefits.
2. Until 2001/02, the ROI analysis treated water charges as a local tax, whereas from 2002/03 they were regarded as expenditure. This change updated the analysis to reflect the water privatisation that had taken place in 1989. The effect of this change was to reduce the direct tax burden by approximately 0.8 percentage points, which contributed to the fall in the estimated tax burden in 2002/03.
3. From 2001/02, the Expenditure and Food Survey (EFS) replaced the Family Expenditure Survey (FES). The ratio between income and expenditure appeared to change from 2001/02 onwards. In the final years of the FES, average expenditure was equal to approximately 95 per cent of disposable income. In the period immediately following the introduction of the EFS, this figure was around 90 per cent. This change in the underlying relationship between income and expenditure in the survey meant that estimates of indirect tax (which are based on expenditure data) were lower when expressed as

Table 3

Shares of post-tax income, imputed income from benefits in kind and final income by quintile group

	Income quintile groups of all households ¹					Percentages	
	Bottom	2nd	3rd	4th	Top	All households	Average per household (£ per year, 2006/07 prices)
Post-tax income²							
1977	7.9	13.2	19.1	24.0	35.8	100	11,749
1981	8.0	12.6	18.2	24.2	37.0	100	12,989
1986	7.4	11.0	17.4	23.8	40.4	100	13,944
1991	5.8	10.1	16.8	24.3	43.0	100	16,932
1996/97	6.4	10.6	16.5	23.7	42.8	100	16,875
2001/02	5.6	10.5	16.0	23.4	44.5	100	20,480
2006/07	6.2	11.1	16.2	23.1	43.4	100	22,420
National Health Service							
1977	23.0	22.1	21.2	18.4	15.3	100	1,193
1981	23.8	22.8	20.0	18.5	14.9	100	1,469
1986	23.8	22.1	20.6	17.9	15.5	100	1,535
1991	23.7	22.7	20.6	18.0	15.0	100	1,794
1996/97	23.7	22.8	20.8	17.5	15.2	100	2,013
2001/02	23.6	23.2	19.8	18.2	15.2	100	2,595
2006/07	22.6	23.7	20.6	17.9	15.3	100	3,462
Education							
1977	19.0	22.9	26.6	19.2	12.2	100	1,144
1981	22.4	22.7	25.1	19.1	10.7	100	1,293
1986	23.0	19.4	25.7	19.1	12.8	100	1,234
1991	23.6	19.4	25.7	19.3	12.0	100	1,331
1996/97	29.7	21.2	20.6	17.6	10.8	100	1,387
2001/02	29.2	21.1	21.4	18.3	10.0	100	1,699
2006/07	32.9	21.1	20.1	15.9	10.0	100	2,042
Other benefits in kind							
1977	22.9	22.3	20.7	19.1	15.0	100	582
1981	25.6	23.6	19.0	18.5	13.1	100	512
1986	30.3	24.4	17.7	13.8	13.9	100	298
1991	32.7	25.1	16.1	12.8	13.3	100	222
1996/97	29.1	22.1	15.6	13.0	20.2	100	181
2001/02	33.4	24.9	15.4	12.6	13.7	100	142
2006/07	28.0	20.7	17.2	15.5	18.6	100	149
Total benefits in kind							
1977	21.4	22.5	23.2	18.8	14.0	100	2,923
1981	23.5	22.9	21.9	18.7	13.0	100	3,274
1986	24.1	21.3	22.4	18.0	14.3	100	3,064
1991	24.3	21.5	22.3	18.2	13.7	100	3,347
1996/97	26.3	22.1	20.5	17.3	13.8	100	3,581
2001/02	26.0	22.5	20.3	18.1	13.2	100	4,438
2006/07	26.5	22.7	20.3	17.1	13.4	100	5,651
Total final income²							
1977	10.6	15.1	19.9	23.0	31.5	100	14,672
1981	11.1	14.7	19.0	23.1	32.2	100	16,261
1986	10.4	12.8	18.3	22.7	35.7	100	17,009
1991	8.8	12.0	17.7	23.3	38.2	100	20,278
1996/97	9.9	12.6	17.2	22.6	37.7	100	20,456
2001/02	9.2	12.7	16.8	22.4	38.9	100	24,918
2006/07	10.3	13.4	17.0	21.9	37.3	100	28,071

Notes:

- 1 Households are ranked by equivalised disposable income.
 2 Unequalised.

a proportion of income, by around 1 percentage point. It appears that at least part of the fall in estimates of indirect tax as a percentage of gross income in 2001/02 was caused by the transition from the FES to the EFS.

4. Until 1995/96, rates rebates, community charge benefit and subsequently council tax benefit were treated as housing benefits. From 1996/97 onwards, council tax benefit was treated as a negative tax and deducted from council tax

payments. The effect of this change was to reduce the estimated tax burden by approximately 0.3 percentage points.

5. Over the period between 1977 and 2006/07, average household size declined from 2.8 people per household to 2.4 people per household. Whereas equivalised incomes are adjusted to take account of changes in household size and composition, a fall in average household size will reduce growth in average unequivalised household incomes. For example, average equivalised disposable income grew 109 per cent in real terms between 1977 and 2006/07, whereas average unequivalised disposable income increased by 87 per cent.
6. The Gini coefficient is a measure of income inequality taking values between 0 and 100, with higher values denoting higher levels of inequality. A value of 0 indicates complete equality in the distribution of household income (all households have the same equivalised income). A value of 100 indicates complete inequality (one household has all the income and the others have none). For further details see www.statistics.gov.uk/about/methodology_by_theme/gini/default.asp.
7. The deduction of indirect tax from disposable income to estimate post-tax income seems quite natural where household expenditure is less than disposable income, since indirect tax can be thought of as having been paid out of disposable income. However, for some households, in the bottom quintile group in particular, measured expenditure can be greater than measured income, sometimes by a wide margin. Where this reflects the real circumstances of the household (as opposed to measurement error), expenditure (and the payment of indirect taxes) are being funded, at least in part, by means other than disposable income, for example credit or savings. Estimates of indirect tax as a proportion of gross income for the bottom quintile are high, partly due to households for which expenditure exceeds income.
8. From 1996/97, ROI estimates are based on a sample weighted to adjust for differential rates of non-response. Prior to this date, estimates were based on an unweighted sample of responding households.
9. Company cars were included in the ROI definition of income from 1990. The effect of this change was to increase the Gini coefficient for equivalised disposable income by 0.5 percentage points (based on data for 1990).

FEATURE

Mavis Anagboso and Alison Spence
Office for National Statistics

Measuring defence

SUMMARY

This article describes current methods for measuring defence in the UK National Accounts, based on staff numbers and other inputs. It sets out proposals for improvements to these measures, making better use of information on the composition of military staffing and spending. It also discusses some innovative proposals for the direct measurement of defence output. One such measure could be based on activities, for example, the proportion of Armed Forces personnel engaged in military operations or training. Another measure could be of 'capabilities' based on the quality and readiness for use of personnel and equipment.

Until 1998, the conventional approach to measuring government output in the National Accounts involved using the volume of inputs as a proxy for output (otherwise known as the output = input convention). This approach means that change in productivity is zero over time because measured inputs will always be equal to output. Under the International System of National Accounts (SNA), it was agreed that government output should instead be measured through direct measures of the volume of output. This allows the possibility of comparing inputs and output to measure change in productivity.

Since the late 1990s, the Office for National Statistics (ONS) has adopted direct measures of output for some public services, with significant progress being made for services such as health, education and social security administration. However, defence is still measured using the output = input convention. This satisfies international standards, as defence is a collective service, that is, it is provided simultaneously to the whole society rather than to individuals.

This article summarises proposals raised in a separate article (Anagboso and Spence 2008). It discusses improvements that could be made to the existing measures of defence inputs in the National Accounts and sets out proposals for the direct measurement of defence output. Output measures being proposed in this article will not be considered for National Accounts.

Developmental work on the

measurement of defence inputs and output has been undertaken as part of ONS's commitment to continuously improve the methods it applies in the production of National Statistics.

Defence in the National Accounts

Defence activities can be broadly described as the administration, supervision and operation of military affairs and land, sea, air and space defence forces. In the National Accounts, defence is split into two categories: military defence, and other defence, with the latter making up around 0.1 per cent of defence spending. Other defence includes: civil defence, foreign military aid, defence research and development and defence not elsewhere classified.

The Ministry of Defence (MoD) is responsible for the Armed Forces, including the operation of military academies, the provision of services to military veterans and the provision of accommodation to military personnel. It works to support the Government's foreign policy objectives, particularly those relating to peace and security, and is the lead department in the government's policy of defence diplomacy through the North Atlantic Treaty Organisation (NATO), Western European Union and the United Nations. It also fulfils the administrative tasks of a department of state including answering parliamentary questions.

In 2007, current price expenditure on defence was £33.2 billion – this was 2.4 per

cent of GDP and 11.2 per cent of general government final consumption expenditure (GGFCE). Defence is the third largest government category as a proportion of total GGFCE spend, following health and education at 33.2 and 17.8 per cent of GGFCE, respectively.

Measuring defence inputs

An input is the collective term that defines all resources used to produce the output. Expenditure on inputs is broadly grouped into three categories: labour, goods and services, and capital.

Figure 1 shows the breakdown of defence current price expenditure between labour, goods and services, and capital consumption over time. The average proportions between 1996 and 2007 were: 56.8, 37.5 and 5.7 per cent for goods and services, labour, and capital, respectively. In 2007, the MoD spent £19.7 billion on goods and services, £11.8 billion on labour and £1.7 billion on capital consumption.

A volume measure of inputs is needed for comparison over time and for productivity analysis, since it removes the effects of inflation. There are two approaches to measuring the volume of inputs: direct and indirect.

A direct method uses the number of units of a certain input, ideally with disaggregation by different levels of quality.

An indirect method uses the deflated expenditure on a given input. Deflation removes the effects of pay or price change from a current price expenditure series, so the remaining change in expenditure is due to changes in the volume of inputs only.

If the data used to construct these measures were perfect, then the direct and indirect measure would give the same result. However, as this is rarely the case,

it is necessary to make a judgement as to which method gives the more accurate estimate.

Defence labour

The labour component of input measures the number, type and effort of staff used in the production process, for example, administrative staff, marines, pilots and soldiers. The MoD employs around 200,000 military personnel and 100,000 civilians, making it one of the UK's largest employers.

Direct estimates of the volume of labour

A direct estimate of the volume of labour should be based on numbers of staff employed, adjusted for hours worked and also for grade, military rank or skill level. Precision in measuring the changing skill mix of the workforce is important: an increase in the number of administrative staff would have a different impact on defence output than an increase in the number of fully trained Special Forces personnel.

Indirect estimates of the volume of labour

An indirect estimate of the volume of labour is obtained by deflating current price expenditure on labour by specific pay indices. An ideal pay index is specific to the workforce concerned, and is sensitive to any variations in pay rises for different types of staff, for example, taking a weighted average of the pay rise of administrative staff and Special Force staff, rather than just a simple figure based on (for example) the starting pay of a single type of staff.

The Eurostat Productivity Manual (Eurostat 2001) advocates a direct estimate of the volume of labour inputs, if appropriate data are available, because pay indices may

not be sufficiently relevant and reliable. In practice, the requirements for ideal direct and indirect estimates of the volume of labour require similar levels of disaggregated data. The choice of method depends on whether a measure of change in hours worked by different staff types, or change in their pay, is more specific and accurate.

Labour component of National Accounts – defence figures

The current National Accounts method is a direct estimate of the volume of labour, based on the number of full-time equivalent (FTE) staff (civilian and military) working on military defence activities, multiplied by the average wage across the entire military defence workforce in the year 2000. This is shown formally in the Appendix.

The current measure has two key flaws:

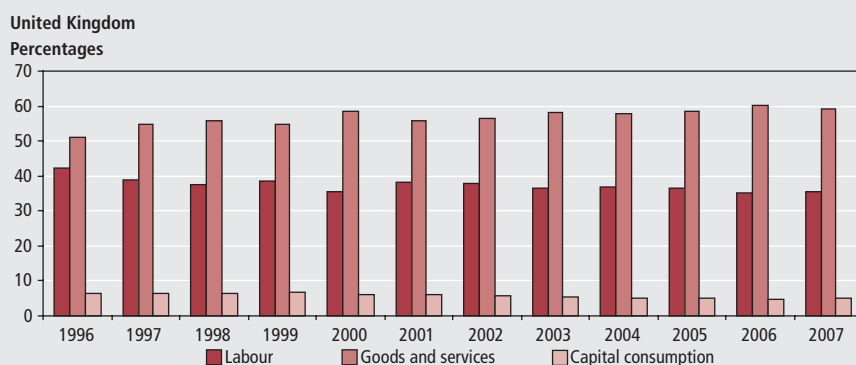
- the number of FTE staff is counted but no account is taken of skill. Measuring workers' skill is crucial to the measure of inputs since, all other things being equal, skilled workers contribute more to production than their less skilled counterparts do, and a shift in the relative proportions of skilled and unskilled workers could be expected to affect output, and
- using weights fixed to the year 2000 means that the weights will not reflect changes in pay

Data available from Defence Analytical Services and Advice (DASA), the MoD and ONS can be used to improve the current measure.

- The direct measure could be improved by disaggregating the number of FTE staff. Staff numbers can be broken down into service personnel by rank, and civilian personnel by grade, weighted by wage
- An indirect measure could be developed using the expenditure on staff, split into service and civilian personnel, broken down by rank/grade and then deflated using rank/grade specific pay indices. Pay indices are available by rank, for service personnel, but not by grade for civilians. In this case, civilian expenditure would have to be deflated using pay indices for the public sector

Subject to further assessment, the direct labour method is likely to be more accurate, based on relevance and specificity of available data.

Figure 1
Shares of current price expenditure on defence: by factors of production



Source: Office for National Statistics

Defence-specific labour issues

There are two particular issues for further consideration.

- Reserves – there are two types of reserves: regulars and volunteers. Regulars are people who have a liability by virtue of their former service in the regular forces; volunteers are those who have joined from the civilian community. Reservists are paid for training, and are paid if mobilised, and their employers are remunerated for any expenses incurred as a result of mobilisation. There is no doubt they should be included in the labour input measure as they work to produce defence, but consideration is needed, for a direct method, of how to weight their contribution relative to that of FTE active personnel. If an indirect measure is used, consideration is needed on the treatment of non-wage payments, such as payments to employers to cover the costs of recruiting temporary replacements
- Special allowances – when deployed, service personnel are given either or both of two allowances: operations allowance and longer-separation allowance. Operations allowances are paid when personnel are deployed in theatre, for example, Iraq and Afghanistan. Longer-separation allowances on the other hand are for separation and get paid irrespective of whether or not the service personnel are in theatre. These allowances can be described as compensation to them for being away from their families and, where applicable, the danger of being in combat. In a direct measure, these payments raise the question of whether time on active deployment should be weighted more highly than time spent training and other periods of duty

Goods and services

Goods and services are resources consumed during the production process. Examples of

goods and services procured by the MoD are facilities management from external companies; fuel for planes, ships and tanks; and uniforms for military personnel. As with labour, the volume of goods and services can be estimated either directly or indirectly.

Defence goods and services in the National Accounts

The volume of military defence goods and services in National Accounts is measured indirectly by deflating total military defence expenditure on goods and services by a weighted deflator. The weighted deflator is calculated using the proportion of spending by the government in the year 2000 on certain sections of the economy, and their corresponding deflators. This is shown formally in the Appendix.

There are a number of problems with the current measure:

- using weights fixed to the year 2000 means that the deflator will not change to reflect the spending patterns in the given year
- the weights are based on the spending in the public administration and defence category, but would be more accurate if they were based on defence alone. Ideally, the deflators should be specific to prices paid by the MoD for goods and services

Data from DASA, the MoD and ONS can be used to improve the current measure. The indirect measure could be improved by disaggregating the expenditure into groups, according to the Standard Industrial Classification, and deflating using the producer price indices for these groups.

Defence specific goods and services issues

There is a further significant issue with the current goods and services measure in that it includes expenditure on destructive military weapons designed for combat (see **Box 1**). This means that the whole

value of a relatively durable product (for example, a fighter jet) is included in the National Accounts in the year of purchase, rather than spreading the value of owning it over a period of years, as would be done if the products were treated as capital assets. This treatment is likely to make the time series for volume of goods and services more volatile than is really appropriate.

The current approach to the measurement of destructive military weapons is in line with the European SNA and SNA guidance. However, guidance on the measurement of durable military assets is likely to change under SNA 2008 such that durable destructive military assets should be capitalised as fixed assets rather than treated as goods and services. These changes are expected to be implemented in the National Accounts in the future and the UK Centre for the Measurement of Government Activity (UKCeMGA) intends to ascertain how this may affect the defence measures prior to their adoption in National Accounts.

Capital

Capital inputs to production are defined as either the consumption of capital (wealth), or the flow of services (production) from the available stock of capital assets of various vintages (Kimbugwe 2008). These two alternative measures of capital inputs are further discussed below.

Capital consumption is measured as the net reduction in the value of assets in a year, based on data on the value of the stock of assets, estimates of their remaining life, and the rate of depreciation.

Capital services measure the flow of productive services from an asset. For example, the productive services from a military building are the protection from the elements, and the comfort and storage capacity that the building provides each period. To calculate the volume index of capital services, a measure of the productive stock (capital stocks) and an estimated rental price is required. Estimates of capital

Box 1

Current treatment of military durable goods in the National Accounts

The 1993 SNA draws a distinction between two types of durable goods used by the military.

- Those 'that are used in much the same way as in any other type of production' – durable goods including airfields, docks, or other facilities used as bases, can potentially be used for civilian purposes, and are treated as fixed assets

- '....Destructive military weapons designed for combat' – rockets, missiles and their warheads and, by extension, missile silos, warships, submarines, fighter aircraft and bombers, and tanks are considered destructive, and are not treated as fixed assets. They are treated as intermediate consumption (goods and services) by general government

Source: UNstats (2003)

stocks are taken from the ONS perpetual inventory model (PIM) while the estimated rental can be modelled from data on the rate of depreciation, rate of return and the change in asset prices, if such data exist.

It is argued that a capital consumption measure does not capture the productive capacity of the asset, or measure capacity utilisation. On the contrary, it is argued that the interest on the cost of the purchase is productive, given that it is the cost of foregoing intermediate consumption.

Defence capital in the National Accounts

Military defence capital is currently included in the National Accounts as a capital consumption estimate. This traditional approach uses the ONS PIM to measure gross investment (new assets acquired), and the price of that new investment, while making some assumptions about how the quantity and value of older assets change over time – arithmetical depreciation.

The problems with the current measure are:

- capital consumption does not measure the services rendered from the capital stock
- the PIM estimates capital consumption using outdated data on depreciation rates which are not defence specific, and
- the current method excludes durable destructive military equipment such as submarines and tanks. This has been discussed in Box 1

The current method can be improved, using data available from DASA, HM Treasury (HMT) and ONS as follows:

- the capital consumption measure could be improved by including durable destructive military equipment and by using data more specific to defence, and
- a capital services method can be pursued if assets lives and estimates of rental rates could be modelled from DASA data. Asset prices could be observed using market transactions

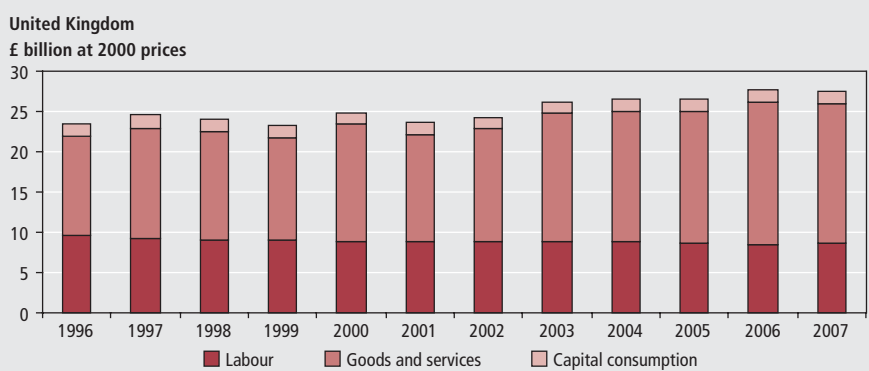
Inputs summary

Figure 2 shows the volume of labour, goods and services, and capital inputs used as a proxy for defence output in the National Accounts.

Defence output as currently measured in the National Accounts has grown by an annual average of 1.4 per cent between 1996

Figure 2

Volume of defence labour, goods and services and capital inputs



Source: Office for National Statistics

and 2007. It is not yet possible to say how this measure might change if the proposed improvements are made.

Measuring defence output

Defence output in the National Accounts is measured using the output = input convention, where the volume of output is equal to the volume of input. While this is acceptable by international standards, this does not preclude work to attempt to measure outputs separately.

A direct output measure would make it possible to analyse productivity change and 'there is an intrinsic case based on public accountability for seeking to measure what is achieved by spending on public services' (Atkinson 2005).

Measuring output directly would also be beneficial for stakeholders, such as MoD, HMT and the National Audit Office, as it would offer a high level measure of what the British public is getting for money spent on defence services. This is particularly important given the MoD's current position in which it is engaged in two separate, but equally challenging, theatres in Iraq and Afghanistan, while facing major efficiency drives and organisational reforms at home.

What is defence output and how could it be measured?

In the development of a direct output volume measure, the key conceptual issue that has to be addressed is how to define a 'unit of output'. The aim of the MoD is to 'deliver security for the people of the United Kingdom and the Overseas Territories by defending them, including against terrorism; and to act as a force for good by strengthening international peace and stability' (MoD 2003). It is not easy to define a 'unit of security' or a 'unit of peace and stability'.

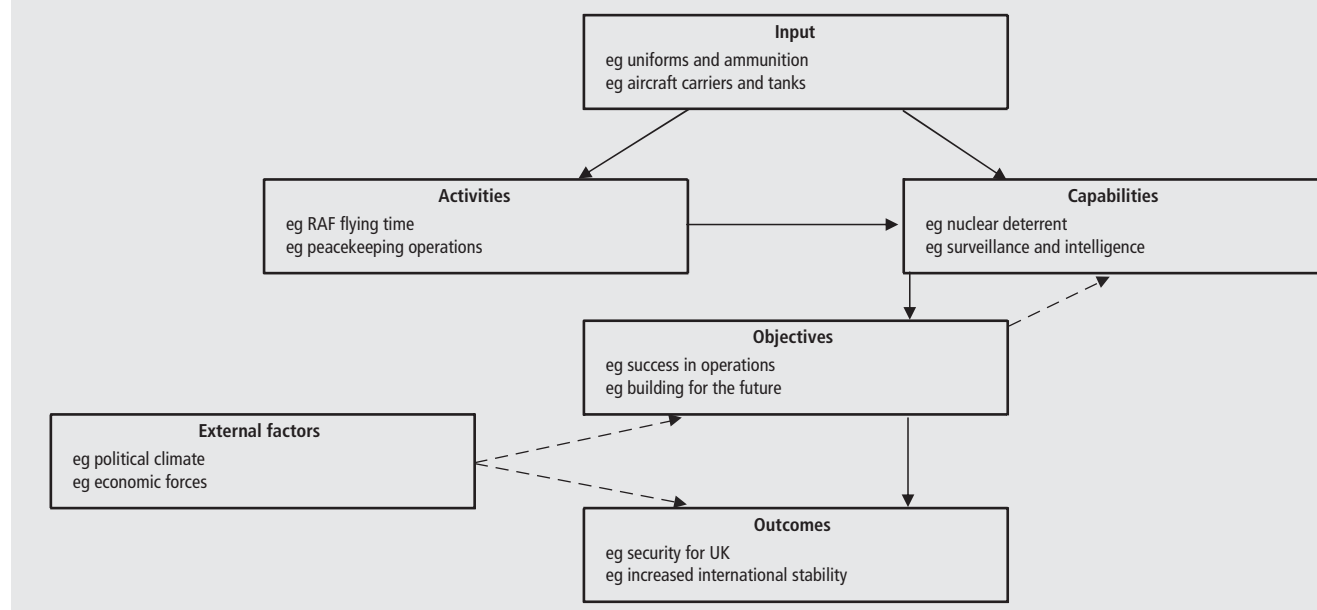
Expenditure on defence can be seen to

provide multiple benefits, such as peace, security, damage limitation in wartime and pursuit of, and protection of, national interests. But none of these can easily be measured and they would involve measuring the counterfactual (that is, what would happen in the absence of defence services) in order to determine the reduction in risk of an attack or reduction in damage that results from defence services. It could also be argued that increased defence activity has a negative impact on security, for example, 'higher UK defence spending and more British troops allocated to Iraq and Afghanistan might make the UK more likely to be subject to terrorist attacks so reducing its security' (Hartley 2006).

While high level outcomes, such as peace and security, are difficult to measure, there are a number of intermediate steps between inputs and outcome which could be used to measure output. This article considers two possibilities: activities which measure specific things the Armed Forces do, and capabilities of the Armed Forces (the ability of the forces to pursue a particular course of action, such as precision strike of military targets). The defence scoping paper (Anagboso and Spence 2008) discusses a further possibility, namely the extent to which the objectives of the MoD are met.

Figure 3 illustrates the connections between these concepts. Inputs can be seen as leading to activities which in turn lead to capabilities, but inputs can also lead directly to capabilities, for example, through the purchase of more advanced equipment. Capabilities and objectives interact as the extent to which the MoD meets its objectives will be determined by whether it has the capabilities required to meet those objectives. The objectives that are set will therefore determine what capabilities are required. There is also a

Figure 3

Relationship between inputs, output and outcomes

role for external factors, such as political motives, to influence what objectives are set and ultimately what outcomes are achieved.

Activities approach

Measures of activity reflect what non-market units are actually doing with their inputs. In order to apply this approach to defence, a full set of activity measures, with corresponding unit costs, that adequately covers the full range of defence activities needs to be developed. Decisions are needed on whether ‘units of output’ include areas like training, which are in a sense secondary to active assignments. There are limited data about the numbers and nature of active assignments. Currently, the only published series is the percentage of service personnel engaged in operations and military tasks from year to year.

As the availability of defence activity data tends to be limited, earlier work in Sweden (Murray 1995) used training data as a proxy for activity data, as this may be more readily available. Murray used hours of attendance at flight training and days of training conscripts, multiplied by unit costs, as output indicators. This follows the argument that ‘it is likely that the fighting ability [i.e. the ability of the defence forces to defend the State from any attack that actually materialised] is a positive function of the amount of training completed’ (Verikios 1998).

There are certain defence training activities for which measures are readily available in the UK. For example, the RAF can provide data on flying hours (by

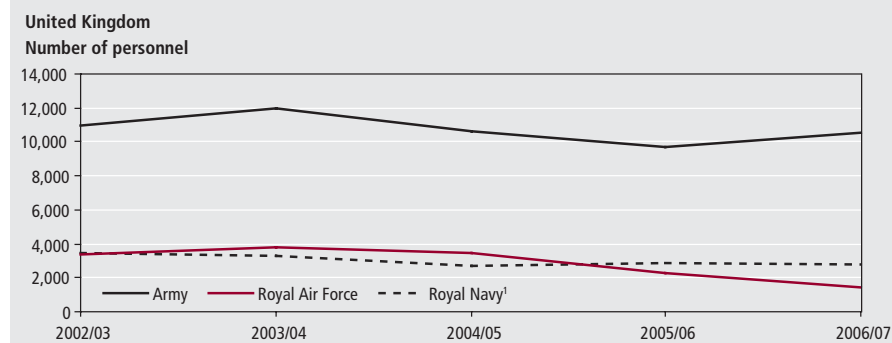
aircraft type and role), while the Royal Navy can provide data on days spent at sea. For the Army, it may be more difficult to determine an exhaustive list of training activities and measures. However, for a measure of Army training, it may be possible to look at personnel data on gains to trained strength, and data on military exercises in which soldiers undertake ‘realistic training’ in various aspects of operations. **Figure 4** demonstrates the sort of data which are readily available that could be used to create a training/activity indicator. It shows the number of personnel that have successfully reached trained status within each service each year.

Activity data, where available, could be weighted together with training data, using cost weights, in order to form an aggregate index. However, a cost-weighted activity index which depends largely on information

about training activities would primarily measure what service personnel do when they are not engaged in operations. As a result, it is not necessarily a useful measure of final output (except where the amount of training is directly related to force quality). A further limitation to this approach is that it does not capture quality. The assumption is that more training and more people engaged on operations is a greater output. It could be the case that a lower volume of better targeted and higher quality training, or smaller scale operations that are more successful, are a truer reflection of high output. It also fails to measure deterrence, which is an underlying issue in the measurement of defence output.

As a result, an activity index (built up from training data) is unlikely to be a suitable measure of defence output. One approach which shows more promise is a measure of capability.

Figure 4

Gains to trained strength for each service**Note:**

1 Includes Royal Marines.

Source: Defence Analytical Services and Advice (2007)

Capability approach

Defence output can be considered to be the sum of the capabilities the Armed Forces provide. Capability describes the ability to execute a specific course of action. The Armed Forces require a range of capabilities, from those that are essential for fighting wars to those needed for peace support and humanitarian operations.

The capabilities required of the Armed Forces at any time are determined by a number of factors, such as the standing commitments and targets or objectives of the MoD, the nature and level of threats to national security and, perhaps more importantly, the capabilities of current or potential adversaries. UK capabilities will also be influenced by membership of NATO and other alliances, to the extent that operations are planned to be undertaken jointly.

During the Cold War, the focus of the Armed Forces was on preparing for, and deterring, a direct military attack on the UK or Western Europe. In the post Cold War era, the security environment has been greatly transformed as there is no longer a direct military threat to the UK or the Overseas Territories. Since the end of the Cold War, the biggest change to the Armed Forces has been the shift of focus from forces deployed in protection of the UK and Western Europe towards deployable and sustainable expeditionary forces with the ability to rapidly acquire and disseminate information, in order to address the challenges of terrorism and the proliferation of Weapons of Mass Destruction.

The Defence White Paper (MoD 2003) identified a number of key capabilities for the UK Armed Forces in the current international security context. This article will discuss capability in terms of the eight key capabilities:

- C4ISR/NEC – command, control, communications, computers, intelligence, surveillance and reconnaissance (C4ISR) and the linked concept of network enabled capability (NEC) refer to the enabling activities that provide knowledge at all levels of operations and enable the planning, organisation and efficient execution of contingencies through effective linkage of platforms
- logistics – this includes the timely provision of assets (such as ammunition) to personnel in the field and the provision of medical support in the field
- Special Forces – these are a vital

element of counter-terrorism and intelligence gathering work. They are sometimes referred to as ‘force multipliers’ – a recognition that small teams of Special Forces can achieve results comparable with much larger forces

- nuclear deterrent – the White Paper identified that ‘the continuing risk from the proliferation of nuclear weapons, and the certainty that a number of other countries will retain substantial nuclear arsenals, mean that our minimum nuclear deterrent capability, currently represented by Trident, is likely to remain a necessary element of our security’
- strategic lift – in the post-Cold War era, the trend has been towards force projection operations for which the Armed Forces need to deploy rapidly across the globe. This sort of operation places an increasing premium on transport and lift capabilities
- maritime – the current emphasis in the maritime environment is on delivering effect from the sea onto land. This, to a large extent, comes under the strategic lift capability; however, maritime forces are also required to protect carriers and deployed forces and to ensure continued access to the theatre. Maritime forces also play a role in humanitarian and disaster relief operations, for example, by evacuating citizens
- land – land forces might be used on any of a full range of tasks, from peace support to high intensity fighting. Key requirements for these forces are firepower, with greater emphasis on precision and range, protection for UK forces and forces that are more deployable and more mobile in theatre, and
- air – air power is a fundamental component of both fighting capability and humanitarian deployments. It can be used in support of maritime warfare, on most battlefields, and provide an offensive capability in its own right. Long-range air attack continues to be important both as an integral part of fighting wars and as a coercive instrument to support political objectives

Figure 5 sets out in more concrete terms some of the elements which affect UK capability in the eight key areas, and which could be used as proxy measures for capability. These are based on the

information provided in various MoD publications.

Measuring capability

There are two possible measures of capability for each of the eight key capabilities:

- quality-adjusted equipment measure, and
- quality-adjusted manpower measure

For some areas, such as lift and logistics, an equipment measure may be sufficient, as the capabilities depend, to a large extent, on the availability of equipment and advances in technology. For others, such as land, air and maritime, it would be more appropriate to look at a manpower measure or a combination of the two measures, weighted together using cost weights. While it could be argued that capabilities are largely reflected by the level of technological advances in the equipment available to the Armed Forces, recognition has also been made of the fact that ‘Ultimately, the delivery of effective operational capability relies on our ability to deploy sufficient numbers of Armed Forces personnel with the right skills and training, supported by civilian personnel’ (MoD 2003).

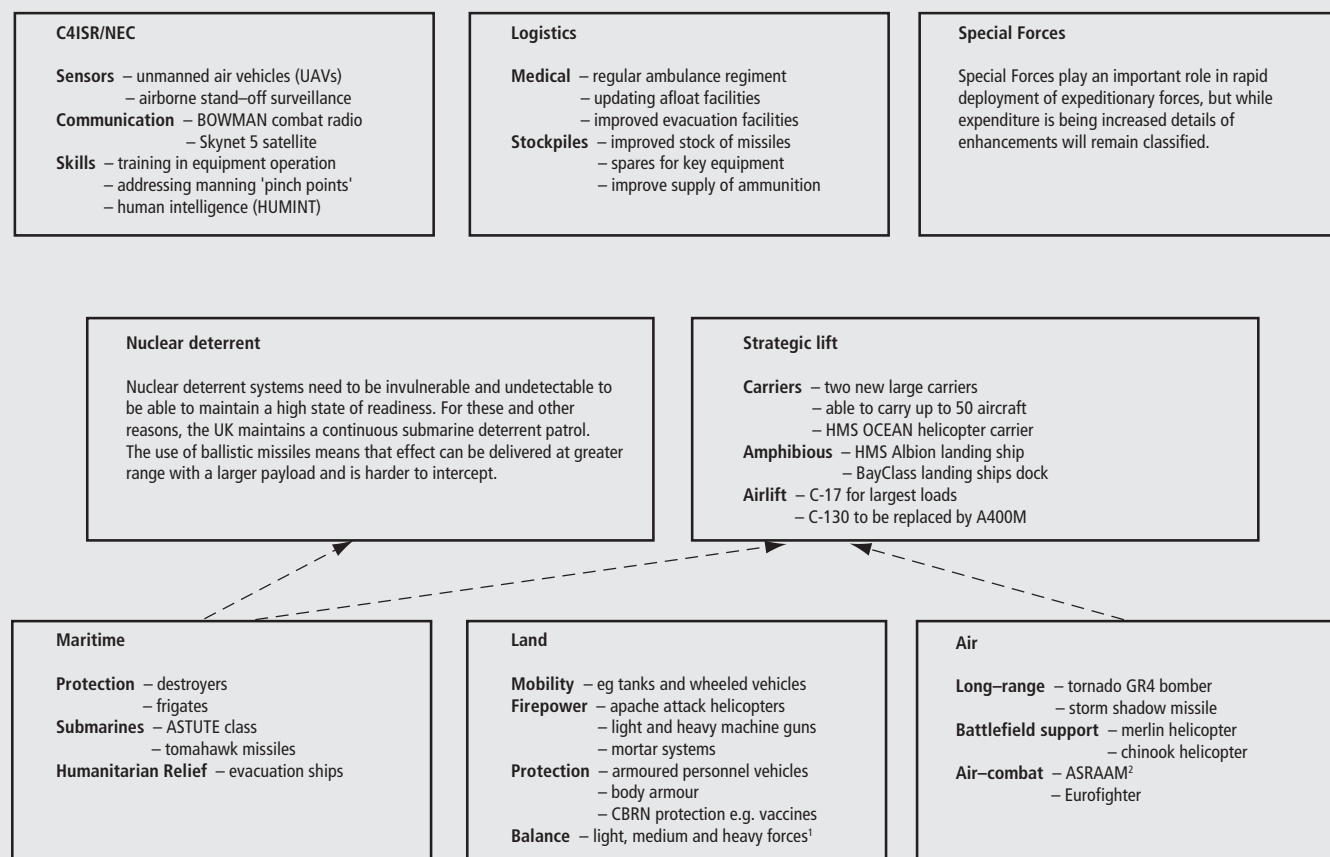
The measures set out below are essentially input measures in the sense that ‘they focus on understanding what “goes into” the making of an effective national military capability and how such effectiveness can be compared across countries’ (Tellis *et al* 2000).

The two possible measures of capability would have both a quantity and a quality component. For the equipment measure, data are available on equipment holdings (quantity component). **Figure 6** illustrates the sort of data which are available.

Explicit quality adjustment would be carried out to take account of quality changes over time. As technology continues to improve, equipment holdings may be reduced as larger numbers of items are replaced with fewer, higher quality items. For example, lift equipment could be adjusted by capacity, that is, the number of aircraft it can carry or the tonnage it can transport. It would also be important to take readiness into account, since assuming that modern sophisticated equipment is more productive is problematic, as the readiness of equipment is arguably the most important factor.

The quantity component of the manpower measure would be the number of service and civilian personnel, broken

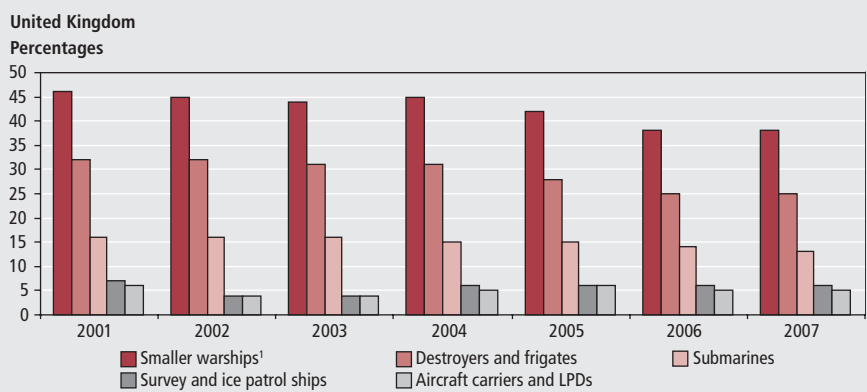
Figure 5
Key capabilities and factors of capability level



Notes:

- Heavy forces have greater firepower and tactical mobility and protection for ground manoeuvres; however, they are much harder to deploy. Light forces provide the UK's rapid deployable capability but lack firepower and protection; medium forces are more deployable than heavy forces but with more mobility and protection than light forces.
- ASRAAM: advanced short-range air-to-air missiles.

Figure 6
Count data on Royal Navy ship holdings



Note:

Source: Defence Analytical Services and Advice (2007)

- Includes minehunting and offshore patrol vehicles.

down by service and by rank or grade. Quality adjustments could be based on:

- 'manning balances' that identify whether services have the correct number of staff based on current planning assumptions. The MoD has

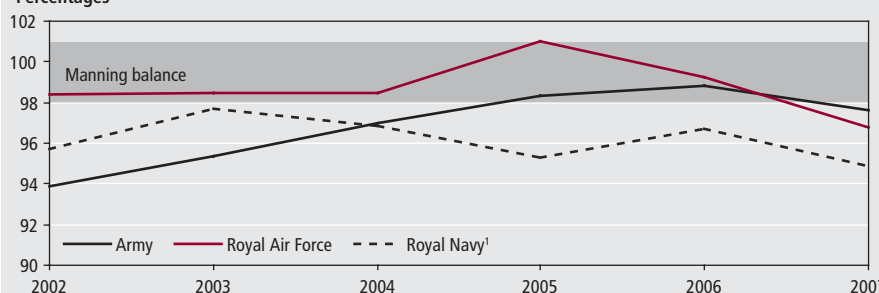
a target of ensuring trained strength in each service is within +1 and -2 per cent of trained liability. The data available are illustrated in **Figure 7** manning 'pinch points' that identify where there is a deficit in personnel within specialised areas, for example,

RAF pilots. The MoD targets to correct pinch points within services where manning within individual specialisations or ranks is significantly out of balance

- each service also has its own set of guidelines which set out how long service personnel should spend away from their families and the time that units should have between operational deployments (these are known as HARMONY guidelines). For example, Royal Navy and Royal Marines should spend no more than 660 days of separated service over a rolling three-year period, with Fleet units spending no more than 60 per cent of time deployed in a three-year cycle
- the MoD also reports the percentage of staff that is medically fit for task

These factors, and others such as morale, level of experience (measured as time in uniform), voluntary outflow exits and educational attainment, could be used to create a quality-adjusted measure of

Figure 7

Armed Forces trained strength as a percentage of required strength for each ServiceUnited Kingdom
Percentages**Note:**

1 Includes Royal Marines.

Source: Defence Analytical Services and Advice (2007)

capability. The assumption is that when Armed Forces are staffed to the required level, medically fit, trained and suitably rested between tours, their ability to carry out the tasks required of them will be optimal.

The measurement of nuclear deterrent capability may not suit either of these measures as it could be argued that a country either has a nuclear deterrent or does not.

Issues and conclusions

There are a number of difficulties with using an output measure based on capabilities.

- It would be difficult to obtain an exhaustive list of capabilities and, even when capabilities have been identified, much of the relevant data may be classified due to its sensitive nature. For this reason, an output measure based on capability would require a high degree of aggregation and may not be fully transparent to those outside ONS and MoD
- Consideration is needed on how best to weight together different elements of the capabilities (for example, should aircraft carriers have more weight than amphibious landing craft?) and how to form an aggregate measure across all capabilities (for example, is lift capability more, less, or equally important as nuclear deterrent capability?). While it may be possible to develop cost weights, these may not reflect the value of different capabilities in terms of their impact on peace and security
- The capability of the UK will be influenced by the capabilities of allies where they are working on joint operations

- Capability targets change over time and so it may be difficult to judge whether output has increased, decreased or simply changed over time due to differing targets, and
- Another issue is whether a capability measure should be adjusted down when the capabilities are not actually being used and, if so, how? It could be argued that capabilities could be weighted by their impact on current objectives (though this would be difficult), but it could also be argued that even if they are not being used, capabilities are playing an important role as they act as a deterrent

It would be possible to develop a capability measure as some data are readily available. This approach shows some potential although not all the above issues can be overcome. It would rely on close co-operation between UKCeMGA and MoD as some of the data required are restricted and not suitable for disclosure. Moreover, as this indicator measures absolute capability of the UK Armed Forces, rather than capability relative to other countries, it does not necessarily measure the UK's ability to deliver improvements in peace and security.

Conclusion

This article has examined the current measure of defence output in the National Accounts. Some of the conceptual issues surrounding the measurement of defence output have been discussed. Two direct measures of defence output are proposed in this article – activities and capabilities. A third approach which involves measuring the extent to which MoD objectives are met is discussed in a separate paper (Anagboso and Spence 2008).

This article provides a basis to help

understand the issues surrounding the measurement of defence output. Subject to rigorous assessment by a peer group appraisal body, the proposals put forward to improve the current inputs measures will be adopted in the National Accounts.

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CONTACT

✉ elmr@ons.gsi.gov.uk

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APPENDIX

Formal definition of National Accounts method of measuring estimates of defence inputs

Labour

$$LD_{vt} = \frac{LD_{2000}}{C_{2000} + S_{2000}} \times (C_t + S_t)$$

where:

LD_{vt} = Quarterly volume of labour consumption, for military defence activities at time t

LD_{2000} = Quarterly expenditure on labour for military defence activities at year 2000 prices

C_t, C_{2000} = Number of FTE civilian staff working on military defence activities at time t, year 2000

S_t, S_{2000} = Number of service personnel working on military defence activities at time t, year 2000

Goods and services

$$GD_{vt} = \frac{GD_t}{\sum_{i=1}^n w_{2000i} * d_{ti}} * 100$$

where:

GD_{vt} = Quarterly volume of intermediate consumption, for military defence activities at time t

GD_t = Quarterly expenditure on intermediate consumption, for military defence activities at time t

w_{2000i} = Weight of intermediate consumption in category i used for military defence activities in year 2000

d_{ti} = Deflator for intermediate consumption in category i used for military defence activities in time t

FEATURE

Gavin Wallis
HM Treasury

Alex Turvey
Office for National Statistics

Volume of capital services: estimates for 1950 to 2007

SUMMARY

Capital services are the flow of services into the production of output that are generated by the capital stock, as opposed to the stock of capital itself. As such, capital services are the measure of capital input that is more suitable for analysing and modelling productivity. This article presents experimental capital services estimates for 1950 to 2007 for the UK as a whole, for the market sector, and for the non-oil sector. Capital services estimates are also presented by eight asset types and by detailed industry. New estimates for 2007 are presented in this article with earlier years updated to incorporate revisions throughout the time series. Revisions are caused primarily by the adoption of an improved methodology for calculating appropriate plant and machinery deflators and due to the use of an improved purchased software deflator. The main result continues to be strong growth in information and communication technology assets since the mid-1990s, with this growth causing a divergence between the volume of capital services and National Accounts measures of net capital stock.

To enhance understanding of the UK's productivity performance, a framework is needed to analyse the relationship between the inputs and outputs of production. Capital and labour are key factors of production, both contributing to the output of the economy, and accurate measurement of these two inputs is essential for the accurate measurement of productivity.

Defining capital and measuring its contribution to production has been a contentious issue for both economists and statisticians for many years. Early work in this area includes Jorgenson (1963), Jorgenson and Griliches (1967), Hall and Jorgenson (1967), and Hulten and Wykoff (1981a, 1981b). More recently, there has been a degree of international agreement about the conceptual issues concerning the stocks and flows of capital. The Organisation for Economic Co-operation and Development published a manual in 2001 (OECD 2001b) covering the measurement of capital stocks and providing practical guidelines for estimation. Work by Oulton and Srinivasan (2003) has also proposed an integrated framework for measuring capital stocks, capital services and depreciation.

Capital services estimates weight together the growth of the net stock of assets with weights that reflect the relative productivity of the different assets that make up the capital stock. These weights are calculated using estimates of rental prices in contrast with the capital stock estimates in the UK National Accounts, which use asset

purchase prices as weights. This difference in weights is important in understanding the difference between the two measures of capital. The capital stock estimates in the National Accounts are wealth estimates of capital while capital services are a flow measure that reflects the input of capital into production. This is the reason why capital services are more suitable for analysing and modelling productivity. By definition, a capital asset generates a stream of services that spans more than one accounting period. Capital services are a measure of this flow of services, so measure the actual contribution of the capital stock of assets to the production process in a given year.

This article presents new experimental capital services estimates for 2007 along with revised estimates for 1950 to 2006.

An accompanying article in this edition of *Economic & Labour Market Review* (Goodridge 2009) presents experimental quality-adjusted labour input estimates for the UK for 1997 to 2007. Alongside the capital services estimates outlined in this article, these form the inputs into the multi-factor productivity (MFP) estimates that are now published annually by the Office for National Statistics (ONS) and are next due for publication in spring 2009.

Estimation methodology

The methodology used to estimate capital services is described in detail in Wallis (2005), Wallis and Dey-Chowdhury (2007) and in *The ONS Productivity Handbook* (ONS 2007).

The four main stages in the estimation of capital services can be summarised as:

- using the perpetual inventory method to calculate a net stock series from a history of constant price investment series
- pricing the services from each asset using an estimated rental for each asset
- generating weights, using the estimated rentals and net stock series, which reflect the input of each asset into production, and
- combining the net stock growth using the estimated weights to give capital services growth estimates

In Wallis and Dey-Chowdhury (2007), changes to the method for calculating the rental rates for assets were described. In the past, the tax adjustment factor used for recent years had simply been rolled forward year to year. For this publication, the tax adjustment factor has been re-estimated for all years to take account of recent tax changes. **Box 1** describes the method that has been used for calculating the tax adjustment factor.

Changes to the methodology for calculating appropriate plant and machinery deflators and an improved purchased software deflator are described in the data section below.

Data

The data used to estimate capital services are the same as those underpinning the UK National Accounts capital stock estimates and are consistent with *Blue Book 2008*. The data set consists of a long time series of annual constant price investment flows, classified by industry, alongside their respective life length means (used to calculate depreciation rates) and price deflators.

Maintaining consistency with *Blue Book 2008* means that these capital services estimates are ideal for MFP estimation, as they are consistent with the output measures in the UK National Accounts, such as gross value added (GVA), which also feed into MFP calculations.

The asset breakdown of the available investment series in the National Accounts is:

- buildings
- copyright and license costs
- mineral exploration
- own-account software
- plant and machinery including computers and purchased software, and
- vehicles

In addition, a series for purchased software is available internally at ONS and is an updated version of the series published in Chamberlin, Clayton and Farooqui (2007).

In order to treat computers and purchased software as separate assets, they have to be separated from investment in plant and machinery and the associated price deflators have to be adjusted to account for this. It should be noted that, although an appropriate life length is used for computers in the National Accounts (currently assumed to be five years), the capital stock estimates do not separately deflate computers. Purchased software is currently treated as part of plant and machinery in the National Accounts; it is not separately deflated and is subject to the general life length for all plant and machinery. For estimating capital services, it is important that both computers and purchased software are given specific treatment as separate assets.

The treatment of computers and purchased software as separate assets has

a significant impact on capital services estimates, as their prices relative to other assets fall rapidly over time and their economic lives tend to be much shorter than other types of plant and machinery. A detailed description of the methodology used to separate computers and purchased software from plant and machinery is provided in Wallis and Dey-Chowdhury (2007). Two changes in this publication are described below.

Firstly, an updated purchased software deflator is used. The updated deflator has a greater weight applied to 'custom' software relative to 'pre-packaged' software than previously: prices have been falling far less steeply for custom software over time, which are reflected in the estimation of the new deflator. As before, the deflator is based on available US software deflators, with an adjustment to take into account price level differences between the US and UK.

Secondly, as noted in previous articles, the plant and machinery deflator in the UK National Accounts has to be adjusted to take account of the separate treatment of computers and purchased software in capital services estimates. It is not appropriate to use the existing producer price indices (PPIs) for plant and machinery which are used in the UK National Accounts, since these include an element capturing price changes in computers. As before, the computer deflator is removed from the existing plant and machinery deflators using available data on PPI weights. In the past, the generated series has been somewhat volatile, partly as a result of the PPI weight being fixed for up to five years. An improved method has been used this time in order to get a less volatile series. There is currently no PPI for purchased software investment included in the UK National Accounts plant and machinery

Box 1

Tax adjustment factor

The tax adjustment factor used to adjust the rental price of capital to take account of taxes on profits and subsidies to investment is given by:

$$T_{at} = \left[\frac{1 - u_t \cdot D_{at}}{1 - u_t} \right] \quad (1)$$

where u_t is the corporation tax rate and D_{at} is the present value of depreciation allowances as a proportion of the price of asset type a .

The main rate of corporation tax is used and this is available from HM Revenue & Customs. The present value of depreciation allowances as a proportion of the asset price is not disaggregated by asset type or industry and is calculated as follows:

$$D_t = \frac{(1 + p_t) \cdot A_t}{(p_t + A_t)} \quad (2)$$

where p_t is the discount rate and is estimated as a weighted average of the cost of equity finance and the cost of debt finance. A_t is the annual writing-down allowance, the rate at which capital allowances can be claimed, and the annual allowance for plant and machinery is used for all assets for simplicity. Equation (1) is based on the allowance being applied on a reducing-balance basis (geometric). This is true for all assets except buildings, for which the rate is actually applied on a straight-line (arithmetic) basis. In practice, the tax adjustment factor has little impact on the estimates, as it does not change substantially over time.

deflator series; this element therefore does not need to be excluded before deflating the plant and machinery excluding computers and purchased software series.

Capital services estimates

This section presents capital services estimates for the whole economy, for the market sector, for the non-oil sector, by eight asset types and also by detailed industry. It provides a 57-industry breakdown, consistent with the most recent industry breakdown of gross fixed capital formation in the supply-use tables.

For most asset classes, estimates are available for the period 1950 to 2007. The full set of data cannot be presented in this article, but is available on the ONS website.¹

Capital services in the UK

Figure 1 illustrates annual growth in capital services for the whole economy. The time series shows a large degree of cyclicity: periods of modest growth coincide with UK recessions (1973 to 1975, 1979 to 1982, the early 1990s) while pick-ups in the growth rate can be observed during periods of stronger economic growth. In addition, particular peaks in capital services growth can in part be explained by economic phenomena. For example, the strong growth seen in the 1990s is partly the result of high levels of investment in information and

communications technology (ICT). In 2007, capital services grew by 3.2 per cent, up from a revised figure of 2.6 per cent in 2006.

Figure 1 also shows annual growth in the net capital stock measure published in the UK National Accounts. The series is the growth in total net stock excluding dwellings, as dwellings are not modelled as part of the productive capital stock. Although measuring different concepts, the close fit of the two series is not surprising since they are both based on the same underlying data sources.

The differences in these two series can be attributed to three main factors:

- the weighting of net stock growth by rental prices in the capital services estimates as opposed to by asset prices in the National Accounts estimates
- the separate treatment of computers, purchased software and own-account software for capital services, and
- the use of a geometric depreciation rate when constructing the capital services estimates instead of an arithmetic depreciation rate

Capital services better account for the input contribution of computers, own-account and purchased software than a capital stock estimate. During the 1990s, there were large levels of capital investment in

ICT assets. The weights used to calculate estimates of capital services are based on two components: the level of net stock and the rental price. The increase in capital investment in computers, own-account and purchased software during this period was reflected in increased levels of net stock for these assets, increasing their share in the whole economy capital services estimates. The period of high levels of ICT investment also saw the prices of ICT assets fall sharply. The UK National Accounts measures of capital stock are wealth-based estimates as they are weighted by asset prices, meaning that the fall in prices is reflected in a fall in the weight attributed to ICT assets. However, the rapid fall in prices of computers is reflected in a rise in the rental price for ICT assets. This combination of increased investment in these assets and falling prices makes the share of computers, own-account software and purchased software in the whole economy capital services estimates grow over time and makes capital services grow more rapidly than the net capital stock estimates.

Another way to look at the divergence of the National Accounts wealth-based measures of capital stock and capital services is using volume indices. **Figure 2** shows that there is a clear divergence between the volume of capital services and the volume of capital stock after 1980, which increased markedly during the 1990s. This divergence is being driven by the shift towards short-lived and more productive assets, such as computers, from which the flow of capital services is high. Standard capital stock measures do not adequately capture this shift and so understate growth in the productive input of capital in the UK economy, especially after 1990. After 2000, however, both capital services and net capital stock have grown at the same rate on average (3.4 per cent) and so the volume indices have moved in tandem.

Revisions since previous release

Revisions to capital services estimates since Wallis and Dey-Chowdhury (2007) arise from revisions to numerous source data series. Revisions have occurred to:

- constant price investment series from 2004 onwards
- gross operating surplus, mainly as a result of the new methodology for the measurement of Financial Intermediation Services Indirectly Measured (FISIM) introduced in *Blue Book 2008* (see Akritidis (2007) for more details)

Figure 1
Annual growth in capital stock and capital services

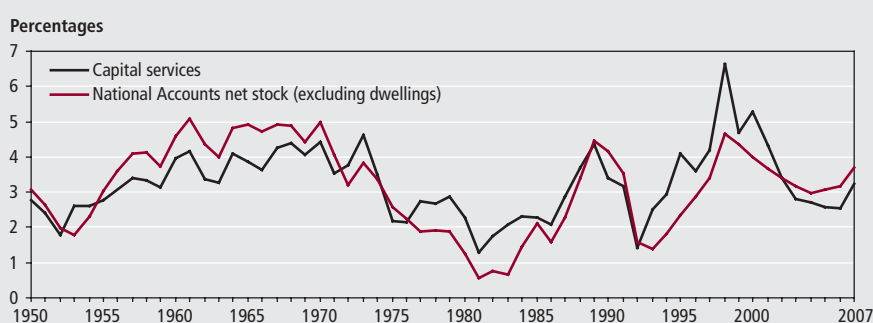
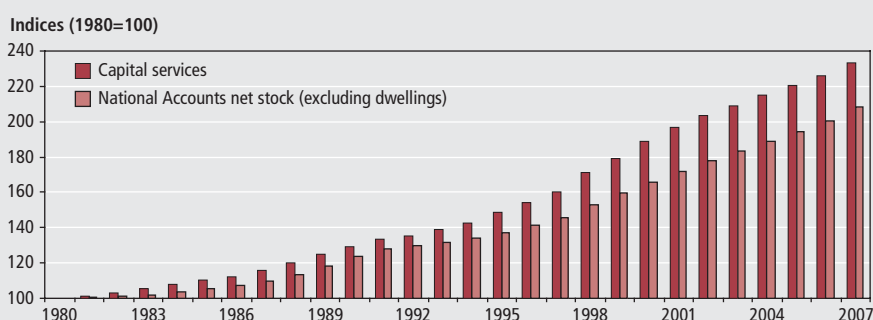


Figure 2
Volume index of capital stock and capital services



- tax adjustment factor (see Box 1)
- the deflator for own-account software from 1999 onwards
- the deflator for purchased software, resulting from the adoption of a new estimation methodology
- deflators for plant and machinery excluding computers, again due to an improved methodology

Figure 3 shows the new estimates of whole economy capital services growth against the previously published estimates. Growth in the updated series is consistently slightly lower than in previous estimates after the mid-1980s but the profile of growth has remained very similar. The slight divergence since the mid-1980s coincides with the beginning of the treatment of ICT assets as distinct from plant and machinery and, hence, the point at which the deflator for plant and machinery excluding computers starts to impact on the series. As mentioned above, the deflator has been revised as a result of a methodological change. This generates the majority of the revisions from previously published estimates, not least due to the relatively high profit share (weight) of plant and machinery in calculating whole economy capital services. See Figure 7 for revisions to plant and machinery capital services growth and Table 3 for the relevant plant and machinery profit share.

The second significant cause of revisions to whole economy capital services growth is the revised purchased software deflator resulting from a new estimation methodology. A greater weight is now applied to 'custom' software relative to 'pre-packaged' software than previously: prices have been falling far less steeply for custom software over time, which are reflected in the estimation of the new deflator. The effect of this change on whole economy capital services growth is greatest in the late 1990s, during the rapid growth in ICT investment. See Figure 8 for subsequent revisions to purchased software capital services growth.

Market sector and non-oil capital services

Productivity and other macroeconomic analyses often focus on the market sector rather than the whole economy. The measurement of the market sector is of importance to policy makers as the market sector better reflects the balance of demand and supply pressures in the UK economy. It assists in making international comparisons of productivity as some countries, notably the US, only publish estimates of market sector productivity. The market sector definition is also used in growth accounting analysis, and when estimating and

analysing business cycles. In response to user needs, ONS began publishing experimental estimates of market sector productivity in 2007 and market sector capital services were published for the first time in Wallis (2007).

Macroeconomic analysts are often interested in examining the non-oil sector, as output from the oil sector is considered to have little direct impact on the sustainable level of employment and non-oil economic activity. HM Treasury use measures of non-oil output in analysis of UK trend growth.

Figure 4 plots the annual growth rates in capital services for the market sector, non-oil sector and the whole economy. The market sector here is consistent with the definition of the National Accounts market sector GVA measure, making it suitable for use in market sector growth accounting analysis. Market sector capital services have been growing faster than for the whole economy throughout the period, averaging 3.5 per cent annual growth since 1950 compared with 3.2 per cent for the whole economy. The divergence in the mid-1990s is partly due to the market sector investing more heavily in ICT assets than the non-market sector. In 2007, market sector capital services grew by 3.5 per cent compared with whole economy capital services growth of 3.2 per cent.

The growth rates of non-oil and whole economy capital services follow each other closely for much of the period, reflecting the small size of assets in the oil and gas extraction industry relative to total UK assets. The divergence in the growth rates between 1975 and 1985 is due to large capital investment in the oil and gas extraction industry as new oil reserves were found in the mid-1970s. These high levels of investment contributed to fast capital services growth in the industry over the period. Recently, growth in non-oil capital services has been slightly higher than for whole economy capital services, as oil and gas reserves in the North Sea decline.

Figure 3
Annual growth in capital services: new and previous estimates

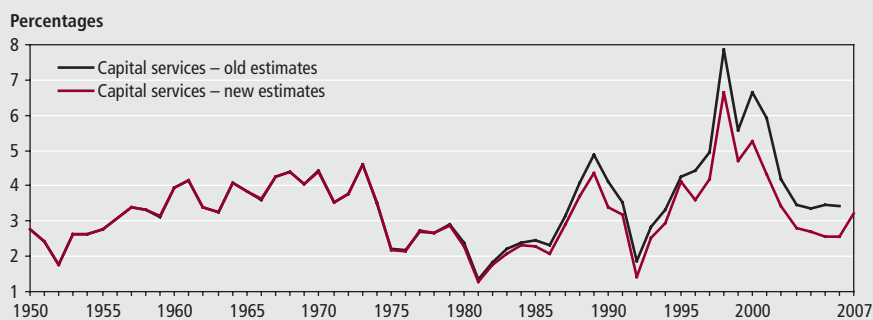
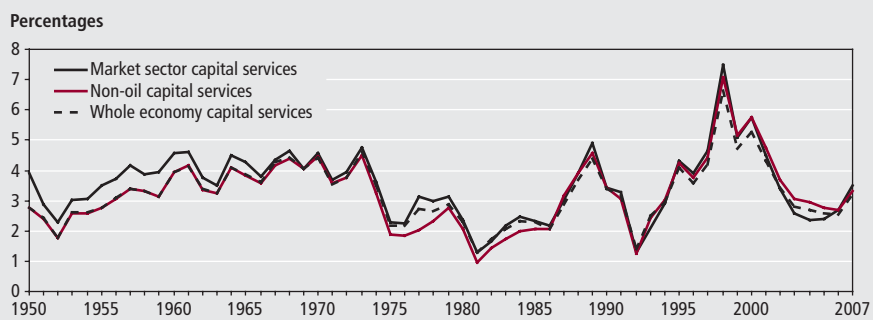


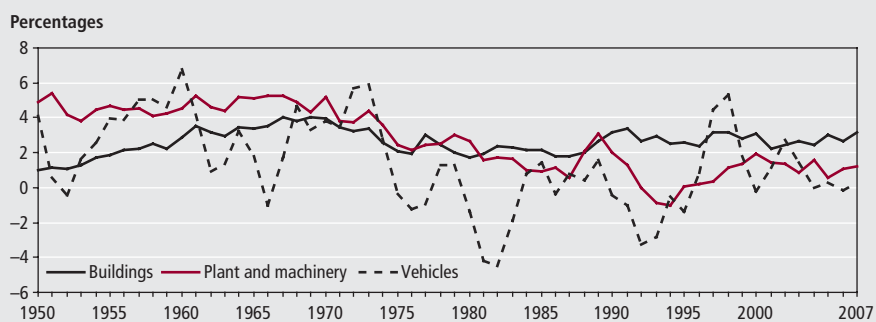
Figure 4
Annual growth in whole economy, market sector and non-oil capital services



Capital services by asset type

Figure 5 shows annual growth in capital services for buildings, plant and machinery and vehicles. Growth in capital services for the ICT assets is not shown in this chart because capital services from computers and purchased software grew much faster than other assets, especially in the late 1990s. Growth in capital services from these ICT assets are shown in Figure 6. Some of the more interesting analytical points to note from Figure 5 are:

Figure 5
Annual growth in capital services: by asset type



- the 1950s and 1960s saw strong and relatively stable growth in capital services for all assets
- growth in capital services from buildings is relatively stable over the period in comparison with the growth in capital services for other asset types
- growth in capital services from vehicles is more volatile compared with the other asset types, exhibiting a high degree of procyclicality
- for all assets, there is a downturn in capital services growth from the mid-1970s, driven by a fall in the net stock of capital in many industries over this period
- capital services growth rates are subdued for all assets during the recession in the early 1990s

Figure 6 shows the volume of capital services from computers, own-account software and purchased software relative to the volume of whole economy capital services, with all series rebased so that 1987 equals 100. The volume index of computers increases to over 3,000 in 2007, while the volume index of whole economy capital services (all assets) increases to just over 200 by 2007. For purchased software, the volume index has increased to over 1,000 in 2007. This explains the divergence seen

in Figure 2 between the wealth-based National Accounts measure of net stock and capital services. The reason that the growth in capital services from computers and purchased software is not driving up whole economy capital services more is that these two assets still only account for about a 10 per cent share of profits (see Table 3). Growth in own-account software capital services is much less pronounced as, although investment in own-account software has increased quite rapidly, the deflator has not fallen as it has for computers and purchased software. The reason for this is that the deflator is based on the average wage index of software-related employees whose wages have increased over the period. This means that the rental price, all things being equal, is lower for own-account software than it is for computers and purchased software.

Given that the revisions observed to whole economy capital services growth are very much asset-specific, it is useful to present the revisions to those particular assets which have driven the revisions to the whole economy measure. **Figure 7** and **Figure 8** illustrate the revisions to growth in plant and machinery and purchased software capital services, respectively.

As previously described, the divergence between the new and old plant and

machinery series occurs around the start of the 1980s from which point computers are treated as a separate asset. Growth in the revised series is consistently below that of the previously published series after this point, with the largest differences observed after the early 1990s. These differences, especially in the early years of this century, are reflected in the revisions to the whole economy series and demonstrate the importance of the plant and machinery series as the main driver of these revisions.

Revisions to capital services growth rates for purchased software, as shown in Figure 8, are also significant, with a large gap opening up between the growth rates of the new and old series since 1979 (note the scale of Figure 8). However, the profile of growth is unchanged. The growth rate of the updated series is consistently lower, due the new deflator giving a greater weight to custom software, which has experienced smaller falls in price over time, resulting in a lower rental price being attributed to purchased software than previously.

Table 1 summarises capital services growth by asset type for selected periods. The periods chosen approximate to complete economic cycles as defined by HM Treasury, with the latest economic cycle judged to have finished in the second half of 2006 (HMT 2008). The results presented here differ from those in Wallis and Dey-Chowdhury (2007), which instead referred to time periods between cyclical peaks. Interesting points to note from Table 1 are:

- average annual growth in whole economy capital services (as shown by 'all assets' in Table 1) is broadly consistent over the four cycles, falling slightly in the 1978 to 1986 period before picking up again more recently
- average annual growth in capital services from buildings is similar in each cycle
- growth in capital services from plant and machinery is relatively low in the three most recent time periods compared with the 1972 to 1978 cycle. This may reflect the shift towards more ICT-intensive production and the shift from production industries towards services industries (see Table 2)
- capital services growth from vehicles has been relatively weak in all periods (although there was a pick-up in growth for the most recent economic

Figure 6
Volume index of whole economy, computers, own-account software and purchased software capital services

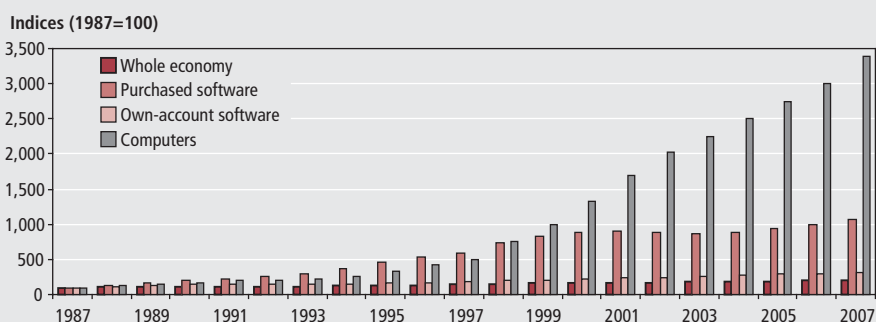


Figure 7

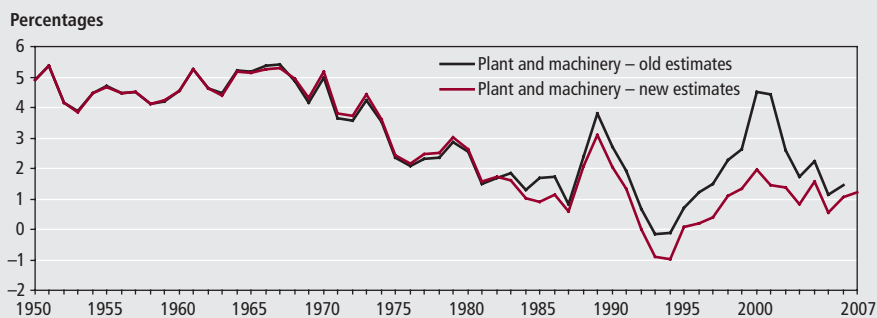
Annual growth in capital services for plant and machinery: new and previous estimates

Figure 8

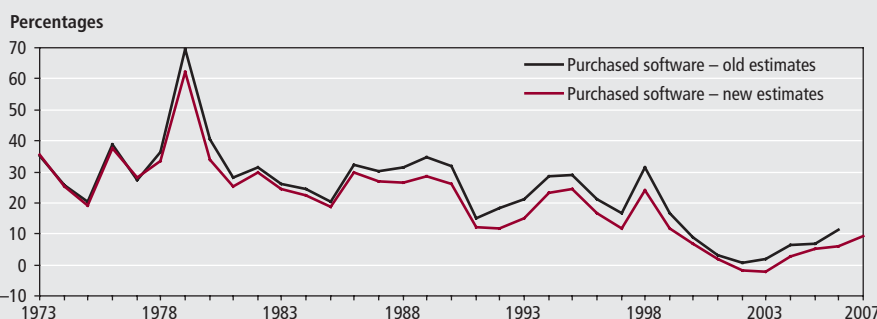
Annual growth in capital services for purchased software: new and previous estimates

Table 1

Average annual growth rates of capital services: by asset type

	Percentages			
	1972–1978	1978–1986	1986–1997	1997–2006
Buildings	2.6	2.1	2.7	2.7
Computers	n/a	n/a	18.4	22.7
Copyright and licence costs	15.0	5.8	5.4	3.7
Mineral exploration	16.0	9.0	-1.7	-9.9
Plant and machinery	2.9	1.7	0.7	1.2
Own account software	11.6	11.2	6.8	5.9
Purchased software	29.8	30.7	20.3	6.1
Vehicles	1.2	-1.1	-0.1	1.4
All assets	3.0	2.1	3.3	3.9

cycle): this is due to weak capital stock growth

- although still relatively high, growth in capital services from both purchased and own-account software has fallen markedly over time. This is because the high growth rates in earlier cycles reflect growth in net capital stock from an initially low level
- growth rates of own-account and purchased software have converged over time and in the most recent complete cycle were very similar, at around 6 per cent
- capital services growth from computers was very strong in the two most recent cycles, representing the increasing importance of this asset in UK economic output

Capital services by industry

Capital services estimates are produced at a 57-industry level, consistent with the most recent supply-use analysis. **Table 2** shows growth in capital services by industry for selected periods. As in **Table 1**, the periods chosen are the most recent complete economic cycles and the table shows average annual growth over these cycles. Also included are estimates for aggregate production and aggregate service industries as well as medians and 25th and 75th percentiles. GVA growth for the production and service sectors is shown for comparison.

Interesting points to note from **Table 2** are:

- in all periods, the average annual growth rate of capital services is higher

for aggregate service industries than for aggregate production industries, which is consistent with the fact that GVA growth has been faster for services

- production industries saw their strongest growth in capital services in the period 1972 to 1978, which was followed by much weaker growth in latter periods – as low as 0.1 per cent in the cycle from 1997 to 2006
- average annual growth of capital services in the service industries has grown over time, rising from 3.3 per cent in the period 1972 to 1978 to 6.1 per cent in the most recent cycle
- all service industries saw positive average annual growth in capital services in the periods 1986 to 1997 and 1997 to 2006 while in all periods some production industries saw negative average annual growth in capital services
- the medians and 25th and 75th percentiles show that average annual growth is much more dispersed in the service industries than in the production industries
- over the two most recent periods, computer services and auxiliary financial services saw the strongest growth in capital services, while the agriculture-based industries saw the largest fall in capital services, reflecting the changing nature of the UK economy, with strong growth in the financial sector and weaker growth in the manufacturing and agricultural sectors
- industries that are large users of ICT assets, such as computer services and research and development, showed the strongest average annual growth in capital services

Profit shares

The weight of each asset or industry in calculating whole economy capital services is the share of gross operating surplus attributable to each asset or to each industry. These are usually referred to as profit shares. Profit shares can be volatile from year to year so are shown below as average shares over selected periods. Profit shares by asset are shown in **Table 3**.

Table 3 shows that the composition of profit shares has changed substantially since the 1950s. The share of buildings, although still the largest, has fallen from around 54 per cent in the 1950s to around 36 per cent in the latest full economic cycle. The other significant profit share is for plant and machinery, which although volatile has remained around 35 to 40 per cent. The

Table 2
Average annual growth rates in capital services: by industry

Industry	Percentages			
	1972–1978	1978–1986	1986–1997	1997–2006
Production industries				
Agriculture	1.7	0.3	2.0	–1.3
Forestry	1.6	2.6	2.5	–2.3
Fishing	3.9	–6.1	–6.6	–5.9
Coal extraction	2.5	3.0	–4.3	–4.3
Oil and gas extraction	31.4	8.1	2.0	–2.4
Other mining and quarrying	1.2	–1.8	–1.6	–1.1
Food products and beverages	3.8	1.8	1.7	1.1
Tobacco products	3.2	1.2	0.4	–0.9
Textiles	0.2	–2.0	–0.4	–2.7
Wearing apparel and fur products	1.3	–1.1	–0.4	–2.5
Leather goods and footwear	22.7	24.1	6.7	–4.3
Wood and wood products	4.3	–2.3	–0.2	0.6
Pulp, paper and paper products	35.1	24.2	15.5	2.4
Printing and publishing	3.5	1.8	2.5	0.8
Coke, refined petroleum and nuclear fuel	–0.8	2.7	1.5	–2.3
Chemicals and chemical products	2.3	1.4	2.9	1.1
Rubber and plastic products	3.1	1.7	4.1	0.1
Other non-metallic mineral products	6.2	7.0	2.2	1.0
Basic metals	2.0	–3.6	–1.2	–2.0
Metal products	2.1	–0.3	1.8	1.4
Machinery and equipment	3.1	0.1	1.5	–0.8
Office machinery and computers	4.9	8.1	9.3	–1.8
Electrical machinery	3.1	–1.1	1.6	–1.8
Radio, TV and communication equipment	30.9	24.9	10.5	–3.7
Medical and precision instruments	5.0	3.0	9.7	4.6
Motor vehicles	2.3	3.1	3.1	0.6
Other transport equipment	1.0	1.5	0.3	5.1
Other manufacturing	2.9	0.6	4.6	2.3
Recycling	7.8	11.4	0.8	6.6
Electricity and gas	0.0	0.8	–0.2	–0.2
Water	0.7	0.9	8.6	6.7
Construction	2.5	–0.3	2.0	6.8
All production industries	2.8	1.5	1.7	0.1
25th percentile	1.6	–0.3	0.2	–2.3
50th percentile	3.0	1.5	1.9	–0.5
75th percentile	4.4	3.0	3.4	1.2
Production industries GVA	2.1	1.0	1.8	0.1
Service industries				
Motor vehicle distribution and repairs, fuel	17.2	19.8	7.3	11.7
Wholesale distribution	4.6	3.5	5.4	3.5
Retail distribution	5.5	4.2	5.0	7.8
Hotels and restaurants	4.7	4.3	5.5	8.1
Land transport and transport via pipelines	0.9	–0.1	0.4	1.2
Water transport	–0.3	–9.2	2.7	1.2
Air transport	1.2	1.3	4.4	10.6
Ancillary transport services	1.9	3.0	6.2	9.9
Post and telecommunications	3.8	–0.1	4.8	7.8
Financial intermediation	6.2	6.3	7.9	3.4
Insurance and pension funds	11.0	9.2	7.7	1.8
Auxiliary financial services	15.6	19.5	14.6	17.2
Real estate activities	3.7	2.7	5.8	5.5
Renting of machinery, etc.	15.8	10.9	8.2	7.9
Computer services	23.4	24.3	24.6	20.1
Research and development	13.7	17.1	19.1	8.2
Other business services	10.8	10.5	12.9	10.8
Public administration and defence	2.0	2.1	2.8	2.3
Education	2.5	0.7	1.4	4.8
Health and social work	5.9	4.8	4.1	4.3
Sewage and sanitary services	6.6	3.9	1.4	5.8
Membership organisations	23.7	19.1	4.4	7.7
Recreational services	5.1	5.5	6.2	8.3
Other service activities	15.8	19.7	6.3	5.1
All services	3.3	2.7	4.5	6.1
25th percentile	3.4	2.6	4.3	4.1
50th percentile	5.7	4.5	5.6	7.8
75th percentile	14.2	12.4	7.7	8.7
Service industries GVA	2.1	2.3	2.8	3.8

profit share of vehicles has declined slightly in recent periods, to just under 10 per cent in the 1997 to 2006 cycle.

Of most interest is the rise of the profit share of computers and software, which, although still a relatively small proportion compared with buildings and plant and machinery, has risen from zero in the 1960s to 18.5 per cent in the most recent cycle. The profit share of computers increased rapidly in the 1980s, 1990s and the early part of this century, culminating in an average share of 8 per cent in the latest economic cycle. Likewise, the profit shares for own-account and purchased software have steadily increased from the 1970s, both reaching an average of around 5 per cent in the latest economic cycle.

Table 4 shows average profit shares by industry for the last four complete economic cycles.

Interesting points to note from Table 4 are:

- the average profit share of production industries fell from 44 per cent in the 1972 to 1978 cycle to 35 per cent in the most recent cycle
- in contrast, the average profit share of services industries increased from 56 per cent in 1972 to 1978 to 65 per cent in the 1997 to 2006 cycle, reflecting the shift in the UK economy from manufacturing to services
- the industry with the largest profit share in each period is public administration, although this share declined to 9 per cent in the most recent cycle
- industries with the largest increases in profit share include telecommunications, computer services, recreational services and other business services (all service industries)

Conclusion

This article presented experimental estimates of the capital services growth for the UK as a whole, for the market sector, for the non-oil sector, by eight asset types and also by detailed industry. Whole economy capital services grew by 3.2 per cent in 2007, an increase over the revised figure for 2006 but below the average of 3.9 per cent during the most recent economic cycle. The estimates presented here have been significantly revised since the previous release due to methodological improvements; however, the main observation continues to be the high growth in capital services from computers and purchased software and much stronger growth in the service industries than in the

Table 3

Profit shares: by asset, average share

	Percentages						
	1950s	1960s	1970s	1972–1978	1978–1986	1986–1997	1997–2006
Buildings	54.5	46.6	37.2	44.1	43.6	45.0	35.7
Computers	0.0	0.0	0.0	0.0	1.0	6.4	8.0
Copyright and licence costs	0.0	0.0	0.5	0.5	0.6	0.8	1.2
Mineral exploration	0.1	0.3	0.8	0.8	1.2	1.3	0.6
Plant and machinery	32.8	40.1	45.9	40.2	38.5	30.8	34.3
Own account software	0.0	0.0	0.8	0.8	1.6	3.1	5.1
Purchased software	0.0	0.0	1.2	1.1	1.9	3.3	5.4
Vehicles	12.6	13.0	13.6	12.5	11.6	9.3	9.6

production industries over recent years. There has also been a clear shift in the profit share from other assets to ICT assets and also from production industries to service industries.

The divergence between the volume of capital services and the volume of capital stock after 1980, especially after 1990, has also been highlighted. This divergence is being driven by the shift towards shorter-lived and more productive assets such as computers and purchased software, from which the estimated flow of capital services is high. It is important to recognise this divergence when considering UK productivity. Capital services and not capital stock should be used when conducting productivity analysis.

Notes

- 1 See www.statistics.gov.uk/statbase/product.asp?vlnk=14205

CONTACT

✉ elmr@ons.gsi.gov.uk

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Table 4

Profit shares: by industry, average share

Industry	Percentages			
	1972–1978	1978–1986	1986–1997	1997–2006
Production industries				
Agriculture	5.0	4.6	3.3	2.5
Forestry	0.1	0.1	0.1	0.1
Fishing	0.3	0.2	0.1	0.0
Coal extraction	1.6	1.8	1.2	0.5
Oil and gas extraction	2.5	5.1	5.5	4.3
Other mining and quarrying	0.9	0.9	0.6	0.4
Food products and beverages	2.9	2.8	2.5	2.3
Tobacco products	0.2	0.2	0.1	0.1
Textiles	1.6	1.2	0.8	0.6
Wearing apparel and fur products	0.5	0.4	0.3	0.2
Leather goods and footwear	0.0	0.0	0.0	0.0
Wood and wood products	0.4	0.4	0.3	0.2
Pulp, paper and paper products	0.0	0.1	0.3	0.5
Printing and publishing	1.8	1.7	1.7	1.8
Coke, refined petroleum and nuclear fuel	1.0	1.2	1.2	0.9
Chemicals and chemical products	3.8	3.8	2.8	3.1
Rubber and plastic products	0.8	0.8	0.7	0.9
Other non-metallic mineral products	0.5	0.7	0.6	0.6
Basic metals	2.4	2.2	1.2	0.9
Metal products	1.3	1.1	0.9	0.9
Machinery and equipment	2.3	2.2	1.7	1.4
Office machinery and computers	0.2	0.2	0.3	0.2
Electrical machinery	1.6	1.2	0.8	0.6
Radio, TV and communication equipment	0.1	0.5	0.8	0.7
Medical and precision instruments	0.2	0.2	0.2	0.3
Motor vehicles	1.7	1.7	1.5	1.8
Other transport equipment	0.9	0.8	0.7	0.8
Other manufacturing	0.3	0.3	0.3	0.4
Recycling	0.0	0.1	0.1	0.1
Electricity and gas	7.0	6.4	5.7	5.2
Water	0.7	0.6	0.8	1.1
Construction	1.8	1.8	1.3	1.6
All production industries	44.2	45.0	38.2	35.2
Service industries				
Motor vehicle distribution and repairs, fuel	0.0	0.3	0.6	0.9
Wholesale distribution	2.2	2.7	3.0	3.1
Retail distribution	4.4	4.2	4.8	5.6
Hotels and restaurants	1.7	1.8	2.1	2.6
Land transport and transport via pipelines	5.1	5.1	4.5	3.4
Water transport	4.0	1.6	0.4	0.4
Air transport	1.1	1.0	0.7	1.8
Ancillary transport services	1.1	1.2	1.5	2.3
Post and telecommunications	4.9	4.7	4.7	6.5
Financial intermediation	2.8	2.6	3.8	3.1
Insurance and pension funds	0.9	1.4	2.1	1.7
Auxiliary financial services	0.0	0.1	0.4	0.7
Real estate activities	2.8	2.8	3.7	3.4
Renting of machinery, etc.	0.9	1.8	2.0	3.0
Computer services	0.0	0.1	0.4	1.7
Research and development	0.0	0.1	0.2	0.5
Other business services	0.7	1.2	2.9	4.1
Public administration and defence	11.9	10.9	11.9	8.7
Education	5.7	5.0	4.2	2.8
Health and social work	1.8	2.0	2.5	2.0
Sewage and sanitary services	1.3	1.5	1.7	2.0
Membership organisations	0.0	0.1	0.2	0.2
Recreational services	2.2	2.5	3.1	4.0
Other service activities	0.0	0.2	0.3	0.3
All services	55.8	55.0	61.8	64.8

FEATURE

Peter Goodridge
Office for National Statistics

Quality-adjusted labour input: estimates for 1997 to 2007

SUMMARY

ONS headline productivity series, Gross Value Added per unit of labour, are based on the concept of 'labour productivity', with labour input measured in terms of hours, jobs or workers. The drawback of this approach is the implicit assumption that each unit of labour is homogenous – one worker is the same as another, or an hour worked in one sector the same as in any other. However, workers are clearly not the same; they each have an array of different skills and characteristics. Therefore it is possible to produce a more complete measure of labour input based on the quality of the workforce as well as the volume of its input. Quality-adjusted labour input (QALI) does this by differentiating between hours worked according to workers' qualifications, experience, gender and industry. QALI is also used alongside the volume index of capital services in the production of multi-factor productivity estimates. This article updates QALI estimates for 1997 to 2006 and extends the series to 2007. Results have been produced for the whole economy, the market sector and for six broad sectors.

Standard labour productivity measures express growth in output with respect to labour input, implicitly assuming that all labour input is homogenous. However, labour is very much heterogeneous, and the quality, or value, of labour input is affected by numerous characteristics. Most of these differences can be captured in the qualifications, experience, industry and gender of the worker, for reasons explained later in the article. Therefore, the quality-adjusted labour input (QALI) measure uses data on these characteristics to adjust the volume of hours, using relative income shares, to create a more complete measure of labour input and provide an indication on the level of human capital within the economy, compared with a standard aggregation of hours, which takes no account of the composition of labour or workers' relative productivity.

As a result an hour worked by a highly experienced surgeon and an hour worked by a newly hired teenager at a fast food restaurant are treated as equal amounts of labour

OECD (2001a)

Therefore, it is implicitly assumed that there are two components to labour input: quantity (hours) and quality (labour composition). QALI is based on Labour Force Survey (LFS) microdata, but to ensure consistency with National Accounts and other productivity statistics, the LFS

microdata are scaled to compensation of employees, productivity hours and productivity jobs. This article contains the annual update of previous data reported in Dey-Chowdhury and Goodridge (2007), extending the QALI measure to 2007. Since the last publication, all LFS data have been regressed using the latest population data. Additionally there have been methodological improvements to the compensation of employees series as part of the National Accounts modernisation programme.

QALI is also used alongside its capital counterpart, the volume index of capital services (VICS), which is based on a complementary methodology, as an input to Office for National Statistics (ONS) multi-factor productivity (MFP) calculations, where growth in output is attributed to growth in the factor inputs and the Solow residual which largely represents technical change.

Methodology

To perform the quality adjustment, hours worked are differentiated into n types of worker (h_1 to h_n), determined by their characteristics: age (six groups), educational attainment (eight groups), industry (six groups) and gender, resulting in 576 worker types. The hours worked by these different worker types contribute to total labour input L through a function g :

$$L = g(h_1, h_2, \dots, h_n) \quad (1)$$

Following the OECD (2001) recommended

methodology, the growth in quality-adjusted hours can be represented as a Törnqvist index:

$$\frac{\Delta L(t)}{L(t)} = \sum_i \left[\frac{w_i(t) + w_i(t-1)}{2} \right] \frac{\Delta h_i(t)}{h_i(t)} \quad (2)$$

Economic theory states that in competitive markets with constant returns to scale, labour will be hired until its marginal cost (wage) equals its marginal revenue product, or its marginal productivity. Therefore, by using income shares as a weight, the relative productivity of workers is taken into account when measuring their labour input. The assumption that workers are paid their marginal product will hold true even if firms do not behave competitively in the labour market, and is only violated if firms are monopsonists, where the firm has a degree of monopoly power in the purchase of labour.

So, in equation (2), $w_i(t)$ is the share of total labour income paid to group i in period t , the weight used is the average of $w_i(t)$ and $w_i(t-1)$ and the income shares sum to one. The use of data from the current and previous period to weight the index is a feature of Törnqvist indices, making them more current or representative measures. The Törnqvist index is also a widely used form in economic analysis, particularly in regard to quality-adjusted labour measures¹ (Bell *et al* 2005).

Labour characteristics

As mentioned previously, hours worked are differentiated into 576 categories according to the workers' characteristics. These characteristics are broken down into relatively homogenous groups, chosen to capture quality change without stretching the LFS dataset too far. The groups of labour characteristics are shown in **Table 1**.

Age

Age is included as a proxy for work experience. Although imperfect, as it takes no account of periods of unemployment or inactivity, the assumption is that older workers tend to be more productive due to their greater experience, and therefore receive greater compensation for their labour. Alternatively, it has been suggested

Table 1

Labour input characteristics

Gender	Age	Education	Industry	Industry description
Male	16–19	Higher degree	ABCE	Agriculture, hunting, forestry, fishing, mining quarrying, utilities
Female	20–29	NVQ5 (excluding higher degree)	D	Manufacturing
	30–39		F	Construction
	40–49	NVQ4	GHI	Wholesale and retail trade, hotels and restaurants, transport storage and communications.
	50–59	NVQ3		Financial intermediation, real estate, renting and business activities
	60 plus	NVQ2	JK	Public administration and defence, education, health and social work, other social and personal services, and extra-territorial activities
		NVQ1	LMNOPQ	
		Other qualifications		
		No qualifications		

that younger workers may be more dynamic and innovative than their older counterparts (Bell *et al* 2005). However, if this is true in some cases then, provided labour markets are competitive, these workers will be paid their marginal product and growth in hours will be weighted accordingly.

Gender

Gender is chosen because of the persistent pay differential that exists between males and females, even after holding other factors constant. Although not a driver of quality change itself, it may represent hidden characteristics such as an increased tendency to take career breaks or to fulfil part-time posts that are not as well paid. Therefore, this compliments, or improves, the use of age as a proxy for work experience, as well as helping to explain the pay differential. However, if the pay differential reflects discrimination, then the assumption that workers are paid their marginal product is violated, resulting in hours growth being weighted incorrectly and the quality adjustment carrying a downward bias. This is a weakness of the model.

Education

This is measured as the highest qualification attained and used as a proxy for skills. Qualifications either act as a signal of ability to employers or they provide the knowledge for specific job requirements. This characteristic is the primary driver of the index. Due to the increasing prevalence of higher degrees and their growing association with higher pay, they are included as a stand-alone category. However, there is a trade-off between the number of categories and the constraints

of the sample size and it has been decided that eight qualification levels provides an optimal balance.

Industry

Although primarily included for the observation of industry trends and the use of QALI in industry-level MFP, this category also helps capture inherent differences in skill and productivity that exist between industries. The industry categories chosen are broad partly because industry is self-reported in the LFS, leading to inaccuracy of response, and also because of small sample sizes for some sectors.

Data source

The LFS is a continuous household survey that currently covers approximately 53,000 households every quarter and contains data on educational attainment, industry, gender and age for men aged 16 to 64 and women aged 16 to 59. Due to discontinuity in the educational attainment variable, and the recent conversion of data from seasonal to calendar quarters, QALI can only be produced from 1997 onwards.

Scaling

To improve consistency with the National Accounts and ONS headline productivity measures, various components of QALI are scaled to ONS aggregates. Specifically:

- gross weekly pay is scaled to National Accounts compensation of employees
- actual hours worked are scaled to productivity hours²
- total jobs are scaled to productivity jobs

The first adjustment improves the consistency of the LFS-based data with

Box 1

Index numbers

The main feature of the Törnqvist index is that the weight used is an average of the weight in the current and previous period making it a more up-to-date and representative measure. Because of this feature, it tends to be used on historic datasets.

Another difference between the Törnqvist index and more conventional indices such as the Laspeyres, is that the former is calculated geometrically rather than arithmetically, meaning that the Törnqvist index is a weighted, geometric average of its components, making it a more representative measure (Goodridge 2007).

National Accounts compensation of employees as, ideally, growth in hours would be weighted using total labour compensation. While the LFS only provides information on wages and salaries, compensation of employees also includes bonuses and income in kind. Additionally, as with other household surveys, LFS microdata include proxy responses, missing responses and inaccurate data. In this case, respondents have particular difficulty recalling their pre-tax income or bonuses accurately. Scaling the data helps overcome these issues. Scaling the jobs and hours data to the labour productivity jobs and hours data also helps to partly overcome the inaccuracies in the LFS industrial breakdown.

Data issues

Approximately 30 per cent of responses in the LFS dataset are proxy responses, meaning that they are responses given on someone else's behalf. In order to check that this does not cause bias in the estimation of QALI, the quality-adjustment of hours was carried out on personal responses only and the relationship between adjusted and unadjusted hours remained the same. It was therefore decided to leave proxy responses in the data, since excluding them would create additional problems, such as a reduced sample size and grossing to population totals.

The inclusion of the self-employed also poses an issue, as wages for the self-employed are not recorded in the LFS, or any other survey. This is because self-employed people remunerate themselves for a combination of labour and entrepreneurial effort, and it is impossible to distinguish between the two – it would be a subjective division if it were done at all. As a result, the wages of the employed with similar characteristics are used as an approximation for the wages of the self-employed.

As mentioned above, the LFS dataset has recently been converted from seasonal to calendar quarters, creating greater consistency with other input and output data. However, calendar quarter data are only available back to 1997 and non-overlapping seasonal data for 1996 only covers March to November (spring to autumn). To avoid this impacting the index by distorting growth rates, and to maintain a consistent set of data based on calendar quarters, it has been decided to begin the series in 1997 rather than 1996.³

Also, to measure labour's true input to production as accurately as possible, no

restrictions have been placed on outliers, and actual hours rather than usual hours are used because, conceptually, it is the former that need to be measured.

Results

The results for the whole economy are shown in **Figure 1**, where the QALI index can be compared with the unadjusted series, a standard aggregation of hours based on LFS microdata, and represented in index form. The difference between the two is the quality adjustment, often referred to as 'labour composition'.⁴

As can be seen in Figure 1, over the period 1997 to 2007, the gap between the QALI and unadjusted hours series has been growing consistently. The trend continued throughout 2007; while growth in hours peaked and began to fall towards the end of the year, growth in QALI merely stagnated, suggesting that the quality of labour has consistently improved throughout the time period and continues to grow into 2007.

As a comparison, the ONS LFS headline series, used in the production of labour productivity series, is also shown in the chart. As can be seen, the series follows a similar trend to the unadjusted hours series, but diverges slightly. This is a result of the unadjusted hours series being presented as a Törnqvist index, to maintain consistency with QALI.

Figure 2 charts labour composition at industry level and shows that, over the series, the quality of labour has fallen in both 'Construction' and a broad industry group that includes 'Agriculture, forestry and fishing', 'Mining and quarrying', and 'Utilities'. However, these industries did show an improvement in 2007

Data for all other industries show that labour composition has increased significantly since 1997, with the strongest growth occurring in 'Finance and business services' and another broad industry group including 'Public sector services', their private sector counterparts and 'Personal and recreational services'. Growth in labour composition in 'Distribution, hotels and restaurants' and 'Transport' also picked up over 2006 to 2007. Therefore, there has been a significant increase in human capital in most industries over the period concerned.

Market sector estimates

Since 2007, a market sector version of QALI has also been produced. The results are consistent with the whole economy estimates and with the market sector definitions used in Marks (2007) and the Productivity First Release.

Indices for QALI and unadjusted hours in the market sector are shown in **Figure 4**. Unfortunately, the market sector hours series to which QALI is scaled is only available

Figure 1
QALI, whole economy

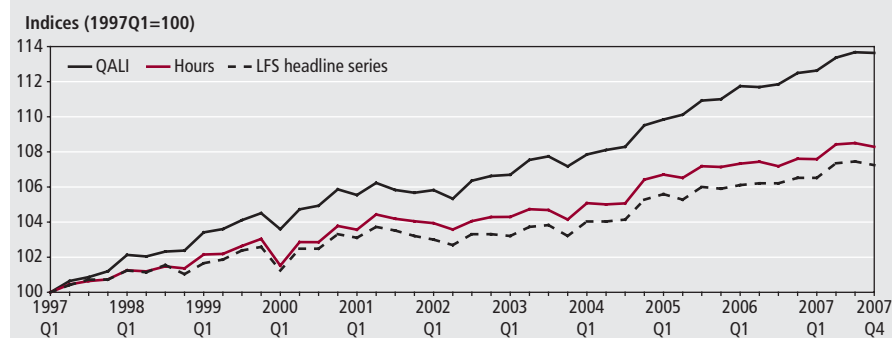
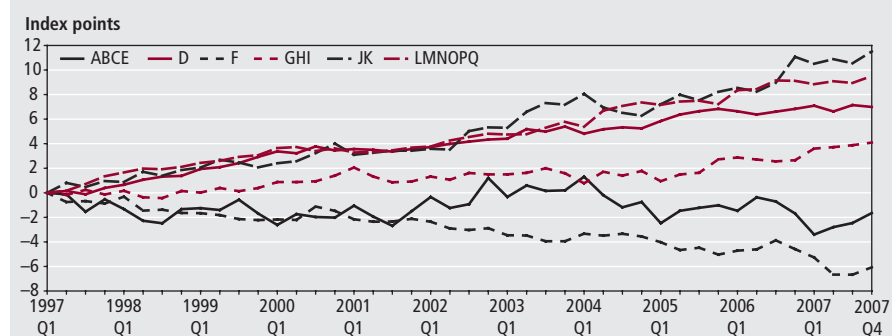


Figure 2
Labour composition: by industry group



Box 2

Comparison with alternative measures

The measurement of the quality of labour input is becoming an increasingly important field in productivity analysis, with both researchers and policy makers interested in skill levels (and therefore gaps) in the labour market, human capital stocks and the actual value of labour input. Therefore, alternative measures of labour quality in the UK have been developed in recent years. **Figure 3** charts the ONS measure alongside those produced at the Bank of England and as part of the EUKLEMS project.

As can be seen, the series follow very similar trends, particularly between 1997 and 2002. After 2002, the EUKLEMS series initially show stronger growth in both the quality-adjusted and unadjusted measures, with the ONS series ultimately continuing

to grow to a similar level. Differences in the profiles are due to each being constructed using a slightly different methodology, and in some cases, different sources. In the Bank of England series, the data are split by five age-groups and four education levels, as well as by gender (Bell *et al* 2005). In the case of EUKLEMS, the LFS data are split by gender, three age-groups and three education levels, and hours for each worker type are derived from industry averages.⁵

In the case of the BoE data, the unadjusted hours series is slightly lower than both the ONS and EUKLEMS series – the main reason behind this is the decision to use ‘total actual hours’ compared with the use of ‘usual hours’ by the Bank of England.

Figure 3
ONS, Bank of England and EUKLEMS comparison

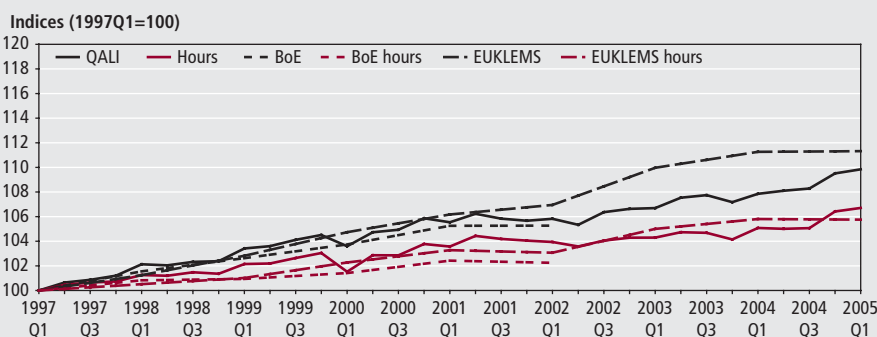
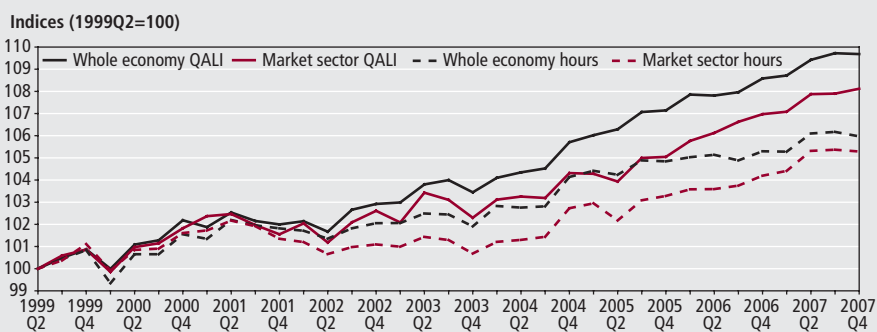


Figure 4
Market sector QALI



as far back as the second quarter of 1999. Therefore, the whole economy measure has been rebased to start in the same period, in order to serve as a comparison.

As can be seen, there has been strong growth in quality-adjusted hours in the market sector, with overall growth at a similar level to the whole economy. Indeed, the market sector QALI continued to grow throughout 2007, whereas growth in unadjusted hours was relatively flat.

Revisions

The data presented in this article contain revisions to the full QALI series for several reasons:

- this is the first time a full set of calendar quarter data have been available, so the reference periods for each data point have changed slightly
- in 2007, the LFS microdata were regressed to the latest population estimates
- there have been revisions to the hours and jobs data used in the production of ONS productivity measures
- there have been substantial revisions to the compensation of employees series due to a change in methodology as part of the re-engineering of National Accounts

- changing the series endpoints has a slight effect on the seasonal adjustment process

Notes

- 1 Previously QALI has also been produced as a Laspeyres index to improve compatibility with its capital counterpart, VICS. However, the introduction of calendar quarters and the use of Q1 (rather than the less seasonal spring quarter) to chain the series has introduced an element of ‘time-reversal’ in some series, reducing the validity of the results. This means that if, for example, hours worked increase, and subsequently decrease, the index fails to decrease all the way back and instead returns to a higher level. This is a well known property and is one of the reasons why superlative indices, such as the Törnqvist, are preferred. Therefore, the series are now only available as Törnqvist indices.
- 2 Productivity hours and jobs are definitions used in the calculation of the headline ONS productivity measures. Productivity hours and jobs provide the best measures of labour input for productivity purposes as they are produced using more reliable proportional breakdowns from both short-term and annual business surveys and constraining to LFS aggregates.
- 3 Conversion to calendar quarters and the introduction of a new occupation variable has resulted in income weights not being created for 2001 Q1. Therefore, gross pay in main and second jobs has been imputed using data from the quarters either side.
- 4 All results are available on the ONS website at www.statistics.gov.uk/statbase/product.asp?vlnk=14206

- 5 Further information on the EUKLEMS project can be found at www.euklems.net

CONTACT

✉ elmr@ons.gsi.gov.uk

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FEATURE

Stephen Hicks, Sarah Conn
and Jenny Johnson
Office for National Statistics

Characteristics of those paid below the National Minimum Wage

SUMMARY

Using the UK Labour Force Survey (LFS), this article looks at the characteristics of employees in jobs paying below the National Minimum Wage (NMW). It shows that it is not possible to accurately estimate from the LFS how many of these may be legitimately paid below the NMW and therefore how many are a result of non-compliance with the law. It considers methodological reasons why some employees may be recorded as being paid below the NMW in the LFS when in reality they are not. It also shows it is important to interpret estimates of low pay from the LFS in light of the methodological limitations of the survey for measuring low pay and also when comparing with estimates available from the Annual Survey of Hours and Earnings.

The National Minimum Wage (NMW) was introduced in April 1999 with two rates: one for those aged 18 to 21 (youth development rate) and one for those aged 22 and over (adult rate). A further rate for 16 to 17-year-olds was introduced in October 2004. The level of the NMW for each age group has tended to increase each October, following recommendations from the Low Pay Commission. **Table 1** outlines the NMW rates applicable in different years since its introduction in 1999.

The Annual Survey of Hours and Earnings (ASHE) is the National Statistic source for estimates of the number of jobs paying below the NMW. However, even though ASHE is the principle source for low-pay estimates, it is not the only official source. The Labour Force Survey (LFS) can also give estimates and is particularly

important when looking at groups of workers affected by the NMW and their characteristics, which are not available from ASHE. The LFS carries far more personal information on the characteristics of low-paid workers than ASHE, which only has limited personal data. Users (including the Low Pay Commission) are interested in where the low paid are concentrated and use the LFS extensively when examining the impact of NMW rate upratings on different groups of workers which cannot be identified in ASHE.

There is also a desire to know the number of workers who may be legitimately paid below the NMW under the minimum wage legislation. Those workers who undertake recognised trade apprenticeships or recognised training may be exempt from the NMW rates. Also, if an employee

Table 1
National Minimum Wage hourly rates, 1999 to 2008

United Kingdom				£
	16 and 17-year-olds' rate ¹	Youth development rate	Adult rate	
	Age 16 and 17	Age 18 to 21	Age 22 and over	
April 1999	-	3.00	3.60	
October 2000	-	3.20	3.70	
October 2001	-	3.50	4.10	
October 2002	-	3.60	4.20	
October 2003	-	3.80	4.50	
October 2004	3.00	4.10	4.85	
October 2005	3.00	4.25	5.05	
October 2006	3.30	4.45	5.35	
October 2007	3.40	4.60	5.52	
October 2008	3.53	4.77	5.73	

Note:

1 Introduced in October 2004.

Source: Low Pay Commission

receives accommodation with the job, employers are able to offset a certain amount of this against their employees' pay. Finally, piece-rate workers, whose productivity is below the piece-rate threshold, may also be legitimately paid less than the NMW under the law.

The LFS cannot provide accurate estimates of the number of individuals who fall into all of the categories exempt under the legislation and therefore may be legitimately paid below the NMW. For

these reasons, it should be noted that the estimates of the number of jobs that pay below the NMW do not indicate the extent of non-compliance with the law.

There is also interest in the extent to which the LFS measures individuals as earning below the NMW when, in reality, they are earning at or above this rate. In certain instances, because of measurement error in the survey, individuals could be recorded as earning below the NMW when in practice they are paid at or above it.

This article firstly looks at the most recent estimates of the number of jobs paid below the NMW from the LFS, compares them with ASHE and looks at the main reasons for the difference. It then examines the key characteristics of those paid less than the NMW using the LFS, again comparing them with the ASHE estimates where appropriate. It goes on to look at the legitimate reasons for earning below the NMW and some of the problems associated with estimating the number of people in

Box 1

Data sources and methodology

Annual Survey of Hours and Earnings

ASHE is used to provide the National Statistics estimate of the number of jobs paid below the NMW. An employer is asked to provide detailed information on the hours and earnings of their employees, and is almost always derived from employers' pay records. The advantage of this is that it allows accurate estimates of earnings, which is why it gives the best estimate of the numbers of jobs paid below the NMW. A disadvantage of ASHE is that it only provides details on a limited range of personal characteristics excluding, for example, ethnicity and disability. Therefore, analysis looking at an individual's personal characteristics is limited.

Labour Force Survey

More information on personal characteristics is collected in the LFS which makes it useful for analyses of low pay by variables not collected in ASHE. The LFS is a household survey and results are published quarterly. Respondents are in the survey for five quarters (or waves) and earnings information is asked of those in waves 1 and 5 of the survey. These individuals are then weighted up to represent the total number of employees in the population.

An advantage of the LFS is that more in-depth analysis can be carried out using data from this survey, for example, on personal characteristics such as ethnicity and disability. One of its weaknesses is that it requires information on earnings and hours worked to be accurately recalled by the respondent. In addition, proxy responses are often accepted, where another member of the household responds on behalf of someone else, often without reference to any documentation such as pay slips. Another disadvantage is that the sample size in the LFS is much smaller than in ASHE and this inhibits the production of precise estimates, especially in the context of those earning below NMW, where the incidence is relatively low.

Among the earnings questions asked in the LFS are those about a respondent's basic hourly rate of pay, as well as gross weekly pay for the pay period and actual hours worked in the week preceding the interview. A derived hourly rate can be calculated by dividing gross weekly pay by the number of hours worked. The LFS also collects a stated hourly rate direct from respondents. In theory, the two measures should give the same estimates of hourly pay; in practice, they can differ by considerable amounts due to measurement error in the LFS. Skinner *et al* (2002) provides more detail. For a household survey such as the LFS, a

stated rate is more accurate than a derived rate for measuring low pay, as less information is needed to be accurately recalled (see Ormerod and Ritchie 2007).

Although the stated rate is the preferred measure of low pay in the LFS, the main difficulty is that not all respondents give a stated hourly rate, which happens in about two-thirds of cases. To overcome this, the Office for National Statistics (ONS) developed an imputation technique with Southampton University. The values of hourly pay are imputed using nearest neighbour donation for those respondents who did not provide one. A summary of the methodology is as follows:

- a regression analysis with the log of the stated hourly rate as the dependent variable and a list of independent variables including derived hourly rate of pay, occupation, qualifications, age, gender and marital status is performed
- the cases are then split into separate groups for ages 16 to 17, 18 to 21 and 22 and over to prevent donation across the national minimum wage bands
- within each age group, cases are sorted in order of their similarity to each other in terms of the regression model
- cases that do not have a stated hourly rate then take independent donor values from the five cases immediately above and the five cases immediately below them that have a stated hourly rate; each case therefore ends up with ten values of hourly rate
- a count is taken of each of the ten values and the average used to determine the number paid below the NMW

This type of nearest neighbour methodology is sometimes called a fractional imputation because an average is taken of ten imputed values, and in some cases only a fraction of the person may earn below the NMW. For example, if two donor values are below the NMW and eight are above, then 20 per cent of that person's weight will be included in the estimate of the number earning below the NMW. For further information on the imputation methodology, see Skinner *et al* (2002).

Estimates for industry sectors A to O only are used in low-pay analysis, so that the LFS estimates of low pay are brought more into line with estimates from ASHE.

these categories. It then examines some other methodological reasons why some workers in the LFS are estimated to earn less than the NMW when in reality they may not. This analysis focuses on the LFS, but a similar piece of analysis undertaken by the Low Pay Commission seeks to investigate similar issues using ASHE; this is available on the Low Pay Commission's website.¹

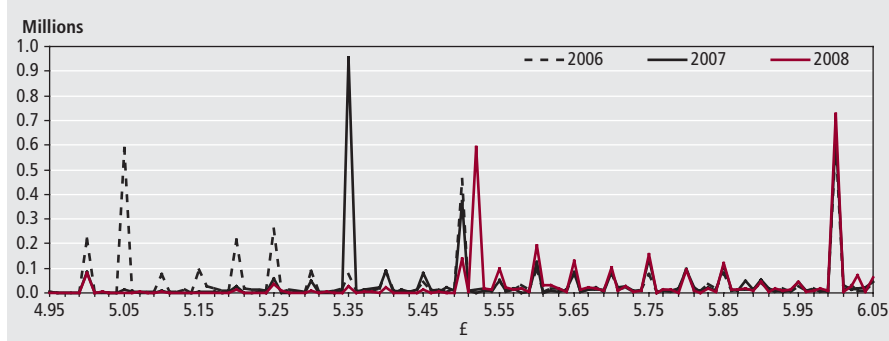
Number of jobs paid below the NMW

Table 2 shows that, according to the April 2008 ASHE, there were 288,000 jobs paying less than the NMW (1.1 per cent of all UK employee jobs). This compares with the estimate from the LFS for April to June 2008 of 445,000 jobs paying below the NMW (1.7 per cent of all UK employee jobs). Table 2 also breaks down the estimate from the LFS into the number and proportion of first and second jobs paying below the NMW. There were 402,000 (1.6 per cent) main jobs paying less than the NMW and 44,000 (5.8 per cent) second jobs.

The differences between estimates of low pay from the LFS and ASHE have been well researched. The reasons for the discrepancy between the estimates from the two sources was explored by Ormerod and Ritchie (2007), where they demonstrated that the differences are mainly due to the source of earnings and hours information and the variables used to measure low pay. ASHE is an employer survey where the information is based on employer records, whereas the LFS is a household survey, with earnings and hours information provided by the respondent in the household. The preferred measure for low pay from the LFS is a stated hourly rate, but not all employees give one; ONS therefore has to estimate one for these respondents based on other

Figure 1

Hourly earnings in jobs held by employees aged 22 and over



information that is collected (see **Box 1** for more details). The estimates from the LFS are less accurate than those from ASHE which uses a derived hourly rate from hours and earnings, which is more accurate when taken from employer records.

The fairly large difference between the estimates for 2008 from the two sources can be attributed to the different variables used in both sources, with the LFS using a stated hourly rate and ASHE using a derived (and more accurate) hourly rate to estimate the incidence of low pay. The stated rate in the LFS suffers from reporting error because respondents can round their responses when questioned (see Ormerod and Ritchie 2007 for further information on rounding). The tendency for respondents to round down to £5.50 in April to June 2008 can be seen from looking at the distribution of low-paid workers' hourly earnings. There is a large spike in the earnings distribution at £5.50 per hour where 137,000 (20 per cent) of the jobs paid below the NMW were reported by respondents to pay this amount (see **Figure 1**). It is not possible to tell how many of these jobs were actually paid this amount by their employer and

how much of this was due to respondents providing a rounded estimate when stating their hourly wage rate. However, the effect of rounding of responses does need to be taken into account when interpreting LFS estimates of low pay and in particular when comparing the levels from ASHE. Overall, ASHE provides more accurate estimates for hourly rates and therefore estimates of pay beneath the NMW, but analysis is limited by the small number of personal characteristics available, which is why the LFS is still useful for looking at the characteristics of low-paid workers.

Characteristics of employees in jobs paid below the NMW

Table 3 shows the number of employee jobs paid below the NMW, by age, sex and full- and part-time status according to the LFS, but also ASHE for comparison. As well as the number of jobs paid below the NMW, it provides the percentage in each category, for example, the proportion of jobs paid below the NMW that are filled by male and female employees. As a comparison, it provides similar information for all employee jobs in the UK labour market regardless of their level of pay. Finally, it provides the percentage of jobs paid below the NMW, by age, sex and full and part-time status.

There are not only differences in the total number of jobs paid below the NMW in the LFS compared with ASHE but also in the percentage shares for various characteristics. Users should be aware of these when using the LFS rather than ASHE, the preferred source of low-pay estimates.

Age

Estimates from the LFS show that a lower proportion of jobs paid below the NMW are filled by 16 to 17 and 18 to 21-year-olds compared with estimates from ASHE. For example, for April to June 2008, the LFS indicates that 7 per cent of jobs that

Table 2

Estimates of the number and proportion of UK jobs paid below the NMW, 2008

	Jobs paid below NMW (thousands)	Total jobs (thousands)	Jobs paid below NMW (percentages)
Estimates from the LFS¹			
Main jobs	402	25,342	1.6
Second jobs	44	773	5.8
All jobs	445	26,115	1.7
Estimates from ASHE^{1,2}			
All jobs	288	26,195	1.1

Notes:

1 LFS total jobs differ from ASHE total jobs because LFS low-pay analysis excludes industry Section P (private households with employed persons) and uses the earnings weight rather than the person weight to calculate main jobs.

2 These are the National Statistic for the number of jobs paid below the NMW.

Source: April to June 2008 Labour Force Survey and April 2008 Annual Survey of Hours and Earnings

Table 3
Characteristics of employees in UK jobs paid below the NMW, 2008

	Jobs paid below NMW		Total jobs		Percentage of jobs paid below the NMW
	(Thousands)	(Percentages)	(Thousands)	(Percentages)	
Estimates from the LFS ¹					
Age					
16 and 17-year-olds	11	3	484	2	2.3
18 to 21-year-olds	29	7	1,785	7	1.6
22 and over	405	91	23,845	91	1.7
Sex					
Men	169	38	13,257	51	1.3
Women	275	62	12,857	49	2.1
Full/part-time					
Full-time	154	35	18,914	72	0.8
Part-time	291	65	7,200	28	4.0
Estimates from ASHE ¹					
Age					
16 and 17-year-olds	17	6	422	2	3.9
18 to 21-year-olds	47	16	1,830	7	2.6
22 and over	224	78	23,942	91	0.9
Sex					
Men	103	36	13,258	51	0.8
Women	185	64	12,937	49	1.4
Full/part-time					
Full-time	162	56	19,163	73	0.8
Part-time	126	44	7,032	27	1.8

Note:

1 LFS total jobs differ from ASHE total jobs because LFS low-pay analysis excludes industry Section P (private households with employed persons) and uses the earnings weight rather than the person weight.

Source: April to June 2008 Labour Force Survey and April 2008 Annual Survey of Hours and Earnings

pay below the NMW were filled by 18 to 21-year-olds compared with ASHE, which estimates that, in April 2008, 16 per cent of jobs were filled by employees of that age.

Estimates from the LFS also show that a lower proportion of total jobs filled by 16 to 17 and 18 to 21-year-olds are paid below the NMW than ASHE. For example, the LFS estimates that 2.3 per cent of all employee jobs filled by 16 and 17-year-olds were paid below the NMW whereas ASHE estimates in April 2008 that 3.9 per cent of such jobs were paid below the NMW.

The last column in Table 3 also shows that, in April to June 2008, the LFS estimates that 16 and 17-year-olds are more likely than 18 to 21-year-olds to be in jobs paying below the minimum wage (2.3 per cent compared with 1.6 per cent). Employees aged 22 and over (1.7 per cent) are more likely than 18 to 21-year-olds to be in jobs paying below the NMW but less likely than 16 and 17-year-olds. **Table 4** shows that a similar difference was observed in 2007. However, this pattern is not always reflected each year in the LFS. In 2005 and 2006, the LFS estimated that a lower proportion of 16 and 17-year-olds were in jobs paid below the NMW than 18 to 21-year-olds.

In contrast, ASHE consistently estimates that 16 and 17-year-olds are most likely to be in jobs paying below the NMW, followed by 18 to 21-year-olds and then those 22 and over. The LFS sample size for the 16 to 17 and 18 to 21-year-olds are much smaller than ASHE; the ASHE estimates by age are therefore considered to be more reliable than the LFS estimates, due to larger sample sizes and more accurate reporting by employers of pay rates.

Sex

The LFS estimates that a higher percentage of jobs filled by women are paid below the NMW compared with men (2.1 and 1.3 per cent, respectively) (Table 3). ASHE shows a similar picture, with 1.4 per cent of jobs filled by women being paid below the NMW compared with 0.8 per cent of jobs filled by men. Of the jobs paid below the NMW, the LFS estimated that 62 per cent of low-paid jobs were filled by women and 38 per cent by men in April to June 2008. ASHE estimated that 64 per cent were filled by women and 36 per cent by men in April 2008 (Table 3). Both sources estimate almost equal numbers of men and women employees in all jobs regardless of the level

of pay. This illustrates that both the LFS and ASHE show that women are concentrated more in lower-paying jobs than men to a similar extent. **Table 5** provides a four-year time series of the number and proportion of men and women in jobs paid below the NMW from the LFS compared with ASHE. It shows that both the number and percentages of men and women in jobs paid below the NMW are more consistent over time from ASHE than from the LFS.

Full and part time

The differences in the estimates of low pay for full- and part-time employees between the two surveys are larger than for age and sex. The LFS estimates that 65 per cent of jobs paid below the NMW in April to June 2008 are part-time jobs compared with ASHE that estimates only 44 per cent in April 2008 (Table 3). There are a couple of likely reasons for this difference. Firstly, the definitions of full and part time differ between ASHE and the LFS. In ASHE, part time is defined as any employee whose basic hours are 30 hours or less (less than 25 for a teacher) while in the LFS it is left to the respondent to decide whether someone considers themselves full or part time. Also it is known that ASHE undersamples part-time employees as it only covers PAYE-registered employees. Employees in these part-time low-paid jobs are less likely to be registered for PAYE as they may earn beneath the lower tax threshold and therefore employers have no need to register them. Also, the weighting methodology in ASHE does not post-stratify responses into full- and part-time calibration groups. Therefore, any undercoverage of part-time employees in the ASHE sample is not entirely corrected for by the weighting scheme, as it is in the LFS.

Industry, occupation and region

Both ASHE and the LFS include earnings information by occupation, industry and region (of work and residence), so either of the surveys can be used to analyse low-paid workers by these categories. As with the variables considered above, the ASHE estimates should be used wherever possible, as they are derived from employer information and based on larger sample sizes and are therefore more accurate. The ASHE estimates for these variables are available from the ONS website.²

Disability, ethnicity and qualifications

Table 6 gives estimates of the number and proportion of jobs paid below the NMW by disability, ethnicity and qualifications. These

Table 4

Number and proportion of UK jobs paid below the NMW: by age group, 2008

	16 and 17-year-olds		18 to 21-year-olds		22 and over		All 16 and over	
	(Thousands)	(Percentages)	(Thousands)	(Percentages)	(Thousands)	(Percentages)	(Thousands)	(Percentages)
Estimates from the LFS								
2005	6	1.1	50	2.8	192	0.8	248	1.0
2006	6	1.2	48	2.7	279	1.2	333	1.3
2007	9	1.9	19	1.1	346	1.5	373	1.5
2008	11	2.3	29	1.6	405	1.7	445	1.7
Estimates from ASHE								
2005	20	4.0	55	3.0	233	1.0	308	1.2
2006	14	3.8	44	2.3	238	1.0	296	1.2
2007	16	4.0	49	2.6	231	1.0	296	1.1
2008	17	3.9	47	2.6	224	0.9	288	1.1

Source: April to June 2005 to 2008 Labour Force Survey and April 2005 to 2008 Annual Survey of Hours and Earnings

Table 5

Number and proportion of UK jobs estimated to be paying below the NMW: by sex, 2008

	Men		Women	
	(Thousands)	(Percentages)	(Thousands)	(Percentages)
Estimates from the LFS				
2005	65	0.5	182	1.5
2006	111	0.9	222	1.8
2007	137	1.0	236	1.9
2008	169	1.3	275	2.1
Estimates from ASHE				
2005	129	1.0	179	1.4
2006	118	0.9	178	1.4
2007	120	0.9	176	1.4
2008	103	0.8	185	1.4

Source: Labour Force Survey Q2, 2005 to 2008 and Annual Survey of Hours and Earnings, April 2005 to 2008

Table 6

Characteristics of employees in UK jobs paid below the NMW, 2008

	Jobs paid below NMW		Total jobs		Percentage of jobs paid below the NMW
	(Thousands)	(Percentages)	(Thousands)	(Percentages)	
Disability					
Disabled	83	19	3,510	13	2.4
Not disabled	361	81	22,604	87	1.6
Ethnicity					
White	371	83	23,884	91	1.6
Asian/Asian British	36	8	987	4	3.7
Black/Black British	7	1	515	2	1.3
Chinese	5	1	80	0	6.5
Mixed	7	2	215	1	1.6
Other	21	5	426	2	4.8
Qualifications					
NVQ level 4 and above	55	12	8,933	34	0.6
NVQ level 3	46	10	4,359	17	1.1
Trade apprenticeships	9	2	1,036	4	0.9
NVQ level 2	90	20	4,160	16	2.2
Below NVQ level 2	88	20	3,561	14	2.5
Other qualifications	54	12	2,023	8	2.7
No qualifications	103	23	2,043	8	5.0

Source: Labour Force Survey April to June 2008

characteristics are not available from ASHE and therefore this is where the LFS has to be used to provide estimates. In April to June 2008, the proportion of jobs paying below the NMW filled by disabled employees was 19 per cent. This compares with 13 per cent

of total jobs (regardless of pay level) filled by disabled people. Of all jobs filled by disabled employees, 2.4 per cent were paid below the NMW compared with 1.6 per cent of jobs filled by employees who were not disabled.

A lower share of low-paid jobs was filled by White employees than all employee jobs. In April to June 2008, 83 per cent of jobs that paid below the NMW were filled by White employees compared with 91 per cent of all jobs. The ethnic groups with the highest proportion of low-paid jobs in this period were Chinese (6.5 per cent), the 'Other' ethnic grouping (4.8 per cent) and Asian or Asian British (3.7 per cent). Black or Black British employees were least likely to be low paid, with 1.3 per cent of all their jobs being paid below the NMW. This is likely to be because this ethnic group is disproportionately concentrated in London, where wages are generally higher. The White and Mixed ethnic groups closely followed the Black and Black British employees, with 1.6 per cent of each group being paid below the NMW. It should be noted that estimates for ethnic minority groups are based on small sample sizes and therefore have larger sampling variability associated with them and this should be borne in mind when interpreting these estimates.

Perhaps not surprisingly, the majority of jobs paid below the NMW were filled with employees with low levels of qualifications. Over half (55 per cent) of jobs paid below the NMW were filled by employees with their highest qualification either 'below the NVQ level 2', 'other qualifications' or with 'no qualifications' at all. Only 30 per cent of all employee jobs (regardless of pay) were filled by employees with these levels of qualification. Only 12 per cent of jobs paid below the NMW were filled by employees with their highest qualification 'NVQ level 4 and above' compared with 34 per cent for all employee jobs in the economy.

Exemption under the law – payment below the NMW for legitimate reasons

As explained earlier in this article, workers may be exempt from NMW legislation or have a reduction in the NMW rate from

their employer for different reasons. The analysis undertaken for this article looked to see to what extent the LFS could be used to measure how many of the employees estimated to be paid below the NMW were done so legitimately under the law. There were three main areas of interest:

- how many workers received commission/bonus payments, tips through the payroll or were on piece rates
- how many had accommodation provided by their employer, and
- how many were on recognised apprenticeships and training schemes

Where workers receive bonus/commission payments and tips through the payroll, their basic pay excluding these may be below the NMW but their total pay above; their employer is therefore still compliant with the law. Although the LFS does ask respondents whether their basic pay included any commission, tips or gratuity, it does not indicate the extent of these payments, so it is not possible to say how many of those who are paid below the NMW do so because they have reported their gross pay excluding these bonuses. The LFS also asks whether people's gross pay includes piecework payments, but again it does not ask how much of the pay is on this basis. Also, as the Low Pay Commission points out in their own analysis (referenced earlier in this article), the number of people in the LFS who report having bonus/commission payments, tips or piecework payments in the LFS is very small and sample sizes do not allow further disaggregation to give a reliable estimate of the number of low-paid workers being paid in this way.

There is an insufficient sample size in the LFS to produce a robust estimate of the number who receive accommodation tied to their job which would allow their employer to legitimately pay them below the NMW.

The LFS also includes a question on whether someone is doing a recognised trade apprenticeship. In April to June 2008, the LFS estimates that 3 per cent of employees in their main job (around 10,000) are paid below the NMW while currently undertaking a recognised trade apprenticeship. It should be noted that this estimate is based on a small sample size and therefore the sampling variability around the estimate is large. It is also not possible to determine from the LFS whether those receiving training are on recognised

schemes, so it is not feasible to determine if this is a legitimate reason some are paid below the NMW.

Methodological reasons for jobs being recorded as paying below the NMW

As seen earlier with respondent rounding, the LFS has measurement errors when recording the amount that employees earn. There are also other methodological reasons why individuals could be recorded as earning below the NMW when in practice they are paid at or above the NMW.

Imputation method

ONS has made significant improvements over the last few years to the estimates of low pay from the LFS. The methodology used to estimate the number of jobs paying below the NMW is outlined in Box 1. The use of the direct hourly rate question yields better estimates of hourly earnings than the derived hourly pay variable; the latter relies on dividing gross weekly pay in the pay period by usual hours of work, substantially overestimating the incidence of low pay. Studies have shown that using the stated (sometimes referred to as 'direct') hourly rate produces more reliable estimates of the low paid from the LFS than using the derived rate (Skinner *et al* 2002, Dickens and Manning 2004). However, not all respondents state an hourly rate and therefore there is a missing data problem to overcome. The method that ONS uses to overcome this is a nearest neighbour imputation technique which uses a regression model to estimate an hourly rate for those that did not report one (Skinner *et al* 2002).

Although the imputation method provides an estimate of hourly pay for respondents who did not state an hourly rate of pay, there is the question of whether it may itself introduce bias in the estimation of low pay. The imputation method is based on the assumption that, where respondents do not provide a stated hourly rate of pay, this non-response is independent of their actual hourly rate of pay (which they did not state) even after conditioning on information that is available (for example, in this case their known derived hourly pay rate). This is known as the missing at random (MAR) assumption in the literature and the imputation process used in the estimation of low pay in the LFS is based on this assumption. However, the situation where individuals who are paid a higher rate of pay are less likely to have or know their hourly rate and therefore find it harder

to provide an answer to this question could easily be envisaged. The extent to which the MAR assumption is violated will be reflected in the extent of overestimation in the number of low-paid jobs in the LFS. Durrant and Skinner (2006) show in their article that the nearest neighbour methods based on the MAR assumption may overestimate the level of low pay from the LFS by about 10 per cent. Put another way, when a method which is not dependent on the missing at random assumption was used, estimates of numbers paid below the NMW were 10 per cent lower.

Another, and perhaps more simplistic, way to look at whether the imputation method overestimates low pay, is to compare derived hourly pay rates at and above the NMW for those respondents who did and did not provide a stated hourly rate of pay (that is, reported versus imputed cases). Estimates based on respondents with a reported stated rate below the NMW and a derived rate equal to or above the NMW can be compared with estimates from respondents who have an imputed stated rate below the NMW and a derived rate at or above the NMW. If the MAR assumption holds, and the non-response to the stated hourly rate question is not dependent on the level of hourly pay, a similar proportion of employees with a reported and imputed hourly rate below the NMW may be expected to have a derived rate at or above the NMW.

In the April to June 2008 LFS, just under half (46 per cent) of employees in their main job (estimates for second jobs were not calculated) who had an imputed stated rate below the NMW had a derived hourly rate equal to or above the minimum wage. This compares with 27 per cent for those who reported a stated hourly rate below the NMW but had a derived hourly rate equal to or above the NMW, a difference of 19 percentage points. Given that those with an imputed rate only make up around 40 per cent of responses below the NMW, this equates to a potential upward bias of around 7 per cent in the estimate of people earning below the NMW. Similar estimates for 2007 (9 per cent) and 2006 (7 per cent) were also observed. These estimates are similar to Durrant and Skinner's estimate of overestimation of MAR-based methods. It could be argued that these should also be removed from the count of those paid below NMW from the LFS. However, this would rely on the further assumption that the stated hourly rate variable does not itself suffer from any measurement error (which again is a fairly strong assumption to

make, given the findings presented earlier on the rounding effect and also the next section which looks at the measurement error resulting from the acceptance of proxy responses).

Proxy responses

Added to the issues surrounding the reporting of an hourly rate is the fact that, in around 30 per cent of cases, people respond to the earnings questions on behalf of someone else in the household. The estimates of the direct hourly rate that are reported by proxy respondents are less accurate than personal responses and are more likely to be rounded in the LFS (Ormerod and Ritchie 2007). Again, the question remains whether accepting these proxy responses when producing an estimate of low pay leads to any bias being introduced into the estimates. Previous research into the effect of proxy responses on overall earnings estimates suggests that derived hourly earnings in the LFS are understated by proxy respondents by between 2 and 13 per cent, depending on the type of proxy respondent (Wilkinson 1998). When proportions of proxy and personal responses that earn below the NMW are looked at separately, there is a difference in the estimates. In April to June 2008, estimates based on personal responses indicate that 1.5 per cent of main employee jobs paid below the NMW compared with 1.7 per cent for proxy responses. If the assumption is made that personal responses are the best estimate of earnings, this difference equates to an overestimation of employees paid below the NMW of around 3 per cent in 2008. For 2006 and 2007, the

upward bias is estimated to be larger, at around 11 and 9 per cent, respectively.

However, basing low-pay estimates purely on personal responses and excluding information by proxy can in itself introduce bias into the estimates. This is because individuals for whom someone else in the household reports on have different characteristics from those who provide a personal response. For example, respondents reported on by proxy are more likely to be younger and, as demonstrated earlier in this article, are more likely to be low paid. Another benefit of accepting information by proxy is that estimates are based on larger sample sizes.

Conclusion

The methodological reasons why the LFS may overestimate the extent of low pay, along with the issues in rounding of responses in the LFS, illustrate why there can be large differences between estimates from the LFS and ASHE. ASHE is the preferred measure of low pay in the UK, as it has a much larger sample and the earnings information obtained from employers is more accurate than information from householders in the LFS. However, as pointed out, ASHE only has limited information regarding employees' characteristics and the LFS therefore still has an important role in estimating low pay for the personal characteristics not available in ASHE. The limitations of the LFS and differences between the two surveys as collection instruments need to be borne in mind when using and interpreting low-pay estimates from both sources. It should also be noted that it is not possible to accurately estimate from the LFS how many of the

employees in jobs below the NMW are legitimately paid below the NMW because of exemptions in the legislation and therefore estimates of these jobs are not a measure of non-compliance with the law.

Notes

- 1 See www.lowpay.gov.uk/lowpay/rep_research_index.shtml
- 2 See www.statistics.gov.uk/statbase/product.asp?vlnk=13272

CONTACT

✉ elmr@ons.gsi.gov.uk

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FEATURE

Ian Richardson
Office for National Statistics

Services producer price index (experimental) – third quarter 2008

SUMMARY

The experimental services producer price index (SPPI) measures movements in prices charged for services supplied by businesses to other businesses, local and national government. This article shows the effects some industries are having on the top-level SPPI. The data produced are used internally by the Office for National Statistics as a deflator for the Index of Services and the quarterly measurement of gross domestic product. The index is also used by HM Treasury and the Bank of England to help monitor inflation in the economy. The SPPI release has been rebased and re-referenced onto 2005=100. This process takes place every five years.

Prices of business-to-business services rose by 3.5 per cent in the year to the third quarter of 2008. This is based on a comparison of the change in the top-level services producer price index (SPPI) on a net sector basis.

Figure 1 shows how the percentage change for the top-level SPPI (net sector) compares with the retail prices index (RPI) all services sector, and the producer price index (PPI) for all manufactured goods (net sector).

The top-level results, on both gross and net sector bases, are shown in Table 1. In 2008 Q3, the top-level SPPI (net sector) rose by 0.6 per cent compared with the previous quarter.

Figure 2 depicts the SPPI annual growths for both the net and gross sector time series. The annual growth for the SPPI net sector rose to 3.5 per cent in 2008 Q3, up from 3.3 per cent in 2008 Q2. The gross SPPI annual growth, at 3.1 per cent in 2008 Q3, was up from 2.8 per cent in the previous quarter.

Industry-specific indices

Tables available on the Office for National Statistics (ONS) website contain the data for the 31 industries for which indices of services producer prices are currently available. The weights for each industry index are shown at both gross and net sector levels. Comparing Q3 2008 with Q3 2007, some key points to note are:

- freight transport by road rose 7.7 per cent, largely due to the rising cost of fuel
- freight forwarding rose by 13.9 per cent, largely due to the rising cost of fuel
- property rentals rose by 2.8 per cent, due to sustained growth within the sector as reported by the Investment Property Databank

Next results

The next set of SPPI results will be published on 25 February 2009 on the ONS

Figure 1

Experimental top-level SPPI compared with the RPI and PPI

Percentage change, quarter on same quarter a year earlier

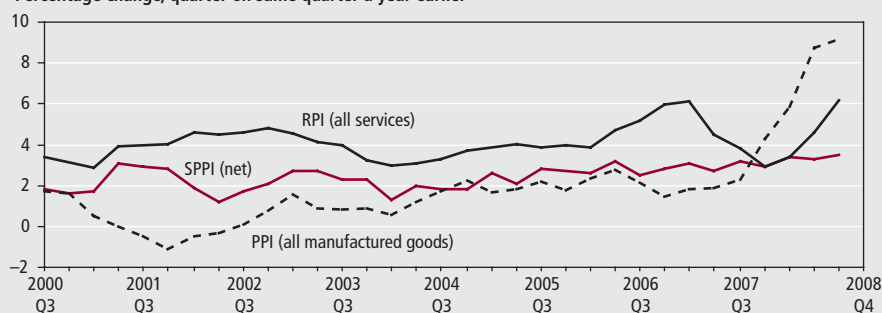


Table 1
SPPI results

	SPPI quarterly index values, 2005=100		Percentage change, quarter on same quarter a year earlier	
	Gross sector	Net sector	Gross sector	Net sector
2000 Q1	91.6	89.3	-0.9	1.0
2000 Q2	91.4	89.4	-0.1	1.4
2000 Q3	91.5	89.7	0.4	1.8
2000 Q4	91.6	90.0	0.4	1.6
2001 Q1	92.1	90.8	0.5	1.7
2001 Q2	93.6	92.2	2.4	3.1
2001 Q3	94.0	92.3	2.7	2.9
2001 Q4	94.2	92.5	2.8	2.8
2002 Q1	94.3	92.5	2.4	1.9
2002 Q2	95.2	93.3	1.7	1.2
2002 Q3	95.9	93.9	2.0	1.7
2002 Q4	96.1	94.4	2.0	2.1
2003 Q1	96.4	95.0	2.2	2.7
2003 Q2	97.1	95.8	2.0	2.7
2003 Q3	97.4	96.1	1.6	2.3
2003 Q4	97.9	96.6	1.9	2.3
2004 Q1	97.2	96.2	0.8	1.3
2004 Q2	98.6	97.7	1.5	2.0
2004 Q3	98.5	97.8	1.1	1.8
2004 Q4	98.8	98.3	0.9	1.8
2005 Q1	98.9	98.7	1.7	2.6
2005 Q2	99.8	99.8	1.2	2.1
2005 Q3	100.4	100.5	1.9	2.8
2005 Q4	100.9	101.0	2.1	2.7
2006 Q1	101.4	101.3	2.5	2.6
2006 Q2	102.7	103.0	2.9	3.2
2006 Q3	102.7	103.0	2.3	2.5
2006 Q4	103.1	103.8	2.2	2.8
2007 Q1	103.9	104.4	2.5	3.1
2007 Q2	105.3	105.8	2.5	2.7
2007 Q3	105.6	106.3	2.8	3.2
2007 Q4	106.0	106.8	2.8	2.9
2008 Q1	107.3	107.9	3.3	3.4
2008 Q2 ¹	108.3	109.3	2.8	3.3
2008 Q3 ¹	108.9	110.0	3.1	3.5

Note:

1 Provisional.

website at

www.statistics.gov.uk/sppi**Further information**

All SPPI tables and articles on the methodology and impact of rebasing the SPPI and the redevelopment of an index for business telecommunications (together with more general information on the SPPI) are available at

www.statistics.gov.uk/sppi.

A Summary Quality Report for the SPPI can be found at

www.statistics.gov.uk/about/data/methodology/quality/information_business_statistics.asp

CONTACT✉ elmr@ons.gsi.gov.uk

Figure 2
Experimental gross and net sector top-level SPPI

Percentage change, quarter on same quarter a year earlier



TECHNICAL NOTE

- 1 The experimental services producer price index (SPPI) replaced the former corporate services price index (CSPI). It measures movements in prices charged for services supplied by businesses to other businesses, local and national government. It is not classified as a National Statistic.
- 2 Unless otherwise stated, index numbers shown in the main text are on a net sector basis. These relate only to transactions between the corporate services sector and other sectors. Detailed tables available on the ONS website also contain gross sector indices, which include transactions within the corporate services sector.
- 3 Indices relate to average prices per quarter. The full effect of a price change occurring within a quarter will only be reflected in the index for the following quarter. All index numbers exclude VAT and are not seasonally adjusted.
- 4 SPPI inflation is the percentage change in the net sector index for the latest quarter compared with the corresponding quarter in the previous year.
- 5 Grants from the European Commission helped ONS to begin developing the SPPI. Funding of approximately 600,000 euros was awarded between 2002 and 2005. This has now ceased.
- 6 A number of external data sources are currently used in the compilation of the SPPI, as follows:
 - Investment Property Database (IPD) – property rental payments
 - Office of Communications (Ofcom) – business telecommunications
 - Office of Rail Regulation (ORR) – business rail fares.
 - Office of Water Services (OFWAT) – sewerage services
 - Parcelforce – national post parcels
- 7 Indices in this SPPI release have been rebased and re-referenced onto 2005=100. This process takes place every five years.
- 8 The banking SPPI was introduced in February 2004. Following a quality review by ONS in January 2007, a decision was made to withdraw this SPPI from publication. As a result, the index has been redeveloped and is being introduced this quarter. Under the redevelopment, the quality of the data collection and processing has been improved and the number of products included in the index has increased. However, the new index is not regarded as proxy for all financial intermediation services within the Standard Industrial Classification (SIC) 65. It has not therefore been included in the top-level SPPI. The services measured are classified to SIC 65.12/1, and will be published as a separate index known as the 'SPPI for financial intermediation (banks)'.

Key time series

1 National accounts aggregates

Last updated: 23/12/08

Seasonally adjusted

	£ million		Indices (2003 = 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
2002	1,075,564	957,094	94.4	94.3	97.1	97.3	97.2	97.0	97.0
2003	1,139,746	1,015,008	100.0	100.0	100.0	100.0	100.0	100.0	100.0
2004	1,200,595	1,068,574	105.3	105.3	102.8	102.8	102.7	102.5	102.5
2005	1,252,505	1,115,121	109.9	109.9	104.2	104.9	104.9	104.8	104.7
2006	1,321,860	1,177,232	116.0	116.0	106.1	107.8	107.9	107.5	107.5
2007	1,402,218	1,248,905	123.0	123.0	110.7	111.1	111.1	110.7	110.7
2002 Q1	263,968	234,651	92.6	92.5	96.1	96.5	96.5	96.0	95.8
2002 Q2	267,473	238,071	93.9	93.8	96.2	96.9	96.8	96.9	96.9
2002 Q3	270,655	240,922	95.0	94.9	98.2	97.5	97.5	97.4	97.4
2002 Q4	273,468	243,450	96.0	95.9	98.1	98.1	98.1	97.8	97.8
2003 Q1	278,207	247,866	97.6	97.7	99.4	98.7	98.7	98.9	98.9
2003 Q2	283,305	252,613	99.4	99.6	99.2	99.6	99.6	99.8	99.9
2003 Q3	287,130	255,626	100.8	100.7	99.8	100.4	100.3	100.4	100.4
2003 Q4	291,104	258,903	102.2	102.0	101.6	101.3	101.3	100.8	100.7
2004 Q1	293,234	260,813	102.9	102.8	101.8	101.8	101.7	101.1	101.1
2004 Q2	299,120	266,134	105.0	104.9	102.5	102.7	102.7	102.2	102.1
2004 Q3	301,608	268,390	105.9	105.8	102.2	102.9	102.9	102.8	102.8
2004 Q4	306,633	273,237	107.6	107.7	104.5	103.6	103.6	103.9	103.9
2005 Q1	308,895	274,979	108.4	108.4	104.2	104.0	104.0	104.2	104.2
2005 Q2	313,126	278,928	109.9	109.9	105.6	104.7	104.7	105.0	104.9
2005 Q3	313,026	278,181	109.9	109.6	103.3	105.1	105.1	104.5	104.3
2005 Q4	317,458	283,033	111.4	111.5	103.9	105.6	105.7	105.5	105.5
2006 Q1	324,523	289,466	113.9	114.1	105.2	106.8	106.9	106.6	106.7
2006 Q2	326,609	290,681	114.6	114.6	106.1	107.6	107.7	106.6	106.4
2006 Q3	332,954	296,264	116.9	116.8	106.4	108.0	108.1	108.2	108.0
2006 Q4	337,774	300,821	118.5	118.5	106.9	109.0	109.0	108.8	108.7
2007 Q1	342,711	304,608	120.3	120.0	108.6	109.8	109.9	109.5	109.2
2007 Q2	348,555	310,201	122.3	122.2	109.8	110.8	110.7	110.4	110.4
2007 Q3	353,619	315,034	124.1	124.2	110.6	111.7	111.7	111.1	111.2
2007 Q4	357,333	319,062	125.4	125.7	113.6	112.3	112.2	111.7	112.0
2008 Q1	361,939	323,160	127.0	127.4	114.5	112.7	112.7	112.7	113.0
2008 Q2	362,859	323,450	127.3	127.5	113.5	112.7	112.7	113.0	113.1
2008 Q3	361,865	324,882	127.0	128.0	112.7	112.0	112.0	113.4	114.3

Percentage change, quarter on corresponding quarter of previous year

	IHYO	ABML ⁴	IHYO	ABML ⁴	YBGO ⁴	IHYR	ABMM ⁴	IHYU	ABML/ABMM ⁴
2002 Q1	4.4	4.5	4.4	4.5	2.9	1.8	1.4	2.5	3.1
2002 Q2	5.1	5.5	5.1	5.5	2.7	2.0	1.5	3.1	3.8
2002 Q3	5.9	6.0	5.9	6.0	3.9	2.2	1.9	3.6	4.1
2002 Q4	5.7	5.8	5.7	5.8	4.1	2.4	2.4	3.2	3.3
2003 Q1	5.4	5.6	5.4	5.6	3.5	2.3	2.3	3.0	3.3
2003 Q2	5.9	6.1	5.9	6.1	3.1	2.8	2.9	3.0	3.1
2003 Q3	6.1	6.1	6.1	6.1	1.7	2.9	2.9	3.1	3.1
2003 Q4	6.4	6.3	6.4	6.3	3.6	3.2	3.3	3.1	3.0
2004 Q1	5.4	5.2	5.4	5.2	2.5	3.1	3.0	2.2	2.2
2004 Q2	5.6	5.4	5.6	5.4	3.4	3.1	3.1	2.4	2.2
2004 Q3	5.0	5.0	5.0	5.0	2.4	2.5	2.6	2.4	2.4
2004 Q4	5.3	5.5	5.3	5.5	2.9	2.3	2.3	3.0	3.2
2005 Q1	5.3	5.4	5.3	5.4	2.3	2.2	2.3	3.0	3.1
2005 Q2	4.7	4.8	4.7	4.8	3.0	1.9	2.0	2.7	2.7
2005 Q3	3.8	3.6	3.8	3.6	1.1	2.1	2.2	1.6	1.4
2005 Q4	3.5	3.6	3.5	3.6	-0.6	2.0	2.0	1.5	1.5
2006 Q1	5.1	5.3	5.1	5.3	1.0	2.7	2.8	2.3	2.4
2006 Q2	4.3	4.2	4.3	4.2	0.5	2.7	2.8	1.5	1.4
2006 Q3	6.4	6.5	6.4	6.5	3.0	2.8	2.8	3.5	3.6
2006 Q4	6.4	6.3	6.4	6.3	2.9	3.2	3.1	3.1	3.0
2007 Q1	5.6	5.2	5.6	5.2	3.3	2.8	2.8	2.7	2.4
2007 Q2	6.7	6.7	6.7	6.7	3.5	3.0	2.9	3.6	3.8
2007 Q3	6.2	6.3	6.2	6.3	3.9	3.3	3.3	2.8	2.9
2007 Q4	5.8	6.1	5.8	6.1	6.3	3.0	2.9	2.7	3.0
2008 Q1	5.6	6.1	5.6	6.1	5.4	2.6	2.6	2.9	3.4
2008 Q2	4.1	4.3	4.1	4.3	3.4	1.7	1.8	2.3	2.4
2008 Q3	2.3	3.1	2.3	3.1	1.9	0.3	0.3	2.0	2.8

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.

Source: Office for National Statistics

2 Gross domestic product: by category of expenditure

Last updated: 23/12/08

£ million, chained volume measures, reference year 2003, seasonally adjusted

	Domestic expenditure on goods and services at market prices											
	Final consumption expenditure			Gross capital formation				Exports of goods and services	Gross final expenditure	Imports of goods and services	Statistical discrepancy (expenditure)	Gross domestic at product market prices
	Households	Non-profit institutions¹	General government	Gross fixed capital formation	Changes in inventories²	Acquisitions less disposals of valuables	Total					
	ABJR	HAYO	NMRY	NPQT	CAFU	NPJR	YBIM	IKBK	ABMG	IKBL	GIXS	ABMI
2002	693,124	27,576	224,973	184,701	2,289	183	1,133,077	285,433	1,418,531	309,982	0	1,108,508
2003	714,608	27,668	232,819	186,700	3,983	-37	1,165,741	290,677	1,456,418	316,672	0	1,139,746
2004	736,857	27,198	240,672	195,782	4,371	-42	1,204,838	304,699	1,509,537	338,359	0	1,171,178
2005	751,288	27,212	244,850	200,187	4,814	-354	1,227,997	329,491	1,557,487	362,211	0	1,195,276
2006	766,378	28,289	248,776	212,146	4,575	290	1,260,454	365,818	1,626,272	397,076	0	1,229,196
2007	789,595	29,445	252,890	227,421	6,561	535	1,306,447	350,325	1,656,771	390,609	518	1,266,680
2002 Q1	171,546	6,871	55,781	44,562	1,372	66	280,217	70,659	350,877	76,009	0	274,918
2002 Q2	172,790	6,867	56,313	45,610	367	48	282,005	72,740	354,783	78,682	0	276,010
2002 Q3	173,839	6,907	56,455	46,422	287	62	284,033	72,259	356,315	78,344	0	277,923
2002 Q4	174,949	6,931	56,424	48,107	263	7	286,822	69,775	356,556	76,947	0	279,657
2003 Q1	176,080	6,949	57,130	46,805	-647	-8	286,469	73,942	360,416	79,207	0	281,208
2003 Q2	178,451	6,889	57,711	46,131	190	94	289,609	71,934	361,538	77,711	0	283,851
2003 Q3	179,545	6,913	58,472	45,964	2,065	-68	292,894	71,671	364,561	78,577	0	285,990
2003 Q4	180,532	6,917	59,506	47,800	2,375	-55	296,769	73,130	369,903	81,177	0	288,697
2004 Q1	182,394	6,950	60,023	48,869	-684	112	297,664	74,062	371,726	81,742	0	289,984
2004 Q2	184,099	6,823	59,806	49,385	603	-90	300,625	75,645	376,270	83,564	0	292,706
2004 Q3	184,893	6,760	60,210	49,061	936	-96	301,763	76,739	378,502	85,230	0	293,272
2004 Q4	185,471	6,665	60,633	48,467	3,516	32	304,786	78,253	383,039	87,823	0	295,216
2005 Q1	186,342	6,867	60,787	48,845	3,151	-158	305,833	77,173	383,006	86,553	0	296,453
2005 Q2	187,191	6,806	61,208	49,264	1,895	86	306,448	80,809	387,257	88,955	0	298,302
2005 Q3	188,172	6,784	61,370	51,286	187	-201	307,597	84,033	391,629	92,100	0	299,529
2005 Q4	189,583	6,755	61,485	50,792	-419	-81	308,119	87,476	395,595	94,603	0	300,992
2006 Q1	189,581	6,945	61,989	50,715	1,593	101	310,924	96,005	406,929	102,518	0	304,412
2006 Q2	192,015	7,037	61,854	52,139	-153	229	313,121	98,339	411,460	105,003	0	306,456
2006 Q3	191,988	7,120	62,329	53,681	1,844	-28	316,934	85,722	402,656	94,804	0	307,853
2006 Q4	192,794	7,187	62,604	55,611	1,291	-12	319,475	85,752	405,227	94,751	0	310,475
2007 Q1	194,389	7,269	62,838	56,352	1,595	73	322,516	86,094	408,610	95,726	66	312,950
2007 Q2	196,449	7,295	63,202	56,054	655	329	323,984	86,823	410,807	95,261	104	315,650
2007 Q3	199,150	7,367	63,328	57,118	2,086	44	329,093	88,813	417,907	99,894	148	318,160
2007 Q4	199,607	7,514	63,522	57,897	2,225	89	330,854	88,595	419,447	99,728	200	319,920
2008 Q1	201,537	7,604	64,773	56,167	925	208	331,213	88,944	420,158	99,318	304	321,144
2008 Q2	200,918	7,731	65,216	55,674	626	415	330,580	88,634	419,214	98,400	346	321,160
2008 Q3	200,596	7,901	65,625	54,089	571	350	329,132	88,916	418,048	99,342	372	319,078

Percentage change, quarter on corresponding quarter of previous year

	IHYR										
2002 Q1	4.0	-1.4	4.0	0.9		3.3	-2.6	2.0	2.6		1.8
2002 Q2	4.1	-0.4	4.4	1.6		2.8	3.1	2.9	6.0		2.0
2002 Q3	3.4	0.6	3.3	3.1		2.8	4.5	3.2	6.5		2.2
2002 Q4	3.2	1.4	2.1	9.0		3.9	-0.8	2.9	4.5		2.4
2003 Q1	2.6	1.1	2.4	5.0		2.2	4.6	2.7	4.2		2.3
2003 Q2	3.3	0.3	2.5	1.1		2.7	-1.1	1.9	-1.2		2.8
2003 Q3	3.3	0.1	3.6	-1.0		3.1	-0.8	2.3	0.3		2.9
2003 Q4	3.2	-0.2	5.5	-0.6		3.5	4.8	3.7	5.5		3.2
2004 Q1	3.6	0.0	5.1	4.4		3.9	0.2	3.1	3.2		3.1
2004 Q2	3.2	-1.0	3.6	7.1		3.8	5.2	4.1	7.5		3.1
2004 Q3	3.0	-2.2	3.0	6.7		3.0	7.1	3.8	8.5		2.5
2004 Q4	2.7	-3.6	1.9	1.4		2.7	7.0	3.6	8.2		2.3
2005 Q1	2.2	-1.2	1.3	0.0		2.7	4.2	3.0	5.9		2.2
2005 Q2	1.7	-0.2	2.3	-0.2		1.9	6.8	2.9	6.5		1.9
2005 Q3	1.8	0.4	1.9	4.5		1.9	9.5	3.5	8.1		2.1
2005 Q4	2.2	1.4	1.4	4.8		1.1	11.8	3.3	7.7		2.0
2006 Q1	1.7	1.1	2.0	3.8		1.7	24.4	6.2	18.4		2.7
2006 Q2	2.6	3.4	1.1	5.8		2.2	21.7	6.2	18.0		2.7
2006 Q3	2.0	5.0	1.6	4.7		3.0	2.0	2.8	2.9		2.8
2006 Q4	1.7	6.4	1.8	9.5		3.7	-2.0	2.4	0.2		3.2
2007 Q1	2.5	4.7	1.4	11.1		3.7	-10.3	0.4	-6.6		2.8
2007 Q2	2.3	3.7	2.2	7.5		3.5	-11.7	-0.2	-9.3		3.0
2007 Q3	3.7	3.5	1.6	6.4		3.8	3.6	3.8	5.4		3.3
2007 Q4	3.5	4.5	1.5	4.1		3.6	3.3	3.5	5.3		3.0
2008 Q1	3.7	4.6	3.1	-0.3		2.7	3.3	2.8	3.8		2.6
2008 Q2	2.3	6.0	3.2	-0.7		2.0	2.1	2.0	3.3		1.7
2008 Q3	0.7	7.2	3.6	-5.3		0.0	0.1	0.0	-0.6		0.3

Notes:

- 1 Non-profit institutions serving households (NPISH).
- 2 This series includes a quarterly alignment adjustment.

Source: Office for National Statistics

3 Labour market summary

Last updated: 17/12/08

United Kingdom (thousands), seasonally adjusted

All aged 16 and over									
	All	Total economically active	Total in employment	Unemployed	Economically inactive	Economic activity rate (%)	Employment rate (%)	Unemployment rate (%)	Economic inactivity rate (%)
	1	2	3	4	5	6	7	8	9
All persons	MGSL	MGSF	MGRZ	MGSC	MGSI	MGWG	MGSR	MGSX	YBTC
Aug-Oct 2006	48,351	30,772	29,083	1,689	17,579	63.6	60.2	5.5	36.4
Aug-Oct 2007	48,750	30,946	29,319	1,626	17,805	63.5	60.1	5.3	36.5
Nov-Jan 2008	48,846	31,061	29,454	1,608	17,785	63.6	60.3	5.2	36.4
Feb-Apr 2008	48,943	31,162	29,506	1,656	17,781	63.7	60.3	5.3	36.3
May-Jul 2008	49,039	31,219	29,491	1,727	17,820	63.7	60.1	5.5	36.3
Aug-Oct 2008	49,141	31,241	29,377	1,864	17,900	63.6	59.8	6.0	36.4
Male	MGSM	MGSF	MGRZ	MGSD	MGSJ	MGWH	MGSX	MGSY	YBTD
Aug-Oct 2006	23,486	16,693	15,715	978	6,793	71.1	66.9	5.9	28.9
Aug-Oct 2007	23,715	16,783	15,863	920	6,932	70.8	66.9	5.5	29.2
Nov-Jan 2008	23,770	16,845	15,917	928	6,925	70.9	67.0	5.5	29.1
Feb-Apr 2008	23,825	16,909	15,959	949	6,917	71.0	67.0	5.6	29.0
May-Jul 2008	23,881	16,940	15,920	1,019	6,941	70.9	66.7	6.0	29.1
Aug-Oct 2008	23,938	16,932	15,828	1,104	7,006	70.7	66.1	6.5	29.3
Female	MGSN	MGSF	MGRZ	MGSE	MGSK	MGWI	MGST	MGSZ	YBTE
Aug-Oct 2006	24,865	14,079	13,368	711	10,786	56.6	53.8	5.0	43.4
Aug-Oct 2007	25,035	14,163	13,457	706	10,872	56.6	53.8	5.0	43.4
Nov-Jan 2008	25,076	14,217	13,537	680	10,860	56.7	54.0	4.8	43.3
Feb-Apr 2008	25,117	14,253	13,547	706	10,864	56.7	53.9	5.0	43.3
May-Jul 2008	25,158	14,279	13,571	708	10,879	56.8	53.9	5.0	43.2
Aug-Oct 2008	25,203	14,309	13,549	760	10,895	56.8	53.8	5.3	43.2
All aged 16 to 59/64									
	All	Total economically active	Total in employment	Unemployed	Economically inactive	Economic activity rate (%)	Employment rate (%)	Unemployment rate (%)	Economic inactivity rate (%)
	10	11	12	13	14	15	16	17	18
All persons	YBTF	YBSK	YBSE	YBSH	YBSN	MGSO	MGSU	YBTI	YBTL
Aug-Oct 2006	37,415	29,566	27,903	1,663	7,849	79.0	74.6	5.6	21.0
Aug-Oct 2007	37,603	29,671	28,069	1,601	7,932	78.9	74.6	5.4	21.1
Nov-Jan 2008	37,645	29,770	28,180	1,590	7,875	79.1	74.9	5.3	20.9
Feb-Apr 2008	37,688	29,831	28,199	1,632	7,857	79.2	74.8	5.5	20.8
May-Jul 2008	37,731	29,870	28,165	1,705	7,860	79.2	74.6	5.7	20.8
Aug-Oct 2008	37,782	29,883	28,047	1,836	7,899	79.1	74.2	6.1	20.9
Male	YBTG	YBSL	YBSF	YBSI	YBSO	MGSP	MGSV	YBTJ	YBTM
Aug-Oct 2006	19,417	16,286	15,319	968	3,130	83.9	78.9	5.9	16.1
Aug-Oct 2007	19,581	16,361	15,451	911	3,220	83.6	78.9	5.6	16.4
Nov-Jan 2008	19,615	16,411	15,491	920	3,204	83.7	79.0	5.6	16.3
Feb-Apr 2008	19,649	16,454	15,515	938	3,196	83.7	79.0	5.7	16.3
May-Jul 2008	19,684	16,486	15,476	1,010	3,198	83.8	78.6	6.1	16.2
Aug-Oct 2008	19,716	16,478	15,389	1,090	3,238	83.6	78.1	6.6	16.4
Female	YBTH	YBSM	YBSG	YBSJ	YBSP	MGSQ	MGSW	YBTK	YBTN
Aug-Oct 2006	17,998	13,280	12,584	696	4,718	73.8	69.9	5.2	26.2
Aug-Oct 2007	18,021	13,309	12,618	691	4,712	73.9	70.0	5.2	26.1
Nov-Jan 2008	18,030	13,359	12,689	670	4,671	74.1	70.4	5.0	25.9
Feb-Apr 2008	18,039	13,377	12,684	693	4,661	74.2	70.3	5.2	25.8
May-Jul 2008	18,047	13,384	12,689	696	4,663	74.2	70.3	5.2	25.8
Aug-Oct 2008	18,066	13,404	12,658	746	4,661	74.2	70.1	5.6	25.8

Notes:

Relationship between columns: 1 = 2 + 5; 2 = 3 + 4; 6 = 2/1; 7 = 3/1; 8 = 4/2; 9 = 5/1; 10 = 11 + 14; 11 = 12 + 13; 15 = 11/10; 16 = 12/10; 17 = 13/11; 18 = 14/10
 The Labour Force Survey is a survey of the population of private households, student halls of residence and NHS accommodation.

Source: Labour Force Survey, Office for National Statistics
 Labour Market Statistics Helpline: 01633 456901

4 Prices

Last updated: 16/12/08

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	EL25	EAD6	CZBH	CDKQ	CBZX	PLLU ³	PLLV ^{3,4}	RNNK ^{3,4}	RNNQ ^{3,4}
2004 Jan	1.4	1.5	1.3	2.6	2.4	2.0	0.7	0.1	-1.9	-1.6
2004 Feb	1.3	1.3	1.1	2.5	2.3	1.9	0.6	0.2	-3.5	-2.8
2004 Mar	1.1	1.1	1.0	2.6	2.1	1.7	0.3	0.2	-1.4	-2.2
2004 Apr	1.1	1.1	1.0	2.5	2.0	1.8	0.7	0.1	1.7	-1.0
2004 May	1.5	1.4	1.3	2.8	2.3	2.2	1.3	0.0	4.1	0.2
2004 Jun	1.6	1.5	1.4	3.0	2.3	2.3	1.4	0.1	2.1	0.0
2004 Jul	1.4	1.4	1.2	3.0	2.2	2.0	1.6	0.4	2.0	0.1
2004 Aug	1.3	1.3	1.1	3.2	2.2	2.0	1.7	0.8	3.3	1.3
2004 Sep	1.1	1.0	0.9	3.1	1.9	1.7	2.0	0.9	6.3	3.0
2004 Oct	1.2	1.2	1.1	3.3	2.1	2.0	2.5	1.3	7.5	3.9
2004 Nov	1.5	1.4	1.4	3.4	2.2	2.2	2.5	1.4	4.8	3.3
2004 Dec	1.7	1.7	1.6	3.5	2.5	2.5	1.8	0.8	2.7	2.8
2005 Jan	1.6	1.7	1.5	3.2	2.1	2.0	1.4	0.9	7.6	5.4
2005 Feb	1.7	1.7	1.6	3.2	2.1	2.0	1.6	0.9	9.0	6.3
2005 Mar	1.9	2.0	1.8	3.2	2.4	2.3	1.8	1.0	9.3	5.8
2005 Apr	1.9	2.0	1.9	3.2	2.3	2.3	2.3	1.1	8.6	5.4
2005 May	1.9	2.0	1.8	2.9	2.1	2.2	1.6	1.0	6.2	4.6
2005 Jun	2.0	2.2	1.9	2.9	2.2	2.2	1.5	0.8	10.6	5.9
2005 Jul	2.3	2.5	2.3	2.9	2.4	2.5	2.0	1.0	13.3	7.6
2005 Aug	2.4	2.6	2.3	2.8	2.3	2.3	2.1	0.9	12.1	6.7
2005 Sep	2.5	2.6	2.4	2.7	2.5	2.5	2.3	0.9	9.3	4.9
2005 Oct	2.3	2.5	2.3	2.5	2.4	2.3	1.8	0.5	8.2	5.6
2005 Nov	2.1	2.3	2.1	2.4	2.3	2.3	1.5	0.5	13.6	8.8
2005 Dec	1.9	2.1	1.8	2.2	2.0	2.0	1.9	1.1	18.0	11.4
2006 Jan	1.9	2.1	1.9	2.4	2.3	2.3	2.5	1.4	15.8	10.1
2006 Feb	2.0	2.1	2.0	2.4	2.3	2.3	2.3	1.4	15.2	10.1
2006 Mar	1.8	1.9	1.7	2.4	2.1	2.2	2.2	1.5	13.1	9.2
2006 Apr	2.0	2.1	2.0	2.6	2.4	2.3	2.3	1.9	15.6	9.8
2006 May	2.2	2.3	2.2	3.0	2.9	2.8	2.9	2.0	13.7	8.4
2006 Jun	2.5	2.6	2.4	3.3	3.1	3.2	3.1	2.5	11.3	8.1
2006 Jul	2.4	2.4	2.3	3.3	3.1	3.2	2.6	2.1	10.6	7.7
2006 Aug	2.5	2.6	2.4	3.4	3.3	3.4	2.3	1.7	8.4	6.7
2006 Sep	2.4	2.6	2.3	3.6	3.2	3.3	1.6	1.7	5.4	5.5
2006 Oct	2.4	2.7	2.3	3.7	3.2	3.3	1.3	2.0	3.9	4.5
2006 Nov	2.7	3.0	2.6	3.9	3.4	3.6	1.4	1.9	2.3	2.8
2006 Dec	3.0	3.2	2.9	4.4	3.8	3.9	1.7	1.6	1.7	1.5
2007 Jan	2.7	2.9	2.6	4.2	3.5	3.7	1.5	1.6	-3.4	-0.5
2007 Feb	2.8	2.9	2.6	4.6	3.7	3.9	1.9	2.0	-2.1	-0.2
2007 Mar	3.1	3.1	2.9	4.8	3.9	4.0	2.2	2.2	-0.3	1.0
2007 Apr	2.8	2.9	2.6	4.5	3.6	3.7	1.8	1.8	-1.5	0.0
2007 May	2.5	2.6	2.3	4.3	3.3	3.4	1.9	1.9	0.6	1.9
2007 Jun	2.4	2.5	2.2	4.4	3.3	3.3	1.9	1.7	1.7	2.2
2007 Jul	1.9	2.0	1.7	3.8	2.7	2.6	2.0	1.8	0.3	0.6
2007 Aug	1.8	1.9	1.6	4.1	2.7	2.6	2.1	2.0	-0.2	1.0
2007 Sep	1.8	1.7	1.6	3.9	2.8	2.8	2.6	1.9	6.0	3.6
2007 Oct	2.1	1.9	1.8	4.2	3.1	3.0	3.6	1.8	9.4	4.6
2007 Nov	2.1	1.9	1.8	4.3	3.2	3.0	4.5	1.9	12.1	5.6
2007 Dec	2.1	2.0	1.9	4.0	3.1	3.1	4.7	2.2	13.2	6.9
2008 Jan	2.2	2.1	2.0	4.1	3.4	3.3	5.7	3.0	20.4	11.0
2008 Feb	2.5	2.5	2.3	4.1	3.7	3.6	5.7	2.8	20.9	11.9
2008 Mar	2.5	2.6	2.3	3.8	3.5	3.6	6.2	2.9	20.8	12.7
2008 Apr	3.0	3.0	2.7	4.2	4.0	3.9	7.4	4.1	25.3	16.6
2008 May	3.3	3.3	3.1	4.3	4.4	4.4	9.1	5.6	30.2	18.9
2008 Jun	3.8	3.9	3.6	4.6	4.8	4.9	9.8	5.9	34.1	21.1
2008 Jul	4.4	4.5	4.2	5.0	5.3	5.4	10.0	6.3	31.3	21.3
2008 Aug	4.7	4.9	4.5	4.8	5.2	5.4	9.1	5.7	29.1	20.8
2008 Sep	5.2	5.4	5.0	5.0	5.5	5.6	8.5	5.6	24.0	19.5
2008 Oct	4.5	4.7	4.3	4.2	4.7	4.9	6.7	5.0	15.4	16.8
2008 Nov	4.1	4.3	3.9	3.0	3.9	3.9	5.1	5.1	7.5	13.6

Notes:

Source: Office for National Statistics

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.

3 Derived from these identification (CDID) codes.

4 These derived series replace those previously shown.

NOTES TO TABLES

Identification (CDID) codes

The four-character identification code at the top of each alpha column of data is the ONS reference for that series of data on our time series database. Please quote the relevant code if you contact us 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 shown. Although figures may be given in unrounded form to facilitate readers' calculation of percentage changes, rates of change, etc, 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
- P provisional
- break in series
- R revised
- r series revised from indicated entry onwards

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 market summary**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, whether working or not working, who reported that they had been made redundant or taken voluntary redundancy in the month of the reference week or in the two calendar months prior to this.

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

The tables listed below are available as Excel spreadsheets via weblinks accessible from the main *Economic & Labour Market Review* (ELMR) page of the National Statistics website. Tables in sections 1, 3, 4 and 5 replace equivalent ones formerly published in *Economic Trends*, although there are one or two new tables here; others have been expanded to include, as appropriate, both unadjusted/seasonally adjusted, and current price/chained volume measure variants. Tables in sections 2 and 6 were formerly in *Labour Market Trends*. The opportunity has also been taken to extend the range of dates shown in many cases, as the online tables are not constrained by page size.

In the online tables, the four-character identification codes at the top of each data column correspond to the ONS reference for that series on our time series database. The latest data sets for the Labour Market Statistics First Release tables are still available on this database via the 'Time Series Data' link on the National Statistics main web page. These data sets can also be accessed from links at the bottom of each section's table listings via the 'Data tables' link in the individual ELMR edition pages on the website. The old *Economic Trends* tables are no longer being updated with effect from January 2009.

Weblink: www.statistics.gov.uk/elmr/01_09/data_page.asp

Title	Frequency of update
UK economic accounts	
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 ¹	Q
1.14 Private non-financial corporations: secondary distribution of income account and capital account ¹	Q
1.15 Balance of payments: current account	M
1.16 Trade in goods (on a balance of payments basis)	M
1.17 Measures of variability of selected economic series	Q
1.18 Index of services	M

Selected labour market statistics

2.01 Summary of Labour Force Survey data	M
2.02 Employment by age	M
2.03 Full-time, part-time and temporary workers	M
2.04 Public and private sector employment	Q
2.05 Workforce jobs	Q
2.06 Workforce jobs by industry	Q
2.07 Actual weekly hours of work	M
2.08 Usual weekly hours of work	M
2.09 Unemployment by age and duration	M
2.10 Claimant count levels and rates	M
2.11 Claimant count by age and duration	M
2.12 Economic activity by age	M
2.13 Economic inactivity by age	M
2.14 Economic inactivity: reasons	M
2.15 Educational status, economic activity and inactivity of young people	M
2.16 Average earnings – including bonuses	M
2.17 Average earnings – excluding bonuses	M
2.18 Productivity and unit wage costs	M
2.19 Regional labour market summary	M

Weblink: www.statistics.gov.uk/elmr/01_09/data_page.asp

2.20	International comparisons	M
2.21	Labour disputes	M
2.22	Vacancies	M
2.23	Vacancies by industry	M
2.24	Redundancies: levels and rates	M
2.25	Redundancies: by industry	Q
2.26	Sampling variability for headline labour market statistics	M

Prices

3.01	Producer and consumer prices	M
3.02	Harmonised Indices of Consumer Prices: EU comparisons	M

Selected output and demand indicators

4.01	Output of the production industries	M
4.02	Engineering and construction: output and orders	M
4.03	Motor vehicle and steel production ¹	M
4.04	Indicators of fixed investment in dwellings	M
4.05	Number of property transactions	M
4.06	Change in inventories ¹	Q
4.07	Inventory ratios ¹	Q
4.08	Retail sales, new registrations of cars and credit business	M
4.09	Inland energy consumption: primary fuel input basis ¹	M

Selected financial statistics

5.01	Sterling exchange rates and UK reserves	M
5.02	Monetary aggregates	M
5.03	Counterparts to changes in money stock M4 ¹	M
5.04	Public sector receipts and expenditure	Q
5.05	Public sector key fiscal indicators	M
5.06	Consumer credit and other household sector borrowing	M
5.07	Analysis of bank lending to UK residents	M
5.08	Interest rates and yields	M
5.09	A selection of asset prices	M

Further labour market statistics

6.01	Working-age households	A
6.02	Local labour market indicators by unitary and local authority	Q
6.03	Employment by occupation	Q
6.04	Employee jobs by industry	M
6.05	Employee jobs by industry division, class or group	Q
6.06	Employee jobs by region and industry	Q
6.07	Key productivity measures by industry	M
6.08	Total workforce hours worked per week	Q
6.09	Total workforce hours worked per week by region and industry group	Q
6.10	Job-related training received by employees	Q
6.11	Unemployment rates by previous occupation	Q
6.12	Average Earnings Index by industry: excluding and including bonuses	M

Weblink: www.statistics.gov.uk/elmr/01_09/data_page.asp

6.13	Average Earnings Index: effect of bonus payments by main industrial sector	M
6.14	Median earnings and hours by main industrial sector	A
6.15	Median earnings and hours by industry section	A
6.16	Index of wages per head: international comparisons	M
6.17	Regional Jobseeker's Allowance claimant count rates	M
6.18	Claimant count area statistics: counties, unitary and local authorities	M
6.19	Claimant count area statistics: UK parliamentary constituencies	M
6.20	Claimant count area statistics: constituencies of the Scottish Parliament	M
6.21	Jobseeker's Allowance claimant count flows	M
6.22	Number of previous Jobseeker's Allowance claims	Q
6.23	Interval between Jobseeker's Allowance claims	Q
6.24	Average duration of Jobseeker's Allowance claims by age	Q
6.25	Vacancies by size of enterprise	M
6.26	Redundancies: re-employment rates	Q
6.27	Redundancies by Government Office Region	Q
6.28	Redundancy rates by industry	Q
6.29	Labour disputes: summary	M
6.30	Labour disputes: stoppages in progress	M

Notes:

1 These tables, though still accessible, are no longer being updated.

A Annually

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.nomisweb.co.uk

Labour Force Survey tables are available from www.statistics.gov.uk/statbase/product.asp?vlnk=14365

Annual Survey of Hours and Earnings data are available from www.statistics.gov.uk/statbase/product.asp?vlnk=13101

Contact points

Recorded announcement of latest RPI

☎ 01633 456961
✉ rpi@ons.gsi.gov.uk

Labour Market Statistics Helpline

☎ 01633 456901
✉ labour.market@ons.gsi.gov.uk

Earnings Customer Helpline

☎ 01633 819024
✉ earnings@ons.gsi.gov.uk

National Statistics Customer Contact Centre

☎ 0845 601 3034
✉ info@statistics.gsi.gov.uk

Skills and Education Network

☎ 024 7682 3439
✉ senet@lsc.gov.uk

Department for Children, Schools and Families Public Enquiry Unit

☎ 0870 000 2288

For statistical information on

Average Earnings Index (monthly)

☎ 01633 819024

Claimant count

☎ 01633 456901

Consumer Prices Index

☎ 01633 456900
✉ cpi@ons.gsi.gov.uk

Earnings

Annual Survey of Hours and Earnings
☎ 01633 456120

Basic wage rates and hours for manual workers with a collective agreement

☎ 01633 819008

Low-paid workers

☎ 01633 819024
✉ lowpay@ons.gsi.gov.uk

Labour Force Survey

☎ 01633 456901
✉ labour.market@ons.gsi.gov.uk

Economic activity and inactivity

☎ 01633 456901

Employment

Labour Force Survey
☎ 01633 456901
✉ labour.market@ons.gsi.gov.uk

Employee jobs by industry

☎ 01633 456776

Total workforce hours worked per week

☎ 01633 456720
✉ productivity@ons.gsi.gov.uk

Workforce jobs series – short-term estimates

☎ 01633 456776
✉ workforce.jobs@ons.gsi.gov.uk

Labour costs

☎ 01633 819024

Labour disputes

☎ 01633 456721

Labour Force Survey

☎ 01633 456901
✉ labour.market@ons.gsi.gov.uk

Labour Force Survey Data Service

☎ 01633 455732
✉ lfs.dataservice@ons.gsi.gov.uk

New Deal

☎ 0114 209 8228

Productivity and unit wage costs

☎ 01633 456720

Public sector employment

General enquiries
☎ 01633 455889

Source and methodology enquiries

☎ 01633 812865

Qualifications (Department for Children, Schools and Families)

☎ 0870 000 2288

Redundancy statistics

☎ 01633 456901

Retail Prices Index

☎ 01633 456900
✉ rpi@ons.gsi.gov.uk

Skills (Department for Innovation, Universities & Skills)

☎ 0870 001 0336

Skill needs surveys and research into skill shortages

☎ 0870 001 0336

Small firms (BERR)

Enterprise Directorate
☎ 0114 279 4439

Subregional estimates

☎ 01633 812038

Annual employment statistics

✉ annual.employment.figures@ons.gsi.gov.uk

Annual Population Survey, local area statistics

☎ 01633 455070

Trade unions (BERR)

Employment relations
☎ 020 7215 5934

Training

Adult learning – work-based training (DWP)
☎ 0114 209 8236

Employer-provided training (Department for Innovation, Universities & Skills)

☎ 0870 001 0336

Travel-to-Work Areas

Composition and review
☎ 01329 813054

Unemployment

☎ 01633 456901

Vacancies

Vacancy Survey: total stocks of vacancies
☎ 01633 455070

ONS economic and labour market publications

ANNUAL

Financial Statistics Explanatory Handbook

2008 edition. Palgrave Macmillan, ISBN 978-0-230-52583-2. Price £47.50.

www.statistics.gov.uk/StatBase/Product.asp?vlnk=4861

Foreign Direct Investment (MA4)

2006 edition

www.statistics.gov.uk/StatBase/Product.asp?vlnk=9614

Input-Output analyses for the United Kingdom

2006 edition

www.statistics.gov.uk/StatBase/Product.asp?vlnk=7640

Research and development in UK businesses (MA14)

2006 edition

www.statistics.gov.uk/StatBase/Product.asp?vlnk=165

Share Ownership

2006 edition

www.statistics.gov.uk/StatBase/Product.asp?vlnk=930

United Kingdom Balance of Payments (Pink Book)

2008 edition. Palgrave Macmillan, ISBN 978-0-230-54565-6. Price £49.50.

www.statistics.gov.uk/StatBase/Product.asp?vlnk=1140

United Kingdom National Accounts (Blue Book)

2008 edition. Palgrave Macmillan, ISBN 978-0-230-54566-3. Price £49.50.

www.statistics.gov.uk/StatBase/Product.asp?vlnk=1143

First releases

- Annual survey of hours and earnings
- Foreign direct investment
- Gross domestic expenditure on research and development
- Low pay estimates
- Regional gross value added
- Share ownership
- UK Business enterprise research and development
- Work and worklessness among households

QUARTERLY

Consumer Trends

2008 quarter 3

www.statistics.gov.uk/StatBase/Product.asp?vlnk=242

United Kingdom Economic Accounts

2008 quarter 3. Palgrave Macmillan, ISBN 978-0-230-57713-8. Price £37.50.

www.statistics.gov.uk/StatBase/Product.asp?vlnk=1904

UK trade in goods analysed in terms of industry (MQ10)

2008 quarter 3

www.statistics.gov.uk/StatBase/Product.asp?vlnk=731

First releases

- Balance of payments
- Business investment
- GDP preliminary estimate
- Government deficit and debt under the Maastricht Treaty (six-monthly)
- International comparisons of productivity (six-monthly)
- Internet connectivity
- Investment by insurance companies, pension funds and trusts
- Productivity
- Profitability of UK companies
- Public sector employment
- Quarterly National Accounts
- UK output, income and expenditure

MONTHLY

Financial Statistics

January 2009. Palgrave Macmillan, ISBN 978-0-230-57711-4. Price £50.00.

www.statistics.gov.uk/StatBase/Product.asp?vlnk=376

Focus on Consumer Price Indices

November 2009

www.statistics.gov.uk/StatBase/Product.asp?vlnk=867

Monthly review of external trade statistics (MM24)

October 2009

www.statistics.gov.uk/StatBase/Product.asp?vlnk=613

Producer Price Indices (MM22)

November 2009

www.statistics.gov.uk/StatBase/Product.asp?vlnk=2208

First releases

- Consumer price indices
- Index of production
- Index of services
- Labour market statistics
- Labour market statistics: regional
- Producer prices
- Public sector finances
- Retail sales
- UK trade

OTHER

The ONS Productivity Handbook: a statistical overview and guide

Palgrave Macmillan, ISBN 978-0-230-57301-7. Price £55.

www.statistics.gov.uk/about/data/guides/productivity/default.asp

Labour Market Review

2006 edition. Palgrave Macmillan, ISBN 1-4039-9735-7. Price £40.

www.statistics.gov.uk/StatBase/Product.asp?vlnk=14315

National Accounts Concepts, Sources and Methods

www.statistics.gov.uk/StatBase/Product.asp?vlnk=1144

Sector classification guide (MA23)

www.statistics.gov.uk/StatBase/Product.asp?vlnk=7163

Recent articles

JULY 2008

Employment of foreign workers in the UK: 1997 to 2008
Gareth Clancy

Regional analysis of public sector employment
Andrew Barnard

The effects of taxes and benefits on household income, 2006/07
Francis Jones

Dealing with potential bias in early estimates of GDP
Robin Youll

Recent trends in corporate net lending
Graeme Chamberlin

Measuring inflation
Rob Pike

Services producer price index (experimental) – first quarter 2008
Ian Richardson

AUGUST 2008

Modelling the gender pay gap in the UK: 1998 to 2006
Andrew Barnard

Inventories: a cross-country comparison of behaviour and methodology
Barry Williams

Regional gross disposable household income
Eddie Holmes

SIC 2007: implementation in ONS
John C Hughes

Measuring the quality of the producer price index – an update
Joanna Woods

Regional economic indicators, August 2008, with a focus on household income
Birgit Wosnitza and Martin Walker

SEPTEMBER 2008

Measuring UK inflation
Rob Pike, Catherine Marks and Darren Morgan

Command GDP: the purchasing power of UK output
Graeme Chamberlin

The impact of the 2006 National Minimum Wage rise on employment
Ian Mulheim

The preliminary R&D satellite account for the UK: a sensitivity analysis
Peter Evans, Michael Hatcher and Damian Whittard

Job separations in the UK
Katherine Kent

Methods explained: perpetual inventory method
Sumit Dey-Chowdhury

OCTOBER 2008

Measuring the UK economy 2008: the National Statistician's perspective
Karen Dunnell

The effect of bonuses on earnings growth in 2008
Harry Duff

Overview of UK National Accounts and Balance of Payments: Blue Book and Pink Book 2008
Ross Meader and Geoff Tily

Annual Population Survey household data sets
Kathryn Ashton and Katherine Kent

Supply-side estimates of UK investment
Graeme Chamberlin

Services producer price index (experimental) – second quarter 2008
Ian Richardson

NOVEMBER 2008

Sickness absence from work in the UK
Debra Leaker

Analysis of international trade and productivity, using the EUKLEMS database
Peter Goodridge

Producer price index rebasing to 2005=100
Rob Luckwell

Labour Force Survey: interim reweighting 2008
Nick Palmer and Mark Chandler

Experimental estimates of rural-urban productivity
Sumit Dey-Chowdhury and Pippa Gibson

Regional economic indicators, November 2008, with a focus on skills
Birgit Wosnitza, Peggy Causer and Jonathan Knight

DECEMBER 2008

The distribution of household income 1977 to 2006/07
Francis Jones, Daniel Annan and Saef Shah

Making sense of Labour Force Survey response rates
William Barnes, Geoff Bright and Colin Hewat

How similar are ONS's annual and monthly business inquiries?
Joe Robjohns and Damian Whittard

Introducing the new business demography statistics
Karen Grierson and Andrew Allen

The impact of Labour Force Survey and Annual Population Survey reweighting
Marilyn Thomas and Sally-Ann Aubrey-Smith

Rebasing the services producer price index
Terry Bradley

Methods explained: cost-benefit analysis
Barry Williams

Future articles

List is provisional and subject to change.

FEBRUARY 2009

Special Labour Market Review edition

The Labour Market and Wider Economy
Labour Demand
Labour Supply – Employment
Labour Supply – Unemployment
Labour Supply – Inactivity
Labour Costs